ThruGlass Touchscreen

Hardware Installation Guide

MicroTouch

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Contents

About This Manual

Congratulations on the purchase of your MicroTouch ThruGlass touchscreen, and welcome to the world of MicroTouch — a world where using a computer is as simple as touching the screen.

This manual describes how to set up the ThruGlass controller and touchscreen.

- Chapter 1 describes installation and application design guidelines for creating a successful ThruGlass setup. Be sure to review these guidelines before setting up your ThruGlass touchscreen.
- Chapter 2 describes how to set up the ThruGlass touchscreen for development and testing purposes. It lists hardware and software requirements and includes step-by-step installation instructions and diagrams.

MicroTouch Support Services

MicroTouch provides extensive support services through our technical support organization, web site, and bulletin board system (BBS).

MicroTouch Technical Support

Technical Support is available as follows:

- 24 hours a day, Monday through Friday (excluding holidays)
- 9:00 a.m. to 5:00 p.m. Eastern Standard Time, Saturday and Sunday (excluding holidays)

Whenever you contact Technical Support, please provide the following information:

- Part number and serial number from the MicroTouch label on your monitor or touchscreen controller
- Type of MicroTouch touchscreen
- Version number of your MicroTouch TouchWare
- Make and model of your personal computer
- Name and version number of your operating system
- Type of mouse connected to your system
- List of other peripherals connected to your computer
- List of application software in use

You can contact MicroTouch Technical Support by calling the hot line, sending a fax, or sending electronic mail.

- Technical Support Hot Line: 978-659-9200
- Technical Support Fax: 978-659-9400
- Technical Support E-Mail: support@microtouch.com

MicroTouch on the World Wide Web

You can visit the MicroTouch web site at the following address:

http://www.microtouch.com

You can download MicroTouch touchscreen software and drivers, obtain regularly updated technical information on MicroTouch products, and learn more about our company.

MicroTouch Bulletin Board System

MicroTouch also has a Bulletin Board System (BBS) that you can access 24 hours a day, 7 days a week. You can use the BBS to download updates of the latest drivers and obtain regularly updated technical information on MicroTouch products.

You can reach the MicroTouch BBS at the following numbers:

- 978-659-9250
- 978-683-0358

To connect to the BBS, you need standard communication software and a modem that supports 2400, 4800, 9600, 14400, or 28800 baud. Additionally, the communication parameters must be set as follows:

No parity, 8 data bits, and 1 stop bit (N81)

Once you establish a modem connection with the BBS, the system prompts you to log in using your name. You can register with MicroTouch the first time you log in to the BBS. The menu of available options is self-explanatory.

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C H A P T E R 1

ThruGlass Design Guidelines

ThruGlass — a revolutionary concept in computer input devices — can detect a touch through up to one inch of non-conductive material such as glass or plastic. ThruGlass, a second surface touch technology, is designed to work behind a protective first surface.

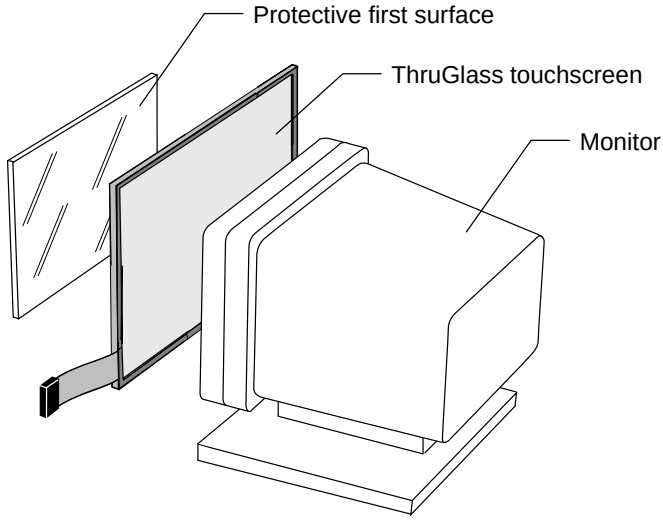
This chapter describes the design guidelines to consider when setting up a ThruGlass touchscreen. It includes the following information:

- Recommendations for the protective surface in front of the ThruGlass touchscreen
- Examples of mounting the ThruGlass touchscreen
- Common design errors (air gaps, metal objects, location) in a ThruGlass setup
- Design techniques to improve the usability of your touch application
- Recommendations for creating artwork that surrounds the ThruGlass touchscreen

This chapter will help you determine your ThruGlass site requirements quickly, easily, and successfully. Be sure to review these guidelines before setting up your ThruGlass touchscreen.

ThruGlass Components

The basic components of a ThruGlass setup include a protective first surface (usually glass), a ThruGlass touchscreen, and a monitor.



What's Up Front?

ThruGlass lets you access a computer application through shop windows, security glass, and other non-conductive materials. This protective first surface is usually glass or plastic, but can also be wood, stone, or other non-conductive material.

Guidelines for Selecting the First Surface

- The best material to use as a first surface is impact-resistant glass, which also offers good scratch resistance. For example:
  - Bullet-proof glass
  - Laminated and tempered glass
  - Toughened glass

- When using plastic, choose polycarbonate rather than acrylic, for strength and UV stability. Several manufacturers produce polycarbonate with scratch-resistant coatings. For example, MicroTouch recommends using ¼ inch Lexan® MR10.
- The minimum, and optimal, thickness of the first surface is ¼ inch, although ThruGlass will work through up to 1 inch thick glass.
- Do not place a ThruGlass touchscreen behind first surfaces that have any type of metallic mesh, reinforced wiring, or electrically conductive coatings. The first surface must be non-conductive.
- Do not place ThruGlass behind thermal-pane (double-glazed) windows. The air gap between the layers of glass interferes with the operation of the touchscreen.

Determining Whether First Surface Is Conductive

To determine whether a window has a conductive coating, hold the two leads of a resistance meter about 3 inches (10 cm) apart and touch the *inside* of the glass with the leads. If the resistance is less than 1 million ohms, the ThruGlass touchscreen will not function correctly.

Repeat this procedure for the *outside* of the glass as well. You need to check both sides of the glass. Multilayered windows may have an ultraviolet protective film in the middle of the panes.

If you have any doubts about whether the glass is non-conductive, check with the window manufacturer.

