the

Toy Shop ™

Marvelous Mechanical Models that Really Work!

20.—

20%

Creative Concept and Toy Designs
by Active Arts, Inc.

By Louis Ewens

APPLE II+ /IIe/IIc

Disk • 64K • Printer Required (see back)
Keyboard or Joystick
CREATIVE WORKSHOP SERIES

Brøderbund®

the Toy Shop

Marvelous Mechanical Models that Really Work!
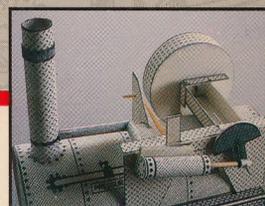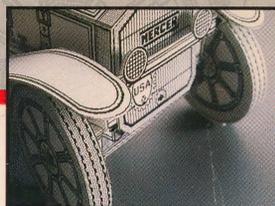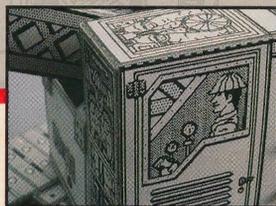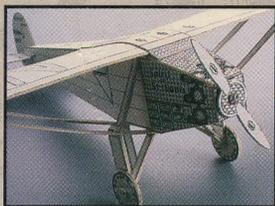
How Does a Computer Create A Working Steam Engine, A Mechanical Bank, and The Spirit of St. Louis?

With Your Help.

A balloon-powered steam engine, a clockwork bank that runs on pennies, a scale model of The Spirit of St. Louis: These are just three of the 20 mechanical models you can create with The Toy Shop. Each one is a three-dimensional marvel that starts with your computer.

Tap Your Creativity.

The Toy Shop's easy-to-use software contains all the detailed designs. Simply choose one from the on-screen menu, then give it personality by adding custom patterns, graphics and text.

Once you've customized your model, send it to print. Precision parts will roll out of your printer, ready to mount on special adhesive cardstock included in the package. Then you're ready to roll up your sleeves, cut out the pieces and start building.

Marvelous Machines Made of Paper!

You can develop your model-making abilities by building simple projects like the Flying Propeller and Balanc-

ing Jet, hone your skills on intermediate models like the Antique Truck and Pennypower Scale, and then move up to advanced challenges like the Tractor Crane, Mechanical Bank and Steam Engine.
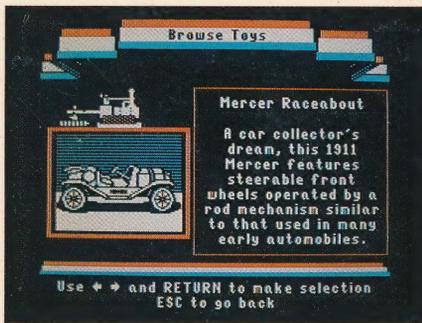
Every model and toy will do something—from soaring into the air like the rubber-band-powered Helicraft to floating on the head of a pin like the "gravity-defying" Balancing Jet. The Medieval Catapult hurls miniature missiles, the Equatorial Sundial tells accurate time, the horses on the turn-of-the-century Carousel prance up and down.

Each of these toys is a marvel of engineering that you'll print out on ordinary pinfeed computer paper and then assemble yourself. The Toy Shop includes a supply of model-makers' adhesive cardstock, wire, wooden dowels, rubber stripping and balloons to help you get started.

Build One or a Hundred.

The supply of models and toys is endless. If you make a mistake on a project, simply print another copy of the design and start again. The Toy Shop's 20 different projects offer hundreds of possible variations, giving you, your friends and your family hours of enjoyment—and opening up a whole new world of creativity with your computer.

Ages 12 Years to Adult

Package Design © 1986 Brøderbund Software, Inc.

The Toy Shop has been tested with the following printers: Admate DP-100 • Alphacom Aero • Apple ImageWriter/ImageWriter II/Scribe/DMP • Axiom SLP • Blue Chip M120/10 • C. Itoh 8510/C310/Riteman II • Centronics GLP • Citizen MSP15 • DMP-85 • Epson FX-80/85/100, MX-80/100¹, JX-80, LX-80/LX-90, RX-80/100, AP-80 • Juki 5510 • Legend 880 • Mannesmann Tally Spirit 80, MT 85/86 • NEC 8023A, Okidata 92/93, 182/183 • Panasonic KX-P1090/1091/1092, KX-P1080/1592 • Proprinter-IBM • Prowriter, Prowriter Jr. • Seikosha SP-1000/1000A • Star Delta-10/10PC, Star Gemini 10X/15X, Star SD10, Star NB-15/NL-10, Star Radix-10. □ 1. Older Epson printer models may require Graftrax. □ **The Toy Shop for Apple works with most interface cards.** Note: If you are using the Epson 8131 interface with certain printers—Blue Chip M120/10, Mannesmann Tally Spirit 80, Legend 880 and Admate DP-100, for example—it must be modified to send 8 bits.

Brøderbund®

the Toy Shop™

Brøderbund®

Rim

Washers

Medieval Catapult
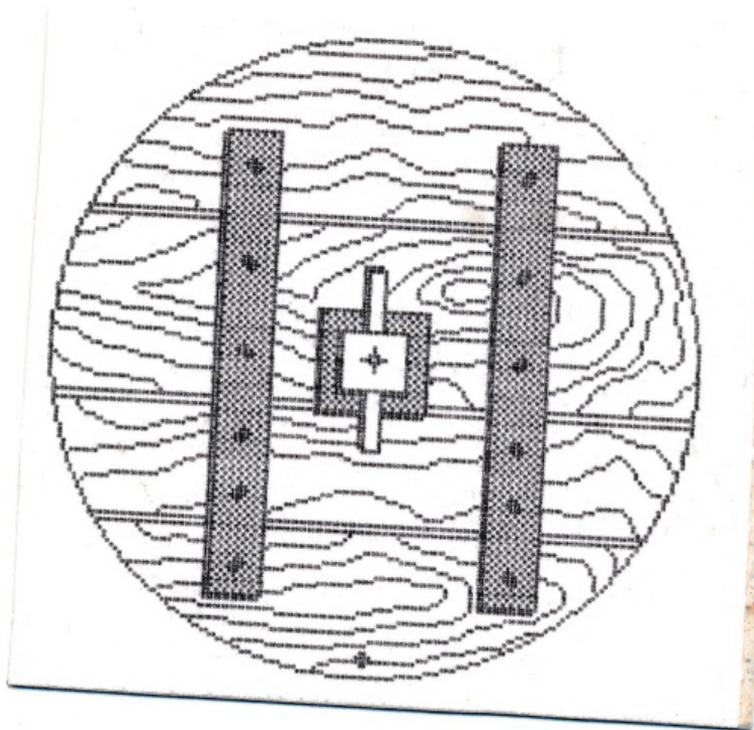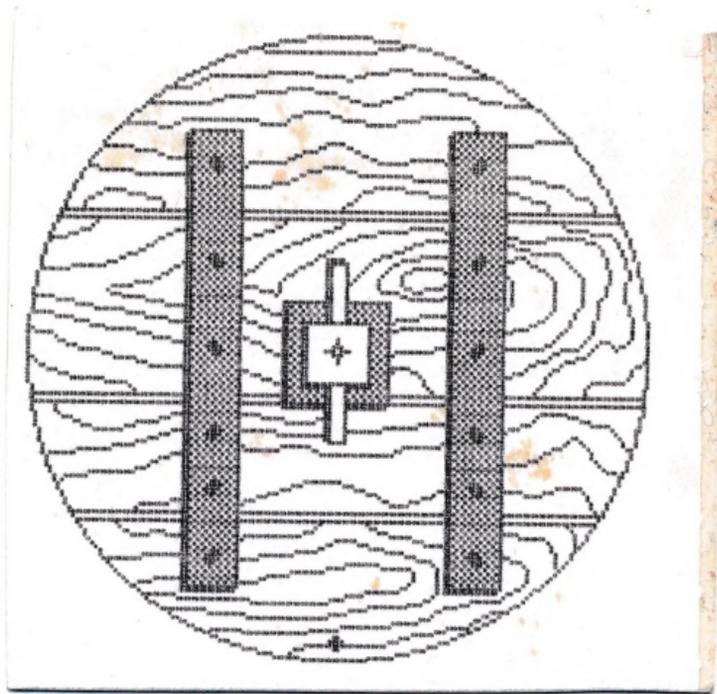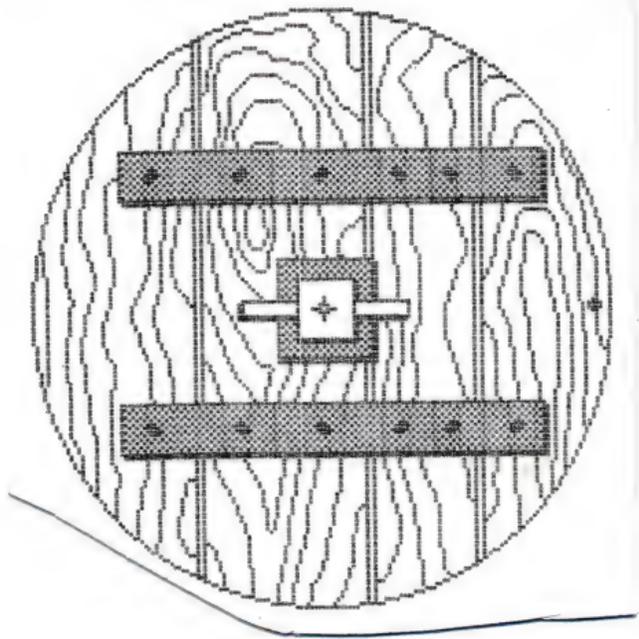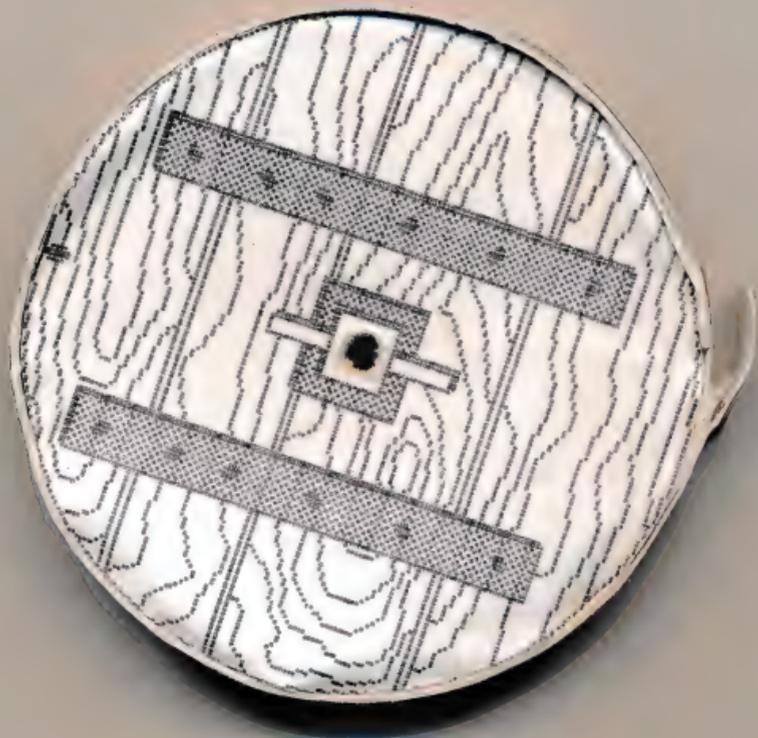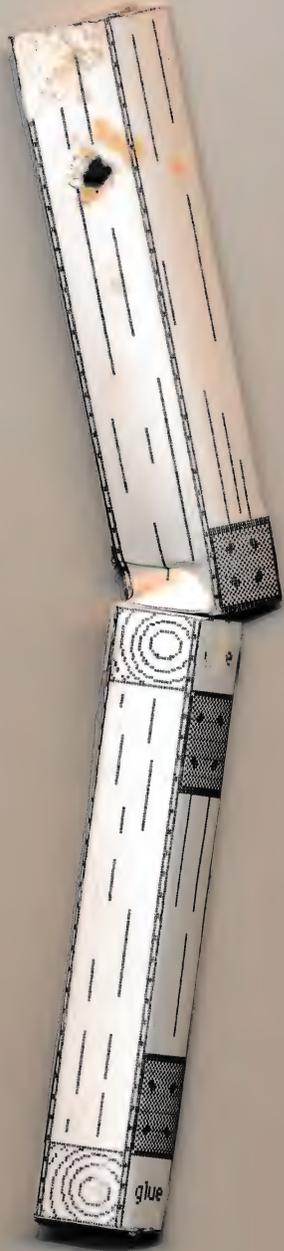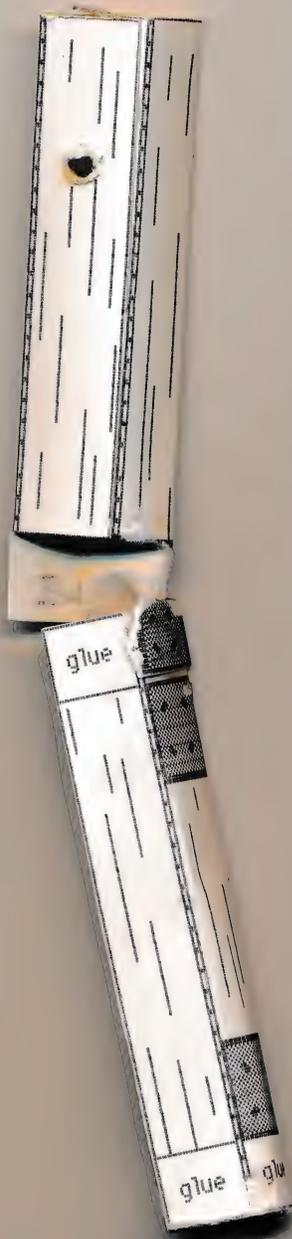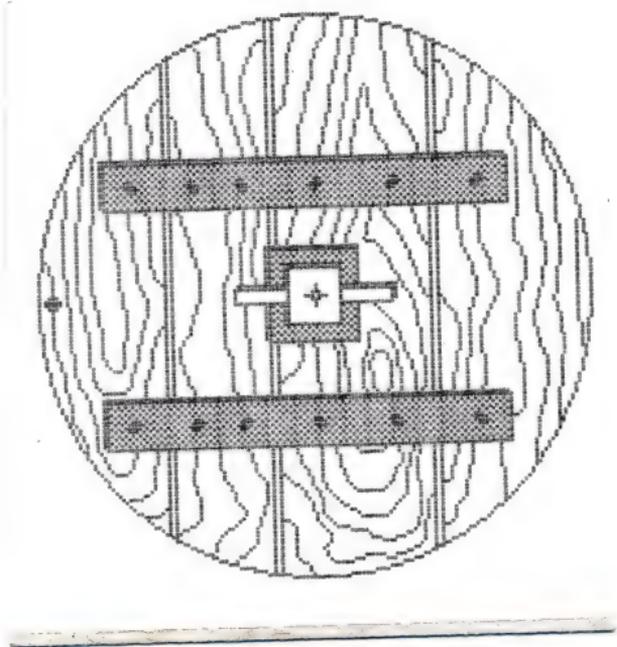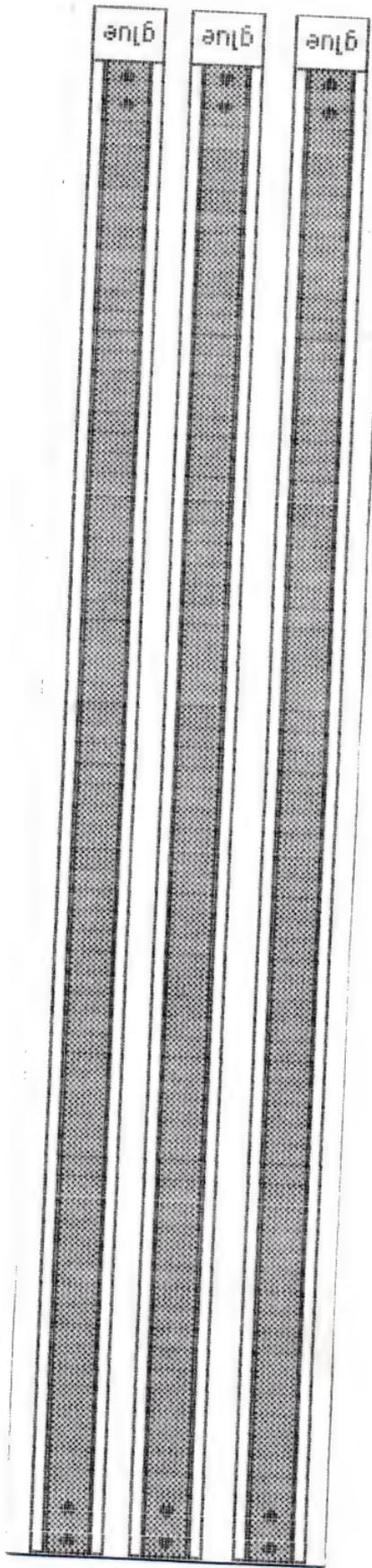
glue

glue

glue

glue

BRODERBUND
SOFTWARE
DELIVERY

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BRODERBUND
SOFTWARE
DELIVERY

Van Section

tab

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Cut at this line to use
this part as open
cargo bed

The Toy Shop

The Toy Shop

tab

tab

Open Cargo Bed

Rim

glue   glue   glue   glue

Washers

tab

Headlight
Assembly

Left
Fender

glue

glue

tab

tab

Right
Fender

↑
Wheel
Plate

Hood →

tab

tab

tab

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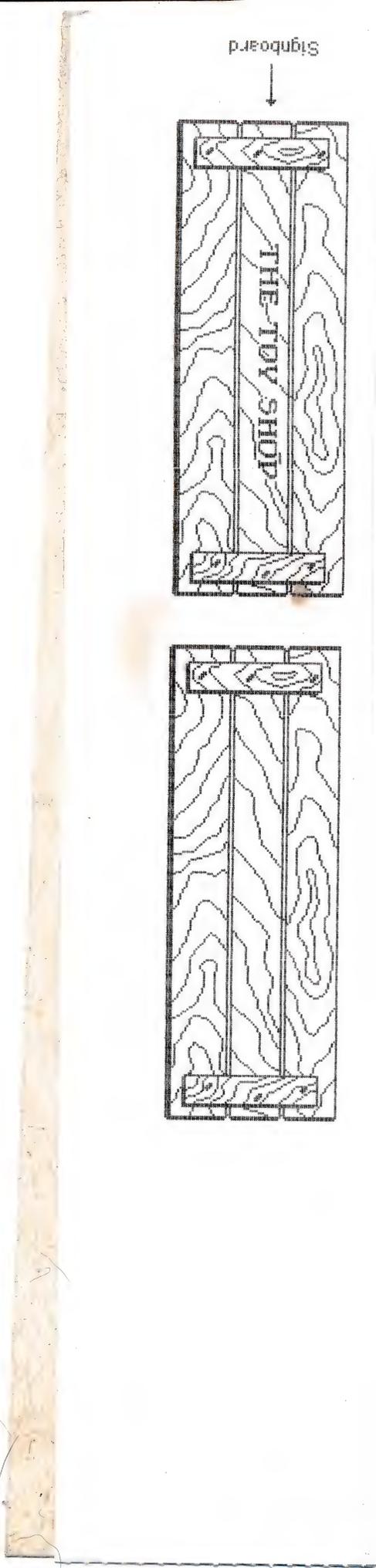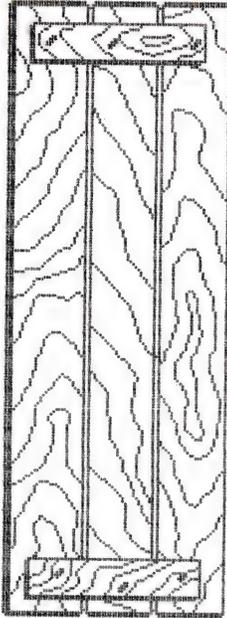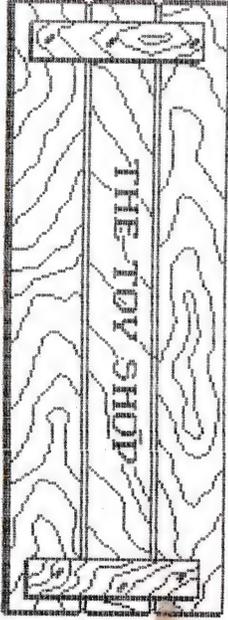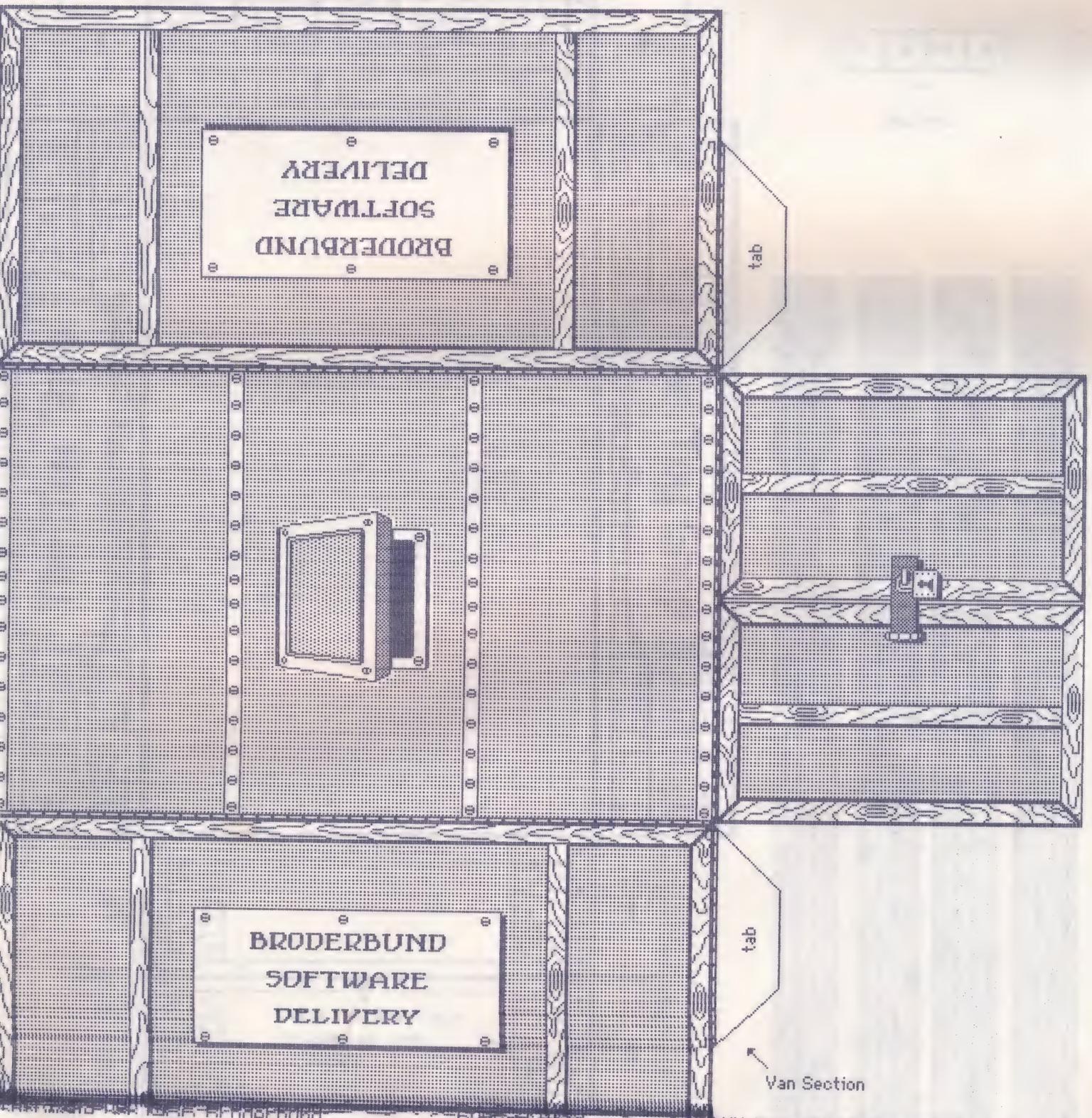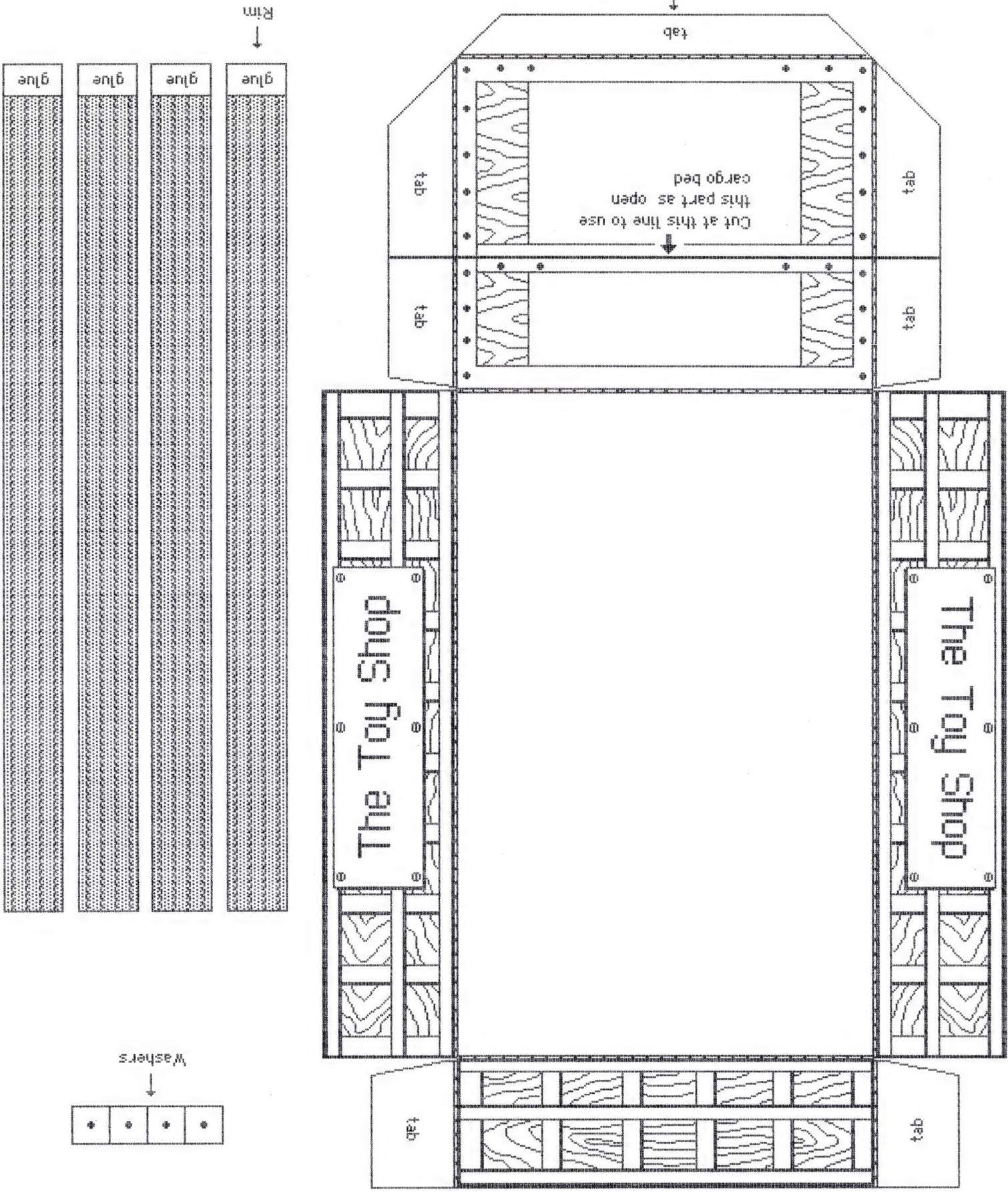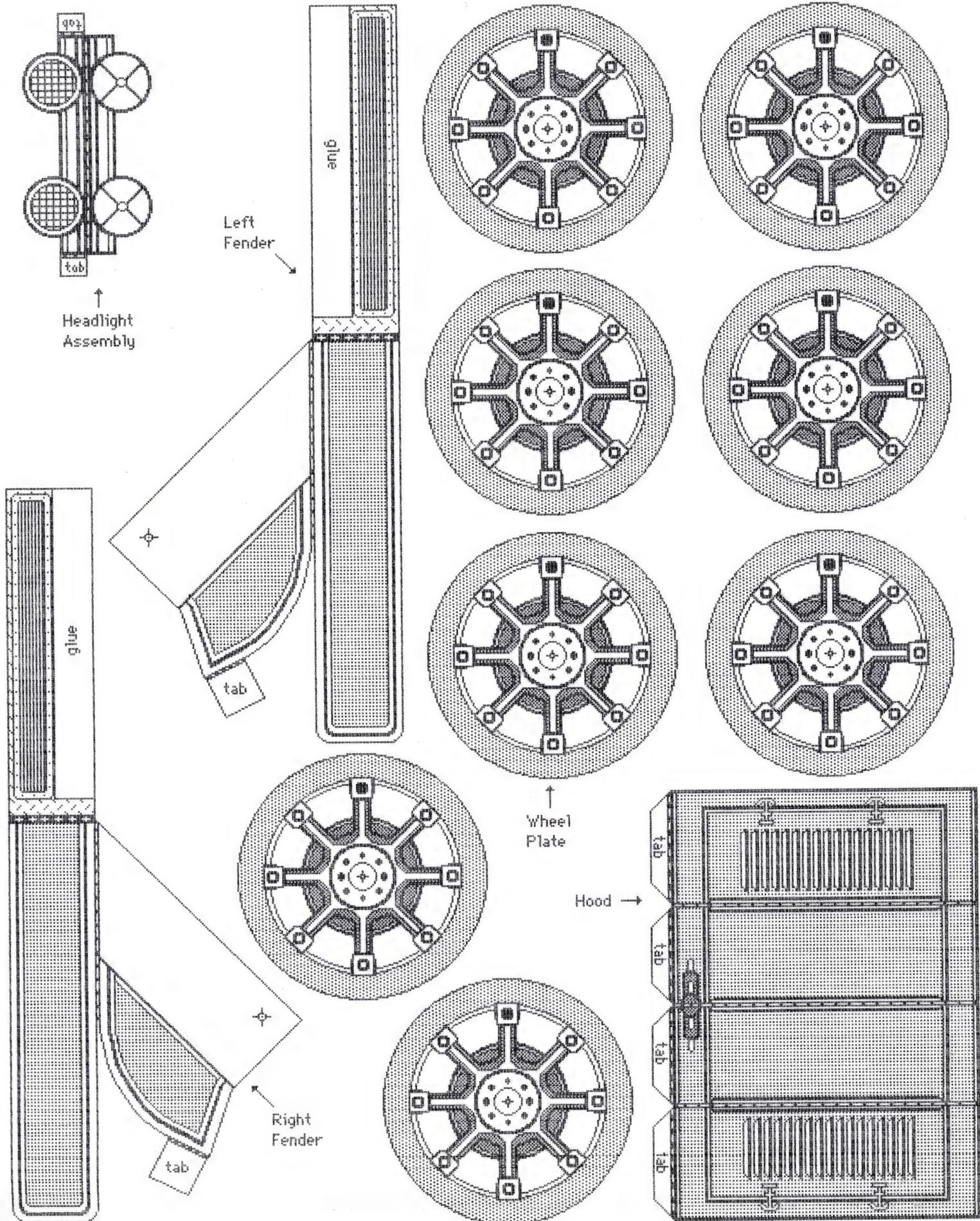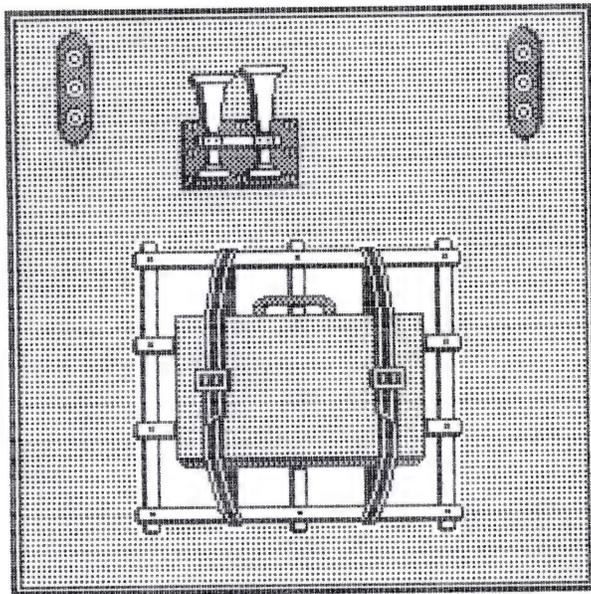
Top of Cab

Front Chassis

Rear Chassis

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rear of this part

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tab

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tab

TS 1986

Cut Out

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tab

tab

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By Broderbund Software

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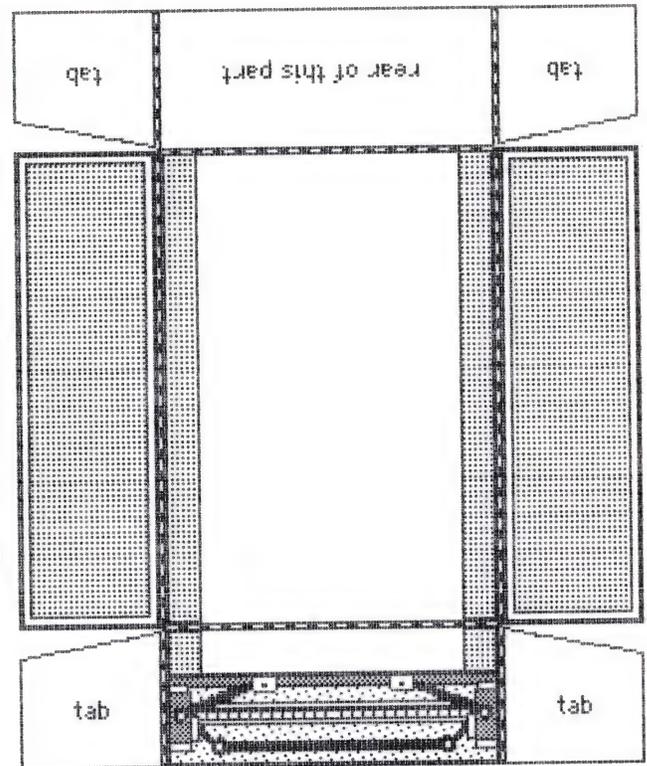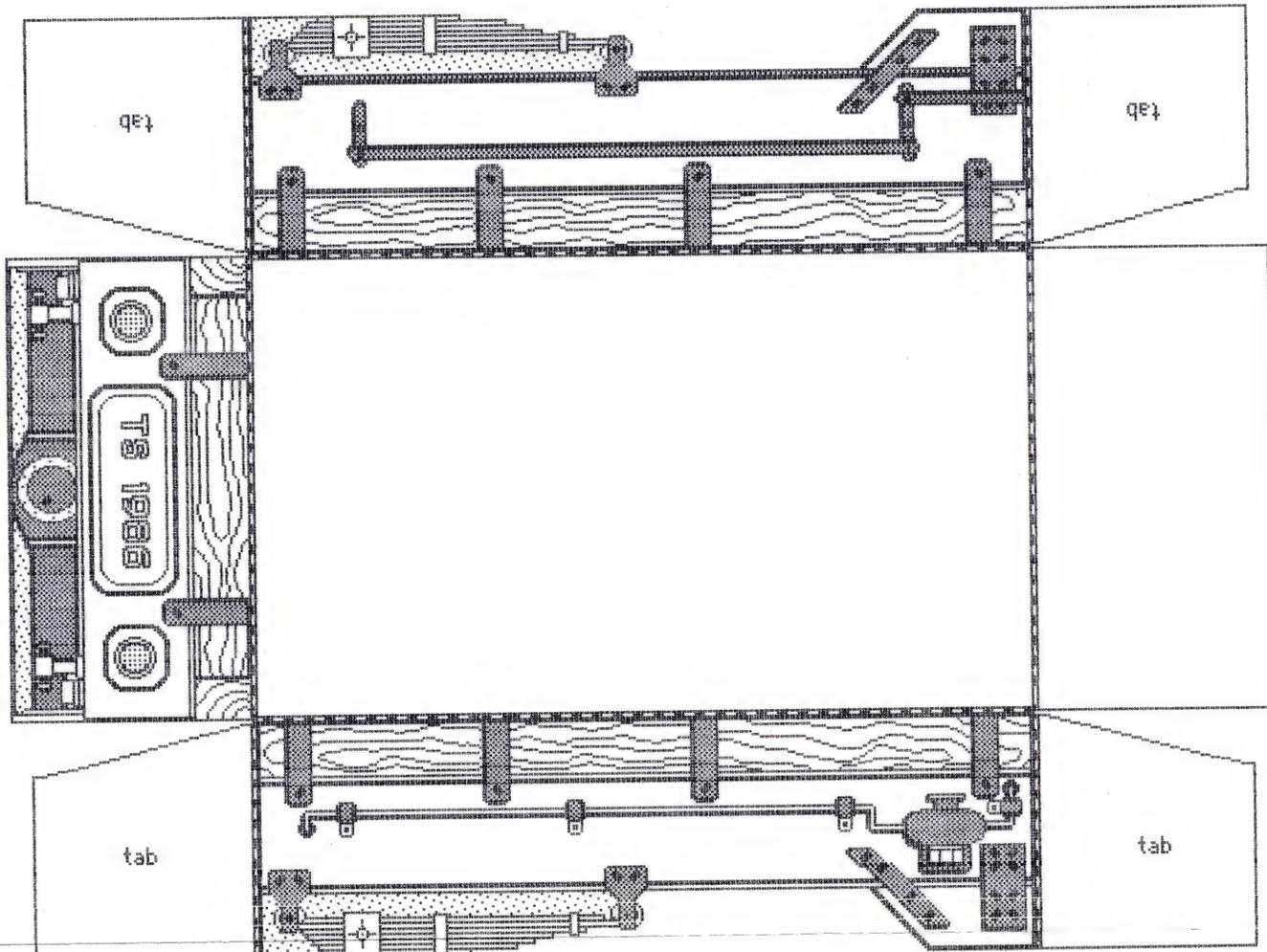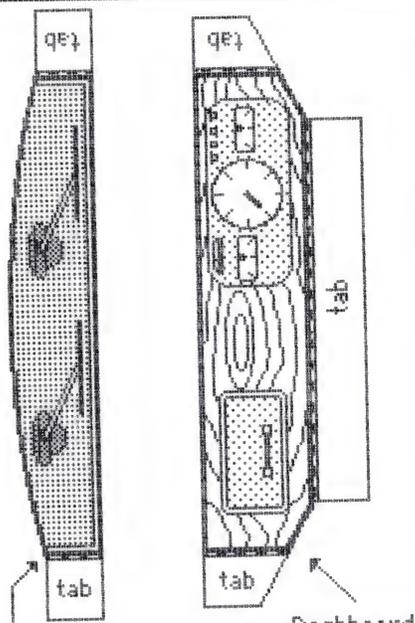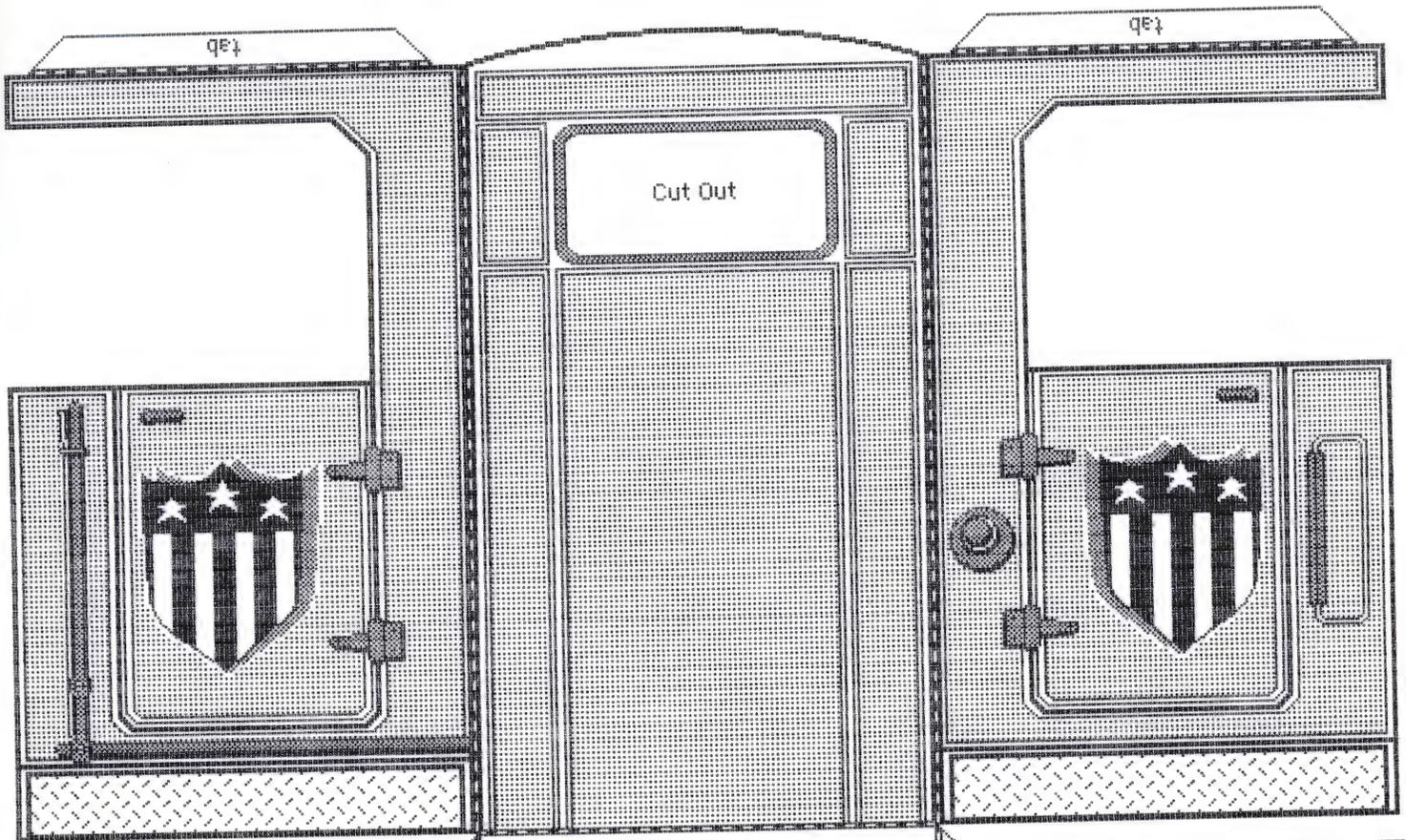
Upper
Windshield
Panel

Dashboard
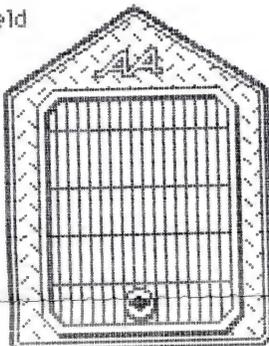
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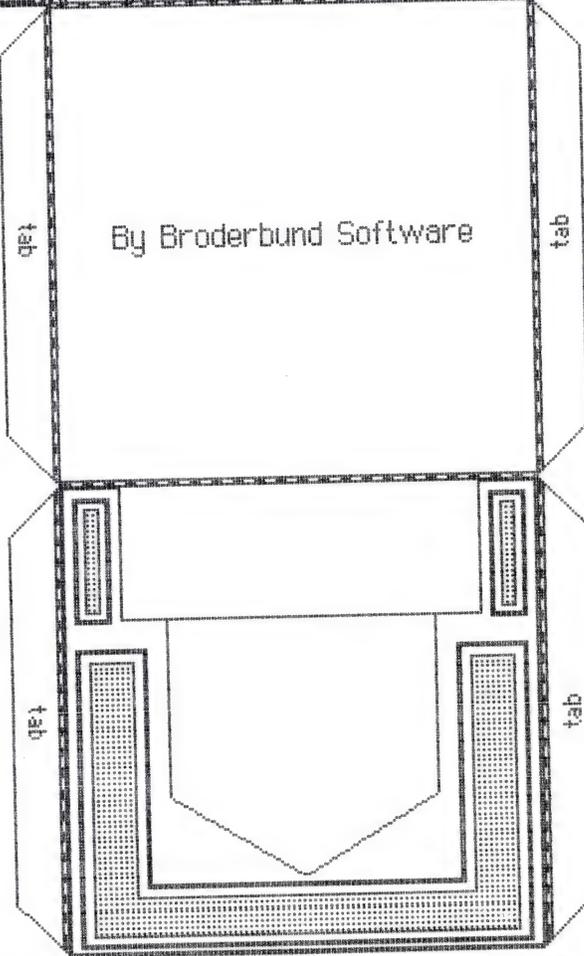
Cab

Spacer
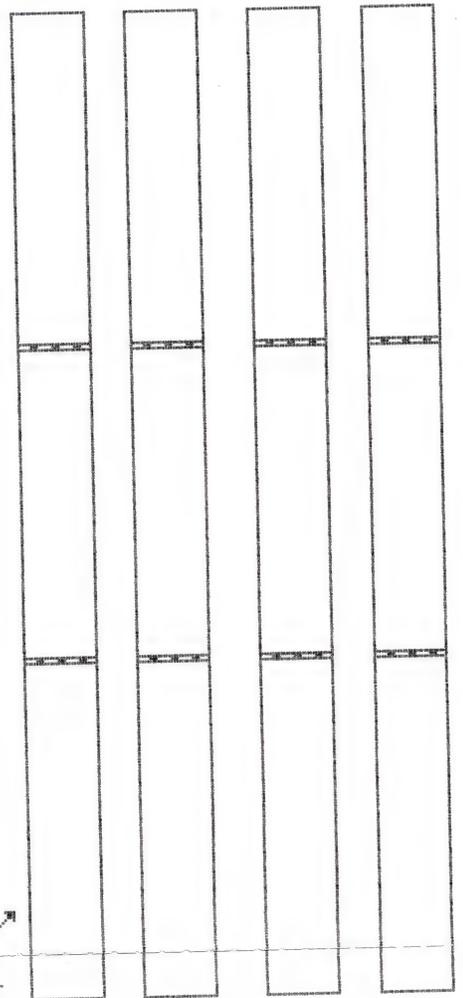
the Toy Shop

Marvelous Mechanical Models That Really Work!

**Creative Concept and Toy Designs
by Active Arts**

FOR the APPLE, COMMODORE, IBM PC, and MACINTOSH

The Toy Shop™
Creative Concept
and Toy Design
by Active Arts

Contents

Welcome to The Toy Shop, the program that lets you use your computer to produce marvelous mechanical models that really work!

The Toy Shop turns your computer and printer into a model-making workshop that never quits. The easy-to-use software generates assembly pieces, printed on ordinary computer paper, for building 20 different extraordinary, three-dimensional mechanical models and toys. Each one is ingeniously engineered and can be personalized and ornamented in hundreds of different ways. Want an antique carousel emblazoned with your name? A mechanical bank with your company logo? With The Toy Shop, all these and more can be yours.

You don't need to be an artist, an engineer, or a designer to create models with The Toy Shop. The menu-driven software allows you to choose, customize, and print out model designs with ease. The easy-to-follow assembly instructions guide you through the process of building a perfect model even if you've never done so before. Losing a model part or making a mistake that destroys an assembly piece is no problem because you can always print out another. The Toy Shop even includes an introductory supply of construction materials to help you get started on this fascinating new hobby.

Perhaps the best thing about The Toy Shop is that there's no limit to the number of models and toys you can make. Surprise your friends with trucks full of jelly beans, give mechanical banks to your entire office staff, supply your classroom or Scout troop with printouts for an assortment of favorites. Or build an entire collection just for yourself. Whichever models you choose, you're in for hours of satisfying fun. You'll be amazed at what you can produce with your computer, printer, The Toy Shop, and your own two hands!

This User's Manual is divided into two main parts. PART I: SOFTWARE INSTRUCTIONS provides easy-to-follow instructions for using The Toy Shop program on your particular computer. PART II: CONSTRUCTION GUIDE gives step-by-step directions for building each of The Toy Shop's projects.

SOFTWARE INSTRUCTIONS is organized into two sections: "Getting Started" and "Using the Program." Each section contains specific instructions for using The Toy Shop with your particular computer.

Note: *Be sure to read the sections written specifically for your computer. If the instructions sound funny, or don't seem to be working, double check to make sure that you're in the right place. After all, it's not likely that your Commodore speaks "IBMese"...!*

"Getting Started" tells you everything you need to know to start using The Toy Shop program. "Using the Program" tells you how to go about selecting, customizing, saving, and printing your models and toys.

Finally, the "Printer Tips" section gives you hints on how to produce the best possible printouts, plus trouble-shooting advice for when things don't seem to be working correctly. Reading this material carefully will save you time and trouble when you're dealing with

the crucial step of printing out your models and toys.

CONSTRUCTION GUIDE is the section to turn to after you've finished printing and are ready to roll up your sleeves and take construction tools in hand. This part of the manual is divided into three main sections.

The first, "Assembly Techniques," provides an overview of techniques to use when building The Toy Shop models and toys. Even though you're eager to start building, take the time to read through this section thoroughly. Good construction techniques will ensure that your model comes out looking great and working perfectly.

The second section, "Assembly Instructions," is organized alphabetically by toy name and gives you step-by-step instructions for building all of the projects in The Toy Shop. For each model or toy, you'll find:

☐ a photograph of the finished project

☐ a description of the model or toy

☐ an illustration showing customizing options

☐ a list of tools and materials you'll need

☐ construction diagrams

☐ step-by-step assembly instructions

The third section, "Index Sheets," provides reduced-size versions of

each printout for every model and toy, organized alphabetically by toy name. These index sheets tell you on what pages specific assembly pieces appear. If you need to replace a piece that is damaged or lost, you can check the index sheet section to find out which page to re-print.

The next-to-last section of the manual, BACKUP DISK INFORMA-TION, explains Brøderbund's backup disk policy and tells you how you can obtain backup disks for The Toy Shop.

The final section, WARRANTY INFORMATION, contains the warranty details for The Toy Shop.

Part I

Software
Instructions

Apple II+, IIe, IIc

The Toy Shop Includes

☐ 3 disks: 1 Master program disk and 2 Toy disks
☐ User's Manual
☐ Adhesive-backed cardstock
☐ Wooden dowels
☐ Wire pieces
☐ Rubber stripping
☐ Cotton cord
☐ Balloons

Equipment You Will Need

Required

☐ 64K Apple II+, Apple IIe, or Apple IIc
☐ Disk drive
☐ TV or monitor (color optional)
☐ Printer (and printer interface for Apple II+ and IIe) (Refer to The Toy Shop package for a list of printers that you may use with this program.)

Optional

☐ Second disk drive
☐ Joystick
☐ Blank disks for saving toys you customize
☐ Colored pinfeed paper

Starting the Program

Insert The Toy Shop Master disk in the disk drive, label side up (Side A), and close the drive door. Turn on your monitor and printer. Then turn on your computer. The program will load automatically.

Note: *Be careful not to touch the exposed dark surface of The Toy Shop disk, or any other floppy disk you handle. Also, always make sure the red disk-drive light is off before either removing or inserting the disk.*

Selecting Menu Items

In The Toy Shop, your options are presented in menu format. All of The Toy Shop's menus work in basically the same way.

To move from item to item on a menu, use the arrow keys or the joystick. The items will be highlighted, each in turn, as you move through them. (If you prefer, you can also use the < and > keys or the i, j, k, and m keys to move the highlighter.)

To select a highlighted item, press RETURN.

To go back through the menus or to return to a previous screen, press ESC.

In the Select Text and Print menus, once you select certain items you'll use the space bar to toggle options on and off.

Apple II+, IIe, IIc

Throughout this manual, the process of highlighting an item and then pressing RETURN is referred to as "selecting."

Prompts at the bottom of the screen will always remind you of how to make your selection.

System Setup

To make The Toy Shop work correctly with your particular system, you'll need to provide information about your printer, printer interface device (for Apple II+ and IIe) and disk drive(s). You provide this information at the Setup Menu.

The first time you start up The Toy Shop program, you'll see a welcome message. Setup will be highlighted on the Main Menu. The program will prompt you to press RETURN to reach the Setup Menu. At the Setup Menu, you'll need to provide the following information:

Which printer are you using?
The Toy Shop will work with a number of different printers, but you need to indicate which model you are using. To do this, simply select the appropriate printer name from the list that appears on your screen.

Note: *If you are using the DMP-85 printer (or any printer that is identical to the DMP-85), the SW1-7 switch must be closed in order for the printer to work with The Toy Shop.*

Which printer interface are you using?
If you have an Apple II+ or Apple IIe, you will need to indicate what type of printer interface card you are using. (If you have an Apple IIc, you won't see this question because the program will automatically select Apple IIc Serial Port.) Again, select the correct interface card from the list that appears on your screen. If you don't see your card name listed after reviewing all of the options, try using the "Epson APL" or "Orange Interface" setting. (Many cards work the same way as these cards do.)

Printer interface in which slot?
If you have an Apple II+ or IIe, you'll need to indicate the number of the slot in which your printer interface card is installed. Select the correct slot number from the list on the screen. (If you are using an Apple IIc, the program will skip this question since the IIc has no user-accessible slots.)

How many disk drives?
The next screen will ask how many disk drives you will be using. Select the correct number. You can use The Toy Shop with only one disk drive, although having two disk drives makes things quicker and easier. On-screen instructions will vary depending on the number of drives you are using.

Apple II +, IIe, IIc

Testing Your Printer

Now you're ready to try a printer test to confirm that you've entered the correct setup information. First, make sure that your printer is ready: properly connected to your computer and printer interface, power on, and selected (on-line). Press RETURN to start the test. If you have entered the correct setup information, your printer should print out a welcome message and a symbol.

If nothing happens, press ESC to move back through the various setup screens so you can re-check the information you have provided. (If you find that you cannot ESC back, you'll have to restart the program.)

Note: *If you change any setup information, you'll have to turn your printer off and then on again before repeating the printer test. In certain cases, you may have to restart your computer.*

When you have completed a successful printer test, you should save the setup information to The Toy Shop Master disk. To do this, press RETURN. After the information is saved, you will be returned to the Main Menu where you can begin the process of choosing your first project.

Note: *Once you have saved your setup information, it's a good idea to place a write-protect tab over the notch on your program disk.*

You are now ready to turn to the "Using the Program" section of this manual to find out how to select, customize, and print out The Toy Shop models and toys.

