

Heart-felt Shirt

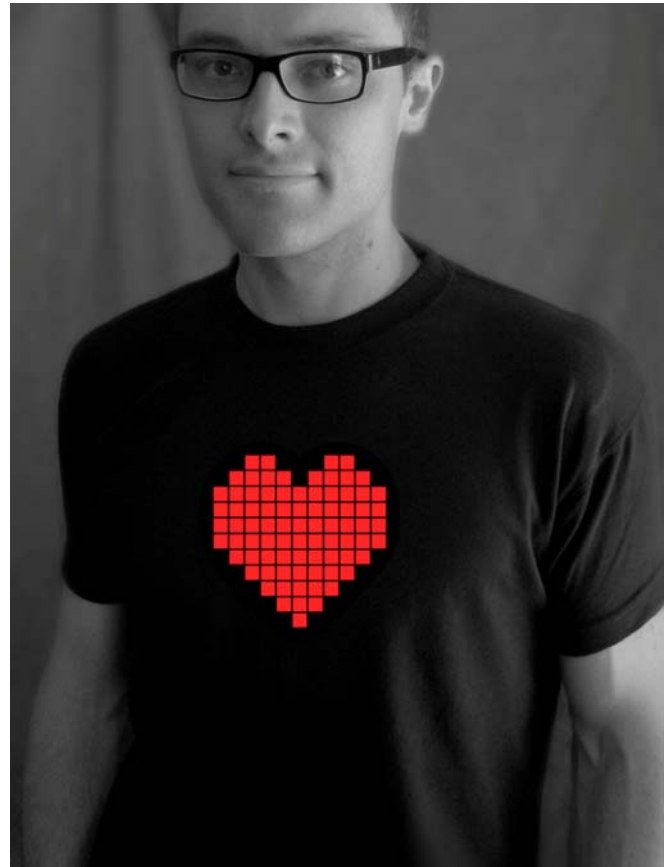
v1.100

by Dr. Sean M. Montgomery

<http://produceconsumerobot.com/heartfeltapparel/>

The Heart-felt Shirt uses bio-sensors to read the wearer's EKG and generate radiating pulses of light from the electroluminescent panel that flash in time with the wearer's own heart rhythm. Wearing the shirt gives an intense feeling of life and rhythm, while at the same time reminding you of your electrical and mechanical roots. It's truly amazing how much the heart responds to social interaction and yet is almost entirely ignored as it meters our life.

Part of the Vital Threads Biofeedback Apparel collection, the Heart-felt Shirt was designed to open fashion to dynamic new forms of self awareness, personal expression and interpersonal communication. By measuring and displaying the wearer's biological signals, Vital Threads Biofeedback Apparel gives the wearer the freedom to express his or her personal vantage on a moment by moment basis.



How it works:

Using an off-the-shelf Polar chest strap, the wearer's heart beat is detected and wirelessly transmitted to the shirt, where it is displayed as flashes of light.

Cleaning: Dry clean only. Unplug and remove the controller box before cleaning.

What's in the kit:

- 1 EL panel shirt
- 1 Polar RMCM01 receiver chip
- 1 NPN transistor
- 1 32.768KHz crystal
- 1 2 conductor wire (~3in)
- 2 AAA batteries



What else you need:

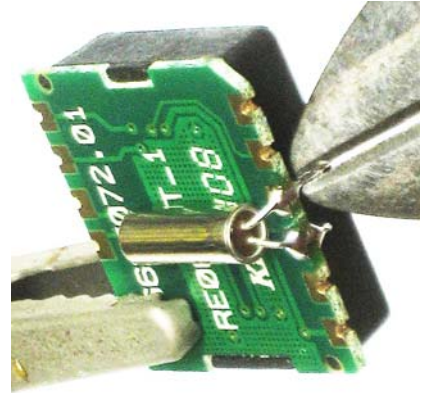
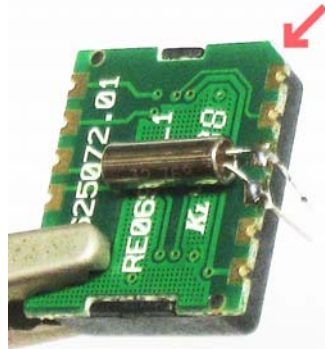
- Polar Wearlink+ chest strap and transmitter (older T31 model may also work with some circuit modification)
- Small philips-head screwdriver
- Fine-tip wire cutters
- Soldering iron
- Solder
- Recommended:
 - Small flat-head screwdriver
 - Needle nose pliers



Assembly Instructions: (see <http://produceconsumerobot.com/heartfeltapparel/> for color and updated details)

1) Solder the crystal to the Polar receiver chip and trim the excess leads.

