Crestron Isys® **TPS-4L**
3.6-Inch Wall Mount Touchpanel
Operations & Installation Guide

CRESTRON®

This document was prepared and written by the Technical Documentation department at:

CRESTRON.

Crestron Electronics, Inc.
15 Volvo Drive
Rockleigh, NJ 07647
1-888-CRESTRON

Contents

3.6-Inch Wall Mount Touchpanel: TPS-4L

Introduction

Features and Functions

The TPS-4L compact wall mount touchpanel delivers amazing touchpanel performance at an incredibly low cost. In the space of a common light switch, the TPS-4L packs a bright, high-contrast 3.6" active matrix color touchscreen with astonishing 16-bit Isys color graphics and 10 backlit pushbuttons.

Crestron® touchpanels offer an ideal user-interface for controlling everything from audio distribution to complete home automation, providing a wide-open canvas for the creation of custom control screens perfectly tailored to the needs of the end-user. Touchpanels do away with piles of remote controls, cryptic front panels, and cluttered wall switches, affording true "one-touch" control over a broad range of complex devices and systems.

- 3.6" active matrix color touchscreen display
- 16-bit Isys graphics | 320 x 240 resolution
- Synapse image rendering algorithm
- 10 white backlit pushbuttons and engravable faceplate*
- WAV file audio feedback
- Ethernet and Cresnet® communications
- Stylish flush wall mount design | 10 designer colors

* Custom-engraved bezel can be designed and obtained by using the Crestron Engraver software. Version 2.6.1.0 and Crestron Database 17.6.0 or later are available from the Crestron website (www.crestron.com).

Isys®

Isys power and beauty are infused throughout Crestron's entire touchpanel lineup. Under the hood, the TPS-4L offers vibrant 16-bit color depth to produce eye-catching graphics and high-res images. The Isys engine supports dynamic graphics and text, full-motion animations, multimode objects, and PNG translucency - all with astonishing speed.

Synapse™

Crestron's exclusive synapse image rendering algorithm enables system programmers to produce amazing graphics - faster and easier. Advanced antialiasing delivers crisper, sharper objects and text. Enhanced 3D effects add new depth and style. Since synapse is native to the touchpanel, memory requirements and upload time are substantially reduced.

Tactile Pushbuttons

Ten programmable "hard" buttons are included for quick pushbutton access to commonly used functions. Translucent white backlit buttons and a custom engravable faceplate simplify operation while providing an alluring appearance.

Audio Feedback

Customized WAV files can be loaded on the touchpanel to add dimension to the touchscreen graphics and pushbuttons with personalized sounds, button feedback, and voice prompts.

High-Speed Connectivity

Both Cresnet and high-speed Ethernet are standard on the TPS-4L, providing for easy network integration and seamless communications with Crestron control systems.

Versatile Flush-Mount Design

The TPS-4L is designed for easy flush-mount installation in a wall, lectern or similar flat surface. Mounting clips furnished with the TPS-4L facilitate a clean installation in post-construction drywall and many furniture applications. Additional mounting options are available.

10 Designer Colors

Optional faceplates are available in a choice of 10 designer colors to match any décor. Faceplates may be ordered with or without custom engraving.

Specifications

Specifications for the TPS-4L are listed in the following table.

TPS-4L Specifications

SPECIFICATION	DETAILS
Touchscreen Display	
Display Type	TFT Active matrix color LCD
Size	3.6 inch (9.1 cm) diagonal
Aspect Ratio	4:3 QVGA
Resolution	320 x 240 pixels
Brightness	300 nits (cd/m^2)
Contrast	300:1
Color Depth	16-bit, 64k colors
Illumination	Edgelit LED
Viewing Angle	± 80° horizontal, +80°/-50° vertical
Touchscreen	Resistive membrane

(Continued on following page)

TPS-4L Specifications (Continued)

SPECIFICATION	DETAILS
Processor	
CPU	32-bit Freescale ColdFire® Microprocessor
Memory	
DRAM	16 MB
Flash	8 MB
Maximum Project Size	7 MB
Graphic engine	Isys engine; 16-bit non-palette graphics; 65,536 colors; synapse image rendering algorithm, multi-mode objects, dynamic graphics, PNG translucency, full-motion (60 fps) animation
Ethernet	10BaseT/100BaseTX, auto-switching, auto-negotiating, full/half duplex, TCP/IP, UDP/IP, CIP, DHCP, IEEE 802.3U compliant
Audio	
Hardware Feature	Built-in amplified speaker (rear), internal volume control
Audio Feedback (WAV)	8-bit PCM, mono, 8 kHz sampling rate
Amplification	1 Watt for built-in speaker
Power	
Cresnet Power Usage	5 Watts (0.21 Amp @ 24 Volts DC)
Default Net ID	03
Firmware	tps-4l_c2n-ft-tps-4_qm-ftcc-tps_tps-4_2.007.0163 or later
Minimum 2-Series Control System Update File[1, 2, 3]	Version 3.137.CUZ or later
Environmental	
Temperature	32º to 104ºF (0º to 40ºC)
Humidity	10% to 90% RH (non-condensing)
Enclosure	
Construction	Injection-molded plastic, flush-mountable using clips provided (additional mounting kits available)
Faceplate	Injection-molded plastic
Dimensions	
Height	4.54 in (11.52 cm)
Width	6.19 in (15.72 cm)
Depth	2.13 in (5.40 cm)
Weight	15 oz (0.43 kg)

1. The latest software versions can be obtained from the Crestron website. Refer to the NOTE following these footnotes.
2. Crestron 2-Series control systems include the AV2 and PRO2. Consult the latest Crestron Product Catalog for a complete list of 2-Series control systems.
3. When loading VisionTools Pro-e files or firmware through the RS-232 port of the control system, be sure that the baud rate is at 38400 (Cresnet speed) or lower. Otherwise, Toolbox may post the "Transfer Failed" message.

> **NOTE:** Crestron software and any files on the website are for authorized Crestron dealers and Crestron Authorized Independent Programmers (CAIP) only. New users may be required to register to obtain access to certain areas of the site (including the FTP site).
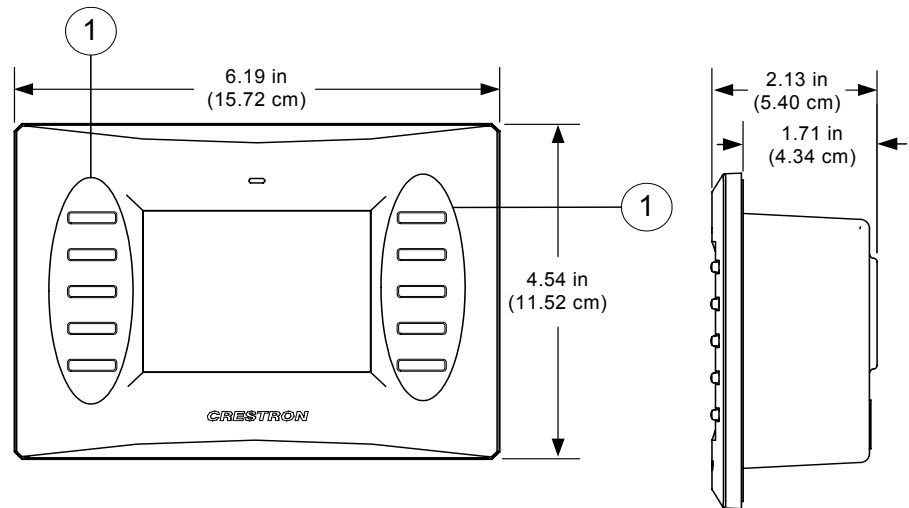
Physical Description

