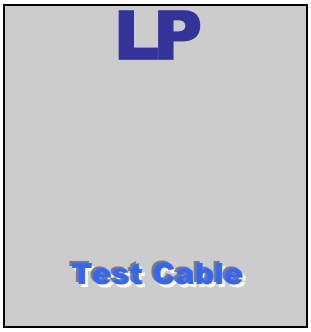

SPRINGBOK DIGITRONICS

Innovative Hardware and Software for the modern world

Assembly Instructions

INNOVATIVE HARDWARE AND SOFTWARE

Product Assembly Series

Standard Document Format

Through out this document you may find various help icons or hyperlinks. By clicking on the icon or hyperlink you will be linked to information about each category of information. Valuable information may include links to datasheets, manuals and other reference material. Contact information is assumed to be names and addresses of people and companies. Internet links are hyperlinks to reference documents available on the Internet or to the CDROM; quite often they are original sources for public information like data sheets. Always consult these links for the latest information from other companies. Application notes are written by Springbok Digitronics in order to ease the understanding and use of its products and to highlight concepts and background information needed for the best use of its products.

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Chapter

1

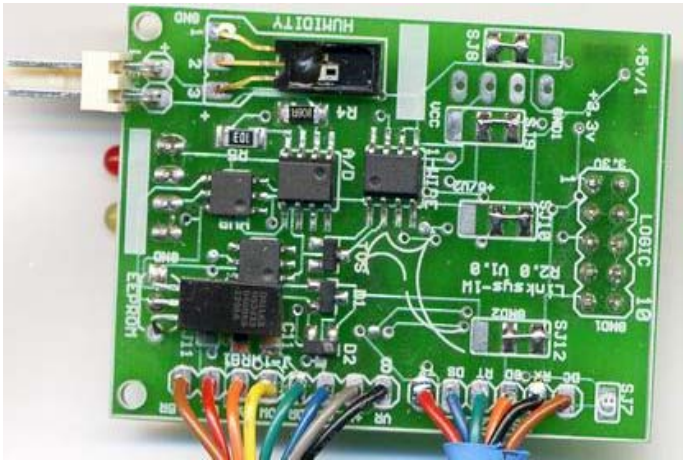
Overview

A review of the environment…

LP-LINKSYS-1W Test Cable

When building the LP-LINKSYS-1W adapter it is useful to be able to test the adapter both during construction and before it is installed into your LINKSYS unit. Indeed, you may also wish to use the adapter as a standalone 1-Wire bus master adapter that is never installed inside an actual Linksys wireless unit. By building a special test cable it becomes easy to do any of the above functions. This document shows you what this test cable is, and how to build it.

Before we begin lets look at the LP-LINKSYS-1W adapter so we know what we are building the cable for. In the image to the right you can see a completed LP-LINKSYS-1W with cables, ready to be tested. (Later revisions of the board may appear differently than this image, but they will all use similar parts)

