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.
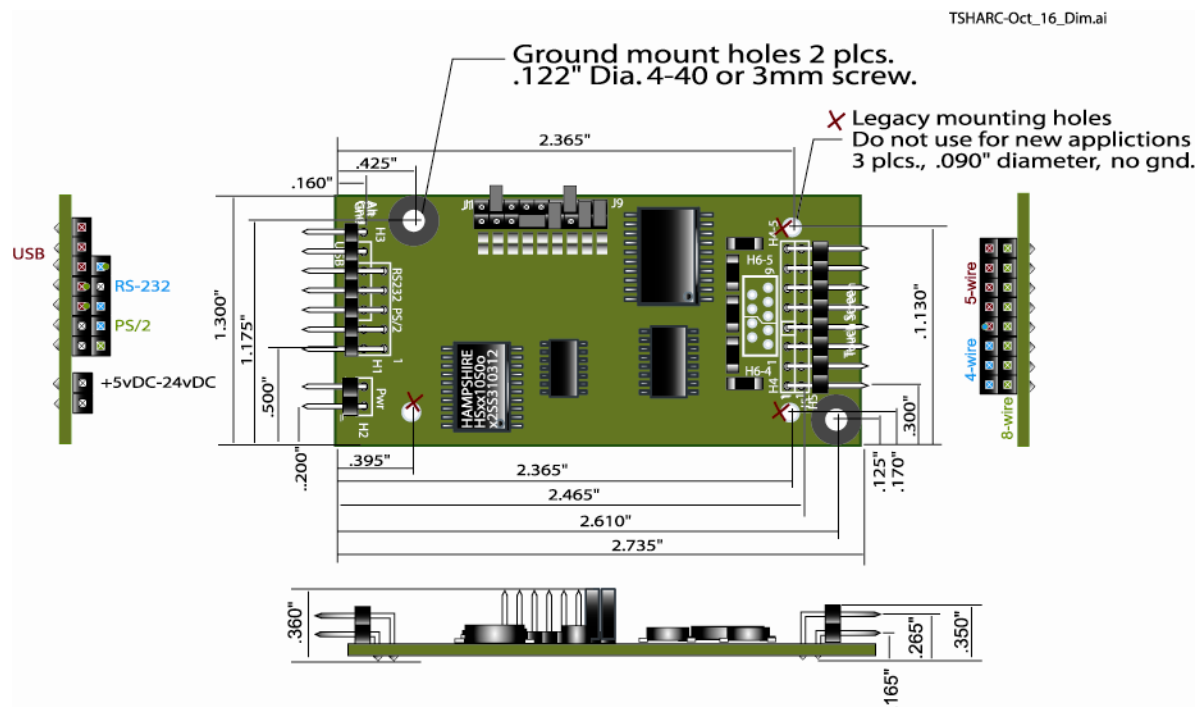
NOTE!! The board revision and firmware release can be found directly on your TSHARC touch screen controller board. Please contact Hampshire Company if you have any questions regarding your hardware revision. A lower cost "USB only" version of the Octopus board is also available: TSHARC-xx Octopus USB 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

Mailing address: ## *World Wide Web Address:*

Hampshire Company, Inc.
3227 North 31st Street
Milwaukee, WI 53216
Phone: 414-873-4675
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Copyright Information:

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.

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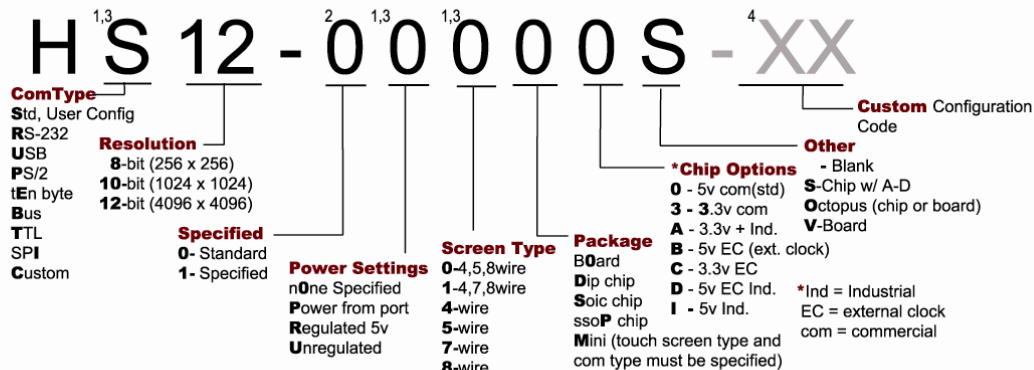# TSHARC "Octopus" part number information P/N: HS12-00000o-xx