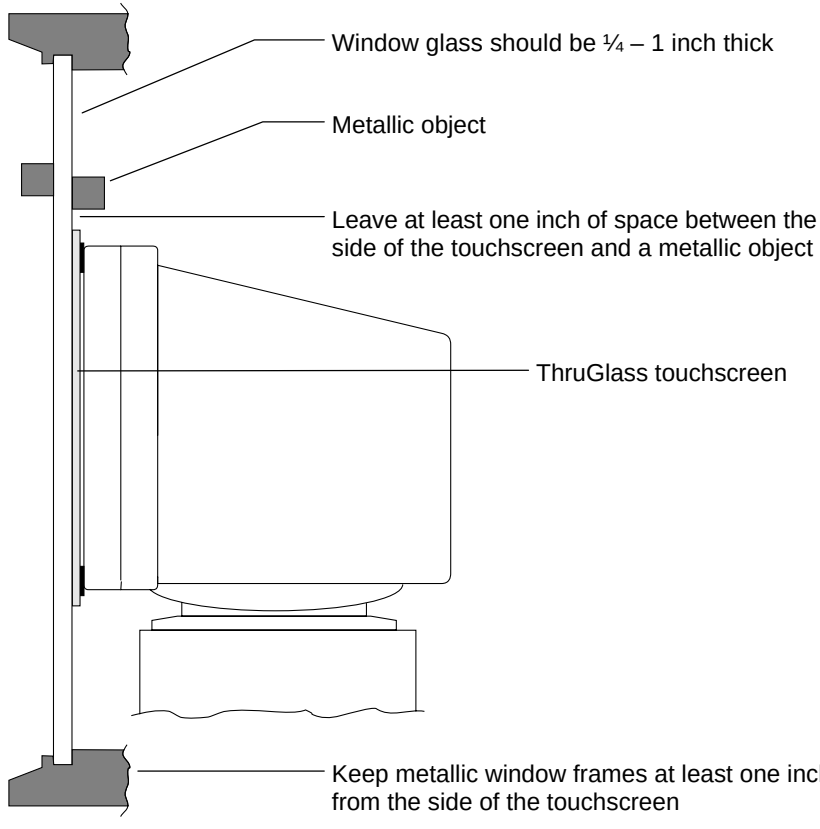
Examples of Mounting the ThruGlass Touchscreen

You can use the ThruGlass touchscreen in a variety of applications using many different ways to mount the touchscreen. For example, the touchscreen may be pressed against a window pane in a storefront, mounted inside a kiosk, installed in a wall opening, installed in an ATM machine, or enclosed in a table or bar top.

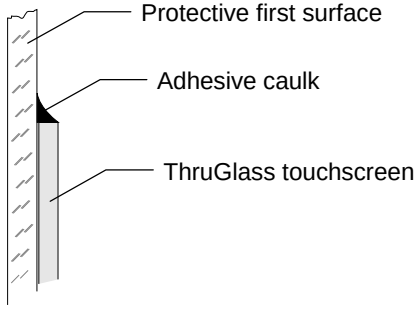
You can also design brackets, mounting cases, or custom frames to set up the ThruGlass touchscreen.

ThruGlass in a Shop Window

The following example shows how you can use Velcro pads to attach the touchscreen to the monitor. After the touchscreen is attached, you can push the monitor against a shop window.

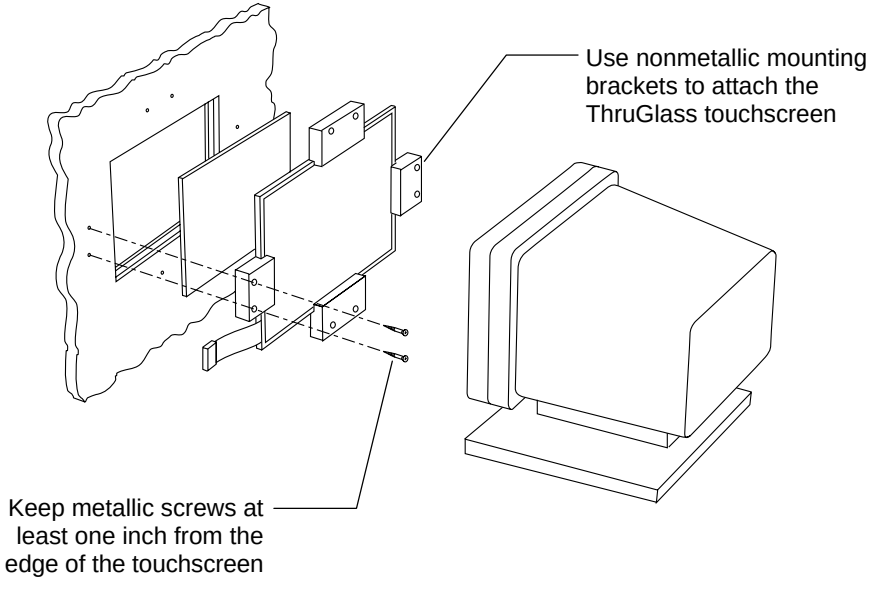


You can also use a bead of adhesive caulk around the *edge* of the ThruGlass to adhere the touchscreen to plate glass windows. Be careful that caulk does not seep between layers. Do *not* use a permanent adhesive as you will not be able to remove the touchscreen.



ThruGlass in a Kiosk or Wall Opening

The following example shows how you can mount ThruGlass into a kiosk or an opening in a wall. Note that the installation still must include a protective surface in front of the ThruGlass touchscreen.

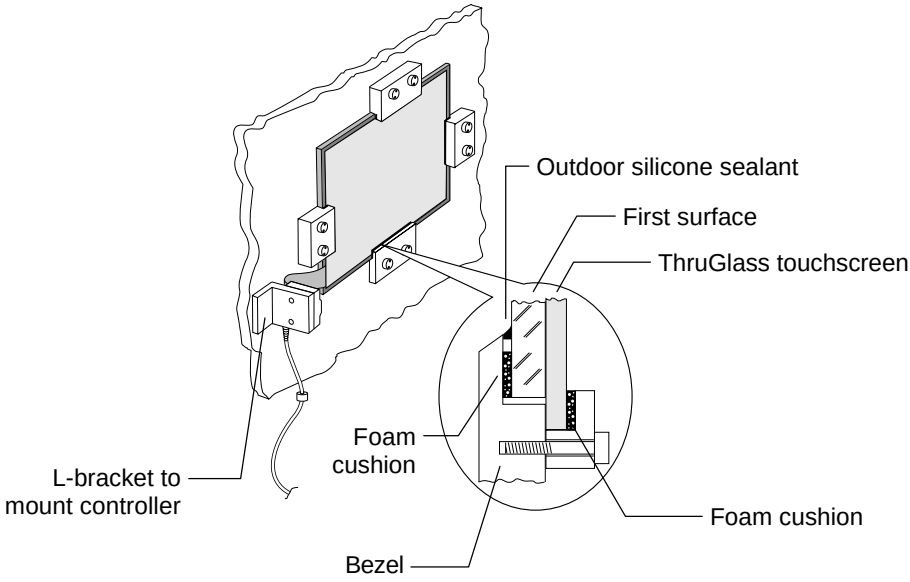


Using Clamps to Attach ThruGlass

Your ThruGlass installation may use clamps to hold the touchscreen and first surface in place securely.

