



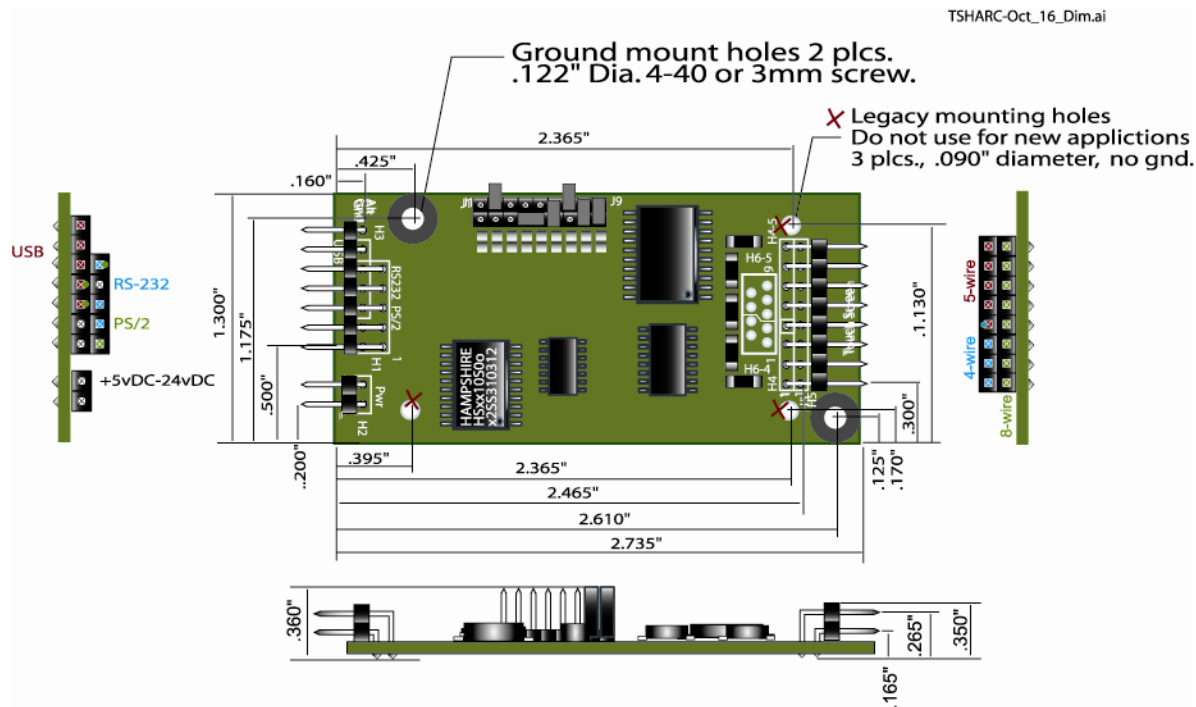
# Setup and Users Manual

## TSHARC "Octopus" RS-232, PS/2, USB Touch Screen Controller

Version 1.6

### TSHARC "Octopus" Mechanical Specification

Note: Use jumper settings and connection diagrams for identifying correct board configuration for your application. Do not use the "Legacy" mounting holes for new applications. These holes have been added to provide for backward compatibility to older revision boards. They may not be available on newer revision boards.



**NOTE!!** The board revision and firmware release can be found directly on your TSHARC touch screen controller board. Please contact Hampshire Company if you have any questions regarding your hardware revision. A lower cost "USB only" version of the Octopus board is also available: TSHARC-xx Octopus USB part number: HUxx-00000o. Where: xx = 10 for 10-bit and 12 for 12 bit.

### Warning:

Although Hampshire Company has taken steps to protect your touch screen controller from transient voltage, it is important to verify that all connections to the controller are correct and take adequate static precautions when connecting the TSHARC controller in your application. **Failure to follow this procedure may result in damage to your controller and/or communication port.**

# Company and General Information

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## **World Wide Web Address:**

[www.hampshirecompany.com](http://www.hampshirecompany.com)

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## **User Information:**

Those responsible for the application and use of Hampshire Company, Inc. products and documentation are assumed to have taken all necessary steps to insure that the application of Hampshire products meet safety and performance requirements including any laws, regulations, codes and standards associated with user application.

