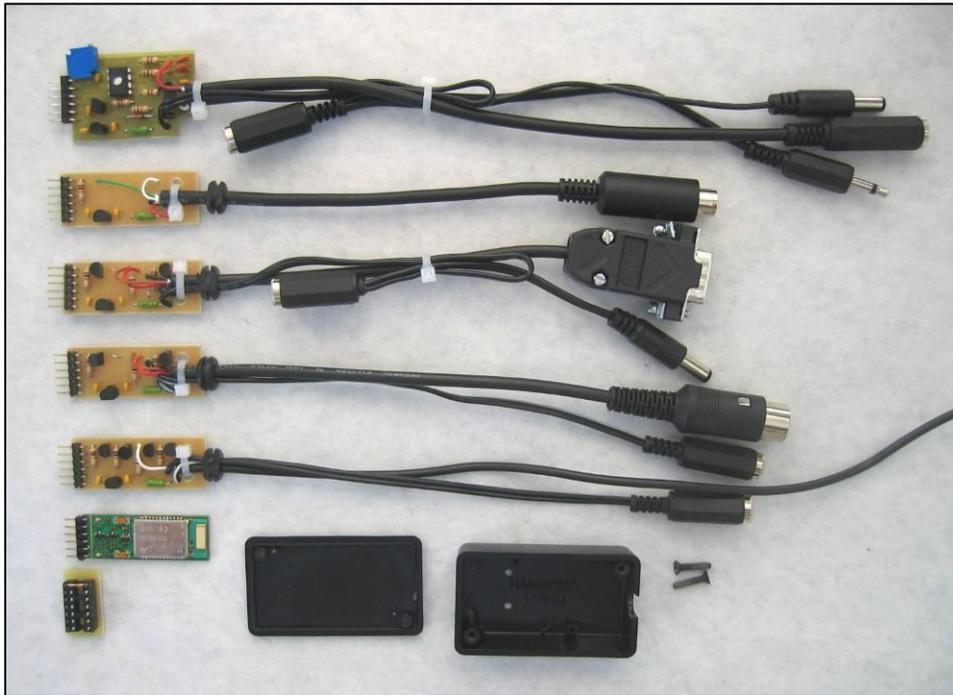


CTR-BlueLync Assembly Manual



Revision 1.04
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Introduction

Thank you for purchasing the CTR-BlueLync radio interface kit, the easy way to provide *Bluetooth*® connectivity for your radio. Each interface is custom designed to connect to selected models from specific radio manufacturers.

CTR-BlueLync utilizes the [Spark Fun Electronics](#) BlueSMiRF™ module. The kit uses conventional through-hole construction and is relatively easy to construct. If you are not comfortable assembling a kit of this size we offer complete assembly for an additional cost.

WARNING! Many of the components in this kit are static sensitive. Observe proper handling techniques when working with this kit.

WARNING! Be very careful when soldering component leads. The pads are small and the clearances from the ground plane are small. It's easy to create solder bridges.

Models

Before you begin, verify that you have received the correct kit for your radio.

Model	Radio manufacturer & models
CTR-BlueLync-Elecraft	Elecraft K2 and K2/100 radios. Requires either the KPA100 or KIO2 RS232 interface kit. Draws power from the interface connector.
CTR-BlueLync-Icom	All Icom radios using the CI-V 2-wire interface. Requires external 5-14 VDC power.
CTR-BlueLync-Kenwood	All Kenwood radios using the Kenwood TTL interface. Does not require the IF-232 interface. This is not compatible with the RS-232 interface used on newer Kenwood radios. Requires external 5-14 VDC power.
CTR-BlueLync-Serial	This interface will work with most RS232 serial ports. It does not pull logic 1 to (-), instead, it goes to 0 VDC. Logic 0 goes to +12 VDC. This unit works with radios such as the Yaesu FT1000 and Kenwood TS2000 and other radios using DB9 RS232 serial ports.
CTR-BlueLync-Rover	This is a special version of CTR-BlueLync that is designed to work with the iRobot Create and Roomba robots.
CTR-BlueLync-Yaesu 8-pin	Yaesu FT817, FT857, FT897, and other Yaesu radios using the 8-pin mini-DIN connector. Uses power from the ACC port.
CTR-BlueLync-Yaesu 6-pin	Yaesu FT100, FT890, FT-900, and other older Yaesu radios using the 6-pin mini-DIN connector. Requires external 5-14 VDC power.

