

ELOR Parts List and Assembly Instructions 04/02/2012

1	PCB	ELOR PC Board
1	IC1	Parallax P8X32A-D40 CPU (large 40-pin IC)
1	IC2	Atmel EEPROM AT24C1024BPU (8-pin IC, look for "2GB" on chip), preprogrammed ELOR
2	IC3,IC4	485/1485 ST485BN Line Transceiver (8-pin ICs, "1485" or "ST485" on chip)
1	IC5	3.3V LDO regulator, 500ma, TO-220 (large 3-pin part with mounting hole)
1	IC6	OKI 5V DC-DC Converter, 1.5A (large 3-pin part with small PC board)
1	ETH1	Wiznet WIZ812MJ Ethernet Module (large module with 2 sets of 20 pins and an Ethernet jack)
1	C1	10uf/35V Tantalum Capacitor (yellow 'blob' with 2 leads, will have a "+" mark and "35")
3	C2-C4	10uf/16V Tantalum Capacitor (same as above, slightly smaller, with "+" and "16" marked)
4	C5-C8	.1uf capacitor (see note 1) (Smallest of all capacitors, no + mark, leads spread wider)
1	xtal	5.00 MHz Crystal (small silver oval 'can' with 2 wire leads, "5.000" on top)
1	YLED	Yellow LED
1	GLED	Green LED
2	RLED	Red LED
1	SW1-SW8	DIP Switch Pack, 8-positions, numbered 1-8
1	RN1	Resistor Array, 8-pin, 4x4.7k (look for number 472 on body)
1	RN2	Resistor Array, 8-pin, 4x270 ohm OR 4x220 ohm, (look for number 271 or 221 on body)
1	RN3	Resistor Array, 9-pin, 8x4.7k (472) OR 8x10k (103) (see note 2), either "472" or "103" on body
1	ICSkt1	40-pin IC socket (see note 1)
3	ICSkt2-4	8-pin IC socket
2	J1A,J2A	2x10 female connector, .1" (for WIZNET module)
2	J3,J4	4-pin male eurostyle connector (green, 4 pins) and mating female connectors
2	J5,J6	RJ-45 Connector (black, vertical-mount)
1		multi-pin length of .1" male header pins. Cut to lengths as needed.

Notes:

- 1) Depending on the style of the 40-pin IC socket supplied, it may be necessary to install C7 before the 40-pin IC socket, and shift its position up slightly to clear the cross-bar of the IC socket.
- 2) The 9-pin resistor array may be either 4.7k ohms (designated 472), or 10k ohms (designated 103). Note that this part is polarized, and pin 1 (designated by a white stripe) must be installed toward the bottom edge of the PC board.

ELOR Assembly Instructions:

Important: Use high quality solder, Kester #44 63/37, .031" diameter is preferred. A good pair of small FLUSH-CUTTING diagonal pliers is essential for trimming component leads.

In general it is suggested to install parts from lowest height to highest height. This way you can turn the board over to solder the next set of components (after covering it with a piece of flat rigid material), without parts falling out.

MANY COMPONENTS ARE POLARIZED. This means they **must** be installed in a certain orientation. Every polarized part is pointed out in the assembly instructions. **Polarized parts include: ALL ICs, ALL IC sockets, the green 4-pin sockets, the 9-pin resistor network, all LEDs, the Wiznet module, and the 5 largest capacitors (10uf).**

Tip: When soldering 2-lead components, make sure that the first lead has cooled sufficiently before soldering the 2nd lead, otherwise the part may shift position slightly, producing a 'cold' solder joint at the first lead. After all joints have cooled, trim the leads close to the PC board with flush-cutting pliers.

Every part location on the PC board has the part outline silk-screened in white, to help with positioning of components. Locations for polarized components are identified with a notch, a +, or some other symbol to denote the proper orientation of the polarized part. If the leads of a component don't appear to line up properly with the holes in the PC board, you either have the wrong part, or the wrong location.

1 Install the crystal, small oval silver can with 2 leads, to the right of the CPU at location XTAL. Note that there is a small amount of play in the holes. When soldering, try to use the play in the holes to insure that the crystal is positioned as far away from the SW1-SW8 location as possible.