## **Edition Information:**

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# TSHARC "Octopus" part number information P/N: **HS12-00000o-xx**

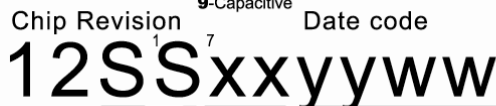
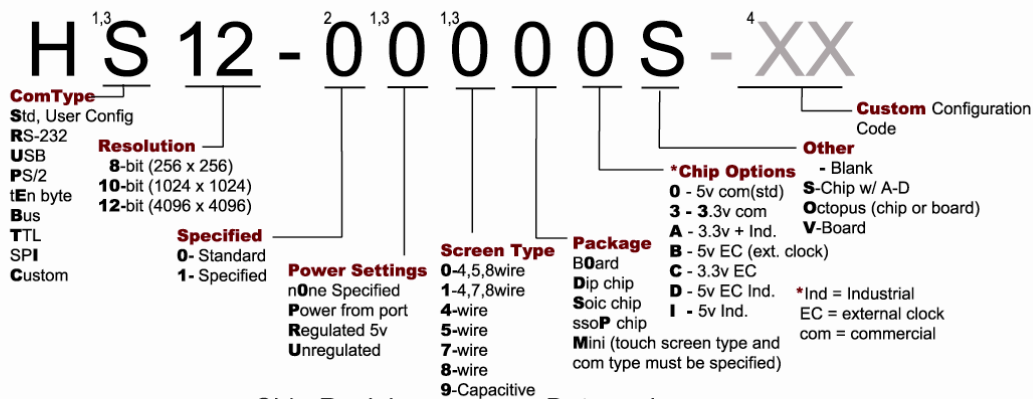
Where: xx = connector configuration code for custom header configurations only.

Part\_Numbers040415.pdf

## Hampshire Part Number Identification Guide

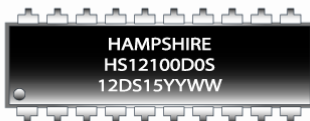
All specified ("1" and "M" orders are non-cancelable / non-returnable

### TSHARC Part Number



### 5 Chip Identification

DIP



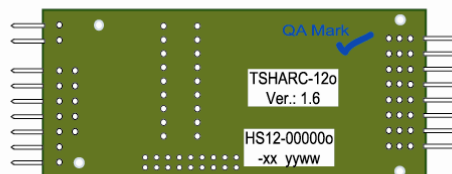
SOIC



SSOP



### 6 Board Identification



Notes:

- Specify communication for TSHARC-12M. These options are user configurable for TSHARC "Octopus" boards, "V" boards and Chips. Specifying other than the standard field code indicates that you would like the board or chip pre-configured or customized and may increase the cost or limit its functionality. Standard Octopus and "V" board configuration: RS-232, Un-Regulated power (7.5vDC - 24vDC), 4-wire (HSxx-00000x-xx)
- Place a "1" in this field if you are ordering TSHARC chips, "M" boards, a custom header configuration or firmware revision. TSHARC controller boards ordered without a firmware specification are considered standard and will be shipped with the current standard firmware revision. If you require a specific firmware please signify this by placing the number "1" in the "Standard / Specific" field location of the TSHARC part number and include the firmware revision on your purchase order. All specified ("1" and "M" orders are non-cancelable / non-returnable.
- For all TSHARC-12M boards:  
 Specify RS-232 or PS/2 communication.  
 Specify touch screen type.  
 Enter "0" in the power specification field: 5vDC
- Custom headers may be specified. To order a controller with a specified .100 center connector configuration place the number "1" in the "Standard / Specific" field of the TSHARC part number and include the appropriate header configuration "dash number". The appropriate dash number may be obtained by contacting Hampshire Company.
- TSHARC chip identification is located on the top of the TSHARC micro-controller. This identification may be in the form of a laser mark or Kapton label. Due to space constraints, SSOP chips have an abbreviated identification which includes the chip revision and date code. Note: On some label options "HAMPSHIRE" may not appear on chip.
- TSHARC board Identification marks are located on the bottom of each controller board. This identification includes: model, version, part number (dash number ID only if assigned by Hampshire) and date code. Other identification may be present on the board, these marks are for internal uses only.
- The firmware revision must be included on all production orders for TSHARC touch screen controller "Chip" solutions. The latest firmware will be shipped with all prototype orders unless specified. Once you have evaluated and approved a specific chip revision Hampshire will register your approved revision for QA and revision control purposes.