NOTE: The orientation of the Polar chip is indicated by the cut corner. Polarity of the crystal leads doesn't matter.

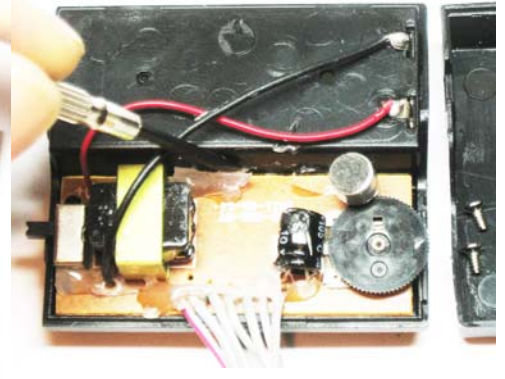


2) Open the controller box:

- **BE CAREFUL** not to put strain on the power leads while you work on the board.

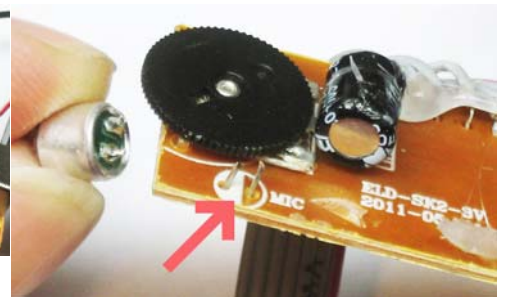
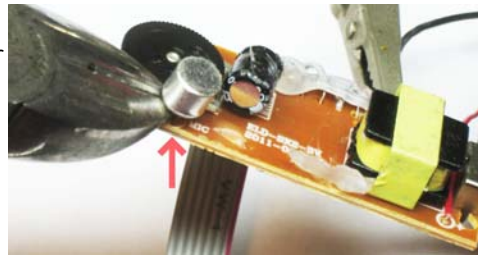
- Find the EL controller box inside the shirt. Open the battery compartment and take out the screws.

- If there is any glue holding the board inside the box, use a flat head screwdriver (or other tool) to remove the glue and carefully pull the board out of the box.



3) **CAREFULLY** cut the microphone off the board with your wire cutters.

- **BE SURE** to leave enough wire protruding from the board that you can solder to it in the next step.

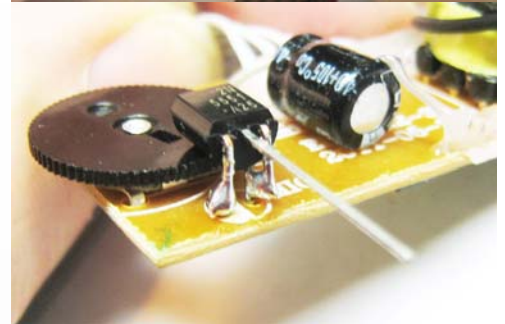
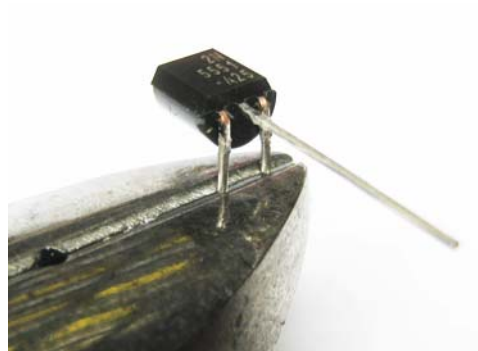


4) Attach the transistor to the board:

- Bend the two outside pins on the transistor away from the flat side and trim the excess to **less than 1/8in.**

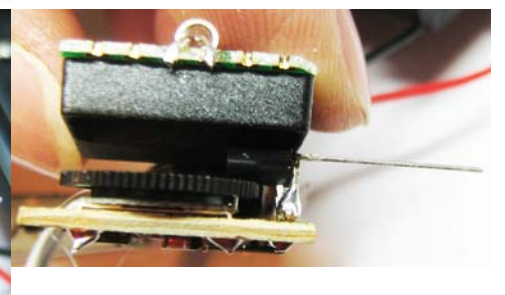
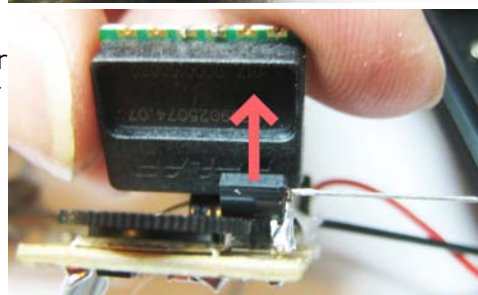
- Solder the transistor so that it sits directly on top of the board's thumbwheel.