NOTE: The BlueSMiRF module must be purchased separately from [Spark Fun Electronics](#). There are two models. One with an [internal antenna](#) and one with an [external antenna](#) ([antenna](#) must be purchased separately). Either model works fine in this interface.

Common Parts List

All kits use the same set of common parts including the circuit board. Please use the part list below to verify that you have received all of the parts in the common kit prior to building.

Part	Description	Qty	Rcvd	Notes
C1, C2	Capacitor .1 uF, 50 V	2		Marked "104"
F1	Picofuse T 250 mA	1		Green
IC1	Voltage Regulator – 78L05 or equivalent	1		
R1	10K ohm ¼ watt resistor	1		Brown-Black-Orange
Box	Plastic Box, Hammond 1551H	1		Machined w/ mounted lenses
CB1	Circuit board	1		
CB2	Interconnect circuit board	1		
Socket	6-Pin vertical socket	2		For interconnect board
HDR	6-Pin right-angle header	1		
	4" tie-wrap	1		Cable strain relief
Grommet	5/16" grommet	1		
Label	CTR-BlueLync	1		Mounted on box
Lens	LED lens	2		Mounted on box

Radio Interface Part List

Each CTR-BlueLync kit is supplied with the parts required for a specific radio interface. Use the part lists below to check the parts in your order before starting construction of your kit.

Elecraft

Part	Description	Qty	Rcvd	Notes
Q2, Q4	FET – 2N7000	2		Static sensitive!
R2	Resistor 1.5k , ¼ W	1		Brown-Green-Red
R3	Resistor 10k, ¼ W	1		Brown-Black-Orange
Cable	6-conductor cable	9"		
P1	DB-9M	1		With shell

Icom

Part	Description	Qty	Rcvd	Notes
Q1, Q2, Q3, Q4	FET 2N7000	4		Static sensitive!
R2, R4	Resistor 10k , ¼ W	2		Brown-Black-Orange
R3	Resistor 100k , ¼ W			Brown-Black-Yellow
P1	3.5MM mono phone plug w/18" shielded cable	1		May be a stereo plug. Connect ring to ground
P2	2.1x5.5MM coaxial in-line power jack	1		For external power
Wire	Unshielded 2-conductor	9"		For power

Icom PCR1000

Part	Description	Qty	Rcvd	Notes
J1	2.1x5.5MM coaxial in-line power jack	1		For external power
Q1, Q4	FET 2N7000	2		Static sensitive!
R2	Resistor 1.5k , ¼ W	1		Brown-Green-Red
R3	Resistor 10k , ¼ W	1		Brown-Black-Orange
Cable	3-conductor cable	9"		
P1	2.1x5.5MM coaxial power plug	1		For pass-through power – connects to PCR1000
P2	DB-9M	1		With shell
Wire	Unshielded 2-conductor	14"		For power

Kenwood

Part	Description	Qty	Rcvd	Notes
Q2, Q4	FET 2N7000	2		Static sensitive!
R2	Resistor 1.5k , ¼ W	1		Brown-Green-Red
R3	Resistor 10k , ¼ W	1		Brown-Black-Orange
Cable	3-conductor cable	9"		
P1	2.1x5.5MM coaxial in-line power jack	1		For external power
P2	6-pin DIN connector	1		5 pins are shown on the schematic
Wire	Unshielded 2-conductor	14"		For power

Rover

Part	Description	Qty	Rcvd	Notes
P1	8-pin mini-DIN plug assembly	1		Plug is mounted and cable leads cut and tinned
T1	LPT80A photo-transistor	1		Mount next to RED LED