Please contact Hampshire if you need further clarification: 414-873-4675 E-Mail: support@hampshirecompany.com

## **Introduction:**

This manual has been written for users of the Hampshire Company Inc. TSHARC-10 or TSHARC-12 “Octopus” touch screen controller boards, which are used in combination with the Hampshire TSHARC device drivers.

The “Octopus” touch screen controllers and software described within this document are assumed to be used with four, five, seven or eight wire analog resistive touch screen products manufactured by a variety of touch screen manufacturers. Touch screens may vary with regards to light transmission, sensitivity and electrical characteristics. Because touch screen quality varies between touch screen technologies and manufacturers the actual, overall resolution may vary (slightly) between touch screen overlay manufacturers’ products. The Hampshire TSHARC “Octopus” series controller allows for 10 bit (1,024 x 1,024) or 12-bit (4,096 x 4,096) resolution of an analog resistive touch screen. Points in a field are: 10-bit: 1,048,578. 12-bit: 16,556,761.

A great deal of attention has been paid to eliminate potential problems with various touch screen manufacturers. Hampshire Company has tested the TSHARC controllers with the following touch screen overlay manufacturers’ analog resistive touch screens: Bergquist™, EloTouch™, MicroTouch™, Hitachi™, Gunze™, Nissha™, TPI™, Carroll Touch™, 3M, Fujitsu™, GroovyTouch™, Touch International, TouchKO, E-Turbotouch, Cybertouch.

## **Features of Hampshire TSHARC “Octopus” touch screen controller**

### ***Software and Device Drivers:***

All Hampshire touch screen controller products are designed to be used with Hampshire’s own TSHARC™ device drivers which are developed and supported in house by Hampshire Company. Third party drivers are also available from various other sources. We recommend that you utilize an authentic Hampshire driver when ever possible to insure software and hardware compatibility. However, Hampshire will continue support the TSHARC controller function regardless of the driver used.

Drivers are available for DOS, Windows: 9x, NT, 2000, ME, XP, XPpro, CE, Linux, WindRiver and QNX. Custom or private labeled drivers may also be purchased from Hampshire Company. If you require a customized or private labeled driver for your application, please contact Hampshire Company, Inc.

All users manuals and drivers are available at the Hampshire web site: [www.hampshirecompany.com](http://www.hampshirecompany.com)  
Hampshire drivers may not be used with other than an authentic Hampshire touch screen controller product.

### ***Communication Options (Jumper Selectable)***

- RS232 - 9600 baud rate (if needed, contact Hampshire for other baud rates available)
- USB, Universal Serial Bus
- PS/2, Personal System / 2
- EloTouch™ Compatible 10 Byte

### ***Touch Screen Interface:***

- Analog Resistive 4 wire
- Analog Resistive 5 wire
- Analog Resistive 8 wire

### ***Resolution:***

- 12 bit (4,096 x 4,096) 16,556,761 points in the field
- 10 bit (1,096 x 1,096) 1,048,578. points in the field

### ***Transmission Speed***

- ~40 – 100 dynamic points / second

## Static Protection:

400 watts static protection

## Calibration:

Software (driver) calibration for all PC and Mac configurations.  
 Hampshire drivers include proprietary 4 point and 20 point calibration to compensate for non-linear or non-square linearization patterns.  
 3 and 7point standard touch screen calibration algorithms.

## Power Options (Jumper selectable):

Power from port (PS/2 and USB only): 5 Vdc +/- 10%  
 External Regulated power: 5 Vdc +/- 10%  
 External Unregulated power: 7.5 Vdc <25 Vdc  
 Power options are jumper configurable. See "jumper setting" diagrams later in this manual.