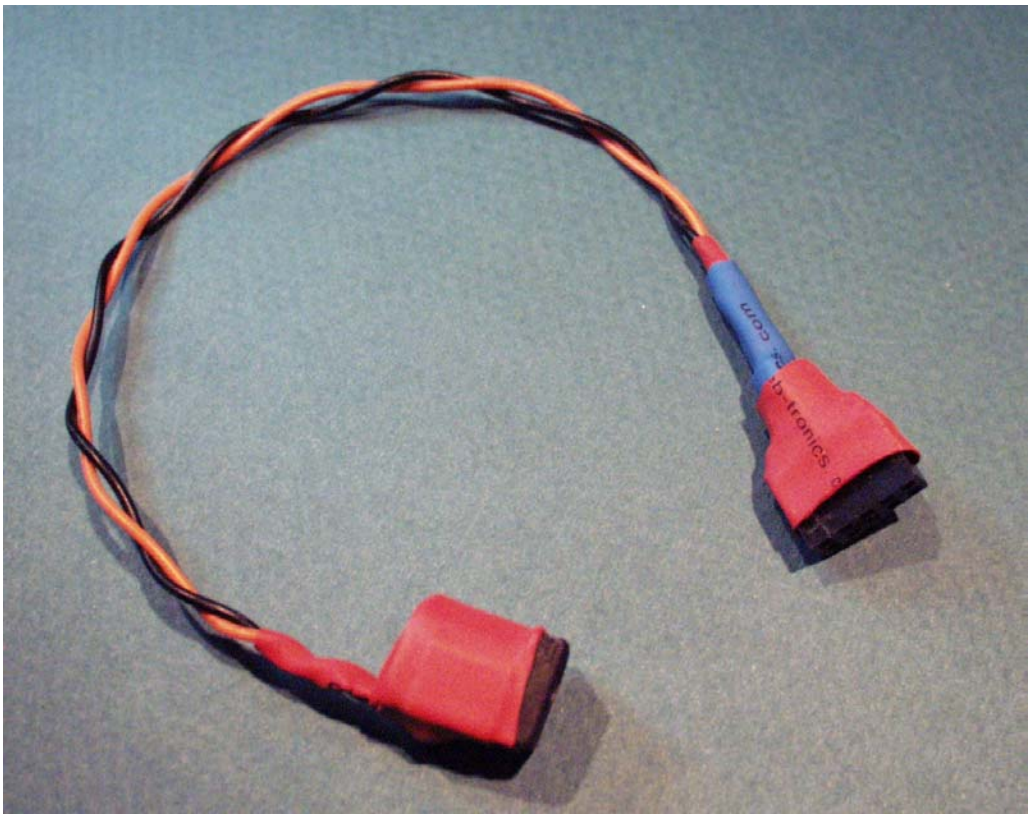


The adapter was designed to plug into a LINKSY wireless unit through the 2x5 male headers (as seen in the bottom of the image of the prototype unit on the previous page). Our test cable is designed to plug into this header.

This header supplies power to the adapter (3.3 Volts) and also feeds two serial logic levels ports to the board (also 3.3 volts) to control the 1-Wire bus master and RS232-F serial ports on the adapter.

By building an adapter that supplies power to the board and also cross connecting the logic lines of the ports we are able to use the RS232-F port of the adapter as an input into the 1-Wire bus master. This lets us test all the components of the adapter and also use it as a standalone 1-Wire bus master.

The adapter we will build will look something like the image below. It has on one end a Female pin header to match the male header of the adapter and a 2.1mm power jack on the other so we can supply power to the board.



Example completed LP-LINKSYS-1W test cable

Chapter

2

The Assembly Environment

General warning!

The LP-LINKSYS-1W test cable is built using off the shelf components and is within the reach of anyone familiar with basic soldering skills. When in doubt of your abilities we suggest you purchase an assembled unit instead. Kit versions are sold as "AS-IS" groups of parts and carry no warranty due to the fact that we do not control the environment or techniques used in their assembly. We cannot help you with assembly problems or fix partially assembled units. We can only guarantee functional parts as they leave our factory.

While all this may seem like a lot of warnings, it is meant to let you know that kit building is not for everyone. It can be done though by those willing to invest in learning the proper techniques and have practiced basic soldering skills. That said, lets look at some of the suggested tools you will need for a good working environment. Not all our kits need all these tools, but it is our recommended general list.

On Tools and Procedures

Suggested Assembly Tools

- A Non-conductive assembly surface
- Grounding Strap
- Non-conductive tweezers (ESD safe), and placement tools
- A strong magnifier (x10 or better) can make dealing with smt components much easier
- Good strong even lighting of the workspace
- A Good temperature controlled soldering iron
- Solder and a Flux Pen
- Solder Wick (for removing excess solder)
- General PCB cleaner (99% Isopropyl Alcohol is a good choice)
- Flux Remover (For general flux removal and final board cleaning)
- Optional Conformal Coating Spray

For the connivance of the infrequent builder we have pulled together a couple pictures of some low cost versions of these components. They are easily available at most electronic specialty stores. You can also purchase them from http://www.mouser.com/ and Circuit specialist

Static Wrist Strap

An example of a very low cost Light/Magnifier system

An example of low cost head magnifier

Typical parts placement tools

Flux Remover to remove solder flux and 99.9% Isopropyl Alcohol for general PCB cleaning

Conformal Coating to protect the finished board

A low cost temperature controlled Soldering Station

Example of a low cost (<$90) Hot air gun for smt work. Great for heat shrink work also.

An example low cost hot air re-work station ($140+)

Chapter

3

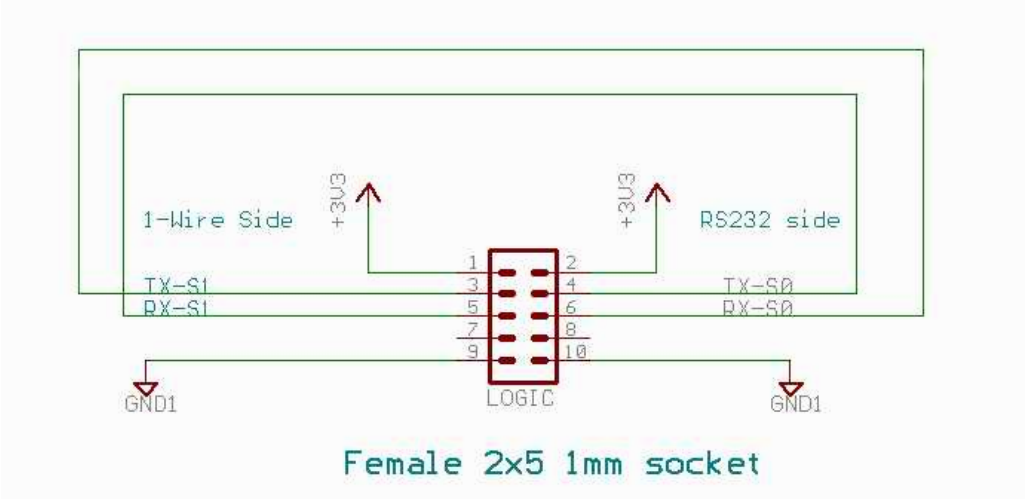
Assembly Overview

What we will be building - Schematics

The pin header connection

We suggest that before beginning that you read through this instruction manual before beginning. That way you will have a feel for the flow of assembly and can make any adjustments that you may wish to in your particular assembly. Work slowly and carefully.