Commodore 64 and 128

The Toy Shop Includes

☐ 3 disks: 1 Master program disk and 2 Toy disks

☐ User's Manual

☐ Adhesive-backed cardstock

☐ Wooden dowels

☐ Wire pieces

☐ Rubber stripping

☐ Cotton cord

☐ Balloons

Equipment You Will Need

Required

☐ Commodore 64 or 128

☐ Disk drive

☐ TV or monitor (color optional)

☐ Printer and, in some cases, printer interface (Refer to The Toy Shop package for a list of printers and interface devices that you may use with this program.)

Optional

☐ Joystick

☐ Blank disks for saving toys you customize

☐ Colored pinfeed paper

Starting the Program

Commodore 64

Insert The Toy Shop Master disk in the disk drive, label side up (Side A), and close the drive door. Then, in the following order, turn on your printer, your monitor, and your disk drive. Then — and only then — turn on your computer. When the blue BASIC screen appears, type in LOAD "TS",8,1. The red disk drive light will come on as the program loads into memory.

Commodore 128

Insert The Toy Shop Master disk in the disk drive, label side up (Side A), and close the drive door. Then, in the following order, turn on your printer, your monitor, and your disk drive. Then, while holding down the Commodore key, turn on your computer. (If your computer is already on and in the 128 mode, type "GO 64" and press RETURN.) When the blue BASIC screen appears, type LOAD "TS",8,1. The red disk drive light will come on as the program loads into memory.

Note: *Be careful not to touch the exposed dark surface of The Toy Shop disk, or any other floppy disk you handle. Also, always make sure the red disk-drive light is off before either removing or inserting the disk.*

Commodore 64 and 128

Connecting Your System

If you are using a printer other than the Commodore VIC- 1525, Commodore MPS-801, or any other printer that attaches directly to the computer, you must use an interface device to connect your printer to your computer.

Note: The Commodore 1525 and MPS-801 printers, because of their lower print resolution, produce printouts of Toy Shop models and toys that are not of the highest quality. In addition, the print time is considerably longer on these printers than on some other models. For best results, it is recommended that other printers listed on The Toy Shop box, with an interface device as necessary, be used with The Toy Shop.

Note: The Commodore 1526 and MPS-802 printers are not graphics printers and will not work with The Toy Shop.

Read the instructions that came with your printer interface carefully before attempting to connect it to your printer. Always make sure that you turn on your system components in the order recommended by the interface manufacturer or the computer manufacturer.

Note: If you are using a Tymac interface, it must have its switches set in "transparent mode." Other interface cards that are not mentioned on The Toy Shop box may work if they can be placed in "transparent mode."

Selecting Menu Items

In The Toy Shop, your options are presented in menu format. All of The Toy Shop's menus work in basically the same way.

To move from item to item on a menu, use the $<$ and $>$ keys or the joystick. The items will be highlighted, each in turn, as you move through them. (If you prefer, you can also use the CRSR keys or the i, j, k, and m keys to move the highlighter.)

To select a highlighted item, press RETURN.

To go back through the menus or to return to a previous screen, press the back arrow key ($\leftarrow$) located at the upper-left corner of your keyboard.

In the Select Text and Print Menus, once you select certain items you'll use the space bar to toggle options on and off.

Throughout this manual, the process of highlighting an item and then pressing RETURN is referred to as "selecting." Prompts at the bottom of the screen will always remind you of how to make your selection.

Commodore 64 and 128

System Setup

To make The Toy Shop work correctly with your particular system, you need to provide information about your printer. You provide this information at the Setup Menu.

The first time you start up The Toy Shop program, you'll see a welcome message. Setup will be highlighted on the Main Menu. The program will prompt you to press RETURN to reach the Setup Menu. At the Setup Menu, you'll need to provide the following information:

Which printer are you using?

The Toy Shop will work with a number of different printers, but you need to indicate which model you are using. To do this, simply select the appropriate printer name from the list that appears on your screen.

Testing Your Printer

Now you're ready to try a printer test to confirm that you've entered the correct setup information. First, make sure that your printer is ready: properly connected to your computer, power on, and selected (on-line). Press RETURN to start the test. If you have entered the correct setup information, your printer should print out a welcome message. If nothing happens, press the back arrow key to move back through the various setup

screens so you can re-check the information you have provided.

Note: *If you do change any setup information, you need to turn your printer off. Depending on your system, you may also need to turn your computer off and restart the program so that you can turn your printer and computer on in the manufacturer's recommended order.*

When you have completed a successful printer test, you should save your setup information to The Toy Shop Master disk. To do this, press RETURN. After the information is saved, you will be returned to the Main Menu where you can begin the process of choosing your first project.

Note: *Once you have saved your setup information, it's a good idea to place a write-protect tab over the notch on your program disk.*

You are now ready to turn to the "Using the Program" section of this manual to find out how to select, customize, and print out the Toy Shop models and toys.

IBM PC, XT, AT, PCjr

The Toy Shop Includes

☐ 3 disks: 1 Master program disk and 2 Toy disks
☐ User's Manual
☐ Adhesive-backed cardstock
☐ Wooden dowels
☐ Wire pieces
☐ Rubber stripping
☐ Cotton cord
☐ Balloons

Equipment You Will Need

Required
☐ 128K IBM PCjr, IBM PC, PC XT or PC AT (or 100% IBM compatibles)
☐ Disk drive
☐ PC DOS 2.0, or later (Only DOS 2.0 series can be used with PCjr.)
☐ Color/graphics card (not required for PCjr)
☐ TV or monitor (color optional)
☐ Printer (Refer to The Toy Shop package for a list of printers that you may use with this program.)

Optional
☐ Second floppy disk drive or hard disk drive
☐ Joystick
☐ Blank disks for saving toys you customize
☐ Colored pinfeed paper

Starting the Program

Start up your computer using your DOS disk. When you see the A> prompt, remove the DOS disk and replace it with The Toy Shop Master disk. Type TS and then press ↵ or ENTER.

Note to PCjr Users: *The Toy Shop can be used on a 128K PCjr with DOS 2.0 series; DOS 3.0 and later cannot be used.*

Note: *Be careful not to touch the exposed dark surface of The Toy Shop disk, or any other floppy disk you handle. Also, always make sure the red disk-drive light is off before either removing or inserting the disk.*

Installing DOS on Your Toy Shop Disk

You can install PC DOS (versions 2.0 to 3.1) on your Toy Shop Master program disk. (Only DOS 2.0 series can be used with PCjr.) Then you'll be able to start the program without having to use your DOS disk first. To install DOS using either a one- or two-drive system, follow the instructions below.

One-drive system:
1) Start up your computer using your DOS disk.
2) When you see the A> prompt, type SYS B: and press ENTER.
3) When you are prompted for the diskette for Drive B, insert The Toy Shop Master disk.

IBM PC,XT,AT,PCjr

Two-drive system
1) Insert your DOS disk in Drive A and The Toy Shop Master disk in Drive B. Start your computer as usual.
2) When you see the A> prompt, type SYS B: and press ENTER.
3) When you see the A> prompt again, type COPY COMMAND. COM B: and press ENTER.

Note: If error messages appear, DOS has not been installed properly. Repeat the installation procedure, making sure that each disk is in the correct drive. Check to see that the disks have been inserted properly and that the drive doors are closed.

4) When you are prompted for the diskette for Drive A, insert your DOS disk.
5) You will swap disks twice, ending up with your DOS disk in Drive A. When you see the A> prompt, type COPY COMMAND. COM B: and press ENTER.
6) When you are prompted for the diskette for Drive B, insert The Toy Shop Master disk.
7) When you are prompted for the diskette for Drive A, insert your DOS disk.

Selecting Menu Items

In The Toy Shop, your options are presented in menu format. All of The Toy Shop's menus work in basically the same way.

To move from item to item on a menu, use the arrow keys or the joystick. The items will be highlighted, each in turn, as you move through them. (If you prefer, you can also use the < and > keys or the i, j, k, and m keys to move the highlighter.)

To select a highlighted item, press ↵ or ENTER.

To go back through the menus or to return to a previous screen, press ESC.

In the Select Text and Print menus, once you select a menu item, you'll use the space bar to toggle options on and off.

Throughout this manual, the process of highlighting an item and then pressing ↵ or ENTER is referred to as "selecting." Prompts at the bottom of the screen will always remind you of how to make your selection.

Note to Joystick Users: The position of the joystick when the program starts up is used as the "center" position. You may readjust the center position at any time by first centering your joystick and then pressing CTRL-A (for adjust.)

IBM PC,XT,AT,PCjr

System Setup

To make The Toy Shop work correctly with your particular system, you'll need to provide information about your printer and disk drive(s). You provide this information at the Setup Menu.

The first time you start up The Toy Shop program, you'll see a welcome message. Setup will be highlighted on the Main Menu. The program will prompt you to press ENTER to reach the Setup Menu. At the Setup Menu, you'll need to provide the following information.

Select Printer:
The Toy Shop will work with a number of different printers, but you need to indicate which model you are using. To do this, simply select the appropriate printer name from the list that appears on your screen.

Note: If you are using a DMP-85 printer (or any printer that is identical to the DMP-85), the SWI-7 switch must be closed to work with The Toy Shop.

Choose Data Drive:
The next screen will ask you to indicate which drive you plan to use for your data disk. Select "A," "B," or "Hard Disk." On-screen instructions will vary depending on the number of drives you are using.

Set Monitor:
You also must indicate if you are using an RGB monitor. Select "yes" if you are using an RGB monitor; select "no" if you are using any other type of monitor.

Testing Your Printer

Now you're ready to try a printer test to confirm that you've entered the correct setup information. First, make sure that your printer is ready: properly connected to your computer, power on, and selected (on-line). Press ⏎ or ENTER to start the test. If you have entered the correct setup information, your printer should print out a welcome message and a symbol. If nothing happens, press ESC to move back through the various setup screens so you can recheck the information you have provided.

Note: If you change any setup information, you'll have to turn your printer off and then on again before repeating the printer test. Depending on your system, you may have to turn your computer off and then restart the program.

When you have completed a successful printer test, you should save the setup information to The Toy Shop Master disk. To do this, press ⏎ or ENTER. You will then be returned to the Main Menu where you can begin the process of choosing your first project.

IBM PC,XT,AT,PCjr

Note: Once you have saved your setup information, it's a good idea to place a write-protect tab over the notch on the Master disk.

Note: If you have a local area network (LAN) card installed in your computer, The Toy Shop may be prevented from printing properly. You may be able to correct the problem if you redirect your LAN printer from LPT1 to LPT2.

Hard Disk Installation

To install The Toy Shop on your hard disk, start up your computer as usual. Place The Toy Shop Master disk in drive A. When you see the A> prompt, type TSINSTAL and press ENTER. You will now be provided with the path name that will take you to the directory that is currently active on your hard disk drive. If this is where you want The Toy Shop to be copied, simply press ENTER. If you want The Toy Shop to be copied into another existing directory, use the back-space key to delete the path name you've been given and then type in the path name of the existing directory you want. As an example, C:\TS is a path name. The C: indicates the hard disk drive. The back slash (\) indicates that a subdirectory name is next. The name of the subdirectory (TS) follows the back slash. For instructions on how to create a new

directory, see your PC DOS manual.

You may have one copy of The Toy Shop on your hard disk at a time. If you want to move The Toy Shop to a different directory, first remove The Toy Shop from your hard disk (see instructions below) and then re-install into the directory of your choice.

Note: To allow for hard disk failure, The Toy Shop lets you copy the program onto your hard disk four (4) times. If you are experiencing repeated hard disk failures, see your hardware dealer.

Removing The Toy Shop from Your Hard Disk:

If you want to move The Toy Shop to another directory or if you plan to format your hard disk, you must first remove or "uninstall" The Toy Shop from the hard disk. To do this, place The Toy Shop Master disk in drive A. At the A> prompt, type TSBACKUP. Highlight the "Remove from Hard Disk" option and press ENTER. Check to see that the path name that appears on your screen is correct and will take you to the directory where The Toy Shop is installed.

Note that when you remove The Toy Shop from your hard disk, you will "recover" one of the four opportunities you are given to copy it onto a hard disk. In other words, if you have already copied the program twice, and you "uninstall" it, three (rather than two) oppor-

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tunities to copy the program will remain.

Note: *If the program you use to compact or "crunch" files on your hard disk follows the usual DOS rules for relocating files, you do not need to remove The Toy Shop prior to crunching. Contact the manufacturer of your crunch program to find out if this applies to your situation.*

You are now ready to turn to the "Using the Program" section of this manual to find out how to select, customize, and print out the Toy Shop models and toys.

Macintosh

The Toy Shop Includes

☐ 3 disks: 1 Master program disk and 2 Toy disks

☐ User's Manual

☐ Adhesive-backed cardstock

☐ Wooden dowels

☐ Wire pieces

☐ Rubber stripping

☐ Cotton cord

☐ Balloons

Equipment You Will Need

Required

☐ Macintosh, Macintosh Plus, or Macintosh XL with a mouse

☐ Printer (ImageWriter, ImageWriter II, Scribe—single color printing modes only—or any completely ImageWriter-compatible printer)

Optional

☐ External disk drive

☐ Blank disks for saving toys you customize

☐ Colored pinfeed paper

Starting the Program

If your computer is off: Turn your computer on, insert The Toy Shop Master disk in the internal disk drive and follow the on-screen prompts.

If your computer is on: Eject any disks currently in the drive. Press the reset button on the left-hand side of your computer. If your computer doesn't have a reset button, turn the power off and then on again. Insert The Toy Shop Master disk in the internal drive and follow the on-screen instructions which will prompt you to insert Toy disks at the appropriate time. When you select a toy to build — or as you review the toys in The Toy Shop's catalog — you will be prompted to insert Toy disks as necessary to load the complete toy files.

Note: *You can load all files at once by using an optional start-up procedure: Insert The Toy Shop Master disk, holding down the Option key until the Menu Bar appears. The program will prompt you to insert Toy disks at the appropriate time. Because of the quantity of data being loaded into memory, this process will take several minutes to complete. You may prefer this start-up procedure if you know that you want to browse through all the toy files in The Toy Shop catalog.*

Note on Backing Up: *If you are working from a backup copy – on either a hard disk or separate 3.5-inch disks – then the program will prompt you to insert the original Toy Shop Master disk as a "key" to start the application. This "key" disk will be ejected, and the program will run from your backup copy.*

Macintosh

Using the Macintosh

If you've been using other Macintosh programs, The Toy Shop's operation should seem familiar to you. Study your Macintosh owner's guide if you have questions about how the Macintosh works. If you'd like a brief refresher, read the following explanations of some Macintosh terms and features that you'll be using with The Toy Shop.

Pointer

The small black arrow you use to "point" at things on the screen. You move the pointer by moving your mouse — the interface device that comes with the Macintosh — on your desktop or optical mouse pad.

Mouse Operation

1. Clicking: Clicking is used to select items that appear on the screen. To click, position the pointer over the item you want, then press and quickly release the mouse button.

2. Pressing: Pressing and holding the mouse button causes a continuous action. To press, position the pointer where you want it, then hold the mouse button down. Press the arrows at the top or bottom of the scroll bar to scroll.

3. Dragging: Move items from one place to another on the screen by "dragging" them. To do this, position the pointer over the item you want to move, then press the mouse button. Holding the button down, "drag" the item to its new location. When the item is placed where you want it, release the mouse button.

Buttons

Circles or rectangles with labels on them. When you want to perform the action or select the item described by the label, click the button with the mouse. Buttons and other items that are grayed-out cannot be used.

Menu Bar

The white strip across the top of your screen. The title of each menu is written on the menu bar. You choose from a menu by positioning the pointer on the menu title, then dragging to the command you want and releasing.

☐ Apple Menu:
Provides access to desk accessories. Some desk accessories particularly useful with The Toy Shop are:

CatchPaint
Lets you capture graphics created with MacPaint to use as Toy Shop graphics.

Scrapbook
Lets you store graphics for later use.

☐ File Menu:

Load . . .
Lets you load a customized model or toy from a separate data disk.

Save . . .
Lets you save a customized model or toy to a separate data disk.

Macintosh

Quit . . .
Lets you leave The Toy Shop and return to the Finder. If you've made changes to a model or toy, you'll be reminded to save the changes before quitting.

☐ Edit Menu:

Undo
Undoes your most recent action.

Cut
Removes selected paint pattern, decal, or text and places the selection on the Clipboard.

Copy
Copies selected paint pattern, decal, or text to the Clipboard.

Paste
Replaces the current selection with the contents of the Clipboard.

Clear
Clears the current selection.

Dialog Boxes
In many cases, when you select an item, a dialog box will appear on the screen. In some dialog boxes, you click buttons to change or confirm choices; other boxes simply provide information. When you have finished making selections in a dialog box, click "Okay" to signal that you are done. Click "Cancel" to return to where you were without taking any action.

Scroll Bars
Scroll bars let you view all the contents of a window when those contents are too long to fit on the screen. Arrows are located at the ends of a scroll bar. The area between the arrows represents the full window; the scroll box located on the scroll bar represents the portion of the window that you see on the screen. You can view different areas of the window by scrolling:

1. To scroll slowly, click one of the arrows.
2. To scroll continuously, press one of the arrows.
3. To scroll more quickly, click the area between the arrows or drag the scroll box to a new position.

You are now ready to turn to the "Using the Program" section of this manual to find out how to select, customize, and print out the Toy Shop models and toys.

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Overview

The Toy Shop lets you use your skill and creativity in a variety of ways. If you can't wait to roll up your sleeves and start building, you can simply select the model you want to make and print the assembly pieces out just as The Toy Shop designers designed them. With just a few keystrokes you'll be on your way to building a model that will look as good as any in this book. If you want a more in-depth, creative involvement with your project, you can take advantage of The Toy Shop's extensive customization options to design a model that's uniquely yours. Models you have customized can be saved to a separate data disk and used again and again.

Customizing options include "paints" (flood-fill patterns used on various areas of a model), "decals" (graphic decorations), and text. Each model has its own range of customizing options. If you choose to customize, you can work on one or all of the options available for that model.

Customizing can be as simple or as complex as you wish to make it. The Toy Shop contains nearly 40 different paints and a wide variety of decals that can be chosen at the touch of a key. If none of these strikes your fancy, you can take the process a step further by editing existing paint patterns and decals, or creating your own from scratch. On most of the models, you'll also be able to add personalized text in a variety of different fonts and type styles.

When it's time to print, The Toy Shop will direct your computer and printer to produce your model pattern precisely as you've designed it. Then you'll be ready to turn to the Construction Guide section of this manual and build the model you've chosen and designed.

Note: *The Toy Shop produces toy patterns that are extremely detailed and printed in the highest resolution that your printer allows. They are likely to be more detailed and complex than any printouts you have previously produced with your printer. Printing The Toy Shop's elaborate patterns can take considerably longer than printing simple, lower resolution graphics and text. The extra time required should seem worth it, however, when you see how wonderfully detailed and ornamented your Marvelous Mechanical Model will be.*

The entire process begins at The Toy Shop's Main Menu.

Main Menu

The Toy Shop's Main Menu, which will appear following the title screen, contains four options: Browse Toys, Choose by Name, Setup, and Quit. You select options by following the instructions for

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your particular computer. If you need a reminder of how to do this, check "Selecting Menu Items" under the "Getting Started" section for your computer or simply follow the prompts at the bottom of the screen.

Use ← → and RETURN to make selection
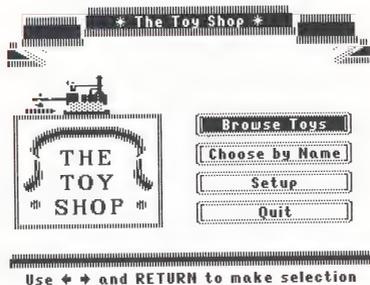
Browse Toys

The Browse Toys option lets you browse leisurely through all of the models and toys included in The Toy Shop. If you select this option, a picture and description of each model or toy will appear on the screen. The models are arranged in alphabetical order (the same way they are arranged in the Construction Guide section of this manual). You can browse through the entire collection of models, moving forward or backward as you choose.

Browsing is a good way to get acquainted with the models and toys available in The Toy Shop. You may want to turn to the assembly instructions for each model as you browse. That way you'll get an idea of what materials you'll need, how difficult the model may be to build,

and so on. If you decide you want to build one of the models you see, simply press RETURN or ENTER to select the model.

Choose by Name

If you're in a hurry, this option is for you. Choose by Name takes you directly to an alphabetical listing of all the models and toys included in The Toy Shop. Use the highlight bar to move through the list. When you reach a model you would like to see, press RETURN or ENTER. A picture and description of the model will appear on your screen. If this is the model you want to build, select it by pressing RETURN or ENTER. If you want to go back to the list to look for a different model or toy, press ESC (Commodore users press the back arrow key) and then go through the process again.

Setup

The Setup option lets you change or re-check your setup information. Selecting this option at any time after you've entered your initial setup information will take you to a screen showing your current setup. If you want to change any of the information you see, select "Yes." If you want leave the setup as is, select "No." Selecting "No" will return you to the Main Menu; selecting "Yes" will take you through the setup options. You can then make any changes you need (for instance, changing the name of your printer if you've gotten a new one) and then save the new information to The Toy Shop Master

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disk. If you need help, see the "System Setup" section for your computer.

Note: *Remember to take the write-protect tab off the Master disk before trying to save new setup information. Once the information has been saved, replace the write-protect tab.*

Quit

The Quit option lets you exit The Toy Shop and start up another program without turning off your computer.

Selecting a Model or Toy

You can select models or toys using either the Browse Toys or the Choose by Name options described above.

Once you've made your selection, you will be given three choices: Print Toy, Customize Toy, and Load From Disk.

```
                Antique Truck
```

```
        [    Print Toy    ]
        [  Customize Toy  ]
        [ Load From Disk  ]
```

```
Use ← → and RETURN to make selection
           ESC to go back
```
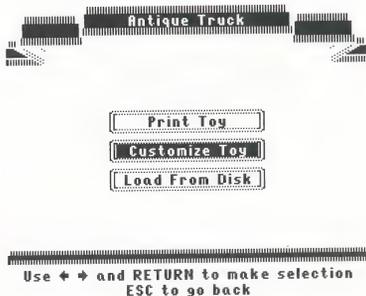
Print Toy

Each model and toy in The Toy Shop comes with carefully chosen, pre-set paint patterns, decals, and text. If you choose Print Toy, you will be taken directly to the Print Menu, bypassing all of the menus offering customizing options. Your model will be printed out with the paints, decals, and text chosen by The Toy Shop's designers.

Print Toy is a good way to get started right away with your model building. It's quick and easy, and you'll be guaranteed a good-looking model every time. If you decide to use Print Toy, you can skip the following section on customizing and go directly to the "Printing Your Model or Toy" section of this manual.

Customize Toy

If you choose Customize Toy, you'll be able to change paints, decals, and text to make a model or toy that's uniquely yours. A complete discussion of The Toy Shop's customizing options and how to use them is contained in the following section on "Customizing Your Model or Toy."

You may also use the Customize Toy option to preview the designer-chosen paints, decals, and text that come with the model you've decided to build. If you choose Customize Toy, you will be taken through a series of screens showing all the customizing options available for your model, plus the designer-chosen paints, decals, and text that will be printed

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on your model if you don't make any changes. To move from one screen to the next, simply select "Done" at the bottom of each screen. When you are through previewing all the customizing options, you can then print the toy (in which case it will turn out exactly as it would if you had selected the "Print Toy" option above) or you can customize it by going back through the screens to reach whatever options you want to change. To go back, press ESC.

Load From Disk
This option allows you to load a previously saved customized model or toy from your own data disk. On-screen prompts will guide you through the loading process. For how to save your customized models, see "Save Toy" under "Printing Your Model or Toy."

Customizing a Model or Toy

Each model or toy has different customizing options available. On some, you can change the paint patterns used in certain areas; on others, you can change the decals applied to various locations; and on nearly all, you can change the wording and style of the text that is placed on the model.

To see what customizing options are available for the model you've decided to build, turn to the "Customization Options" page at the beginning of the Assembly

Instructions section for your model. The "Customization Options" illustration indicates where the paint patterns, decals, and text will go. By studying the illustration, you'll get an idea of what you may want to change. You'll also be able to judge what kinds of paint patterns, decals, and text would be most appropriate for the areas you plan to customize.

When you're ready to start customizing your model, select Customize Toy from the options that appear on the screen after you've made your model selection. You will then be taken through a series of screens showing the customization options available for the model you've chosen. These screens will show you the pre-set paints, decals, and text chosen by The Toy Shop's designers. You can change any or all as you choose. Options that do not apply to the model you've selected will not appear on your screen.

Detailed instructions for using all of The Toy Shop's customization options are provided below.

Paints

Paints are flood-fill patterns that you can apply to designated areas of a model. The Toy Shop includes nearly 40 different paint patterns that can be used as is or edited in any way you want. You can also create your own paint patterns entirely from scratch. Patterns that you edit or create can be saved to

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a separate data disk so that you can use them again on any number of toys.

Choosing Paints

When you decide to customize a model that has paint options available, you will be presented with a Choose Paints screen listing the areas that can be "painted." A box at the right of the screen shows the pre-set paint pattern for the highlighted location. As you move the highlighter, the pattern in the box will change to show the pattern that is pre-set for the new highlighted location.

Use ← → and RETURN to make selection
ESC to go back
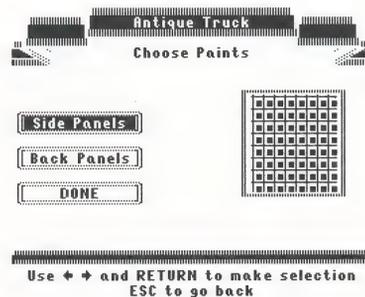
If you want to change a paint pattern, move the highlighter to the name of the location you want to work on and press RETURN or ENTER.

You will now see the Paint Choices screen containing a grid with 19 different paint patterns. To the right of the grid is a Preview Box showing how a paint pattern will look when it is spread over a larger area. More paint patterns are contained on a second screen and

can be viewed by moving the highlighter (in this case, a square outlining one of the paint patterns in the grid) to the "More" box in the upper left-hand corner. Select "More" and you will see the second screen of paint patterns.

Use ← → ↑ ↓ and RETURN to make selection
ESC to go back
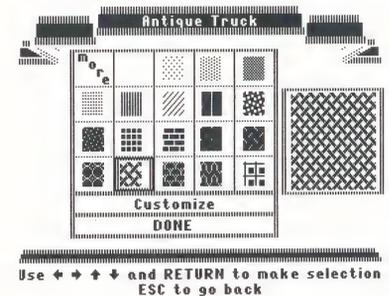
To view and then select a paint pattern, highlight the pattern you want. Press RETURN or ENTER and the pattern will appear in the Preview Box. If you decide to use that pattern, highlight "Done" and press RETURN or ENTER.

If you'd like to view another pattern, move the highlighter to the new pattern, press RETURN or ENTER and the pattern will appear in the Preview Box. You can continue to preview patterns until you find one that you like. Then select "Done" and you will be returned to the Choose Paints screen where you can choose another area to work on, or move on to the next available customizing option.

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Editing Paints

You can edit an existing paint pattern, changing it in any way you want, by using The Toy Shop's Paint Editor.

To reach the Paint Editor, first select the paint pattern you want from the Paint Choices screen. Then highlight "Customize" and press RETURN or ENTER. You will now be given three choices: Edit Existing, Create Your Own, and Load From Disk. Select "Edit Existing." This will take you to the Paint Editor. The pattern you have selected will be in the editing window.

```
              ▄▄▄▄▄▄     Paint Editor    ▄▄▄▄▄▄
           ▄▄▄                                  ▄▄▄
          ▄                                       ▄

                           I
                           ↑          MOVE
                       J←  →K
                           ↓          CURSOR
                           M
            ▉
                       D    Draw
                       E    Erase

                       CTRL-G    Get
                       CRTL-S    Save
                       CTRL-C    Clear
          x = 4   y = 4  CTRL-Q    Quit

                       ESC to go back
```
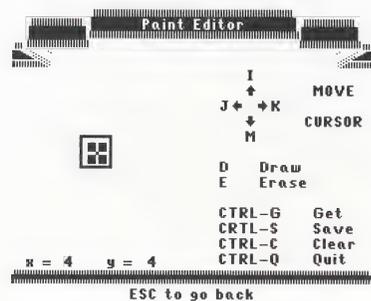
You can edit the pattern displayed in the editing window by drawing and erasing lines or portions of lines, using either your keyboard or a joystick.

Note: The editing window is 8-by-8 pixels in size. (A pixel is a picture element, a single dot on your computer screen.) This is the standard size of all the paint patterns included in The Toy Shop.

If you want to see how the pattern will look when spread over a larger area, quit the Paint Editor (see CTRL-Q below) and return to the Paint Choices screen. The pattern, with all the changes you've made, will be displayed in the Preview Box.

Drawing and erasing

If you are using your keyboard, move the cursor (the flashing square in the editing window) by using the cursor movement keys indicated at the right-hand side of the screen. When the cursor is positioned where you want it, press D to draw a dot. To erase a dot, position the cursor over the dot and press E.

If you are using a joystick, move the cursor by moving the joystick lever up, down, left, or right. One of the two joystick buttons acts the same as the D key; press it and a dot will be drawn. The other joystick button acts the same as the E key; press it and a dot will be erased. You may draw and/or erase in a continuous line by holding down the appropriate button while moving the joystick lever.

(Note for Commodore users: Your joystick must be connected to Control Port #2. Move the cursor by pushing the joystick lever up, down, left, or right. To draw, press the D key to set the drawing mode. Then press the joystick button to draw a dot. To erase, press the E key to set the erase mode. Then use the joystick button to erase.

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You may draw and/or erase in a continuous line by holding down the button while moving the joystick lever.)

X and Y coordinates beneath the editing window show the numerical position of the cursor. The X coordinate refers to the vertical column in which the cursor is placed; the Y coordinate refers to the horizontal line.

Other Paint Editor functions
In addition to letting you edit a paint pattern by drawing and erasing dots and lines, the Paint Editor lets you Get paint patterns previously saved to a separate data disk, Save the paint pattern you are currently editing, Clear, and Quit. The commands for these functions are listed at the right-hand side of the screen.

CTRL-G
Lets you Get a previously saved pattern from a data disk and bring it into the editing window. When you press CTRL-G, on-screen prompts will guide you through the process of getting the pattern you want. Note that only patterns created with The Toy Shop's Paint Editor can be retrieved and brought into the editing window.

CTRL-S
Lets you save the pattern currently in the editing window to a separate data disk. To save a pattern, you will need a blank (or previously formatted) data disk. Be sure to have one on hand before you begin. You will also need to name

your pattern. Think of a descriptive name, then follow the on-screen prompts to format your disk (if required) and to save your pattern. (Note: PCjr. users must have a previously formatted disk.) The saved pattern can be used on future models as well as appearing on the one you are currently customizing.

Note: *Formatting will destroy any data already on the disk, so be sure to use a blank or previously formatted disk, or one containing data you no longer need.*

CTRL-C
Lets you clear the editing window. When you press CTRL-C you will be asked if you are sure you want to clear. If you answer "yes," the editing window will be completely cleared. The paint pattern and all the changes you've made to it will be gone. To get the original pattern back you will have to go through the process of selecting the pattern at the Paint Choices screen and bringing it into the Paint Editor all over again. If you answer "no," the editing window will not be cleared. The pattern and all the changes you've made will remain intact.

CTRL-Q
Lets you quit the Paint Editor and return to the Paint Choices screen. The pattern you have been editing will be displayed, with all your changes, in the Preview Box. If you are satisfied with the way your edited pattern looks, select "Done." The program will store

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your paint pattern, ready to be printed on your model when you're all finished customizing.

If you're not satisfied, you can continue to work on your pattern by selecting "Customize" and then choosing "Edit Existing" from the list that appears on the screen. You will be returned to the Paint Editor where you can continue to work on your pattern.

Creating Paints

In addition to editing existing paint patterns you can create your own patterns from scratch. To do this, select "Customize" from the Paint Choices screen. Then select "Create Your Own" from the list of choices you are given.

Choose Paint Size

Standard (8 X 8)
Small (16 X 16)
Medium (32 X 32)
Large (64 X 64)

Use ← → and RETURN -- ESC to go back
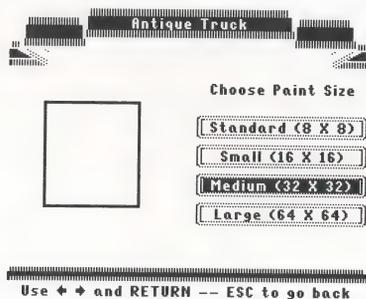
You will now be asked to choose the size of the pattern you want to create. Sizes range from Standard — 8-by-8 pixels, the size of all the paint patterns included in The Toy Shop — to Large (64-by-64 pixels). In choosing the size of your paint pattern, let the size and shape of the area to be "painted" guide you.

Generally speaking, smaller areas call for smaller size patterns while larger areas can accommodate both small and large patterns. Study the "Customization Options" illustration for your model and decide what size pattern you think would work best. Select the size you want. You will then be taken to the Paint Editor.

Creating a paint pattern is much the same as editing a paint pattern. The only difference is that you begin with a blank editing window (of whatever size you've chosen) and create your pattern entirely from scratch. All of the commands and functions — including Get, Save, Clear, and Quit — work exactly as described above.

Loading From Disk

Paint patterns that you have created or edited can be saved to a separate data disk (for how to save, see CTRL-S under "Other Paint Editor functions" above), then loaded and used again.

To load a previously saved paint pattern, select "Customize" from the Paint Choices screen. Then select "Load From Disk" from the list of choices you are given. Follow the on-screen prompts to load the pattern. The loaded pattern will appear in the editing window of the Paint Editor. You can now edit the pattern if you want, or use it as is by pressing CTRL-Q to quit the Paint Editor and then following the steps outlined under CTRL-Q above.

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Note: *You can also load a saved paint pattern by using (CTRL-G)*

Decals

Decals are graphic designs and pictures that can be applied to designated locations on a model. The Toy Shop includes a variety of decals — everything from flowers, to a dollar bill, to the American flag — that you can use as is or edit in any way you want. You can also create your own decals from scratch.

Decals are selected, edited, and created in much the same way as Paints.

Choosing Decals

If the model you are customizing has decal options available, you will be presented with a Choose Decals screen listing the locations to which decals can be applied. For some models, decals can be applied to only one location; for others, they can be applied to several. The window to the right of the list shows the pre-set decal for the highlighted location. To see decals for other locations, move the highlighter down the list. If you're satisfied with the pre-set decals, select "Done."

Antique Truck
Choose Decals

Cab Door
Van Roof
Cab Top
DONE

Flag Banner

Use ← → and RETURN to make selection
ESC to go back

If you want to change one of the decals, or see what other decals are available, highlight the location where you want to make a change and press RETURN or ENTER.

You will now see a Decal Choices screen listing the names of the available decals. A window to the right of the list displays the decal for the highlighted name. To see other decals, simply move the highlighter down the list. The window will display the decal for whatever name is highlighted. When the decal you want is in the display window, select it by pressing RETURN or ENTER. Then select "Done."

Editing Decals

You can edit any of the decals included in The Toy Shop by using the Decal Editor. To edit a decal, first get the decal you want into the display window of the Decal Choices screen. Press RETURN or ENTER. Then select "Customize." You will now be given three

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choices: Edit Existing, Create Your Own, and Load From Disk. Select "Edit Existing." This will take you to the Decal Editor. The decal you have selected will be displayed in the editing window.

Hints on Editing/Creating Decals: When editing or creating decals, you should be aware that any paint patterns behind the decal location will flow into openings in the decal. Be sure to close off completely sections of the decal that you don't want painted. If you don't want any paints behind your decal, draw a box around the entire decal and the area between the decal and the box side will remain unpainted.

Capture Box

A capture box — represented by a moving line — will surround the decal you've chosen. This box lets you know how much drawing space is available. When the decal is printed on your model, only the portion that falls within the capture box will appear; anything outside the box will not be printed. This ensures that the decal is the right size for its location on the model.

You can move the capture box by using CTRL I,J,K,M — the capture box movement keys. The box can be moved around the entire editing window. However, only what is within the capture box will be printed on your model.

Drawing and erasing

You can draw and erase anywhere within the editing window.

If you are using your keyboard, move the cursor (the flashing square in the editing window) by using the cursor movement keys. When the cursor is positioned where you want it, press D to draw a dot. To erase a dot, press E.

If you are using a joystick, move the cursor by moving the joystick lever up, down, left, or right. One of the two joystick buttons acts the same as the D key; press it and a dot will be drawn. The other joystick button acts the same as the E key; press it and a dot will be erased. You may draw and/or erase in a continuous line by holding down the appropriate button while moving the joystick lever.

(Note for Commodore users: Your joystick must be connected to Control Port #2. Move the cursor by pushing the joystick lever up, down, left, or right. To draw, press the D key to set the drawing mode. Then press the joystick button to draw a dot. To erase, press the E key to set the erase mode. Then use the joystick button to erase. You may draw and/or erase in a continuous line by holding down

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the button while moving the joystick lever.)

X and Y coordinates beneath the editing window show the numerical position of the cursor. The X coordinate refers to the vertical column in which the cursor is placed; the Y coordinate refers to the horizontal line.

Other Decal Editor functions

In addition to letting you edit a decal by drawing and erasing dots and lines, the Decal Editor lets you Get decals previously saved to a separate data disk (or graphics from Brøderbund's The Print Shop, which can be used as decals), Save the decal you are currently editing, Clear, and Quit. The commands for these functions are listed at the right-hand side of the screen.

CTRL-G
Lets you Get a previously saved decal from a data disk and bring it into the editing window. When you press CTRL-G, on-screen prompts will guide you through the process of getting the decal you want.

You can also Get graphics from The Print Shop, any of the Print Shop Graphics Library disks, or any data disk containing graphics created with The Print Shop. To do so, simply follow the on-screen prompts, inserting the disk containing the graphic you want when instructed to "Insert Data Disk."

(Note for Apple/Commodore users: Although you can get

graphics created with The Print Shop or graphics contained on any Print Shop Graphics Library disk directly, you must go through an intermediate step to get graphics contained on the original Print Shop disk. If you want a graphic from The Print Shop disk, first put the graphic into The Print Shop's graphic editor. Save the graphic to a separate data disk and then load it into The Toy Shop's decal editor using CTRL-G as described above.)

Graphics that you get will appear in the editing window. The capture box will show you how much of the graphic you can use as a decal. Move the box around to "capture" the portion of the graphic you want.

CTRL-S
Lets you Save the decal currently in the editing window to a separate data disk. To save a decal, you will need a blank (or previously formatted) data disk. Be sure to have one on hand before you begin. You will also need to name your decal. Think of a descriptive name, then follow the on-screen prompts to format your disk, if required, and to save your decal. (Note: PCjr users must have a previously formatted disk.) The saved decal can be used on future models as well as appearing on the one you are currently customizing.

Note: Formatting will destroy any data already on the disk, so be sure to use a blank or previously formatted disk or one containing data you no longer need.

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CTRL-C
Lets you Clear the editing window. When you press CTRL-C, you will be asked if you are sure you want to clear. If you answer "yes," the editing window will be completely cleared. The decal and all the changes you've made to it will be gone. To get the original decal back you will have to go through the process of selecting the decal and bringing it into the Decal Editor all over again. If you answer "no," the editing window will not be cleared. The decal and all the changes you've made will remain intact.

CTRL-Q
Lets you Quit the Decal Editor and return to the Decal Choices screen. The decal you have been editing will be in the display window. If you are satisfied with the way your edited decal looks, select "Done." The program will store your decal, ready to be printed on your model.

If you're not satisfied with your decal, you can either select another decal or continue to work on the same decal by selecting "Customize," and returning to the Decal Editor.

Creating Decals
In addition to editing existing decals, you can create your own decals entirely from scratch. To do this, go to the Choose Decals screen and select the location for which you want to create a decal. Then select "Customize" from the Decal Choices screen. Select

"Create Your Own" from the list that appears on your screen. This will take you to the Decal Editor.

The editing window will be blank except for the capture box. The box is correctly sized for the decal location you've chosen. Remember that the decal you create must fit within the dimensions of the capture box; anything outside the capture box will not be printed.

Creating a decal is much the same as editing a decal, except that you start from scratch. All of the commands and functions — including Get, Save, Clear, and Quit — work exactly as described above.

Loading From Disk

Decals that you have created or edited can be saved to a separate data disk (for how to save, see CTRL-S under "Other Decal Editor functions" above) and then loaded and used again. You can also load graphics from The Print Shop or any Print Shop Library disk to use as Toy Shop decals.

To load a previously saved decal or a Print Shop graphic, first select the location where you want to place the decal from the Choose Decals screen. Then select "Customize" from the Decal Choices screen. Select "Load From Disk" from the list that appears next. Then follow the on-screen prompts to load your decal or Print Shop graphic.

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(Note for Apple/Commodore users: Although you can load graphics created with The Print Shop or graphics contained on any Print Shop Graphics Library disk directly, you must go through an intermediate step to load graphics contained on the original Print Shop disk. If you want to load a graphic from The Print Shop disk, first put the graphic into The Print Shop's graphic editor. Save the graphic to a separate data disk and then load it into The Toy Shop's decal editor as described above.)

The loaded decal or graphic will appear in the editing window of the Decal Editor. The capture box, correctly sized for the location you have chosen, will also appear. Remember that whatever is within the box will be printed; whatever is outside the box will not. You can now move the capture box wherever you want, and then edit the decal or use it as is by pressing CTRL-Q to quit the Decal Editor and then following the steps outlined under CTRL-Q above.

Note: *You can also load a saved decal or Print Shop graphic by using the Get function (CTRL-G) while you are in the Decal Editor.*

Text

Text can be placed on designated parts of a model. You can add a birthday greeting, give the model a special title, include your company name, or dedicate the project to your mother. You'll even be able to give yourself credit for designing

and building a model that is uniquely yours. Text will be printed in a font and typestyle of your choice. To see where text will be placed, check the "Customization Options" illustration for your model.

Selecting and Customizing Text

If your model has text options available, you will be presented with a Choose Text screen listing all the locations where text can be applied. The pre-set text for the highlighted location is displayed at the bottom of the screen. To see the pre-set text for other locations, simply move the highlighter.


```
            Antique Truck
            Choose Text
          [ Truck Side 1 ]
          [ Truck Side 2 ]
          [ Truck Side 3 ]
          [  Credit Line  ]
          [      DONE      ]

          [ Jim's Delivery ]
```
Use ← → and RETURN to make selection
ESC to go back

If you're satisfied with the pre-set text, select "Done." If you want to see in what font and typestyle the text will be printed, or if you want to change any of these elements, highlight the location you want to work on and press RETURN or ENTER. You will now see a Text Choices screen showing the pre-set text for the location you've selected as well as the font and style in which it will be printed.

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```
         Antique Truck
           Text Choices
   ┌─Truck Side 1─┐
   ┌─ Font  ─┐      Universe
   ┌─ Style ─┐      ✓  Bold
   ┌─ Text  ─┐      ✓  Italic
   ┌─ DONE  ─┐      ✓  Underline
                    ✓  Outline
   Jim's Delivery   ✓  Shadow

   Use ← → and RETURN to make selection
              ESC to go back
```
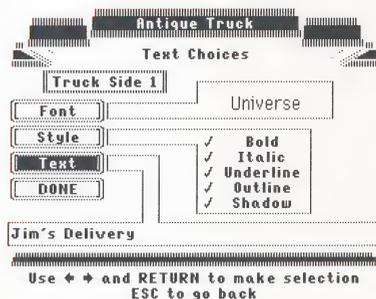
If you don't want to make changes, select "Done." If you do want to make changes, select the element — text, font, or style — that you want to work on first.

Note: *You will notice that text is highlighted when the screen appears. Usually, this is the element you will want to change first. However, the amount of text you can enter is influenced by the font and style. If you want to use a font and/or style that takes up a lot of room, you should change those elements before going on to enter your text.*

Text

When you select Text, a flashing cursor will appear after the last letter in the text box. You can then edit or erase the pre-set text (using your computer's delete or back-space key) and type in whatever text you want. The amount of text you'll be able to enter will vary, depending on the amount of space available on the model. When you've typed as much text as there is room for, the cursor will stop and you won't be able to type any more.

You can then shorten or change your message if necessary. When you're satisfied with what you've typed, press RETURN or ENTER.

Font

When you select Font, an on-screen warning will tell you that changing the font may cause your text to be shortened. A similar warning will appear when you select Style. This is because some fonts and styles take up more space than others. If you choose a font or style that makes your text message too long for the available space, the program will automatically remove letters from the end of the message until it is short enough to fit in the space. This message will appear the first time you select Font; after that, it will not appear.

Move the highlighter through the list of fonts. When you reach the one you want, press RETURN or ENTER. Check to see that your text message still fits. If letters have been removed, you'll either have to change the font or rewrite the text to fit within the limits.

Style

All the Style options appear in a list on the screen. Those that will be used (unless you change them) are indicated by check marks. You can use one, all or any combination of styles that you want.

To change the style, select Style. Then toggle the style options on and off by using the space bar. An option is on when a check mark appears; it is off when the check

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mark disappears. When all the style options you want to use are checked, press RETURN or ENTER.

Note that changing the style may also cause your message to take up too much space. If this happens, letters will be automatically removed from the end of the message. You'll have to either change your style and/or font choices or rewrite the text to fit within the limits.

Note also that elaborate typestyles take considerably longer to print than simple typestyles. If you want to keep printing time down, limit the number of style options you choose.

When your message is the way you want it, select "Done." You will be returned to the Choose Text screen, where you can choose another location to work on. When you have finished all the locations, you can give yourself credit for building your model or toy by selecting "Credit Line," if available as an option. (Note that on some toys, "Credit Line" will be the only text option. See below for a discussion of credit line text.)

Credit Line

You'll probably be proud of the models you build, so on most projects, The Toy Shop gives you a chance to add a personalized credit line to be printed on your model. Credit lines usually are printed on the bottom or back of a model. For this reason, they are not indicated on the "Customization

Options" illustration. To add a credit line, simply select "Credit Line" and proceed just as you did when selecting and customizing text.

Note that you don't have to use the credit line option for giving yourself credit. You can type in any kind of text that you want. Just remember that it will probably be printed on a part of the model that is hidden from view.

When you are finished selecting and customizing text, select "Done." This will take you to the Print Menu where you will begin the process of printing your customized model or toy.

Printing a Model or Toy

You'll reach the Print Menu after you finish your last customizing option; if you choose to print your model without customizing it, you'll come here as soon as you've made your model choice and selected the "Print Toy" option.

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The Print Menu allows you to do a number of things in addition to printing. You can save your customized model to a separate data disk, check your setup, or return to the Main Menu. You can also check the position of the paper in your printer, and, of course, print out your model.

Save Toy

You can save your customized model or toy to a separate data disk either before or after printing it out. Generally speaking, it's better to save before printing. That way you'll have your model safely stored on disk in case anything goes wrong during the printing process. To save your model, you'll need a blank or previously formatted data disk. Be sure to have one on hand before you begin. Then, select "Save Toy" and follow the on-screen prompts to format your disk, if required, and save your model or toy. (Note: PCjr users must have a previously formatted disk.)

Note: *Formatting will destroy any data already on the disk, so be sure to use a blank or previously formatted disk or one containing data you no longer need.*

Align Paper

This option lets you test the position of the paper in your printer. To get the best possible printouts,

it's important that the paper be aligned properly. The test involves printing a line of dashes across the paper; the object is to print the dashes directly over the horizontal perforations on your pinfeed paper.

To run the paper position test, first make sure that your printer is connected properly to your computer, that the power is on, and that the printer is on-line. Adjust the paper so that the print head is over the horizontal perforations that separate the sheets. Select the "Align Paper" option. A line of dashes will be printed across the paper. Your goal is to position the paper so that the dashes are printed directly on top of the horizontal perforations.

If the dashes aren't positioned correctly, re-align the paper and try again until the dashes are printed on top of the perforations. The paper will advance very slightly after each test so you'll be able to position it quite accurately simply by repeating the test a number of times.

Note: *The print head on some printers may block your view. In this case, trial and error is the best way to align your paper correctly. Note also that with some printers it is best to turn the printer off before manually advancing the paper.*

Check Setup

This option lets you check your setup information without having to abandon your work and go back to the Main Menu. When you select

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"Check Setup" you will reach a screen indicating your current setup choices; you will be given an opportunity to change them if you want. For more information on setup choices, see the "System Setup" section under the "Getting Started" instructions for your computer.

Go to Main Menu

This option allows you to return to the Main Menu. If you select it, you will be reminded that returning to the Main Menu will erase the model or toy that is currently in your computer's memory. If you want to preserve a customized model, save it to a separate data disk (using the Save Toy option) before returning to the Main Menu.

Print Toy

When you're all ready to print, select "→PRINT TOY←." You will then see the Select Print Options screen.