## Communication Format

### TSHARC USB Protocol

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	0	0	0	0	0	0	P
2	X7	X6	X5	X4	X3	X2	X1	X0
3	0	0	0	0	X11	X10	X9	X8
4	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
5	0	0	0	0	Y11	Y10	Y9	Y8

### TSHARC RS232 Protocol (Standard)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	1	P	X11	X10	X9	Y11	Y10	Y9
2	0	X8	X7	X6	X5	X4	X3	X2
3	0	Y8	Y7	Y6	Y5	Y4	Y3	Y2
4	0	0	0	0	X1	X0	Y1	Y0

### TSHARC RS232 Protocol (Ten Byte)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	1	0	1	0	1	0	1
2	0	1	0	1	0	1	0	0
3	0	0	0	0	0	PU	PD	0
4	X7	X6	X5	X4	X3	X2	X1	X0
5	0	0	0	0	X11	X10	X9	X8
6	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
7	0	0	0	0	Y11	Y10	Y9	Y8
8	1	1	1	1	1	1	1	1
9	0	0	0	0	0	0	0	0
10	CK7	CK6	CK5	CK4	CK3	CK2	CK1	CK0

### TSHARC PS/2 Protocol

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	1	P	X11	X10	X9	Y11	Y10	Y9
2	0	X8	X7	X6	X5	X4	X3	X2
3	0	Y8	Y7	Y6	Y5	Y4	Y3	Y2
4	0	0	0	0	X1	X0	Y1	Y0

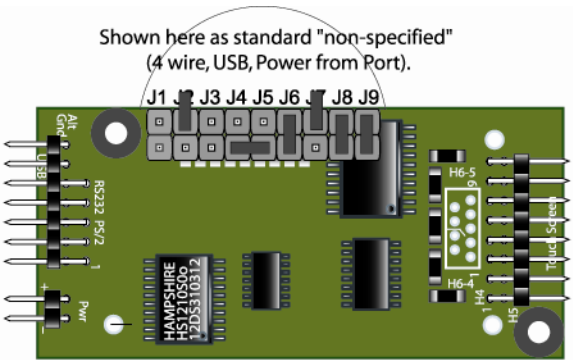
Where:

P - 0 Pen-Up, 1 Pen-Down  
 X11-X0 - 12 bit X position data  
 Y11-Y0 - 12 bit Y position data  
 PU - 0 no Pen-Up, 1 Pen-Up  
 PD - 0 no Pen-Down, 1 Pen-Down  
 CK7-CK0 - AAH + 55H + Sum of Bytes 2 through 9

## TSHARC-XX Octopus Communication Jumper Settings

Jumper settings must be set for communication options as well as power. Use power from port settings for USB and PS/2 applications. INCORRECT JUMPER SETTINGS WILL DAMAGE YOUR TSHARC OCTOPUS BOARD.

Shown here as standard "non-specified" (4 wire, USB, Power from Port).



Touch Screen Type	RS-232	PS/2	USB	ELO™ 10-byte
4-Wire	J1 J2 J3 J4 J5 J6 J7 J8 J9	J1 J2 J3 J4 J5 J6 J7 J8 J9	J1 J2 J3 J4 J5 J6 J7 J8 J9	J1 J2 J3 J4 J5 J6 J7 J8 J9
5-Wire	J1 J2 J3 J4 J5 J6 J7 J8 J9	J1 J2 J3 J4 J5 J6 J7 J8 J9	J1 J2 J3 J4 J5 J6 J7 J8 J9	J1 J2 J3 J4 J5 J6 J7 J8 J9
8-Wire	J1 J2 J3 J4 J5 J6 J7 J8 J9	J1 J2 J3 J4 J5 J6 J7 J8 J9	J1 J2 J3 J4 J5 J6 J7 J8 J9	J1 J2 J3 J4 J5 J6 J7 J8 J9