When you design clamps for ThruGlass:

- Make sure the clamps are nonmetallic.
- Make sure the clamps do not interfere with the closeness of the monitor to the touchscreen.
- Make sure you design a support bracket for the ThruGlass controller.



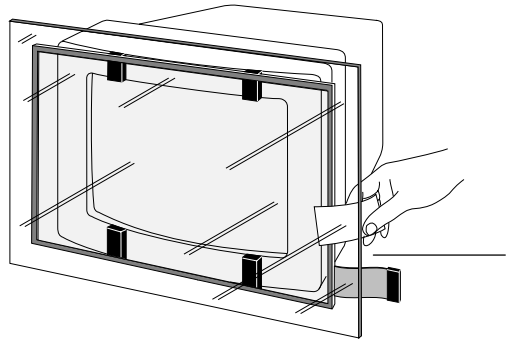
Common Design Errors in a ThruGlass Setup

This section describes the following common design errors in a ThruGlass setup:

- Excessive space between the ThruGlass touchscreen and the first surface
- Metallic objects near the ThruGlass touchscreen

Mind the Gap!

- Almost all issues with ThruGlass stem from excessive space between the ThruGlass touchscreen and the first surface of non-conductive material. An air gap will cause a lack of sensitivity or unstable touch points.

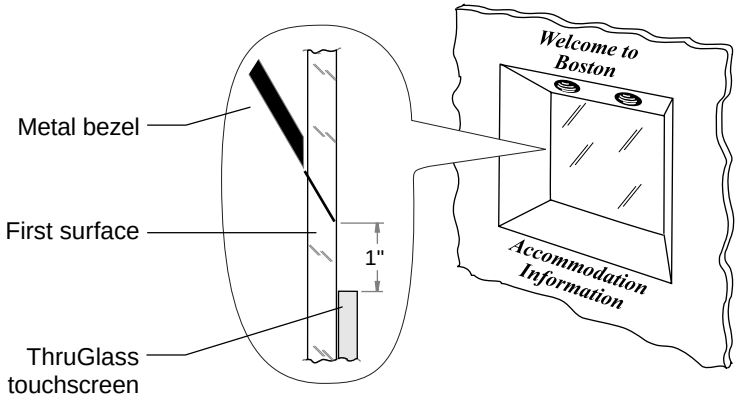


- If you notice a rainbow effect (Newton rings) between the layers of glass, apply strips of thin tape between the first surface and the ThruGlass touchscreen. Use the thinnest tape possible to eliminate the rainbow, place the tape around the perimeter of the glass, and keep the tape outside the viewing area.
- Do not place ThruGlass behind thermal-pane (double-glazed) windows. The air gap between the layers of glass interferes with the operation of the touchscreen.

Keep Metal Away!

Because metal can interfere with and reduce the sensitivity of a ThruGlass touchscreen, you must be careful when positioning the touchscreen near metallic objects or materials.

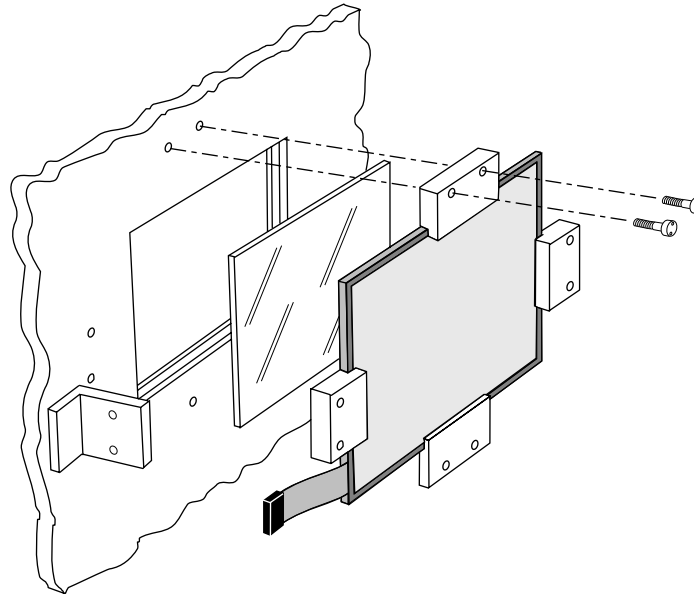
- Do not let any metal come in direct contact with the touchscreen. This will be recognized as a touch.
- To obtain the ideal touch sensitivity, leave at least one inch of space between the side of the touchscreen and any metallic objects. The following illustration shows the recommended placement of the ThruGlass touchscreen in relation to a metal bezel.



- Avoid using metal bezels whenever possible. If your current design has a metal bezel, leave at least 1½ inches between the viewable area and the touchscreen.

  Mechanical drawings are available for detailing viewable area dimensions and keep-outs for metal bezels.
- Do not use metallic paint on the first surface or on the ThruGlass touchscreen.
- Do not place metallic artwork in front of or on the ThruGlass touchscreen. ThruGlass will not work through metal.

- Do not let any metal — such as metal mounting brackets or screws — *physically* contact the back of the touchscreen.



- Factura, a subsidiary of MicroTouch, designs and manufactures kiosks. They have developed the Durashell bezel and mounting scheme specifically for ThruGlass.

Location, Location, Location

ThruGlass works well in almost any location when you keep in mind certain design considerations.

Remember, lighting changes over the course of a day and depends on weather. Consider the brightness of an area and how it will affect readability of the computer display.

- For outdoor use, you may need an anti-reflective, polarized screen. Also, consider using high brightness monitors for better readability.
- Generally, weather (humidity, rain, bright sunlight, and/or extreme cold) does not affect ThruGlass. For example, ThruGlass works fine in seacoast weather exposed to occasional sea spray.
- ThruGlass cannot operate with a constant flow of salt water directly on it. The high content of minerals in salt water creates a conductive coating.
- Electromagnetic interference can cause problems with ThruGlass. Be aware of devices that generate electrical fields, such as radio transmitters, pager transmitters, and security tag deactivators, and plan your installation accordingly.
- Daylight, particularly direct sun, can affect the paper, inks, and adhesives in any artwork your installation may contain. Make sure that these materials are UV stable.