```
         Antique Truck
       Select Print Options

  ┌─────────────────┐ ┌───────────────┐
  │ Set # of copies │ │ # of copies: 1│
  ├─────────────────┤ └───────────────┘
  │ Set pages to print │      1
  ├─────────────────┤     ✓ 2
  │ Begin Printing  │       3
  └─────────────────┘     ✓ 4
                           5
                           6

  Use ← → and SPACEBAR to toggle pages
           ESC to go back
```
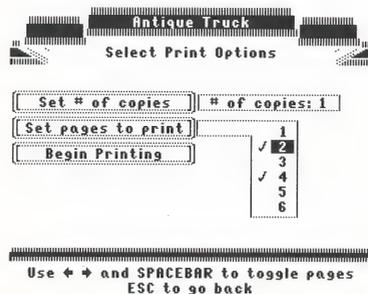
"Begin Printing" will be highlighted. If you want to change the number of copies or indicate specific pages to be printed, move the highlighter to the appropriate item and press RETURN or ENTER. Otherwise, skip to the "Begin Printing" section below.

Set # of copies

You can print from one to nine copies of your model or toy. The number of copies is automatically set at "1." To change that value, delete "1" by using your back-space or delete key. Then type in the number you want and press RETURN or ENTER.

Set pages to print

You can print out all of your model or only the specific pages you need. This is handy if you want to print out a page containing a specific assembly piece without having to reprint the entire model.

The page numbers listed and marked by a check are those that will be printed unless you indicate otherwise. The program assumes that you will want to print out all of the pages.

To change the pages that will be printed, highlight "Set Pages to Print" and press RETURN or ENTER. Then use the arrow keys to move the highlighter and the space bar to toggle the check marks on and off. When only the pages you want to print are checked, press RETURN or ENTER.

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Note: *To find out which pages contain what parts, check the "Index Sheets" for your model. These sheets are located at the very end of this manual.*

Begin printing

When you've answered all the printing questions, select "Begin Printing" and your computer will start putting together the various elements of your model. (You will be prompted to insert Toy disks as necessary.) While it's doing this a "GETTING READY" message will appear on the screen. Once the components of the model have been assembled in the computer's memory, the word "PRINTING" will appear and your model will begin to be printed out on paper.

Note on Disk Access: *The printer will stop up to six times while printing each page so your computer can get the next section of the page ready to print. You'll be told on screen that the computer is "Getting Ready." You can pause printing at any time by pressing ESC. To resume printing, press RETURN. (To stop the printing process entirely, press ESC twice.)*

Note on Printing Time: *The Toy Shop produces toy patterns that are extremely detailed and printed in the highest resolution that your printer allows. These printouts are likely to be more detailed and complex than any printouts you have previously produced with your printer. Printing The Toy Shop's elaborate patterns can take considerably longer than printing simple, lower resolution graphics and text. Printing time will vary depending on the printer model you are using: In general, newer, faster printers will take as little as 8 to 10 minutes per pattern page; older models may take as much as 20 minutes or longer.*

Note: *When printing a number of pages, it's a good idea to pause printing from time to time to avoid overheating the print head. This is especially important if you are printing multiple copies of a complex model.*

When printing is complete, carefully remove the finished pattern pages from your printer. Then turn to the second part of this manual and get ready to transform your printout sheets into an amazing three-dimensional mechanical model or toy!

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Overview

The Toy Shop lets you use your skill and creativity in a variety of ways. If you can't wait to roll up your sleeves and start building, you can simply select the model you want and print out the assembly pieces just as The Toy Shop designers designed them. With just a few clicks, you'll start printing out a pattern and be on your way to building a model that will look as good as any in this book. If you want a more in-depth creative involvement with your project, you can take advantage of The Toy Shop's extensive customization options to design a model that's uniquely yours. Models you have customized can be saved to a separate data disk and used again and again.

Customizing options include "paints" or flood-fill patterns used on various areas of the model, "decals" or graphic decorations, and text. Each model has its own range of customizing options.

Customizing can be as simple or as complex as you wish to make it. The Toy Shop contains 40 different paints and a wide variety of decals. If none of these strikes your fancy, you can design your own or use graphics created with MacPaint. On most of the models, you'll also be able to add personalized text in the font and style of your choice.

When it's time to print, The Toy Shop will direct your computer and printer to produce your model pat-tern exactly as you've designed it.

The entire process begins as you select your model or toy.

Selecting a Model or Toy

When The Toy Shop program finishes loading, your screen will look like this:
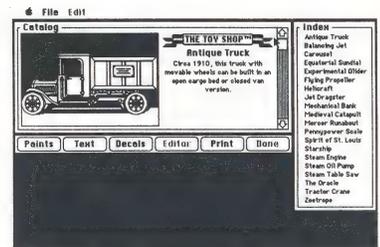
Catalog

The Catalog lets you view the entire collection of Toy Shop models and toys. The toys are arranged alphabetically by name; each one is illustrated and described.

Use the Scroll Bar to scroll through the Catalog, toy by toy.

Index

Models and toys are listed alphabetically in the Index. Click the name of the toy you want and a picture and description will appear in the Catalog window.

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Control Bar

The Control Bar provides access to the key functions of The Toy Shop program:

☐ Paints – Lets you select, edit, and create paints.

☐ Text – Lets you select and customize text.

☐ Decals – Lets you select, edit, and create decals.

☐ Editor – Lets you use the Paint and Decal Editors.

☐ Print – Lets you print out your model or toy.

☐ Done – Lets you return to the Catalog and Index.

Click the button you want. Buttons that are not available are grayed-out.

Customizing a Model or Toy

Each model or toy has different customizing options available. On some, you can change the paint patterns used in certain areas; on others, you can change the decals applied to various locations; and on nearly all, you can change the wording and style of the text that is placed on the model.

To see what customizing options are available for the model you've decided to build, turn to the "Customization Options" page at the beginning of the Assembly Instructions section for your model. (The Table of Contents will help you find the right page.) The "Customization Options" illustration indicates where the paint patterns, decals, and text will go. By studying the illustration, you'll get an idea of what you may want to change. You'll also be able to judge what kinds of paint patterns, decals, and text would be most appropriate for the areas you plan to customize.

Each model has pre-set paint patterns, decals, and text. You can view these by clicking the Control Bar buttons. The paints, decals, and text that you see are the ones that will be printed on your model unless you change them.

If you want to print out your model exactly as The Toy Shop designers designed it, simply click the Print button. You'll then select your printing options (see "Printing a Model or Toy" at the end of this section) and be on your way to building a great-looking model.

If you want to customize your model, click whatever option — Paints, Text, or Decals — you want to work on first. When you have finished working on one option, click another. You can print out your model at any time by clicking Print.

Paints

Paints are flood-fill patterns that you can apply to designated areas of a model. The Toy Shop contains a palette of 40 paint patterns that you can use "as is" or edit in any way you want. You can also create

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paint patterns entirely from scratch.

Selecting Paints

To select paints, click the Paints button. A Paint Options and a Paints window will appear.
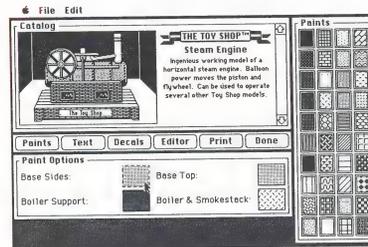
The Paint Options window describes the locations where paints may be placed. The Paints window shows all the paint patterns available.

The pre-set paint pattern for each location appears in a box next to the location name. A selection rectangle surrounding a location box indicates that this location is currently selected. To change the pattern in the selected location, click the pattern you want in the Paints window. To select another location, click the location's name or box.

Editing Paints

To edit a paint pattern, select a location, click a pattern to edit, and then click the Editor button. The Paint Editor will appear on the screen.
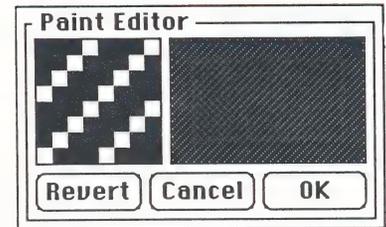
The paint pattern you've chosen is displayed in a close-up, 8-by-8 pixel view in the box on the left (a pixel is a picture element, a single dot on your computer screen); the box on the right shows how the paint pattern will look when spread out over a larger area.

Beneath the Paint Editor are three control buttons: Revert, Cancel, and OK.

☐ Revert — Lets you get rid of any changes you have made and revert to the pattern you started with.

☐ Cancel — Lets you cancel what you are doing and return to the Paint Options window. If you click Cancel, the pattern you are editing will be lost.

☐ OK — Lets the program know that you are done editing. If you click OK, you will be returned to the Paint Options window; your edited paint pattern will be in the selected location.

To edit the paint pattern, move the pointer to the box on the left and click to draw and erase dots. As you work, the pattern in the box on

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the right will change, showing you how your pattern will look when spread over a larger area.

Creating Paints
To create a paint pattern from scratch, select a location and click Editor. Clear the box on the left by clicking to erase the dots. Then create your pattern.

Decals

Decals are graphic designs and pictures that can be applied to designated locations on a model. The Toy Shop includes a variety of decals — everything from flowers, to a dollar bill, to the American flag — which you can use as is or edit in any way you want. You can also create your own decals from scratch or use graphics created with MacPaint.

Selecting Decals
To select decals, click the Decals button. A Decal Options and a Decals window will appear.
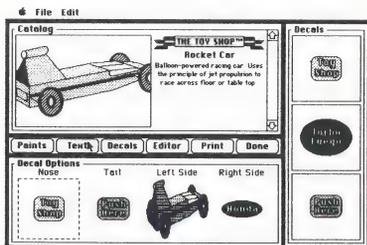
The Decal Options window describes the locations where decals may be placed. The Decals

window shows the decals available for the currently selected location.

The pre-set decal for each location appears beneath the location name. A selection rectangle surrounding a decal indicates that that location is currently selected. To change the decal for the selected location, click the decal you want in the Decals window. To select another location, click the location's name or decal. You will see the decals available for the new location displayed in the Decals window.

Editing Decals
To edit a decal, select a location, click a decal to edit, and then click the Editor button. The Decal Editor will appear on the screen.

Drawing tools   Patterns

Current pattern
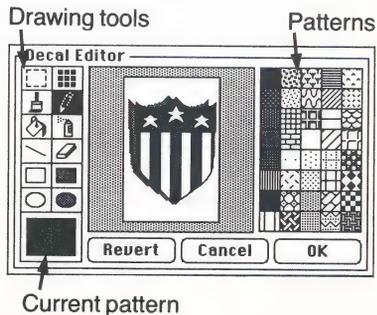
The decal you have chosen to work on is displayed in the editing window. The decal is surrounded by a box which represents the space available for the decal on your model. You can draw only within this box. You may notice that the decal in the editing window

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looks somewhat different than the decal that is shown in the Decal Options window. This is because the decal in the editing window is displayed in its true size, exactly as it will appear on your model.

Beneath the editing window are three control buttons: Revert, Cancel, and OK.

☐ Revert — Lets you get rid of any changes you have made and revert to the original decal.

☐ Cancel — Lets you cancel what you are doing and return to the Decal Options window. If you click Cancel, any edited decal currently in the editing window will be lost.

☐ OK — Lets the program know that you are done editing whatever is in the Decal Editor. If you click OK, you will be returned to the Decal Options window; your edited decal will be in the selected location.

Hint on editing/creating decals: When editing or creating decals, you should be aware that any paint patterns behind the decal location will flow into openings in the decal. Be sure to close off completely sections of the decal that you don't want painted. If you don't want any paints behind your decal, draw a box around the entire decal and the area between the decal and the box side will remain unpainted.

Using the drawing tools
Select a drawing tool by clicking it. You can then use the tool in the editing window. Change the current pattern by clicking the pattern you want.

Selection Rectangle — Select a rectangular area. To move a selected area within the editing window, position the pointer inside the area and drag. To copy a selected area, hold down the Option key while you drag the selection.

Fat Bits — Do detailed editing. To use Fat Bits, select the area you want to edit. Click the Fat Bits icon. The area you have selected will appear in detail in the editing window. You can also get into Fat Bits by double clicking the Pencil icon or by holding down the Command key, moving the pencil to the area you want and clicking.

To move the decal under the editing window, hold down the Option key on your keyboard; a hand cursor will appear. Move the decal by dragging your mouse.

Toggle Fat Bits on and off by clicking.

Paint Brush — Paint with the current pattern. Double click the Paint Brush icon to change the type of paint brush.

Pencil — Draw a thin line, black on white or white on black. Click to draw individual dots.

Paint Can — Flood-fill an outlined area with the current pattern. Position the Paint

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Can in the area you want to fill and click.

🖍 Spray Can — Spraypaint with the current pattern.

\ Line — Draw straight lines.

🖊 Eraser — Erase wherever you drag or click. Double click to clear the editing window.

⬜ Hollow shapes — Draw hollow shapes by positioning the pointer and dragging.

⬛ Filled shapes — Draw shapes filled with the current pattern by positioning the pointer and dragging.

Creating Decals

Creating decals is exactly like editing decals except that you start from scratch. If you want to create your own decal, select a location and then click Editor. When the Decal Editor appears, double click the eraser to clear the editing window. The decal will disappear, leaving an empty box. You can then proceed to create your decal within the box using the drawing tools.

Using MacPaint Graphics as Decals

You can use graphics created with MacPaint as Toy Shop graphics. To do this, select "CatchPaint" from the Apple menu.

Load the desired MacPaint file. You will then see the CatchPaint window with your MacPaint file displayed. (Note: You can change the size of the window by dragging the size box in the lower-right corner; you can view the complete contents of the window by scrolling.) Select the area you want by positioning the pointer at one corner of the area and dragging. (To re-select, first click anywhere outside the selection.) Choose Copy from either the Catch or Edit menu and close the CatchPaint window (by clicking the close box in the upper-left corner). Your selected graphic is in the Clipboard. You can now paste it into the current selection.

Using Graphics from Other Applications

Use graphics from other applications by way of the Clipboard.

Storing Decals

Store decals you've edited or created by using the Scrapbook desk accessory.

Text

Text can be placed on designated parts of a model. You can add a birthday greeting, give the model a special title, include your company name, or even dedicate the project to your mother. You'll also be able to give yourself credit for building a model that is uniquely yours.

Macintosh

Selecting and Customizing Text
To work on the text options available for your model, click the Text button. A Text Options and a Text window will appear.
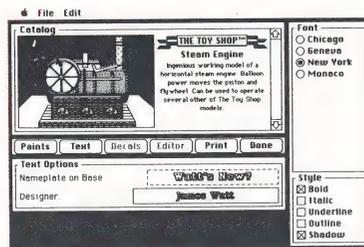
The Text Options window describes the locations where text may be placed. The Text window shows the fonts and typestyles available.

The pre-set text for each location appears in a box next to the location name. The size of the box indicates the amount of space available for text at that location. A selection rectangle surrounding a box indicates that that location is currently selected.

To enter your own text, click the current selection and type in the text that you want. If you prefer, you can get rid of all or part of the pre-set text before you start typing by highlighting the words you want to delete (to highlight, drag the pointer across the text) and then pressing the backspace key or selecting "Clear" from the Edit menu.

Note that the space your text occupies is influenced by the font

and the style. If you find that what you've typed doesn't fit, try changing either the text or one of these elements. Click font and style options until you've found the combination you want.

Credit Line
You can use the credit line for any text you want, but most people like to use it to give themselves credit for building their model or toy. The credit line usually is printed on the inside or bottom of a model and for this reason is not indicated on the "Customization Options" illustration.

Saving and Loading

Saving
You can save your customized model or toy at any point by selecting Save from the File menu. A dialog box will appear showing the name of the current toy. To avoid confusion, give your customized toy a different name. To do this, first clear the current name by pressing the backspace key. Type in the name you want. Be sure the name is descriptive so you'll know what it is later on. Then insert a separate data disk and save the toy.

Note: *DO NOT save toys to The Toy Shop Master disk or Toy disks. Though it is possible to do this, you run the risk of becoming confused and accidentally discarding original toy files without which the program cannot work. For safety's*

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sake, SAVE CUSTOMIZED TOYS TO SEPARATE DATA DISKS ONLY.

Loading

To load a previously saved customized toy or the original uncustomized toy, select Load from the File menu. Insert the appropriate disk (either a Toy Shop disk or your own data disk) and open the file you want.

Once a customized model or toy has been loaded, its name (with an asterisk beside it) will appear in the Index and Catalog windows, replacing the name of the current version of the toy.

Printing a Model or Toy

You can print out your model or toy at any time. When you are ready to print, click the Print button. A Print Options window will appear.
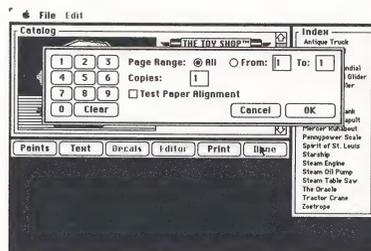
You can print one or more copies of your model and either all or some of the pages. You'll find the ability to print specific pages handy if you need to replace a model assembly piece that is lost or destroyed. The

Index Sheets for your model (which can be found at the very end of this manual) will show you on which page specific parts appear.

To print all of the pages, simply click "All." To print only some of the pages, click "From," and then use the numerical keypad to set the page range. To do this, click the number of the page you want to begin with. Then click the number of the page you want to end with. If you want to print just one page, page 3, for example, enter From 3 To 3.

To print more than one copy of your model, click the "Copies" box. Use the keypad to click the number of copies you want.

Note: *When printing multiple copies, be sure to pause printing periodically to avoid overheating your printer.*

If you want to test to make sure your printer paper is properly aligned, click "Test Paper Alignment". Check to be sure that your printer is properly connected to your computer, power on and selected (on-line). The print head should be positioned over the horizontal perforations in the pinfeed paper.

When you've finished setting all your printing options, click "OK." If you've chosen to test paper alignment, the paper alignment test will begin. If you've not chosen to test paper alignment, printing of your model will begin.

Macintosh

Test Paper Alignment

If you've selected "Test Paper Alignment," a line of dashes will be printed across the paper. Your goal is to position the pinfeed paper so that the dashes are printed directly on top of the horizontal perforations. If the dashes are not positioned correctly, re-align the paper and click "Test" in the dialog box that appears after the paper alignment test is run. Repeat the test as many times as necessary. When your paper is aligned correctly, click "Yes" and printing of your model will begin.

When printing of your model is complete, remove the finished pattern pages from your printer. Then turn to the second part of this manual and get ready to transform your printouts into an amazing three-dimensional mechanical model or toy!

Do and Don'ts

No matter which computer and printer you are using you should read the following hints for producing better printouts. These printer tips will help you get the results you want when using The Toy Shop.

Paper Insertion

Check your printer manual for instructions on the correct way to insert paper in your printer. If the paper isn't inserted correctly, your models and toys may not be printed out properly.

Paper Adjustment

Whenever you adjust the paper vertically by hand (turning the carriage yourself), make sure you turn the printer OFF before you start. After you finish adjusting the paper, turn the printer back ON to print.

If your printouts are slanted to one side, you may need to adjust the horizontal position of the paper in your printer. Follow the instructions in your printer manual. It may take some experimenting to get the positioning right.

Use the paper alignment test to make sure your paper is in the correct position for best printout results.

Before-You-Print Checklist

Before printing, make sure of the following:

1) system has been turned on in the correct order (see "Starting the Program" and your equipment manuals)
2) system is properly set up (see "System Setup")
3) printer cable is connected
4) printer power switch is on
5) printer is on-line or "selected"
6) tractor-feed (not friction-feed) mechanism is activated
7) paper is positioned properly

System Setup

Once you've set up your system by specifying the printer, interface device (where applicable), disk drive and slot you are using (where applicable), and are sure that the system is operating properly, make sure you write protect your Toy Shop Master disk.

Ribbon Changes

When changing ribbons, be sure to read your printer manual and follow the instructions. On most printers, you need to turn off your printer before removing the ribbon or cartridge. Use a relatively new ribbon in your printer. A worn out ribbon will not produce the crisp, clean lines you need for your patterns. However, note that printing out patterns with a brand new ribbon may result in smudged printouts. For best results, use a ribbon for other tasks (such as printing word-processed text) until some of its "newness" wears off. Then use it with The Toy Shop.

Printer Heat

Printing for long, uninterrupted periods of time can cause the print head to become very hot. Be sure

to give your printer a rest between toys. This is especially important if you are using a buffer, since there are fewer pauses during printing and less time for heat to dissipate. If your printer occasionally misses a line, it may indicate overheating. Pause printing until the printer cools down.

Problem Solving or What To Do When . . .

Nothing Happens

Make sure the printer is turned on, on-line and properly connected to your computer. Check to see that the printer's removable top, if any, is firmly in place. Check the manuals for your printer and other printing devices (such as an interface card) to make sure they are installed correctly and have been turned on in the proper order. If the printer still doesn't work, re-check your "Setup" information.

Your Printer Acts Up

If your printer starts behaving strangely while printing is under-way, turn the printer off and then on again to get a fresh start. If your printer is still acting up, re-check your "Setup" choices to make sure they are the right ones for your equipment.

You may also need to re-set the DIP switches on your printer (and interface device) if they have been changed from the factory settings. Refer to your printer or interface device manual or contact the manufacturer for instructions and settings. When re-setting the DIP switches, make sure you first turn off your printer and computer. When turning the system back on, turn the printer on first.

If your printer skips lines while printing, turn the printer's "automatic linefeed" switch off. Turn your printer and computer off and then on again (printer first) and try printing again.

Part II

Construction Guide

Introduction

This part of the manual tells you how to assemble all of the marvelous mechanical models included in The Toy Shop. The accompanying photographs show how your completed models should look, while detailed construction diagrams focus on each step of the assembly process.

Before beginning to print out and build a model, it's a good idea to read through the assembly instructions to make sure that you have all the necessary supplies on hand and that you're "up to" the project. The models and toys are graded — Easy, Medium, and Challenging — to give you some idea of how much time and effort will be needed to construct them successfully. If you're new to model-building, it makes sense to start with something easy and work up to the more difficult projects.

Also, take some time to read the "Assembly Techniques" section which follows. Here, you'll find complete instructions on how to cut, score, bend, and glue your models, plus valuable advice on the kinds of tools and materials to use. With these guidelines in mind, you'll be on your way to assembling good-looking, workable models the first time around.

Adhering Printouts to Cardstock

All of The Toy Shop models are made entirely of paper. You'll use your computer and printer to produce printouts of the assembly pieces needed for each model (for how to do this, see PART I: SOFTWARE INSTRUCTIONS). Then you'll adhere these printouts to cardstock.

This is easy to do when you use the adhesive-backed cardstock supplied with The Toy Shop. First, remove the edges of your pinfeed paper. Then peel the protective backing from the cardstock and adhere the entire printout to the sticky side. The best way to accomplish this is by placing the cardstock, adhesive side up, on a flat surface. Lower the printout, plain side down, onto the cardstock, aligning one end and then smoothing the rest of the paper into place. Rub the printout with the flat of your hand to adhere it to the cardstock. Be sure to rub all over so that no part of the paper separates from the cardstock. When printout and cardstock are firmly joined, you're ready to begin building your model. **(see illus. A.)**

Some things to remember:
☐ Always peel the protective backing from the cardstock, rather than the cardstock from the backing. The material that is peeled away tends to curl and you want the cardstock to remain flat.

☐ Let your printout "dry" before adhering it to the cardstock. Otherwise, the ink is likely to smear. This is especially important if you are using a new printer ribbon.

☐ Check your printout pages carefully before adhering them to cardstock. Some are labeled "DO NOT ADHERE TO CARDSTOCK." These pages, or portions of pages, should be left un-backed.

If you run out of adhesive-backed cardstock:
Additional adhesive-backed cardstock is available in The Toy Shop Refill Pack. Check with your local Brøderbund dealer for availability or use the order form included with The Toy Shop to purchase this refill kit. If you do not have an order form and you wish to order direct from Brøderbund, please call Brøderbund's Software-Direct at (415) 479-1185 between the hours of 8:30 a.m. and 5 p.m. (Pacific Time), Monday through Friday.

As an alternative, you can use spray adhesive — available at art or hobby supply stores — and plain cardstock. Choose cardstock of the same thickness as that supplied with The Toy Shop.

Note: *Before using spray adhesive, read the manufacturer's instructions and warnings carefully. This adhesive is messy and its fumes can be toxic if inhaled. Use the adhesive out-of-doors if*

A.

Remove backing

Adhere printout

Apply pressure
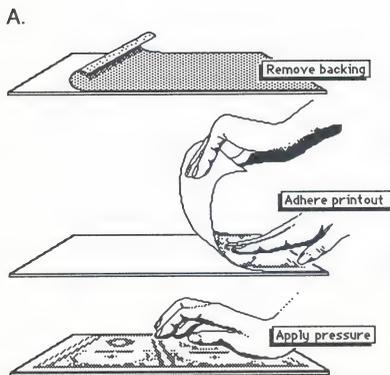
possible, and protect your work surface with plenty of newspapers.

Cutting

All you need to cut out most of the assembly pieces is a good pair of scissors. The best kind are paper scissors with straight blades.

When cutting, it's a good idea to make a rough cut first, leaving approximately ¼ inch around the edges of a piece. Then make a precise final cut. This technique helps ensure that the assembly piece will not become bent or deformed during cutting.

Sometimes sections need to be cut out within a piece. For this, use a hobby knife, such as an X-ACTO®. Don't try to cut all the way through the cardstock at once. Instead, use the blade to score along the outline of the area to be cut. Then, run the blade along the score lines once or twice until the section is freed.

Some things to remember:

☐ Be sure to cover your work surface with a thick piece of poster board or cardboard to protect it from damage during cutting operations.

☐ Cut along the outside edge of each model piece. The models have been designed with this sizing in mind. If you leave a margin around a piece or cut off an outline, the model may not fit together properly.

☐ To minimize confusion, cut out pieces as you need them rather than all at once. In models with many small pieces, it's a good idea to label each piece, in pencil, on the reverse side so you'll remember what it is.

Scoring and Bending

Scoring is one of the most important steps in constructing paper models. Proper scoring — cutting partway through the cardstock along designated lines — makes it easy to bend various parts of the models into shape.

Use a hobby knife to score along dotted lines ▬▬▬▬▬ . Lines marked like this ▬+▬+▬+▬ should be scored on the reverse side. Study assembly pieces carefully to determine where the score lines are. Some paint patterns may make score lines difficult to see.

When you score, use a metal-edged ruler as a cutting guide. Place the ruler along the scoring line. Then, applying an even pressure, draw the blade quickly and neatly down the line. The idea is to cut halfway through the cardstock. After scoring, bend the cardstock away from the cut. Always overbend so that when the scored piece is released it will have a natural tendency to stay at a 90-degree angle. **(see illus. B.)**

B.

51
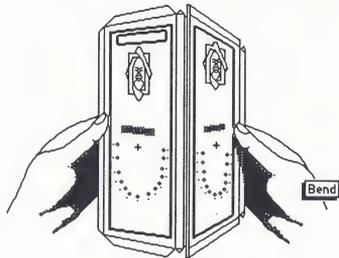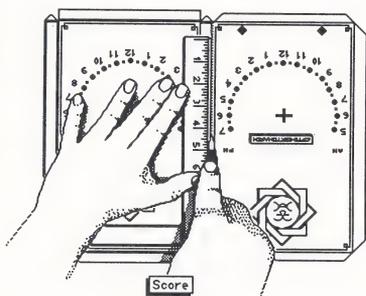
Practice scoring before you begin building your model. You'll quickly get a feel for how much pressure you need to apply to produce the right results.

When you're finished assembling a model, it's a good idea to apply a thin film of white glue over all the score lines. This will keep the paper from fraying. Since the glue dries clear, the appearance of the model will not be altered.

Drilling Holes

Many of The Toy Shop models need holes for wire, dowels, or string to pass through. A ⊕ mark indicates a place where a hole should be drilled.

Most holes should be drilled BEFORE the model is assembled. The instructions for each model will tell you when to drill the holes. Follow these instructions carefully, because in some cases once a model is put together, hole drilling is impossible.

For drilling, use the sharp tip of a hobby knife. Start at the exact center of the mark, twisting the blade in one direction only. When the tip of the blade comes through the cardstock, turn the assembly piece over and drill from the other side. Continue drilling until the hole is the size specified in the instructions.

For large holes, start drilling with a hobby knife and then switch to a pencil point. Insert the pencil point in the hole and twist. This technique produces a neat hole with no ragged edges.

Gluing

White glue:
Whenever "glue" is specified in the instructions, white household glue (such as Elmer's Glue-All ®) should be used.

The biggest mistake is to use too much glue. If you apply glue lavishly, your model will be messy and will take a long time to dry.

The right way to glue is to place just a few drops of glue on one of the surfaces you want to join and spread the glue around. Then, using a piece of scrap cardstock, wipe most of the glue off. Only a thin film should remain. Press the parts together and hold them firmly in place until the glue has set. If you've used the right amount of glue this will take just a few seconds. The bond will be strong and the paper will not pucker.

In some of the models, white glue is used to strengthen joints and fill cracks. In these cases, apply a line of glue, squeezed straight from the container, along the joint or crack. Set the model aside until the glue is completely dry. This may take several hours. Don't worry about the glue's effect on the appearance

of the model; white glue becomes transparent as it dries.

Super glue:

Super glue, or cyanoacrylate adhesive (known by such brand names as Krazy Glue ® and Wonder Bond ®), is used in a number of The Toy Shop models. It makes a strong bond between metal and paper and can also be used to strengthen and waterproof model pieces. Whenever super glue is called for, the instructions will mention it specifically. DO NOT use super glue unless specifically instructed to do so.

As with white glue, it's important not to use too much. A drop is usually sufficient; more than a drop will take too long to dry. When used correctly, super glue bonds almost immediately.

Note: *Before beginning to work with super glue, read the manufacturer's instructions carefully. Use super glue in very small quantities and avoid spilling. DO NOT allow the glue to come in contact with your skin or eyes. Super glue is extremely difficult to remove and can bond skin to skin.*

Some things to remember:

□ Super glue will not bond with itself. Therefore, if you need to re-apply super glue, you must scrape or sand the original coat away before applying a new coat.

□ Super glue will not bond with wire that has oil on it. Be sure that the wire you use is clean and free of

oil from your hands. If you suspect the wire is dirty, clean it with alcohol before attempting to use super glue.

□ Super glue has a short shelf life. If the tube of glue you're using doesn't seem to work, it may be because it's too old. Try a fresh tube.

Dowels and Wire

Dowels and wire are used in many Toy Shop models. The dowelling supplied with The Toy Shop is ⅛-inch wooden dowelling. The wire is paper clip wire.

To cut dowelling, use your hobby knife. Measure the length you need and mark with a pencil. Lay the marked dowel on your work surface. Place the knife blade over the pencil mark and roll the dowel back and forth, applying pressure until it is cut halfway through by the knife. At this point you should be able to break the dowel quickly and neatly. **(see illus. C.)**

To cut wire, use either wire cutters or a pair of needle-nosed pliers with a cutting edge. Simply measure the wire and clip.

Some models call for pieces of wire to be bent into specific shapes. To bend wire, use needle-nosed pliers and follow the bending guides that accompany the instructions.

C.

Assembly Techniques
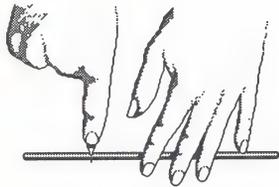
Some things to remember:

☐ Wire used for wheel axles should be straight. If it's not, the wheels of the model you're building will wobble. Roll the wire over your work surface to test its straightness. If it is curved or bent, straighten it using needle-nosed pliers.

☐ If you need to replenish your supply of dowels and wire be sure to get the same size as is supplied with The Toy Shop. Dowelling can be found at a hobby supply store or a lumberyard. Wire can be found at a hardware store. You can also use paper clips that have been unbent and straightened.

Dowels and wire are also included in The Toy Shop Refill Pack.

Sanding

Some model pieces need to be sanded. Whenever sanding is called for in the instructions, use a fine grade of sandpaper and sand lightly. Be careful not to destroy or deform the model piece by sanding too much of it away.

Coloring

You can use a variety of materials — everything from colored pencils to water colors, acrylics, oil paints, or marking pens — to color your models. Experiment to discover which coloring materials give you the effects you want.

The models can be colored either before or after assembly. However, since some areas may be difficult to reach once a model is assembled, it's often better to color the pieces before you cut them out and put them together.

Another way to add color to your models is to print them on colored pinfeed paper. If you choose this technique, be sure to check the layout to see which pieces appear on which page. If pieces that you want in different colors appear on the same page you may have to print that page twice, once in one color and then in another, to get the effect you want.

Some things to remember:

☐ If you are using water colors, be careful not to get the paper too wet. Paper that is overly wet will pucker.

☐ When using any new type of coloring material, test it first on a piece of printout paper adhered to cardstock. Some paints and markers may weaken the adhesive backing and cause the paper and cardstock to separate.

Using the Construction Diagrams