This section provides information on the connections, controls and indicators available on your TPS-4L.
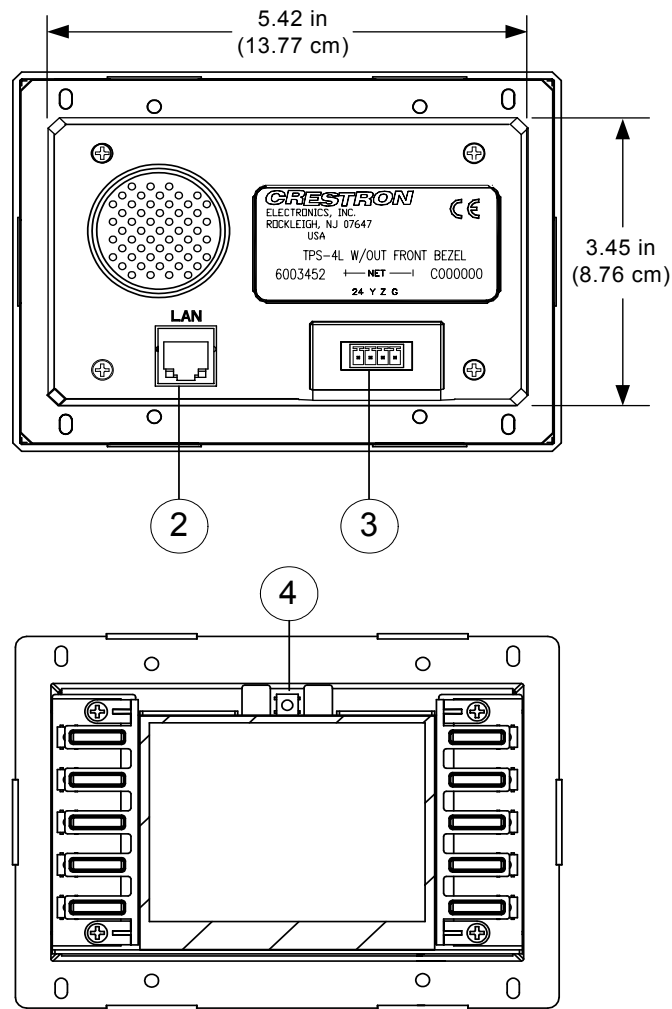
TPS-4L Physical View

TPS-4L Overall Dimensions
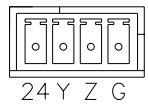
TPS-4L Overall Dimensions (continued)

5.42 in
(13.77 cm)

3.45 in
(8.76 cm)

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Connectors, Controls & Indicators

#	CONNECTORS[1], CONTROLS & INDICATORS	DESCRIPTION			
1	FUNCTION BUTTONS	(10) Translucent white backlit pushbuttons, programmable.			
2	LAN[2] PIN 1 PIN 8 YELLOW LED GREEN LED	(1) 8-wire RJ-45 with 2 LED indicators; 10/100BaseT Ethernet port; Green LED indicates link status Yellow LED indicates Ethernet activity.			

PIN	SIGNAL	PIN	SIGNAL
1	TX +	5	N/C
2	TX -	6	RC -
3	RC+	7	N/C
4	N/C	8	N/C

(Continued on following page)

Connectors, Controls & Indicators (Continued)

#	CONNECTORS[1], CONTROLS & INDICATORS	DESCRIPTION
3	NET 24 Y Z G	Four-position terminal block connector for data and power. Connects to Cresnet control network. Pin 1 (24) Power (24 Volts DC) Pin 2 (Y) Data Pin 3 (Z) Data Pin 4 (G) Ground
4	RESET	(1) Miniature pushbutton behind faceplate, used for resetting touchpanel.

1. Interface connectors for **NET** ports are provided with the unit.
2. To determine which is pin 1 on the cable, hold the cable so that the end of the eight pin modular jack is facing away from you, with the clip down and copper side up. Pin 1 is on the far left.

Industry Compliance

As of the date of manufacture, the TPS-4L has been tested and found to comply with specifications for CE marking and standards per EMC and Radiocommunications Compliance Labelling.

$$C \in \mathcal{C}$$

NOTE: This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

▪ Reorient or relocate the receiving antenna.

▪ Increase the separation between the equipment and receiver.

▪ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

▪ Consult the dealer or an experienced radio/TV technician for help.

Setup

Network Wiring

When wiring the network, consider the following:

- Use Crestron Certified Wire.

- Use Crestron power supplies for Crestron equipment.

- Provide sufficient power to the system.

  CAUTION: Insufficient power can lead to unpredictable results or damage to the equipment. Please use the Crestron Power Calculator to help calculate how much power is needed for the system (www.crestron.com/calculators).

- For larger networks, use a Cresnet Hub/Repeater (CNXHUB) to maintain signal quality.

For more details, refer to "Check Network Wiring" on page 27.

Identity Code

The Net ID of the TPS-4L has been factory set to **03**. The Net IDs of multiple TPS-4L devices in the same system must be unique. The Net ID is set using the internal setup menu (refer to "Interface Menu" on page 9). Net ID may also be set from a personal computer (PC) via the Crestron Toolbox (refer to "Establishing Communication" on page 24).

When setting the Net ID, consider the following:

- The Net ID of each unit must match an ID code specified in the SIMPL™ Windows® program.

- Each network device must have a unique Net ID.

For more details, refer to the Crestron Toolbox help file.

Configuring the Touchpanel

NOTE: The only connection required to configure the touchpanel is power. Refer to "Hardware Hookup" on page 15 for details.

NOTE: The touch screen responds to both finger and stylus commands. Since the screen is small, Crestron recommends that a stylus (not supplied) be used to ensure the accuracy of commands. Use a stylus that will not damage the surface of the screen.

MAIN MENU

MAIN MENU	
	Exit and Run Program
Touch Screen Calibration	Setup
	Diagnostics
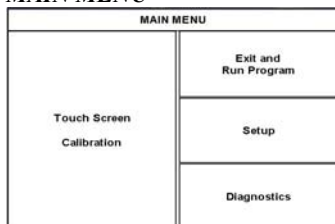
*This menu can also be obtained via digital reserved join number, 17242.*

Prior to normal operation, it is advisable to configure the unit using a series of setup screens. The MAIN MENU for configuring the touchpanel appears when a finger (or stylus) is held (approximately five seconds) to the touchscreen when power is applied or when the reset button is pressed.

Upon entering SETUP MODE, the MAIN MENU, shown to the left, displays four buttons: **Touch Screen Calibration**, **Exit and Run Program**, **Setup**, and **Diagnostics**.

Selecting **Exit and Run Program** verifies that all of the setup information has been saved to EEPROM and displays the main page that has been programmed into the touchpanel. The remaining buttons on the MAIN MENU open other menus, which are discussed in subsequent paragraphs.

Calibration Menu

CALIBRATION MENU

| CALIBRATION MENU	
Perform Calibration	
	Return
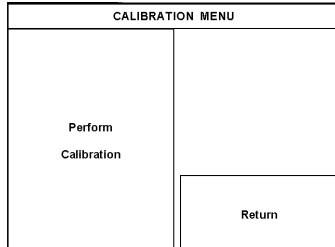
Calibration of the touchscreen is required if the active touch area of a button does not coincide with the button's image. Select the **Touch Screen Calibration** button to display the CALIBRATION MENU, as shown to the left. The CALIBRATION MENU offers the choice to initiate calibration with the **Perform Calibration** button or return to the previous screen with the **Return** button. Choose an option by touching the appropriate button.

If you need to calibrate the touchpanel, the screen displays the message "Touch Upper Left" centered on the panel with a cross hair in the upper left corner. Touch the cross hair to initiate calibration. Another message, "Touch Upper Right", appears with a cross hair in the correct corner. Touch the cross hair. A final message, "Touch Lower Right", appears with a cross hair in the correct corner. Touch the crosshair to finish the calibration and return to the MAIN MENU.

NOTE: When touching each crosshair during calibration, be as accurate as possible. Use a stylus or the tip of a capped pen or the eraser end of a pencil. To cancel calibration and return to the CALIBRATION MENU without saving calibration data, create a calibration error by touching the screen in an area that is opposite from the instructed area.

Setup Menu
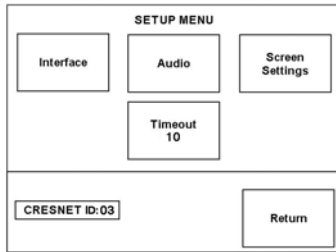
To obtain the SETUP MENU, shown to the left, press the **Setup** button from the MAIN MENU. The SETUP MENU offers a series of buttons, which open additional menus and screens that are detailed in subsequent paragraphs. After setup parameters have been set, select the **Return** button to return to the MAIN MENU.

NOTE: For convenience, the current CRESNET ID setting is displayed in the lower left corner.

NOTE: All touchpanel settings are automatically saved in non-volatile memory.

Interface

INTERFACE MENU
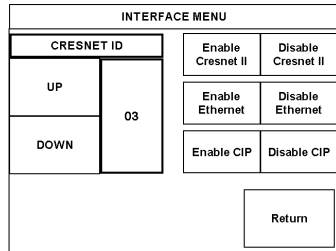
The touchpanel communicates with a control system to activate commands or to display feedback from components within the system. The communication interface must be correctly specified or communication will not occur. To set communication parameters, first select the **Interface** button on the SETUP MENU to display the INTERFACE MENU screen, shown to the left. Then, use the **CRESNET ID UP** and **DOWN** buttons to set the Cresnet network identity (CRESNET ID).

Use the other buttons on the screen to enable/disable the preferred communications protocol: Cresnet II, Ethernet, or CIP (Crestron Internet Protocol).