- **NOTE** the transistor orientation with the flat side facing up.

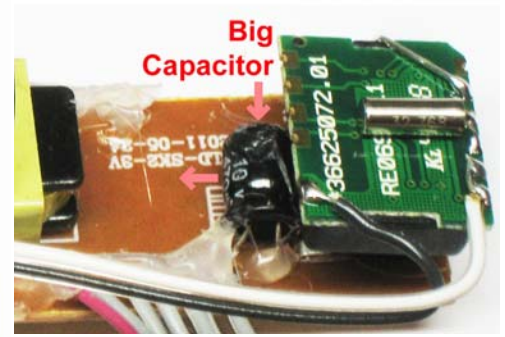
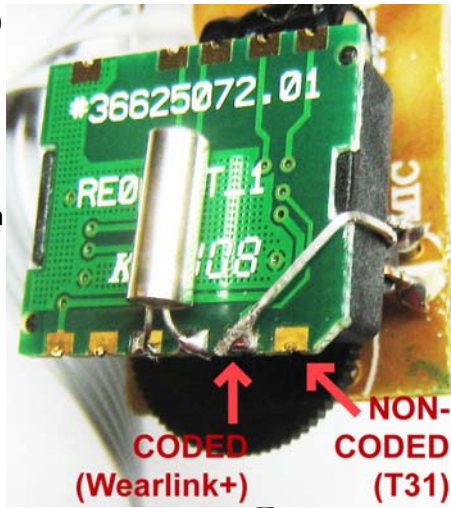


5) Attach the Polar chip:

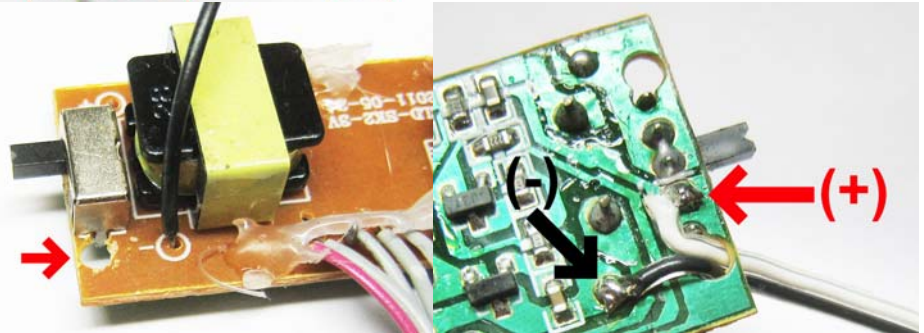
- Insert the Polar receiver chip over the transistor so that the transistor **FITS INSIDE** the cavity on the Polar chip.



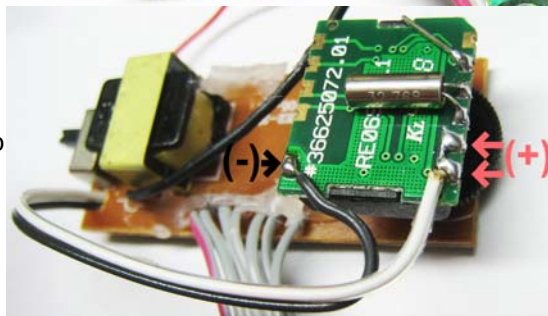
- Bend the transistor center (BASE) pin around the Polar chip.
- **HINT:** You may want to nudge the big capacitor out of the way to get the Polar chip to sit nicely.
- If you have a Wearlink+ heart rate strap, solder to the CODED pin in the 2nd position (By "coding" the wireless transmission, there is less interference from multiple nearby transmitter straps).
- If you have a T31 or other non-coded Polar transmitter, solder to the NON-CODED pin in the 1st position.



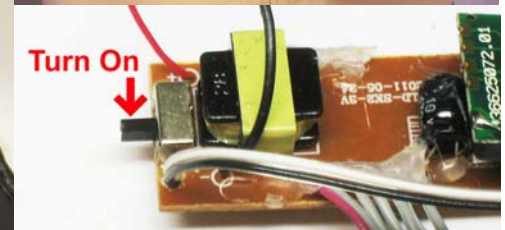
- 8)** Hook into the board's power switch:
- If there is glue covering the hole next to the switch, remove it.
 - Insert the wire through the hole.
 - Solder one wire to the positive output terminal from the switch.
 - Solder the other wire to the negative terminal coming from the battery.