Serial

Part	Description	Qty	Rcvd	Notes
Q2, Q4	FET 2N7000	2		Static sensitive!
R2	Resistor 1.5k , ¼ W	1		Brown-Green-Red
R3	Resistor 10k , ¼ W	1		Brown-Black-Orange
Cable	3-conductor cable	9"		
J1	2.1x5.5MM coaxial in-line power jack	1		For external power
P1	DB9 Female connector and hood assembly	1		For RS232 serial port
Wire	Unshielded 2-conductor	14"		For power

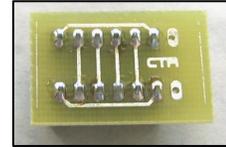
Yaesu

Part	Description	Qty	Rcvd	Notes
P1A	8-pin mini-DIN plug assembly	1 *		**Supplied with CTR-BlueLync- 8-pin kit for external power. Plug is mounted and cable leads cut and tinned
P1B	6-pin mini-DIN plug	1 **		**Supplied with CTR-BlueLync- 6-pin kit for external power. Plug is mounted and cable leads cut and tinned
P2	2.1x5.5MM coaxial in-line power jack	1 **		**Supplied with CTR-BlueLync- 6-pin kit for external power
Wire	Unshielded 2-conductor	9" **		**Supplied with CTR-BlueLync- 6-pin kit for external power

Construction

Interconnect Board

The small interconnect board supplied with the kit is used to connect the BlueSMiRF to the interface board. Mount the two 6-pin vertical sockets to this board. Install them in the holes that have traces on them. There should be a circuit trace connecting the first and last pin on each socket together with not pins soldered to the unused pins. Trim the leads close to the board.



The sockets on the interconnect board are offset. When placing the circuit pack into the box, the short side of the interconnect board should be placed against the screw post in the box.

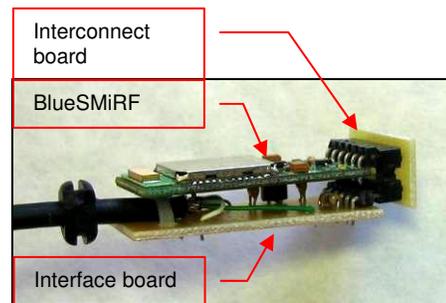
Warning! Make sure you do not install the sockets into the two spare holes. They are very difficult to unsolder (personal experience talking here!)

Circuit Board

There is no specific order to follow when mounting components to the board. You may find it easier to mount the smaller components first then mount the regulator and transistors (if supplied).

As you solder each part in place, make sure it sits as low as possible and trim its leads short. There isn't a lot of clearance between the interface board and the BlueSMiRF module.

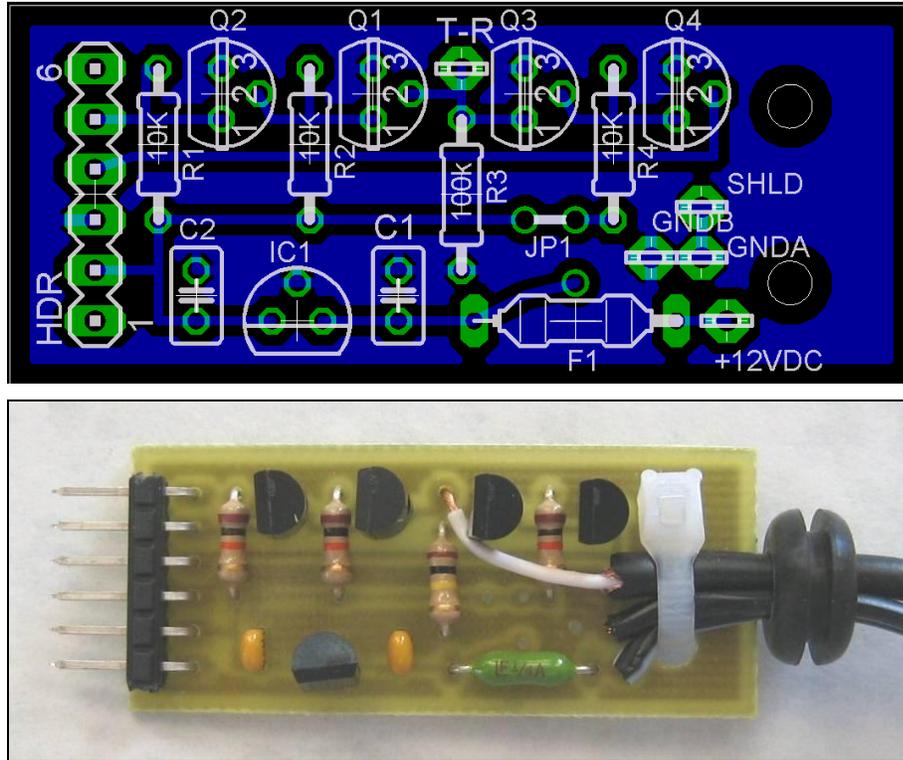
Inspect each solder junction to make sure there are no solder bridges or cold solder joints.