Cresnet II buttons determine the touchpanel's communication mode. Select **Enable** for normal Cresnet communications (default); select **Disable** to disable the Cresnet communications interface.

The Ethernet **Enable** and **Disable** buttons determine the touchpanel's ability to communicate with other devices via Ethernet.

The CIP **Enable** and **Disable** buttons determine the touchpanel's ability to communicate with other Crestron devices using CIP. CIP must be enabled for the touchpanel to communicate with other Crestron Ethernet devices.

After the Cresnet ID setting has been verified and the communications protocol has been selected, press **Return** to save the settings and return to the SETUP MENU.

Audio
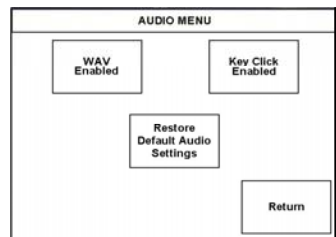
AUDIO MENU

From the SETUP MENU, press the **Audio** button to open the AUDIO MENU screen, shown at left.

Press the **WAV** button to open the AUDIO SETUP – WAV screen. Use the buttons on this screen to set the WAV file volume level, to enable/disable the WAV file function and to play the WAV file to verify your settings. The area to the right of the volume UP/DOWN buttons shows the relative volume from 0% to 100%, both as a numeric value and, for a quick visual reference, as an analog bar.

Similarly, press the KEY CLICK Enabled/Disabled button to open the AUDIO SETUP – KEY CLICK screen. Use the buttons on this screen to adjust the key click volume level (0 – 100%), and to enable/disable an audible tone (beep) when the touchpanel buttons are pressed. The area to the right of the volume UP/DOWN buttons shows the relative volume from 0% to 100%, both as a numeric value and, for a quick visual reference, as an analog bar.

Press the **Restore Default Audio Settings** button to cancel any changes and restore all default audio settings: WAV volume = 100%, and WAV function enabled; key click volume = 100%, and key click function enabled.

Press **Return** to save the settings and return to the SETUP MENU.

SCREEN SETTINGS

SCREEN SETTINGS
Brightness 100% / Key Backlight 48% / LCD Bias 182
Return

Screen Settings

From the SETUP MENU, press the **Screen Settings** button to open the SCREEN SETTINGS screen, shown at left.

Press the **Brightness** button to open the SCREEN SETTINGS – BRIGHTNESS screen. Use the UP/DOWN buttons to set the display brightness (0 – 100%). The area to the right of the buttons shows the relative brightness from 0% to 100%, both as a numeric value and, for quick visual reference, as an analog bar.
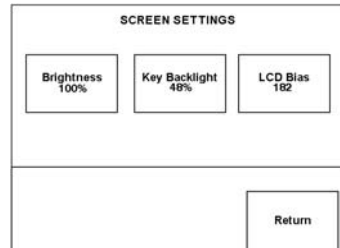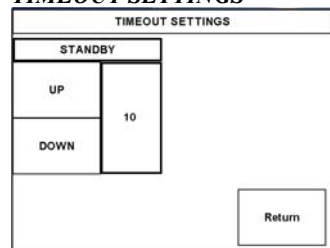
Press the **Key Backlight** button to open the SCREEN SETTINGS – KEY BACKLIGHT screen. Use the UP/DOWN buttons to set the key backlight brightness (0 – 100%). The area to the right of the buttons shows the relative brightness from 0% to 100%, both as a numeric value and, for quick visual reference, as an analog bar.

Press the **LCD Bias** button to open the SCREEN SETTINGS – LCD BIAS screen. Use the **UP/DOWN** buttons to set the LCD bias (0 – 255). Use the graphic on the right side of the screen to see the effects of the adjustment. The bias setting is best when the lines are crisp and dark and the white area around them is bright.

Press **Return** to save the settings and return to the SETUP MENU.

TIMEOUT SETTINGS

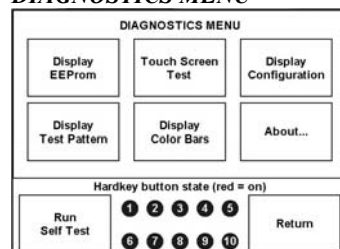| TIMEOUT SETTINGS |
| --- |
| STANDBY |
| UP / 10 / DOWN |
| Return |

Timeout Settings

From the SETUP MENU, press the **Timeout** button to open the SCREEN SETTINGS – TIMEOUT screen. Use the **UP/DOWN** buttons to set the timeout from 0 through 120 minutes, where 0 disables the timeout. Adjustment is in one-minute increments from 1 to 10; in ten-minute increments from 20-120.

STANDBY timeout turns the display and backlight off when the touchpanel is inactive for the specified time. When the touchpanel is reactivated, the last screen to be displayed reappears. The specified time is displayed in minutes. The default STANDBY timeout is 10 minutes.

Press **Return** to save the settings and return to the SETUP MENU.

DIAGNOSTICS MENU

DIAGNOSTICS MENU
Display EEProm / Touch Screen Test / Display Configuration
Display Test Pattern / Display Color Bars / About...
Hardkey button state (red = on)
Run Self Test / ① ② ③ ④ ⑤ / ⑥ ⑦ ⑧ ⑨ ⑩ / Return

Diagnostics Menu

The **Diagnostics** button from the MAIN MENU should only be used under supervision from a Crestron customer service representative during telephone support. Many options available from the DIAGNOSTICS MENU, shown to the left, are numeric in nature and their interpretation is beyond the scope of this manual.

Mounting Options

The TPS-4L touchpanel installs simply and cleanly into existing or newly constructed walls, with an assortment of pre- and post-construction mounting options. The TPS-4L is supplied with four screws and clips for post-construction installation. All available mounting options are listed in the following table. (The Wall Mount Kit – Bracket, Model WMKB-4L, consists of multiple sets of clips like the ones supplied.)

NOTE: Refer to the latest version of the supplied Touchpanel Mounting QuickStart Guide, Doc. 6140, which is available from the Crestron website (www.crestron.com/manuals), for details about the available mounting options before starting any actual installation procedures.

Mounting Options for the TPS-4L

PRE-CONSTRUCTION OPTION	POST-CONSTRUCTION OPTION	MODEL NUMBER	DOCUMENT NUMBER
Back Box Kit	-	BB-4L	6387
Pre-Construction Mount Kit	-	PMK-4L	6388
Mud Ring Mount Kit (Accessory)	-	MMK-4L	6389
Trim Ring Mount Kit (Accessory)	-	TMK-4L	6390
-	Wall Mount Kit – Mud Ring	WMKM-4L	6389
-	Wall Mount Kit – Trim Ring	WMKT-4L	6390
	Wall Mount Kit – Bracket	WMKB-4L	Not Applicable

NOTE: Pre-construction refers to framed walls prior to hanging drywall. Post-construction refers to framed walls with drywall hung.

If the BB-4L or PMK-4L are to be used and a touchpanel is not available, the installer can either leave the hole in the mounting surface open (if permitted by local building codes) or attach the cover plate supplied with the mounting kit.

Touchpanel Mounting

Physical installation of the TPS-4L includes mounting the unit to the wall and installing an engraved touchpanel bezel. The only tools required for the procedures presented here are masking tape (or equivalent), a gypsum board saw (or equivalent), and a #2 Phillips tip screwdriver. The following procedures are based on the use of the supplied screws and clips for post-construction installation.
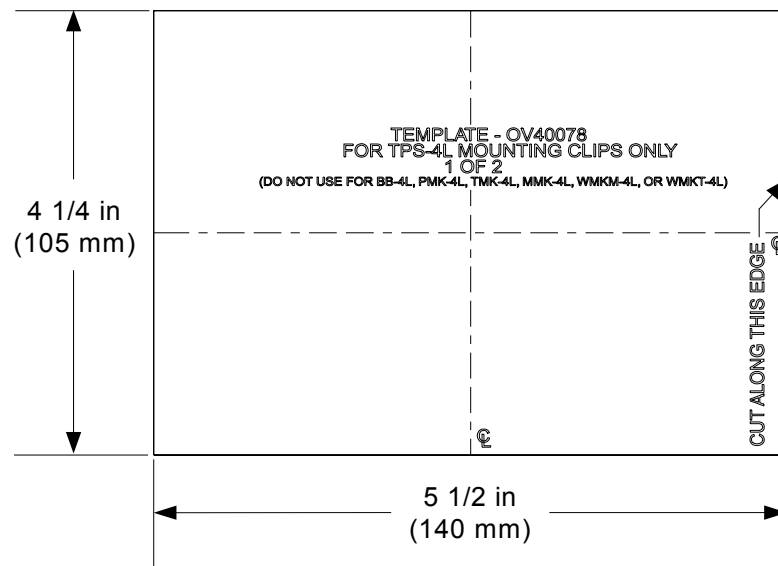
Mounting to the Wall

The TPS-4L is designed to be mounted in a wall or lectern. Two overlay cutout templates (0V40078) are supplied. One is in the shape of the required opening; the other is similar to a frame, with the inner area of the frame the shape of the required opening. (Refer to the following diagrams.) Use the template that is most convenient.