- Solder the opposite end of the positive wire to the two pads on the Polar chip next to the crystal.
- **BE SURE to connect both pins** to the positive lead.
- Solder the negative lead to the lone pad on the opposing edge of the Polar chip.



- 9)** As per the Polar instructions:
- Wet the Polar strap contacts.
 - Put the strap on and clip in the transmitter module.
 - Insert the included AAA batteries into the EL controller box and Turn on the board.
 - After a few seconds, the shirt should start to flash with your heartbeat!
 - If the shirt doesn't start flashing after 10 seconds, see the troubleshooting advice below.



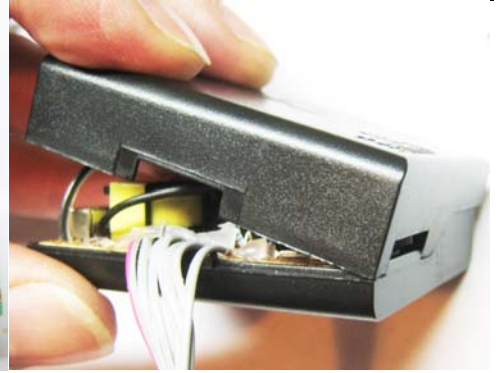
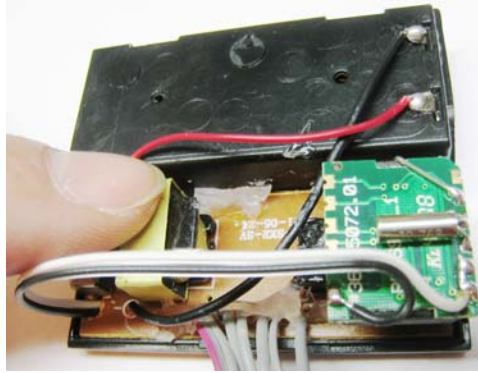
10) Modify the box to fit the modified board:

- Remove the shown tab from the controller box. This lets the power wires pass through the hole without getting pinched.
- Carefully slip the board back into the box.

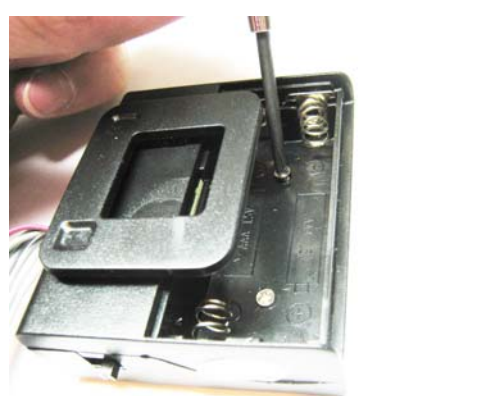


11) Replace the board and close the box:

- **CAREFULLY** put the lid back on the controller box. It can be a little fiddly to fit everything back inside, but it will fit if you got everything positioned correctly.
- Alternatively, you can keep the Polar chip outside the box and run the power wires and a transistor base wire out the slot with the EL wires.
- Once you get the box closed, screw it back together.



VOILA! You have your own Heart-felt Shirt! Wear it at home, wear it to parties... see what makes you beat faster or slower. See if you can synchronize with your friends!



Troubleshooting:

If you flip the power switch and nothing happens, check:

- Your shirt/controller box is close enough (~2ft) to the strap transmitter.
- Battery contacts/orientation.
- Your power wires didn't break and are soldered to the correct contacts.
- The (+) wire is connected to both of the appropriate pads on the Polar chip.
- The transistor is well soldered and in the correct orientation without any solder bridges.
- The crystal is soldered in the correct spot (polarity doesn't matter).
- You have the correct CODED/NON-CODED pin attached for your Polar transmitter strap.
- Spin the thumbwheel so that it is halfway between the two limits.

If the shirt flashes, but not timed with your heartbeat:

- Re-wet the strap to get good contact with your skin.
- Check the controller box is close enough (~2ft) to the strap transmitter.
- Turn the controller box off and back on.
- Spin the thumbwheel so that it is halfway between the two limits.
- Change the transmitter battery if it's old.
- Change the controller box batteries if they're old.

Send me your comments:

Do you have any comments on how to improve these instructions or how to improve the Heart-felt Shirt for the next version? What was the most interesting experience you had wearing the shirt? Send me an email:

<http://www.produceconsumerobot.com/>

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