WARNING! The FETs can be easily damaged by static discharge. Observe proper static handling procedures when working on this kit.

The Icom kit contains the most parts due to the 2-wire CI-V control interface. A drawing and photo of a complete Icom board is shown below.

NOTE: Not all kits will contain all of these components but this will give you a good idea of part placement. Schematic and layout diagrams for each kit are available on www.lynovation.com.



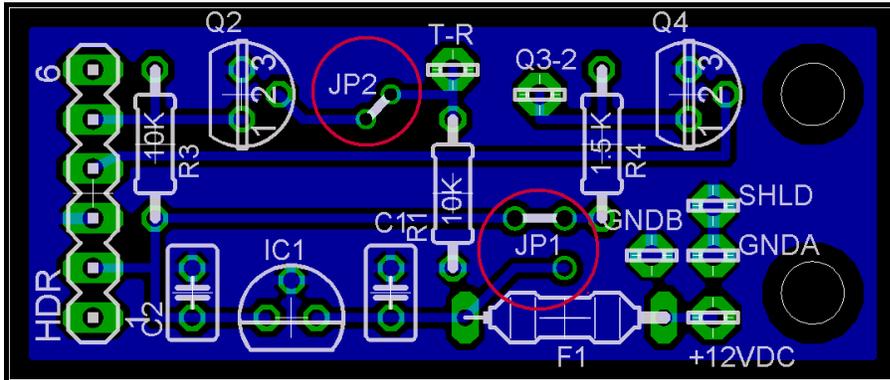
Icom Board

NOTE: Some interfaces refer to pads on the Icom board for their connections (such as Q3-2). Use the drawing above to locate these pads.

Jumpers

The **Kenwood**, **Serial**, and **K2** interfaces require the installation of at least one jumper on the interface board. The following board layout drawings show the Kenwood and PCR1000 boards and these jumpers.

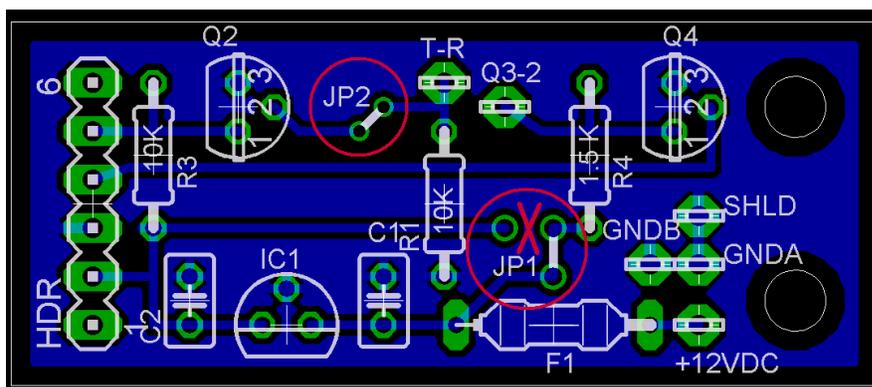
These models all require Jumper 2, labeled JP2 on the board layout. It is just to the right of Q2 and shown in the drawing below.