The construction diagrams, included with the assembly instructions for each model, show how the model or toy is put together. Study these diagrams closely before beginning to build and refer to them often during the construction process. They are one of your most valuable aids in building good-looking, workable models.

Antique Truck

This antique truck, circa 1910, is fun to build and has many uses. Make it in two different versions — with an open cargo bed or a closed van. The open cargo bed can hold a memo pad, paper clips, or even jelly beans, while the truck cab provides a place to store your pencils and pens. The closed van can be used as a bank to store your spare change. With your company name printed on the side, it makes a great promotional gift. Pattern pieces for both versions are included on your printout.

Difficulty level: Medium
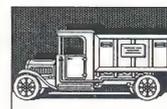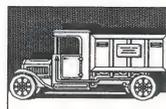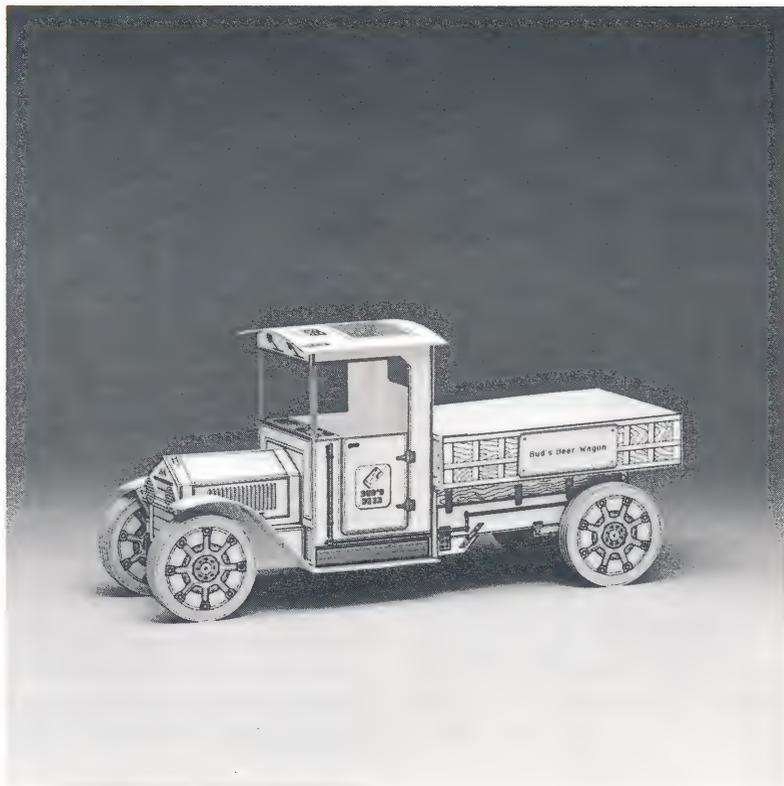
What you will need:

☐ Scissors
☐ White glue
☐ Super glue
☐ Metal-edged ruler
☐ Hobby knife
☐ Wire
☐ Dowelling
☐ Needle-nosed pliers with cutting edge
☐ Salt or clean sand (optional)

Van Roof (Decals)

Cab Roof (Decals)

Cab Roof and
Fenders (Paints)

Van Panels (Paints)

Van Side (Text)

Cab Doors *(Decals)

Cab (Paints)

Engine Compartment
(Paints)
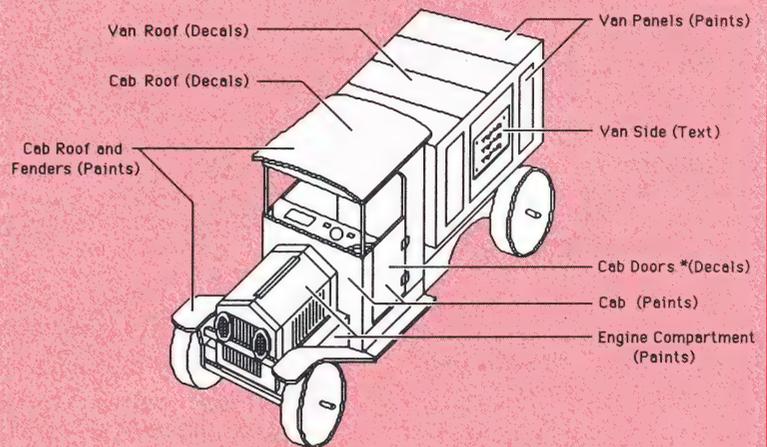
*Note: Avoid using decals containing text in this location.

Customization Options
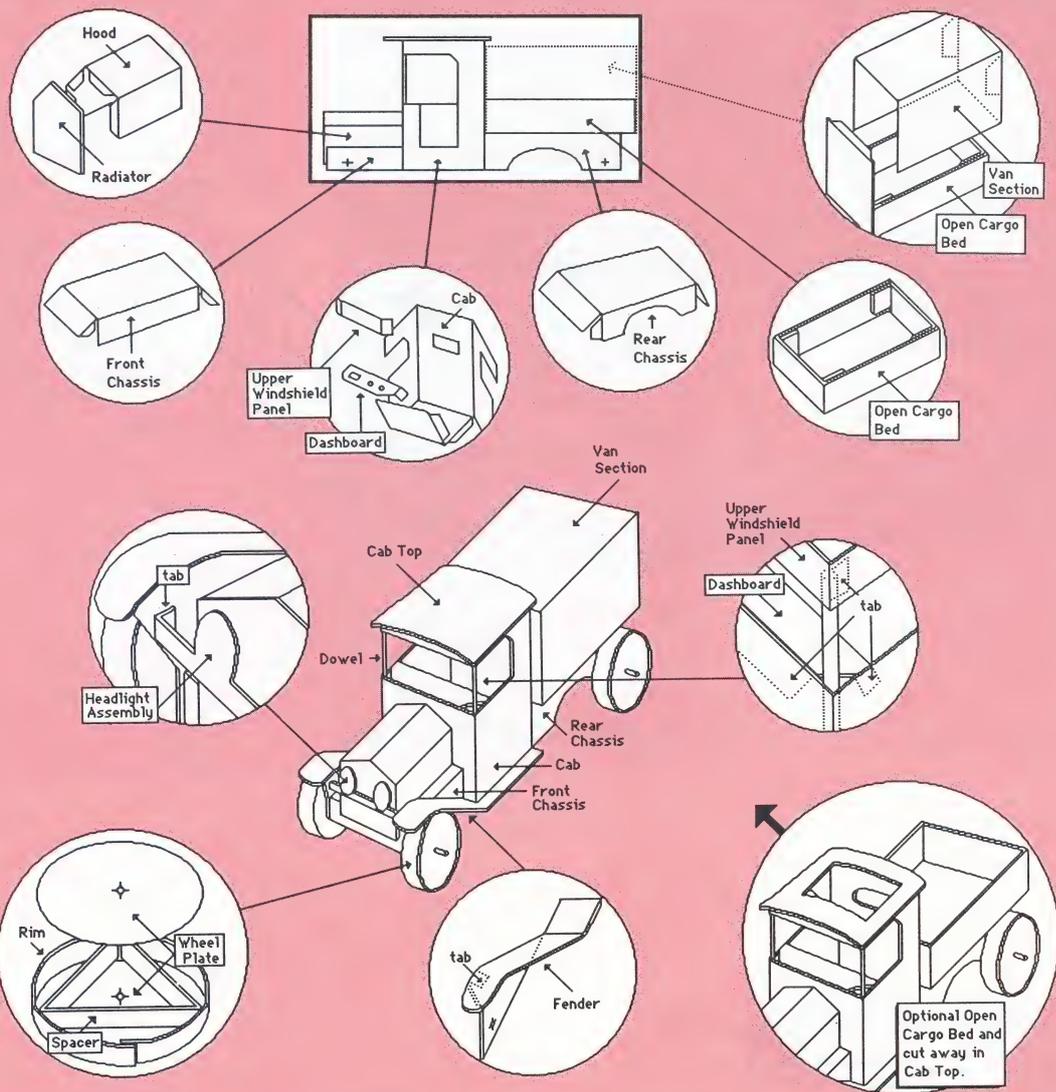
Construction Diagrams

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

Cab assembly

☐ Cut out cab, dashboard, upper windshield panel, and top of cab. If you are planning to use the cab of your truck as a pencil holder and have selected a cut-out decal when customizing your truck, use a hobby knife to cut out the center section of the cab top.

☐ Score and bend on dotted lines.

☐ Fold cab into an open box shape as shown. Glue tabs in place.

☐ Glue dashboard and upper windshield panel, curved edge up, into place at front of cab as shown.

☐ Cut two pieces of dowelling, 2½ inches long. These will be the windshield posts.

☐ Apply white glue to both ends of the posts and slip in place at front inside corners of cab. Twist dowels to spread glue. Hold in place until glue has set, being careful to keep the cab assembly square.

☐ Gently curve the top of the cab to match the curve in windshield and back of cab. Then glue top of cab in place, allowing an equal amount of overhang on all sides.

Rear chassis

☐ Cut out rear chassis.

☐ Drill holes where indicated for rear axles. Holes should be just large enough for wire to pass through and rotate freely.

☐ Score and bend on dotted lines.

☐ Fold chassis into an open box shape. Glue tabs in place.

☐ Glue front end of chassis to rear end of cab, placing both parts flat on your work surface and holding them together until glue has set.

Front chassis

☐ Cut out front chassis.

☐ Score and bend on dotted lines.

☐ Fold chassis into an open box shape. Glue tabs in place.

☐ Glue front chassis to front end of cab, placing both parts flat on your work surface and holding them together until glue has set.

☐ Cut out hood and radiator.

☐ Score and bend on dotted lines.

☐ Fold hood as shown. Glue radiator to tabs at front end of hood.

☐ Glue hood and radiator assembly onto front chassis. Note that the radiator overlaps the front of the chassis. Hold parts together until glue has set.

Antique Truck

Assembly Instructions

Fenders

☐ Cut out fenders.

☐ Drill holes where indicated. Holes should be just large enough for wire to pass through and rotate freely.

☐ Score and bend on dotted lines. Lines marked like this ➜ ➜ ➜ ➜ should be scored on the reverse side.

☐ Fold each fender as shown, gently curving the part that will fit over the wheel by pulling it over the sharp edge of a desk or table top. Glue tab in place.

☐ Glue fenders to truck as shown. The running board section should be glued under the cab and the fender section should be glued to the front chassis. The straight forward edge of the fender should be flush with the straight forward edge of the chassis.

☐ When glue is dry, redrill holes for front axles.

Headlights

☐ Cut out headlight assembly.

☐ Score and bend on dotted lines. Then fold and glue the two sides of the headlight assembly together.

☐ Install headlights in front of radiator, gluing tabs to fenders as shown.

Wheels

Note: *It's a good idea to assemble all four wheels at once. This is an efficient way to work and has the added advantage of allowing the glue on one wheel to set while you work on another.*

☐ Cut out wheel plates (8), wheel spacers (4), and wheel rims (4). Note that each wheel plate has a solid black "lug nut." This will be used to align the front and back plates when you assemble the wheels.

☐ Score and bend the wheel spacers.

☐ Pull each rim over the sharp edge of a desk or table top to give the paper a curl. Then check the fit of the wheel plates and rims. The rims should fit snugly around the wheel plates. Note the amount of overlap required and then glue the overlapping ends of each rim together to form a circle. Lay the rim on its side on the work surface and check to see that it is not warped or twisted.

☐ Select a rim. Shape it with your fingers into as nearly perfect a circle as possible, then place it flat on your work surface. Insert a wheel plate, printed side down, into the rim. Ease the plate into place until it is flush with the bottom edge of the rim. When fitted properly, the wheel plate will remain in place without being held. Apply a line of glue around the inside of the wheel where plate and rim meet and set aside to dry.

Assembly Instructions

Repeat, using three more rims and wheel plates. Set aside to dry.

☐ Select a wheel assembly and a wheel spacer. Apply glue to one edge of the spacer and set in place in the wheel assembly as shown. Note that the spacer must be bent slightly to fit inside the wheel. Repeat with the remaining wheels.

Note: *If you want to add weight to your truck and give it a nice "feel" as it rolls, pour salt or clean sand into the wheel assemblies at this point. Fill each wheel assembly about half full and then proceed to the next step.*

☐ Select a wheel plate. Apply glue to the top edge of the spacer and insert the plate in the rim. Be sure to align the back and front wheel plates, using the black "lug nut" as a guide. When plate is correctly installed, apply a line of glue around the plate where it joins the rim. Set aside to dry.

Repeat with the remaining wheel assemblies, being careful to align the black dots on each. Set aside to dry.

Cargo bed

☐ Cut out open cargo bed. If you are building your truck as an open cargo carrier, cut along the line indicated at the front of the cargo bed. If you are building your truck as a van, leave this section intact.

☐ Score and bend along dotted lines.

☐ Fold into an open box shape. Glue tabs in place.

☐ If you are building an open cargo carrier, glue cargo bed to rear chassis and cab of truck. Hold in place until glue has set. If you are building a van, complete the following steps before gluing the van assembly onto the truck.

Closed van

☐ Cut out the van section. If you are building the van as a bank and have selected the coin slot decal when customizing your truck, use a hobby knife to cut out the coin slot.

☐ Score and bend on dotted lines.

☐ Fold into an open box shape. Glue tabs in place.

☐ Glue van section to cargo bed section as shown to form a closed box.

☐ Glue the completed van assembly to the rear chassis and cab of the truck. Hold in place until glue has set.

Installing the wheels

☐ Drill a hole in the center of both sides of each wheel. Holes should be just large enough for wire to fit through snugly.

Antique Truck

Assembly Instructions

☐ Cut a piece of wire 3¾ inches long for the rear axle and 3¼ inches long for the front axle. Each axle should be as straight as possible. Use pliers to straighten wire if it is curved or bent.

☐ Drill holes in washers, then cut washers out.

☐ Pass axles through axle holes at front and rear ends of truck. Slip washers and then wheels onto axles. Position so that wheels are close to the truck but not so close that they rub against the sides. Glue each wheel in place with a drop of super glue applied to the axle where it exits the wheel.

☐ When glue is completely dry, check operation of the wheels. If wheels wobble, apply gentle pressure to straighten axle wire.

If you want your truck to be immobile, simply glue axles to chassis with super glue.

This sleek jet plane, perched on the point of a pin, is a perfect desktop toy. Give it a gentle shove and it goes into action — dipping, revolving, but never once losing its balance. The secret behind this amazing feat is a penny glued to the underside of each wing. With these coin counterweights in place, the plane's center of gravity is located precisely at the tip of its tail.

As an alternative, you can suspend the jet from a thread passed through the balancing point. Hang it from your ceiling, or attach it to a hook so that you can suspend it from the edge of your desk.

Difficulty level: Easy
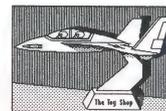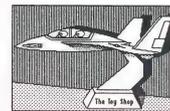
Balancing Jet

What you will need:

- ☐ Scissors
- ☐ White glue
- ☐ Super glue
- ☐ Metal-edged ruler
- ☐ Hobby knife
- ☐ Wire cutters
- ☐ Straight pin (1)
- ☐ Pennies (2)
- ☐ Sewing needle
- ☐ Sewing thread

Fuselage, Fins (Paints)

Stripe (Paints)

Pedestal (Paints)

Pedestal *(Decals)

Base Plaque (Text)

Base (Paints)

*Note: Avoid using decals containing text in this location.

Customization Options

Vertical Stabilizer

1¢

Underside of Wing

Locating Penny

Hook

Sewing Thread

Balance Point

Vertical Stabilizer

Wing

Wing

Fold leading edge of wing under.

Pedestal

Pedestal Base

Underside of Pedestal Base

Wing

Rear of Fuselage

Joining Fuselage to Wing

Construction Diagrams

Balancing Jet

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

Base

☐ Cut out pedestal base.

☐ Cut slot in top of base, using a hobby knife.

☐ Score and bend on dotted lines.

☐ Fold base. Glue tabs, keeping the base square by placing it on a flat surface while gluing.

Pedestal

☐ Cut out pedestal sections (2), using a hobby knife to cut the small slots between the body of the pedestal and the tab.

☐ Glue pedestal sections together, back to back.

☐ Insert pedestal into slot in base. Bend ends of pedestal tab in opposite directions to help hold pedestal in place as shown. Glue pedestal to base by applying a line of white glue along both sides of the tab.

☐ Place base flat on your work surface. Check to make sure pedestal is straight. Then apply a line of white glue along both sides of the pedestal where it meets the base. Set aside to dry.

Plane

☐ Cut out fuselage sections (2), wing, and vertical stabilizers (4). Use a hobby knife to cut narrow slots as indicated.

☐ Score and bend leading edge of wing. Glue as shown.

☐ Glue vertical stabilizers together, back to back, to form two double thick stabilizers.

☐ Glue fuselage sections together, back to back.

☐ Glue fuselage to wing by fitting the pieces together as shown and then applying a line of white glue along each side of the fuselage where it meets the wing. Apply glue both above and below the wing.

☐ Glue stabilizers to wing tips, using the same technique. Set aside to dry.

☐ When glue is completely dry, glue a penny to the underside of each wing tip. Each penny should be placed so that it touches both the vertical stabilizer and the edge of the wing. Since newer pennies are lighter than older pennies, use either two new pennies, or two old pennies. Glue the pennies in place as shown, using a drop of super glue.

Assembly Instructions

Installing plane on pedestal

☐ Insert a straight pin through the top part of the pedestal as shown. Pin should pass between the pedestal layers. The sharp point of the pin should extend ¼ of an inch from the top of the pedestal. Check to make sure pin is positioned properly, then clip away the lower part of the pin. Place a drop of super glue on the lower part of the pin to keep it from slipping out of the pedestal.

☐ Balance the plane on the pedestal by placing the tip of the tail that extends to the rear of the fuselage onto the sharp point of the pin. Adjust until the plane balances in a level position. Once you have found the balancing point, press down so that the pin makes a small indentation in the underside of the plane. Use a pencil point to deepen the indentation slightly. This will help hold the plane in place and will make it easy to locate the balancing point whenever the plane is re-installed on the base.

Suspending plane from hook

☐ Cut out hook sections.

☐ Glue together, back to back.

☐ Drill hole as indicated, large enough for string to pass through.

☐ Thread a sewing needle and tie a knot in the end of the thread. Pass the needle through the plane's balancing point (as determined by installing the plane on the pedestal). Pass the other end of the thread through the hole in the hook. Tie in place. Then use the hook to suspend the plane from the edge of your desk or door jamb.

Carousel

Horses prance as this ornate antique carousel spins. A cleverly designed system of circular ramps makes the galloping steeds go up and down while a cogwheel engages the teeth of the lower rim to make the wheel turn.

Carousels, in one form or another, have been around for centuries. The earliest visual record is found in a Byzantine bas-relief dating from around 500 A.D. The word "carousel" comes from the ancient Spanish word *carosella* used to describe a war game played by 12th-century Arabian horsemen. In 18th-century England, carousels came to be called merry-go-rounds or roundabouts. Interestingly, English-made carousels always turn clockwise, while those made in Germany or the United States usually turn counter-clockwise.

Difficulty level: Challenging
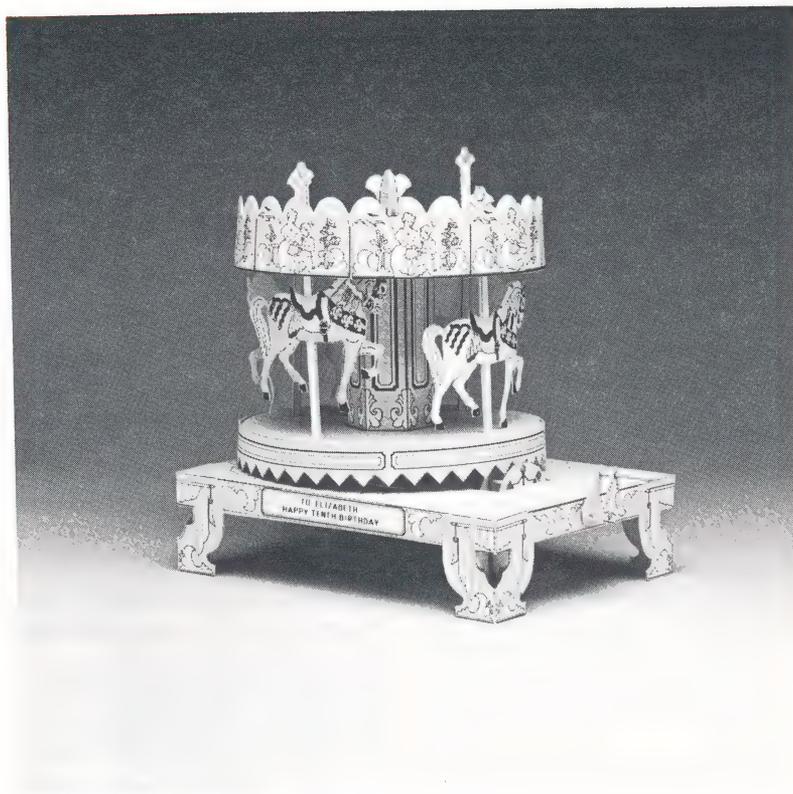
What you will need:

☐ Scissors
☐ White glue
☐ Super glue
☐ Metal-edged ruler
☐ Hobby knife
☐ Dowelling

Upper and Lower
Disks (Paints)

Rims (Paints)

Base and Legs
(Paints)

Trim Panels
(Paints)

Base Plaque
(Text)

Lower Disk
(Decals)

Customization Options

Carousel

Pole Ornament

Center Ornament

Center Post

Upper Disk

Upper Rim Joiner

Upper Rim

Upper Rim

Center Column Stiffener

Center Column

Pole

Lower Disk

Lower Rim

Lower disk rests here.

Lower Rim

Lower Rim Joiner

Long Support Beam

Short Support Beam

Base

Washer

Ramp

Crank

Cogwheel

Crossbeam

Center Post

Large Washer

Leg

Center Post

Spacer
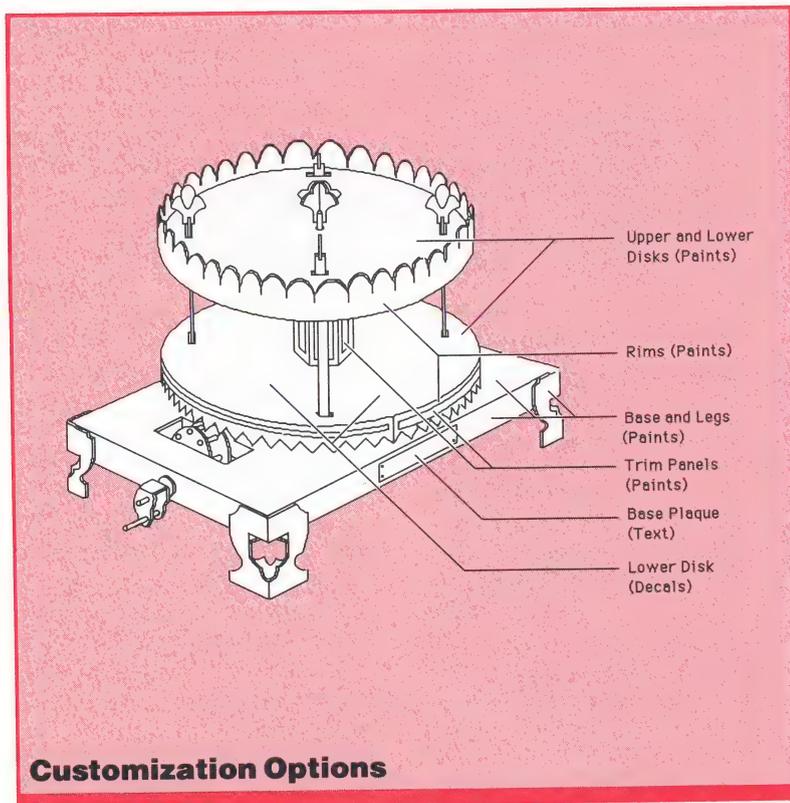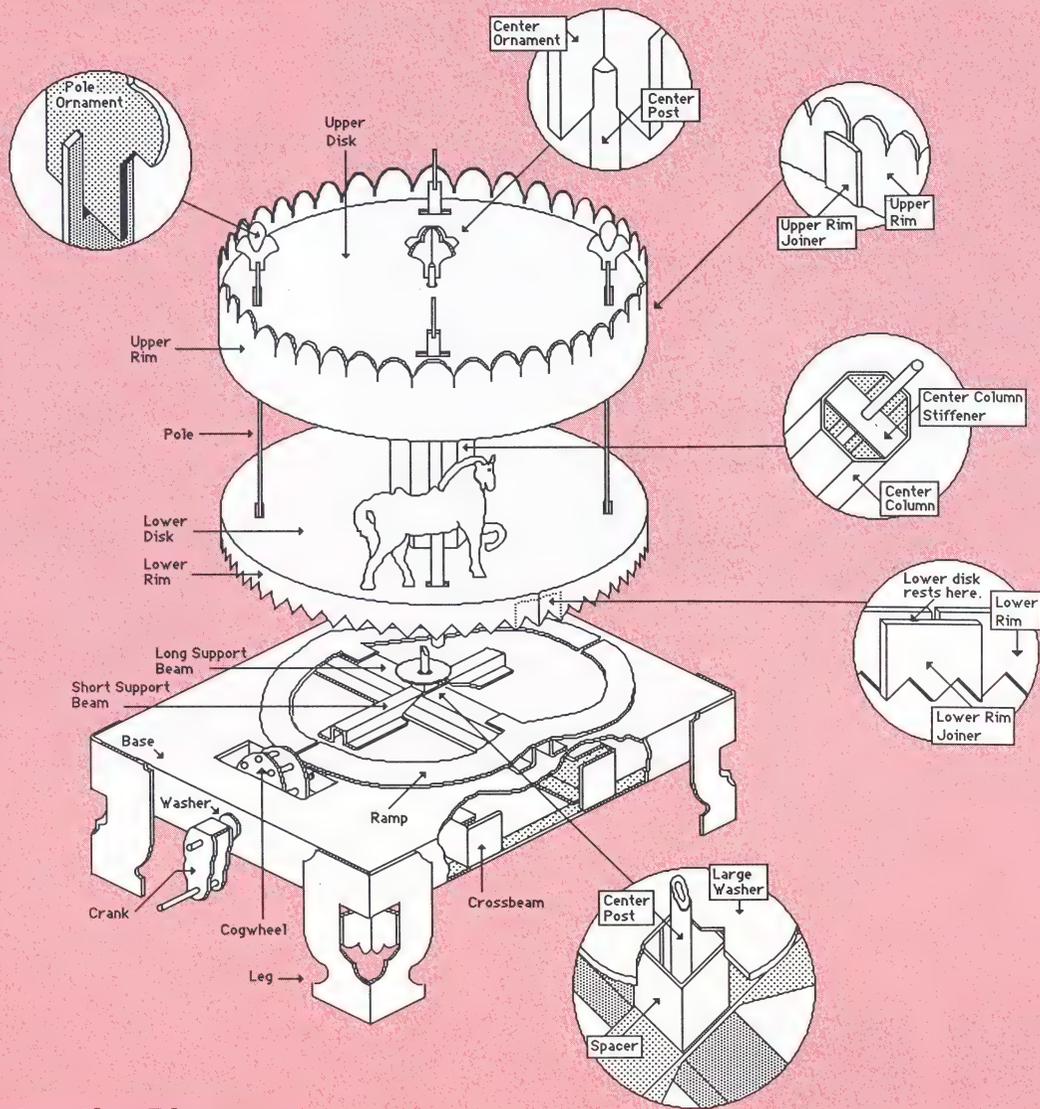
Construction Diagrams

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhensive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

Base

☐ Cut out base. Note that the rectangle labeled "Fold down" is to be cut on three sides and scored on one, then folded down to provide a mount for the crankshaft.

☐ Drill holes where indicated large enough for dowel to pass through and rotate freely.

☐ Score and bend on dotted lines.

☐ Fold base into an open box shape and glue corner tabs in place. Tabs should be glued to the inside of the base.

☐ Cut out crossbeams (2). Drill holes where indicated large enough for dowel to pass through and rotate freely. Score and bend on dotted lines. Then fold and glue the beams to the underside of the base, using the arrows to position them properly. One of the beams should be glued to the crankshaft mount (the rectangle folded down from the base). The tabs with the arrows should be folded over the crossbeams and glued in place.

☐ Cut out legs, first studying the illustration carefully so that you understand how the inner section is to be cut, scored, and folded.

Lines marked like this ▪▪▪▪ should be scored on the reverse side.

☐ Fold legs as shown and glue to corners of the base. Glue the edges of the base to the inner sections of the legs. This will increase the strength of the legs.

Support beams and ramp

☐ Cut out long support beam and short support beam.

☐ Drill holes where indicated large enough for dowel to pass through and rotate freely.

☐ Score and bend on dotted lines. Lines marked like this ▪▪▪▪ should be scored on the reverse side.

☐ Fold long support beam and glue to base as shown, passing a piece of dowelling through the holes in the beam and the base to ensure accurate alignment. Fold short support beam and glue to long beam and base as shown, using the dowel to keep the holes aligned.

☐ Cut out spacer. Score and bend on dotted lines. Then fold into an open box shape and glue tab in place. Glue spacer to top of short support beam, open end up as shown.

☐ Cut out one of the four washers. Drill hole in center large enough for dowel to fit through snugly. Glue

Carousel

Assembly Instructions

the washer onto the spacer using dowel to keep holes aligned.

☐ Cut out ramp sections. Glue in place on base and over ends of long support beams as shown. Be sure that the ends of the ramp sections meet. There should be no gap left between them.

Carousel assembly

☐ Cut out bottom disk, lower rim sections (2) and lower rim connectors (4).

Before cutting the teeth in the rim sections, give the paper a curl by drawing it over the sharp edge of a desk or table top.

Use a hobby knife to cut out the four rectangles in the disk. Drill a hole in the center of the disk, as indicated, large enough for dowel to fit through snugly.

☐ Place the two rim sections face down on your work surface with ends adjacent. Join by gluing a connector over the ends, matching the teeth on the connector with the teeth on the rims. Be sure that no gap is left between the rim sections. Note that the connector does not extend all the way to the straight edge of the rim, thus forming a shelf for the bottom disk to rest on.

☐ Join the remaining ends of the rim sections in the same way to form a circular rim. Glue the last two connectors midway between the two already in place. This will provide additional support for the disk. Form the completed rim into as nearly perfect a circle as possible.

☐ Place the bottom disk face down on your work surface. Install the rim around the disk with the teeth pointing upward. The disk should rest on the top of the connectors and be flush with the upper edge of the rim. The disk should fit snugly into the rim. If the disk is too large, trim away a very small amount all around the edges of the disk. Trimming away a small amount will result in a large change in the size of the disk, so be careful not to trim too much. If the disk is too small, resulting in a loose fit, disassemble one of the rim joints, trim the ends, and glue together again so that the rim fits snugly around the disk. Glue disk and rim together by applying a line of glue around the circumference of the disk where it meets the rim on the inside of the assembly. Set aside to dry.

☐ Cut out center column.

☐ Score and bend on dotted lines. Fold to form a six-sided column and glue tab in place.

☐ Cut out column stiffener. Drill a hole in the center large enough for a dowel to pass through and rotate freely. Score and bend on dotted lines. Glue the stiffener in place

Assembly Instructions

flush with the edges at one end of the column as shown. This will be the upper end of the column.

□ Glue the lower end of the column to the bottom disk, positioning it over the hexagon printed on the disk. For added strength, apply a line of glue around the bottom of the column where it meets the disk. Set aside to dry.

□ Cut out the top disk, the upper rim sections (2), and the upper rim connectors (4).

Before cutting out the scallops in the rim sections, give the paper a curl by drawing it over the sharp edge of a desk or table top.

Use a hobby knife to cut out the four rectangles in the disk. Drill a hole in the center of the disk large enough for a dowel to fit through snugly.

□ Use rim connectors to join the upper rim sections just as you did the lower rim sections. One edge of the rim connectors should be flush with the straight edge of the rim. Place the two additional rim connectors midway between the connectors which are glued over the joints.

□ Install the top disk in the rim, allowing the disk to rest on the top edge of the connectors. Again, if the disk is too large, trim away a very small amount all around the edges of the disk. If the disk is too small, disassemble one of the rim joints, trim the ends, and glue together again. Glue disk and rim

together by applying a line of glue around the circumference of the disk where it meets the rim on the inside of the assembly. Set aside to dry.

□ Glue the top disk to the center column, using a dowel to keep the holes aligned. Make sure that the slots in the top disk are directly above the slots in the bottom disk.

□ Cut out the four center ornament sections.

□ Glue matching pairs together, back to back. Cut out the slots in each glued-together section using a hobby knife. Fit the sections together as shown.

□ Cut a piece of dowelling 6 inches long. Slide the ornament onto one end of the dowelling and glue in place. Insert the dowel through the carousel assembly, pushing it down so that the bottom of the ornament rests on the top of the top disk. Glue dowel to top and bottom of the assembly with super glue.

Cogwheel and crankshaft

□ Cut out cogwheel sections.

□ Drill holes where indicated large enough for dowelling to fit through snugly.

□ Cut eight pieces of dowelling, each exactly ½ inch long.

□ Holding the cogwheel sections together, back to back, insert a ½-inch section of dowelling into each

Carousel

Assembly Instructions

of the holes (except the one in the center), passing the dowelling through both wheel sections. When all the dowels are installed, ease the wheel sections apart so that the ends of the dowels are flush with the surface of the wheels. Place a drop of super glue at the end of each dowel. Set aside to dry.

☐ Cut out the crank.

☐ Drill holes where indicated large enough for dowel to fit through snugly. Score and bend on dotted lines.

☐ Cut a piece of dowelling 3½ inches long. This will serve as the crankshaft. Cut another piece of dowelling 1⅛ inches long. This will be the handle of the crank.

☐ Pass the longer piece of dowelling through the holes in the upper part of the crank. Adjust so that the crank is positioned at the end of the dowel as shown. Glue dowel to crank with a drop of super glue.

☐ Insert the shorter piece of dowelling through the holes at the bottom of the crank with the end extending in the opposite direction from the crankshaft as shown. Glue in place with a drop of super glue.

☐ Cut out two washers. Drill a hole in the center of each, large enough for dowelling to fit through snugly. Slip one washer onto the crankshaft next to the crank.

☐ Check the size of the holes in the base through which the

crankshaft will pass. They should be large enough for dowel to rotate freely. Enlarge if necessary.

☐ Insert the crankshaft through the hole in the side of the base, then through the cogwheel, and finally through the hole in the crossbeam. Slide a washer onto the end of the crankshaft as it emerges from the crossbeam, but do not glue in place at this time.

☐ Install the carousel assembly on the base by inserting the dowel through the center holes. The cogwheel should engage the teeth on the lower edge of the lower rim. Adjust the position of the cogwheel on the crankshaft so that the teeth and the cogs meet properly. The crank should be snug against the base. When you are satisfied with the alignment, glue the washer at the end of the crankshaft to the shaft with a drop of super glue. Attach the cogwheel to the shaft by applying a drop of super glue to each joint. Be careful not to glue the shaft or the washer to the base. Set aside. Do not attempt to turn the cogwheel until glue is completely dry.

Assembly Instructions

Horses and poles

☐ Cut out horses, poles, and pole ornaments.

☐ Score and bend on dotted lines.

☐ Fold the pole sections in half and glue the halves together. When glue has dried, cut slots in the ends of the poles, using a hobby knife. Fold and glue the pole ornament sections in the same way, cutting slots with a hobby knife. Insert the pole ornaments in the slotted ends of the poles and glue in place.

☐ Install the poles through the slots in the upper and lower disks of the carousel as shown. Check to make sure that the poles move freely up and down. Enlarge slots if necessary. Rotate the carousel to make sure that the poles slide properly over the ramp. If any of the poles tend to get caught as they slide over the joints in the ramp sections, simply snip off the leading edge at the bottom of the pole causing the problem. Normally, this will not be necessary.

☐ Gently bend each horse so that when it is mounted on the carousel it will be curved enough to clear the edge of the upper rim. Glue a horse to each pole. The horse's feet should just clear the surface of the bottom disk when the pole is in a down position. Check to see that the horses' ears do not catch on the upper rim as the carousel turns.

☐ When you are satisfied with the operation of the carousel, cut out the remaining washer. Drill a hole in the center large enough for a dowel to fit snugly. Slide the washer into place on the center dowel as it emerges from the underside of the base. Allow enough space between the base and the washer for the dowel to rotate freely. Glue the washer to the dowel with a drop of super glue.

Equatorial Sundial

This equatorial sundial is portable, easy-to-make, and can be adjusted to any latitude between 25 and 50 degrees. It works because, when oriented properly, the top section simulates the earth's equator. When the sun is above the equator — as it is from March 21 to September 23 — it is above the top section of the sundial and will cause a shadow to be cast on the upper face. When the sun is below the equator, it is below the top section of the dial and will cause a shadow to be cast on the lower face. To tell the time, all you need do is observe where the shadow falls.

Before mechanical clocks were invented, sundials were an important way of telling time. The first sundial is believed to have been used in Babylon around 2000 B.C. Over the centuries, these solar time machines have been made in every conceivable shape and form. There have been vertical sundials and horizontal sundials. Sundials of stone, wood, silver, and gold. During the Renaissance, some sundials were made in miniature pocket versions and were even set into pistol butts and finger rings.

Difficulty level: Easy

What you will need:

☐ Scissors
☐ White glue
☐ Metal-edged ruler
☐ Hobby knife
☐ Dowelling
☐ Wire

Lower Face–Winter (Decals)

Sides (Paints)

Motto Plaque (Text)

Upper Face–Summer (Decals)

Sides (Paints)
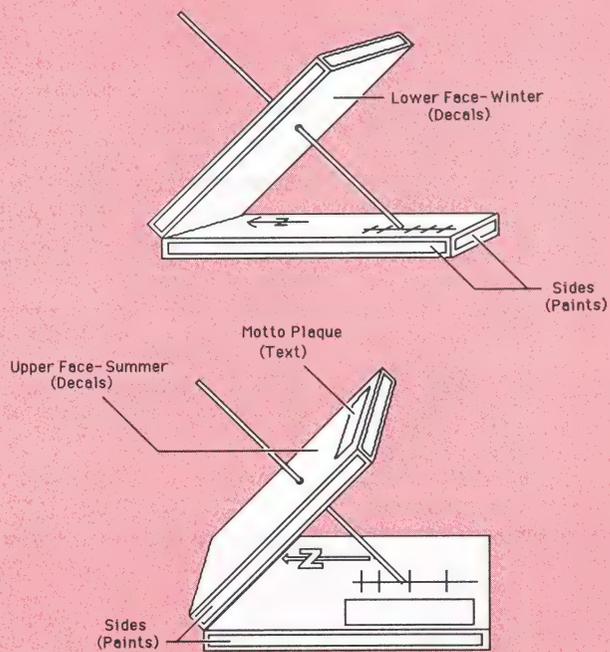
Customization Options

Equatorial Sundial

Construction Diagrams

Summer in northern hemisphere.
(Sun is "above" equator.)

Equator

Earth's axis

Sun

Aligning sundial to proper magnetic setting and placing gnomon on proper latitude causes the upper surface of the sundial to be parallel to the equator and the gnomon to be parallel to the axis of the earth's rotation.

Earth's axis

Winter in northern hemisphere.
(Sun is "below" equator.)

Equator

Sun

Mechanics of equatorial sundial.

Clear Tape

Top

Clear Tape

Bottom

Reading time from sundial.

Compass

Gnomon (Dowel)

1. Set gnomon to latitude.
2. Align sundial to proper magnetic setting.
3. Read time at shadow of gnomon.
4. Read seasonal correction and add or subtract.
5. Add or subtract time zone correction.

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those that are marked "Do not adhere to cardstock."*

Building the Dial

☐ Cut out sundial top and sundial bottom.

☐ Drill holes in both sides of sundial top as indicated. Holes should be just large enough for a piece of wire to pass through snugly. (These small holes will be enlarged later to accomodate dowelling.)

☐ Score and bend on dotted lines.

☐ Fold each sundial piece into a closed box shape. Glue tabs in place, starting with the long tab that runs the length of the box and ending with the shorter tabs at each end. Be sure the sundial top is as square at the corners as possible so that the holes you have drilled will be properly aligned.

☐ When glue is completely dry, drill hole as indicated in the front edge of the sundial bottom. This will provide a place to store the gnomon when the sundial is not in use.

Note: *The gnomon (from the Greek word meaning interpreter) is the part of a sundial that casts a shadow. In this case, the gnomon is a piece of dowelling inserted through the top section of the sundial.*

☐ Tape sundial top to sundial bottom, using transparent tape and matching the diamond-shaped marks located at the end of each piece. Diamond-shaped marks should be on the inside. The upper face of the dial should read "March to September" and the lower face should read "September to March." Apply tape to the outside, closing the box completely, and then to the inside, opening the box completely.

☐ Check the alignment of the gnomon holes in the sundial top by passing a piece of straight wire through them. If the holes are aligned properly, enlarge them using a hobby knife to begin drilling and a pencil point to finish. Holes should be just large enough for dowelling to fit through snugly. If the holes are not aligned, adjust their positions during the enlargement process.

☐ Cut a piece of dowelling 8 inches long. This will be the gnomon. Then, follow instructions below to put your sundial into operation.

Equatorial Sundial

Assembly Instructions

Setting the dial

First, place the sundial on a level surface in a spot where it is fully exposed to the sun. Push the gnomon through the holes in the top section of the sundial. Adjust so that the lower end of the gnomon touches the appropriate spot on the latitude scale. (Note: If you don't know what your latitude is, check the column marked "Lat" in the table on the back of the sundial to find out.) Once you've adjusted for latitude, use a compass to find north. Since the compass will point to the magnetic north pole, not the "true" north pole, consult the table on the bottom of the sundial to find the city nearest you. Check the column marked "Mag Set" to find the magnetic direction in which you should point the sundial and orient the dial accordingly. For example, San Francisco shows a magnetic setting of 016 degrees. To orient the sundial, align the true north arrow on the sundial with 016 degrees on the compass. (Note: You may round off the table reading to the nearest five-degree increment on the compass dial.) Read the sundial by observing where the shadow cast by the gnomon falls. Read the upper face from March to September and the lower face from September to March. The dial shows standard time. When daylight savings time is in effect, add one hour.

To correct for the "wobble" of the earth on its axis and the varying speed of the earth in its orbit, consult the seasonal correction table on the inside of the sundial. To use the table, first find the month and then move across to the column representing the current week of the month. Add or subtract the minutes shown on the table from the time shown on the dial to get the correct time.

Time zone correction

The sundial is accurate in the center of each time zone. Consult the column marked "Zone Corr" in the table on the back of the sundial to find the time zone correction for the city nearest you. If the city is in the eastern portion of your time zone, the table will show a minus correction; if it is in the western portion, a plus correction. Add or subtract the number shown for your city to or from the time obtained by applying the seasonal correction above.

Note: *You may want to purchase a small, inexpensive compass at your local variety store and imbed it in the bottom section of the sundial next to the north arrow. You can do this by cutting a hole just large enough for the compass to fit. Then you'll be able to carry your sundial with you and set it to tell time accurately wherever you are.*

The Toy Shop's experimental glider is one of the best paper airplanes you're likely to come across. It flies like a dream and makes perfect three-point landings. Since the paper it's made from can be bent and cut with ease, it's ideal for experimenting. You can reshape the wings to get more lift, bend them to make the aircraft turn, and even adjust the stabilizers so that the plane flies upside down.

Difficulty level: Medium
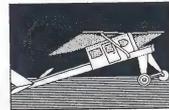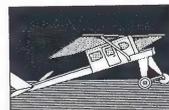
Experimental Glider

What you will need:

☐ Scissors
☐ White glue
☐ Super glue
☐ Metal-edged ruler
☐ Hobby knife
☐ Wire
☐ Wire cutters
☐ Ball point pen

Sunburst-Foreground (Paints)
Sunburst-Background (Paints)
Fuselage (Paints)
Nameplate (Text)
Landing Gear (Paints)

Customization Options

3/8"
Raise wing tip 3/8 inch and glue strut to wing.

WING AND STRUT INSTALLATION

Vertical Stabilizer

Fuselage

Horizontal Stabilizer

Glue here.

Wing Strut

Cockpit

Wing

Glue here.

Gear Bracket

Gear Strut

Crossbrace

Glue to underside of wing.

Fold over and glue to top of wing.

Fold over and glue to top of wing.

Glue to top of fuselage.

Glue to top of fuselage.

Glue to Side of Fuselage

tab

Cockpit

Construction Diagrams

Experimental Glider

Assembly Instructions

Note: Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."

Note: Most of this aircraft is made of plain paper. Only the landing gear and wing struts are adhered to adhesive cardstock. Scoring on the plain paper parts should be done with a ball point pen, rather than a hobby knife. Score the parts before cutting them out. For best appearance, use a pen with the same color ink as your printer. Score all lines on the printed side of the paper. If a line is marked like this ▣▣▣▣ , fold the paper toward you; if it is marked like this ▬▬▬▬, fold the paper away from you. Use a hobby knife to score the parts that are adhered to poster board. When gluing plain paper parts, be sure to use as little glue as possible to keep the paper from buckling.

Fuselage

☐ Score the fuselage, using a ball point pen, then cut out.

☐ Fold fuselage into a long, narrow, box shape. Glue tab in place, using as little glue as possible to prevent paper buckling.

Cockpit

☐ Score the cockpit, then cut out.

☐ Fold the cockpit as shown. Glue tab along front of cockpit in place. All other tabs should be folded out so that they can be glued to the fuselage and wing.

☐ Glue cockpit sides to sides of fuselage. Note that the pilot should face forward. Glue tabs at front and back of cockpit to fuselage.

Wing

☐ Score the wing, then cut out.

☐ Fold the front edge of the wing as shown, then glue the edge of the fold to the underside of the wing, aligning it with the line that runs from one end of the wing to the other. This will form a box beam at the leading edge of the wing that will provide strength and proper airfoil shape.

☐ Attach the wing to the cockpit by first gluing the tab at the front of the cockpit in place over the wing (this will flatten the box beam at this point) and then gluing the tab at the rear of the cockpit over the wing. Next, glue the tabs on each side of the cockpit to the underside of the wing.

Assembly Instructions

Tail

☐ Score and then cut out the horizontal and vertical stabilizers.

☐ Fold the front edge of the horizontal stabilizer as shown. Glue the fold to the top side of the stabilizer, aligning it with the line that runs from one end of the stabilizer to the other. This will form a box beam at the leading edge of the stabilizer to provide strength and proper airfoil shape.

☐ Glue horizontal stabilizer in place on fuselage at spot labeled "Glue tail here." Note that the fold on the leading edge of the stabilizer faces up and that the stabilizer extends beyond the end of the fuselage.

☐ Fold tabs at bottom of vertical stabilizer and glue in place on top of horizontal stabilizer as indicated.

Gear strut

☐ Cut out gear strut and gear crossbrace.

☐ Drill holes where indicated in both pieces. Holes should be large enough for wire to pass through and rotate freely.

☐ Score and bend on dotted lines.

☐ Fold strut and crossbrace as shown.

☐ Glue crossbrace to strut. When glue is dry, redrill holes if necessary.

Gear bracket

☐ Cut out gear bracket.

☐ Score and bend on dotted lines. Lines marked like this ➔ ➔ ➔ ➔ should be scored on the reverse side.

☐ Glue gear bracket over fuselage just in front of the cockpit.

☐ Glue gear strut assembly to gear bracket as shown.

Wheels and axle

☐ Cut a piece of wire 3½ inches long to form the wheel axle. Pass the axle through the holes in the gear strut assembly.

☐ Cut out wheels.

☐ Drill a hole in each wheel large enough for wire to pass through and rotate freely.

☐ Drill holes in washers. Holes should be just large enough for wire to pass through snugly. Cut washers out.

☐ Slip wheels and then washers onto axle. Place washers so that the wheels turn freely without wobbling. Attach washers to axle with super glue, being careful not to let the glue run down the axle and onto the wheel.

Experimental Glider

Assembly Instructions

Wing struts

☐ Cut out wing struts.

☐ Score and bend on dotted lines.

☐ Glue one end of each strut to gear bracket at points labeled "glue."

☐ When glue has set, raise the tips of the wing approximately ⅜ inch and glue the other end of the struts in place behind the box beam. Study the illustration for proper placement and look at the plane head on to make sure that both sides of the wing extend from the cockpit at the same angle. The slight upward slope of each side of the wing is called dihedral. It gives the aircraft stability.

Flying your glider

Launch the plane gently at a slightly downward angle so that it will land approximately 15 feet in front of you. If thrown too hard or at an upward angle, the plane will stall, causing the nose to drop and resulting in a sharp dive to the ground. If the plane tends to stall even when launched properly, bend the rear portion of the horizontal stabilizer slightly downward. If this doesn't solve the problem, try adding a paper clip to the nose. The weight of the paperclip will cause the plane to glide at a steeper downward angle.