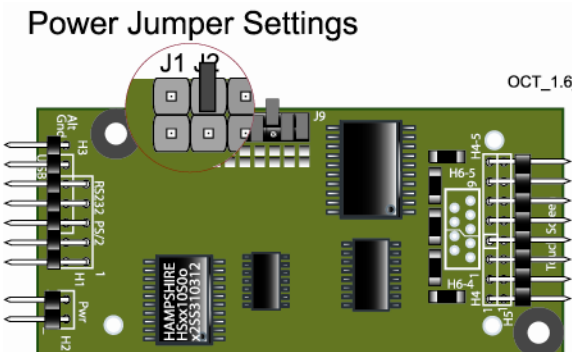
Communication Jumper Settings

OCT\_1.6\_Jump.ai

## TSHARC-XX Octopus Power Jumper Settings

Configure your power jumper for Regulated or un-regulated power. Use power from port settings for USB and PS/2 applications. INCORRECT JUMPER SETTINGS WILL DAMAGE YOUR TSHARC OCTOPUS BOARD.

Power Jumper Settings



Un-reg	Regulated	From Port
7.5 - 25v DC	+5v DC	PS/2 or USB

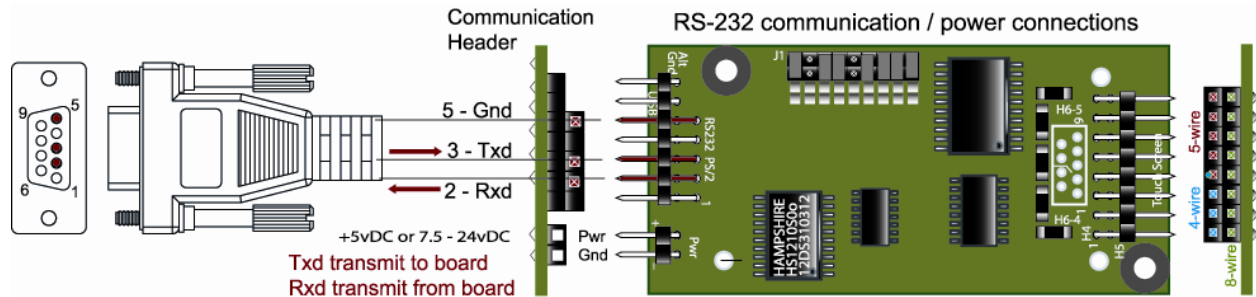
OCT\_1.6\_power.pdf

!! Set communication jumpers before powering on your controller board.

## TSHARC-XX Octopus Communication Connection Diagrams

Attention: Pin 1 identified on the RS-232 and PS/2 connector is identified for IDC cable connections. Pin and socket connectors locate pin 1 differently than an IDC connector. Make sure to check your cable connection to insure that your connections are correct.

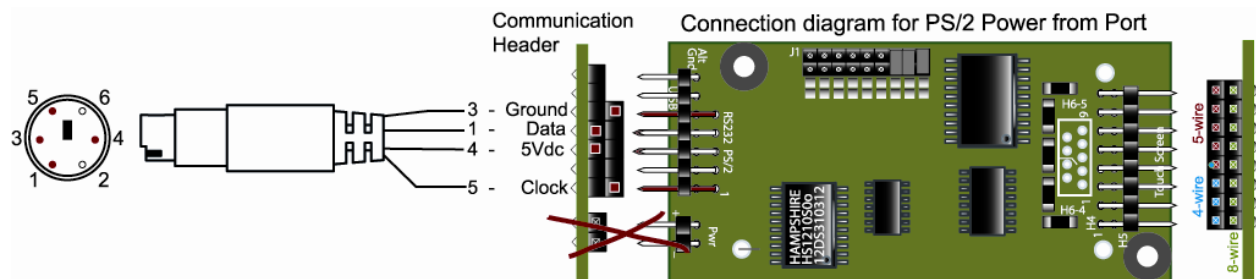
### TSHARC-XX Octopus RS-232 Communication Connection Diagram



Note: A standard IDC RS-232 (DB-9) to 10-position dual row socket jumper cable assembly may be used. Pin out: 1-1, 2-3, 3-5, 4-7, 5-9, 6-2, 7-4, 8-6, 9-8, NC-10