Kenwood Board JP2 Installation

The **Serial** and **PCR1000** kit require a second jumper, Jumper 1, or JP1 on the circuit board below. To install this jumper, a trace first needs to be cut. A new wire jumper is then installed as shown on the circuit board layout drawing below. It is shown as a thick white line just above F1 on the Serial and PCR1000 drawings. This jumper must be installed for the unit to work correctly.

WARNING: JP1 is factory etched on the board. Before installing the wire jumper, scrape the trace off between the two pads above the JP1 label as shown at the **red X** in the drawing below. Failure to do this will short +12 VDC to the +5 VDC supply and damage the BlueSMiRF board.



Serial and PCR1000 Board JP1 and JP2 Installation

Cable Assembly

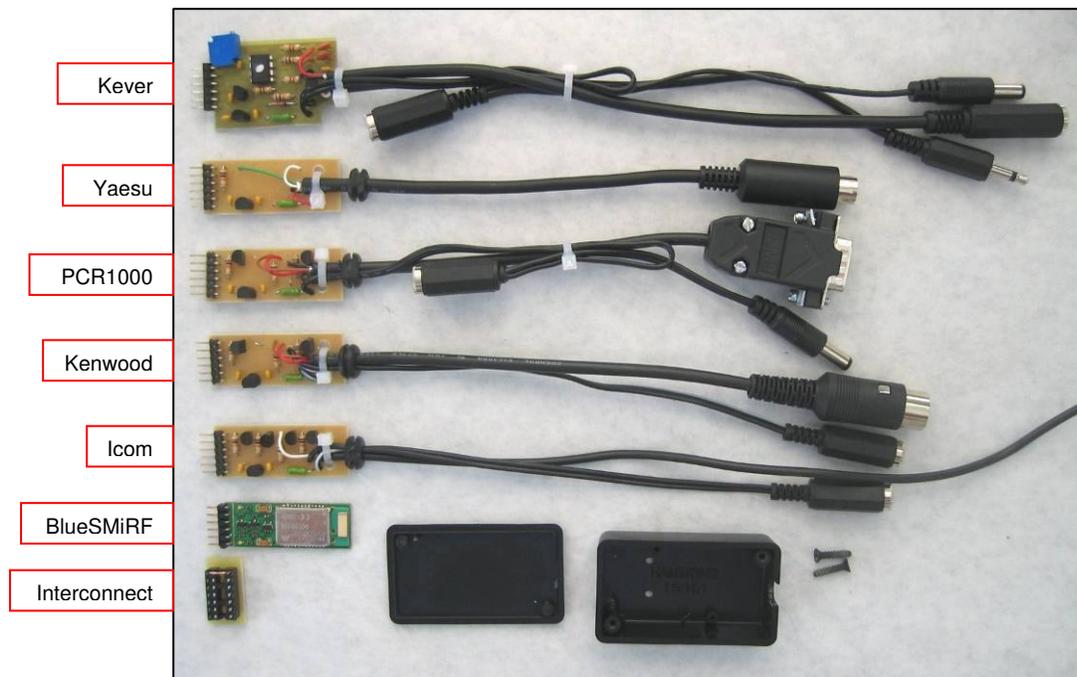
The cable assembly depends on the radio interface. Some interfaces come with pre-assembled cable sets. You simply need to solder the tinned leads to the circuit board. Install a 4" cable-tie in the two holes at the end of the board for strain-relief.

For cables that require connector installation, install the connector before soldering the cable to the board. **Be sure to slide the grommet onto the cable before you connect it to the circuit board.** If you fail to do this, simply cut the grommet with your diagonal cutters and snap it to the cable. On kits with large shield wires the SHLD hole has been drilled out.