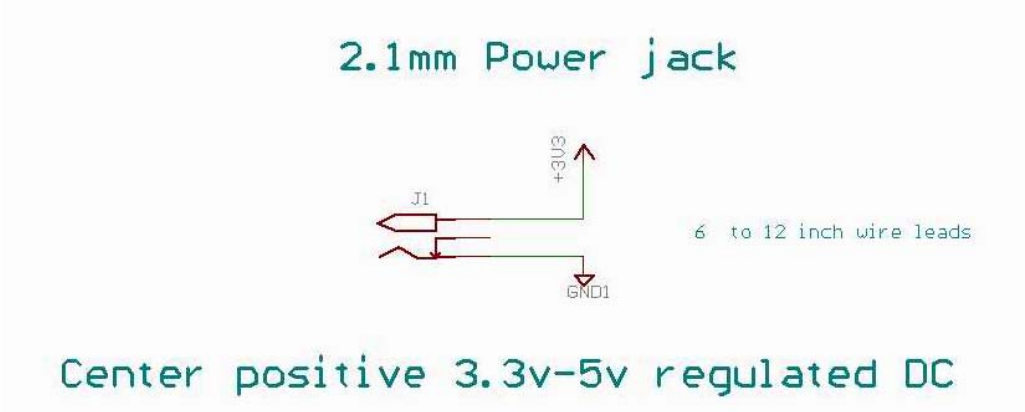
Lets see how this is done by first looking first at the schematic for the test cable we are going to build. (You can see the full schematic as an image by clicking here).



The xx-S1 side is the 1-Wire logic signals and the xx-S0 side is the serial logic levels for the RS232-F port. As you can see we cross connect these so the RS232-F ports transmit line (TX-S0) is connected to the receiver side (RX-S1) of the 1-Wire port, and the receiver line (RX-S0) of the RS232-F is connected to the output (TX-S1) of the 1-Wire port.

The Power supply connection

In addition we need to also supply power to the +3V3 lines and supply the ground return line at the GND1 pins. Typically we like to use a 2.1mm power jack to do this as it allows a wide range of easily available DC regulated power wall wart supplies to be used to supply power. Its schematic might look like this.

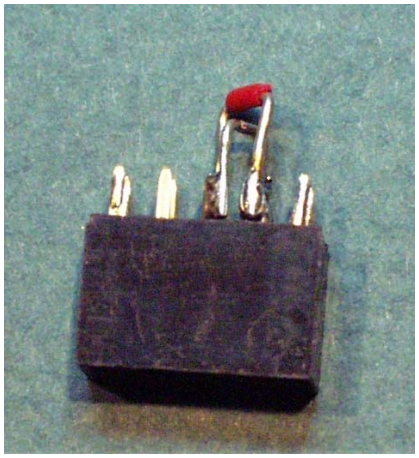


While available from us on special order it is easy to make your own custom test cable. All you need is a 10 pin female socket (Available from Digikey as S4305-ND for .69 cents, a 2.1mm center positive power jack, two wire jumpers and a two length of stranded wire for the power connection to the power jack and some heat shrink).

Assembly Part 1

Beginning with the header

The key component we will use to assembly our cable is a female 10 position (2x5) header .1" centers to plug into the adapters male pins. We used the PPPC052LFBN which is available from Digi-Key for about $0.69 as part number S4305-ND. You can see the datasheet for this connector here: 2x5 Connectors\68683.pdf.



☐ **1.) Attach the cross over jumpers**

Using two jumper wires (at least one insulated is preferable) make the cross connections between pins 3-6 and 4-5 on the header. One wire connects pins 3-6 and the other pins 4-5. We find it is easier if you pre-tin all the pins on the header you are going to use. The use of a small vise to hold the connector and clamping tweezers to hold the wires and act as a heat sink makes this easier when you position the wire leads for soldering. It should look something like the image on the right when you are finished.