Supplied Hardware for the TPS-4L

DESCRIPTION	PART NUMBER	QUANTITY
Mounting Clip	2014237	4
Overlay Template Cutout	4007314	1
Conn, Plug, 4 Pin, SKT, Single Row	2003576	1
Screw, #06-AB, 2-1/2", Pan Head	2014276	2

NOTE: The following drawings are not to scale. Do not attempt to use them to prepare the hole in the mounting surface.

TPS-4L Cutout Dimensions (4007314, 1 of 2)

TEMPLATE - OV40078
FOR TPS-4L MOUNTING CLIPS ONLY
1 OF 2
(DO NOT USE FOR BB-4L, PMK-4L, TMK-4L, MMK-4L, WMKM-4L, OR WMKT-4L)

CUT ALONG THIS EDGE

4 1/4 in
(105 mm)

5 1/2 in
(140 mm)

TPS-4L Cutout Dimensions (4007314, 1 of 2)
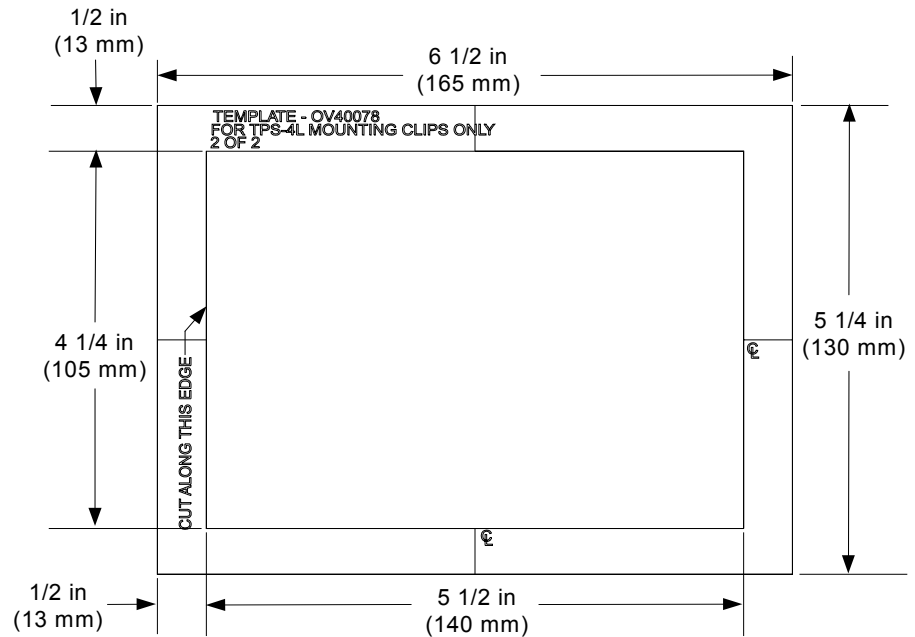
1. Locate an area on the wall that is free of miscellaneous wiring and studs.

2. Make a small hole near the middle of the designated site, and verify that the location is suitable.

3. Using masking tape (or equivalent), fasten the template to the wall; verify that the template is level, and trace the opening shape on the wall.

4. Remove the template, and then cut out and remove the traced shape to produce the required opening.

NOTE: Before inserting the TPS-4L in the mounting hole, ensure that all required cables have been installed in the wall.

5. Install the four supplied #6x 2-½" screws and mounting clips as shown in the diagram on the next page (two on the top and two on the bottom).

   - Insert the screws through the touchpanel flange and then through the larger hole in the mounting clip.

   - Thread the screws through the smaller hole in the mounting clips and tighten the screws only enough that the mounting clips are brought flush with the rear of the touchpanel flange. Do not compress the mounting clips at this time.

Attaching the Screws and Mounting Clips
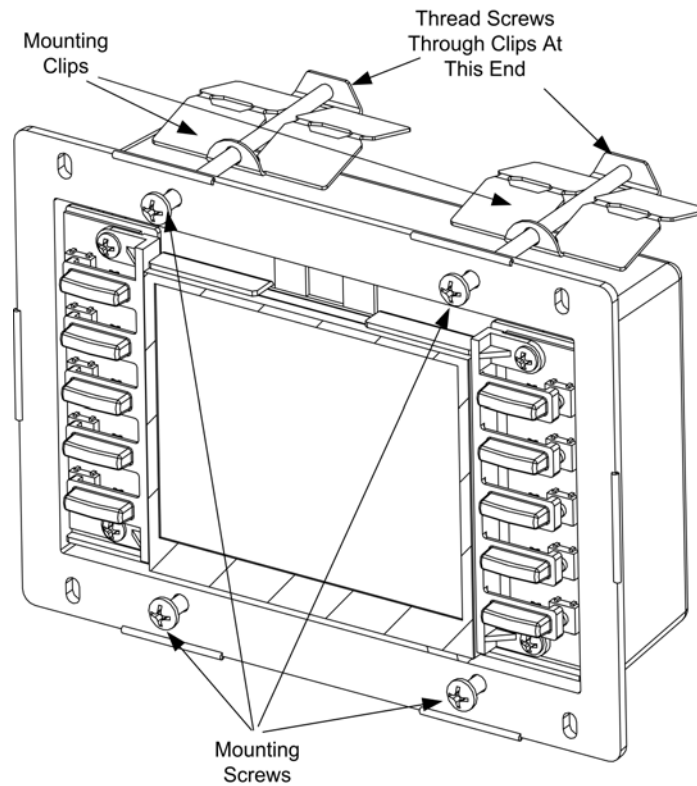
6. Connect the Cresnet cable, using the supplied mating connector, to the Cresnet port; attach the Ethernet cable, if required, and position the TPS-4L in the mounting hole.

Insert the TPS-4L Into the Mounting Surface
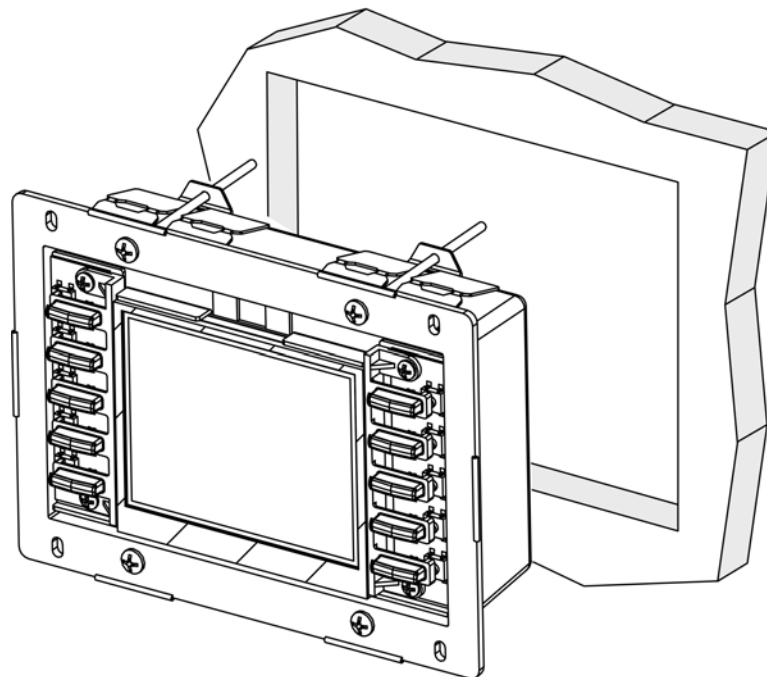
7. Tighten the mounting screws evenly and only enough to compress the mounting clips and secure the TPS-4L squarely in the mounting surface. Do not over tighten the screws.

NOTE: If it becomes necessary to remove the touchpanel from the mounting surface, the original mounting clips cannot be reused to remount the touchpanel. Additional mounting clips are available in the Mounting Kit WMKB-4L identified in "Mounting Options" on page 11.

Installing the Bezel

Use the Crestron Engraver software package to obtain a custom-engraved bezel for the TPS-4L. Install the bezel as follows.