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

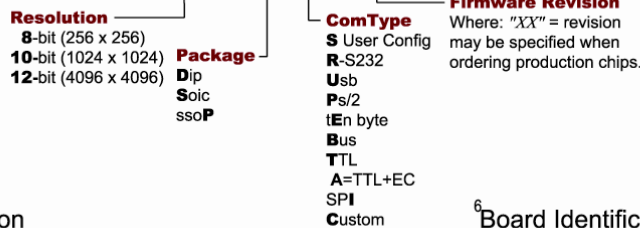Part_Numbers040415.pdf

Hampshire Part Number Identification Guide

All specified ("1") and "M" orders are non-cancelable / non-returnable
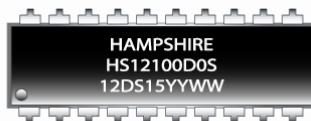
TSHARC Part Number

H S 12 - 0 0 0 0 0 S - XX

ComType
Std, User Config
RS-232
USB
PS/2
tEn byte
Bus
TTL
SPI
Custom

Resolution
8-bit (256 x 256)
10-bit (1024 x 1024)
12-bit (4096 x 4096)

Specified
0- Standard
1- Specified

Power Settings
nOne Specified
Power from port
Regulated 5v
Unregulated

Screen Type
0-4,5,8wire
1-4,7,8wire
4-wire
5-wire
7-wire
8-wire
9-Capacitive

Package
BOard
Dip chip
Soic chip
ssoP chip
Mini (touch screen type and com type must be specified)

*Chip Options
0 - 5v com(std)
3 - 3.3v com
A - 3.3v + Ind.
B - 5v EC (ext. clock)
C - 3.3v EC
D - 5v EC Ind.
I - 5v Ind.

Other
- - Blank
S-Chip w/ A-D
Octopus (chip or board)
V-Board

*Ind = Industrial
EC = external clock
com = commercial

Custom Configuration Code

Chip Revision   Date code

12SSxxyyww

Resolution
8-bit (256 x 256)
10-bit (1024 x 1024)
12-bit (4096 x 4096)

Package
Dip
Soic
ssoP

ComType
S User Config
R-S232
Usb
Ps/2
tEn byte
Bus
TTL
 A=TTL+EC
SPI
Custom

Firmware Revision
Where: "XX" = revision may be specified when ordering production chips.

[5]Chip Identification

DIP
HAMPSHIRE
HS12100DOS
12DS15YYWW

SOIC
HAMPSHIRE
HS12100S0S
12SS15YYWW

SSOP
2PS15
YYWW

[6]Board Identification

QA Mark
TSHARC-12o
Ver.: 1.6
HS12-00000o
-xx yyww
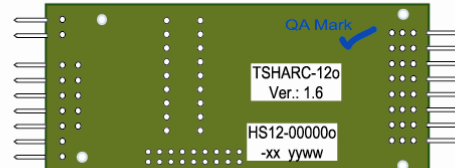
Notes:

1 - 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)

2 - 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.

3 - For all TSHARC-12M boards:
Specify RS-232 or PS/2 communication.
Specify touch screen type.
Enter "0" in the power specification field: 5vDC

4 - 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.

5 - 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.

6 - 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.