Experiment to find the best flight path. Try adding extra weight to the nose and bending the horizontal stabilizer slightly upward. This should give a longer flight. Try bending the aft (rear) edge of both wings downward. This will give more lift. The aircraft can be made to turn gently by bending the aft edge of one wing downward and leaving the other wing as is. You can also try launching the aircraft upside down. See if you can adjust the stabilizers so that it flies well in this position. Try building a model with no dihedral (that is, no upward or downward slope of the wings) that will fly equally well upside down or right side up.

This glider is ideal for experiments in flight since it's easy to cut and bend the paper. Additional models can be made quickly. You may want to try angling the wings down at the tips, creating "anti-hedral," or cutting away portions of the wings to make a differently shaped airfoil. You can even increase the wingspan or add drooping wing tips by gluing on extra sections of paper. Take out your scissors and see what you can do.

Helpful hint

The fuselage of your experimental glider is fragile. To give it strength, you can saturate the area just behind the cockpit with super glue. Be warned, however, that the super glue will discolor the model.

Long before there were airplanes or helicopters, there were flying toys. This one — a simple flying propeller — was popular in the 1800's. Often hand-carved of wood, propellers like these could fly to a height of 20 feet or more.

The Toy Shop's flying propeller is given a modern twist by the daring foursome of death-defying skydivers that graces its wings.

Difficulty level: Easy
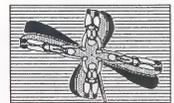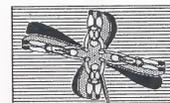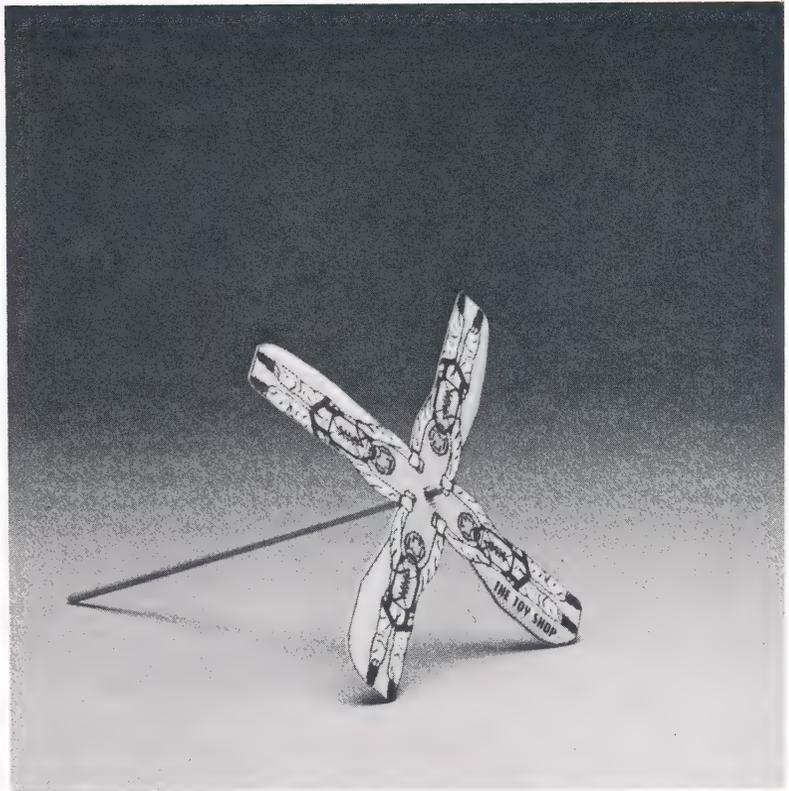
Flying Propeller

What you will need:

- ☐ Scissors
- ☐ White glue
- ☐ Super glue
- ☐ Dowelling

Wings (Paints)

Customization Options

Bend Blades
Into Curved
Shape

↑
Blade ← Washer
← Dowel
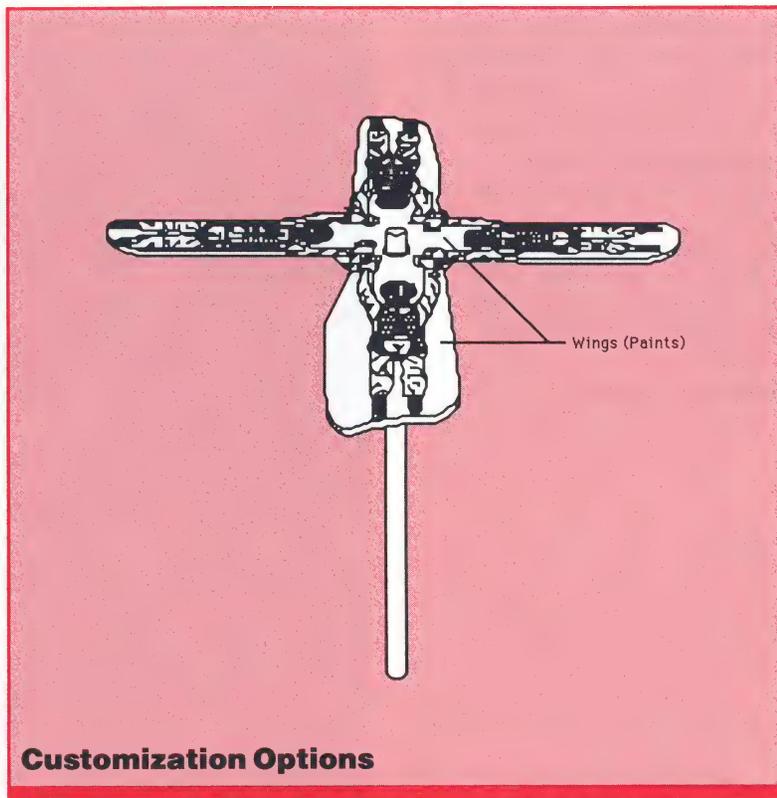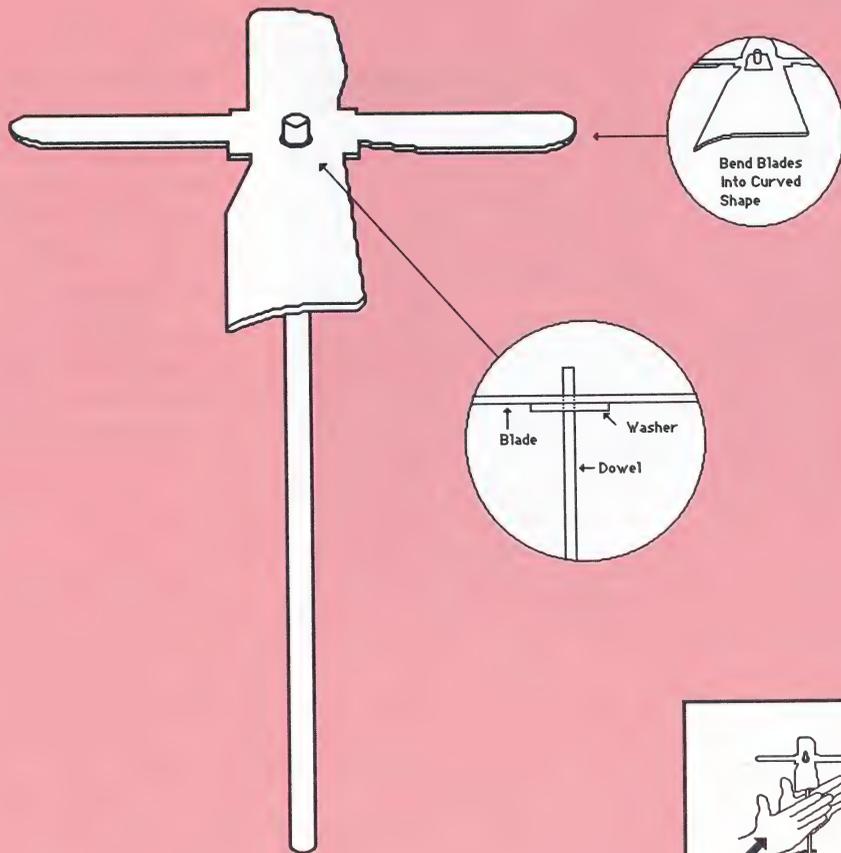
Construction Diagrams

Flying Propeller

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

☐ Cut out propeller and washer.

☐ Glue washer to propeller as shown.

☐ Drill a hole through the center of the propeller just large enough for dowelling to pass through snugly.

☐ Cut a piece of dowelling 6 inches long.

☐ Slide propeller onto dowel and use super glue to glue in place ¼ inch from end of dowel as shown.

☐ When glue has dried, bend the blades of the propeller into a curved wing shape.

To make the propeller fly, hold the dowel between the palms of your hands. Slide your right hand forward rapidly and release. The propeller will fly upward like a helicopter.

The Toy Shop helicraft is a model with a long history. Nearly 500 years ago, the Italian artist and scientist, Leonardo Da Vinci sketched plans for a helicopter-like flying machine, and even earlier, the Chinese were making helicopter toys called "flying tops." A variety of experimental model helicopters were built long before the first real ones got off the ground. One version, built by two Frenchmen in 1784, had blades made of feathers and used the spring action of a piece of whalebone to turn the rotors. Others used steam as a source of power. A model built by Alphonse Penaud in the 1870's was powered by rubber bands just as The Toy Shop's helicraft is.

Difficulty level: Challenging
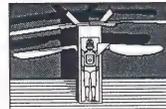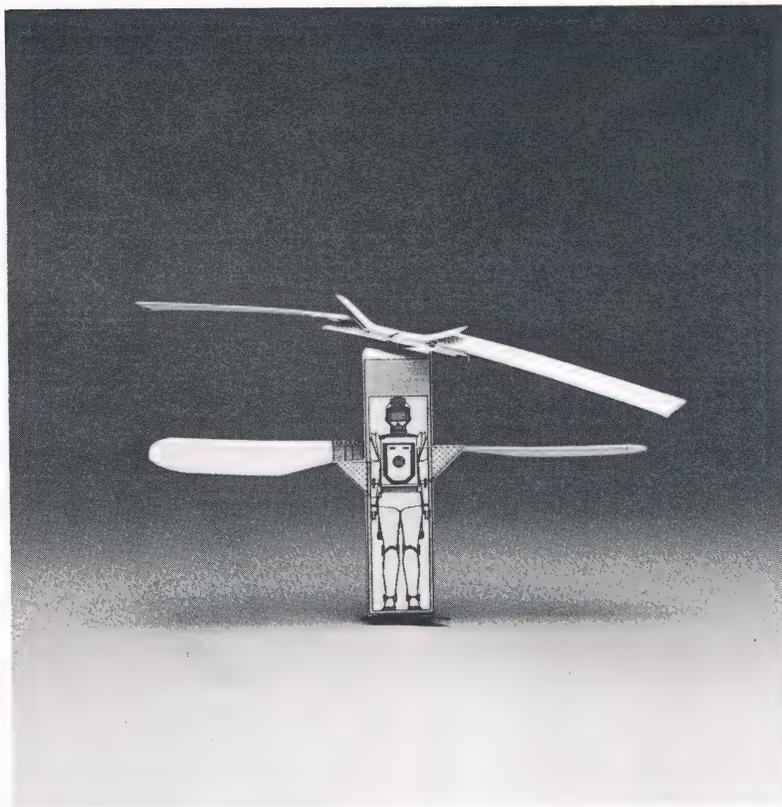
Helicraft

What you will need:

- ☐ Scissors
- ☐ White glue
- ☐ Super glue
- ☐ Metal-edged ruler
- ☐ Hobby knife
- ☐ Wire
- ☐ Needle-nosed pliers with cutting edge
- ☐ Rubber stripping
- ☐ Petroleum jelly
- ☐ Liquid detergent

Upper Rotor Blades (Paints)

Lower Rotor Blades (Paints)

Frame Border (Paints)

Lower Rotor (Decals)

Customization Options

Rotor Shaft

tab

Leading edge folded under.

Lower Rotor Blade

Lower Rotor Support

Frame

Rubber Stripping

Optional Back Cover

← tab

Construction Diagrams

Rotor
Stop

Upper Rotor
Blade

Hinge
Bracket

Upper Blade
Supports

1/8 inch

Rotor
Hinge

Rotor
Hinge

Rotor
Shaft

1/2 half inch

Washer

Upper
Rotor

Hinge
Bracket

Crease here
with thumbnail.

Crease here
with thumbnail.

Apply "superglue"
to top of washer
and rotor shaft.

Make rotor
shaft this size
and shape.

Bending
Guide For
Rotor Shaft

Construction Diagrams

Construction Diagrams

1. Bend to this shape and size.

2. Bend at dotted line —

3. — to exactly this angle

4. Now looks like this.

5. Bend down 90 degrees —

6. —like this.

7. Now looks like this.
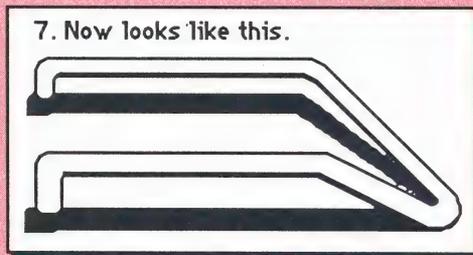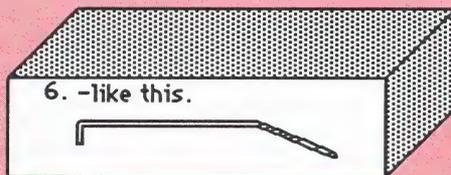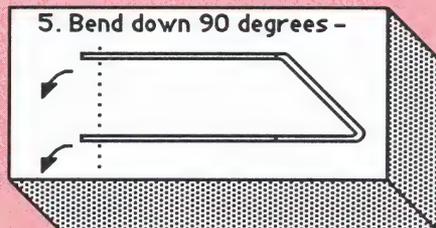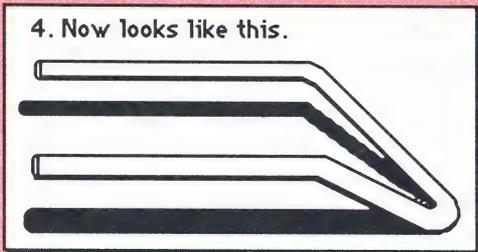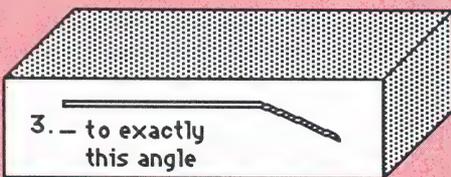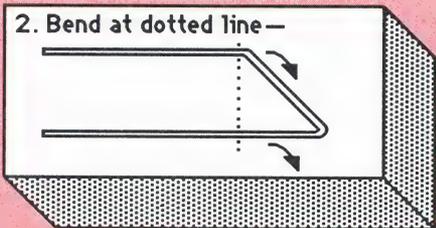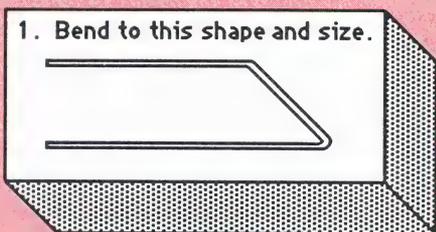
Bending Guide
For Rotor Hinge

Helicraft

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

Frame

☐ Cut out frame.

☐ Drill hole in top, just large enough for wire to fit through snugly. Drill two holes in bottom. These holes should be large enough for rubber stripping to fit through. Start drilling the holes with a hobby knife and enlarge with the point of a pencil.

☐ Score and bend on dotted lines.

☐ Fold the frame into an open box shape. Glue corner tabs in place. Glue end flaps over long side tabs.

☐ Apply two or three drops of super glue to the hole drilled in the top of the frame. Let the glue dry completely. Then redrill the hole, making it just large enough for wire to fit through snugly. Sand lightly to remove the ridge around the hole. This treatment will create a smooth, low-friction surface against which the washer attached to the rotor shaft will turn.

Lower rotor blades

☐ Cut out lower rotor blades and lower rotor supports.

☐ Score and bend on dotted lines.

☐ Fold the straight edge of each blade under and glue in place.

☐ Glue a lower rotor support to each blade as shown. Study the illustration carefully so that you glue each support on in the right direction.

☐ Glue the lower blades to the frame as shown, matching the extending tabs on the supports to the indicated gluing areas on the frame. For added strength, apply a line of glue where the blades join the frame. Apply a thin film of glue to the scored edges of the supports as well. Set aside to dry.

Upper rotor blade assembly

☐ Cut two pieces of wire $3\frac{1}{3}$ inches long. Bend each piece of wire, following the rotor hinge bending guide, to form two rotor hinges.

Note: *The angle of bend in these wires will affect the way the model flies more than any other step in its construction. Work carefully, matching the hinges to the illustrations as closely as possible.*

☐ Cut a piece of wire 3 inches long. Form the rotor shaft by bending the wire, following the rotor shaft bending guide. When finished, clip away any excess wire. Install the rotor shaft in the frame by passing the straight end of the shaft up through the hole

Assembly Instructions

drilled in the top of the frame as shown.

☐ Cut out washer. Drill a hole in the center large enough for wire to fit through snugly. Slide the washer onto the rotor shaft, locating it approximately 1 inch from the top end of the shaft. Apply a drop of super glue to the top of the washer, then pull the shaft down so that the washer rests lightly on the top of the frame. Be careful not to glue the washer to the top of the frame. Check from several angles to make sure that the shaft is vertical and the washer is flat against the frame. This alignment of the washer is critical to the model's performance. When glue has set, apply an additional drop of glue to the top of the washer to reinforce the joint. Let glue dry completely.

☐ Cut out blade supports.

☐ Glue together, back to back. When glue has dried, drill a hole where indicated large enough for wire to fit through snugly.

☐ Cut out upper rotor blades.

☐ Score and bend on dotted lines.

☐ Fold long tab on each blade and glue to the underside of the blade.

☐ Turn blades face down on the work surface and install rotor hinges as shown. The two short tabs at the end of the blades should be folded and glued over the hinges so that the 90-degree bends in the wire touch the edges of the tabs. Before the glue sets, use your thumbnail to crease the tabs as shown, making them fit

closely against the wire. Apply a thin film of glue to the score line along the edge of each tab to keep the paper from fraying.

☐ Cut out the hinge plate. Fold along diagonal lines without scoring so that the ends meet with a slight overlap in the middle of the center section. If folded correctly, the shape of the piece (when placed flat on the work surface with the overlapping sections on top) will match the shape printed on the upper blade support.

☐ Join the upper rotor blades to the hinge plate by placing the hinge plate flat on the work surface with the overlapping sections on top. With rotor blades tab side down, install the rotor hinge wires inside the folds of the hinge plate. Glue hinge plate sections over the wire, creasing the plate close to the hinge wire as shown. Study the illustration carefully to see how the pieces go together.

☐ Glue the rotor blade assembly to the upper blade support, aligning the hinge plate with the shape printed on the support. When the glue has dried, drill a hole through the entire assembly using the hole previously drilled in the upper blade support as a guide. Hole should be just large enough for wire to fit through snugly.

☐ Cut out rotor stop. Drill hole where indicated large enough for wire to fit through snugly. Glue rotor stop to top of upper rotor assembly, aligning holes. Use your thumbnail

Helicraft

Assembly Instructions

to crease the stop next to the hinges so that the ends of the stop stick up as shown. When the glue has set, turn the rotor assembly upside down, allowing the rotor blades to droop against the ends of the stop. Bend the ends of the stop back and release so that both blades droop at a 45-degree angle.

Installing the upper rotor blade

☐ Slip the upper rotor blade assembly onto the rotor shaft. The underside of the assembly should be approximately 3/8 inch above the washer. Bend the top of the shaft over the blade assembly as shown. Use needle-nosed pliers to squeeze the wire, clamping the rotor blade assembly securely in place.

☐ Cut a 20 inch piece of rubber stripping. Fold the stripping in half so its thickness is doubled, then install as shown, trimming the ends to a point to make it easier to thread them through the holes in the bottom of the frame. Adjust the stripping so that there is just enough tension to hold the rotor shaft upright. Tie in place with a square knot at the bottom of the frame.

☐ Check to see that the rotor assembly is aligned as shown. Rotate to see that it stays in alignment as it turns. When satisfied, apply a

drop of super glue to the top and bottom of the rotor assembly to attach it permanently to the shaft.

Back cover (optional)

☐ Test fly the model. Then, if you want, cut out the back cover and glue in place on the back of the frame. It's a good idea to attach the cover with only a small spot of white glue at each corner. The cover will then be easy to remove if you need to replace the rubber stripping inside.

Lubrication

☐ Apply a dab of petroleum jelly between the washer and the frame. Also apply a coat of liquid dishwashing detergent to all surfaces of the rubber stripping after installation. Apply enough undiluted detergent to wet the stripping.

Flying the helicraft

☐ Before flying, hold the model upright and check the amount of clearance between the leading edge of the upper rotor blades and the upper surface of the upper blade support. The clearance should be approximately 1/8 inch as shown in the illustration. It should be the same for both

Assembly Instructions

blades. If necessary, carefully adjust the wire hinge. Also, check both hinges to see that they move freely.

☐ Wind the upper rotor clockwise. As you wind, knots will form in the rubber stripping. In general, a double row of knots is the minimum needed, and a triple row is about as much stress as the rubber stripping can stand.

☐ To launch the model, hold it by the bottom, release the upper rotor and allow it to begin rotating. Then let go of the bottom. Do not toss the model upward.

The helicraft should climb easily to a height of 12 or 15 feet and then descend smoothly to the ground. As with any flying model, air currents will have a major effect on its performance. If you wish to experiment, vary the angle of the upper rotor hinge wires. A smaller angle will increase the speed of the rotor and thereby enhance stability, but the craft will not climb as high. A typical flight characteristic of the model is to spiral upward, then down while flying in approximately a six-foot circle. A carefully constructed and precisely adjusted model will fly straight up and remain almost stationary over the ground when the air is calm.

Jet Dragster

Isaac Newton was right! For every action, there's an equal and oppposite reaction. That's what makes this jet dragster work. Attach an inflated balloon to the front end of the engine, release it so that the air rushes out, and watch the car zoom off in the opposite direction. Experiment to see which variables make the dragster go faster or slower. Build several models and stage your own dragster races.

Difficulty level: Medium
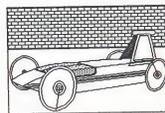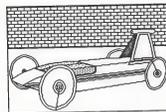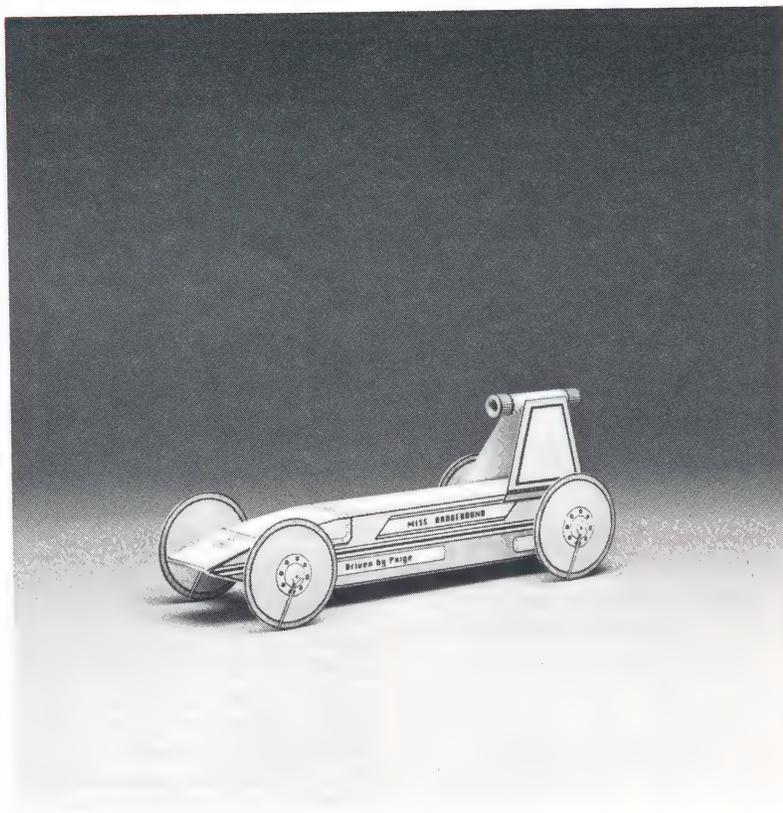
What you will need:

☐ Scissors
☐ White glue
☐ Super glue
☐ Metal-edged ruler
☐ Hobby knife
☐ Wire
☐ Wire cutters
☐ Balloon
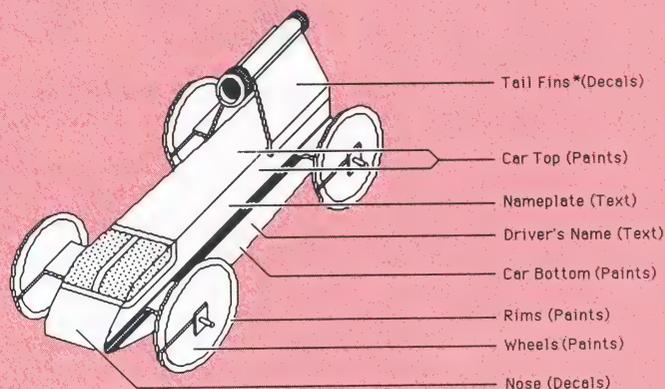
Tail Fins*(Decals)

Car Top (Paints)

Nameplate (Text)

Driver's Name (Text)

Car Bottom (Paints)

Rims (Paints)

Wheels (Paints)

Nose (Decals)

* Note: Avoid using decals containing text in this location.

Customization Options

Balloon Retaining Ring

Engine

Engine Support

Rear Axle Mount

Rear Body Panel

Axle Mount

Axle

Washer

Body

Large tab goes outside.

Inner Wheel Section

Outer Wheel Section
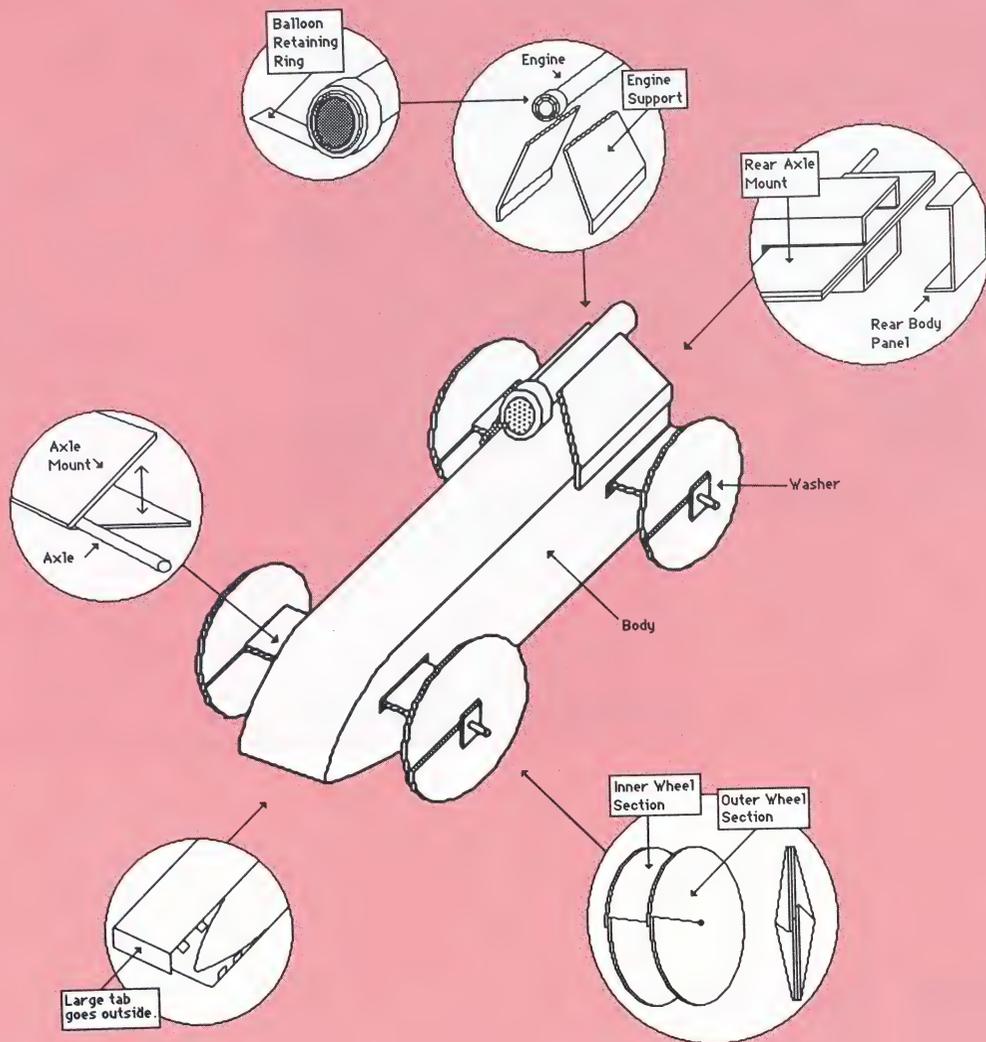
Construction Diagrams

Assembly Instructions

Note: *Before beginning to assemble your model, adhere print-out pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

Body of Car

☐ Cut out body of car. Cut slots for wheel mounts at front and back of car using a hobby knife.

☐ Score and bend on dotted lines.

☐ Fold car body. Glue long tab in place. Then glue small tabs in place. Fold large tab on nose over bottom section of car and glue in place.

Assembling axles

☐ Cut out axle mounts.

☐ Score and bend on dotted lines.

☐ Cut two 4 inch pieces of wire. These will be the axles. Place an axle in the fold of each axle mount. Be sure that an equal amount of wire extends from each side of the mount. Glue the two sides of each axle mount together.

Mounting axles

☐ Slide one axle mount through the slots at the front end of the car. The wire axle should be at the front end of the mount. Align the axle by matching the alignment marks on the mount with the body of the car. Glue the mount to the car by applying a line of glue along the mount where it meets the body of the car.

☐ Slide the other axle mount into the slots at rear end of car. The wire axle should be at the front end of mount. Do not glue the mount to the car until the rear body panel is in place.

☐ Cut out rear body panel. Score and bend on dotted lines. Glue in place at rear of car with tabs on the outside. Be sure to keep the car body square.

☐ Align the rear axle mount as you did the front axle mount. Then glue in place.

Engine support

☐ Cut out engine supports.

☐ Score and bend on dotted lines.

☐ Glue in place at rear end of car body as shown.

Jet Dragster

Assembly Instructions

Engine

Note: *The engine and balloon retaining band should NOT be adhered to cardstock.*

☐ Cut out engine and balloon retaining band.

☐ Give a curl to the paper by pulling each piece over the sharp edge of a desk or table top. This will make the paper easier to roll.

☐ Form the engine by rolling it around a pencil or the handle of your hobby knife. Keep the ends even and roll tightly. Glue last wrap in place, then remove from dowelling.

☐ Roll the balloon retaining band around one end of the engine, gluing the first and last wrap in place.

☐ To strengthen and waterproof the engine, saturate the balloon retaining strip with super glue. Use enough glue to wet the paper both inside and out. Be careful not to get super glue on your fingers. Set engine aside to dry completely.

☐ Mount the engine by gluing it between the engine supports as shown. The balloon retaining band should be toward the front of the car. The engine should extend beyond the supports far enough for the balloon to be attached.

Assembling wheels

☐ Cut out wheels.

☐ Drill a hole in the center of each wheel. Hole should be large enough for wire to pass through and rotate freely.

☐ Slash each wheel along the line leading from the center to the edge. Overlap and glue in place to form a slight cone.

☐ Glue wheel halves together, pairing inner and outer halves. Seams formed by overlap should match as shown in the illustration. Hold wheel halves together until glue has set.

Mounting wheels

☐ Drill holes in washers. Cut washers out.

☐ Slip wheels and then washers onto wire axles. Glue washers to axles using super glue. Be careful not to glue the washers to the wheels.

☐ When glue is completely dry, check operation of the wheels. All four wheels should rotate freely and touch the ground. If necessary, adjust wheel position by gently bending the wire axles.

Assembly Instructions

Operating the jet dragster

To make the jet dragster go, fit an uninflated balloon over the band on the front part of the engine. Then, blow into the engine to inflate the balloon. Pinch the neck of the balloon so that the air won't escape, place the car on a flat surface and let the balloon go. The car will race forward, propelled bythe force of the escaping air.

Mechanical Bank

Tabby's tail twitches as tooth-some mice chase your spare change into the coin box of this intriguing mechanical bank. This model is part of a long tradition of mechanical banks. Unlike most, however, it utilizes an intricately connected system of gears, more like the mechanism of a clock than a bank.

The first mechanical clocks of the 13th and 14th centuries were driven by a system of falling weights that moved the gears. A verge escapement mechanism in which two projections fixed to a balance axis engaged and disengaged the teeth of an escape wheel provided the regularly recurring movement that kept these clocks running on time. The same mechanism is at work in this bank.

To insure that the bank will run once you have put it together, perform all cutting, folding, and gluing operations with care. Precision and accuracy are essential. Follow the instructions exactly and the rewards of completing this challenging project will be yours.

Difficulty level: Challenging
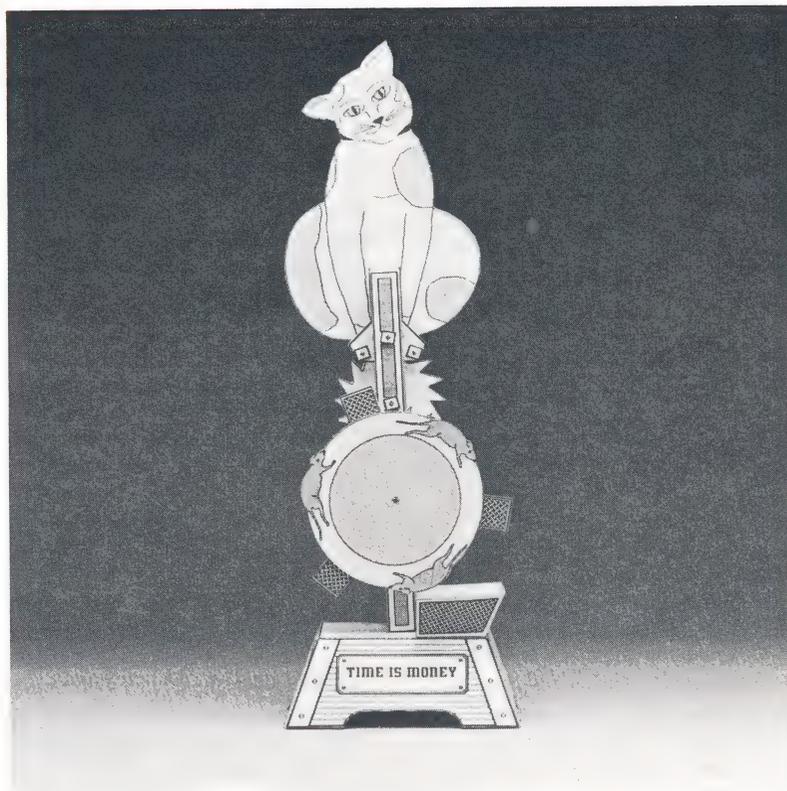
What you will need:

- ☐ Scissors
- ☐ White glue
- ☐ Super glue
- ☐ Metal-edged ruler
- ☐ Hobby knife
- ☐ Wire
- ☐ Wire cutters
- ☐ Straight pins (2)
- ☐ Sandpaper, fine grade
- ☐ One penny
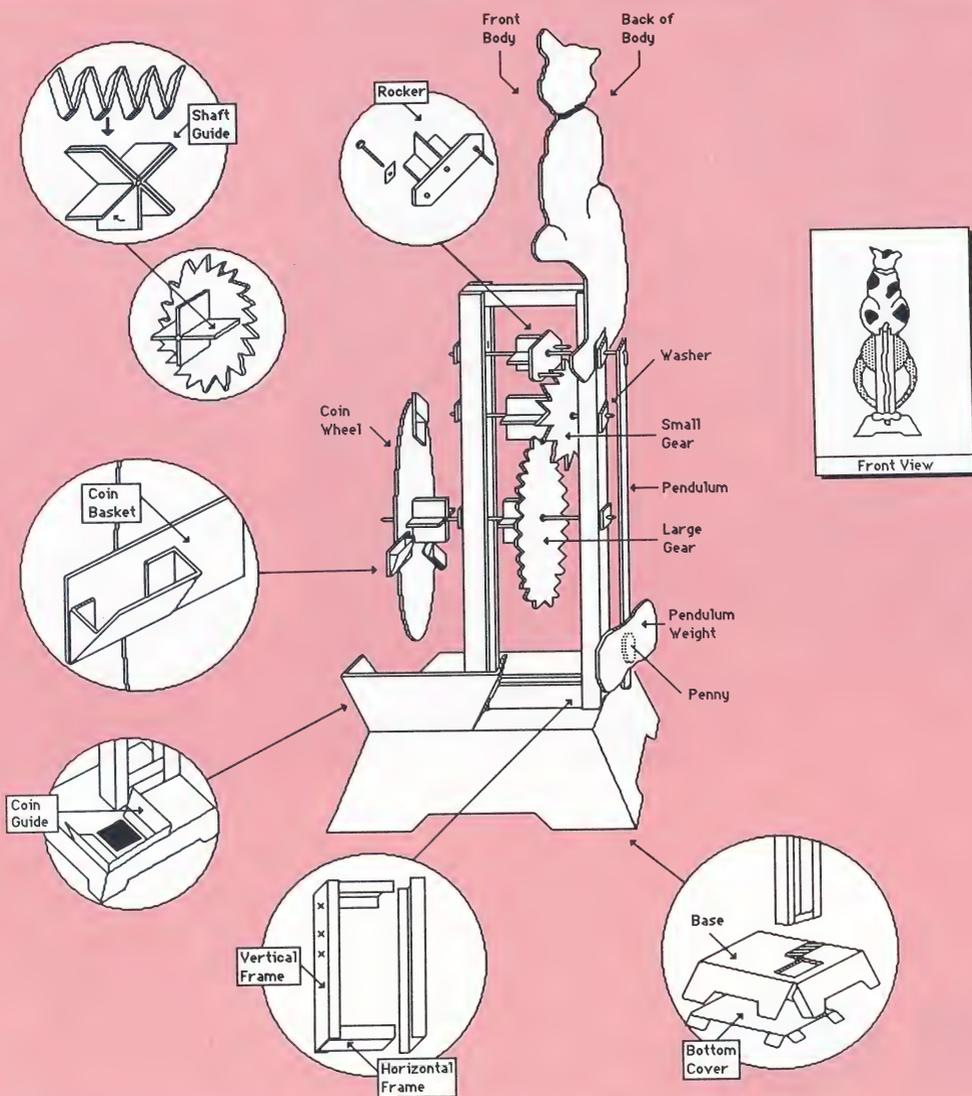
Spots on Cat (Paints)

Coin Wheel Interior (Paints)

Base and Frame Panels (Paints)

Coin Guide and Baskets (Paints)

Base (Decals)

Base Plaque (Text)

Customization Options

Mechanical Bank

Construction Diagrams

Assembly Instructions

Note: *Before beginning to assemble your model, adhere print-out pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

Base

☐ Cut out base and bottom cover.

☐ Cut opening in base, using a hobby knife. This will be the bank's coin hole.

☐ Score and bend on dotted lines.

☐ Fold base. Glue tabs in place.

☐ Glue bottom cover to base with tabs pointing toward bottom of the base. To seal edges, apply a line of glue around the bottom cover where it meets the inner walls of the base. Set aside to dry.

Note: *You may want to leave the bottom cover off until you've built the bank and made a few test runs. Once the bottom is in place it's not easy to get your money out.*

Framework

☐ Cut out vertical and horizontal frame sections.

☐ Drill holes for gear shafts in vertical frame sections. Holes should be just large enough for wire to pass through and rotate freely. Accurate positioning of the holes is crucial to the bank's operation. Be sure to drill them precisely at the places indicated.

Note: *For smooth, long-running operation of the bank, place a drop of super glue on each hole you drill. Immediately blow on the hole to blow away excess glue. Redrill when glue is dry. Holes must be large enough for wire to rotate freely.*

☐ Score and bend on dotted lines.

☐ Glue vertical frame sections to horizontal frame sections, making sure that holes in vertical frame are aligned opposite one another and that corners are square.

☐ Glue framework onto base. Long rectangles on vertical frame sections should be nearest the bottom. This is important. If short rectangles are at the bottom you will not be able to position the gears properly.

Mechanical Bank

Assembly Instructions

Coin guide

☐ Cut out coin guide.

☐ Score and bend on dotted lines.

☐ Glue coin guide in place around coin hole.

Coin wheel

☐ Cut out coin wheel front, coin wheel back, and coin baskets (3).

☐ Score and bend on dotted lines.

☐ Glue coin wheel back to coin wheel front to make one double-thick wheel.

☐ Drill hole in center of coin wheel. Hole should be just large enough for wire to pass through snugly.

☐ Fold baskets, gluing tabs in place as shown.

☐ Glue baskets in place over rectangles on front of coin wheel. The baskets will extend over the edge of the wheel.

Gears — Preparation

☐ Cut out large gear, small gear, rocker, and large and small shaft guides.

Note: Accurate cutting of the gears is extremely important. To cut accurately, first cut the circle drawn around the gears. Be sure to cut precisely on the outside edge of the line. Then, cut the gear teeth, using sharp scissors. Be careful not to bend the gears as you work. They should be kept as flat as possible. Coat the edges of the gear teeth with super glue. When the glue is completely dry, sand very lightly to smooth the surface of the gears.

☐ Drill holes in gears and rocker as indicated. Holes should be just large enough for wire to pass through snugly.

☐ Assemble shaft guides, by first scoring and bending on dotted lines. Score lines marked like this ▪+▪+▪+▪ on the reverse side. Then fold each shaft guide accordian fashion.

Note: Proper scoring and folding of the shaft guides is very important. Be sure to score in the center of the dotted lines making a straight, even cut with your hobby knife. Fold each guide, using your fingers to make the sections line up. The sections should lie, one on top of another, like a deck of cards. Squeeze the folded guide between your fingers. Check to see that the edges are even by placing the folded guide on a table top. If edges are uneven, re-fold and check again.

Assembly Instructions

□ When shaft guides are properly folded, spread a light coat of glue on every other section of the guides and glue each guide into an X shape. Be sure that the ends of the guide are at the outside edge — not the center — of the X. Use your fingers to form the guide into a symmetrical X shape that lies flat on the table top. Hold until glue has set.

□ Position shaft guides on gears, coin wheel, and rocker by passing a piece of wire through both the shaft guide and the center hole in the gear (or coin wheel or rocker). Glue shaft guides in place by spreading glue over the X mark on each piece, wiping off excess, and then sliding the shaft guide into place over the X. Be sure that the guide is positioned squarely over the X. When glue has set, remove the wire used to center the shaft guide on the gear.

Note: *Glue short shaft guides to large gear and rocker. Glue long shaft guides to small gear and coin wheel. This is important. If you glue the wrong guide to the wrong gear, your bank won't work.*

Coat the long shaft guide attached to the small gear with super glue. When glue is completely dry, sand lightly to smooth the surface.

□ Complete rocker by first drilling holes in two washers and cutting the washers out. Insert two straight pins into the rocker from the gear shaft side as shown, passing the pins first through the washers and then through the rocker holes (see illustration).

Glue pins in place by applying super glue under the washer and over the head of the pin. Make sure that pins are perfectly straight as they extend from the rocker. Set aside to dry. When dry, cut each pin so that it is ¼ inch long.

Gears — Assembly

□ Drill holes in remaining washers. Holes should be just large enough for wire to pass through snugly. Cut washers out.

□ Cut three pieces of wire, each 3 inches long. These will be the gear shafts. Sand the wire, using a fine grade of sandpaper. This will make for a better bond when the gears are glued to the shafts. Make sure wire is as straight as possible.

□ Re-check holes in framework to make sure wire can pass through and rotate freely. Then, set shafts and gears into position on framework, placing the large gear at the bottom, the small gear in the middle, and the rocker at the top. (For each gear, pass wire shaft through appropriate hole in the framework. Slide the gear and attached shaft guide onto the wire and then pass the wire out through the hole on the opposite side of the framework.)

Mechanical Bank

Assembly Instructions

Center gears on shafts. Then turn the bank on its side and place a drop of super glue at every point where gears and gear shaft wires meet. With the bank on its side, glue will run down into the shaft guides and bond them firmly to the wire. Let dry for at least five minutes. Turn bank on its other side and place drops of glue on the other side of the gears and gear shaft wires. Let dry for five minutes. For a strong bond, be very careful not to move or in any way disturb the gears until you are sure the glue is completely dry.

☐ Align gears by moving shafts until gears are positioned as shown in the diagram. Check to make sure that neither the gears, the shaft guides, nor the pins on the rocker touch the framework. When alignment is correct, slip washers into place on each end of each gear shaft. Leave a small space, the thickness of a piece of cardstock, between the washers and the framework. Glue washers to gear shafts, using super glue. Be careful not to glue the washers to the framework.

☐ When glue is dry, cut excess wire, leaving ½ inch on the top shaft for the pendulum (see illustration) and 1 inch on the bottom shaft for the coin wheel.

Note: At this point, it's a good idea to check the operation of the gears. Turn the bottom gear, making at least one complete revolution, to see if the gears mesh smoothly. If the gears don't work, or if they work for awhile and then stop, something is wrong. Check the list of things to do if your bank won't run, included at the end of these instructions. Locate the problem and make the necessary adjustments. The bank is easier to fix at this point than it will be later on when all of the pieces are in place.

Coin wheel

☐ Slide coin wheel onto bottom gear shaft as shown. Position so that baskets are aligned with coin hole. Tip the bank on its side and place a drop of super glue at the point where the wheel and the wire gear shaft meet. Let dry at least five minutes. Then, tip the bank on its other side and place a drop of super glue on the other side of the coin wheel where it joins the wire shaft. Let dry.

Pendulum

☐ Cut out pendulum and pendulum weight.

☐ Drill hole in pendulum as indicated. Hole should be just large enough for wire to pass through snugly.

Assembly Instructions

☐ Glue a penny to the pendulum where indicated, using a drop of super glue. Then glue the pendulum weight on top of the penny.

☐ Slide pendulum onto top gear shaft. Be sure to allow plenty of space between the pendulum and the framework. The pendulum should not touch the framework at any point. Align so that when the pendulum is vertical, the rocker is horizontal. This is very important. The bank will not operate properly if the pendulum alignment is off. When the pendulum is positioned correctly, use pliers to put a 90-degree bend in the end of the wire. Then, being careful to maintain the correct positioning of the pendulum, use super glue to glue pendulum to bend in the wire. Let dry. When glue has dried, check the movement of the pendulum. It should swing freely without rubbing against the framework at any point.

Body

☐ Cut out front and back of body.

☐ Glue front and back together.

☐ Glue body in place at top of scaffolding as shown. The front of the body should face the coin wheel. The opening at the base of the body fits around the upper gear shaft. Make sure that the body does not interfere with the movement of the washer on the top shaft. The gear shaft and washer must be able to move freely if the bank is to work.

Operating the bank

Put the bank into operation by placing a penny or a nickel in one of the coin baskets. Ideally, the weight of the coin will set the gears in motion, but you may have to give the pendulum a gentle shove to get things started. As the coin wheel turns, the pendulum will swing. When the basket reaches the coin hole, the coin will drop out and be deposited in the bank.

Things to do if your bank won't work

1. Check the pendulum alignment. The tip of the pendulum should be aligned with the vertical section of the framework when the the rocker is horizontal. If the pendulum alignment is not correct, adjust the pendulum and add glue to re-attach.

2. Check to see that the wire shafts are straight. A shaft that is not straight can throw the gears or the rocker out of alignment.

3. Check to see that the washers have not been glued to the beams and that the gears are not rubbing against each other or the framework.

Mechanical Bank

Assembly Instructions

4. Check to see that the gears are firmly glued to the shafts. If they are not, apply additional drops of super glue.

5. Rotate the gear mechanism by hand, checking to see that the rocker pins move freely. If rocker pins catch on the gears, check to see that the pins are absolutely straight. If they are not, straighten them. Apply additional super glue if necessary.

Rocker pins should touch the gear one at a time. If rocker pins touch the gear at the same time, it's likely that the gear was not cut accurately. Check to see whether the gear teeth are too long and snip off the ends of those that are.

6. Check to see that all gears mesh properly. If they don't, try to figure out whether this is due to inaccurate cutting (in which case you can use scissors to trim the gears) or whether it is due to shaft holes in the framework being located too high or too low. If this is the case, remove the wire gear shaft. Glue a piece of cardstock to the inside of the framework, and redrill the holes as necessary.

Primitive but lethal! The medieval siege catapult, on which this model is based, was used to hurl heavy stones over the moats and walls of enemy castles. Spies who had been captured and killed were returned to the castle via catapult, too. Sometimes this ingenious war machine was used to sling rotting horse carcasses into beseiged towns in hopes of causing disease.

You won't be able to hurl dead horses with The Toy Shop catapult, but you can use it to lob paper clips, rubber erasers, or jelly beans across the room. Your missiles will go surprisingly far, so be careful where you aim!

Difficulty level: Challenging
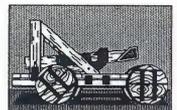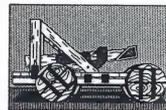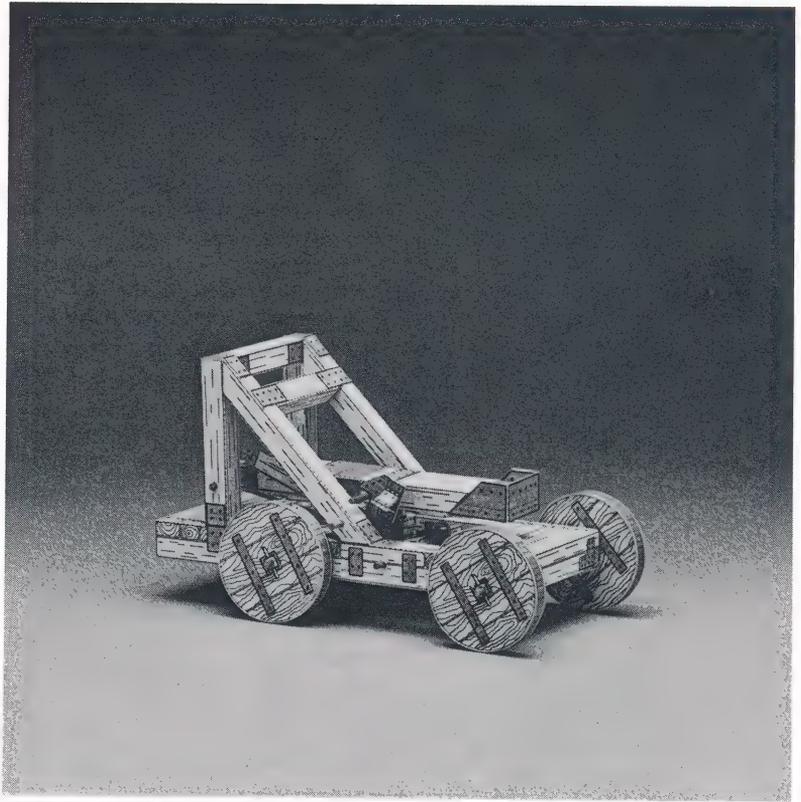
Medieval Catapult

What you will need:

- ☐ Scissors
- ☐ White glue
- ☐ Super glue
- ☐ Metal-edged ruler
- ☐ Hobby knife
- ☐ Dowelling
- ☐ Rubber stripping
- ☐ Cotton cord
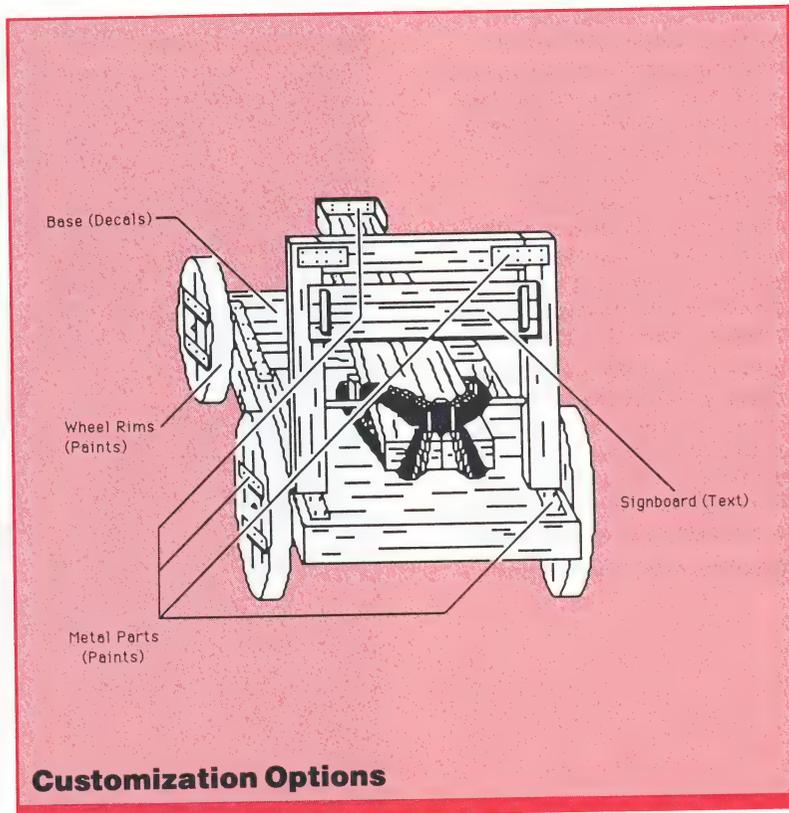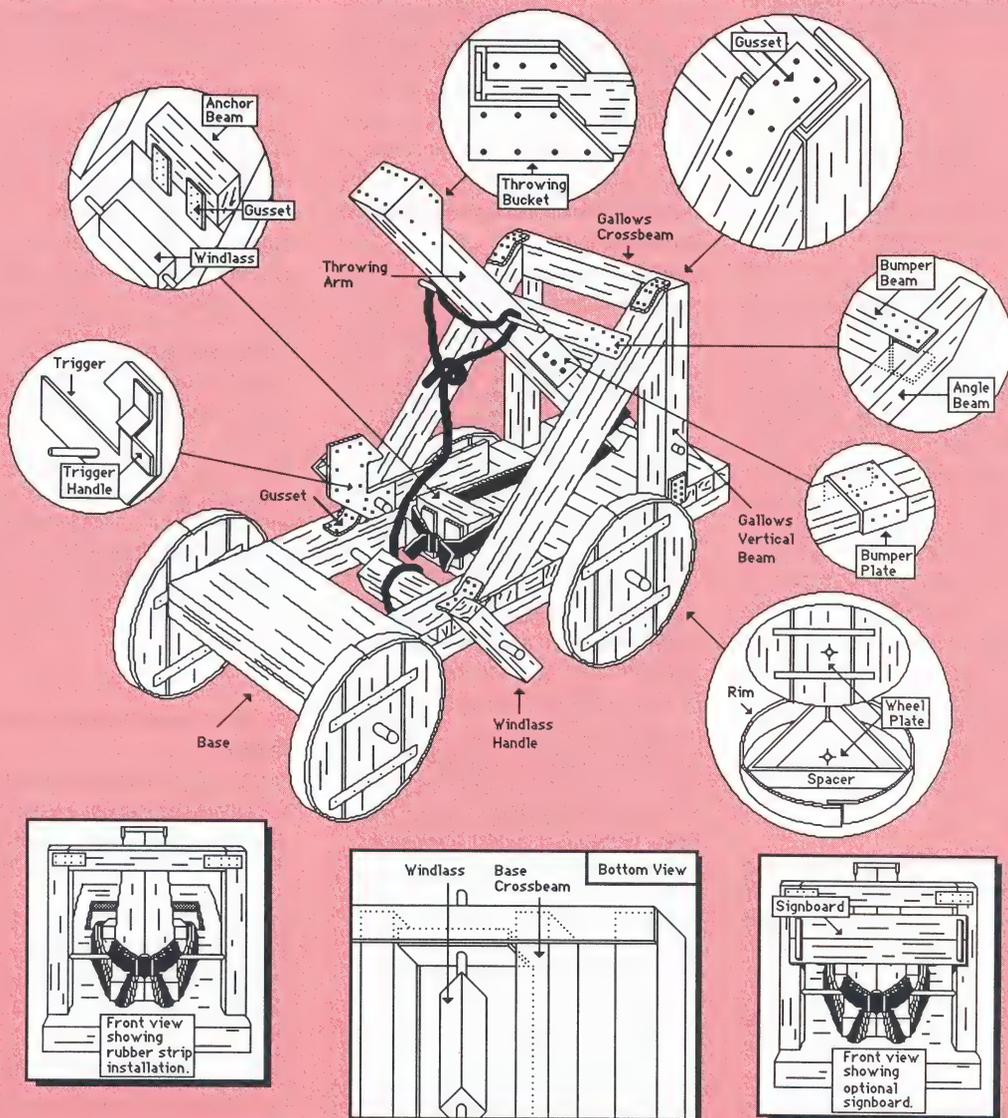
Base (Decals)

Wheel Rims
(Paints)

Signboard (Text)

Metal Parts
(Paints)

Customization Options

Construction Diagrams

Anchor Beam
Gusset
Windlass
Throwing Bucket
Gusset
Gallows Crossbeam
Throwing Arm
Bumper Beam
Angle Beam
Trigger
Trigger Handle
Gusset
Gallows Vertical Beam
Bumper Plate
Base
Windlass Handle
Rim
Wheel Plate
Spacer
Front view showing rubber strip installation.
Windlass
Base Crossbeam
Bottom View
Signboard
Front view showing optional signboard.

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

Wheels

☐ Cut out wheel plates (8), rims (4), and spacers (4).

☐ Drill a hole in the center of each wheel plate, large enough for dowelling to fit through snugly.

☐ Curl each rim by drawing it over the sharp edge of a desk or table top. Then check the fit of the wheel plates and rims. The rims should fit snugly around the wheel plates. Note the amount of overlap required and then glue the overlapping ends of each rim together to form a circle. Hold ends together until glue has set.

☐ Select a wheel rim and place it flat on the work surface. Select a wheel plate and ease it, printed side down, into the rim. This is difficult and may take several tries. Keep working at it until the wheel plate is in the proper position, flush with the lower edge of the rim. Then apply a line of glue around the inside of the wheel assembly where rim and wheel plate meet. Set aside to dry.

Repeat this procedure with each of the remaining wheels.

☐ Score and bend the wheel spacers. Fold each spacer into a triangular shape, apply glue to one edge and glue in place inside the wheel assembly as shown. Note that the spacer must be bent slightly to fit.

☐ Apply glue to top edge of each spacer. Fit a wheel plate into the rim on top of the spacer, holding in place until glue has set.

Note: *It is important that the plank pattern on the top and bottom wheel plates runs in the same direction. This will ensure that the axle holes are aligned. Check the direction of the plank pattern before gluing the top wheel plate in place.*

When the wheel plate is properly installed, apply a line of glue around the circumference of the wheel where plate and rim meet. Repeat this procedure for each of the wheels and then set aside to dry.

Base

☐ Cut out base. Use a hobby knife to cut out the center section, studying the section carefully so that you will see exactly where to cut.

☐ Drill holes in base where indicated. There are eight in all. Holes should be large enough for dowel to pass through and rotate freely.

☐ Score and bend on dotted lines.

☐ Fold base. Glue tabs at corners

Assembly Instructions

in place. Leave flaps along the sides and ends, as well as the center fold-down area, unattached.

☐ Cut out base crossbeams. These will form the front and back sides of the opening in the base.

☐ Score and bend on dotted lines. Then fold and glue tabs in place.

☐ Glue beams into place as shown, applying glue to the bottom of the beams and pressing each beam firmly against the base. The wood pattern on the beams should face the inside of the opening.

☐ Glue the long flaps along the sides of the base and the flaps that form the sides of the opening into place. Notice that the side flaps overlap the end flaps. Study the illustration to be sure that you understand how the base goes together.

Gallows

☐ Cut out gallows vertical beams (2) and gallows crossbeam.

☐ Drill holes in vertical beams large enough for dowel to fit through snugly.

☐ Score and bend on dotted lines. Then fold and glue tabs in place.

☐ Glue the crossbeam to the vertical beams, fitting the ends of the crossbeam into the cut out ends of the vertical beams. Place the crossbeam flat on your work surface while gluing, being sure to keep the corners square.

☐ Glue the crossbeam assembly to the squares marked "glue" at the front of the base.

☐ Cut out angle beams (2).

☐ Drill holes where indicated in one of the angle beams. Holes should be large enough for dowel to pass through and rotate freely. Do not drill holes in the other angle beam.

☐ Score and bend on dotted lines. Then fold and glue tabs in place.

☐ Place the angle beam with holes drilled in it on the side of the base where the trigger will be installed. Place the beam without holes on the other side. Study the illustration to see how the beams should be positioned. Glue ends of the beams to points indicated on base and crossbeam assembly. Hold in place until glue has set.

☐ Cut out six gusset plates. Glue gusset plates in place at bottom and top of angle beams and at bottom of vertical beams as shown. The gussets will reinforce the joints.

Windlass and windlass handle

☐ Cut out windlass and windlass handle.

☐ Drill holes where indicated large enough for dowel to fit through snugly.

☐ Score and bend on dotted lines. Then fold each piece into a closed

Medieval Catapult

Assembly Instructions

box shape and glue tabs in place.

☐ Cut a piece of dowel 4 inches long. Using the dowel as an axle, install the windlass in the opening in the base as shown. Make sure that the dowel turns freely in the holes in the sides of the base. Enlarge holes if necessary. Center the windlass and apply a drop of super glue to each end to attach it firmly to the dowel.

☐ Slide the windlass handle onto the dowel at the right side of the base. Adjust so that the clearance between the windlass and the base is the same as the clearance between the handle and the base. The windlass will now be slightly off center in the opening. Glue the handle to the dowel with a drop of super glue.

Trigger

☐ Cut out the trigger and the trigger handle.

☐ Score and bend on dotted lines. Lines marked like this ➕➕➕➕ should be scored on the reverse side.

☐ Fold the trigger in half and glue the two sides together back to back.

☐ When glue is dry, drill hole where indicated large enough for dowel to fit through snugly.

☐ Glue trigger handle to front side of trigger where indicated. Study

the illustration to see how it should look.