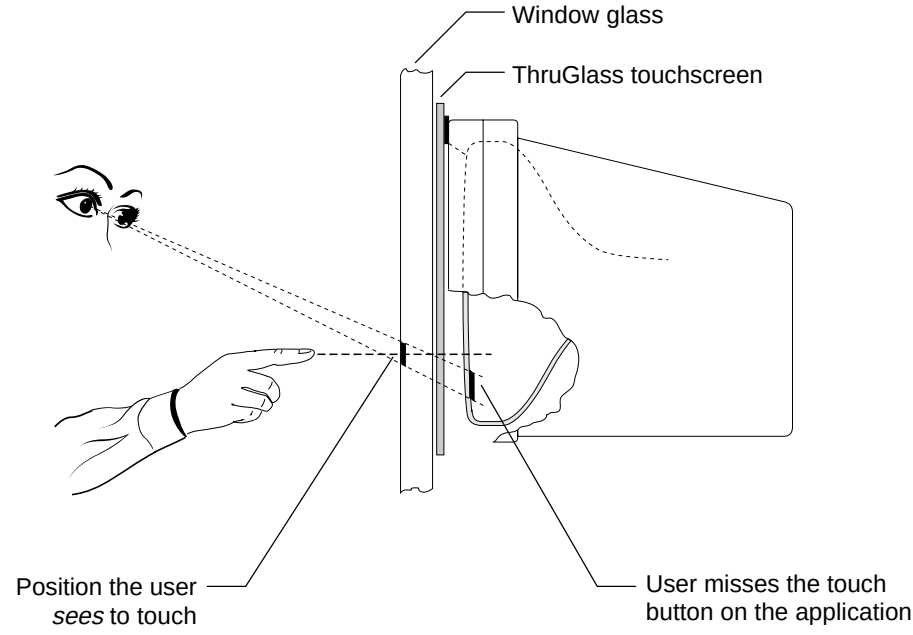
Designing ThruGlass Applications

With any touch application, the design is crucial to the usability of the final product. Clear icons, bright contrasting colors, large buttons, and simple layouts will go a long way towards the success of your installation.

Parallax, the effect of an object appearing to be in different positions when it is looked at from different angles, is a common problem in touch applications.

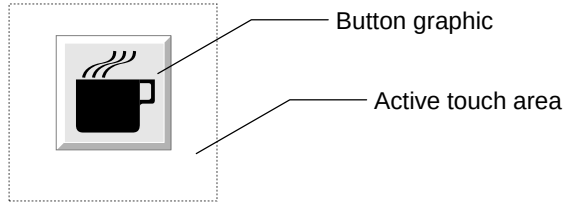
In ThruGlass installations, the touchscreen, the monitor, and the front surface are very close to each other. The combination of the flat glass, the glass thickness, the touchscreen, the curved monitor, and the location of the user causes parallax.

As shown in the following illustration, the parallax effect may cause a user to miss the target button on the touch application.



When designing your ThruGlass software application, use the following guidelines to help reduce the effects of parallax:

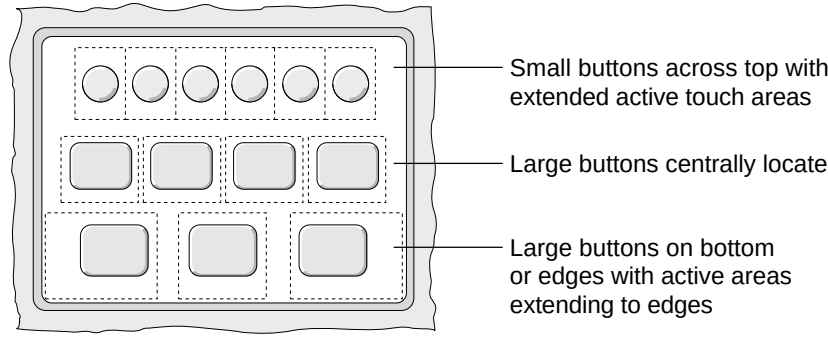
- Design large buttons to facilitate touch. Remember that a fingertip is much larger than a cursor. Make sure the size of each button is at least 1 inch by 1 inch.
- Design larger active areas for each button. For example, if the button graphic is 1" *x* 1" the active area behind it could be 2" *x* 2".



- Keep buttons away from the edges and corners of the screen. Parallax is worse at the edges of the screen.

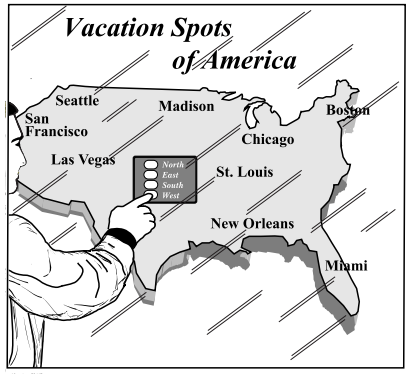
  If your application must have buttons at the edge or corner, extend the active touch areas to the outer edges of the viewing area.

- Make sure there is minimal space between the touchscreen and the *monitor glass*. Using monitors with flat tubes and shallow bezels, such as LCD displays, can be very effective in a ThruGlass setup.
- Design your application and artwork with bright, high contrast colors to optimize visibility through glare and sunlight.
- Place buttons horizontally whenever possible. Placing buttons horizontally makes it easier for users to adjust their viewing points and touches when dealing with parallax.



Surrounding Artwork

You may want to use artwork or graphics to surround the outer edge of the ThruGlass touchscreen. For example, the artwork may attract users to the kiosk or advertise your product.



When designing or mounting artwork, follow these guidelines:

- Make sure that artwork placed between the protective layer and the ThruGlass touchscreen is less than 0.01 inches thick (about the thickness of a business card).
- Use ultraviolet-resistant laminates, inks, and paper when creating your artwork. Your artwork materials must be able to withstand the environmental conditions (for example, heat, ultraviolet light, weather, temperature, condensation) of your ThruGlass setup.
- Do not use artwork that has metallic pigments, metallic inks, or foil backings. The artwork must be non-conductive.
- Use *thin* double-sided tape to attach the artwork.
- Do not match the opening in your artwork to the opening in the touchscreen. Instead, match the opening in your artwork to the touch area for the application. You may want to make the opening slightly smaller than the opening in the monitor bezel so that the bezel edges do not show.