7 - 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™, Hitatchi™, 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 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.
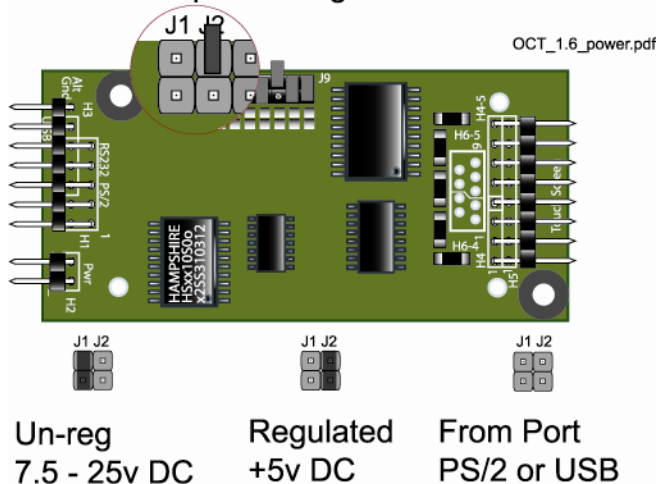

Communication Jumper Settings
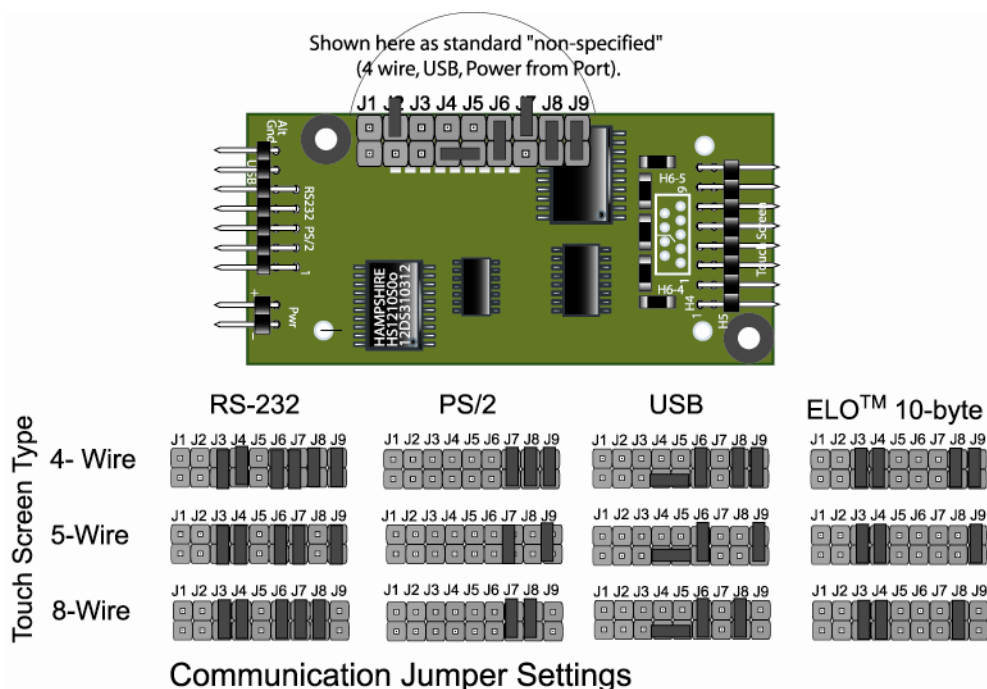
OCT_1.6_Jump.ai