☐ Cut a 1 inch piece of dowelling. Insert dowel through hole in trigger so that one end is flush with the back side of the trigger and the other end extends from the front side (the side with the handle attached). Apply a drop of super glue to join trigger and dowel firmly together.

☐ Install the trigger by sliding the dowel into the holes in the angle beam as shown. Note that the trigger should be on the inside of the beam. Make sure that the trigger dowel turns freely in the holes.

Anchor beam

☐ Cut out the anchor beam.

☐ Score and bend on dotted lines. Then fold into a closed box shape and glue tabs in place. Hold ends firmly until glue has set.

☐ Glue anchor beam in place behind opening in base as shown.

☐ Cut out remaining two gusset plates and glue to anchor beam and base as shown. Then apply a line of glue around the anchor beam where it joins the base. Set aside to dry. The gussets and the glue will make the anchor beam sturdy enough to resist the strong pull of the rubber stripping which will be anchored to it when the catapult is put into action.

Assembly Instructions

Throwing arm

☐ Cut out throwing arm, bumper plate, and throwing bucket.

☐ Drill holes in throwing arm large enough for dowel to fit through snugly.

☐ Score and bend on dotted lines.

☐ Fold the throwing arm into an open box shape and glue tabs in place. Glue long tab first, then glue end tabs. Hold firmly until glue has set. To give the throwing arm added strength, apply a thin line of glue along the fold lines. Wipe away excess glue and let dry.

☐ Glue bumper plate over throwing arm where indicated. For added strength, apply a thin line of glue along the fold lines. Wipe away excess glue and let dry.

☐ Fold upper edges of throwing bucket down and glue over lower bucket. Fold entire bucket and glue in place at end of the throwing arm.

☐ Cut a 3 inch piece of dowelling. Insert dowelling through holes in throwing arm between the bumper plate and the throwing bucket. Center the dowelling and glue in place with a drop of super glue applied to each side.

☐ Cut a 3½ inch piece of dowelling. Using the dowelling as an axle, install the throwing arm between the vertical beams of the gallows as shown. The throwing arm should be able to move freely on the dowel. Enlarge holes in throwing arm if necessary. Adjust so that an equal amount of dowelling extends from the vertical beams on each side. Use a drop of super glue to attach the dowel to the vertical beams.

Bumper beam

☐ Cut out the bumper beam.

☐ Score and bend on dotted lines. Then fold and glue tab in place. To strengthen the beam, apply a line of glue along each fold, wipe off excess glue, and let dry.

☐ Glue bumper beam in place between angle beams as shown.

Note: *Check the position of the beam before gluing by swinging the throwing arm up until it touches the bottom of the beam. Adjust the bumper beam, if necessary, so that it lies flat against the throwing arm. For added strength, apply a line of glue where bumper beam and angle beams meet. Wipe away excess glue and let dry.*

Rubber band

☐ Study the illustration showing rubber band installation so that you will have an idea of how the rubber band is installed.

☐ Cut a 20 inch piece of rubber stripping. Turn the model so that it faces you as in the illustration. Double the rubber stripping so that

Medieval Catapult

Assembly Instructions

you have a 10 inch, double-thick piece. Then loop the rubber stripping around the throwing arm just behind the dowelling. Tie the stripping tightly on top of the throwing arm using a square knot. Tie a second knot, two inches from the first, forming a loop. Cut away excess stripping. Now, stretch the rubber stripping across the end of the throwing arm as shown. Bring the loop under the arm and hook it around the anchor beam. As you can see, this arrangement will bring the throwing arm up with considerable force.

String

□ Cut a 14 inch piece of cotton cord. Tie one end tightly around the windlass. Glue in place with a drop of super glue. Tie the other end around the dowel on the throwing arm as shown.

Installing the wheels

□ Cut two 4½ inch long dowels to serve as wheel axles.

□ Drill holes in washers, large enough for dowelling to fit through snugly. Cut washers out.

□ Check axle holes in base. Enlarge if necessary so that axles will rotate freely.

□ Insert axles in axle holes. Slip washers onto the ends of the axles.

Center axles. Position the washers so that there is just enough room between the washer and the base for the axles to turn freely. Attach washers to axles with a drop of super glue, being careful not to glue the washers to the base. When glue is dry, slip wheels onto axles and attach with a drop of super glue.

Signboard

□ Cut out signboard sections. Glue sections together back to back.

□ Glue signboard to vertical beams at front of gallows.

Operating the catapult

To cock the catapult, wind the windlass handle to pull the throwing arm down. The trigger should automatically engage the dowel that extends from the left side of the throwing arm. Place whatever you want to throw in the throwing bucket. Fire the catapult by pushing the trigger handle down.

Note: *The catapult is capable of hurling objects with enough force to do considerable damage, so be careful how you use it. Never aim at people or animals or at breakable objects such as glassware and windows.*

The Type 35 Mercer Raceabout is a car collector's dream. Manufactured in Mercer County, New Jersey, from 1911 to 1915, the Raceabout had a four-cylinder, 300-cubic-inch, T-head engine, a wet multiple-disc clutch, and a three-speed gearbox built by Brown and Lipe. The factory guaranteed a mile in 51 seconds, but this was thought by most to be conservative.

Many famous race drivers of the day, including Ralph DePalma, Barney Oldfield, and Eddie Pullen drove Mercers. In 1912, Ralph DePalma won the Santa Monica Road Race 300-cubic-inch class in a Mercer, averaging close to 70 mph for 150 miles. In 1914, Eddie Pullen won the 301.8-mile Corona Road Race at a speed of 87.76 mph.

The Mercer Raceabout sold for $2,200 new. About 500 were made before the factory discontinued production in 1915. Some two dozen are still in existence.

This Raceabout model features steerable front wheels operated by a simple system of push-pull rods, a mechanism similar to that used in many early automobiles. If you prefer, you can install the front wheels on a straight wire axle, to make construction easier. For a solid feel, fill the wheels with salt or clean sand. Enhance with gold or silver trim and you'll be ready to hit the road!

Difficulty level: Challenging
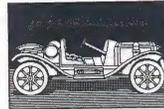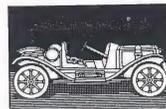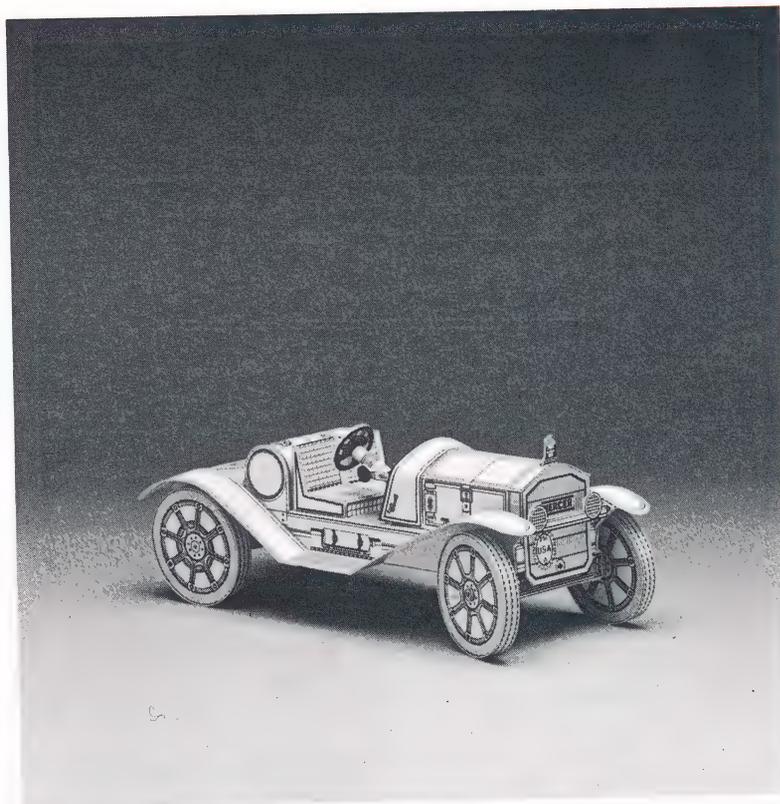
Mercer Raceabout

What you will need:
- ☐ Scissors
- ☐ White glue
- ☐ Super glue
- ☐ Metal-edged ruler
- ☐ Hobby knife
- ☐ Wire
- ☐ Dowelling
- ☐ Needle-nosed pliers with cutting edge
- ☐ Salt or clean sand (optional)

License Plate (Text)

Gas Tank Ends
*(Decals)

Fenders (Paints)

Body (Paints)

Seats (Paints)

Seats (Decals)

Rally Badge (Text)

*Note: Avoid using decals containing text in this location.

Customization Options
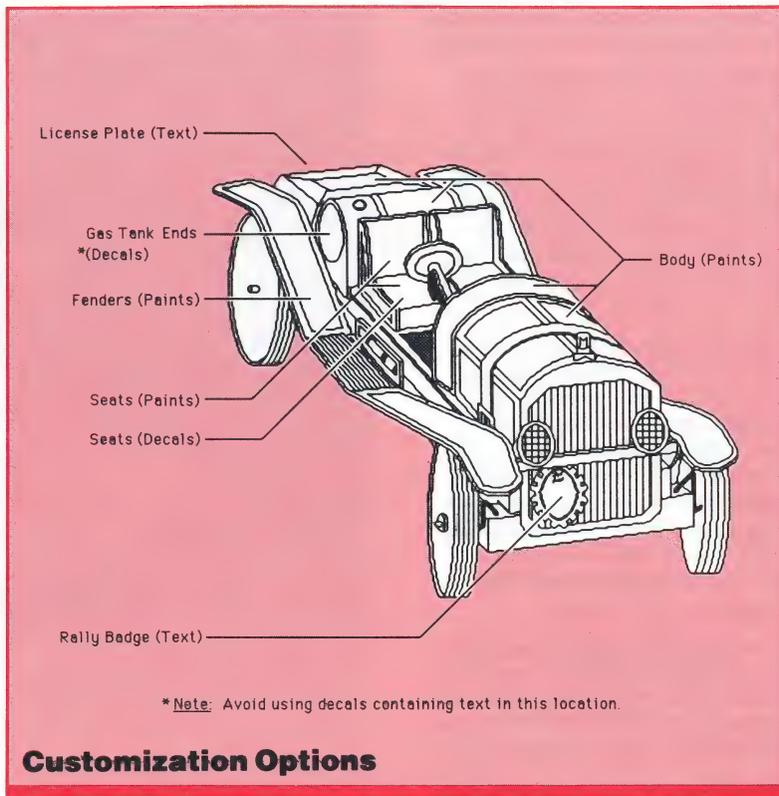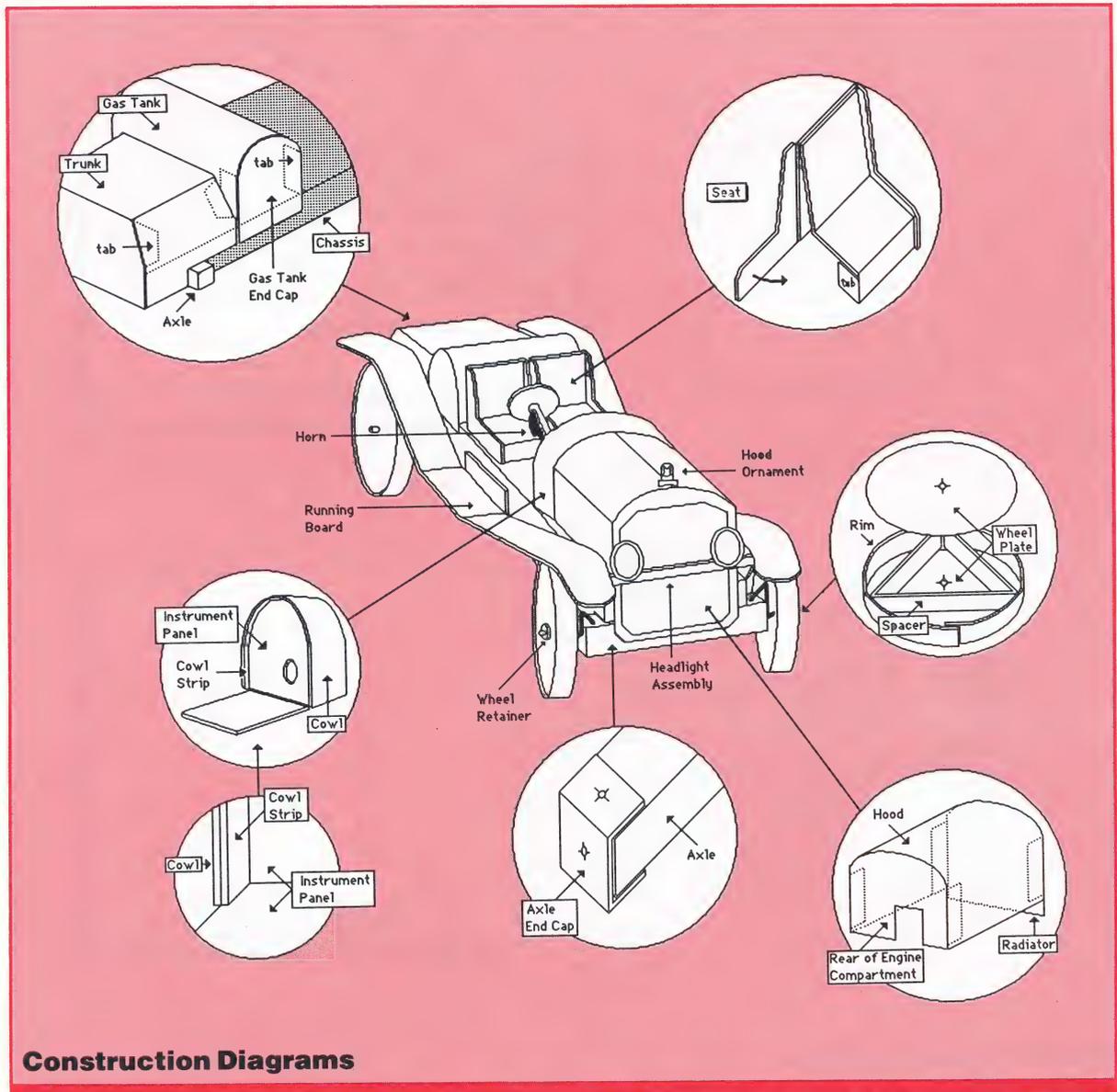
Construction Diagrams

Mercer Raceabout
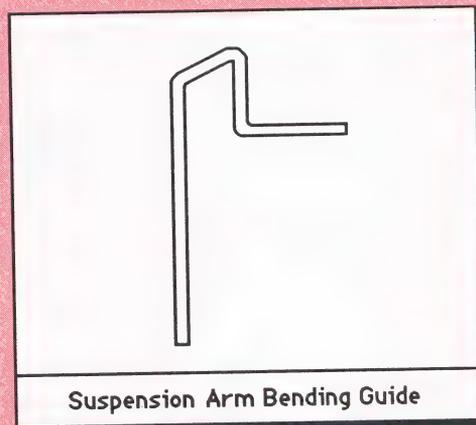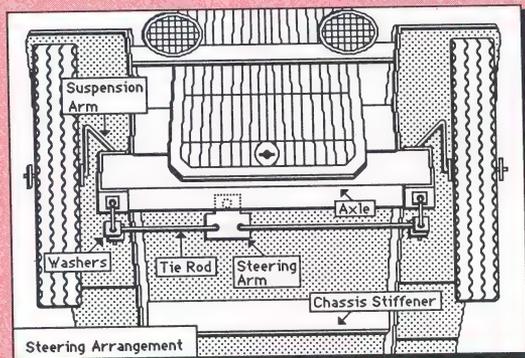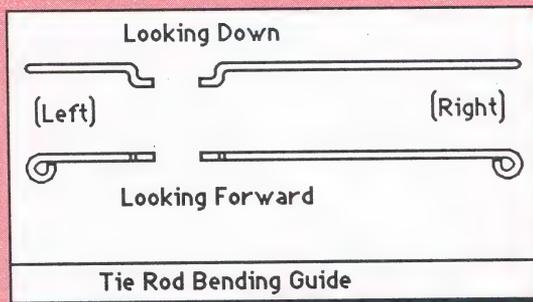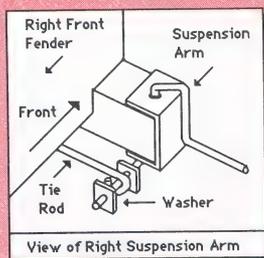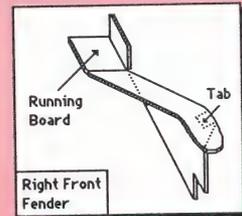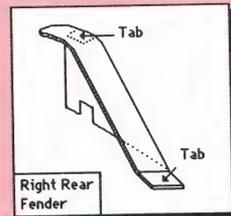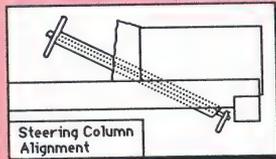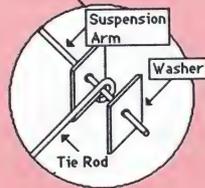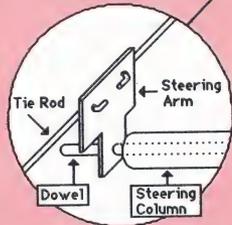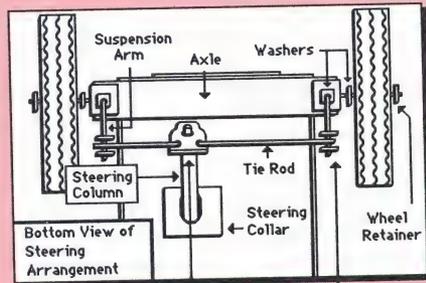
View of Right Suspension Arm

Tie Rod Bending Guide

Looking Down
(Left) (Right)
Looking Forward

Steering Arrangement

Suspension Arm Bending Guide

Construction Diagrams

Suspension Arm — Axle — Washers

Steering Column — Tie Rod

Bottom View of Steering Arrangement — Steering Collar — Wheel Retainer

Tie Rod — Steering Arm — Dowel — Steering Column

Suspension Arm — Washer — Tie Rod

Steering Column Alignment

Right Rear Fender — Tab — Tab

Running Board — Tab — Right Front Fender

Construction Diagrams

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Mercer Raceabout

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

Chassis

☐ Cut out chassis and chassis stiffener. Use a hobby knife to cut out the rectangle marked "cut out" in the front part of the chassis. Be sure to cut the small tabs in the chassis sides as indicated.

☐ Score and bend on dotted lines.

☐ Fold the chassis into an open box shape. Glue corner tabs in place.

☐ Fold chassis stiffener and glue to underside of chassis. The stiffener should be placed approximately in the center of the chassis with the tabs glued to the bottom and sides. This will strengthen the chassis and keep the sides from bending in.

Axles

☐ Cut out front axle, rear axle, and axle end caps (4)

☐ Score and bend on dotted lines.

☐ Fold each axle and glue tab in place.

☐ Fold and glue axle caps over open ends of axles. The tabs go over the top and bottom of each axle. Be sure to keep the axle square while gluing.

☐ When glue is dry, drill holes in axles. Holes should be drilled in the center of each end of the rear axle and in the top and bottom of each end of the front axle. (Ignore other hole indicators marked on the axle end caps.) Holes should be just large enough for wire to pass through and rotate freely.

☐ Install axles, gluing them to the tabs extending from the notches cut in the chassis. Axles should be centered and graphics should face outward. Hold in place until glue has set, then apply a line of glue at every place where the axles touch the chassis. Set aside to dry.

Wheels

☐ Cut out wheel plates (8), spacers (4), and rims (4)

Note that the rear wheel plates have brake drums visible behind the spokes while the front wheel plates do not. Note also that each plate has a solid black "lug nut." This will be used to align the front and back plates when you assemble your wheels. Aligning the plates is an important step in the assembly process because during printing, some distortion of the plates may occur. By using the "lug nut" to align the plates, you'll be sure they are properly matched.

Assembly Instructions

☐ Score and bend the wheel spacers.

☐ Pull each rim over the sharp edge of a desk or table top to give the paper a curl. Then check the fit of the wheel plates and rims. The rims should fit snugly around the wheel plates. Note the amount of overlap required and then glue the overlapping ends of each rim together to form a circle.

☐ Select a rim. Shape it with your fingers into as nearly perfect a circle as possible, then place it flat on your work surface. Insert a front wheel plate, printed side down, into the rim. Ease the plate into place until it is flush with the bottom edge of the rim. When fitted properly, the wheel plate will remain in place without being held. Apply a line of glue around the inside of the wheel where plate and rim meet and set aside to dry.

Repeat using another front wheel plate and then two rear wheel plates. Set aside to dry.

Trunk

☐ Cut out trunk.

☐ Score and bend on dotted lines. Fold into an open box shape and glue corner tabs in place.

☐ Glue trunk into place at rear of chassis. The trunk will overlap the sides and the rear of the chassis, and fit snugly against the rear axle.

Gas tank

☐ Cut out gas tank and gas tank end caps.

☐ Score end caps on dotted lines and bend tabs back.

☐ Give the gas tank section a curl by drawing it over the sharp edge of a desk or table top. The horizontal lines should run over the curve of the tank.

☐ Assemble gas tank by gluing end caps to curved tank. The tank should overlap the edge of the caps and be flush with the cap surface. Work on one end cap at a time, holding in place until glue has set.

☐ Glue gas tank in place in front of trunk. Apply glue to edges of the tank, to the endcaps as they overlap the sides of the chassis, and to the trunk where it touches the tank.

Note: *For authenticity, the tank should be placed so the gas cap is on the right-hand side of the car.*

Seats

☐ Cut out seats.

☐ Score and bend on dotted lines. Lines marked like this ✦✦✦✦ should be scored on the reverse side.

☐ Fold as shown and glue tabs in place. Apply glue to edges of seat

Mercer Raceabout

Assembly Instructions

cushions as well as to tabs. Hold in place until glue has set.

☐ Glue seats in front of gas tank as indicated, leaving a space of approximately 1/16 inch between the tank and the seats.

Engine compartment

☐ Cut out hood, radiator, and rear wall of engine compartment.

☐ Score and bend on dotted lines.

☐ Gently curve the middle section of the hood so that it matches the curve of the radiator and rear wall sections.

☐ Glue the radiator and then the rear wall to the hood. The hood should overlap the edge and be flush with the surface of each piece. Apply glue to edges and tabs. Work on one piece at a time, making sure that the corners match. Hold in place until glue has set.

☐ Glue engine compartment to chassis. Note that the lower part of the radiator overlaps and should be glued to both the front edge of the chassis and the front edge of the axle.

Instrument panel

☐ Cut out instrument panel, instrument panel cowl, and cowl strip.

☐ Give a curve to the cowl and the cowl strip by pulling each piece over the sharp edge of a desk or table top. Glue the cowl strip to the cowl, placing the strip so that it is inside the curve and flush with the straight edge of the cowl.

☐ Cut a hole in the instrument panel where indicated. Score and bend. Remember that lines marked like this ■+ +■+■ should be scored on the reverse side.

☐ Glue the instrument panel into the cowl as shown. The panel should rest on the cowl strip. Make sure the ends of the cowl extend equally on each side.

☐ Put the instrument panel assembly onto the engine compartment and chassis to check the fit. The floor portion of the panel should touch the front edge of the seats. The bottom edges of the cowl should touch the chassis. When satisfied with the fit, remove and apply glue to the floor section and the front edge of the cowl. Reinstall the assembly and hold firmly in place until glue has set.

Fenders

☐ Cut out the left front, left rear, right front, and right rear fenders. Label each piece so you'll know which is which.

☐ Score and bend on dotted lines. Lines marked like this ■+ +■+■ should be scored on the reverse side.

Assembly Instructions

☐ Fold each fender as shown, gently curving the part that fits over the wheel by pulling it over the sharp edge of a desk or table top. Glue tabs in place.

☐ Join right rear fender to right front fender by gluing tab to underside of running board. Do the same with the left fender sections.

☐ Glue right fender to right side of car. Check fit before applying glue. The running board should line up with the bottom of the chassis and the vertical sections of the fender should line up with the chassis front and back. You may find that you need to trim the notches in the fender so that it fits over the axles properly.

Glue left fender to left side of car in the same way.

Steering column

☐ Cut out steering column section (which should not be adhered to poster board backing). Curl the paper by pulling it over the sharp edge of a desk or table top.

☐ Cut a piece of dowelling 4⅜ inches long.

☐ Wrap the steering column section around the dowel to form a tightly rolled cylinder. Glue the last wrap in place.

☐ Cut out the steering wheel sections and glue them back to back. When glue has dried, drill a hole in the center of the steering wheel large enough for dowel to fit through snugly.

☐ Remove the dowel from the center of the steering column. Slip steering wheel onto dowel so that end of dowel is flush with the surface of the wheel. Glue using a drop of super glue.

☐ Cut out steering collar and steering arm. Use a hobby knife to cut hole in steering collar.

☐ Drill holes in steering arm. Small holes should be just large enough for wire to pass through and rotate freely. Large hole should be large enough for dowel to fit through snugly.

☐ Install the steering column by slipping it in through the hole in the instrument panel and out through the hole in bottom of the chassis. Slip the collar onto the column as it emerges from the chassis bottom. Do not glue at this time.

☐ Slip the dowel with the steering wheel attached into the steering column. Slide the steering arm onto the lower end of the dowel as it emerges from the column. End of the dowel should be flush with the surface of the steering arm. Glue steering arm to dowel with a drop of super glue. Be careful not to glue the dowel to the column.

☐ Adjust the position of the steering column so that it is straight and so that the steering arm just clears the front axle when the steering wheel is turned. When the column is adjusted correctly, glue the collar to the bottom of the

Mercer Raceabout

Assembly Instructions

chassis. Then glue the column to the collar. Apply a line of glue around the column where it emerges from the instrument panel and set the car aside until glue is completely dry.

Installing the rear wheels

☐ Drill holes in center of rear wheels. Holes should be just large enough for wire to fit through snugly.

☐ Cut a piece of wire 4 inches long. Insert the wire through the holes in the rear axle.

☐ Drill holes in two washers. Cut out and install one on each end of the wire extending from the rear axle. Center the wire in the axle and arrange the washers so that they are a paper's thickness away from the ends of the axle. Glue washers to wire with a drop of super glue. Be careful not to glue the wire to the axle.

☐ Slide rear wheels onto wire. Glue each in place with a drop of super glue. Do not disturb until glue is completely dry. Then snip off excess wire.

Installing front wheels

☐ Drill holes in front wheels. Holes should be large enough for wire to pass through and rotate freely.

☐ Cut two pieces of wire 2½ inches long. Use the bending guide to bend the wire, forming a left and a right suspension arm for the front wheels.

☐ Install the suspension arms as shown, using a pair of needle-nosed pliers to bend the wire extending from the bottom of the front axle straight back.

☐ Drill holes in four washers and two wheel retainers. Then cut out. Slip a washer onto each suspension arm as it emerges from the bottom of the front axle. Arrange so that the washers fit flat against the axle, then glue to the wire with a drop of super glue.

☐ Install the front wheels as shown, placing a washer, a wheel, and then a wheel retainer on each suspension arm. Adjust the retainers so they fit snugly against the wheels, then glue them to the wire with a drop of super glue. Make sure that the wheel is able to rotate freely on the suspension arm.

☐ Cut two pieces of wire, one for the left tie rod and one for the right tie rod. Form the two tie rods by using the tie rod bending guides. Make them exactly the size and shape shown by the guides. Install the bent end of each tie rod in the steering arm at the bottom end of the steering column as shown.

☐ Drill holes in four washers and cut out. Install the washers and the looped ends of the tie rods on the suspension arms as shown. The

Assembly Instructions

loop must be positioned on the suspension arm so that it is as close to the axle box as possible while still leaving room for movement of the suspension arm. Leave enough room between the washers and the tie rod so that the tie rod won't bind when the steering wheel is turned, causing the angle between the tie rod and the suspension arm to change. Also, check that the loop in the end of the tie rod is as tight as possible without binding the tie rod to the suspension arm. These adjustments will determine how much play is present in the steering mechanism and how well the wheels stay aligned as the car is operated. When you are satisfied with the adjustments, glue each washer to the suspension arm with a drop of super glue.

☐ Place the model upright on your work surface and check the alignment of the front wheels. If the wheels are not aligned, use a pair of needle-nosed pliers to clamp the suspension arm between the wheel and the axle. Then, apply pressure to the points where the suspension arms and tie rods connect to adjust the mechanism so that both front wheels point in the same direction. If both wheels do not touch the work surface, adjust the suspension arms to which the wheels are attached accordingly.

Accessories

☐ Cut out the hood ornament sections and glue together back to back. Glue in place on top of the radiator.

☐ Cut out the horn. Score, fold, and glue the sections together back to back. Glue onto the right-hand side of the steering column as shown.

☐ Cut out the headlight assembly. Score on dotted line, then fold and glue the sections together back to back. Install the headlights in front of the radiator by gluing the tabs on each side of the headlight assembly to the fenders as shown.

The Oracle

Having a tough time making decisions? Why not consult The Oracle? This ingenious pop-up decision-maker is guaranteed to provide answers to any questions you ask. To make it work, just press down on the top, ask your question, and then pull your hand away quickly. The Oracle will leap to your rescue by popping up and landing on one of its sides. The side that faces up contains the answer to the question you've asked.

Difficulty level: Easy

What you will need:

- ☐ Scissors
- ☐ White glue
- ☐ Metal-edge ruler
- ☐ Hobby knife
- ☐ Rubber band (2½ inches long)
- ☐ Dowelling
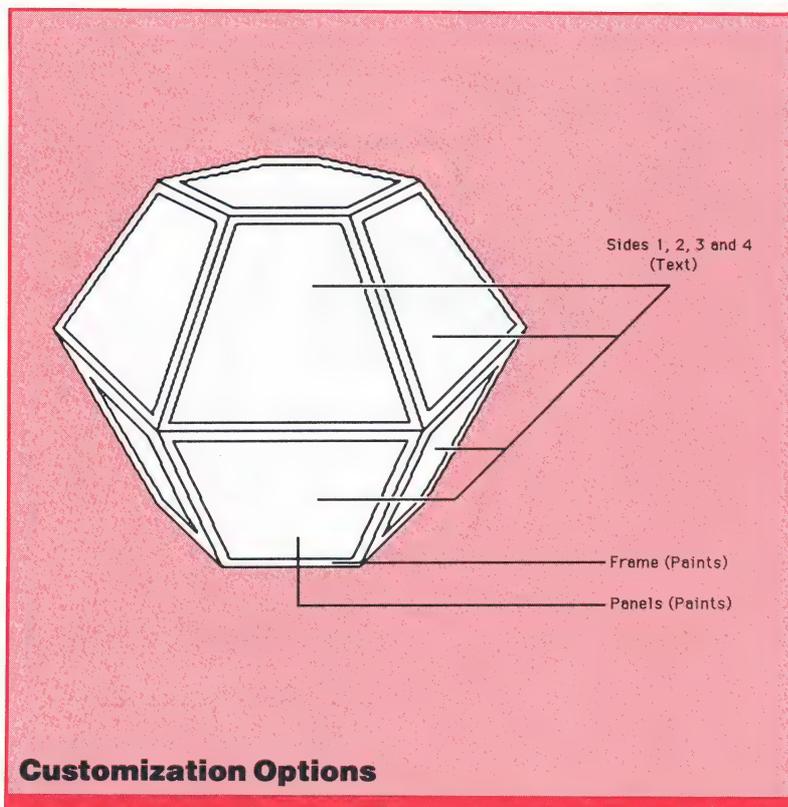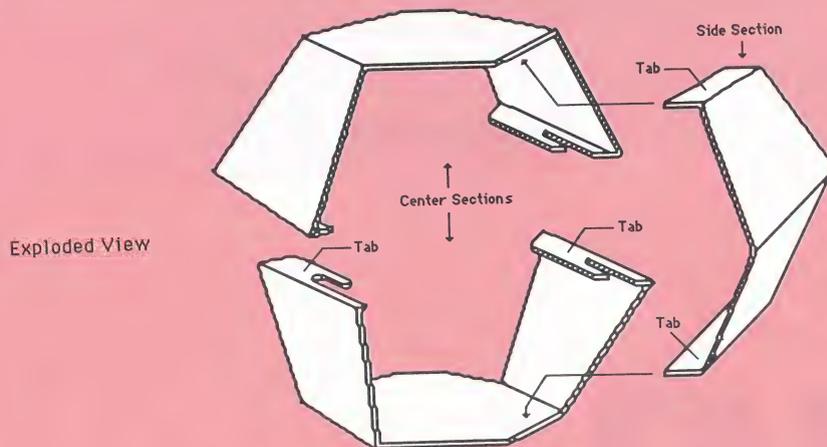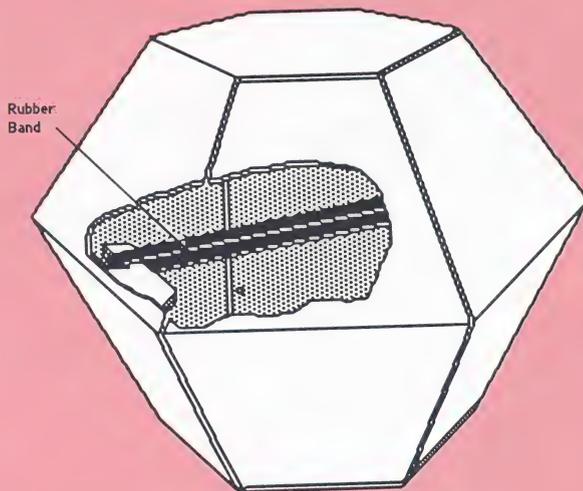
Sides 1, 2, 3 and 4
(Text)

Frame (Paints)

Panels (Paints)

Customization Options

Rubber Band

Side Section

Tab

Tab

Center Sections

Exploded View

Tab

Tab

Tab

Construction Diagrams

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

☐ Cut out center sections (2) and side sections (4).

☐ Score and bend on dotted lines.

Note: *Be careful not to cut too deeply when you score. The scored areas will serve as hinges; if cut too deeply they may come apart when the toy pops up.*

☐ Study the construction diagram to see how the toy fits together.

☐ Select a center section. Place it printed side down on your work surface. Glue the side sections to the center section as shown. The side sections should radiate from the center section and should not overlap one another.

☐ Join the remaining center section to the center section that is already in place by gluing the tabs at each end of one center section to the tabs at each end of the other center section.

☐ Glue the remaining side section tabs to the underside of the center section you have just set in place. Let glue dry completely.

☐ When glue is completely dry, slip a 2½ inch long rubber band over the hooks on the inside of the toy. The rubber band should stretch across the interior of the toy from one hook to the other. Use a piece of dowelling as a tool for installing the rubber band.

☐ To operate, press the top of the toy down and quickly remove your hand. The toy should pop up three to five inches and land on one of its sides. If the toy does not pop high enough, shorten the rubber band by tying one or two knots in it, or try using two rubber bands.

Pennypower Scale

Make your own penny-powered, desktop scale. This balancing device has its roots in ancient Egypt where balancing scales were first developed around 3000 B.C. Those scales were similar to the yokes used on oxen and were of little use in weighing small amounts. Over the centuries, as trade developed, scales for weighing small quantities of precious metals and spices were invented.

The pennypower scale is similar to a postal scale and can weigh objects up to 1½ ounces. If you want, you can build additional scales with different weight ranges simply by adding more pennies and adjusting the weight marks on the quadrant.

Difficulty level: Medium

What you will need:

- ☐ Scissors
- ☐ White glue
- ☐ Super glue
- ☐ Metal-edged ruler
- ☐ Hobby knife
- ☐ Straight pins (4)
- ☐ Pennies (6)
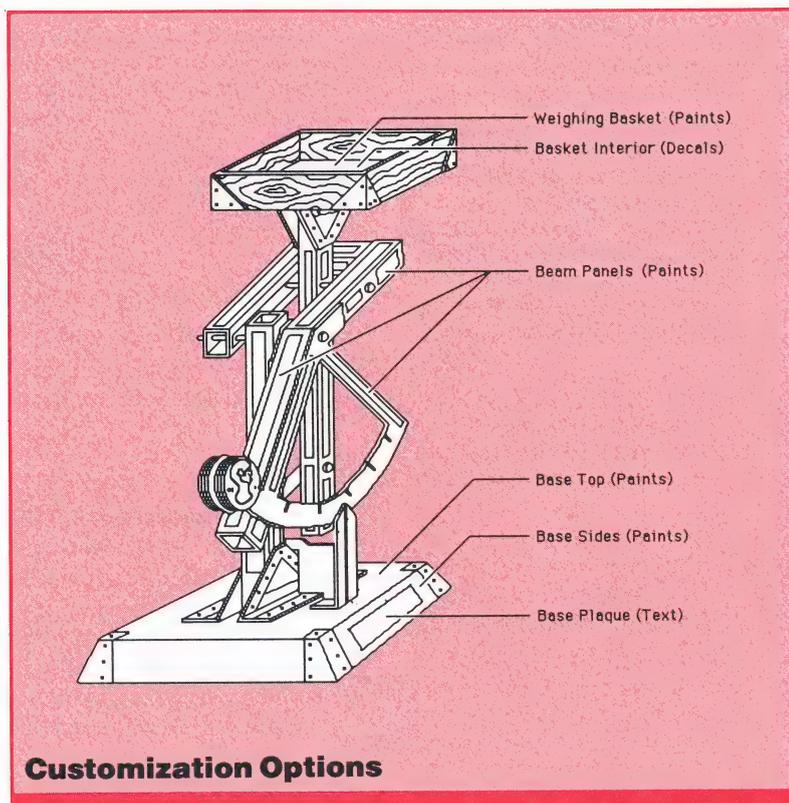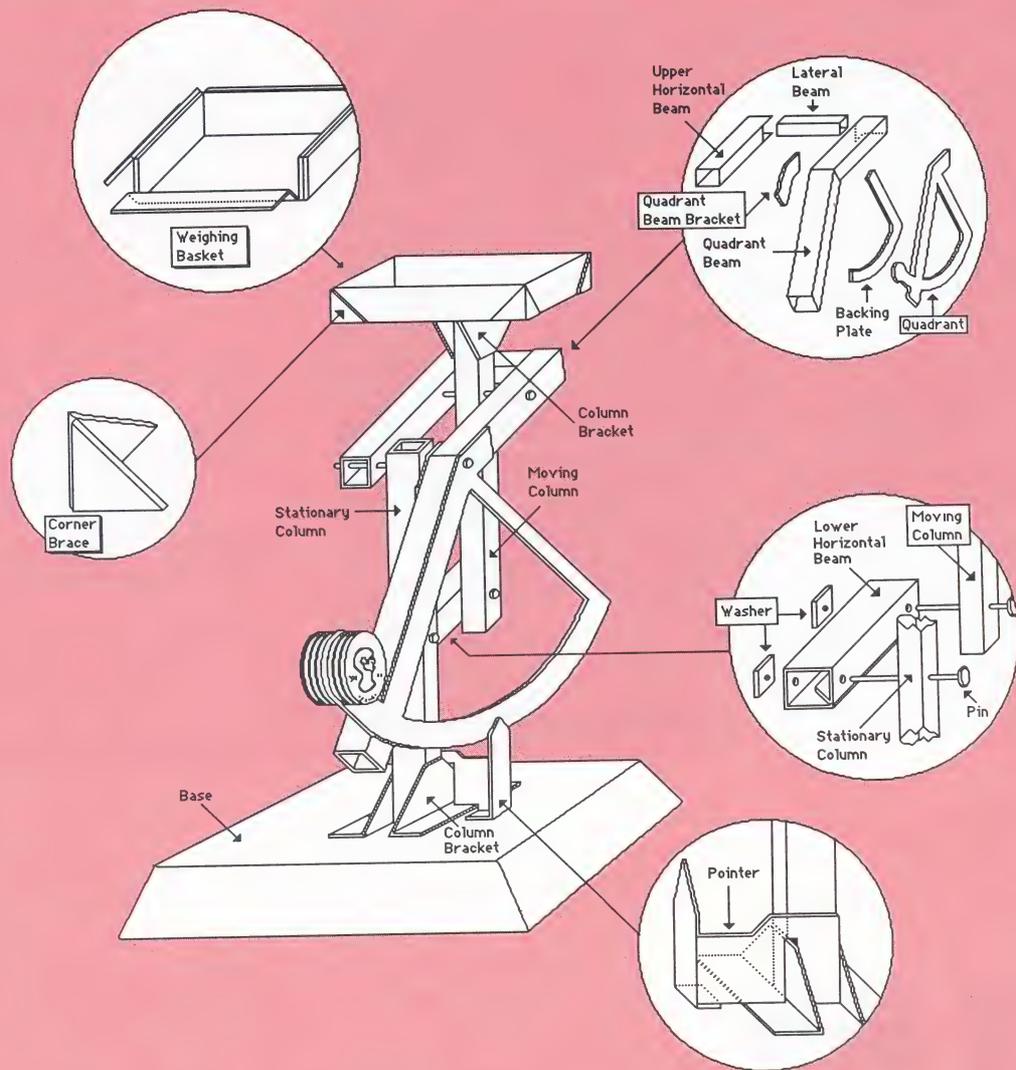
Weighing Basket (Paints)
Basket Interior (Decals)
Beam Panels (Paints)
Base Top (Paints)
Base Sides (Paints)
Base Plaque (Text)

Customization Options

Pennypower Scale

Weighing Basket

Upper Horizontal Beam

Lateral Beam

Quadrant Beam Bracket

Quadrant Beam

Backing Plate

Quadrant

Column Bracket

Corner Brace

Moving Column

Stationary Column

Lower Horizontal Beam

Moving Column

Washer

Pin

Stationary Column

Base

Column Bracket

Pointer

Construction Diagrams

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

Base

☐ Cut out base.

☐ Score and bend on dotted lines.

☐ Fold into an open box shape. Glue corner tabs in place.

Stationary column and pointer

☐ Cut out stationary column, two of the column brackets, and the pointer.

☐ Score and bend on dotted lines. Score lines marked like this ▬▬▬▬ on the reverse side.

☐ Drill holes in stationary column where indicated. Holes should be just large enough for a straight pin to fit through.

☐ Fold the stationary column and glue tab in place, being careful to align tab correctly so the column is straight.

☐ Glue one of the column brackets over one of the rectangles printed on the base. Then glue the other column bracket to the base, first checking its position by placing the stationary column between the two brackets. Brackets should fit tightly against the column.

☐ When both brackets have been glued in place, glue the stationary column to the base and to the brackets. Note that the brackets should be glued to the areas indicated at the bottom of the column. While gluing, place the base flat on your work surface and look at the column from several angles to make sure that the column is perpendicular to the base.

☐ Glue the pointer to the stationary column and base as shown, aligning it so that the arrow points straight up.

Weighing basket and moving column

☐ Cut out moving column, weighing basket, corner braces (4), and remaining column brackets (2).

☐ Score and bend on dotted lines. Lines marked like this ▬▬▬▬ should be scored on the reverse side.

☐ Drill holes in moving column where indicated. Holes should be just large enough for a straight pin to fit through.

☐ Fold column and glue tab in place, being careful to align the tab correctly so the column is straight.

Assembly Instructions

□ Fold and glue the side sections of the basket as shown so that they are of a double thickness. Then fold into an open box shape and glue corner braces in place as shown.

□ Turn basket over. Use a ruler and pencil to mark the center, then glue the column and brackets in place using the same technique as on the base. View the assembly from several angles to make sure that the column is perpendicular to the weighing basket.

Quadrant and supporting beams

□ Cut out quadrant beam, upper horizontal beam, and lateral beam.

□ Drill holes where indicated. Holes should be just large enough for a straight pin to fit through.

□ Score and bend on dotted lines. Note that the small tab on the quadrant beam is marked like this ■+ +■+■ and should be scored on the reverse side.

□ Fold upper horizontal and lateral beams. Glue tabs in place, being sure to align correctly so the beams are straight.

□ The quadrant beam is actually two beam sections hinged together. Fold each section and glue tabs in place. DO NOT glue the two sections together at this point.

□ Cut out the quadrant, the quadrant backing plate, and the quadrant beam bracket.

□ Drill hole in quadrant and quadrant beam bracket, just large enough for straight pin to fit through.

□ Glue the quadrant and quadrant backing plate together, back to back, aligning the pieces carefully.

□ Glue quadrant to quadrant beam as shown, using the quadrant as a guide to form the correct angle in the quadrant beam. Glue the quadrant beam bracket to the other side of the quadrant beam. Insert a pin through the holes in the beam bracket and the quadrant beam in order to keep the pieces aligned correctly. When glue is dry, remove the pin. Now glue the two sections of the quadrant beam together.

□ Complete the quadrant assembly by gluing the quadrant beam and the upper horizontal beam to the lateral beam as shown, being careful to keep the corners square.

□ Glue three pennies to each side of the quadrant as shown, using super glue.

Putting the scale together

□ Cut out the lower horizontal beam.

□ Drill holes where indicated, just large enough for a straight pin to fit

through.

☐ Score and bend on dotted lines.

☐ Fold horizontal beam and glue tab in place.

☐ Study the illustration carefully to see how the scale goes together. Then assemble the pieces in the following order:

1) Insert a straight pin through the lower holes in the stationary column. Pin should enter the beam from the pointer side.

2) Slide the lower horizontal beam onto the pin as it extends from the stationary column.

3) Insert a straight pin through the bottom hole in the moving column. Pass the end of the pin through the holes in the end of the lower horizontal beam.

4) Mount the quadrant assembly around the moving beam and the stationary beam as shown, inserting pins through the holes. Pins should be inserted from the pointer side of the scale.

☐ Check the movement of the scale before gluing the pins in place. The scale should move smoothly. Test it by pressing the weighing basket all the way down and releasing it. The basket should travel quickly and smoothly back to the up position. If it does not, check to make sure that the beams and columns are straight and are not rubbing against one another. If the alignment is correct and the basket still does not return to the up position, it is probably because the pin holes are too tight. Disassemble the scale and enlarge the holes very slightly. Then reassemble and check the movement again.

☐ When satisfied with the way the scale works, glue the pins in the quadrant beam in place by applying a drop of super glue to their heads. Cut out washers. Drill holes where indicated large enough for a straight pin to fit through snugly. Install washers on pins extending from lower horizontal beam. Apply a drop of super glue to each pin and washer. When glue is dry, cut off excess length of pins.

Calibrating the scale

If assembled correctly, your scale will be highly accurate. You may want to experiment with building additional scales for which you establish different weight ranges by gluing a greater or lesser number of pennies to the quadrant. Make an overlay of plain paper for the quadrants of your experimental scales. Then use objects of known weight to help you establish the weight marks on the quadrants.

Spirit of St. Louis

The Spirit of St. Louis, the plane that carried Charles Lindbergh on his historic 1927 solo non-stop flight across the Atlantic, is one of the most famous planes in the world. Built by the Ryan Aeronautical Company for a price of $10,500, the Spirit (now housed in the Smithsonian Institution in Washington, D.C.) has a wingspan of 46 feet, a length of 28 feet, and a single, nine-cylinder, air-cooled, 220-horsepower Wright Whirlwind engine.

To keep weight down, Lindbergh had the plane equipped with a bare minimum of flight instruments and no radio. The front windshield was eliminated so that an extra fuel tank could be installed. Lindbergh sat surrounded by tanks containing 153 gallons of gasoline and had to use a periscope to see out of the front of the plane. For provisions he carried five sandwiches — one egg, two ham, two roast beef — bought "to go" at a corner drugstore.

The 3,600-mile flight from New York to Paris took 33.5 hours and made the 25-year-old Lindbergh a world hero. He won a Congressional Medal of Honor, a $25,000 prize, and the nickname "Lucky Lindy."

Your own scale model of this famous plane will look great mounted on a pedestal or suspended above your desk.

Difficulty level: Medium
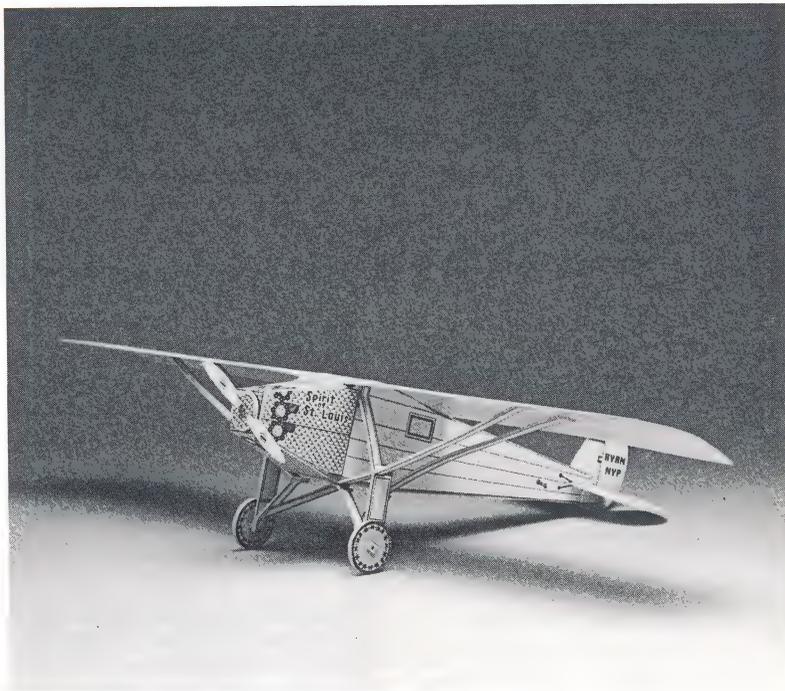
144

What you will need:

☐ Scissors
☐ White glue
☐ Super glue
☐ Metal-edged ruler
☐ Hobby knife
☐ Straight pins (3)
☐ Wire cutters
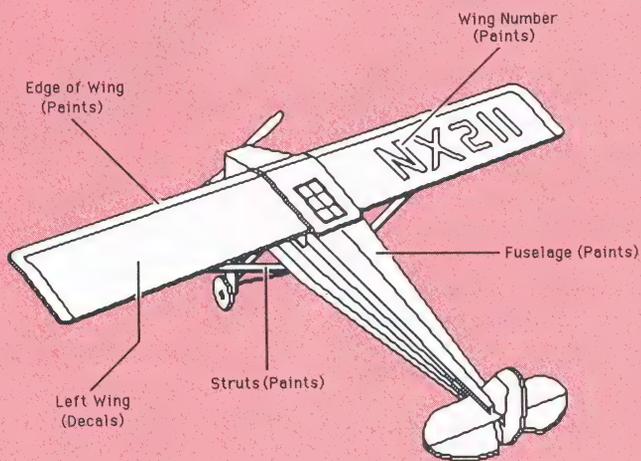
Customization Options
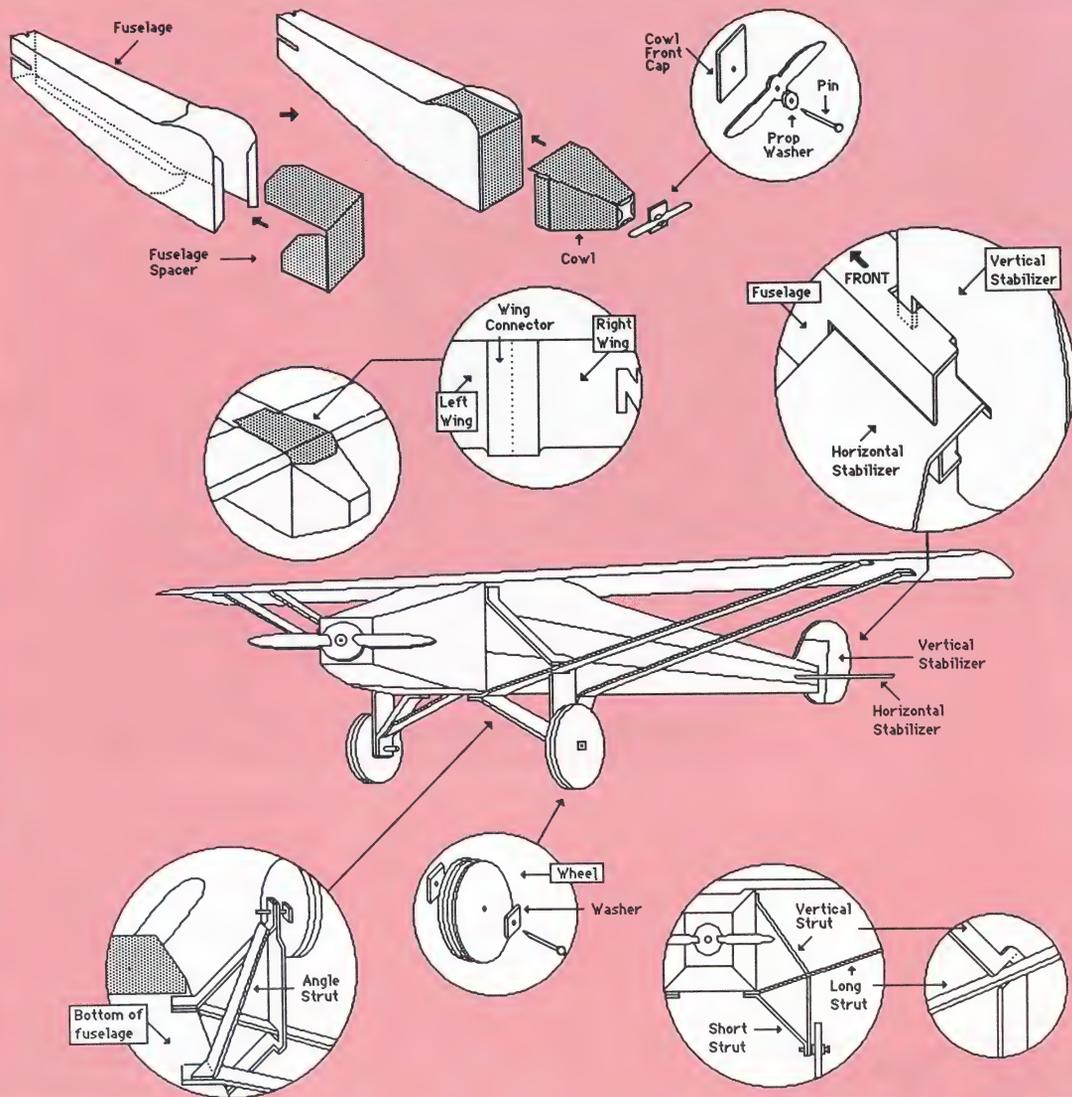
Fuselage

Cowl Front Cap

Pin

Prop Washer

Fuselage Spacer

Cowl

Wing Connector

Right Wing

Left Wing

Fuselage

FRONT

Vertical Stabilizer

Horizontal Stabilizer

Vertical Stabilizer

Horizontal Stabilizer

Bottom of fuselage

Angle Strut

Wheel

Washer

Vertical Strut

Long Strut

Short Strut

Construction Diagrams

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

Fuselage

□ Cut out fuselage, fuselage spacer, and cowl. Use a hobby knife to cut slots in fuselage.

□ Score and bend on dotted lines.

□ Fold fuselage into an open box shape. Glue long tab along fuselage bottom into place.

□ Glue fuselage spacer to front end of fuselage as shown. Spacer should be glued to the tabs at the front end of the fuselage and to the places marked "glue fuselage spacer here."

□ Fold cowl into an open box shape. Glue long tab in place. Slide cowl onto fuselage, gluing to fuselage spacer and sides of fuselage as indicated. Note that the cowl must bend to fit the flat sides of the fuselage. It's a good idea to glue the sides first and then the top and bottom, holding the cowl firmly in place until the glue has set.

Propeller assembly

□ Cut out propeller pieces, cowl front cap, and prop washer.

□ Glue propeller pieces together, back to back.

□ Drill holes as indicated in propeller, cowl front cap, and prop washer. Holes in cowl cap and prop washer should be just large enough for a straight pin to pass through. Hole in propeller should allow propeller to spin freely on the pin.

□ Slide the prop washer onto a straight pin, gluing it to the head of the pin with a drop of super glue. When glue is completely dry, slide the propeller onto the pin. Then insert the pin through the hole in the cowl front cap. Position the pin so that there is enough room for the propeller to spin freely. Glue the pin in place with a drop of super glue applied to the back side of the cowl front cap.

□ Glue the propeller assembly in place on the cowl as shown.

Wings

□ Cut out wings and wing connector.

□ Score and bend on dotted lines.

□ Fold tabs running the length of the wings under and glue to make a double-thick leading edge on each wing.

Spirit of St. Louis

Assembly Instructions

☐ Gently curve the wings to fit over the curved section of the fuselage. Hold curve in place for a few seconds to give the wing a chance to "set" in its new form. If released immediately, the wing will have a tendency to return to its original shape. Be careful not to crease the wings while curving them.

☐ Curve the wing connector to match the curve of the wings.

☐ Glue wing connector over the two wings, joining them together. Match the line on the connector with the line on the front edge of the wings. Note that the graphics on the front of the connector match the graphics on the cowl. Hold the wings and the connector in a curved shape until glue has set. This will help make the shape permanent.

☐ Glue wings to fuselage by applying a thin film of glue over edges of curved section of fuselage and on areas labeled "glue wing here." Set wing in place. Press down firmly, maintaining the curve of the wing and holding in place until glue has set.

Tail section

☐ Cut out vertical stabilizers and horizontal stabilizer.

☐ Glue vertical stabilizers together, back to back. Use a hobby knife to cut the slot in the lower part of the stabilizer.

☐ Slide horizontal stabilizer into slot in vertical stabilizer. Then slide the entire stabilizer assembly into the slots in the rear of the fuselage. Check alignment, then apply a line of white glue at every point where the stabilizer sections touch each other or the fuselage. Set aside to dry.

Wing struts and landing gear

☐ Cut out long struts (4), short struts (2), left and right angle struts, and left and right vertical struts.

☐ Score lengthwise along the dotted line that runs down the center of each strut. Fold in half and glue so that each strut is double-thick.

☐ When struts have been folded and glued, score and bend on remaining dotted lines. Cut slots in vertical struts, using a hobby knife. Drill a hole in the end of each vertical strut as indicated. The hole should be large enough for a straight pin to pass through.

☐ Turn the plane over. Select a long strut and glue one end to the square marked on the bottom of the fuselage, just behind the cowl, and the other end to the underside of the wing. Position the strut so that it is just behind the folded wing tab, at the approximate spot pointed to by the arrow on the tab. Examine the plane with your eye to

Assembly Instructions

make sure that the wing extends straight out from the fuselage before gluing the strut in place.

☐ Select another long strut and position it parallel to the first strut, gluing one end to the square marked on the bottom of the fuselage and the other end to the underside of the wing.

☐ Select a short strut. Glue one end on top of the long strut which is glued to the fuselage just behind the cowl. Leave the other end free. Study the illustration to see how these pieces should go together.

☐ Select a vertical strut (either right or left, depending on which side of the plane you are working on) and install as shown, first gluing the upper end of the strut (the end without the hole in it) to the fuselage just behind the cowl and touching the underside of the wing. Slide slotted section onto the long strut and glue the end with the hole in it to the free end of the short strut. Do not glue vertical strut to long strut at this time.

☐ Repeat on other side of the plane, installing long struts, short strut, and vertical strut in exactly the same manner.

☐ When struts have been installed on both sides, place the plane upright on your work surface. Then adjust the vertical struts so that they are positioned as shown in the illustration. The plane should sit in a level position with each wing tip the same distance above the table. Be sure that the long struts remain