C H A P T E R 2

Installing a ThruGlass Touchscreen and Controller

This chapter describes how to *temporarily* set up the ThruGlass touchscreen for *development and testing purposes*. It includes the following topics:

- Hardware and software requirements
- Attaching the touchscreen to your monitor
- Connecting the ThruGlass controller
- Supplying power to the ThruGlass controller

Note: Chapter 1 describes installation and application design guidelines for creating a successful ThruGlass setup. Be sure to review these guidelines before setting up your ThruGlass touchscreen.

Hardware and Software Requirements

To set up a ThruGlass touchscreen and load TouchWare, you need the following hardware and software:

- An industry-standard PC running either Microsoft Windows 95, Windows NT 4.0, Windows 3.1, or MS-DOS 6.0.
- A monitor that is the appropriate size to work with your ThruGlass touchscreen (for example, 17-inch or 10-inch).
- An available serial communication port with a unique IRQ.
- 2 megabytes of disk space.
- Tools and supplies: antistatic pad, flat-blade screwdriver, pencil, and tape.
- A piece of non-conductive glass (ranging from ¼ to 1 inch in thickness) to place in front of the ThruGlass touchscreen. The glass should be the same size or larger than your touchscreen.

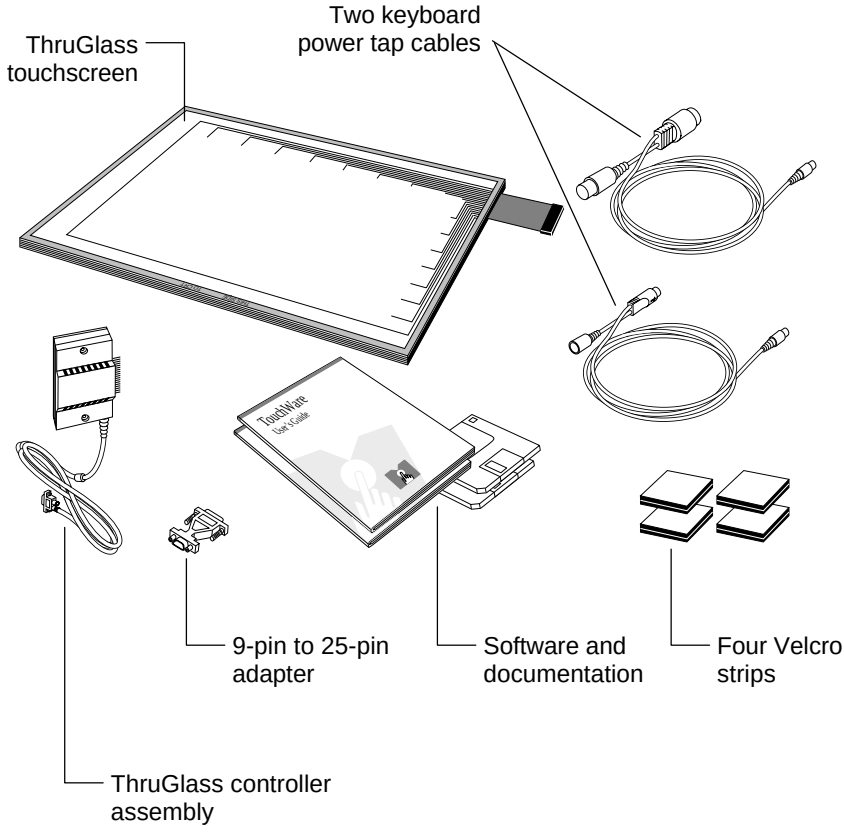
You may need an external power supply to provide power to the ThruGlass touchscreen controller. For details about the power supply and specific requirements, refer to “Connecting an External Power Supply” later in this chapter.

When choosing your work space, select a sturdy, level surface. Also, make sure you can easily access the monitor and the computer.

Unpacking the ThruGlass Touchscreen Developer's Kit

Carefully unpack the carton and inspect the contents. Make sure you received the items shown below.

Save the invoice, shipping container, and all packing material in case you need to transport the equipment any time in the future.



Setting Up the ThruGlass Touchscreen

These installation instructions describe how to *temporarily* set up the ThruGlass touchscreen in a way that is similar to how you might install it for your application. Depending on your touch application, the method of mounting the touchscreen will vary.

About the Velcro Strips

You can use the Velcro strips included in your ThruGlass kit to mount the touchscreen to your monitor and *evaluate ThruGlass technology*. One Velcro pair supports 16 pounds in shear. The two pairs support 32 pounds in shear.

Note: Although the Velcro mounting is useful for testing and developing, it is not intended for a permanent touchscreen installation. In your final application, use some additional means of support.

Ensuring an Accurate Installation

For accurate development and testing, note the following guidelines:

- Be sure to properly mount the ThruGlass touchscreen against the monitor.
- Be sure to place a piece of non-conductive material (such as glass or plastic) in front of the touchscreen. For guidelines on the best material to use as a first surface, the optimal thickness of the first surface, and the allowable space between the first surface and the touchscreen, refer to Chapter 1.

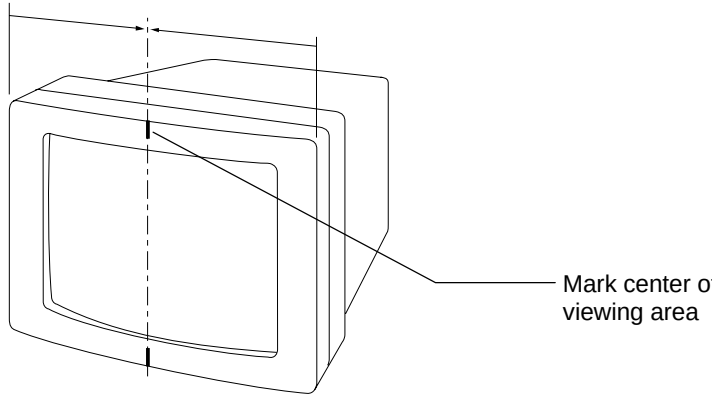
Note: The ThruGlass touchscreen will work without a protective surface in front of it. However, default sensitivity and calibration values assume there is ¼ inch of glass in front of the touchscreen.

Attaching the ThruGlass Touchscreen to Your Monitor

The following instructions describe how to attach the touchscreen to the top and bottom of the monitor bezel. If your monitor is relatively flat, you can attach the touchscreen to the left and right sides of the bezel. Mounting on the sides helps to reduce the effects of parallax.