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

OCT_1.6_power.pdf

Un-reg
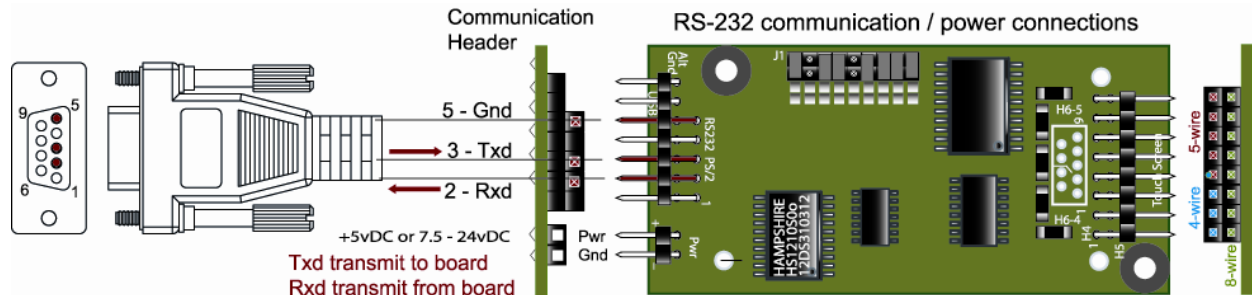7.5 - 25v DC

Regulated
+5v DC

From Port
PS/2 or USB

!! 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

Communication Header

RS-232 communication / power connections

5 - Gnd
3 - Txd
2 - Rxd

+5vDC or 7.5 - 24vDC

Txd transmit to board
Rxd transmit from board

Pwr
Gnd

Important! Make sure the power jumpers are set properly for 5vDC regulated or 7.5 - 24vDC un-regulated power before you supply power to board.

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

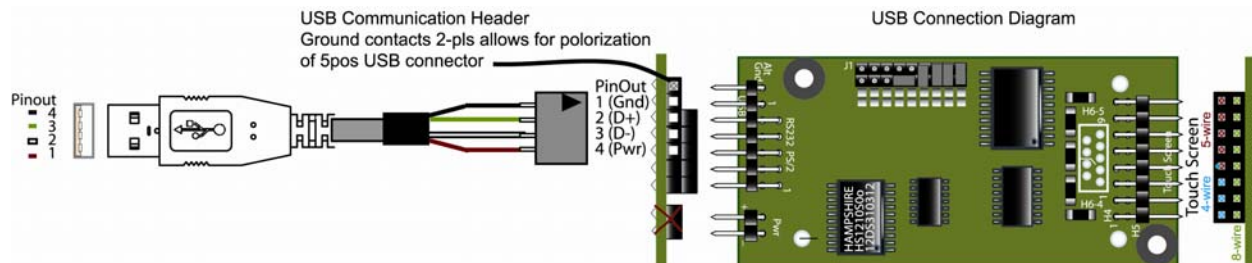## *TSHARC-XX Octopus PS/2 Communication Connection Diagram*

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

Communication Header

Connection diagram for PS/2 Power from Port

3 - Ground
1 - Data
4 - 5Vdc
5 - Clock
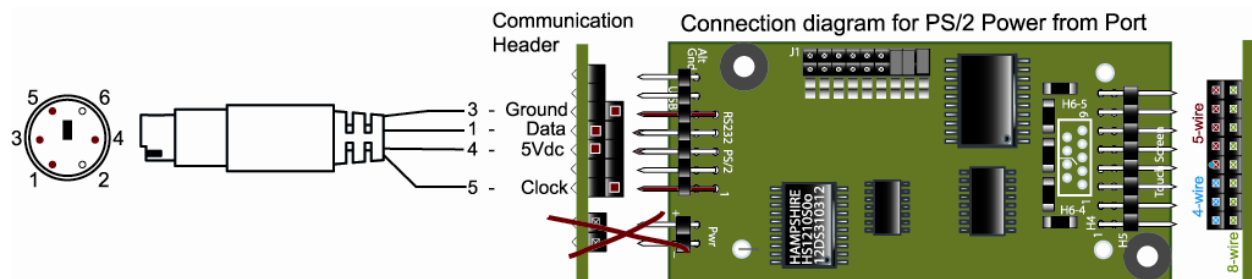
Important: Make sure that the power jumpers are set for Power from port.
!!DO NOT CONNECT POWER TO THE POWER HEADERS!!