- The Elecraft kit uses a standard DB9 connector. Solder the connector to the supplied cable as shown on the schematic and then solder the cable to the circuit board as shown on the layout drawing.
- The Icom kit uses a 3.5-mm mono or stereo phone plug. The plug will already be installed. If your kit is supplied with a stereo plug, connect the ring (middle connection on the plug) to ground. Slide the grommet onto the cable and solder the other end to the circuit board. The tip of the plug goes to T-R and shield (and ring if stereo) to ground. Route the power cable through the grommet and solder it to the board. A 2.1x5.5mm inline coaxial jack is provided. This jack will fit many wall-wart power supplies. Just wire the center pin to match your wall-wart (usually the center pin is +).
- The Kenwood kit uses a 6-pin DIN connector (only 5 pins are shown on the schematic). Solder the cable to the connector as shown in the schematic, slide the grommet over the cable, and then solder the cable to the circuit board as shown in the layout drawing. Install the 2.1x5.5MM coaxial in-line jack on the unshielded power cable and route it through the grommet and solder it to the board. Wire the power jack to match your wall-wart power supply (usually the center pin is +).
- The Serial and PCR1000 kits come with a DB9 connectors and hoods. The Serial unit uses a DB9-Female and the PCR1000 uses the DB9-Male. Please let us know if you need the DB9-Male for your Serial unit when you order. Install this connector on the end of the supplied cable and slide the grommet on before you prep the board end.
- The Yaesu kit comes with either pre-assembled 8-pin mini-DIN or 6-pin miniDIN cables depending on the model you ordered. The leads have been cut and tinned.
 - One of two cables will be supplied with the 8-pin kit. The only difference in the cables is the wiring configuration. Your cable will have four tinned leads and a shield wire and will be labeled "1" or "2". Cable type "1" has a red wire and cable type "2" has a brown wire. Use the chart on the schematic to wire your cable.
 - The 6-pin kit comes with a power connector similar to the Icom and Kenwood kits for external power.

Available Interfaces

A variety of assembled BlueLync interface units are shown below. Only one BlueSMiRF RF module is required for all of your radios by simply swapping the interface cable.



Interfaces

NOTE: The BlueLync Kever shown is a prototype. The blue pot has been replaced with an external pot in production devices.

Pre-Test

Before you plug in the BlueSMiRF you should thoroughly inspect the board for shorts and solder bridges. All traces should show at least some resistance to ground. A strong table lamp can be used to locate shorts between traces.

Power the interface up and check for +5 VDC between pins 2 and 3 of the 6-pin header. If this is correct, power the interface down and plug it into the interconnect board with the components facing toward the inside of the socket. Plug the BlueSMiRF module into the other 6-pin connector with its components facing outward (the unit has SMD LEDs that will shine through lenses installed in the case when assembled).

Final Test

You should verify the unit is operating properly before mounting it in the plastic housing. Connect it to your radio and connect external power if required. The green LED should flash when power is applied. If it doesn't, disconnect power and recheck it for construction errors.

WARNING! The unit includes a 250 mA fuse to protect the power supply. If you connect the power leads in reverse, you will blow this fuse! If this happens, contact us for a replacement.

Connecting to CTR-BlueLync

Once you have the green LED lit, you are ready to test the Bluetooth connection. Run CTR-Remote on your Bluetooth-enabled Pocket PC or CTR-PC on your Bluetooth-enabled PC.

First, you must set the program to operate with CTR-BlueLync. Do this by selecting the *Comm...Com Properties...Bluetooth Options* menu. Click on the *CTR-BlueLync* radio button. You can also enter a new name for your BlueLync module, its default (power up) baud rate, Transmit Power (+15 dBm is suggested), and Power Source (choose the low power option if you operate on batteries). Once complete, click the *Save to Flash* button and select the **BlueLync** device on the *Bluetooth Devices* display to save these settings in the BlueLync's flash memory.

To connect to your BlueLync, select the *Comm...Com Properties* menu and select the comm port assigned as the *Outbound COM Port* on your PPC. This port can be found in the *Bluetooth Settings* application on your PPC. Click on the *Services* tab, select *Serial Port* then click on the *Advanced...* button. Note the *Outbound COM Port* shown on this display.