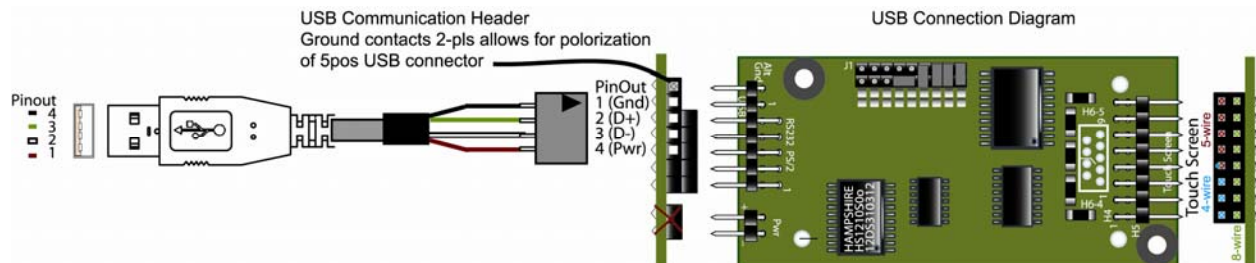
### TSHARC-XX Octopus PS/2 Communication Connection Diagram

Make sure that you have set the jumpers for power from port before connecting to the PS/2 port.



### TSHARC-XX Octopus USB Communication Connection Diagram

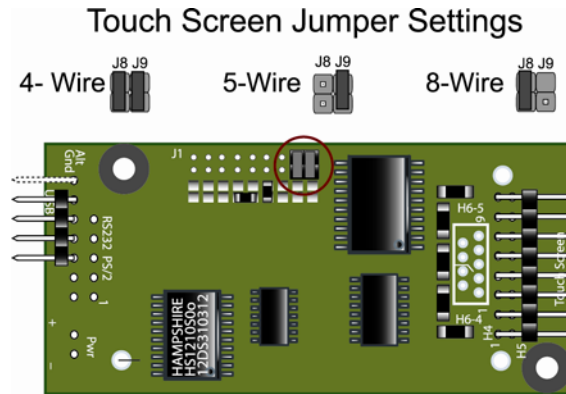
Make sure that you have set the jumpers for power from port before connecting to the USB port.



# TSHARC-XX Octopus *USB Only* Jumper Settings

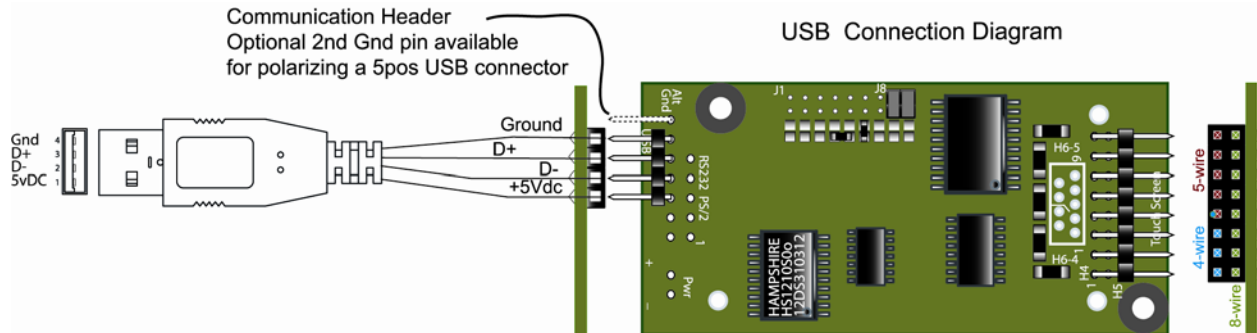
## TSHARC-XX USB only Touch Screen Jumper Settings.

For the TSHARC-XX Octopus USB only controller board, it is not necessary to jumper communication or power settings. Set the jumpers for touch screen type only.