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.
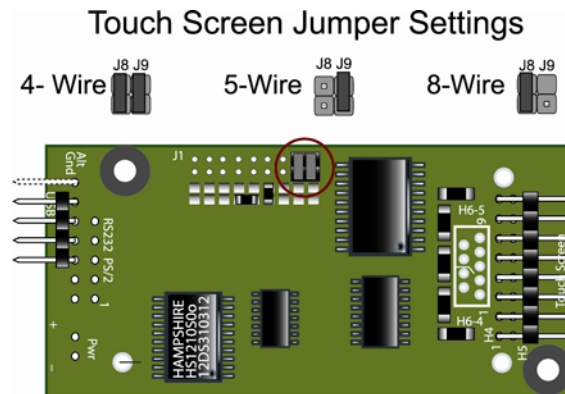

USB Communication Header
Ground contacts 2-pls allows for polorization of 5pos USB connector

USB Connection Diagram

Pinout

PinOut
1 (Gnd)
2 (D+)
3 (D-)
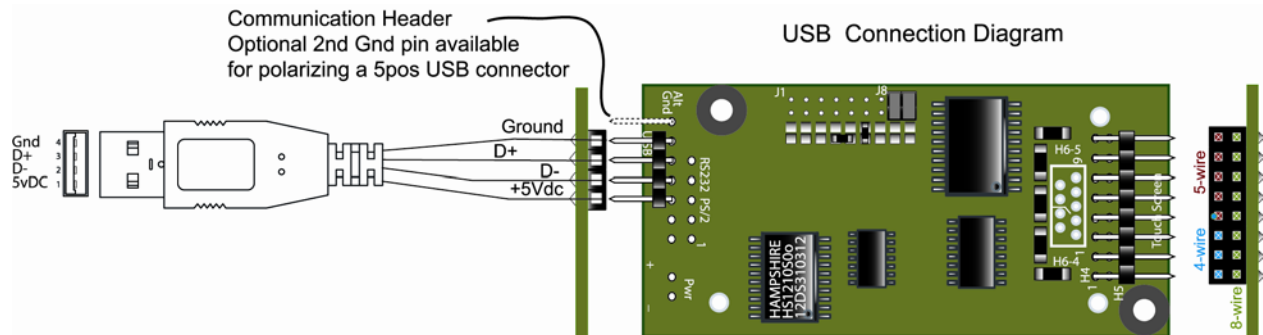4 (Pwr)

TSHARC-XX Octopus *USB Only* Jumper Settings

TSHARC-XX <u>USB only</u> 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 <u>USB only</u> 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.