If you are using a Pocket PC running CTR-Remote, connect to CTR-BlueLync as follows:

- Click the *On-line* checkbox
- If you have selected the correct COM port above, you will be taken to the *Bluetooth Browser* screen that will allow you to pick a Bluetooth device from a list. The default name, **BlueLync** or the new name you selected above should appear in your list. If it does, click on its icon to connect. If it doesn't, click the *Refresh* button to rescan for devices.

NOTE: If you ordered your BlueSMiRF directly from Spark Fun its default name will be either **BlueRadios** or **SparkFun**.

NOTE: If you change the name of the BlueSMiRF, it will not appear on the device list properly until after you connect to the device's old name once.

If you are using your PC and CTR-PC to connect to CTR-BlueLync, use this procedure:

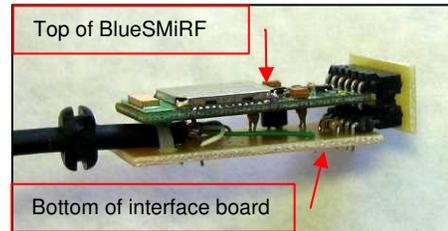
- Using your *Bluetooth* management software, establish a connection between your PC and CTR-BlueLync before connecting CTR-PC to BlueLync.
- In CTR-PC, click the *On-line* button at the top-right. The program should connect and start transferring data with the radio.

NOTE: When shipped from the factory the default passkey for the BlueSMiRF module is **default**. You may enter this in the passkey screen when connecting for the first time.

Once you successfully connect to the unit, the green LED stops flashing and the red LED should illuminate. At this point the frequency and mode of your radio should appear on CTR and you should be able to control your radio using the program.

Putting it all together

The completed interface should be assembled as shown here. Plug the BlueSMiRF board in with its components facing up then plug the interface board in with its components facing up too. A small piece of foam has been installed in the box for the BlueSMiRF to rest against.



Two lenses are mounted on the box. The green LED will flash indicates the unit is *listening* for a connection request. The red LED lights solid indicating that the unit is *On-line*.



If you chose the BlueSMiRF unit with the external antenna, cut the 5/16" cable slot the entire depth of the box as shown at the right.



Once the box is ready, slip the circuit board pack in with components on the BlueSMiRF board facing the lenses at the bottom of the box. The bottom of the CTR-BlueLync board should be visible from the lid side. Attach the lid and you're ready to go!

NOTE: The interconnect board is off-set to one side. The short side of the board should be against the screw post. This allows the circuit pack to fit in the center of the box.

CTR-BlueLync Rover photo-transistor

The CTR-BlueLync Rover kit includes a photo-transistor to detect when the BlueSMiRF is on-line. The photo-transistor must be mounted so that it "sees" the RED LED. When this LED is lit the photo-transistor conducts and puts a ground on pin DD of the interface connector. This signal tells the Roomba robot to wake-up if it is asleep.

Install 2" pigtail wires on the photo-transistor then wire the emitter to the ground plane and the collector to an unused pad on an unused trace on the circuit board. Connect the DD wire from the interface connector to another pad on the same trace. This provides a convenient method to splice the DD pin to the collector of the photo-transistor. You may also choose to simply splice the two wires together with a piece of heat-shrink tubing.

NOTE: The photo-transistor is not required on the iRobot Create robot.

Troubleshooting

There isn't much to troubleshooting CTR-BlueLync. Below is a list of possible problems and their solution. If you can't find the problem with your unit using this chart, contact us at <mailto:info@lynovation.com> for further help.