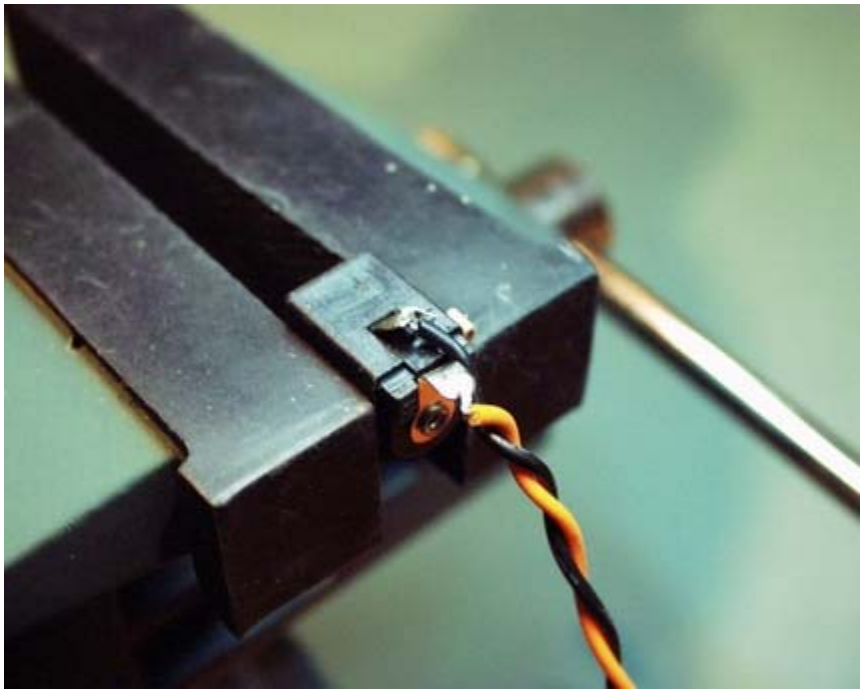
☐ **2.) Cover the cross over wires with heat shrink**

We like to cover these connections with a small piece of heat shrink to start to build mass for the final cable connection and to help keep these logic lines from accidentally touching the power lines. At this time we can put this assemble aside for a moment and begin work on the power jack for the cable.

Preparing the power jack

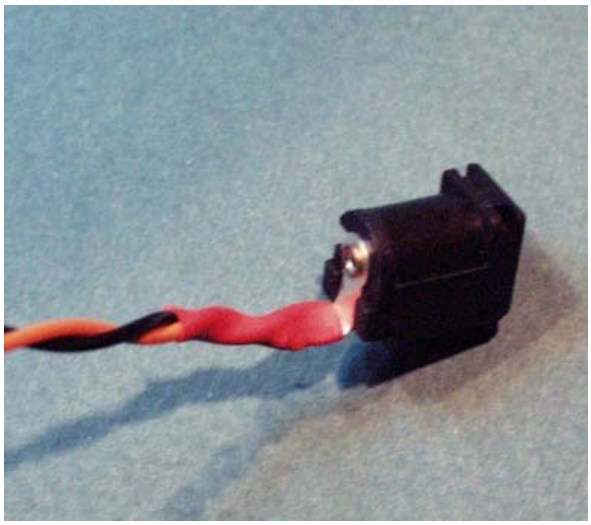
3). Attach the two power lines to the DC Jack

We will start by taking two twisted pair stranded wires (you can twist them yourself if needed) cut to the appropriate length. We find 6 to 8 inches (around 150-200mm) to be a handy size. Select wires colors appropriate for you standards (such as RED and Black). In some of the following images the RED wire appears yellow in the image due to lighting but it is actually Red. The Red wire will be the positive voltage and the Black wire, the negative ground return.



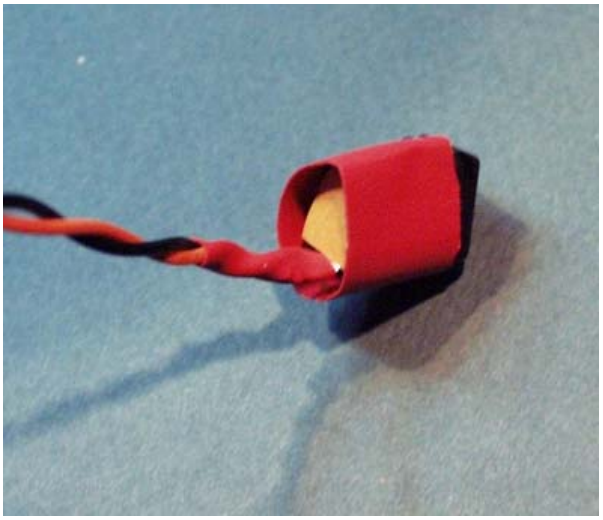
Note how we carefully bent the jacks solder connections so they do not stick up. This is done because we don't want anything sticking up that can cut through the heat shrink covering we will apply later. So we bent the unused side connection flat against the jack and bent the center pin connector at 90 degrees (Attached to yellow wire in above picture). And the laid down the ground connection (The black wire) enough so we could still solder to it.

Solder the positive red wire to the center pin connector of the jack and the black wire to the negative connection.