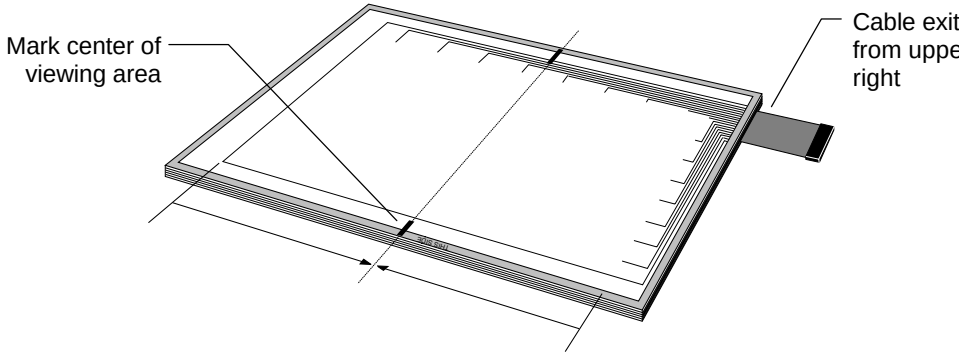
▶ To attach the ThruGlass touchscreen to your monitor:

1. Place a pencil mark at the top and bottom of the monitor bezel to indicate the horizontal center of the viewing area.



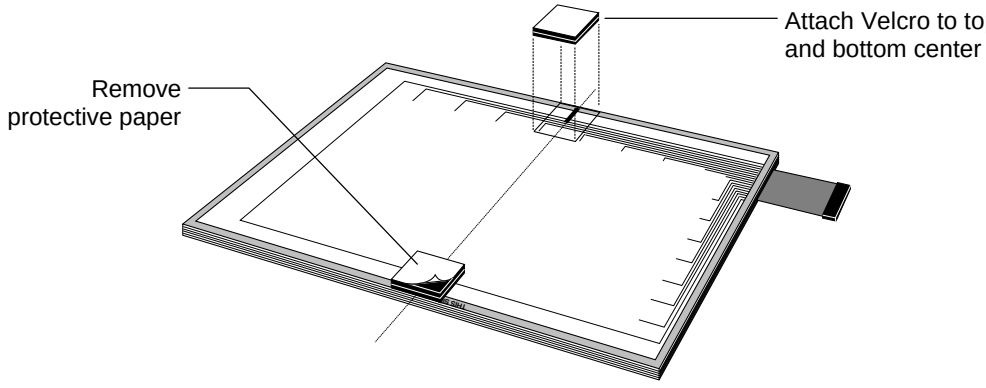
2. Place the touchscreen face down on a clean, antistatic pad. Make sure the cable exits from the **upper right** corner, as shown in the following illustration.

3. Place a pencil mark at the top and bottom of the screen to indicate the horizontal center of the viewing area.



4. Take two Velcro strips and remove the protective paper from one side of each mated pair. Be sure to keep both sides of the Velcro together.

5. Attach a **mated pair** of Velcro (2-inch strip) to the top center and bottom center of the touchscreen where you made the marks.

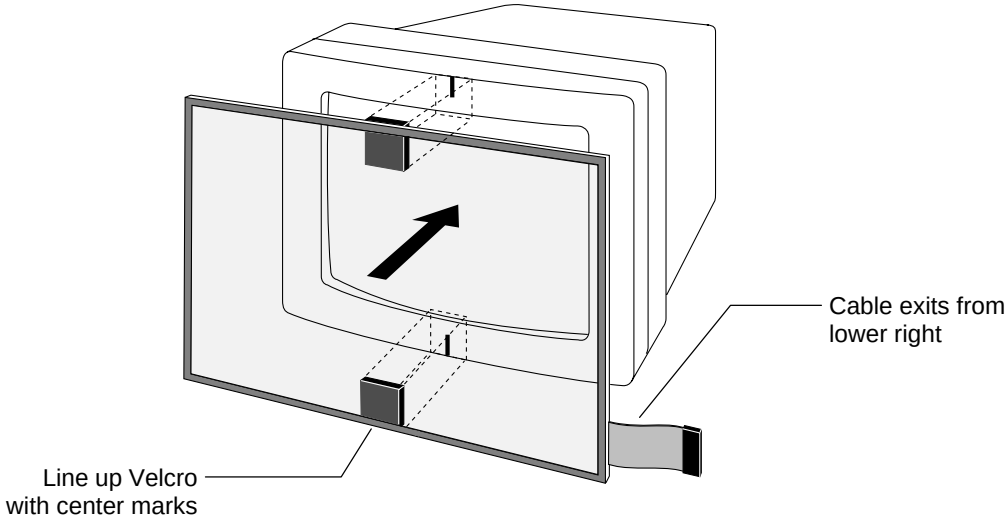


Note: You may want to clean this side of the touchscreen before you mount it to your monitor. For information about cleaning the touchscreen, refer to "Touchscreen Care and Cleaning" later in this chapter.

6. Remove the protective paper from the back of each Velcro strip.

7. Position and then stick the touchscreen to the front of the monitor applying the Velcro on the touchscreen to the center marks on the bezel.

   - Make sure the cable tail exits from the **lower right** of the touchscreen as you look at the front of the monitor.
   - Make sure the Velcro strips are not in the viewing area.
   - Be sure to frame the viewing area on your monitor as evenly as possible.



8. Place a piece of non-conductive material (such as glass or plastic) in front of the ThruGlass touchscreen. For guidelines on the best material to use as a first surface, the optimal thickness of the first surface, and the allowable space between the first surface and the touchscreen, refer to Chapter 1.

   You can use tape to keep the glass flush against the touchscreen.

Note: When two pieces of glass are placed together, sometimes a rainbow appears between the layers. This rainbow, also called Newton rings, occurs because of the inconsistencies in glass surfaces. To eliminate the rainbow effect, apply strips of thin tape between the ThruGlass touchscreen and the sheet of glass. Use the thinnest tape possible to eliminate the rainbow, place the tape around the perimeter of the glass, and keep the tape outside the viewing area.

Connecting the ThruGlass Controller to the Touchscreen

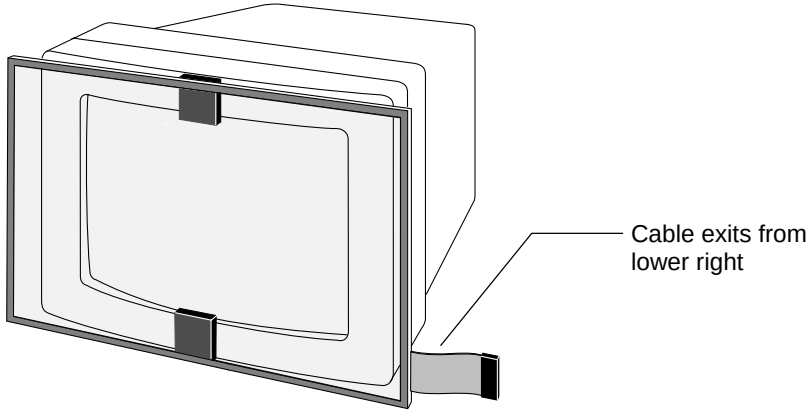
After you attach the ThruGlass touchscreen to your monitor, connect the ThruGlass controller to the touchscreen.