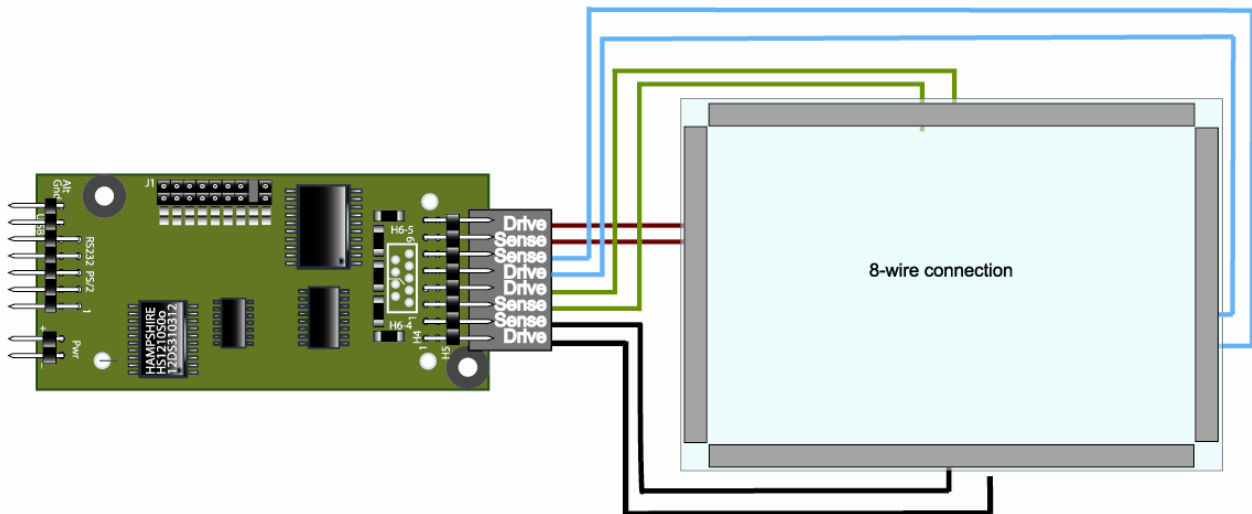
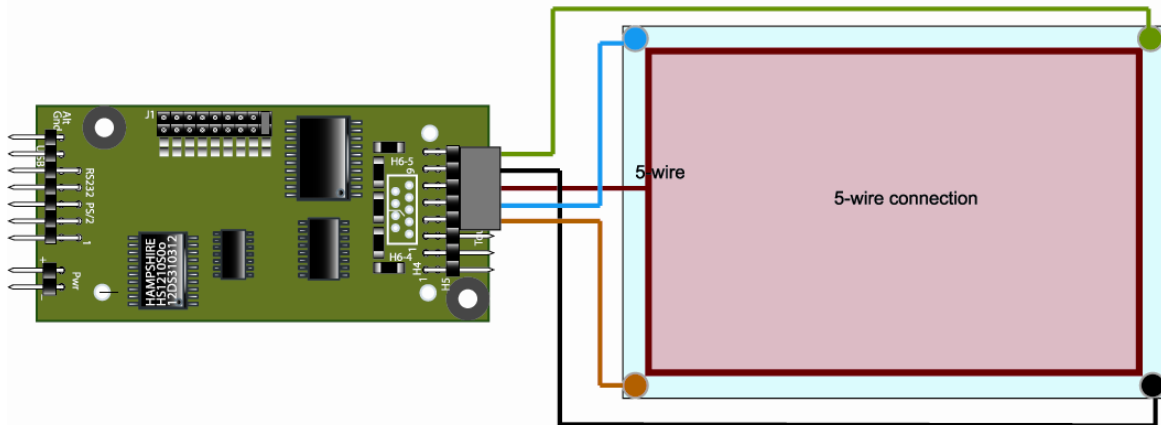
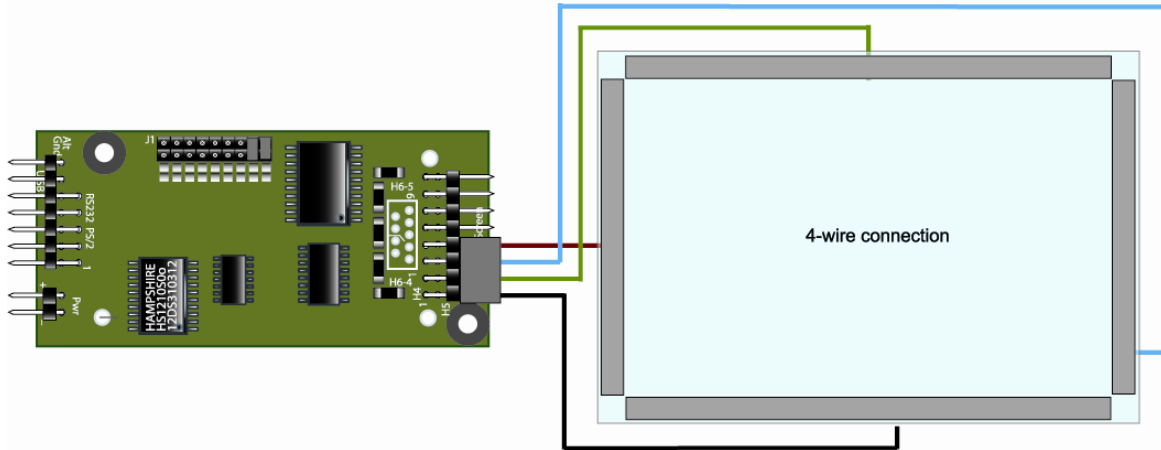
## TSHARC-XX Octopus USB only Communication Connection Diagram