1. Carefully position the bezel over the face of the touchpanel.

2. Ensure that the bezel is oriented properly and press against the TPS-4L until the bezel snaps into place.

Touchpanel Removal

If it is necessary to remove the touchpanel after it has been installed into a mounting surface, complete the following steps in the order provided to remove the touchpanel. The only tool required is a #2 Phillips tip screwdriver.

1. Lift one edge of the bezel to free it from the touchpanel, and lift it off. Do not apply excessive pressure to the touchscreen.

2. Loosen and remove the screws that secure touchpanel to the mounting option in use.

3. Using equal pressure, carefully remove the touchpanel from the opening.

If necessary, secure and label the attached cables before disconnecting them from the back of the touchpanel.

Hardware Hookup

NOTE: To prevent overheating, do not operate this product in an area that exceeds the environmental temperature range listed in the specifications table. Consideration must be given if installed in a closed or multi-unit rack assembly, inside a closed desk, or in a closed podium since the operating ambient temperature of these environments may be greater than the room ambient. Contact with thermal insulating materials should be avoided on all sides of the unit.

Connect the Device

Make the necessary connections as called out in the illustration on the next page. Refer to "Network Wiring" on page 7 before attaching the 4-position terminal block connector. Apply power after all connections have been made.

When making connections to theTPS-4L use Crestron power supplies for Crestron equipment.

Hardware Connections for the TPS-4L
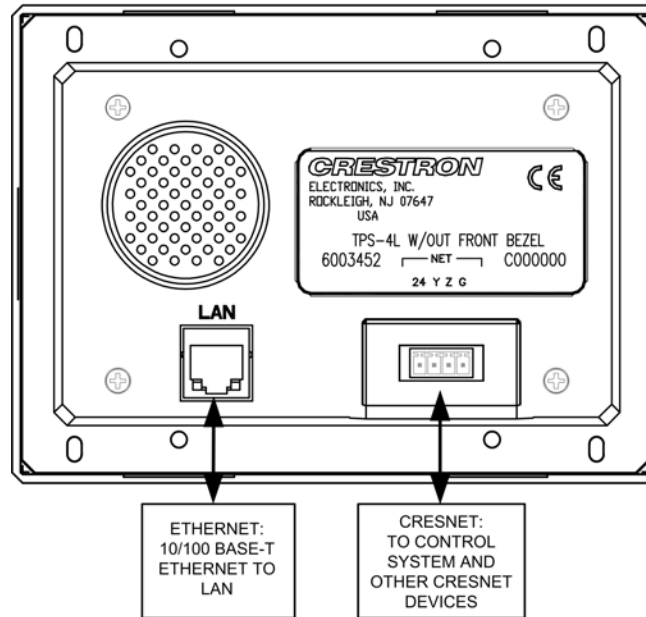
CAUTION: Do not apply excessive pressure to the touchscreen display during handling. Doing so can crack the screen and damage the touchpanel.

Label the Buttons

Use Crestron Engraver software to print custom labels for the TPS-4L's front panel buttons and LEDS. Crestron recommends printing on 100-pound paper. Paper weighing less than 100 pounds will tend to crumple while sliding in, while paper weighing more than 100 pounds may not fit.

Recommended Cleaning

Keep the surface of the touchscreen free of dirt, dust or other materials that could degrade optical properties. Long-term contact with abrasive materials can scratch the surface, which may detrimentally affect image quality.

For best cleaning results use a clean, damp, non-abrasive cloth with any commercially available non-ammonia glass cleaner. Bezels may not provide a complete watertight seal. Therefore, apply cleaning solution to the cloth rather than the surface of the touchscreen. Wipe touchscreen clean and avoid getting moisture beneath the bezels.

Programming Software

Have a question or comment about Crestron software?

Answers to frequently asked questions (FAQs) can be viewed in the Online Help section of the Crestron website. To post a question or view questions you have submitted to Crestron's True Blue Support, log in at http://support.crestron.com. First-time users will need to establish a user account.

Earliest Version Software Requirements for the PC

NOTE: Crestron recommends that you use the latest software to take advantage of the most recently released features. The latest software is available from the Crestron website.

The following are the minimum recommended software versions for the PC:

Software

TASK	REQUIRED SOFTWARE VERSION
Program control system to operate TPS-4L.	SIMPL Windows version 2.06.20 or later and Library update 361 or later. Also requires Crestron Database version 17.6.0 or later.
Upload program and firmware.	Crestron Toolbox 1.01.06 or later.
For graphical touchscreen design.	Crestron VisionTools® Pro-e version 3.4.2.5 or later.
Program with simple wizards for QuickMedia systems using a TPS-4L (optional but recommended).	Crestron SystemBuilder™ version 2.0.6 or later with SystemBuilder Templates version 2.0.1 or later. Refer to software release notes or Crestron website for other required Crestron software packages.
Create labels for front panel buttons.	Crestron Engraver 2.6.1.0 or later.

Programming with Crestron SystemBuilder

Crestron SystemBuilder is the easiest method of programming but does not offer as much flexibility as SIMPL Windows. For additional details, download SystemBuilder from the Crestron website and examine the extensive help file.

Programming with SIMPL Windows

NOTE: While SIMPL Windows can be used to program the TPS-4L, it is recommended to use SystemBuilder for configuring a system.

SIMPL Windows is Crestron's premier software for programming Crestron control systems. It is organized into two separate but equally important "Managers".

Configuration Manager

Configuration Manager is the view where programmers "build" a Crestron control system by selecting hardware from the *Device Library*.

- To incorporate the TPS-4L into the system, drag the PRO2 from the Control Systems folder of the *Device Library* and drop it in the *System Views.*

- The *System Views* lower pane displays the PRO2 system tree. This tree can be expanded to display and configure the communications ports.

Locating the TPS-4L in the Device Library
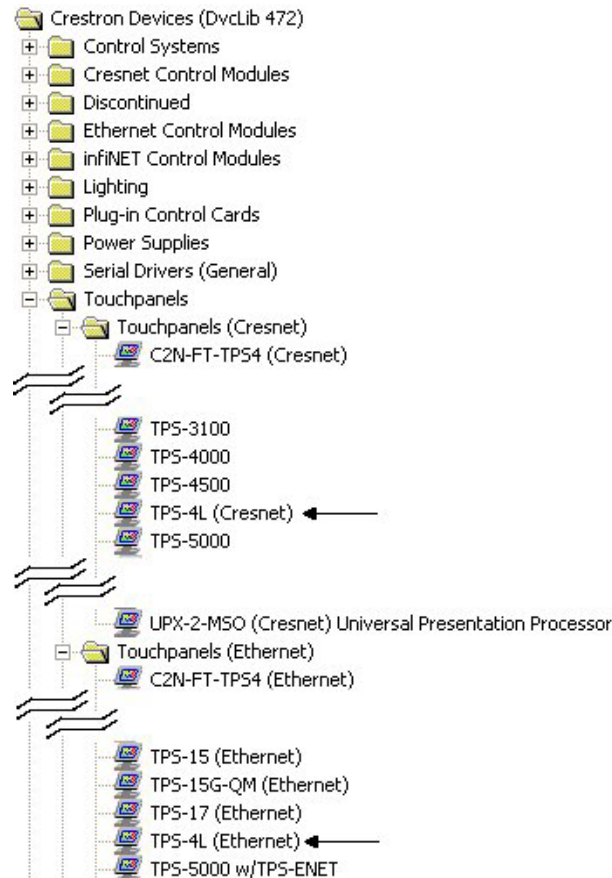
- The system tree of the control system displays the device in the appropriate slot with a default Net ID and default IP ID as shown in the following illustration.

C2Net Device, Slot 9
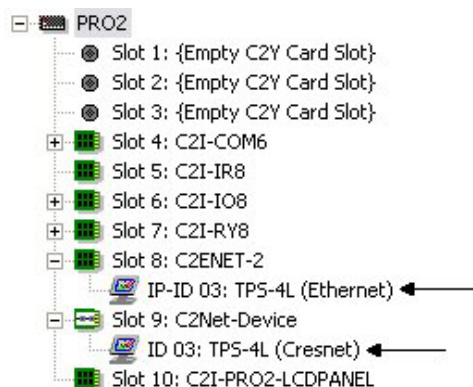
- Additional TPS-4L devices are assigned different Net ID (for Cresnet devices) or IP ID (for Ethernet devices) numbers as they are added.

- If necessary, double click a device to open the "Device Settings" window and change the Net ID or IP ID as shown in the following figures.