▶ To connect the ThruGlass controller to the touchscreen:

1. Turn off your computer.

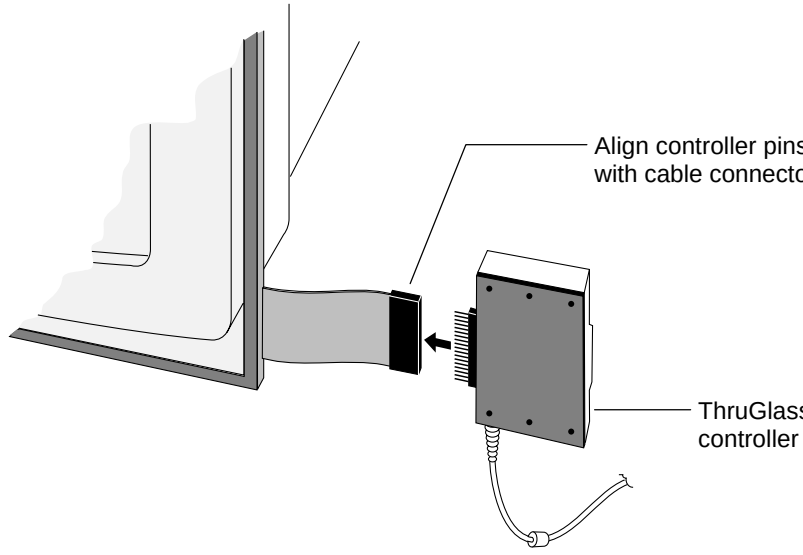
   You should always turn off the computer before connecting or disconnecting a device.

2. Look at the front of the monitor. Check that the cable on the touchscreen exits from the lower right.



3. Hold the ThruGlass controller so you can see the green printed circuit board and the connector exits from the left side of the controller case.

4. Align the 18 pins on the ThruGlass controller with the cable connector on the ThruGlass touchscreen. Carefully connect the ThruGlass controller to the touchscreen cable.



Let the controller rest on your desk for the remainder of this installation. You may need to place something under the controller to support it. Be careful not to twist or damage the touchscreen cable.

Note: Depending on your ThruGlass application, you may mount the controller to the window glass, to the side of the monitor, to a kiosk enclosure, or to a table top. Always make sure you securely mount the controller so that it does not separate from the touchscreen cable.

Connecting the ThruGlass Controller to Your Computer

The ThruGlass touchscreen controller has an RS-232 cable with a 9-pin D connector.

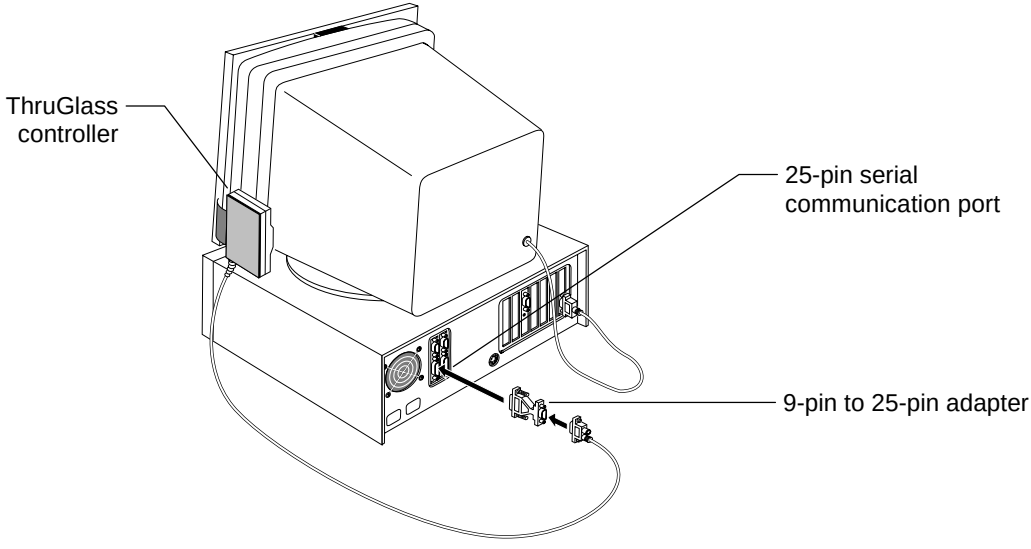
▶ To connect the ThruGlass controller to your computer:

1. Make sure your computer is off.

   You should always turn off the computer before connecting or disconnecting a device.

2. Connect the controller cable to an available serial communication (COM) port on the back of your computer.

   If necessary, use a 9-pin to 25-pin adapter. For help in locating a COM port on your computer, refer to your system documentation.



3. Tighten the two screws holding the cable to the port.

Continue the installation by supplying power to the controller. Refer to the next section for more information.

Supplying Power to the ThruGlass Controller

The ThruGlass touchscreen controller does not have an internal power supply. Therefore, you need to provide power to the controller. You can use either a keyboard power tap cable or an external AC/DC power supply. Refer to the following sections for more information.

Connecting a Keyboard Power Tap Cable

The ThruGlass touchscreen developer's kit includes two keyboard power tap cables for supplying power to the controller. The cable with a 5-pin connector is for use with PC/AT compatible systems; the cable with a 6-pin connector is for use with PS/2 compatible systems.

Note: Your computer must be able to provide 300 mA of power to use the keyboard power tap cable. If not, use an external power supply.