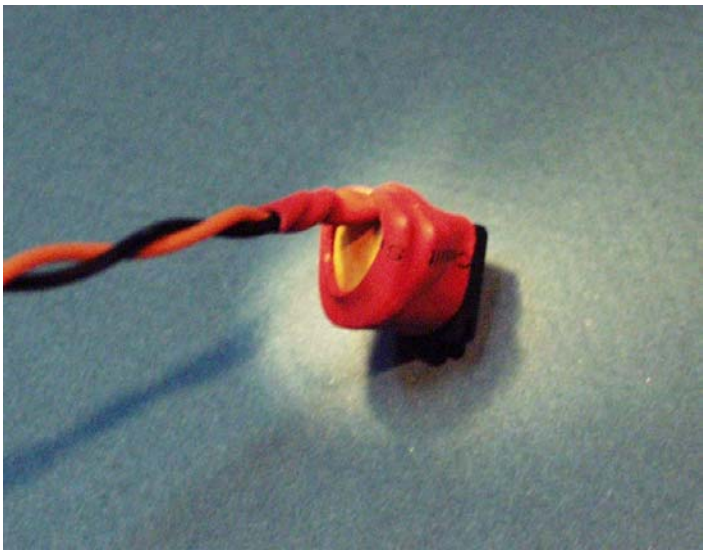
☐ **4). Use heat shrink to cover the jacks terminals**

Use as small amount of heat shrink to cover the exposed center pin terminal.



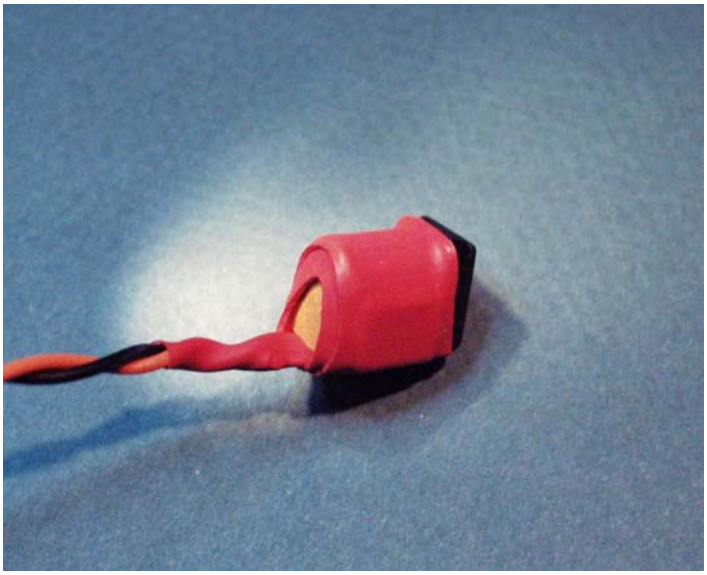
☐ **5). Prepare to cover assembly with heatshrink.**

We like to add some additional protection by cutting a small piece of stiff paper into the shape of the back of the connector. And fitting it against the back of the connector when we heat shrink the 1st outer layer on (red heatshrink).



☐ **6). Check for problems**

After shrinking the heatshrink, the shoulders will wrap around the paper holding it firmly in place. Your assembly should look some like this now. Carefully check that you have created a good seal and apply extra heat as needed.



☐ **6). Add a 2nd layer of outer heat shrink**

Add a 2nd layer of heat shrink around the body of the connector to build up the insulation and provide additional protection. If the heat shrink is carefully cut to length before installing and placed you will end up with a nice neat final package. You are now done with the jack portion of the assembly.