straight.When you are satisfied with the alignment, use white glue applied along the slots to glue the vertical struts to the long struts. Let glue dry completely before proceeding.

☐ When glue has set, turn the plane over again and glue angled struts in place as shown.

Wheels

☐ Cut out inner and outer wheel sections.

☐ Build wheels by gluing four sections together in a "sandwich," starting with an outer wheel, adding two inner wheels, and ending with an outer wheel. Let glue dry.

☐ Drill a hole in each completed wheel. Holes should be just large enough for a straight pin to fit through snugly.

☐ Drill a similar hole in the lower end of each vertical strut and in each of the four washers. Cut washers out.

☐ Install the wheels on the plane as shown, using a straight pin as an axle and placing a washer on each side of each wheel. Push the pin and the wheel snugly against the vertical strut so that the wheel will not wobble. Place a drop of super glue on the pin where it exits the vertical strut. Let dry, then clip pin close to vertical strut.

Starship

Here's a paper airplane that really flies! In fact, the plane on which this one is based won a paper airplane flying competition sponsored by *Scientific American* magazine. The aerodynamics of the plane were later studied by NASA.

The Starship is so easy to build, you can make a whole fleet. Experiment to see how altering the weight attached to the nose of the plane affects its patterns of flight.

Difficulty level: Easy
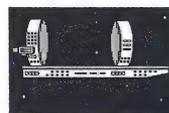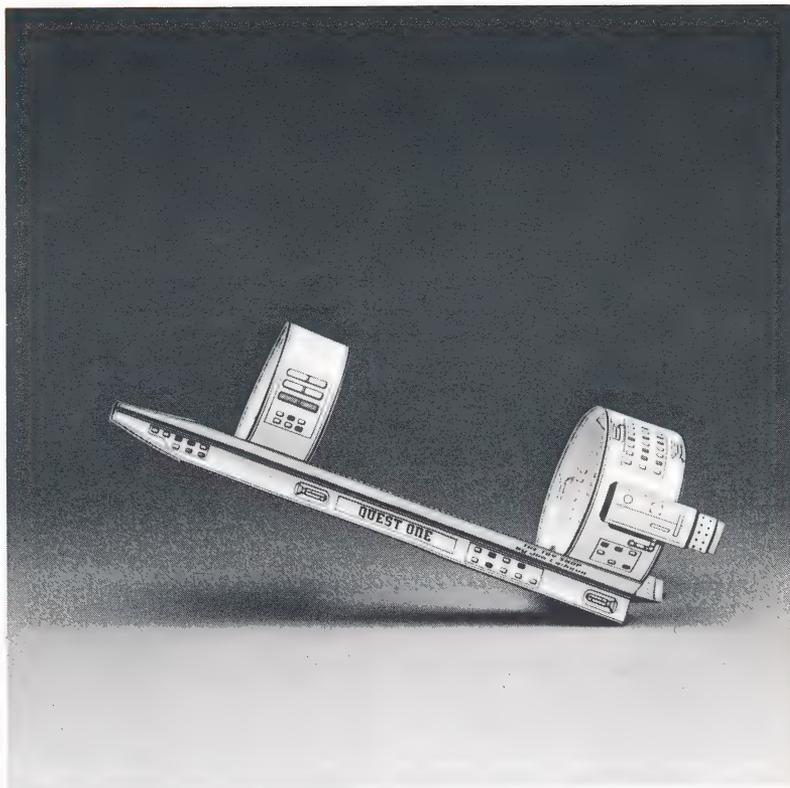
What you will need:

- ☐ Scissors
- ☐ White glue
- ☐ Paper clips

Wings/Body (Decals)

Wings (Paints)

Fuselage Top
(Paints)

Nameplate (Text)

Fuselage Bottom
(Paints)

Customization Options

Starship

Forward Wing

Wing

Fuselage
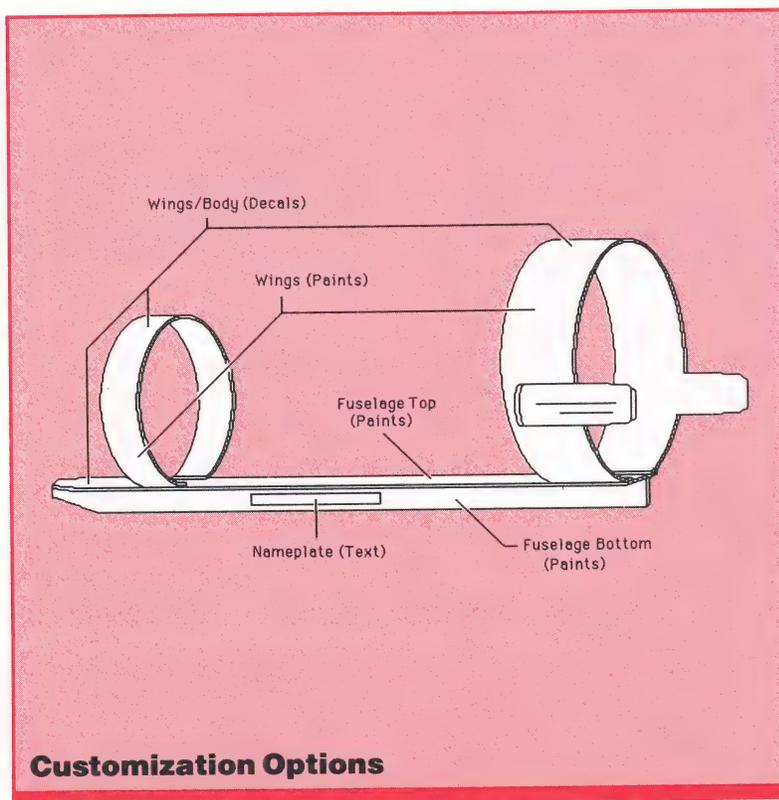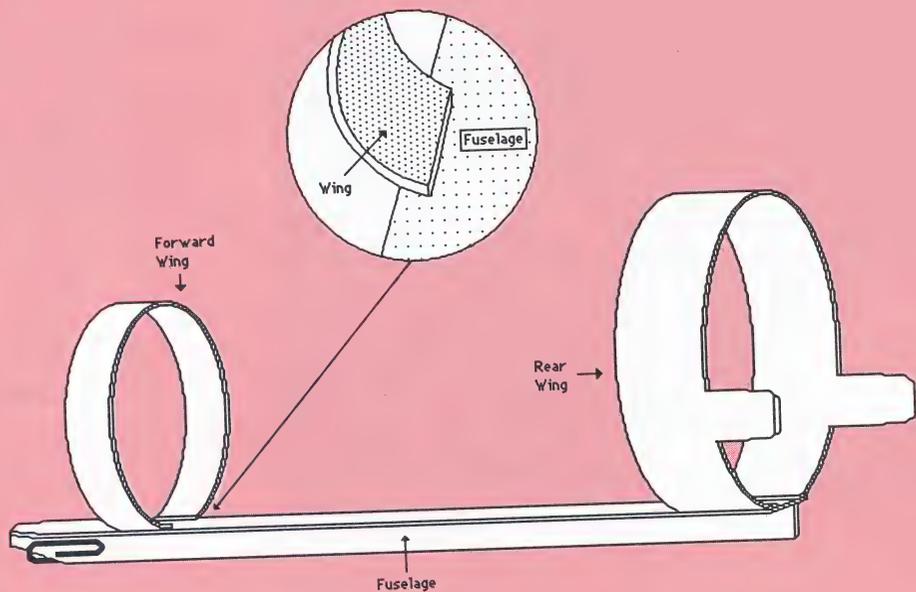
Rear Wing

Fuselage

Rear view of fuselage fold as shown.

Fuselage

Fuselage

Construction Diagrams

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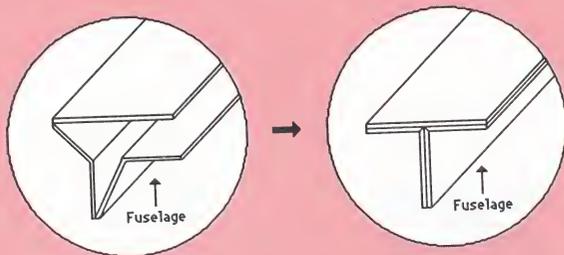
Assembly Instructions

Note: The Starship should NOT be adhered to cardstock.

Building the Starship

☐ Cut out fuselage.

☐ Fold and glue together as shown.

☐ Cut out front and rear wings. Give the paper a curl by pulling each piece over the sharp edge of a desk or table top.

☐ Glue wings in place on top of fuselage as shown.

Flying the Starship

The Starship flies beautifully. For proper balance, it needs from one to three paper clips on its nose. The number you use depends on how you want it to fly.

For slow, graceful flight, slip one paperclip on the Starship's nose and launch it very gently at a pronounced downward angle so that it will land about ten feet in front of you. For fast flight, attach three paperclips and throw it hard and straight out, parallel with the floor. Equipped this way, the Starship is great for playing catch.

You can also change the flight characteristics of the Starship by adjusting the upper portion of each circular wing. Start with both wings smooth and symmetrical and attach two paper clips to the nose. Then experiment by gently bending the wings to obtain the longest glide. Try it with one paperclip. This is harder, but gives a slow graceful descent. Try varying the way you launch the model, too. Due to its unique design the Starship will fly well at almost any speed or angle of launch.

Steam Engine

This is it! The most amazing model you're ever likely to build. A steam engine — or more accurately, a steamless steam engine — made entirely from paper! Modeled after toy steam engines popular in the United States during the late 19th and early 20th centuries, this miniature, fully-functioning machine relies on air pressure supplied by an inflated balloon to push a piston which then pushes against a crankshaft, causing rotation of the shaft. It was this rotating shaft — in real steam engines — that powered the Industrial Revolution.

You won't be able to build the Toy Shop steam engine at a single sitting. Plan to work on one section at a time, following the instructions carefully. You'll notice that there are many small pieces which are numbered, rather than labeled. To keep from getting confused, write the correct number in pencil on the back of each piece as you cut it out. Keep track of where you are in the assembly process by checking off each step as you complete it. Also, study the construction diagrams carefully. You'll notice that many parts are visible in more than one view. Finally, work as accurately and precisely as possible. Remember, this model isn't a simulation, it's a real working engine!

Difficulty level: Challenging
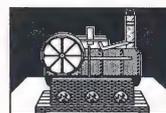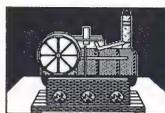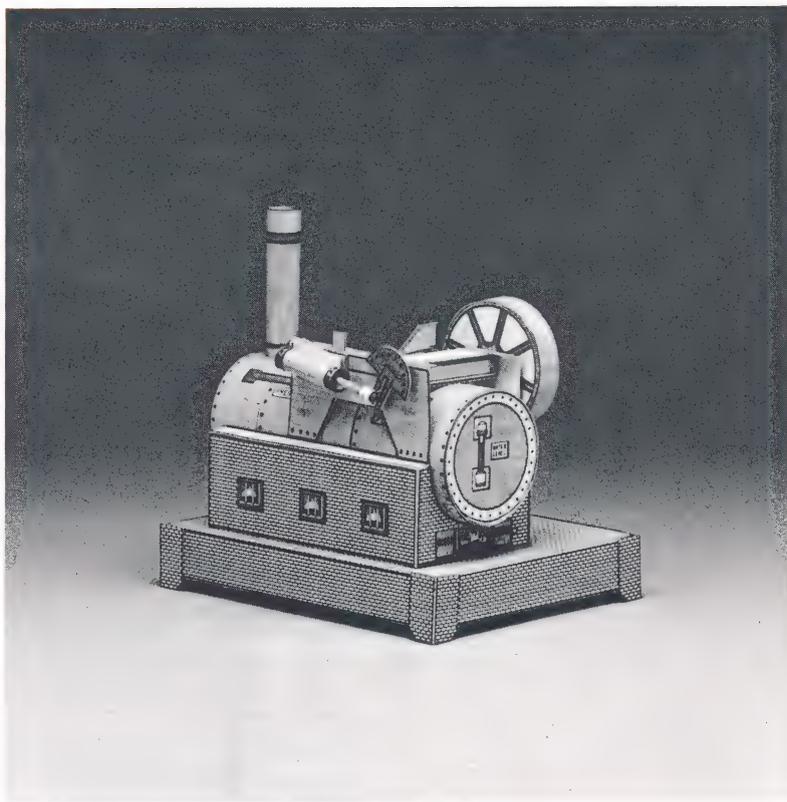
What you will need:

- ☐ Scissors
- ☐ White glue
- ☐ Super glue
- ☐ Metal-edged ruler
- ☐ Hobby knife
- ☐ Wire
- ☐ Needle-nosed pliers with cutting edge
- ☐ Needle or straight pin
- ☐ Wax paper or plastic wrap
- ☐ Round toothpick
- ☐ Rubber band
- ☐ Ball point pen refill
- ☐ Fine sandpaper (150 grit)
- ☐ Graphite powder
- ☐ Salt or clean sand (optional)

Boiler and Smokestack (Paints)

Boiler Support (Paints)

Base Plaque (Text)

Base Sides (Paints)

Base Top (Paints)

Boiler End (Decals)

Customization Options

(39) Air Tube
(38) Smokestack
(36) & (37) Flywheel Pulley Assembly
(32), (33), (34), & (35) Fly Wheel Assembly

(31) Valve Spring Anchor
(30) Valve Spring (rubber band)
(29) Pivot Pin

(28) Valve Adjuster
(27) Spacers (not visible)
(24), (25), & (26) Crankshaft and Counterweight Assembly

(21), (22), & (23) Piston Assembly
(14) - (20) Cylinder and Cylinder Valve Plate Assembly
(11), (12), & (13) Main Valve Plate Assembly
(8), (9), & (10) Engine Support Assembly
(7) Boiler End Guide (not visible)
(6) Boiler
(4) & (5) Boiler Ends
(3) Boiler Support
(2) Leg
(1) Base

(3) Boiler Support

Boiler Support

(1) Base

Base

Boiler Ends

(5)

(4) Boiler End Guide (7)

Boiler End Guide (7)

Boiler (6)

Boiler Assembly

Boiler

Glue
Boiler End

Boiler End Guide (7)

Boiler Cross-section

Construction Diagrams

Engine Support Assembly

Pivot Pin Alignment

Piston Assembly

Cylinder

Forming cylinder

Gluing cylinder to cylinder valve plate

Main Valve Plate Assembly

Cylinder Valve Plate

Cylinder Assembly

Construction Diagrams

Steam Engine
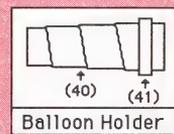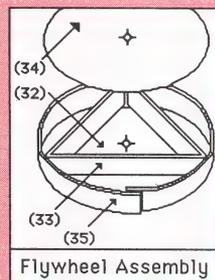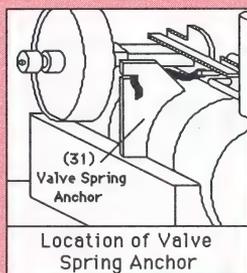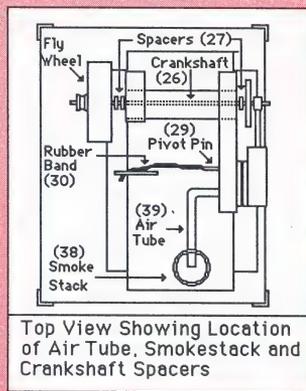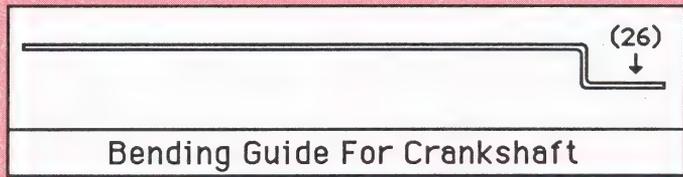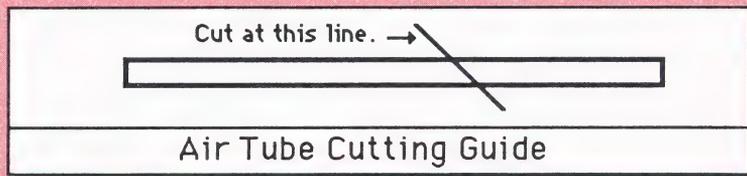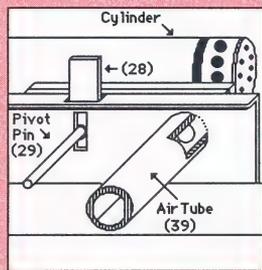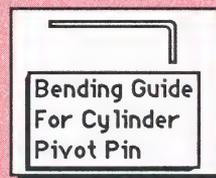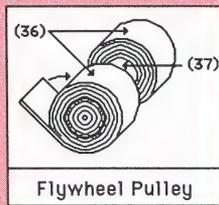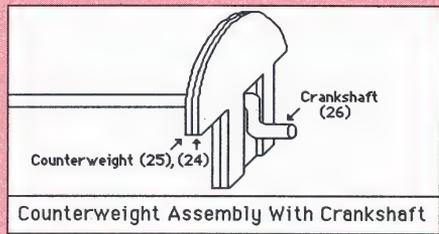
Counterweight Assembly With Crankshaft

Flywheel Pulley

Bending Guide For Cylinder Pivot Pin

Cut at this line. →

Air Tube Cutting Guide

(26)

Bending Guide For Crankshaft

Top View Showing Location of Air Tube, Smokestack and Crankshaft Spacers

Location of Valve Spring Anchor

Flywheel Assembly

Balloon Holder

Construction Diagrams

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

Base

☐ Cut out base (part 1) and base legs (parts 2).

☐ Score and bend on dotted lines.

☐ Fold base into an open box shape. Glue tabs in place as shown.

☐ Glue legs to corners of base.

Boiler support

☐ Cut out boiler support (part 3).

☐ Score and bend on dotted lines.

☐ Fold into an open box shape. Glue tabs in place.

☐ Glue boiler support to base, placing end with fire box opposite the smokestack end of the base.

Boiler

☐ Cut out boiler (part 6), boiler ends (parts 4 and 5), and both boiler end guides (parts 7).

☐ Note that the boiler has four rectangles labeled A, B, C, and D located at or near its corners. Stick a pin through the + mark in each of these rectangles. Then turn the boiler over and on the reverse side draw a line from A to B and then from C to D, using the holes made by the pin as the starting and ending points of the lines.

☐ Using the lines you have drawn as guides, glue boiler end guides (parts 7) to boiler so that they are positioned approximately ⅛ inch in from the edge. Let dry completely before proceeding.

☐ When glue is completely dry, draw boiler over the sharp edge of a desk or table top to give the paper a curl. Then form into a cylinder, overlapping the ends by EXACTLY the amount shown. Glue along overlap. Let glue dry completely before proceeding.

☐ When glue is dry, use your hands to form the boiler into a cylindrical shape that is smooth and symmetrical.

☐ Put boiler ends (parts 4 and 5) in place at proper ends of the boiler (part 4, which has the optional decal, goes on the smokestack end of the boiler), letting them rest against the ridge formed by the boiler end guides. Glue in place by applying a line of glue around the boiler ends where they meet the boiler. Let dry completely.

Note: *To add weight to the steam engine, so that it doesn't slide around when you are using it to operate one of the steam-driven models in The Toy Shop, you can fill the boiler half full with salt or clean sand after gluing one end in place.*

Steam Engine

Assembly Instructions

When the boiler is filled, glue the other end in place. Be sure to fill any cracks with glue so that the salt or sand won't leak out.

☐ Fit boiler into boiler support, using large white rectangles on boiler to position. When boiler is properly positioned, these rectangles should not show at all. Note that the smoke stack end of the boiler should be placed opposite the flame end of the boiler support. Glue boiler to support by applying a line of glue where the boiler and the boiler support meet. Set aside to dry.

Engine support

☐ Cut out engine support (part 8), part 9, and part 10. Use a hobby knife to cut out the two rectangular slots on part 8.

☐ Drill holes in parts 8 and 9 where indicated. Holes should be just large enough for a wire to pass through.

☐ Score and bend on dotted lines.

☐ Study the illustration to see how the engine support looks when assembled. Then, glue part 8 to part 10, positioning part 10 between the arrows on part 8. Glue part 9 to part 10, again using the arrows to position part 10. Note that part 10 forms a bridge between parts 8 and 9 and is positioned open side down.

☐ Place the entire engine support over the boiler as shown. Glue to indicated areas on the boiler's sides, being careful to keep part 10 straight and at right angles to parts 8 and 9. Let dry.

Building main valve plate

Note: *The main valve plate is a precision piece. Be sure to cut all parts carefully and avoid bending. Follow assembly instructions exactly.*

☐ Cut out parts 11, 12, and 13. DO NOT cut slots at this time.

☐ Place a sheet of wax paper or plastic wrap over your work surface. Then, stack pieces with part 13 on top and part 11 on the bottom. Make sure they are lined up perfectly. Apply a drop of super glue to each corner of the stack to hold together temporarily.

☐ Apply super glue to all the edges of the valve plate assembly, being very careful not to let glue get on your fingers. Place the valve plate flat on wax paper-covered work surface. Fold paper over valve plate and press firmly to make sure the plate stays flat while the super glue sets.

☐ When glue has dried, apply super glue to the top surface of the valve plate assembly. Then, using wax paper to protect your fingers, flip the valve plate over and rub it around on the wax paper covering

Assembly Instructions

your work surface. This will spread the glue and help smooth the surface. Set aside to dry.

☐ When glue has dried, cut the exhaust slot and pivot pin slot in the valve plate, using a hobby knife.

☐ Drill intake hole at dot, using a hobby knife. Hole should be just large enough for a round toothpick to pass through. After drilling, apply a small amount of super glue to the paper ridge that has formed around the hole. Let dry. Then, use a hobby knife to shave away the ridge so that the surface of the plate on both sides is perfectly flat.

☐ Place the valve plate face down on a piece of fine sand paper (150 grit) and lightly sand the surface of the plate to remove any rough spots left by the super glue. Turn the plate over and sand the other side. When sanding valve plate, keep the plate flat on the sand paper and stroke in one direction only.

Note: *Be careful not to over sand. The idea is simply to remove rough spots so that the surface is smooth. DO NOT bend the plate or round off the edges while sanding.*

Installing the main valve plate

The main valve plate is glued to the area indicated on the engine support (part 8). Before gluing

valve plate in place you must drill an air intake hole in part 8.

☐ To drill air intake hole, first position the valve plate over the indicated area. The slot in the valve plate should match up with the slot on part 8. The black lines on the valve plate and the engine support should also match. When the plate is positioned properly, stick a straight pin through the center of the hole in the valve plate so that it marks the spot on part 8 where the air intake hole should be drilled. Set the valve plate aside and drill the intake hole in part 8. The hole should be just large enough for a round toothpick to pass through. Shave away any ridge left around the hole so that the surface of part 8 is perfectly flat.

☐ Glue the main valve plate into place over the shaded area on part 8. Be sure that the slot, the air intake hole, and the black line match. Let dry. When glue has set, check the intake hole to make sure it is not blocked by any excess glue. Redrill if necessary, being careful not to damage the smooth surface of the valve plate.

Building the engine cylinder

☐ Cut out part 14 (engine cylinder) and part 15 (engine cylinder cap).

Note: *The page containing part 14 SHOULD NOT be adhered to cardstock.*

☐ Place part 14 face down on a

Steam Engine

Assembly Instructions

piece of wax paper. Apply several drops of super glue to the indicated area of part 14. Fold the wax paper over this area and rub so that the super glue saturates the entire area. Set aside to dry.

☐ When glue has dried, lightly sand both sides of the glue-saturated paper so that the surface is smooth.

☐ Give the paper a curl by drawing it over the sharp edge of a desk or table top. Then wrap it around the handle of your hobby knife — if you are using an X-ACTO® — or any other $5/16$ inch shaft. Start with the glue-saturated end and wrap the paper tightly and evenly. Glue the last wrap in place with white glue.

☐ When glue has dried, slide the cylinder half way off the knife handle. Apply several drops of super glue to the outside of the cylinder. Rub with wax paper to spread the glue so that the surface of the entire cylinder is wet. Be careful not to glue the cylinder to the knife handle. When glue has dried, remove cylinder. Insert handle of knife in other end and apply super glue to any areas of the cylinder you missed.

☐ When glue is dry, slide the cylinder off the knife handle. Glue part 15 (the cylinder end cap) into place at one end of the cylinder, using white glue. When glue has dried, blow into the open end of the cylinder to check for air leaks. If the cylinder leaks, seal by applying a line of white glue around the edge

of the cap. Let cylinder dry completely before proceeding.

☐ Apply a small amount of super glue around the edge of the cylinder at the open end. This will stiffen it. Let glue dry, then carefully scrape away any rough spots left by the super glue, using the blade of your hobby knife or a piece of fine sandpaper rolled into a tube and inserted into the cylinder.

☐ Drill air intake hole in cylinder, positioning as shown in diagram so that the hole is centered on the black line around the capped end of the cylinder. Hole should be just large enough for a round toothpick to pass through.

Building the cylinder valve plate

☐ Cut out parts 16, 17, 18, 19, and 20. Cut slots in parts 17 and 18, but do not drill hole in part 19.

☐ Stack parts 16, 17, and 18 together with part 18 on top. Glue stack together temporarily by placing a drop of super glue at each corner. Then place the stack on a piece of wax paper and apply super glue to the edges. Fold wax paper over the assembly and press down to keep the valve plate flat while the glue dries.

☐ Glue parts 19 and 20 in place as shown, using white glue. The black line and the arrow will help you position the parts correctly.

Assembly Instructions

□ Apply a few drops of super glue to the front surfaces of parts 19 and 20. Place face down on wax paper and rub to spread the glue evenly. Let dry.

□ When glue is completely dry, sand parts 19 and 20 lightly with fine grade sandpaper to smooth the surface. To sand, lay plate face down on sandpaper and stroke in one direction only. The plate must be kept flat so that the sanding operation won't round off the edges.

□ Drill air intake hole in part 19, using the same technique you used for the main valve plate. The hole should go all the way through the whole stack and should be just large enough for a round toothpick to pass through. Scrape away the rough edges of the hole and sand so that the surface on BOTH sides of the plate is perfectly smooth. Be sure to keep the valve plate flat while sanding and to stroke in one direction only.

Attaching cylinder to cylinder valve plate

□ Position the cylinder on the back side of the valve plate by passing a toothpick through the air intake holes in both the plate and the cylinder. Line the cylinder up so that it lies straight on the plate as shown. Then, apply a drop of super glue to each side of the cylinder where it touches the plate at the

end farthest from the intake hole. Hold until glue has set.

□ Apply a drop of super glue to the other end of the cylinder where it touches the plate. Quickly remove the toothpick (so it won't get glued to the intake hole) and hold cylinder in place until glue has set.

□ Use a toothpick to apply a line of white glue to both sides of the cylinder where it joins the plate. Let glue dry completely before proceeding.

Attaching the cylinder pivot pin

□ Cut a piece of wire 1 inch long. This will be part 29, the pivot pin.

□ Use a pair of needle-nosed pliers to place a right angle bend in the wire following the pivot pin bending guide.

□ Position the pivot pin as shown, fitting it into the slot in the front surface of the cylinder valve plate. Make sure that the pivot pin is standing perfectly straight at a 90-degree angle from the plate. Then apply a drop or two of super glue to attach the pin firmly to the plate. Make sure the glue does not get onto the surface of the plate. Set aside until glue is completely dry. Then, add another drop or two of glue to insure that the pivot pin is firmly attached to the plate.

Steam Engine

Assembly Instructions

Building the piston and piston rod

☐ Cut out parts 22 (2) and part 23.

☐ Draw each of these pieces over the sharp edge of a table to give a curl to the paper.

☐ Cut a piece of round toothpick EXACTLY 1⅝ inches long to use as the piston rod (part 21).

☐ Build the piston by wrapping both parts 22 around one end of the toothpick. Begin with one strip of paper and wrap tightly and evenly, gluing the last wrap in place with white glue. Begin wrapping the second strip where the first one left off. Do not overlap. Wrap tightly and evenly, checking for approximate fit in the cylinder as you wrap. Glue the last wrap in place with white glue.

☐ Check the fit of the piston in the cylinder. It should be loose enough to fall freely when dropped into the open end of the cylinder. If the fit is too tight, remove one wrap of paper at a time until the fit is correct. If the fit is too loose, add a wrap or two of paper.

☐ Wrap part 23 around the other end of the piston rod, wrapping tightly and evenly, and gluing the final wrap in place with white glue.

☐ Apply super glue to each end of the piston. Glue should saturate the edges and outside surfaces of the paper. Use wax paper to wipe away excess glue and smooth the surface. Set aside to dry.

☐ When glue has dried completely, use fine sandpaper to smooth the surfaces of the piston. Be careful not to deform the piston. To sand evenly all the way around, wrap sandpaper around the piston and then twirl the piston inside the sandpaper. Check the fit of the piston in the cylinder again. It should move freely without catching. The piston should drop to the bottom of the cylinder when the cylinder is held upright and the piston is held above the open end and released. If there are any rough spots on the piston or inside the cylinder, sand them until all surfaces are perfectly smooth.

☐ Drill a hole as shown in the small end of the piston. Using your hobby knife, drill from first one side and then from the other until the hole goes through both the paper and the wood. Hole should be large enough for wire to pass through easily. The fit should be loose to cut down on friction. When finished, sand away any rough edges left by the drilling.

Building the crankshaft and the counterweight

☐ Cut out parts 24 and 25, using a hobby knife to cut the slot in part 24.

☐ Drill a hole where indicated on part 25. Hole should be just large enough for wire to pass through.

☐ Glue parts 24 and 25 together back to back. When glue has

Assembly Instructions

dried, check to see that the hole in part 25 is not blocked by glue. Redrill if necessary.

☐ Cut a piece of wire 3½ inches long. This will be part 26, the crankshaft. Bend, following the crankshaft bending guide.

☐ Fit the crankshaft into the counterweight as shown. Use a drop of super glue to secure the shaft to the counterweight. Let dry. Check to make sure the crankshaft is positioned properly, then apply more super glue to strengthen the joint between the shaft and counterweight.

Installing the crankshaft assembly

☐ Cut out parts 27 (3) which will serve as spacers when you install the crankshaft on the engine support.

☐ Drill a hole in each spacer as indicated. Holes should be large enough for crankshaft wire to pass through.

☐ Install the crankshaft assembly in the engine support as shown, placing one spacer on the shaft between the counterweight and the engine support and two spacers on the shaft as it emerges from the opposite side of the engine support.

Installing the valve spring and the cylinder assembly

☐ Cut out part 28 and parts 31 (2).

☐ Glue parts 31 together, back to back. Then use a hobby knife to cut out the slot.

☐ Drill hole in part 28 large enough for wire to pass through.

☐ Glue part 31 to boiler, using line printed on the boiler as a guide and positioning as shown. For a strong bond, apply a line of white glue down each side of part 31 where it touches the boiler. Let dry completely before proceeding.

☐ Insert part 28 into the horizontal slot in part 8 of the engine support (see illustration). The hole drilled in part 28 should be at the bottom.

Note: *The purpose of part 28 is to allow you to adjust the alignment of the cylinder valve plate to the main valve plate. Part 28 will eventually be glued in place. DO NOT glue it at this time.*

☐ Install the cylinder assembly by passing the pivot pin first through the slot in the main valve plate and then through the hole in part 28.

☐ Cut a piece of ordinary rubber band 2 inches long. Use the weakest, thinnest rubber band you can find. (DO NOT use the rubber stripping supplied with The Toy Shop.) This piece of rubber band will be part 30. Use a small drop of super glue to glue one end of the rubber band to the end of the pivot

Assembly Instructions

pin. Pull the other end of the rubber band through the slot in part 31.

Note: *For the engine to run properly, the rubber band, which serves as a valve spring, must be loose. Adjust so that it is just tight enough to hold the cylinder valve plate against the main valve plate. Further adjustments will be made once the flywheel and piston are installed.*

Building the flywheel

☐ Cut out parts 32, 33, 34, and 35.

☐ Draw part 35 (the rim of the flywheel) over the sharp edge of a desk or table top to give the paper a curl. Check the fit of the wheel plates (parts 32 and 34) and the rim (part 35). The rim should fit snugly around the wheel plates. Note the amount of overlap required and then glue the overlapping ends of the rim together to form a circle. Hold in place until glue has set.

☐ Score and bend part 33 (the flywheel spacer) on dotted lines.

☐ Shape the flywheel rim (part 35) into as nearly perfect a circle as possible, then place it flat on your work surface. Insert part 32 (a wheel plate) printed side down, into the rim. Ease the wheel plate into place until it is flush with the bottom edge of the rim. When fitted properly, the wheel plate will remain in place without being held. Apply a line of glue around the inside of the wheel where plate and rim meet and set aside to dry.

☐ Fold the spacer (part 33) into a triangular shape. Apply a thin film of glue along one edge of the spacer and set in place in the flywheel assembly as shown. Note that the spacer must be bent slightly to fit inside the wheel.

☐ Apply glue to the top edge of the spacer and then insert part 34 (a wheel plate) into the rim. Align the two wheel plates by matching the black dot located on the outer edge of each plate. When plate is correctly installed, apply a line of glue around the plate where it joins the rim. Set aside to dry.

☐ Drill a hole in the center of each wheel plate large enough for a wire to pass through snugly. Set the completed flywheel assembly aside.

Building the drive pulley

☐ Cut out parts 36 (2) and part 37.

☐ Draw each part over the sharp edge of a desk or table top to curl the paper.

☐ Roll part 37 to form a small, solid cylinder. Glue last wrap in place with white glue.

☐ Wrap parts 36 around each end of part 37 as shown, gluing the first and last wraps in place with white glue. The space in between will form a groove in the finished drive pulley.

Assembly Instructions

Installing the flywheel and drive pulley

☐ Slide the flywheel onto the end of the crankshaft, making sure that the spacers on the crankshaft are still in place. Place a drop of super glue at the point where the crankshaft emerges from the flywheel. Let dry.

☐ Force a piece of wire through the center of the drive pulley to form a hole. Then place several drops of super glue at the center of one end of the drive pulley. Slide the pulley onto the crankshaft and press firmly against the flywheel. Hold in place until glue has set. Then apply several drops of super glue to the outside end of the drive pulley to bind the paper firmly together.

Building the smokestack

☐ Cut out part 38.

☐ Give paper a curl by pulling it over the sharp edge of a desk or table top.

☐ Roll part 38 into a cylinder, using the area indicated on the part as a guide to forming the first roll. The diameter of the cylinder should be approximately ½ inch. Glue last wrap in place with white glue.

☐ To strengthen and waterproof the smokestack, apply super glue around the top end (the end with the double lines). Use enough glue to wet the paper both inside and out down to the double lines. Set aside to dry.

Building the air tube

☐ Cut out part 39 which will become the air tube.

☐ Give the paper a curl by pulling it over the sharp edge of a desk or table top.

☐ Roll part 39 into a tube, using a ball point pen refill as a form to roll it around. Glue last wrap in place with white glue. Let dry.

☐ When dry, slide the air tube off the pen refill. Place on the air tube cutting guide and use a hobby knife to cut as indicated.

☐ Fit the two pieces together like the corner of a picture frame. They should form a 90-degree angle. Trim ends of tubes if necessary until the angle at which they meet is correct.

☐ Spread a thin film of white glue over the cut edge of one tube. Join to the other tube, pressing parts together firmly and holding in place until glue has set.

☐ When glue is dry, hold your finger over one end of the tube and blow into the other to check for air leaks. Use white glue to plug any leaks that you find.

Steam Engine

Assembly Instructions

Installing smokestack and air tube

☐ Drill a hole in the smokestack, positioning it on the thick black line at the bottom of the stack. Hole should be large enough for air tube to fit through snugly.

☐ Position smokestack on circle at front end of boiler. Air tube hole should be pointing toward the back of the boiler. Trim bottom edge of smokestack so that it fits the boiler snugly. Trim carefully, testing the fit as you go. Only a small amount of the stack will need to be trimmed away.

☐ Check length of air tube assembly by laying the tube on top of the boiler. Place so that the short end is in line with the air intake hole on the valve plate. The long end should extend no more than halfway into the circle to which the smokestack will be glued. Trim this end if necessary.

☐ Glue smokestack to boiler by applying a thin film of glue over the circle on the boiler and setting smokestack in place. Be sure that air tube hole is pointing toward the back of the boiler. Apply a line of glue around the bottom of the smokestack where it meets the boiler and set aside to dry.

☐ When glue is completely dry, install the air tube, gluing the short end into place over the air intake hole on the main valve plate and inserting the long end into the hole in the smokestack. Seal the tube to the stack and the valve plate by applying white glue to both joints. Set aside to dry.

☐ When glue is completely dry, check to make sure the air intake hole is not blocked by excess glue. Remove any excess glue with a hobby knife, being careful not to damage the surface of the valve plate. Blow into the smokestack to check for air leaks. If you locate leaks, seal them with white glue.

Building the balloon holder

☐ Cut out part 40 and parts 41 (2).

☐ Give both parts a curl by pulling the paper over the sharp edge of a desk or table top.

☐ Roll part 40 which will become the balloon holder into a tapered tube, using the white area as a guide for forming the first roll and determining the diameter of the tube. Roll the tube tightly and evenly so that it will fit snugly into the smokestack.

☐ Slip the balloon holder into the smokestack to check the fit. If the balloon holder is too large, unwind paper and re-roll until the correct size is achieved. Then glue final wrap in place.

☐ Create a band to hold the balloon in place by wrapping part 41 around part 40 as shown, using the line at the top of part 40 to position. Glue last wrap in place with white glue.

Assembly Instructions

☐ Saturate the entire balloon holder with super glue. Use wax paper to hold the tube so that you will not get glue on your hands. Apply enough glue to wet the tube inside and out. Set aside to dry.

Installing the piston

☐ Slip the piston into the cylinder and slide the crankshaft into the hole in the piston rod.

Aligning air intake holes

☐ Use part 28 to adjust the alignment of the air intake holes on the cylinder valve plate and the main valve plate. When the plates are correctly aligned, the air intake hole on the cylinder valve plate should overlap the upper edge of the exhaust port (the slot beneath the air intake hole on the main valve plate) by a slight amount when the cylinder is horizontal. Since it is difficult to determine this alignment visually, it's best to experiment until you find the correct position.

Begin by positioning part 28 so that the intake hole on the cylinder valve plate is halfway between the intake hole and the exhaust port on the main valve plate when the cylinder is horizontal. Use a small piece of tape to hold part 28 in place temporarily. The engine should run when the plates are in

this position. Test by blowing into the smokestack and giving the flywheel a gentle spin. The flywheel should turn clockwise when viewed from the flywheel side of the engine. If the engine doesn't run, check the list of things to do if your engine doesn't run.

Improve performance by changing the position of part 28 slightly and re-testing. Experiment until you find the position in which the engine works best. Then, either tape or glue part 28 in place. If you use tape, you'll have the option of readjusting the alignment later on.

Operating your steamless steamer

☐ Lubricate the engine by applying a small amount of graphite powder to the valve plates and the cylinder. Graphite powder, which is used to lubricate locks, is necessary to make your engine run smoothly.

☐ Slip a balloon over the balloon holder, pulling it down over the band so that it will stay in place. Blow up the balloon. Pinch it together to save the air while you insert the balloon holder into the smokestack. Release the balloon and turn the flywheel gently to start the engine running. The engine should run for 30 seconds or more.

Steam Engine

Assembly Instructions

If your engine doesn't run

Don't be disappointed if your engine doesn't run on the first try. You may need to make some minor adjustments. The following suggestions should solve your problem.

1) You may have a weak balloon. To find out whether this is your problem, try blowing into the smokestack, giving the flywheel a gentle turn to start the engine. If the engine works when you blow directly into the stack, the problem lies in the balloon you were using. Try another balloon. Two weak balloons may be strengthened by putting one inside the other. To accomplish this, slip one balloon onto the eraser end of a pencil. Then push it into the other balloon.

2) Check the tension of the rubber band you are using as a valve spring. It should be just tight enough to keep the cylinder valve plate in contact with the main valve plate. If it is too tight, friction between the valve plates will keep the engine from running. If you think this is the problem, try reducing the tension.

3) Check the surfaces of the main valve plate and the cylinder valve plate to see that they are perfectly smooth. A drop of spilled glue or a raised area around the air intake hole can prevent the engine from operating. If you find that the surfaces are not smooth, slip a piece of fine sandpaper between the two plates. Holding the plates together lightly, work the sandpaper back and forth. Turn the sandpaper over and repeat to sand the opposite valve surface. Be very careful not to damage or deform the surfaces of the plates. Blow away any dust left by the sanding operation and apply more graphite powder to the surfaces of the plates.

4) Check the air tube for leaks. Check also to see that the air intake hole in the cylinder valve plate and in the main valve plate is not blocked. Clear any blockage. Apply white glue to any areas that are leaking.

5) Check alignment of the air intake hole in the main valve plate and the air intake hole in the cylinder valve plate. The holes should be lined up when the counterweight is at its lowest point. If alignment is off, adjust part 28.

6) Check the fit of the piston in the cylinder. The piston should drop freely to the bottom of the cylinder when released. Insert the handle of your hobby knife into the cylinder to see that it is still correctly shaped.

7) Check to see that the flywheel and the crankshaft move freely. Give the flywheel a gentle spin. It should coast several turns before stopping. If it does not, check to make sure the wheel is not rubbing against another part of the engine. Too much tension on the rubber band or rough and uneven valve plates will also keep the flywheel from spinning freely.

Assembly Instructions

8) If your engine has been running well and then starts to run poorly, it may be because moisture from your breath has accumulated in the engine. If this happens, set the engine aside and give it time to dry out. When it has dried it will function well once again.

How The Toy Shop steam engine works

The Toy Shop steam engine uses air pressure stored inside a balloon in place of steam, but in all other respects it functions just as a real steam engine does. Air enters the cylinder through a valve. The pressure of this air forces the piston inside the cylinder to move. The piston is connected by a piston rod to the crankshaft which is forced — by the movement of the piston and piston rod — to rotate. When the piston has traveled the length of the cylinder, the momentum of the flywheel attached to the crankshaft takes over. The piston is pushed back to its starting point and the cycle is repeated.

For this cycle to work, the air trapped inside the cylinder must be able to escape. Otherwise the piston could not return to its starting point. To allow this to happen, the valve plate on the Toy Shop steam engine has both an intake port for air to enter the cylinder and an exhaust port for air to escape. The opening and closing of these ports is ac-

complished by an arrangement known as a "wobble cylinder." As the engine runs, this cylinder moves, or wobbles, up and down. The hole in the side of the cylinder is matched first with the air intake port and then with the air exhaust port. This allows air to enter and escape the cylinder in a regular cycle. As long as air continues to enter, the engine will continue to run.

Steam Oil Pump

An oil pump run by a steam engine? Well, why not? This hardworking pump is designed to be driven by The Toy Shop's balloon-powered steam engine. Connected to the engine by a drive belt made of sewing thread and weighted down with salt or clean sand, the pump will pump as long as the balloon power holds out. It's the Industrial Revolution all over again!

Difficulty level: Medium

What you will need:

☐ Scissors
☐ White glue
☐ Super glue
☐ Metal-edged ruler
☐ Hobby knife
☐ Wire
☐ Needle-nosed pliers with cutting edge
☐ Salt or clean sand
☐ Sewing thread

Counterweight and Pulley
(Paints)

Frame Plaque
(Decals)

Base Top (Paints)

Base Plaque (Text)

Base Sides and Legs
(Paints)

Customization Options

Hinge Bracket

Counterweight

Derrick

tab

Pump Beam

Pump Rod Connector

Pump Rod

Pulley

Crankshaft

Crankshaft Bending Guide

Washer

Washer

Gearbox

Base

Base Leg

Base

Tab

Base Bottom Cover

Construction Diagrams

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

Base

☐ Cut out base, base bottom cover, and base legs.

☐ Score and bend on dotted lines.

☐ Fold base into an open box shape. Glue corner tabs in place.
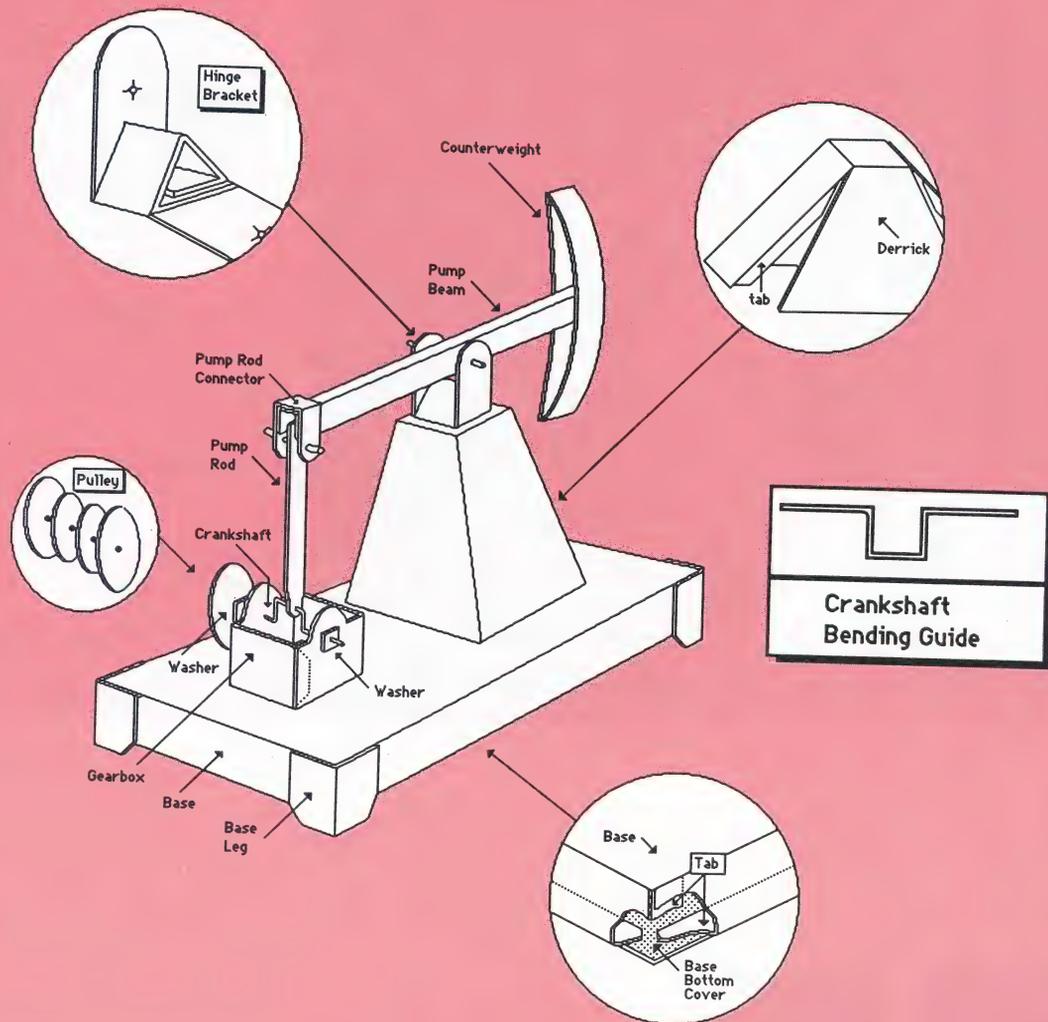