The TSHARC-XX Octopus USB only controller board has a connector for the USB connection only. If you have a full utility Octopus controller, please reference the previous connection diagrams.



# TSHARC-XX Octopus and Octopus USB only Touch Screen Connection Diagrams

OCT1.6\_TSConnect



## Connection Hardware and Cable Assemblies

### Communication Cables

Description	Part Number	Connection
6' RS-232 cable.	C72-100S2F-09XDXF	H1 header to female DB-9
6' PS/2 cable	C72-100S2F-XXXPXM	H1 header to PS/2 plug
6' USB cable	C72-040S1F-04XAXM	H3 header to USB type A plug
6' RS-232 jumper cable	C72-09XDXM-09XDXF	Female DB-9 to Male DB-9 cable

### Touch Screen Cables

Description	Part Number	Connection
12" touch screen cable.	C12-040S1F-040S1M-xx	Direct connect to H4-4
12" touch screen cable.	C12-050S1F-050S1M-xx	Direct connect to H4-5
12" touch screen cable.	C12-080S1F-080S1M-xx	Direct connect to H5

### Power Cables

Description	Part Number	Connection
12" power cable (wire lead)	C12-020S1F-xxxxxx	H2 to wire lead.
12" power cable	C12-020S1F-020S1F	H2 to 2 pos. .100 socket

### Mounting Hardware

Do to the wide variety of mounting options available for the TSHARC. Please visit the RAF web site to review the available mounting hardware.

[http://www.rafhdwe.com/RAF\\_site/OnlineCatalog/EHCoverFrame.html](http://www.rafhdwe.com/RAF_site/OnlineCatalog/EHCoverFrame.html)

### On Board Connector Specs

Standard on board connectors:

.100" .024" sq. post, with mating length of .230", header reference part numbers and manufacturer.

Sullins web site: <http://www.edgecards.com/index.php>

Location	Mfg	Part number	Brief description
H4, H4-5, H5,	Sullins	PTC08DBAN	.100" 2x8pos Rt Dual Row Hdr
H1	Sullins	PTC05DBAN	.100" 2x5pos Rt Dual Row Hdr
H2, H3	Sullins	PTC02SBAN	.100" 2pos Rt Header

\*Other .100", .024" square post headers may be specified. Contact Hampshire for details.

### Mating wire mount connectors (cable connections).

Any industry standard, single and/or dual row, .100" socket may be used to connect to Hampshire's controller board's .100" .024" sq post headers. Minimum mating length is .230" socket depth.