2 Install the 3 resistor networks (black rectangular parts with 8 or 9 short leads). NOTE: Two of the resistor networks are identified by the same designation "472", but one is an 8-pin part, while the other is a 9-pin part. The 8-pin part with the designation "271" mounts in the lower right corner. The 8-pin part with the designation "472" mounts at the top edge, just above the 8-pin socket. The 8-pin parts are not polarized any may be installed in either direction. **The 9-pin network, designated "472" IS POLARIZED AND MUST BE INSTALLED WITH PIN 1 (designated by the white stripe) NEAREST THE BOTTOM OF THE board.** This part mounts to the left of the switch location.

Tip: When installing multi-pin sockets, start by just soldering 2 pins on opposite corners. Then make sure the part is fully seated flat against the PC board before soldering the remaining pins.

3 Install the three 8-pin IC sockets. **They all face DOWN** (designated by the notch at one end that matches the notch on the silkscreened legend of the PC board).

4 Install the 4 LEDs (2 red, 1 green, 1 yellow) in the lower right corner of the board. . The locations are marked with the color, eg "GLED" for green. **LEDs are polarized. The longest of the 2 leads is +, and on ELOR, all LEDs mount with the + lead toward the bottom of the board.**

Tip: The 4 small identical capacitors (yellow body, 2 leads) are C5-C8 and are NOT polarized.

5 **Caution: This step is ONLY done if you have a 40-pin IC socket with 3 crossbars (top, center, bottom).** Install C7 now. C7 mounts inside of the IC socket. For the 3-crossbar sockets, you will need to shift C7 up slightly, then lay it flat. Before soldering C7 make sure that the 40-pin IC socket will sit flat on the board. If not, re-adjust C7s position as needed. Solder C7.

6 Install the 40-pin IC socket, the notch faces **UP** (opposite direction to the 8-pin sockets).

7 Install the four .1uf capacitors C5-C8. (C7 may have been installed in a previous step). Two mount to the left of the 40-pin socket, one inside the 40-pin socket, and one to the right. These are NOT polarized.

8 Install the three 10uf 16V tantalum capacitors at C2, C3, and C4. **These capacitors are POLARIZED and must be installed with the + lead (longest lead) near the + symbol on the board.** These 3 parts will have the number "16" on the body.

9 Install the 10uf 35 V tantalum capacitor at C1. **This is polarized also.** It is larger than C2-C4, and will have the number “35” on the body.

10 Install IC5, the 3.3V regulator. This is a fairly large part with 3 leads and a mounting hole. Bend the 3 leads down 90 degrees and insert the leads into the board. Make sure that the flat side of the part is against the board and that the mounting hole is properly aligned. Bolt the part in place with the supplied nut and bolt BEFORE soldering.

Use caution to insure that the body of the regulator isn't twisted out of position while tightening the bolt. After bolting, solder and trim the 3 leads.

11 Using a spare piece of wire lead trimmed from a capacitor or LED, form the lead into a U shape, and insert it into the 2 holes in the lower-left corner to the right of the designation “PWR”. Solder this jumper in place. This goes in the 2 holes nearest the lower-left corner PC board mounting hole,

12 **REVISED 03/31/2012:** Trim the provided multi-pin single row .1” male header into one length of 2 pins and two lengths of 4 pins. Install the 2-pin header near the jumper just installed, to the left of the “LOR” designation. Install one of the 4-pin headers at J7, above the 40-pin socket, and install the other 4-pin header to the left of the 40-pin IC socket with the bottom 3 pins in the holes labeled GND, TP7, and TP6. **Note that this location has 5 holes, you want to mount this part in the LOWER 4 of the 5 holes, the hole labeled TP4 is not used.** Optionally, you can cut a 5-pin length of header and install it at J10, at the upper edge of the board near the right side. This is for a possible future hardware option, but is not presently used.

13 Install the 8-position “DIP” switch just to the right of the 40-pin socket, near the bottom edge of the board. **Install this part with switch #1 nearest the bottom edge of the board.** Make sure the part seats flush with the board. It may be necessary to shift the position of the crystal up slightly.