OCT1.6_TSConnect

4-wire connection

5-wire

5-wire connection

Drive
Sense
Sense
Drive
Drive
Sense
Sense
Drive

8-wire connection
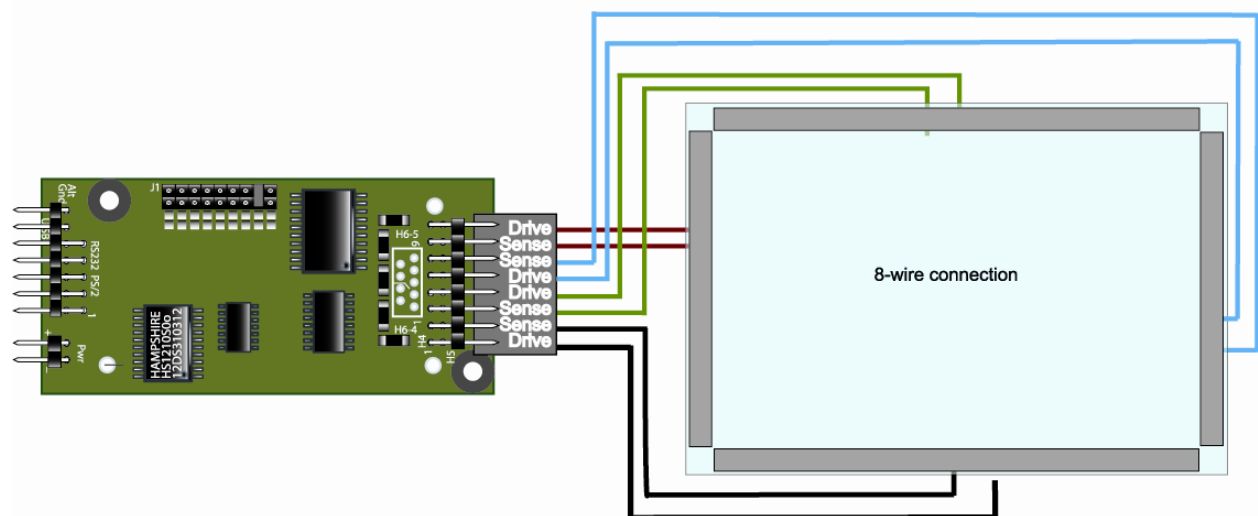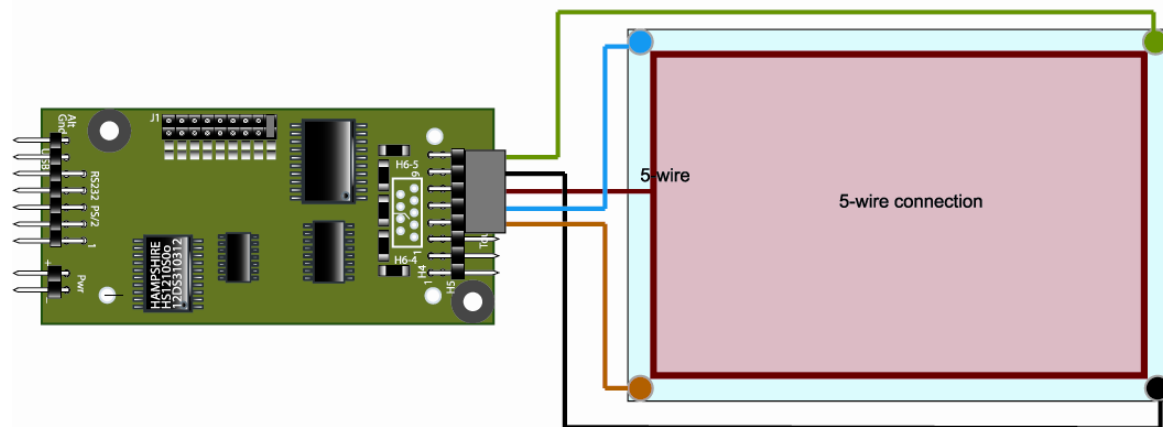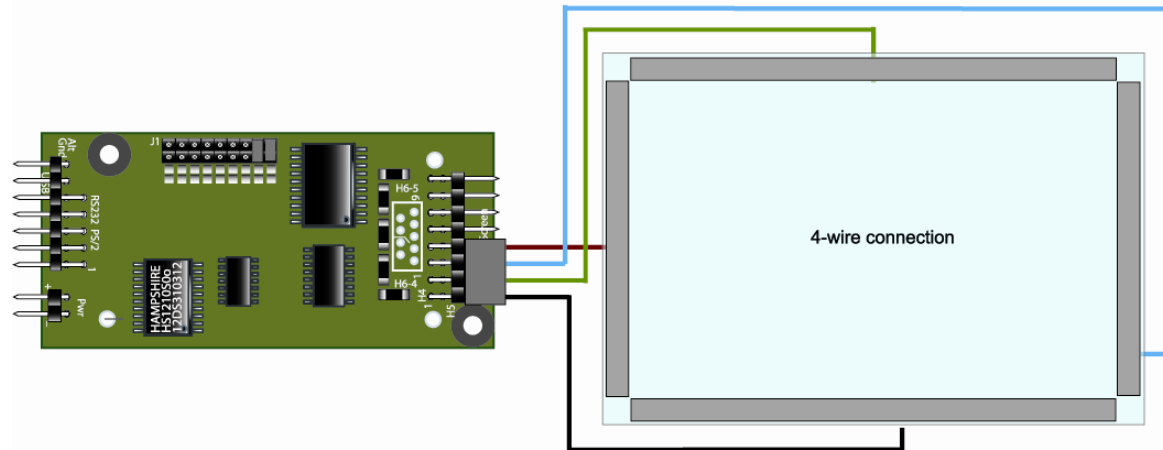
Connection Hardware and Cable Assemblies

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

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.