☐ Place base upside down on the work surface. Fill with salt or clean sand. Glue base bottom to base, keeping corners square. Apply a line of glue around the edges of the base where it joins the bottom. Set aside to dry. This will seal any cracks and keep the salt from leaking out.

☐ Glue base legs to corners of base. Keep base upside down and flat on the work surface as you work. The tops of the legs should be flush with the top of the base.

Derrick

☐ Cut out derrick.

☐ Score and bend on dotted lines.

☐ Fold derrick into a pyramid shape as shown. Glue side tabs in place.

☐ Glue derrick to base, positioning it over the large square printed on the base.

Hinge bracket

☐ Cut out hinge bracket.

☐ Drill holes where indicated large enough for wire to pass through snugly.

☐ Score and bend on dotted lines.

☐ Fold as shown, gluing the triangular center section first and then folding the side sections up and gluing to the ends of the triangle.

☐ Glue hinge bracket into place on top of the derrick.

Pump beam

☐ Cut out pump beam, pump rod connector, and counterweights.

☐ Drill holes in pump beam and pump rod connector where indicated. Holes in connector should be just large enough for wire to fit through snugly. Holes in beam should be large enough for wire to pass through loosely. Apply a drop of super glue to each of the holes in the beam. Let dry and then redrill. This will strengthen the area around the holes and ensure smooth operation of the pump.

☐ Score and bend on dotted lines.

Steam Oil Pump

Assembly Instructions

☐ Fold pump beam and pump rod connector. Glue connector to one end of beam as shown.

☐ Glue counterweights to other end of beam as shown. Glue one weight to each side of the beam. When glue is dry, glue tips of the counterweights together.

Gear box

☐ Cut out gear box.

☐ Drill holes where indicated. Holes should be large enough for wire to pass through loosely. Apply a drop of super glue to each of the holes. Let dry and then redrill.

☐ Score and bend on dotted lines.

☐ Fold gear box shape and glue tab in place.

☐ Glue gear box to base, positioning it over the small square.

Pump rod

☐ Cut out pump rod.

☐ Score and bend on dotted line.

☐ Fold and glue together, making a double-thick rod.

☐ Drill holes where indicated. Holes should be large enough for wire to fit through loosely. Apply a drop of super glue to each of the holes. Let dry and then redrill.

Pulley

☐ Cut out inner and outer pulley sections.

☐ Drill hole in the center of each pulley section just large enough for wire to pass through snugly.

☐ Glue inner pulley sections together, making sure that glue extends to the edge of the sections so that no opening is left between the two pieces.

☐ Glue the completed inner pulley to one of the outer pulley sections. To ensure proper positioning, pass a piece of wire through the holes in the center of the pulley sections before pressing the pieces together. Complete the pulley "sandwich" by gluing the remaining outer pulley section to the inner pulley, using the wire to center it properly. Again, be sure that the glue extends to the edge of the pulley sections so that no opening is left between the pieces.

Crankshaft

☐ Cut a piece of wire 1⅞ inches long.

☐ Bend, using the crankshaft bending guide.

☐ Slip the pump rod onto the crankshaft and then install the crankshaft in the gear box as shown.

Assembly Instructions

□ Drill holes in two washers. Then cut the washers out.

□ Slip a washer onto each end of the crankshaft as it extends from the gear box. Center the crankshaft and then glue the washers to the wire with a drop of super glue. Be careful not to glue the washers to the gear box.

□ Slip the pulley onto one end of the crankshaft as shown. Use a drop of super glue to glue the pulley to the shaft. When glue has dried, apply another drop of glue to strengthen the joint.

Installing the pump beam

□ Cut two pieces of wire ¾ inch long.

□ Install the pump beam in the hinge bracket, passing one of the pieces of wire through the holes as shown. Check to make sure the pump beam moves freely on the wire. If it does not, enlarge the holes in the pump beam. When the fit is correct, glue the wire to the hinge bracket, using a drop of super glue applied to each side.

□ Attach the loose end of the pump rod to the pump rod connector using the other piece of wire as shown. The pump rod should be able to move freely on the wire. Glue the wire to the connector by applying a drop of super glue to each side.

Operating the oil pump

To run the oil pump using the steam engine, make a drive belt by tying a square knot in a piece of sewing thread approximately 16 inches long. Loop one end of the belt around the pulley wheel on the oil pump and the other end around the flywheel pulley on the steam engine. Put the steam engine in motion and see the pump pump!

Steam Table Saw

This table saw is an accessory to The Toy Shop's balloon-powered steam engine. Connected to the engine by a drive belt made of sewing thread, the saw will spin as long as the air in the balloon lasts. Antique toy steam engines were sold with a variety of accessories, everything from miniature machine shops to cardboard figures that moved up and down.

Difficulty level: Medium

What you will need:

- ☐ Scissors
- ☐ White glue
- ☐ Super glue
- ☐ Metal-edged ruler
- ☐ Hobby knife
- ☐ Wire
- ☐ Needle-nosed pliers with cutting edge
- ☐ Salt or clean sand
- ☐ Sewing thread

Table Top (Paints)

Table Sides (Paints)

Base Top (Paints)

Base Sides and Legs (Paints)

Base Plaque (Text)

Base (Decals)

Customization Options

Steam Table Saw

Washer

Table Top

Saw Blade

Pulley

Table Base

Pulley

Leg

Base

Tab

Base Bottom Cover

Construction Diagrams

Assembly Instructions

Note: Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."

Base

☐ Cut out base, base bottom cover, and base legs.

☐ Score and bend on dotted lines.

☐ Fold base into an open box shape. Glue corner tabs in place.

☐ Place base upside down on your work surface. Fill with salt or clean sand. Glue base bottom to base, keeping corners square. Apply a line of glue around the edges of the base where it joins the bottom. Set aside to dry. This will seal any cracks and keep the salt from leaking out.

☐ Glue base legs to corners of base. Keep base upside down and flat on the work surface as you work. The tops of the legs should be flush with the top of the base.

Table base and table top

☐ Cut out table base and table top. Use a hobby knife to cut out the slot in the table top.

☐ Drill holes in sides of the table base where indicated. Holes should be large enough for wire to

pass through and rotate freely. Apply a drop of super glue to each of the holes. Let dry and then redrill. This will strengthen the area around the holes and ensure smooth operation of the pump.

☐ Score and bend on dotted lines.

☐ Fold table base into an open box shape. Glue tab in place. Glue the table base to the base, positioning the legs over the marks printed on the base.

☐ Fold the table top into an open box shape. Glue corner tabs in place. Set aside.

Pulley

☐ Cut out inner and outer pulley sections.

☐ Drill a hole in the center of each section just large enough for wire to fit through snugly.

☐ Glue the pulley sections together, sandwiching the inner sections between the outer sections. Pass a wire through the holes while gluing to keep the pulley sections aligned. Set aside.

Saw blade

☐ Cut out saw blades.

☐ Glue blades together, back to back. When glue has dried, drill a hole in the center just large enough for wire to fit through snugly.

Steam Table Saw

Assembly Instructions

☐ Drill holes in two washers and cut out. Set aside.

Assembling the table saw

☐ Cut a piece of wire 2 inches long.

☐ Slide the pulley onto one end of the wire. Position so that pulley is approximately $1/16$ inch from the end of the wire. Glue pulley to the wire, using a drop of super glue. Let dry.

☐ Install the wire as shown, passing it through one of the holes in the table base, then slipping on a washer, the saw blade, and another washer and passing it out through the hole in the other side of the table base. The end of the wire without the pulley should extend no more than $1/16$ inch from the table base so as not to interfere with the operation of the blade.

☐ Adjust the washers so that they fit snugly against the inside walls of the table base. Glue the washers to the wire with super glue, being careful not to glue the wire to the table base.

☐ Adjust the saw blade so that when the table top is set in place, the blade extends through the center of the slot. When the blade is positioned properly, glue it to the wire with super glue.

☐ Glue the table top to the table base.

Operating the table saw

To operate the table saw, cut a 16 inch length of sewing thread and tie the ends together. Loop one end around the pulley wheel on the table saw and the other end around the flywheel pulley of the steam engine. Put the steam engine in motion to make the saw blade spin.

The Toy Shop tractor crane works just like the real thing. Two cables are attached to the bucket — one to the center and the other to the sides. The cable attached to the sides is used to open the bucket. The cable attached to the center is used to lift the bucket. The crane operator must coordinate the action of the two cables, preventing a tangle by keeping the slack out of the cable that is not in use. The boom can be raised or lowered without affecting the open or closed position of the bucket.

In real life, tractor cranes are used to carry loads from place to place. Track pads, instead of wheels, allow the crane to travel over rough or muddy ground. This model crane can pick up and carry pencils, coins, and other small objects. If you make two you can compete against a friend to see who can operate the crane to pick up objects most quickly.

Difficulty level: Challenging
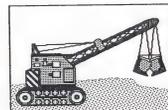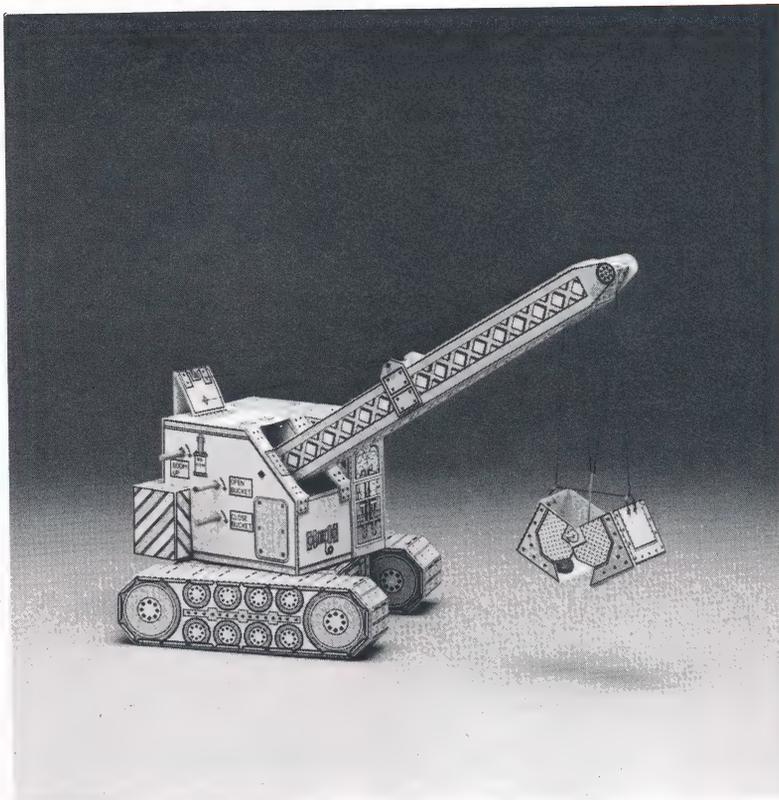
Tractor Crane

What you will need:

- ☐ Scissors
- ☐ White glue
- ☐ Super glue
- ☐ Metal-edged ruler
- ☐ Hobby knife
- ☐ Wire
- ☐ Needle-nosed pliers with cutting edge
- ☐ Dowelling
- ☐ Sewing needle
- ☐ Sewing thread
- ☐ Straight pins (3)
- ☐ Paper clips (2)
- ☐ Salt or clean sand

Counterweight Stripes (Paints)

Counterweight (Text)

Cab (Decals)

Cab (Paints)

Boom and Bucket (Paints)

Tracks (Paints)

Customization Options
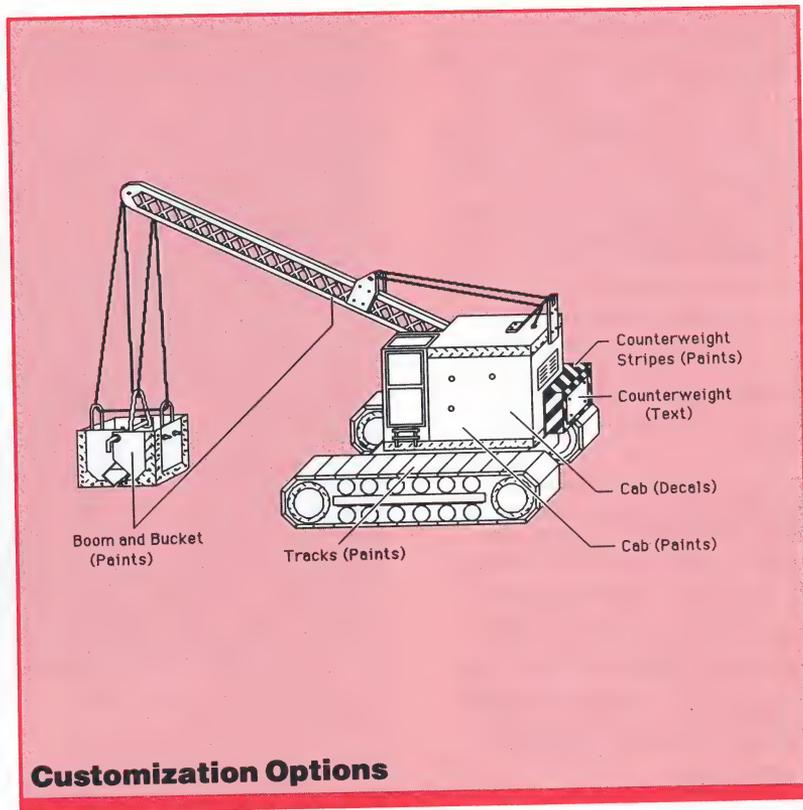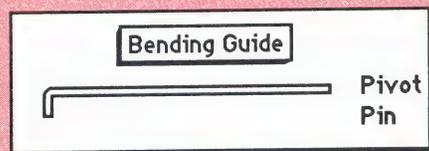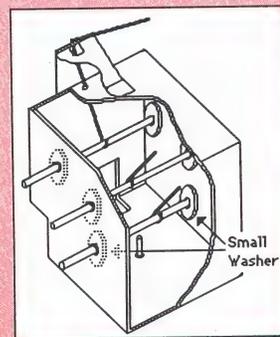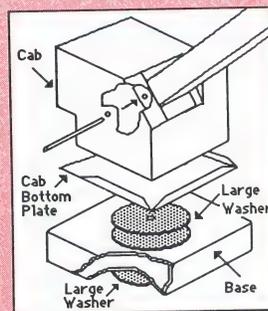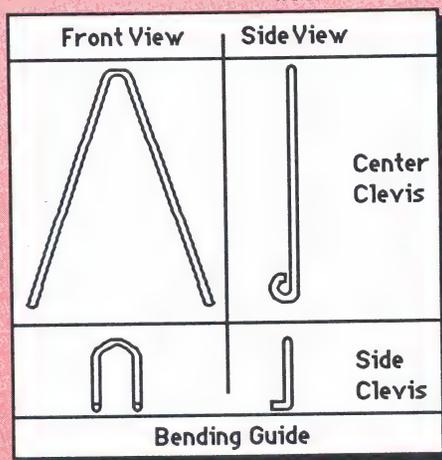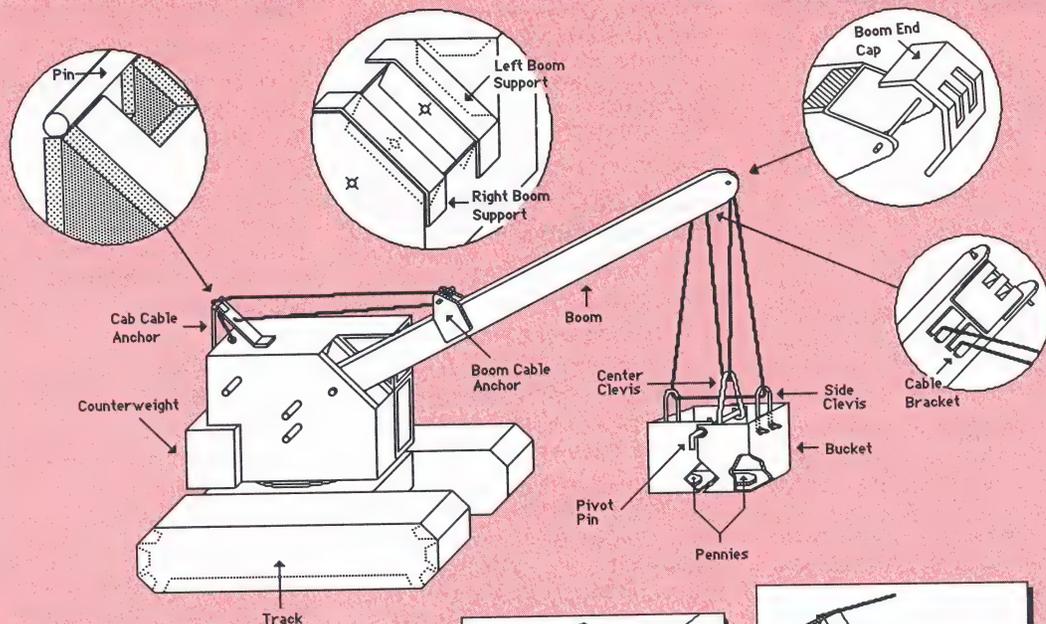
Construction Diagrams

Tractor Crane

Assembly Instructions

Note: *Before beginning to assemble your model, adhere printout pages to adhesive-backed cardstock. Back all pages except those marked "Do not adhere to cardstock."*

Base and tracks

☐ Cut out base, tracks (2), and one large washer.

☐ Score and bend on dotted lines.

☐ Fold base into a closed box shape. Glue together with all tabs on the inside. Be careful to keep the base square while gluing.

☐ Glue washer to circle printed on the base. When glue is dry, drill a hole through the center of the washer large enough for a dowel to fit through snugly. Start drilling with a hobby knife and finish with the point of a pencil.

☐ Fold each track into a closed box shape as shown. Glue together with all tabs on the inside.

☐ Place base upside down on your work surface and glue one track to each side. The rear corners of the base should be aligned with the center of the rear wheels. The tops of the tracks should be flush with the top of the base.

For extra strength, apply a line of glue to all points where base and tracks meet.

Cab

☐ Cut out cab.

☐ Drill holes where indicated, large enough for dowel to fit through snugly. There are eight holes in all.

☐ Score and bend on dotted lines. Note that the tab on the triangular shaped "window" of the cab is marked like this ■+■+■+■ and should be scored on the reverse side.

☐ Fold cab into an open box shape as shown. Glue tabs in place.

☐ Cut out bottom of cab and one large washer.

☐ Score and bend on dotted lines.

☐ Glue washer to circle printed on bottom of cab. When glue has dried, drill a hole through the center of the washer, large enough for a dowel to fit through snugly. Set cab bottom aside.

☐ Cut out boom supports (2).

☐ Score and bend on dotted lines.

☐ Drill a hole in each support where indicated, large enough for a dowel to fit through snugly.

☐ Glue the boom supports in place as shown, holding the ends of the supports (which bend to fit the cab) firmly in place until glue has set.

☐ Cut out cab cable anchor. Use a hobby knife to cut the center slot.

Assembly Instructions

☐ Score and bend on dotted lines. Lines marked like this ➍ ➍ ➍ ➍ should be scored on the reverse side.

☐ Drill hole where indicated, large enough for thread to pass through.

☐ Glue cable anchor in place on top and back of cab as shown.

☐ Cut the head off a straight pin and trim the end so that the pin is as long as the cable anchor is wide. Position the pin across the top of the anchor as shown and glue in place with super glue. Do not disturb until glue is completely dry.

Boom

☐ Cut out boom.

☐ Drill holes in boom where indicated. Holes at rounded end should be just large enough for a straight pin to pass through. Holes at straight end should be large enough for a dowel to fit through snugly.

☐ Score and bend on dotted lines.

☐ Fold boom and glue tab in place, being careful to align the tab so that the boom is straight.

☐ Cut out boom end cap. Use a hobby knife to cut slots in the cap.

☐ Pass a straight pin through the holes in the rounded end of the boom. Clip pointed end off and glue the pin to the boom with super glue.

☐ Glue end cap in place as shown, fitting snugly over pin at the end of the boom.

☐ Cut out boom cable anchors (2).

☐ Drill a hole in each anchor just large enough for a straight pin to fit through.

☐ Glue boom cable anchors to boom at points indicated by arrows. The ends with the holes should extend upward as shown.

☐ Pass a straight pin through the holes in the anchors. Clip pointed end off and glue both ends in place with super glue.

☐ Cut a piece of dowel 2 inches long. Install the boom on the cab by passing the dowel through one side of the cab, the boom, and the boom supports as shown. Leave a small amount of dowel extending from the side of the cab so you can remove it later if necessary. Once the bottom of the cab is in place, removing the boom will be the only way to get inside the cab to fix broken cable threads.

☐ Cut three pieces of dowel, each 3½ inches long.

☐ Cut out six small washers. Drill a hole in each large enough for a dowel to fit through snugly.

☐ Slide the three dowels through the holes in one side of the cab. Place two washers on each dowel and then slide the dowels out of the holes in the other side of the cab. Adjust so that dowels extend from left side of cab (side with the driver) ⅛ inch or less. Position

Tractor Crane

Assembly Instructions

washers so that they fit against the inside walls of the cab. This is to prevent the dowel from moving from side to side. Glue washers to dowels with super glue, being careful not to glue washers or dowels to cab walls.

☐ Cut two pieces of thread, each 3 feet long. Use super glue to attach the end of one thread to the dowel marked "open bucket" and the end of the other thread to the dowel marked "lift bucket." Let dry. It's best to attach the thread slightly away from the center of the dowel so that the glue will not interfere with normal winding.

Tie a paper clip to the end of each piece of thread. Drop the paper clips through the boom so that the thread passes through the center of the boom and comes out the end. The "open bucket" thread should pass over the top of the dowel which attaches the boom to the cab. The "lift bucket" thread should pass beneath the dowel. Each thread should come out its own slot in the boom end cap and pass over the wire at the end of the boom. Be sure that the threads inside the boom are not twisted. Wind about six inches of thread onto each dowel by turning the dowel clockwise while applying tension to the thread.

☐ Thread a sewing needle with a piece of thread 2 feet long. Tie a knot in the end. Pass the thread through the small hole in the cab

cable anchor. Glue the knot at the end of the thread in place on the inner surface of the anchor with a drop of super glue. Pass the thread under the pin in the boom cable anchor. Then carry it back over the boom cable pin and the pin in the cab cable anchor. Pass it down through the hole in the top of the cab and tie the end to the dowel marked "boom up." Glue with a drop of super glue. When glue is dry, take up the slack in the thread by winding the "boom up" dowel in a clockwise direction.

☐ When all the threads are in place, glue the cab bottom to the cab with the washer on the outside. Be careful to keep the cab square while gluing.

Counterweight

☐ Cut out counterweight and counterweight end caps.

☐ Score and bend on dotted lines.

☐ Fold counterweight into an open box shape. Glue tab in place. Glue one of the caps to the end of the box, keeping the corners square. Fill the box half full with salt or clean sand. Then glue the other end cap in place. Check for leaks, applying glue to seal any openings in the box. Set aside to dry.

Assembly Instructions

Bucket

☐ Cut out bucket sections (2).

☐ Drill holes in bucket sections where indicated. Corner holes should be large enough for wire to pass through and rotate freely. Center holes should be just large enough for wire to fit through snugly.

☐ Score and bend on dotted lines.

☐ Fold each bucket section and glue tabs in place. Then, using super glue, glue a penny to the inside bottom surface of each bucket section. The pennies will provide the weight needed for the bucket to open and close properly when lifting up objects.

☐ Cut two pieces of wire, each 1 inch long. Bend the wires, using the side clevis bending guide, to form the side clevis pieces. Install a side clevis in each bucket section as shown, gluing in place with super glue.

☐ Cut a piece of wire 2¾ inches long. Bend, using the center clevis bending guide and making a curl in each end of the wire as shown.

☐ Cut a piece of wire 1¾ inches long. Bend, using the pivot pin bending guide.

☐ Assemble the bucket by putting the two sections together, one inside the other, with corners overlapping. Slide the pivot pin through the corner holes in one side of the assembled bucket, slip the center clevis onto the pivot pin, and pass the pivot pin out through the holes in the other side of the bucket. Bend the straight end of the pivot pin down to hold the assembled bucket together.

Assembling the crane

☐ Attach the counterweight to the cab as shown, gluing it first to the cab bottom and then to the cab sides by applying a line of glue at every point where the counterweight touches the cab.

☐ Cut a piece of dowel 1½ inches long. Insert into the hole in the bottom of the cab, allowing 1 inch of dowel to extend from the bottom of the cab. Glue in place with super glue.

☐ Cut out the remaining large washer. Drill a hole in the center large enough for dowel to fit through snugly. Install the cab on the base. Slip the washer onto the dowel extending from the bottom of the base. Adjust so that the washer fits against the base snugly. Glue the washer to the dowel with super glue. Be careful not to glue the washer to the base.

☐ Place the bucket directly under the raised boom. Pass the threads through the center clevis and the side clevis pieces as shown, making sure that the "open

Tractor Crane

Assembly Instructions

bucket" thread goes through the side clevis pins and the "closed bucket" thread goes through the center clevis.

☐ Cut out the cable brackets, cutting a slot in the end of each as indicated. Slip one of the threads through each slot, then glue the brackets (with the threads attached) to the underside of the boom, just beneath the boom end cap.

The Zoetrope is an early motion picture machine. Spin the drum and look through the slits to see a series of still pictures leap into action.

This popular 19th century optical toy was invented twice: first in 1834 by an Englishman, William Horner, and later in 1860 by a Frenchman, Pierre Desvigns. The English called their machine the "wheel of the devil," but Desvigns named his device the Zoetrope (from the Greek words *zoion* meaning "living being" and *tropos* meaning "turn") and called it the "wheel of life."

In 1878, the British-born American photographer Eadweard Muybridge used the Zoetrope to perform an experiment and help win a bet. The bet was made by Leland Stanford, then Governor of California, who wagered $25,000 that a galloping horse, at some point in its gallop, has all four feet off the ground. Muybridge set up his cameras along a race track to produce a series of still photos which proved that Stanford was right—at one point in its gallop, a horse does have all four feet off the ground. Muybridge then placed his pictures of a galloping horse in a Zoetrope and spun it, thus producing the first motion picture made of real photographs.

Difficulty level: Medium

Zoetrope

What you will need:

- ☐ Scissors
- ☐ White glue
- ☐ Super glue
- ☐ Metal-edged ruler
- ☐ Hobby knife
- ☐ Dowelling
- ☐ Cellophane tape
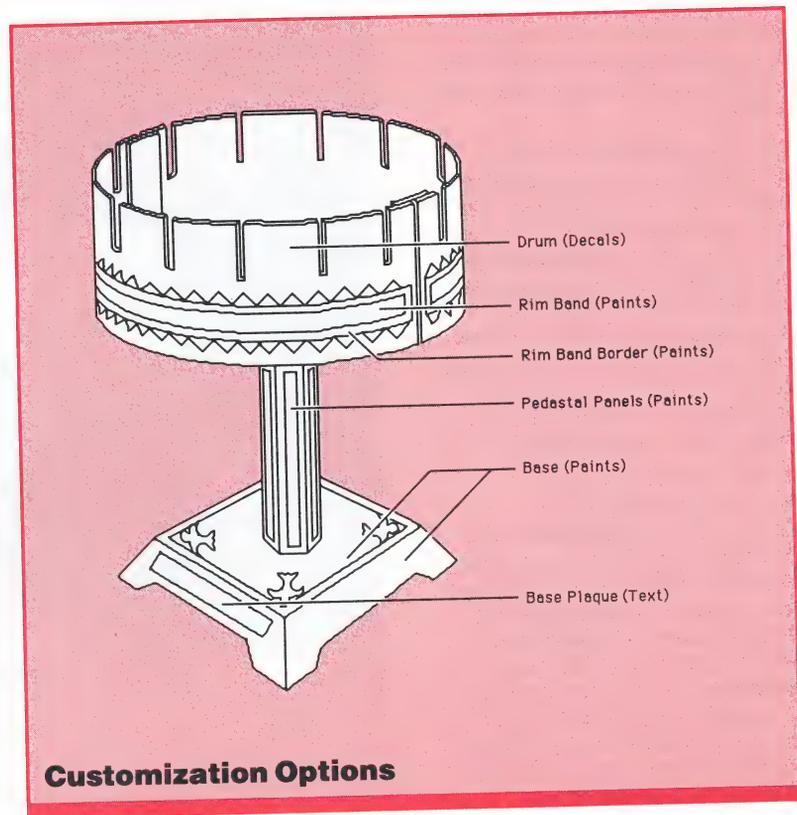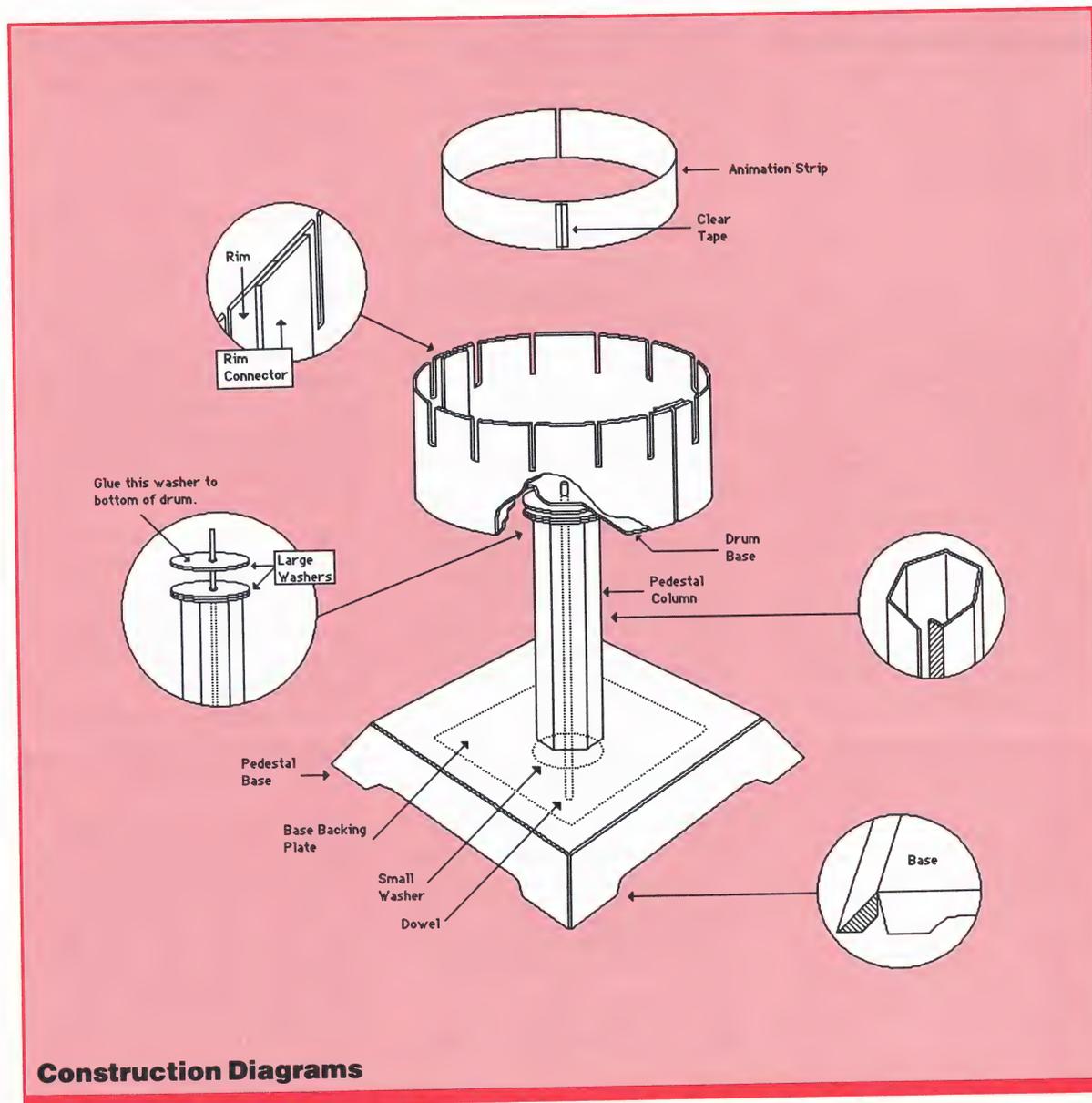
Drum (Decals)

Rim Band (Paints)

Rim Band Border (Paints)

Pedestal Panels (Paints)

Base (Paints)

Base Plaque (Text)

Customization Options

Animation Strip

Clear Tape

Rim

Rim Connector

Glue this washer to bottom of drum.

Large Washers

Drum Base

Pedestal Column

Pedestal Base

Base Backing Plate

Small Washer

Dowel

Base

Construction Diagrams

Zoetrope

Assembly Instructions

Pedestal base

□ Cut out pedestal base and base backing plate.

□ Score and bend on dotted lines.

□ Glue base backing plate to back side of base, centering the plate on the base.

□ When glue is dry, drill a hole where indicated in the center of the base. Begin drilling with a hobby knife and finish with a pencil point. Hole should be large enough for dowelling to pass through and rotate freely.

□ Fold base into an open box shape and glue tabs in place.

Pedestal column

□ Cut out pedestal column.

□ Score and bend on dotted lines.

□ Fold and glue tab in place.

□ Glue column to base by applying a thin film of glue to the edges of one end of the column and setting it in place over the hexagon shape printed on the base. Hold in place until glue has set. Then apply a line of glue around the bottom of the column where it meets the base. Set aside and do not disturb until glue is completely dry.

Axle

□ Cut a piece of dowelling 6 inches long.

□ Cut out small washer. Drill a hole in the center of the washer large enough for dowelling to fit through snugly. Slide washer onto one end of the dowel, positioning so that it is approximately $3/8$ inch from the end of the dowel. Glue in place with a drop of super glue.

□ Cut out two large washers. Glue together back to back. Drill a hole in the center large enough for dowelling to pass through and rotate freely. Start drilling the hole with a hobby knife and finish up with the point of a pencil.

□ Pass the dowel with the small washer attached through the pedestal base and column as shown.

□ Apply a thin film of glue to the upper end of the pedestal column. Slide the double-thick washer onto the dowel as it emerges from the top of the column. Press washer down onto top of column, centering carefully. Hold in place until glue has set. Check to see that the dowel can turn and slide up and down freely in the hole. Apply a line

Assembly Instructions

of glue around the column where it meets the washer and set aside to dry.

Drum base

☐ Cut out drum base and remaining large washer.

☐ Glue washer over circle on base, with hole indicator facing up. When glue has dried, drill hole where indicated large enough for dowel to fit through snugly.

Drum rim

☐ Cut out drum rims and rim connectors. Do not cut slots in rims at this point.

☐ Give drum rim sections a curl by drawing them over the sharp edge of a desk or table top. Then cut slots in rims, using a hobby knife.

☐ Curve rim connectors to match the curve in the rims. Join rim sections by placing sections end to end and gluing one of the rim connectors over the joint. The top of the connector should be flush with the top (the slotted edge) of the rim. A space of about 1/16 inch will be left at the bottom. Hold connector in place until glue has set. Repeat with the remaining connector.

Installing the base in the rim

☐ Place drum rim on table top, slotted side up. Then, ease the base into the rim, making sure that the side with the washer faces down so that the washer will wind up on the outside of the completed drum.

The base should fit snugly into the rim. If the base is too large, trim away a very small amount all around the edge of the base. Trimming away a small amount will result in a large change in the size of the base, so be careful not to trim too much. If the base is too small, resulting in a loose fit, disassemble one of the rim joints, trim the ends, and glue together again so that the rim fits snugly around the base.

☐ When base is properly installed, apply a line of glue around the inside circumference of the drum where base and rim meet. Set drum aside. Do not disturb until glue has dried completely.

Zoetrope

Assembly Instructions

Installing the drum on the pedestal

☐ Slide the drum onto the dowel that extends from the top of the pedestal column. Position the dowel so that when the drum is resting on the pedestal there is approximately ⅛ inch of space between the washer on the end of the dowel and the underside of the base. This clearance will allow the drum to rotate freely when it is spun.

☐ When drum is positioned properly, attach to dowel by applying a drop of super glue at the point where the dowel emerges on the INSIDE of the drum base. Be sure that the drum is straight on the axle so it won't wobble when spun. Be careful not to glue the drum to the pedestal column.

Picture strips

☐ Cut out a set of picture strips. Place them end to end and turn them face down on your work surface. Join with a strip of cellophane tape. The strips should be joined at one end only. DO NOT join the other end of the strips.

Operating your Zoetrope

To operate the Zoetrope, place a picture strip inside the drum. The bottom of the strip should rest on the bottom of the drum and the pictures should face the center. Hold the Zoetrope under a light and spin the drum by rotating the dowel from underneath the pedestal base. Look through the viewing slots in the rim to see the pictures move.

You can make your own original movies by cutting two strips of blank paper the same size as the picture strips that come with the Zoetrope, then joining the strips and drawing a series of sequential images, one to each frame.
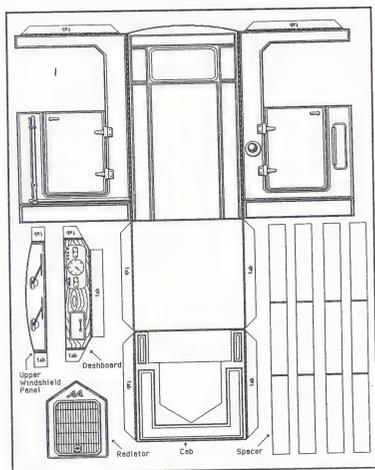
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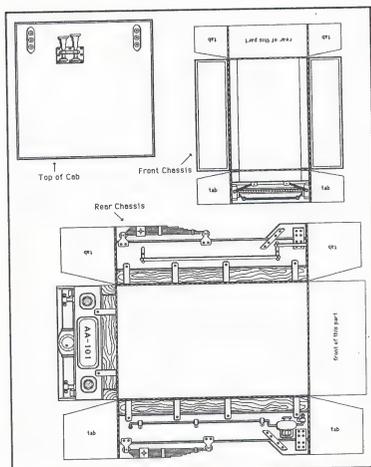
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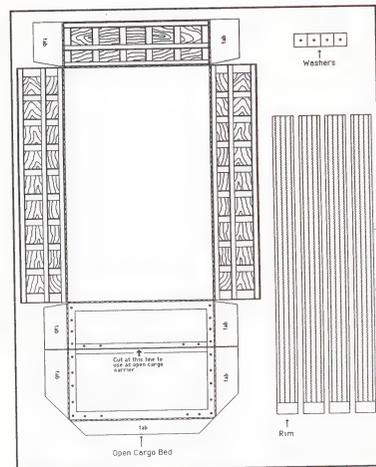
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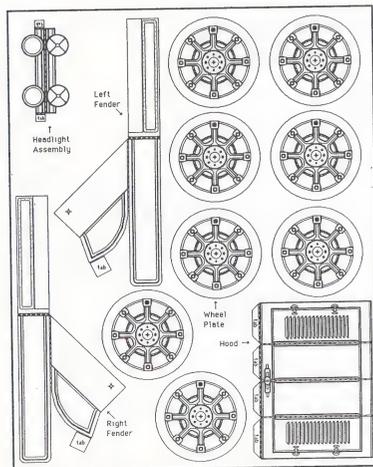
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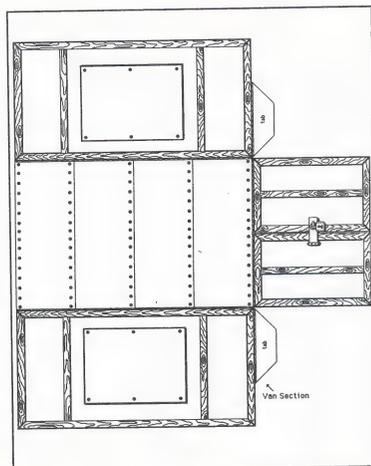
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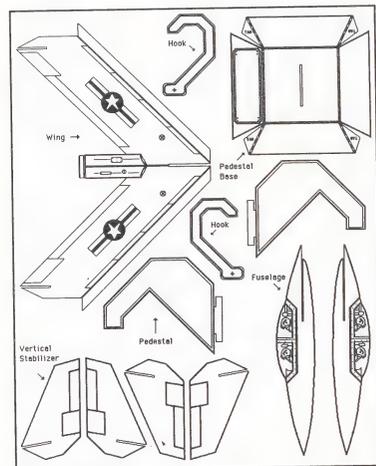
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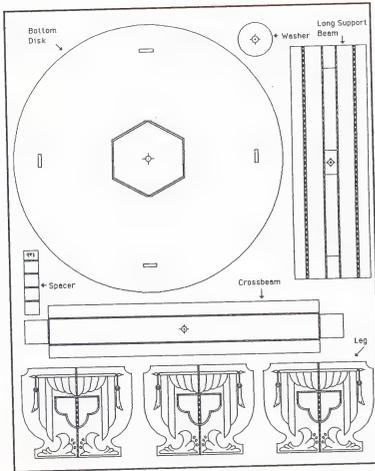
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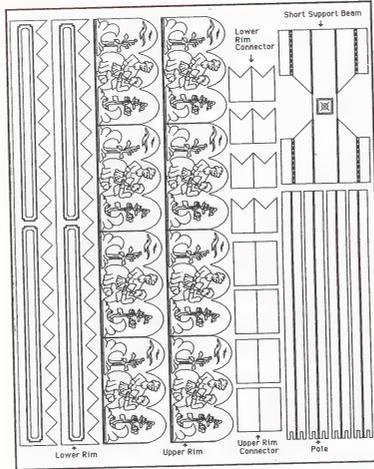
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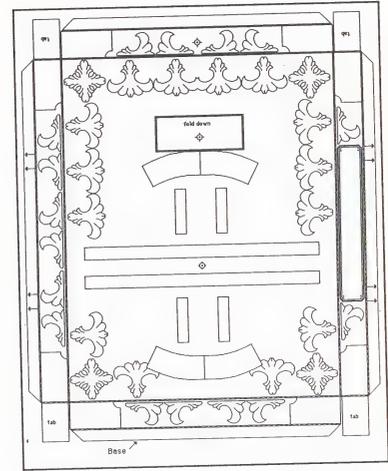
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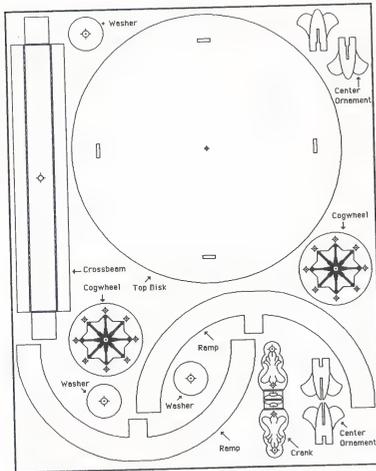
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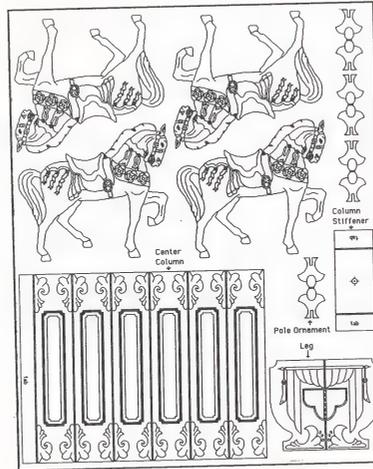
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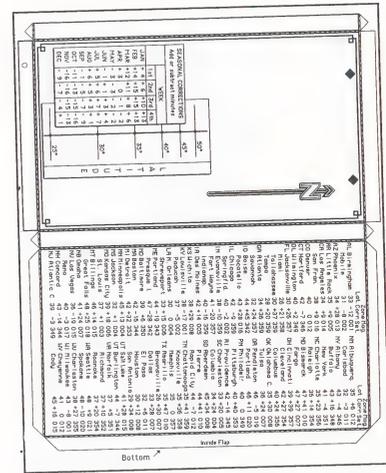
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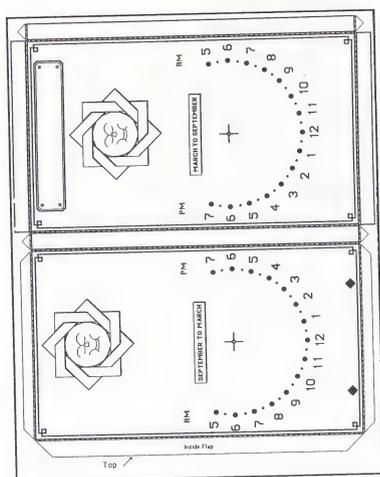
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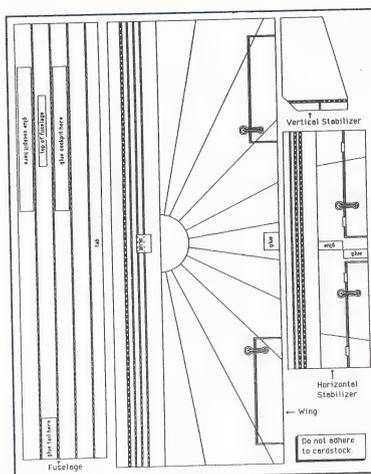
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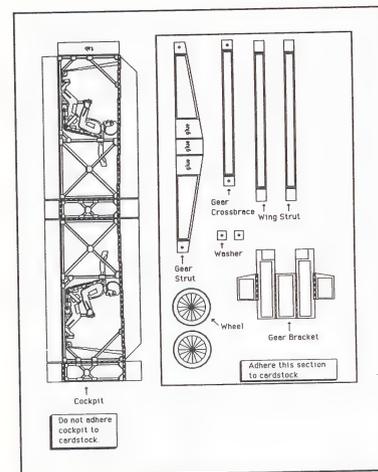
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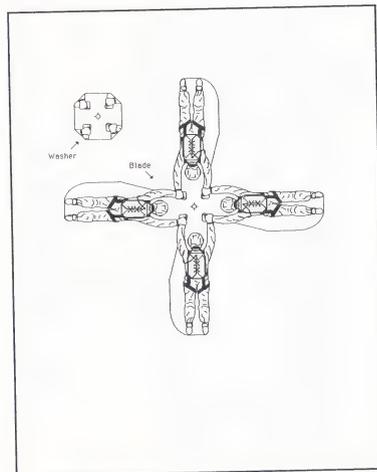
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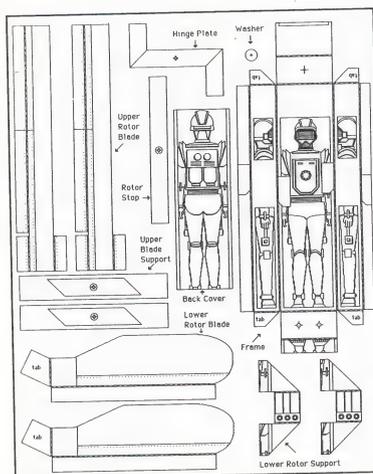
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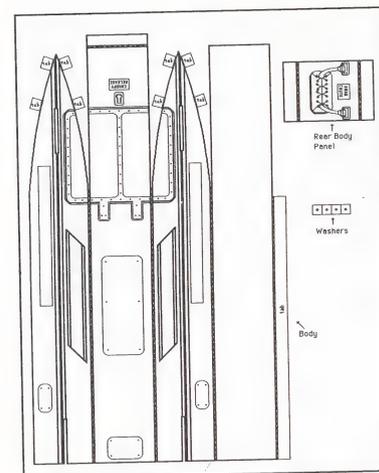
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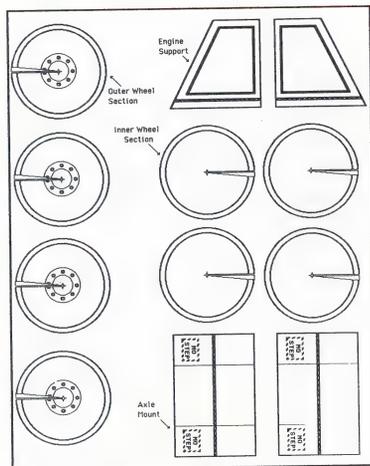
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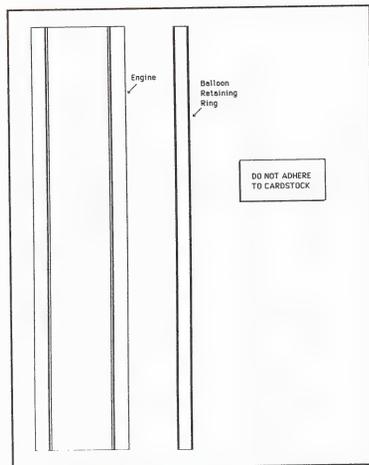
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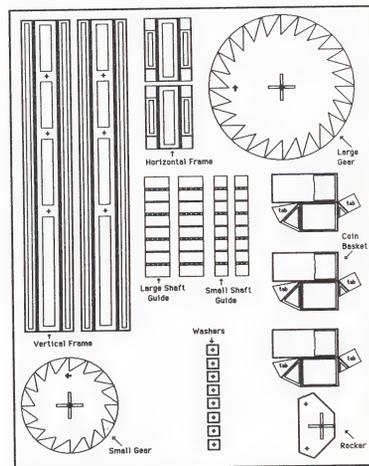
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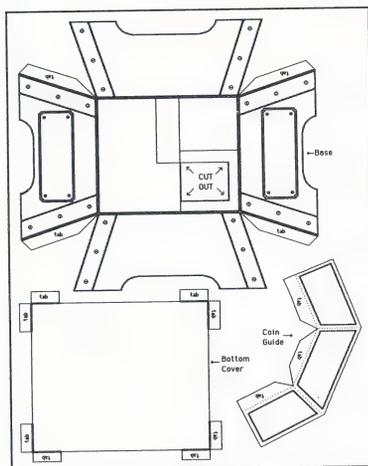
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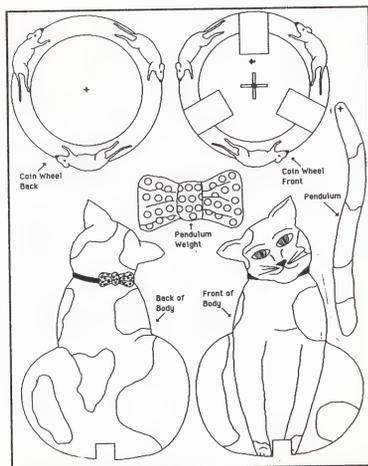
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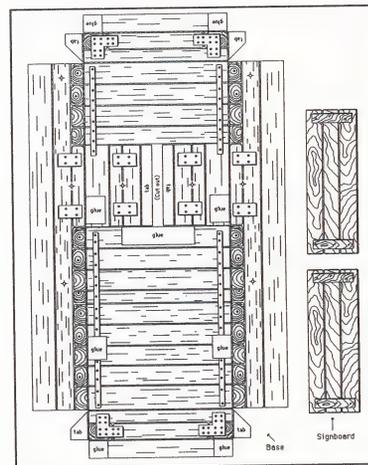
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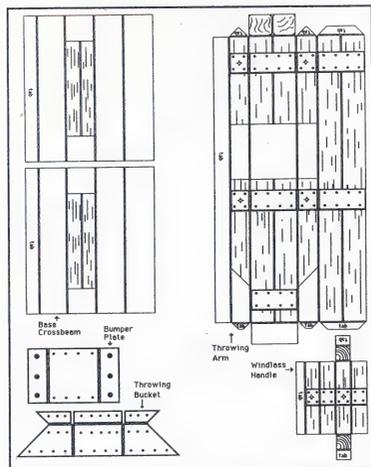
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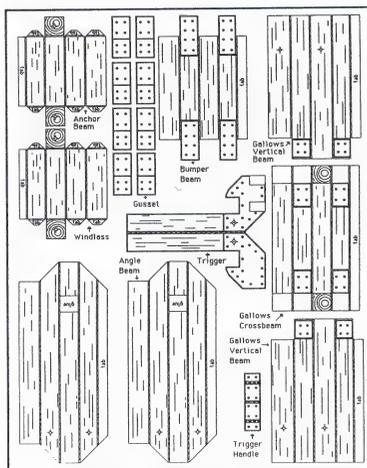
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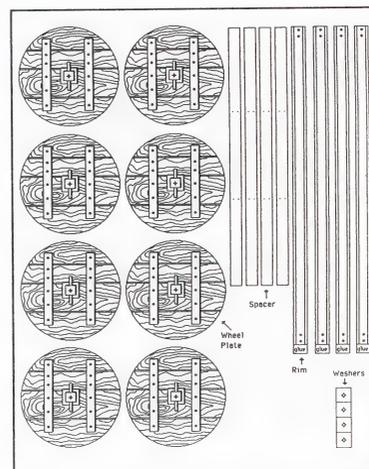
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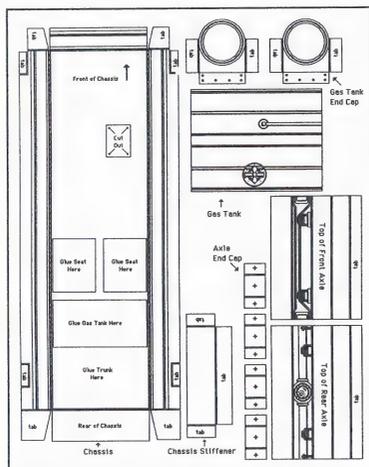
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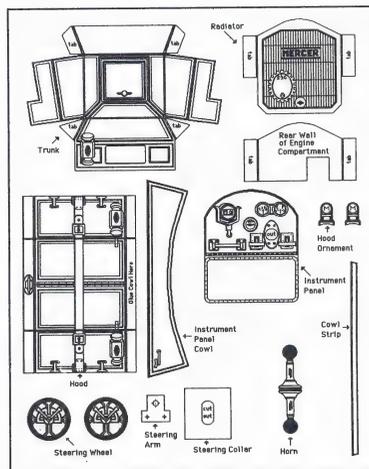
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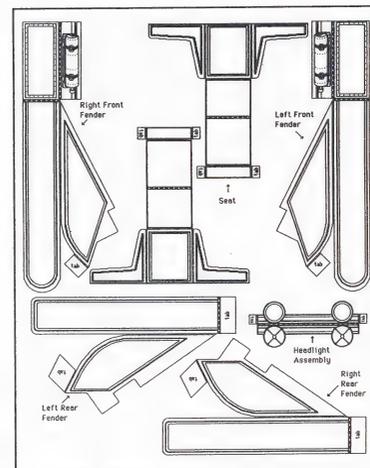
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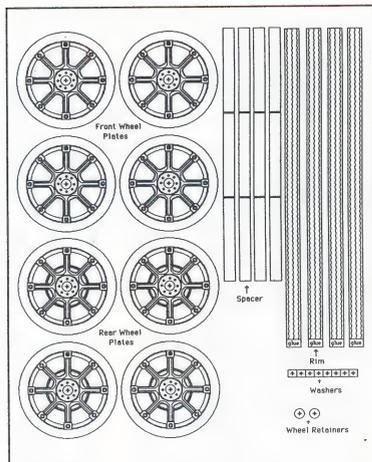
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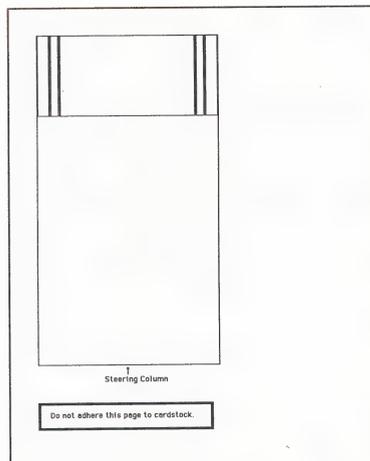
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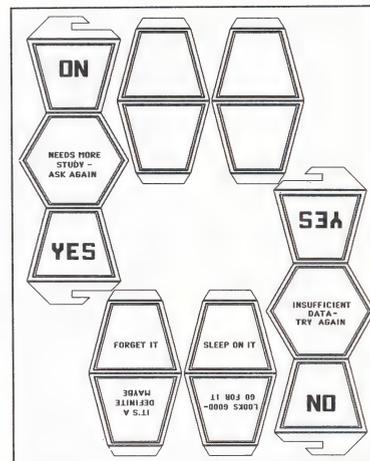
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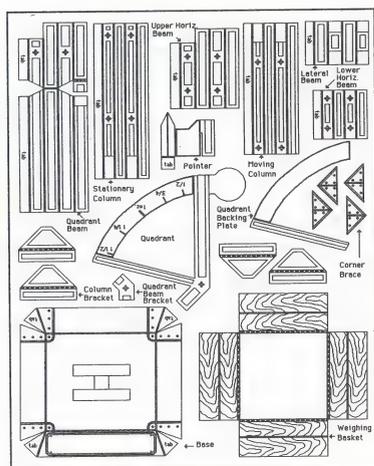
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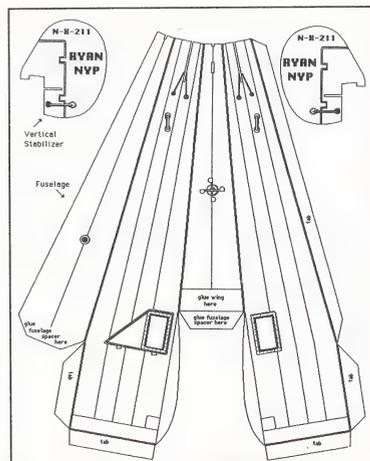
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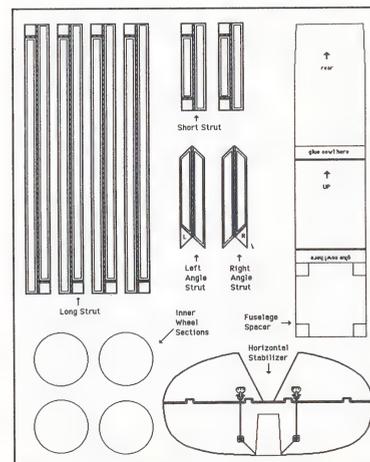
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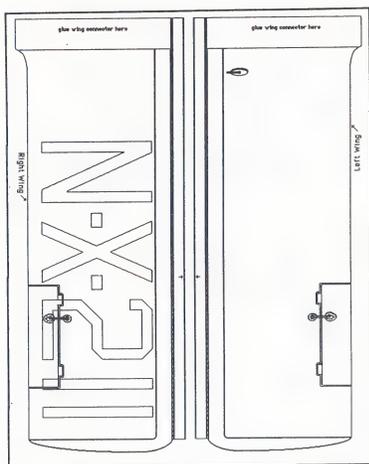
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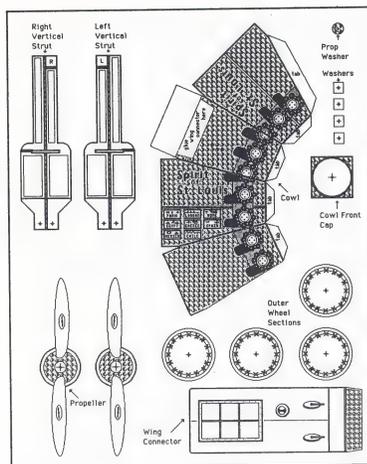
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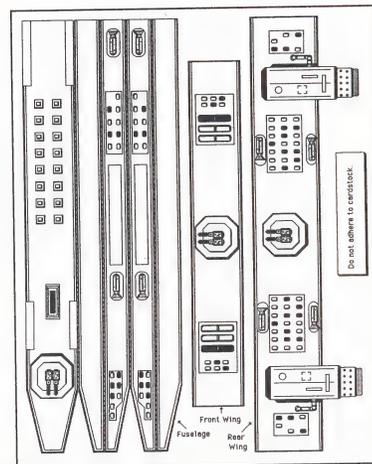
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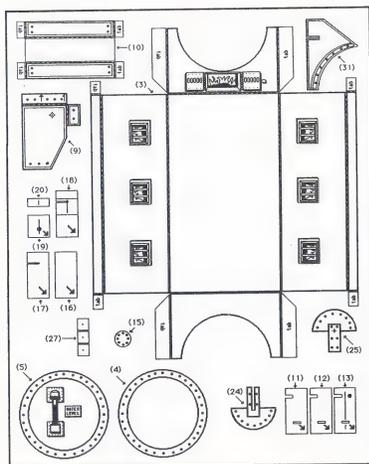
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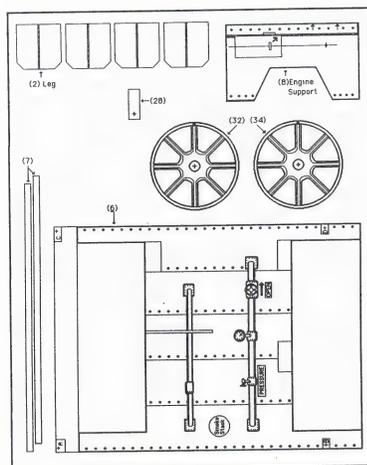
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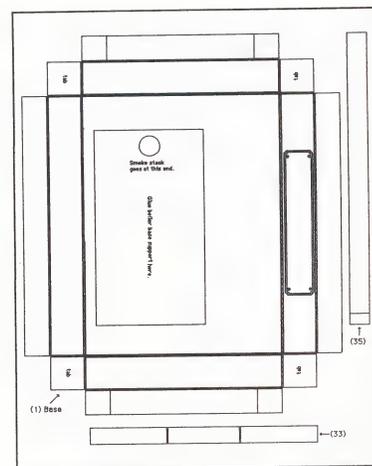
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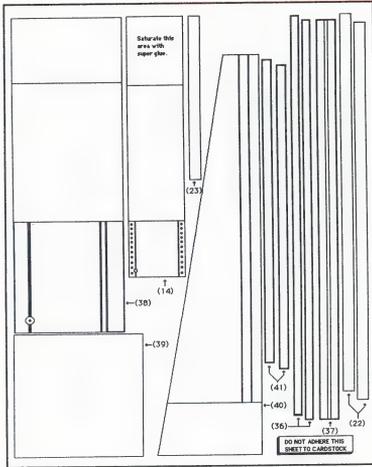
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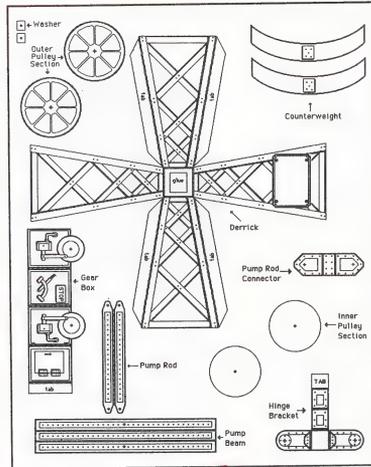
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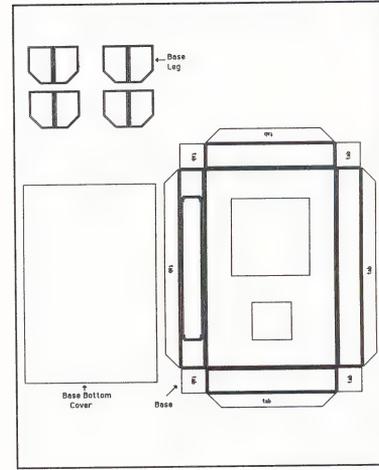
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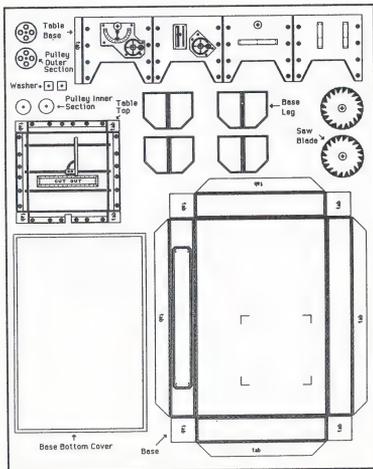
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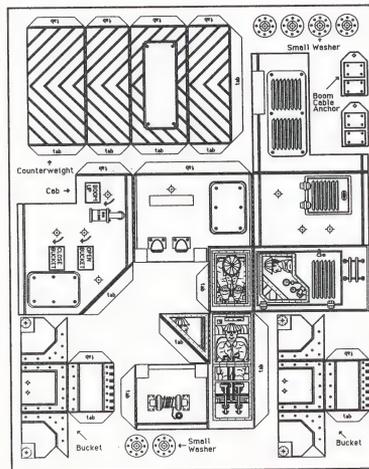
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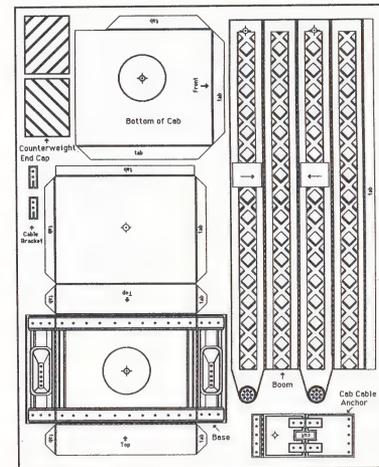
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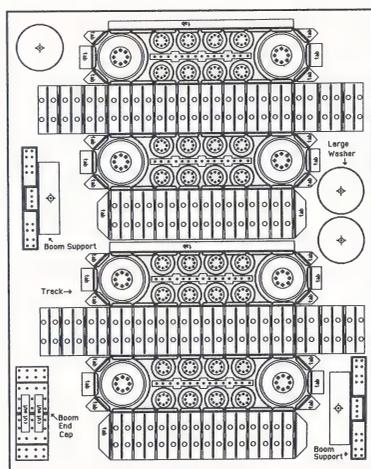
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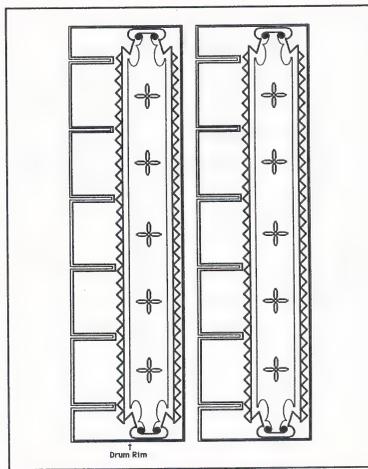
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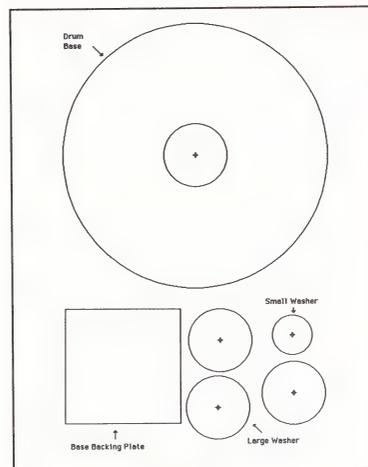
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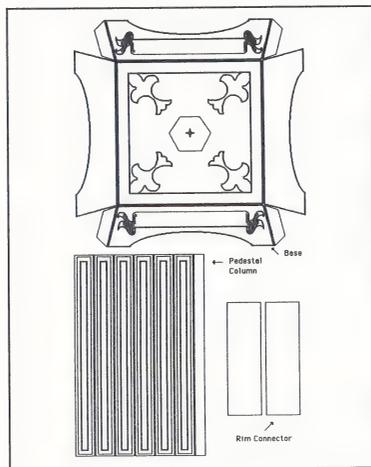
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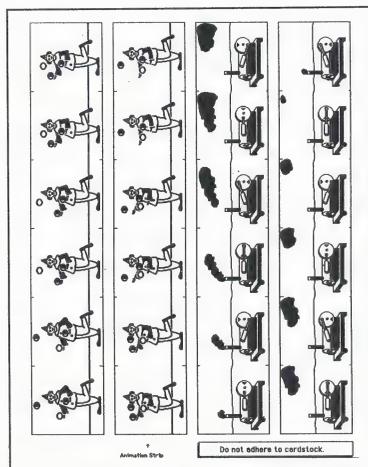
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Warranty Information

Disk Replacement Policy

If any of these disks should fail within 90 days of purchase, please return with proof of purchase for prompt FREE replacement. If the disk has been physically damaged, or after 90 days from date of purchase, please include $5 per disk for replacement, plus $2.50 for postage and handling.

Printer Compatibility

This program is warranted to work only with the printers listed on the outside of the package. Broderbund Software, Inc. assumes no responsibility for supporting printers not listed on the outside of this package.

Limited Warranty

This manual and the software described in this manual are sold "AS IS," without warranty as to their performance. The entire risk as to the quality and performance of the software is assumed by the user. The user, and not the manufacturer, distributor or retailer, assumes the entire cost of all necessary servicing, repair or correction and any incidental or consequential damages.

However, to the original purchaser only, Brøderbund warrants that the medium on which the program is recorded shall be free from defects in materials and workmanship under normal use and service for a period of ninety (90) days from the date of purchase. If during this period a defect in the product should occur, the product may be returned to Brøderbund or to an authorized Brøderbund dealer along with proof of purchase, and Brøderbund will replace or repair the product at Brøderbund's option without charge to you. Your sole and exclusive remedy in the event of a defect is expressly limited to replacement or repair of the product as provided above.

If failure of the product, in the judgment of Brøderbund, resulted from accident, abuse or misapplication of the product, then Brøderbund shall have no responsibility to replace or repair the product under the above terms.

Nonetheless, such products (and products that become defective after the ninety-day replacement period) may be returned to Brøderbund along with

$5 per disk, plus $2.50 for postage and handling, and Brøderbund will provide you with a replacement, providing that Brøderbund is still manufacturing the product.

Some toys and models included in The Toy Shop require substantial skill to construct successfully. Brøderbund does not guarantee that all users will be able to construct successfully any or all toys and models for which this product provides plans and instructions.

WARNING: Various items and materials used in the construction of The Toy Shop's models and toys may cause injury to the user if directions are not followed carefully and correctly. Brøderbund Software recommends that an adult directly supervise usage by any minor who does not demonstrate an understanding of the safe use of these items and materials. The use of finished toys and models by small children should be supervised by an adult. Particular attention should be paid to safety notes and manufacturer's instructions when using super glue. The user shall use The Toy Shop at his own risk. Brøderbund assumes no liability whatsoever for injury caused by use of The Toy Shop.

The above warranties for goods are in lieu of all other express warranties and no implied warranties of merchantability and fitness for a particular purpose or any other warranty obligation on the part of Brøderbund shall last longer than ninety (90) days. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. In no event shall Brøderbund or anyone else who has been involved in the creation and production of this software be liable for indirect, special, or consequential damages, such as, but not limited to, loss of anticipated profits or benefits resulting from the use of this software, or arising out of any breach of this warranty. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

For technical support on this or any other Brøderbund product, call (415)479-1170.

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Backup Disk Information

This program is copy protected. If you would like a complete set of backup disks, you may order them using the coupon below. You may do this at any time, as long as the product is still being manufactured by Brøderbund. (Limit: one set per customer.)

Please mail the original coupon, not a copy, along with a check or money order for $15.00 (in U.S. funds) to:

Software-Direct Division
Brøderbund Software, Inc.
17 Paul Drive
San Rafael, CA 94913-2947

Please make your check or money order payable to Brøderbund Software.

- -

Backup Disk Coupon

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Name: _____

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Product Name: The Toy Shop
Computer: (please specify)

Apple _____   Commodore _____   IBM _____   Macintosh _____

(Clip out this coupon on the dotted lines and send along with your payment. Please allow four to six weeks for delivery.)
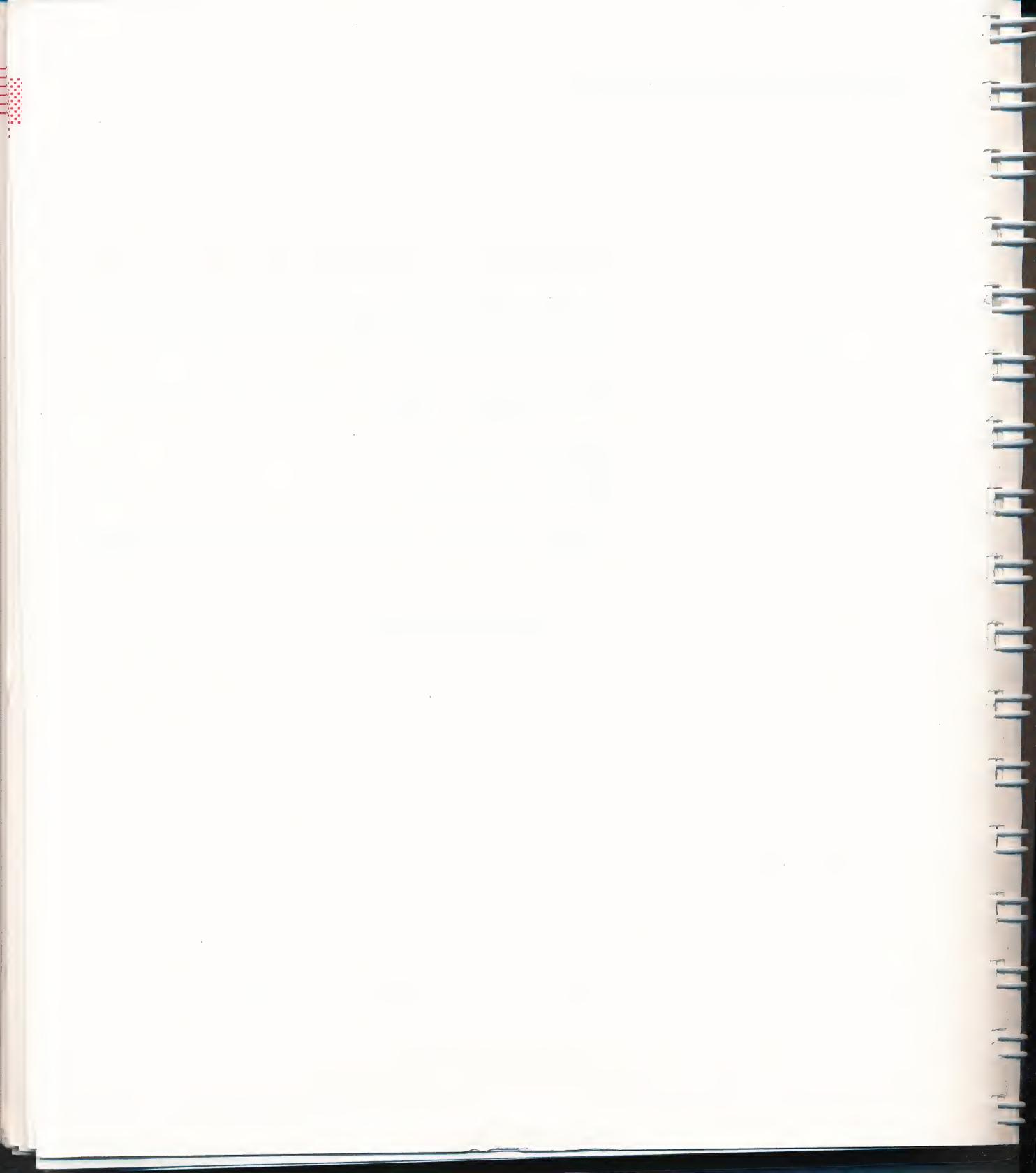
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Notes
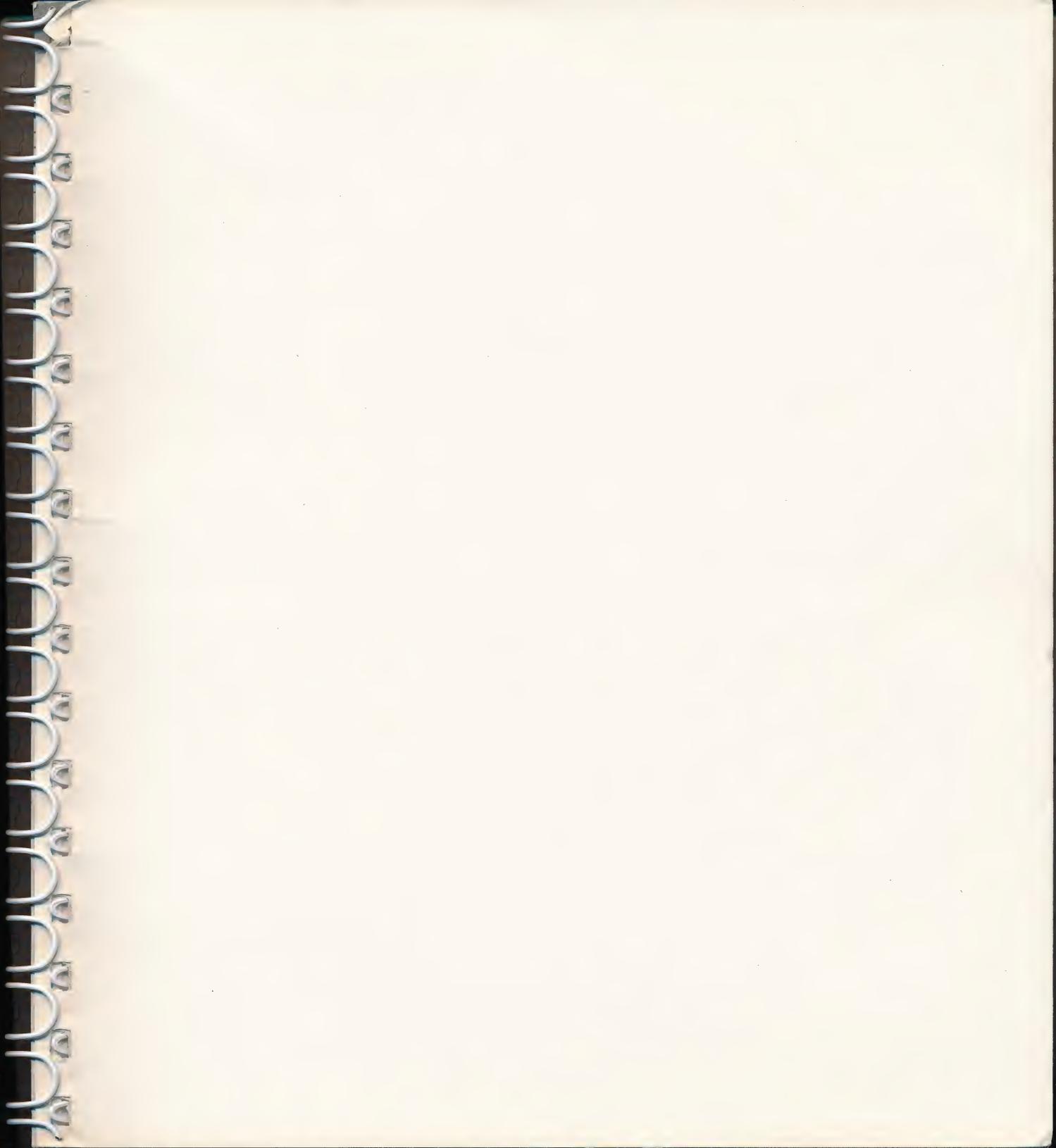
Broderbund®

the Toy Shop™

Side A

TOY DISK 1

(Side B on back)

For APPLE II+/IIe/IIc

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APDSK 76

Brøderbund Software™

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Protect Proteger Proteger Schutzen 保護	Never Nunca Jamais Nie 絕對禁止
No No Non Nein 禁止	10°C—52°C 50°F—125°F
Insert Carefully Insertar Inserer avec soin Sorgfaltig Einsetzen 插入小心	Never Nunca Jamais Nie 絕對禁止

the Toy Shop™

TOY DISK 2

Side A   (Side B on back)

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Nie
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No
No
Non
Nein
注意

10°C—52°C
50°F—125°F

Insert Carefully
Insertar
Inserer avec soin
Sorgfaltig Einsetzen
挿入注意

Never
Nunca
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Nie
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the *Toy Shop*™

MASTER DISK

Side A

(Side B on back)

For APPLE II+/IIe/IIc

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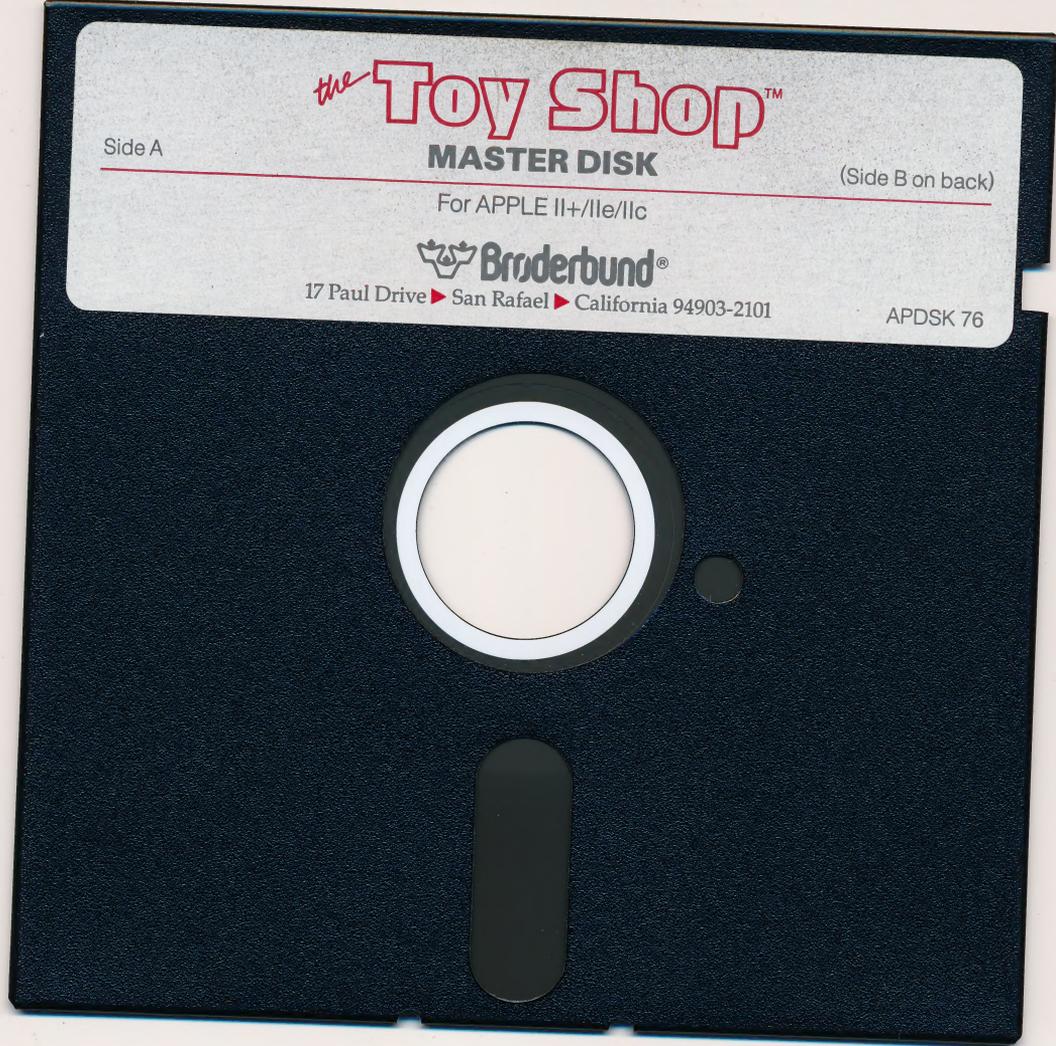
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Proteger
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Schützen
保 護

Never
Nunca
Jamais
Nie
絶対禁止

Insert Carefully
Insertar
Insérer avec soin
Sorgfältig Einsetzen
挿入注意

Never
Nunca
Jamais
Nie
絶対禁止

10°C—52°C
50°F—125°F
R.H. 8%—80%

Never
Nunca
Jamais
Nie
絶対禁止