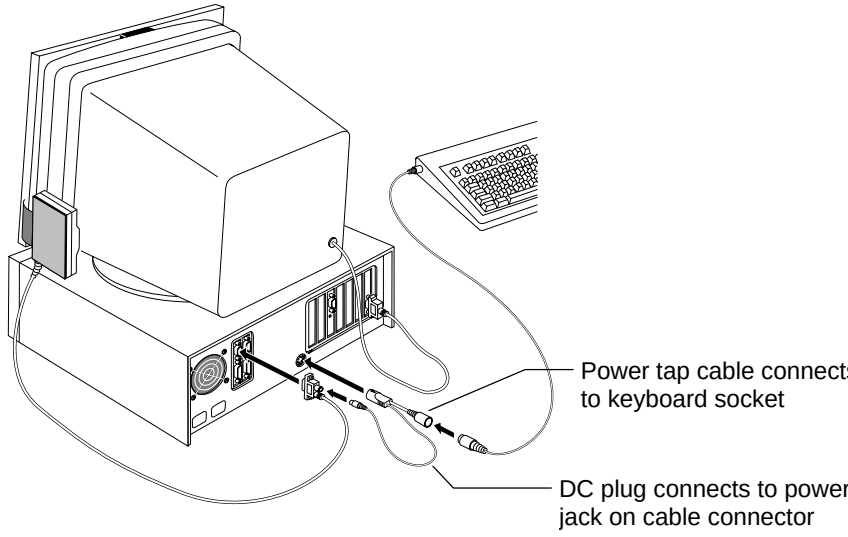
▶ To connect a keyboard power tap cable:

1. Make sure your computer is off.

   You should always turn off the computer before connecting or disconnecting a device. Note that you may blow the keyboard fuse if you do not turn off the power.

2. Disconnect the keyboard cable from the back of your computer.

3. Plug the keyboard cable into the power tap cable.



4. Plug the other end of the power tap cable into the keyboard socket on the back of your computer.
5. Check the connector on the controller cable for a plastic plug covering the jack. If the plastic plug is there, remove it.
6. Connect the DC power plug from the keyboard power tap cable to the power jack on the controller cable.

Caution: Be sure not to touch the computer's metal casing with the power plug barrel (the metal cylinder), which carries 5 volts. Touching the metal casing with the power plug barrel could damage your system.

Connecting an External Power Supply

Some systems, such as computers with non-standard keyboard interfaces, do not support keyboard power tap cables. In these cases, use an external AC/DC power supply to provide power to the ThruGlass touchscreen controller.

The external power supply must provide +5 volts DC ± 5%, and a minimum of 300 mA power with less than 100 mV peak-to-peak ripple. You can order the power supply from MicroTouch or your local distributor.

▶ To connect an external power supply:

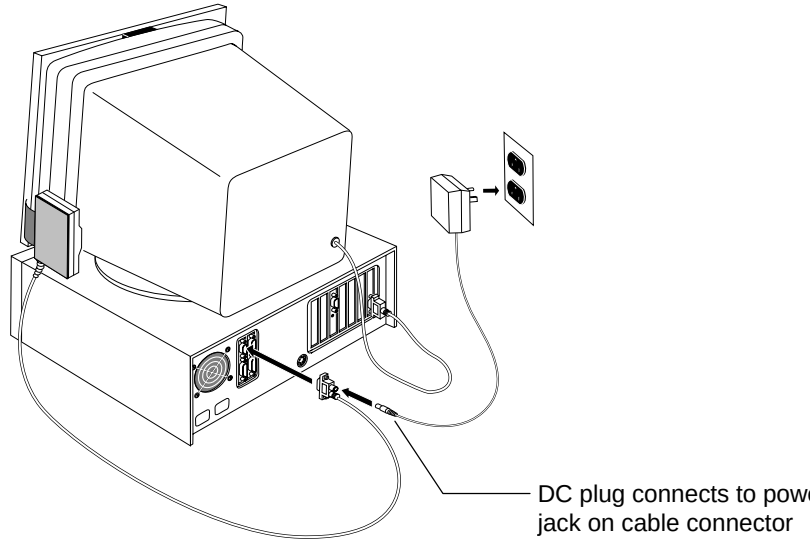
1. Make sure your computer is off.

   You should always turn off the computer before connecting or disconnecting a device.

2. Check the connector on the controller cable for a plastic plug covering the jack. If the plastic plug is there, remove it.

3. Plug the power supply into a grounded outlet.

4. Connect the DC power plug to the power jack built into the connector on the controller cable.



Notes on Obtaining Your Own Power Supply

If you obtain or build your power supply, note that the power jack built into the connector on the ThruGlass controller cable uses the following design:

- The center pin in the connector is ground.
- The outer sleeve (that is, ring) is the +5 positive voltage.

If you obtain a power supply, check the power supply package. It should include a diagram that looks like the following example:

Caution: The ThruGlass controller uses +5 volts DC ± 5% and requires a minimum of 300 mA. The input is fused with an on-board mini-fuse for over voltage and reverse power. If you blow the fuse, the board must be replaced. Therefore, if you obtain your own power supply, MicroTouch recommends that you check the polarity and voltage *before* connecting the power supply. Failure to verify that the power supply meets the specified requirements may damage the controller.

Testing the ThruGlass Installation

▶ To check that you installed the ThruGlass controller and touchscreen properly:

1. Turn on your monitor and computer.
2. Check the status light on the controller.

   If the status light is on (steady dim green), the controller is receiving power.

   If the status light is off, the controller is not receiving power. Check all cable connections. Did you attach a keyboard power tap or an AC/DC external power supply?

What's Next?

Congratulations! You successfully installed the ThruGlass controller and touchscreen.

Install the TouchWare Software

Once the hardware is connected, you can install TouchWare. TouchWare includes the drivers that let your ThruGlass touchscreen work with your computer. TouchWare also includes tools for optimizing performance, setting touchscreen preferences, and testing the touchscreen.

TouchWare for ThruGlass is available for Windows 95, Windows NT 4.0, Windows 3.1*x*, and MS-DOS.

Configure the Controller and Touchscreen

After the software is installed, you must use TouchWare to properly configure your ThruGlass controller and touchscreen. Specifically, you must complete these tasks:

- Specify the type of ThruGlass touchscreen you are using.
- Adjust the touchscreen controller frequency.

- Adjust the touchscreen controller sensitivity.
- Calibrate the touchscreen.

For more information on using TouchWare and configuring the touchscreen, refer to the user documentation or the online help.

Review ThruGlass Design Guidelines

There are many design elements to consider when creating your ThruGlass setup. Chapter 1 describes installation and application design guidelines. For example, Chapter 1 recommends materials for the protective first surface, lists common design errors (air gaps, metal objects, location), and presents techniques to improve the usability of your touch application. Be sure to review these guidelines to ensure a successful ThruGlass setup.

Touchscreen Care and Cleaning

The touchscreen does not require much maintenance.

MicroTouch does, however, recommend that you periodically clean the glass touchscreen surface.

- Use isopropyl alcohol or a non-abrasive glass cleaner. Avoid using cleaners other than glass cleaners. Do not use any vinegar-based solutions.
- Apply the cleaner with a soft cloth. Avoid using gritty cloths.
- Always dampen the cloth and then clean the screen.

Always handle the touchscreen with care. Do not pull on or stress cables.

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