Chapter

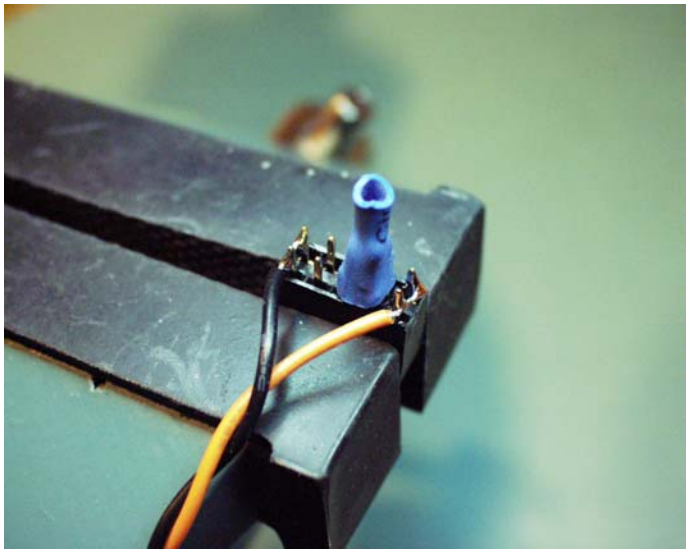
4

LP-THS Assembly Instructions

Assembly Part 2

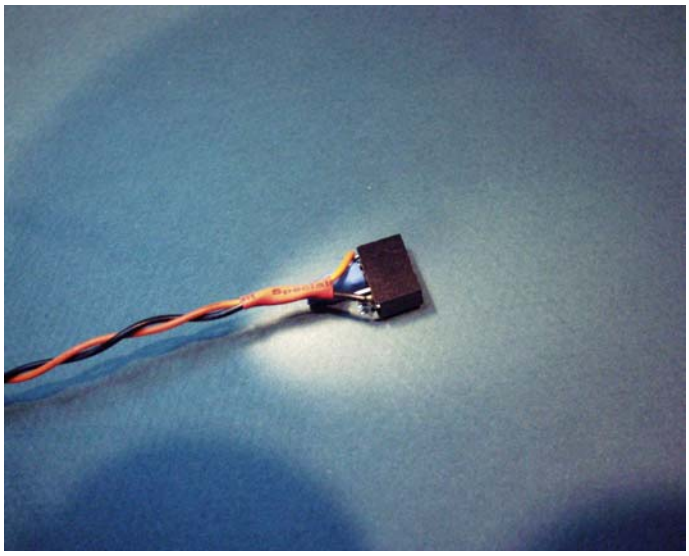
General Instructions – Prep

At this time we are ready to connect the jack assembly to the header. Before we begin it is ***very important*** that you slip onto the wires the 4 pieces of heat shrink tubing that will be use to hold the wires and build up the final diameter. Slide all the pieces onto the jack side wire in reverse order (largest to smallest). Once you have done this you are ready to continue. Be sure to do this before you proceed.



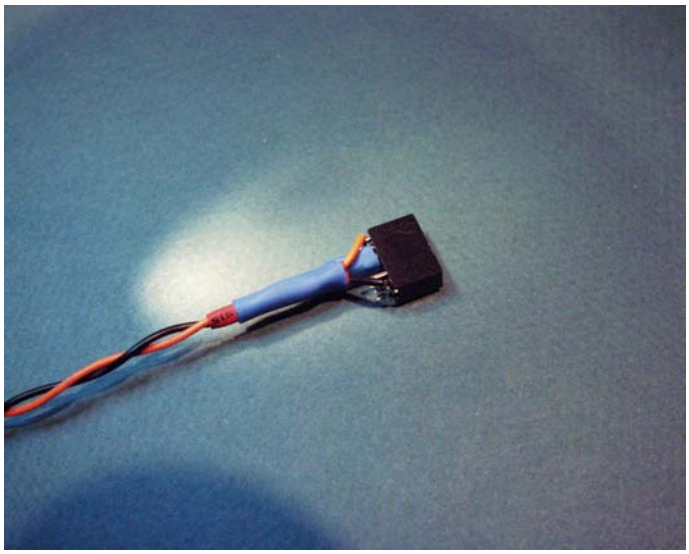
☐ **7.) Attach the jack assembly wires to the connector**

Carefully attach the jack wires to the connector assembly. Note that the red positive wire (yellow in picture) is wired to the near side of the jumpers installed earlier. The connection should go across both pins of the connector. And the ground side (black wire), on the other end of the connector, also across both pins of the connector at its end.



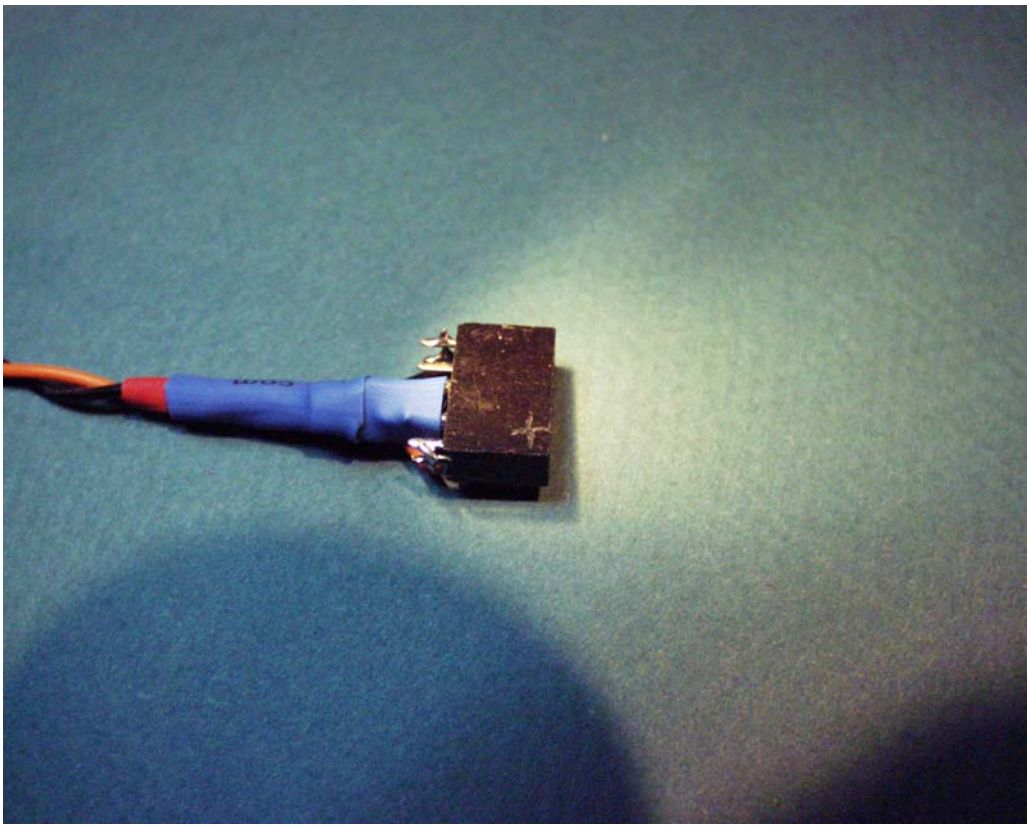
☐ **8.) Heat shrink smallest diameter heatshrink**

Slide up the smallest piece of heat shrink from the wires as far as it will go and shrink around the two power lines you just attached. This adds some surface bulk to the wires.