Symptom	Cause
The green LED fails to light when power is applied	<ol style="list-style-type: none"> 1. Check for power to the interface. The unit requires +5 to +14 VDC to operate. 2. Check for power to IC1. The input pin should be +5 to +14 VDC. The output pin should be +5 VDC connecting to HDR pin 2 <p>WARNING! Be very careful measuring these points. Shorting either outside pin to the center pin will blow F1</p>
The Pocket PC does not open the Bluetooth selection screen when you connect.	Verify that you have selected the Pocket PC's Bluetooth Outbound COM port in CTR-Remote Comm menu. You can find this port in PPC's <i>Bluetooth Settings...Serial Port...Advanced Settings</i> screen.
The unit does not show up in the Bluetooth device selection screen on your Pocket PC or PC	<ol style="list-style-type: none"> 1. Verify that the <i>Bluetooth</i> radio on your Pocket PC is turned on. 2. Verify that the unit is turned on and the green LED is flashing. 3. Click the Refresh button on the Pocket PC to refresh the list
The Pocket PC fails to connect to the selected device.	<ol style="list-style-type: none"> 1. Cycle the power on the <i>Bluetooth</i> radio on the Pocket PC. Sometimes the PPC's radio locks up and can't connect to your device.
The red LED comes on but I don't get any information from the radio and I can't control it	<ol style="list-style-type: none"> 1. Make sure you have selected <i>CTR-BlueLync</i> in CTR-Remote/CTR-PC's <i>Comm...Port Properties...Bluetooth Options</i> window. This must be selected for the program to set the baud rate on CTR-BlueLync. 2. Cycle the power on the interface and try connecting again. 3. Verify the baud rate of the radio has been set to the baud rate selected in the Comm menu. This is the rate downloaded to the interface. 4. On Icom radios, make sure that you have turned <i>Transceiver Mode</i> OFF and that you have assigned the correct address for your radio in CTR's COMM menu.

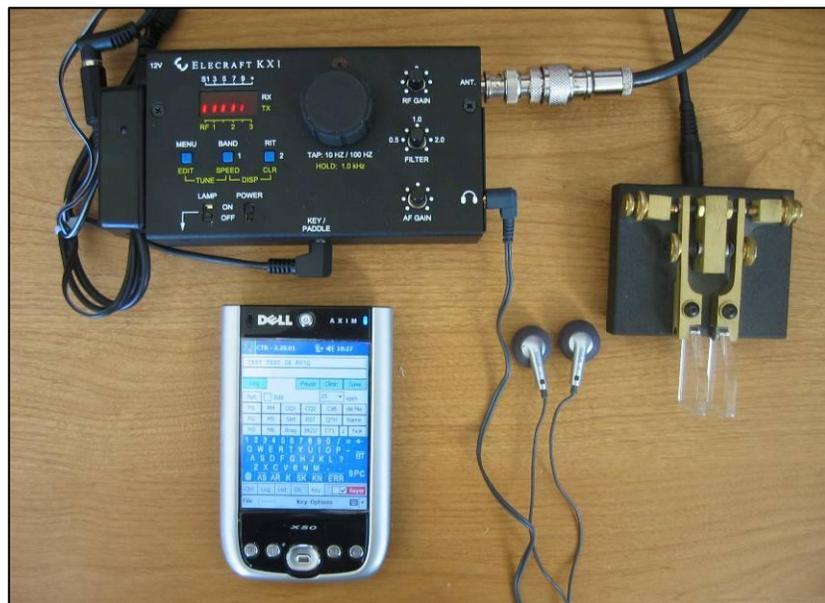
Additional Modules

One of the advantages to this design is that additional modules can be built to perform other functions. One such module is the CTR-BlueLync Keyer. This module incorporates the K1EL WinKey IC and provides a *Bluetooth* enabled keyboard/paddle keyer. You can use it with CTR-Remote to provide a portable keyboard keyer, or stand-alone with a set of paddles. It features a pass-through power connection, manual speed control, and supports an external sounder (not supplied).



CTR-BlueLync Keyer

The photo at the right shows a CTR-BlueLync Keyer interfaced to an Elecraft KX1. Not only does the CTR-BlueLync Keyer bring fully automatic keying to virtually any solid-state keyed radio but CTR-Remote provides additional tools such as logging, beacon watch, and DX cluster monitoring to portable and remote locations.



CTR-BlueLync Winkey is available from www.lynovation.com.

Credits

I hope you enjoy building this kit and find that it is a useful addition to your shack. I would especially like to thank Klaus Ludwig, DL7AIR for his expertise in hardware development and for inspiring me to take CTR-817 further than I ever thought possible.

Thank you for building CTR-BlueLync,
73, Lynn Hansen, KU7Q