14 Install the two 20-pin female sockets (2 rows of 10 pins each) at J1A and J2A. Solder one pin of each, verify that they are fully seated flat against the PC board, then solder the remaining pins. They are not polarized.

15 Install the 2 green 4-pin male connectors at J3 and J4. **Orient these parts to match the legend on the circuit board.** If you think of the separators between pins as arrows, J4 arrows will point down, and J3 arrows will point left.

16 Install IC6, the DC-DC converter. This part mounts vertically. **The small PC board should line up with the white line on the board, and the octagonal-shaped portion with the paper sticker should face toward the 40-pin socket.**

17 Install the 2 RJ-45 (LOR Network) connectors at J5 and J6. Start by holding the part at an angle and pushing the 8 leads slightly into their holes, with the plastic pins resisting against their holes. When all 8 leads are started into their holes, use some force to “rock” the part into place, seating the 2 plastic pins at the same time. Make sure all 8 leads are protruding through their respective holes before soldering this part.

Tip: Use static precautions when handling ICs.

Tip: Before inserting ICs, insure that the leads are perpendicular to the IC body. Typically, when shipped, ICs have the 2 rows of pins ‘splayed’ out slightly. To align these leads, lay the IC on it's side against a flat surface, and while applying downward pressure, “roll” the body of the IC slightly to straighten the row of pins. Repeat for the other row of pins.

It's important to make sure that all leads are straight and properly lined up before attempting to insert an IC into its socket. After all ICs are started into their holes, use downward pressure to force all pins into place. After inserting. Visually inspect to make sure that no pins were kinked or bent.

It is MUCH EASIER to take plenty of time and get it right the first time, than to have to remove an IC with bent pins and straighten them.

18 Insert the 40-pin CPU into its socket, with the notch on the IC matching the notch in the socket, facing the top of the board.

19 Insert the eeprom into the 8-pin socket to the right of the CPU. This part will have the designation “2GB” on the body. The notch faces down.

20 Insert the 2 ST485 ICs into the remaining two 8-pin sockets, both with the notch facing down.

21 Plug the Wiznet Ethernet module into J1A and J2A. The Ethernet connector should face the top edge of the board. Make sure that all 20 pins on each side of the module properly line up with the sockets.

This completes the assembly of the ELOR. **At this time please do a careful visual inspection of the solder side of the board. Check for solder bridges, pads that weren't soldered, 'cold' solder joints, and joints without enough solder.**

Verify that the orientation of all polarized components is correct. Verify that all IC pins are straight and properly inserted into their respective sockets. Verify that all ICs are facing the proper direction (CPU UP, all others DOWN).

Set DIP switches 1 and 6 in the ON position, all others OFF.

Initial Testing

If you will be powering ELOR from your LOR network, install a jumper (shunt) across the 2 pins near the LOR legend in the lower-left corner.

Insert the 2 supplied 4-pin female connectors into J3 and J4 (these aren't wired yet).

Testing: The easiest way to do an initial test of ELOR is to plug it into a LOR network that provides power on the CAT5 cable. With the LOR jumper in place, connect your LOR network to either of the 2 black vertical RJ-45 connectors on the left side of the ELOR board. **WARNING: NEVER CONNECT LOR CABLES TO THE ETHERNET JACK OR ETHERNET CABLES TO THE LOR JACKS!**

After a few seconds the red "LOR SYNC" LED should begin to flash. If there is data on the LOR network then this LED will go solid red after a few more seconds.

If there is no activity on the LOR SYNC LED, it's possible that your LOR network isn't providing power. In this case you will need to provide power with an external "wall wart" type transformer. These are available at Radio Shack, and you need a unit that supplies between 6 and 24 volts DC, with a current rating of at least 300ma.

It's important that you properly identify the + and - connections to your power transformer. Wire the external transformer to the 2 upper pins of the connector at J3. The top pin is +, the second pin is -. Also, **REMOVE the JUMPER at LOR when using an external transformer.**

With power applied, the LOR SYNC LED should begin flashing after a few seconds. As before, if you're connected to a LOR network and data is present, the SYNC LED will go on solid.

If the board fails this test, re-check for missed or bridged solder joints, bent IC leads, etc. If the test is successful, refer to the ELOR operating manual for installation procedures.