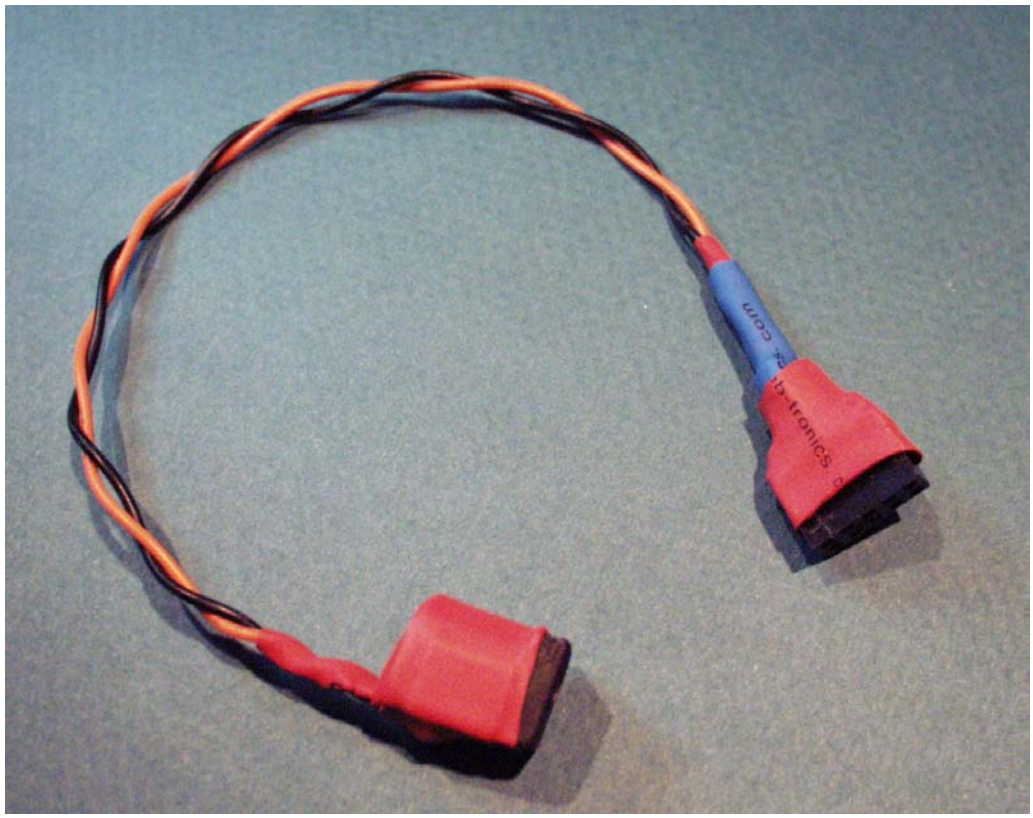
☐ **9.) Do next two smallest heat shrink layers**

Slide up each of the next two smallest layers of heat shrink and shrink each one as you do it. In the above picture you can see that the smaller read heatshrink extends past the larger blue layer. This helps taper the final product.



☐ **10.) Slide up last layer of heat shrink and shrink it.**

Your assembly should look something like the above image. Note that we scratched a + sign on the connector to indicate the positive side (red wire) of the connector.