"TPS-4L Device Settings" Net ID Window

"TPS-4L Device Settings" IP ID Window
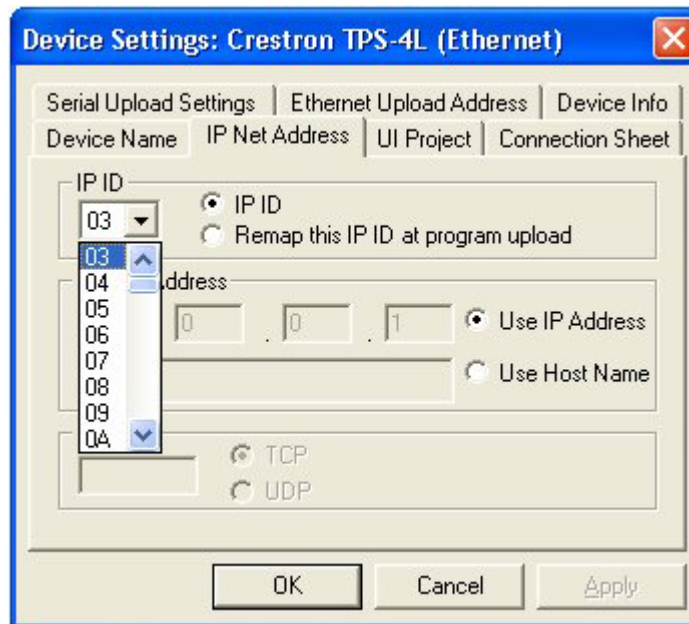
- The ID code specified in the SIMPL Windows program must match the Net ID of each unit. Refer to "Identity Code" on page 7.

Program Manager   Program Manager is the view where programmers "program" a Crestron control system by assigning signals to symbols.

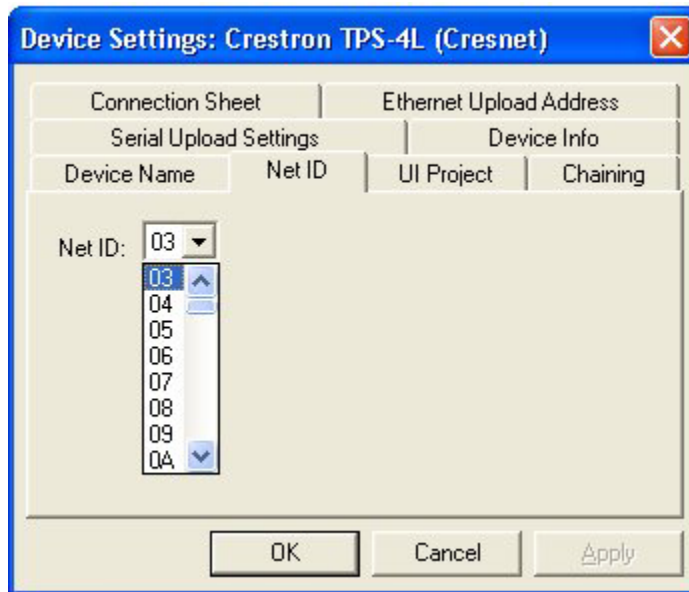The symbol can be viewed by double clicking on the icon or dragging it into *Detail View*. Each signal in the symbol is described in the SIMPL Windows help file (**F1**).

Programming with VisionTools Pro-e

Touchpanel screens should be created in VisionTools Pro-e to allow accessing the embedded applications, switching of source signals to desired outputs as well as selection of the system mode. There are no special programming requirements to use the functions of the TPS-4L in a room control system.

Multi-Mode Objects

Multi-mode objects offer high-performance programming!

The single most-advanced VisionTools Pro-e high-performance programming technique involving the TPS-4L is the concept of multi-mode objects. A multi-mode object (i.e. button, legend, etc.) is an object drawn on a VisionTools Pro-e page that can have one or more active and inactive visible settings (*modes*).

For examples, refer to www.crestron.com/exampleprograms and search for multi-mode object examples. This file contains the VisionTools Pro-e touchpanel files and SIMPL Windows files that illustrate the high-performance capabilities of multi-mode objects.

WAV File Audio Messages

The TPS-4L touchpanels are capable of playing audio messages as system prompts and responses. These files are recorded as WAV files on a PC using an audio utility such as Sound Recorder that is packaged with Microsoft Windows 95/98/Me/XP/NT/2000/Vista™. Files from other sources may also be converted to an acceptable format by using this or a similar utility. Many other audio utilities are available commercially or as shareware. The TPS-4L touchpanels only accept the following WAV file format: **8-bit PCM, mono, 8KHz.** For more information about how to use Sound Recorder, refer to its User's Guide and extensive help information provided with the software. Also refer to the help file in VisionTools Pro-e to learn how to use its audio tool, Sound Manager, to attach WAV files to a touchpanel project.

Pre-recorded WAV files for voice prompts and responses are available from Crestron. These files can be stored into and programmed for use in the touchpanel directly or may be edited with the Sound Recorder. For example, the individual files can be combined to create custom messages.

NOTE: Touchpanel WAV files can be obtained from the Wave LC Library of the Crestron FTP site.

Bit Depth and File Size

A bit depth refers to the number of memory bits used to store color data for each pixel in a raster image. A touchpanel raster image consists of a rectangular grid of picture elements (pixels). Each pixel uses the same amount of memory to store its color data. The amount of memory is called the bit depth of the image.

Greater bit depths are required to represent finer gradations of color. Increasing bit depth necessarily increases file size. A black and white drawing requires only one bit per pixel to store all the available color information. Using a 32-bit per pixel bit depth for a black and white image increases the file size 32 times without adding anything to the black and white image quality.

In an 8-bit per pixel system, the associated 8-bits of video memory for every screen pixel contain a value referring to a location in an 8-bit color table. In this way any one of the specific 256 color table locations is assigned to a pixel.

A 16-bit highcolor system is considered sufficient to provide life-like colors. It is encoded using 5-bits to represent red, 5-bits to represent blue and (since the human eye is more sensitive to the color green) 6-bits to represent 64 levels of green. These can therefore be combined to provide 65,536 mixed colors (32 x 32 x 64 = 65,536).

In a 24-bit graphics display, the video memory allocates 24 bits for each pixel on the screen enabling each pixel to take on any one of a possible 16.7 million colors. Each 24-bit value is composed of 8-bits for red, 8-bits for green and 8-bits for blue. These triplets of 8-bit values are also referred to as the red, green and blue color planes. A 24-bit image is actually composed of three component images which combine to create the truecolor picture. The reason this is called truecolor is that this is near the maximum number of colors the human eye is able to detect.

Truecolor images are sometimes represented by a 32-bit value. The extra 8-bits do not enhance the precision of the color representation but act as an alpha channel that represents pixel translucence. 32-bit truecolor has become popular on the computer desktop to provide effects such as translucent windows, fading menus and shadows.

In graphics intensive applications such as touchpanels, raising or lowering the color depth of the displayed graphics can achieve a balance of performance and quality. Lower color depths do not require as much frame buffer memory or display bandwidth, allowing them to be generated and displayed more quickly. Increasing color depth results in higher color quality at the expense of display speed and responsiveness. By using mostly 8-bit or 16-bit graphics and holding 32-bit graphics to a minimum (e.g. for a family photo, etc.), you can create a sophisticated project that will fit in the memory space provided and have the touchpanel remain very responsive.
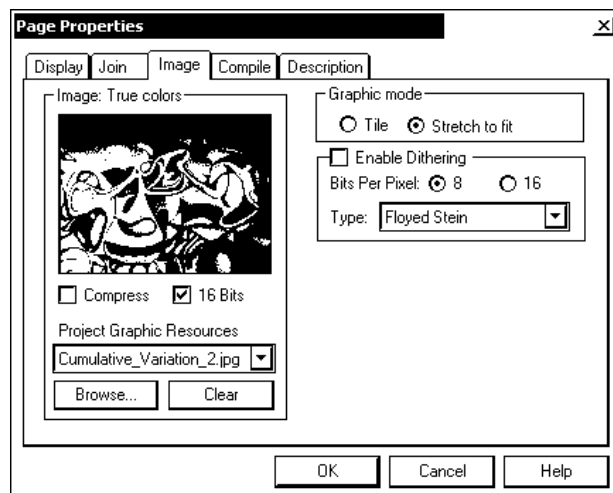
Relationship of Bits to Colors

NUMBER OF BITS	NUMBER OF COLORS
1 bit	Black and White
2 bits	4 Colors
4 bits	16 Colors
8 bits	256 Colors
16 bits	65,536 Colors (Highcolor)
24 bits	16.7 million Colors (Truecolor)
32 bits	16.7 million Colors plus Transparency

When creating a VisionTools Pro-e project you can elect to compress and reduce the image size in the "Page Properties" window for the entire page and/or perform the same function of reducing the image size using the "Image Properties" window. A reduction in image size will save a considerable amount of memory space for your project.