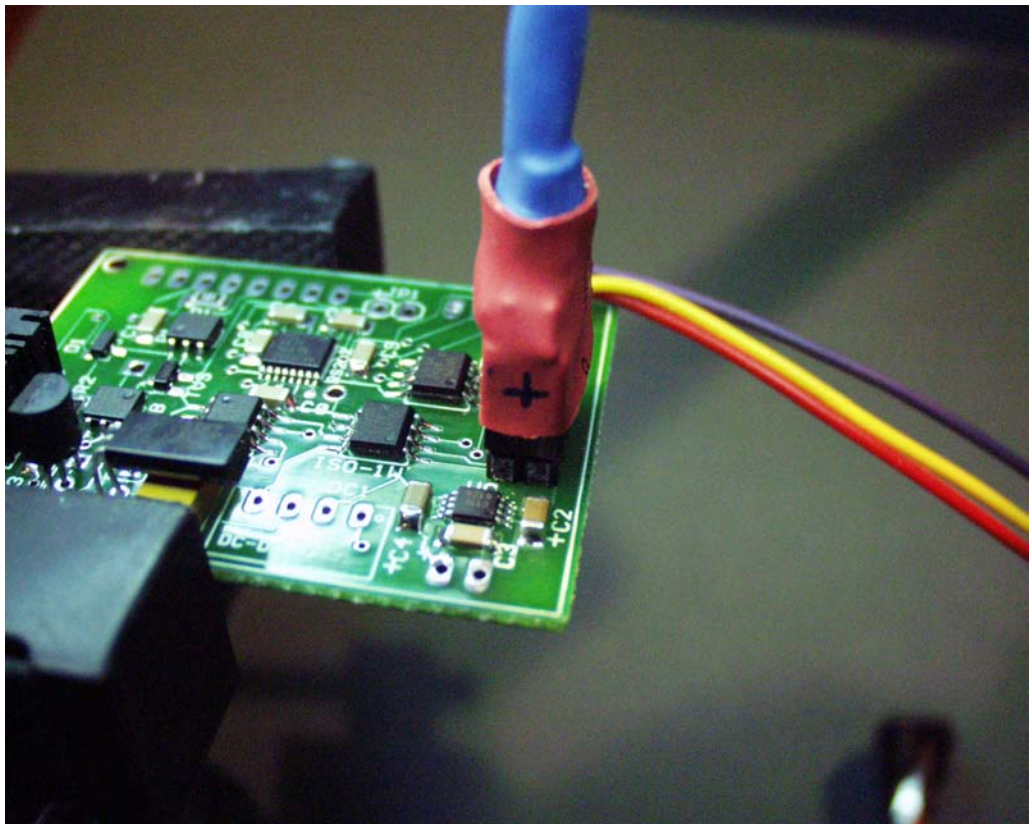
11.) Cover the connector with heat shrink

Position the final large (red) heatshrink over the connector leaving about 1/8 inch of the connector exposed on the bottom. Heat shrink in place. There should be just enough mass on the wire covered heat shrink that it will firmly wrap around both the connector and the heat shrink covered wires. Mark the side of connector so you know which side of the connector is positive.

12.) Test your cable

Plug in a 5 pin male header into the logic connector. (Either row of pins is fine) Connect a multimeter to the end pins. The positive should be attached to the side you marked as + and the ground to the other end. Attach a regulated 3.3-volt center positive wall wart power supply to the cables jack. Apply power. You should see 3.3 volts. Turn off power.

Move the 5 pin male header into the other row of pins in the logic connector. And repeat the test. This checks that both power pins and both ground pins are attached and working..



13.) Using the cable to test a board

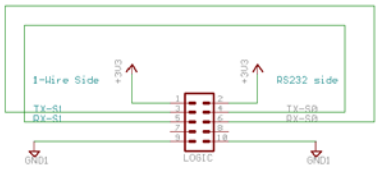
At this time you can use the test cable to help test your LP-LINKSYS-1W board as you assemble it. It is plugged into the male headers of the board. There is no indexing on this cable so it is up to YOU to be sure you are plugging it in right. Double check your connection before applying power! Be sure that you attach it so the positive side of the cable attaches so it is closest to the REG711 DC-DC converter side of the board. Note the + symbol on the cable assembly and the REG711 nearby.

The unit being tested in the above picture is the original version 1 prototype of the LP-LINKSYS-1W board and is a different layout than the version 2 version. The red, yellow , purple wires seen going off to the right are RS232 connections. With the test cable installed to power and cross connect the ports we are able to use the RS232 circuitry as an input to the 1-Wire bus and to totally check out the functionality of the entire board before plugging it into the LINKSYS unit.

DO NOT USE your cable UNLESS YOU HAVE CHECKED IT!

Linksys 1-Wire adapter Test Cable

Wiring to connect the RS232-F port to the 1-Wire Bus master



Female 2x5 1mm socket

Assembly instructions

Connect TX-S0 (RS232-F Serial port logic level output) to RX-S1 (the 1-Wire logic input)
Connect RX-S0 (RS232-F Serial port logic level input) to TX-S1 (the 1-Wire logic output)
Connect GND1 to the 2.1mm power jack ground
Connect +3V3 to the center pin of the 2.1mm power jack
Use heat shrink to protect the socket and jumpers and the Power Jack

2.1mm Power jack

Center positive 3.3v-5v regulated DC

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TITLE: 1-Wire adapter Test Cable	
Document Number:	REV:
Date: 12/04/2004 12:13:02a	Sheet: 1/1

Final thoughts

A General Warning

With careful assembly it is easy to assemble this cable assembly. The circuit is not complex and troubleshooting is very easy. If you have any doubts on you ability to do these steps we recommend that you consider buying an already assembled and tested unit instead or having a skilled assembler construct it for you.

The ideas presented in this document are part of Springbok Digitronics efforts to widen its focus by looking in a broad manner at particular problems. No implied suitability for manufacturing or use is implied but all rights are reserved.

Chapter

5

Reference