In VisionTools Pro-e, the **Compress** checkbox permits the image to be compressed when compiling. The **16 Bits** checkbox converts a 24-bit or 32-bit image to 16 bits. This conversion to a 16-bit image may cause the loss of some subtle shading. To compensate for this, use the dithering to simulate the original shading. Various dithering types are available. Refer to the illustrations on the next page.

VT Pro-e "Page Properties" Window – Bit Depth Selection   *VT Pro-e "Image Properties" Window – Bit Depth Selection*
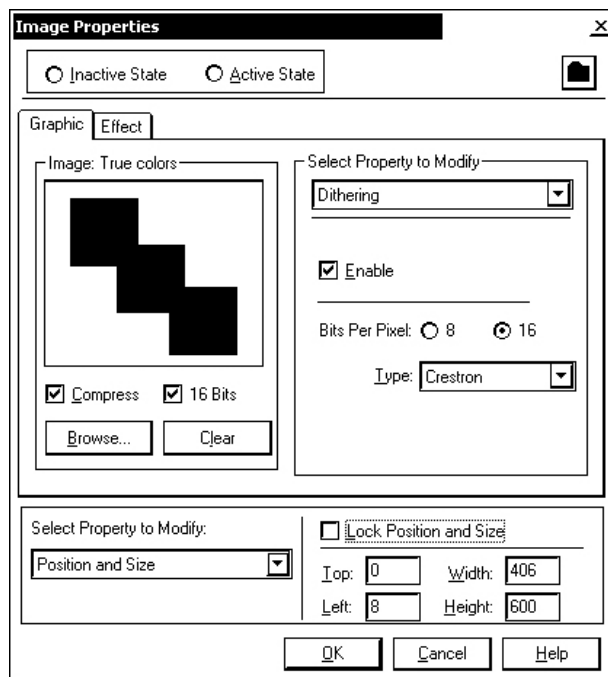
Pushbutton Programming

The ten pushbuttons that flank the display can be programmed to access any frequently used command. Each button has a permanently fixed digital join number. The sequence of digital join numbers are (top to bottom, left to right) 1 through 5 and 6 through 10. Refer to the following illustration. A description for each button signal is given in the SIMPL Windows help file (**F1**).

Pushbutton Layout and Join Number Assignment
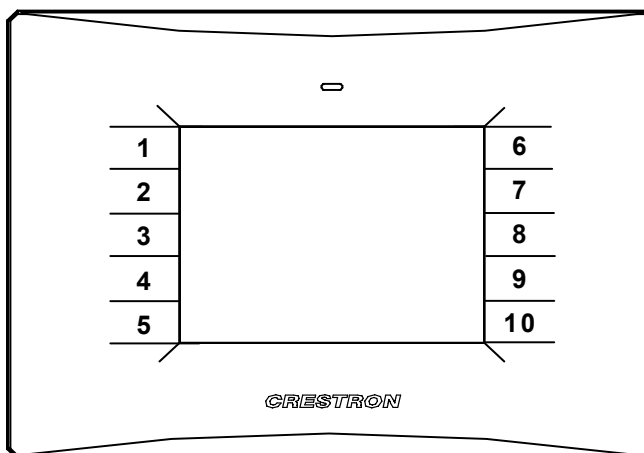
MultiByte International Characters

Most languages use a single byte of eight bits to represent a character, e.g. English, French, German, Hebrew, Russian, Thai, etc.

Multibyte character fonts require more than the usual eight bits to specify a character. This occurs when a language has more than 256 characters (2^8) in a font.

For example, Chinese fonts contain several thousand characters. Other multibyte languages include Japanese and Korean.

There are two separate applications with multibyte characters – static text on buttons and indirect text on buttons. No Isys touchpanel firmware changes are required in either case.

Indirect text on a button is entered in VisionTools Pro-e and the actual string to be displayed is entered in SIMPL Windows. As of this publication date only completely single byte or completely multibyte strings may be entered or they will not be compiled correctly in SIMPL Windows. In other words, you cannot enter Chinese characters interspersed with numbers. You can enter Chinese characters or numbers in separate strings or you can pad each number with "\x00" to make it multibyte and then combine it with Chinese characters in the same string.

Of course you can always use the workaround of showing a graphic that displays the string but it is not dynamic. To compile and use multibyte characters it is essential that the operating system understand the language. Windows XP and Vista are available in many international languages and add-on software is available for other versions of Windows.

Example Program

An example program for the TPS-4L is available from the Crestron website (www.crestron.com/exampleprograms).

Uploading and Upgrading

Crestron recommends using the latest programming software and that each device contains the latest firmware to take advantage of the most recently released features. However, before attempting to upload or upgrade it is necessary to establish communication. Once communication has been established, files (for example, programs, projects or firmware) can be transferred to the control system (and/or device). Finally, program checks can be performed (such as changing the device ID or creating an IP table) to ensure proper functioning.

Establishing Communication

Use Crestron Toolbox for communicating with the TPS-4L; refer to the Crestron Toolbox help file for details. There are two methods of communication.

Indirect Communication

Indirect Communication
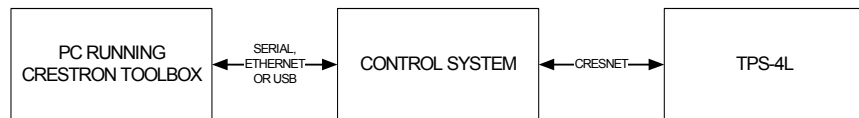
- TPS-4L connects to control system via Cresnet.

- Establish communication between the PC and the control system as described in the latest version of the 2-Series Control Systems Reference Guide (Doc. 6256).

- Use the Address Book in Crestron Toolbox to create an entry for the TPS-4L using the expected communication protocol (Indirect). Select the Cresnet ID of the TPS-4L and the address book entry of the control system that is connected to the TPS-4L.

- Display the TPS-4L's "System Info" window (click the ⬛ icon); communications are confirmed when the device information is displayed.

TCP/IP Communication

NOTE: Required for operation with a Crestron control system.

Ethernet Communication

- Establish indirect communication between TPS-4L and PC as stated above.

- Enter the IP address, IP mask and default router of the TPS-4L via the Crestron Toolbox (**Functions | Ethernet Addressing**); otherwise enable DHCP.

- Confirm Ethernet connections between TPS-4L and PC. If connecting through a hub or router, use CAT5 straight through cables with 8-pin RJ-45 connectors. Alternatively, use a CAT5 crossover cable to connect the two **LAN** ports directly without using a hub or router.

- Use the Address Book in the Crestron Toolbox to create an entry for the TPS-4L with the TPS-4L's TCP/IP communication parameters.

- Display the "System Info" window (click the ◼ icon) and select the TPS-4L entry.

Programs, Projects and Firmware

Program, project or firmware files may be distributed from programmers to installers or from Crestron to dealers. Firmware upgrades are available from the Crestron website as new features are developed after product releases. One has the option to upload programs and projects via the programming software or to upload and upgrade via the Crestron Toolbox. For details on uploading and upgrading, refer to the SIMPL Windows help file, VisionTools Pro-e help file or the Crestron Toolbox help file.

SIMPL Windows

If a SIMPL Windows program is provided, it can be uploaded to the control system using SIMPL Windows or Crestron Toolbox.

VisionTools Pro-e

Upload the VisionTools Pro-e file to the touchpanel using VisionTools Pro-e or Crestron Toolbox.

Firmware

Check the Crestron website to find the latest firmware. (New users may be required to register to obtain access to certain areas of the site, including the FTP site.)

Upgrade TPS-4L firmware via Crestron Toolbox.

- Establish communication with the TPS-4L and display the "System Info" window.

- Select **Functions | Firmware…** to upgrade the TPS-4L firmware.

Program Checks

Actions that can be performed on the TPS-4L vary depending on whether it is connected via Cresnet or Ethernet.

Cresnet Connections

For Cresnet connections, using Crestron Toolbox, display the network device tree (**Tools | Network Device Tree**) to show all network devices connected to the control system. Right-click on the TPS-4L to display actions that can be performed on the TPS-4L.

Ethernet Connections

For Ethernet connections, display the "System Info window (click the ◼ icon) and select the **Functions** menu to display actions that can be performed on the TPS-4L.

Be sure to use the Crestron Toolbox to create the TPS-4L IP table.

- Select **Functions | IP Table Setup**.

- Add, modify or delete entries in the IP table. The TPS-4L can have only one IP table entry.

- A defined IP table can be saved to a file or sent to the device.

Edit the control system's IP table to include an entry for the TPS-4L. The entry should list the TPS-4L's IP ID (specified on the TPS-4L's IP table) and the internal gateway IP address 127.0.0.1.

Problem Solving

Troubleshooting

The following table provides corrective action for possible trouble situations. If further assistance is required, please contact a Crestron customer service representative.

TPS-4L Troubleshooting

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Device does not function.	Device is not communicating with the network.	Use Crestron Toolbox to poll the network. Verify network connection to the device.
	Device is not receiving power from a Crestron power source.	Use the provided Crestron power source. Verify connections.
	Device is not receiving sufficient power.	Use the Crestron Power Calculator to help calculate how much power is needed for the system.
	Net ID is not set to match the Net ID specified in SIMPL Windows program.	Verify SIMPL Windows program for setting Net IDs.
	Net ID is the same as another device's Net ID.	Assign a different Net ID.
Buttons do not function when pressed.	Net ID incorrect or does not match SIMPL Windows program.	In Crestron Toolbox, check **Functions | CresnetID** to verify Net ID. Verify SIMPL Windows program ID.
Button press yields incorrect result.	Incorrect programming.	Verify SIMPL Windows program.
Unexpected response from the touchpanel.	Touchpanel is incorrectly calibrated.	Enter "SETUP MODE" or use Crestron Toolbox to initiate the calibration sequence and recalibrate.
Communications via the LAN port is not functioning.	Improper Ethernet connection (IEC).	Verify proper connection at touchpanel **LAN** port.
	Incorrect touchpanel selected in SIMPL Windows.	Select "Touchpanel (Ethernet)" instead of "Touchpanel (Cresnet)" in SIMPL Windows.
	Another device set to the same IP address	Obtain new touchpanel static IP address.

(Continued on following page)

TPS-4L Troubleshooting (Continued)

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Communications via the LAN port is not functioning (continued).	Possible bad port on the hub.	Use crossover cable to connect directly to the Ethernet port on a PC and ping the IP address of the touchpanel to confirm communication. If communication is active, confirm hub port by testing with another Ethernet device.

Check Network Wiring

Use the Right Wire

In order to ensure optimum performance over the full range of your installation topology, Crestron Certified Wire and only Crestron Certified Wire may be used. Failure to do so may incur additional charges if support is required to identify performance deficiencies because of using improper wire.

Calculate Power

CAUTION: Use only Crestron power supplies for Crestron equipment. Failure to do so could cause equipment damage or void the Crestron warranty.

CAUTION: Provide sufficient power to the system. Insufficient power can lead to unpredictable results or damage to the equipment. Please use the Crestron Power Calculator to help calculate how much power is needed for the system (www.crestron.com/calculators).

When calculating the length of wire for a particular Cresnet run, the wire gauge and the Cresnet power usage of each network unit to be connected must be taken into consideration. Use Crestron Certified Wire only. If Cresnet units are to be daisy-chained on the run, the Cresnet power usage of each network unit to be daisy-chained must be added together to determine the Cresnet power usage of the entire chain. If the unit is home-run from a Crestron system power supply network port, the Cresnet power usage of that unit is the Cresnet power usage of the entire run. The wire gauge and the Cresnet power usage of the run should be used in the following equation to calculate the cable length value on the equation's left side.

Cable Length Equation

$$L < \frac{40,000}{R \times P}$$

Where: L = Length of run (or chain) in feet
R = 6 Ohms (Crestron Certified Wire: 18 AWG (0.75 MM^2))
   or 1.6 Ohms (Cresnet HP: 12 AWG (4 MM^2))
P = Cresnet power usage of entire run (or chain)

Make sure the cable length value is less than the value calculated on the right side of the equation. For example, a Cresnet run using 18 AWG Crestron Certified Wire and drawing 20 watts should not have a length of run more than 333 feet. If Cresnet HP is used for the same run, its length could extend to 1250 feet.

NOTE: All Crestron certified Cresnet wiring must consist of two twisted pairs. One twisted pair is the +24V conductor and the GND conductor and the other twisted pair is the Y conductor and the Z conductor.

Strip and Tin Wire

When daisy-chaining Cresnet units, strip the ends of the wires carefully to avoid nicking the conductors. Twist together the ends of the wires that share a pin on the

network connector and tin the twisted connection. Apply solder only to the ends of the twisted wires. Avoid tinning too far up the wires or the end becomes brittle. Insert the tinned connection into the Cresnet connector and tighten the retaining screw. Repeat the procedure for the other three conductors.

Add Hubs

For larger networks (i.e., greater than 28 network devices), it may become necessary to add a Cresnet Hub/Repeater (CNXHUB) to maintain signal quality throughout the network. Also, for networks with lengthy cable runs it may be necessary to add a Hub/Repeater after only 20 devices.

Reference Documents

The latest version of all documents mentioned within the guide can be obtained from the Crestron website (www.crestron.com/manuals). This link will provide a list of product manuals arranged in alphabetical order by model number.

List of Related Reference Documents

DOCUMENT TITLE
2-Series Control Systems Reference Guide
BB-4L Back Box
MMK-4L and WMKM-4L Mud Mount Kits
PMK-4L Preconstruction Mounting Kit
TMK-4L and WMKT-4L Trim Ring Mount Kits
Touchpanel Mounting QuickStart Guide

Further Inquiries

If you cannot locate specific information or have questions after reviewing this guide, please take advantage of Crestron's award winning customer service team by calling the Crestron corporate headquarters at 1-888-CRESTRON [1-888-273-7876]. For assistance in your local time zone, refer to the Crestron website (www.crestron.com/offices) for a listing of Crestron worldwide offices.

You can also log onto the online help section of the Crestron website (www.crestron.com/onlinehelp) to ask questions about Crestron products. First-time users will need to establish a user account to fully benefit from all available features.

Future Updates

As Crestron improves functions, adds new features and extends the capabilities of the TPS-4L, additional information may be made available as manual updates. These updates are solely electronic and serve as intermediary supplements prior to the release of a complete technical documentation revision.

Check the Crestron website periodically for manual update availability and its relevance. Updates are identified as an "Addendum" in the Download column.

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Return and Warranty Policies

Merchandise Returns / Repair Service

1. No merchandise may be returned for credit, exchange or service without prior authorization from CRESTRON. To obtain warranty service for CRESTRON products, contact an authorized CRESTRON dealer. Only authorized CRESTRON dealers may contact the factory and request an RMA (Return Merchandise Authorization) number. Enclose a note specifying the nature of the problem, name and phone number of contact person, RMA number and return address.

2. Products may be returned for credit, exchange or service with a CRESTRON Return Merchandise Authorization (RMA) number. Authorized returns must be shipped freight prepaid to CRESTRON, 6 Volvo Drive, Rockleigh, N.J. or its authorized subsidiaries, with RMA number clearly marked on the outside of all cartons. Shipments arriving freight collect or without an RMA number shall be subject to refusal. CRESTRON reserves the right in its sole and absolute discretion to charge a 15% restocking fee plus shipping costs on any products returned with an RMA.

3. Return freight charges following repair of items under warranty shall be paid by CRESTRON, shipping by standard ground carrier. In the event repairs are found to be non-warranty, return freight costs shall be paid by the purchaser.

CRESTRON Limited Warranty

CRESTRON ELECTRONICS, Inc. warrants its products to be free from manufacturing defects in materials and workmanship under normal use for a period of three (3) years from the date of purchase from CRESTRON, with the following exceptions: disk drives and any other moving or rotating mechanical parts, pan/tilt heads and power supplies are covered for a period of one (1) year; touchscreen display and overlay components are covered for 90 days; batteries and incandescent lamps are not covered.

This warranty extends to products purchased directly from CRESTRON or an authorized CRESTRON dealer. Purchasers should inquire of the dealer regarding the nature and extent of the dealer's warranty, if any.

CRESTRON shall not be liable to honor the terms of this warranty if the product has been used in any application other than that for which it was intended or if it has been subjected to misuse, accidental damage, modification or improper installation procedures. Furthermore, this warranty does not cover any product that has had the serial number altered, defaced or removed.

This warranty shall be the sole and exclusive remedy to the original purchaser. In no event shall CRESTRON be liable for incidental or consequential damages of any kind (property or economic damages inclusive) arising from the sale or use of this equipment. CRESTRON is not liable for any claim made by a third party or made by the purchaser for a third party.

CRESTRON shall, at its option, repair or replace any product found defective, without charge for parts or labor. Repaired or replaced equipment and parts supplied under this warranty shall be covered only by the unexpired portion of the warranty.

Except as expressly set forth in this warranty, CRESTRON makes no other warranties, expressed or implied, nor authorizes any other party to offer any warranty, including any implied warranties of merchantability or fitness for a particular purpose. Any implied warranties that may be imposed by law are limited to the terms of this limited warranty. This warranty statement supersedes all previous warranties.

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