

IGORE PCB ASSEMBLY GUIDE

Revision 1.02

- JP5** (*green screw down post*) - holes face outwards from board
- S2** (*blue or red 4 switch dip switch*)
- JP25** (*3 pin header*) Slightly bend two of the leads toward each other before placing in the board. This will hold the header on the board while you solder
- IC5** (*voltage regulator*) Metal side toward the inside of the board (lettering faces outwards)
- C6** (*cap*) Positive toward inside of board
- C4** (*cap*) Positive toward regulator (Use the 16V 220uF cap, not the 10V cap in the IGORE 'official' kit)
- C7** (*cap*) Positive toward regulator
- R22** (*resistor*) Mount vertically (680 ohm replaced by a 1Kohm resistor in the 'official' IGORE kit)
- U\$4** (*Red LED*) Don't mount flush to the board... leave 1/4 to 1/2 inch between board and LED (for visibility). Short lead (cathode) faces away from the regulator.

SMOKE TEST : Install shunt on 2 pins closest to the regulator. Run wires to JP5. Ground is on the outside and +5.5V (or more) is toward the inside of the board. Turn on power. The red LED should light. Power down the board.

- C1** (*cap*) Mounted vertically (test fit with C3 and the 40 pin DIP socket. If the caps interfere with the socket, mount the caps on the bottom of the board.
- C3** (*cap*) Mount the same as C1
- IC1** (*40 pin dip socket*) The indentation on the socket faces toward the regulator side of the board.
- Q1** (*20.48M crystal*) Straighten the leads on the crystal in order to go through the holes. The crystal case should not be touching the board. Orientation does not matter.
- R1** (*resistor*) Mounted vertically
- U\$1** (*Green LED*) Don't mount flush to the board (leave 1/4 to 1/2 inch between board and LED. The short lead (cathode) faces toward the regulator.
- R14** (*resistor*) Mounted vertically
- JP26** (*2 pin header*) Slightly bend two of the leads toward each other before placing in the board. This will hold the header on the board while you solder
- C14** (*cap*) Mounted vertically (If using a socket for IC3, test fit C14 and the socket to see if the cap will fit on the top of the board. If not, mount the cap on the bottom of the board.
- IC3** (*socket or max232 chip*) The indentation faces toward the regulator side of the board. A socket here is not required.
- C9** (*cap*) Mounted vertically
- C10** (*cap*) Mounted vertically
- C11** (*cap*) Mounted vertically
- C12** (*cap*) Mounted vertically
- DB9** (*9 pin serial connector*) Mounted right beside IC3. It isn't necessary to solder the mounting holes.

SMOKE TEST : Apply power to the board and make sure that the red led lights. Power down and insert JP26. Insert the 18F452/16F877 into the 40 pin socket and place a max232 into the IC3 socket (if using a socket). Power up the board again and check for the red led. Power down the board and connect a serial cable to the board and a PC. Start up the bootloader application and select 'read all'. Power up the board. the bootloader app should find the board and read all the memory from it. After it is done, load the test1.hex file (found in the testproj.zip file at <http://www.ottawarobotics.org/igore>) in the app and then select program. It should send the hex file to the board. When it is done, power down the board and then back up. The green led should blink after two seconds or so. Power down the board. Remove the PIC and the max232 chip.

- JP15** (*2x2 pin header*) Slightly bend two leads before placing on the board.
- JP14** (*2x2 pin header*) Slightly bend two leads before placing on the board.
- R2** (*resistor*) Mounted vertically
- Q3** (*transistor*) The flat side of the transistor faces away from the regulator.
- R26** (*resistor*) Mounted vertically
- Q2** (*transistor*) The flat side of the transistor faces toward the regulator.

- R24** (*resistor*) Mounted vertically
- R25** (*resistor*) Mounted vertically
- C2** (*cap*) Mounted vertically (test fit C14 and the IC2 socket to see if the cap will fit on the top of the board. If not, mount the cap on the bottom of the board.)
- IC2** (*socket*) Indentation faces to the DB9 connector side of the board
- C18** (*cap*) The positive side faces toward the DB9 connector
- JP3** (*green screw down post*) Holes face outwards from board
- JP4** (*green screw down post*) Holes face outwards from board

SMOKE TEST : Power up the board. The red LED should light. Power down the board. Connect one motor to JP3 and one motor to JP4. Orientation doesn't matter for now. Place the PIC chip and the L293D chips in the sockets. Place 4 jumpers in JP14/JP15. The jumpers should be oriented left-to-right. Power up the board. The motors should spin in one direction for 2 seconds. Power down the board. Remove the PIC.

- S1** (*reset switch*) Cut trace from R1 to S1. Mount switch. Solder wire from c16 (hole close to switch) to far side of switch (on bottom of board)
- R4** (*resistor*) Mounted vertically
- R6** (*resistor*) Mounted vertically
- R8** (*resistor*) Mounted vertically
- R10** (*resistor*) Mounted vertically
- R5** (*resistor*) Mounted vertically
- R7** (*resistor*) Mounted vertically
- R9** (*resistor*) Mounted vertically
- R11** (*resistor*) Mounted vertically
- JP6** (*3 pin header*) Slightly bend two leads before placing on the board.
- JP7** (*3 pin header*) Slightly bend two leads before placing on the board.
- JP8** (*3 pin header*) Slightly bend two leads before placing on the board.
- JP9** (*3 pin header*) Slightly bend two leads before placing on the board.

SMOKE TEST : Power up the board. The red LED should light. Power down the board. Place the PIC in the socket. Connect a PC to the board and start up hyperterminal at 19200 baud. Power up the board. Pressing a1,a2,a3,a4 on the keyboard will read an analog value from JP6,7,8,9. Connect a QRD114 sensor to one of the JPs and take some readings. The value should change when it is far away from object as opposed to when it is close to objects. Power down the board and remove the chips.

- IC7** (*8 pin DIP socket*) The indentation faces away from the DB9 connector
- C13** (*cap*) Mounted vertically
- R13** (*resistor*) Mounted vertically
- R12** (*resistor*) Mounted vertically
- JP1** (*3 pin header*) Slightly bend two leads before placing on the board.
- JP2** (*3 pin header*) Slightly bend two leads before placing on the board.
- C17** (*cap*) Mounted vertically (test fit with C15 to practice mount them. C15 requires the leads to be bent slightly in order to fit correctly.)
- C15** (*cap*) See C17 for instructions
- R16** (*resistor*) Mounted vertically
- JP10** (*3 pin header*) Slightly bend two leads before placing on the board.
- R15** (*resistor*) Mounted vertically
- JP11** (*3 pin header*) Slightly bend two leads before placing on the board.

SMOKE TEST (Power up the board. The red LED should light. Power down the board. Place the PIC and the 24LC256P in the socket. Connect a PC to the board and start up hyperterminal at 19200 baud. RX and WX commands can be used to test the external EEPROM. Press a4 or a5 on the keyboard will read the Sharp distance sensor. Connect the sharp sensor to JP1 and take some readings using the a4 command. The value should change as an object is moved around in front of the robot. Power down the board and remove the chips.

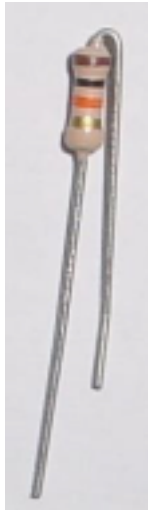
- R19** (*resistor*) Mounted vertically
- R20** (*resistor*) Mounted vertically

- R21** (*resistor*) Mounted vertically
- R17** (*resistor*) Mounted vertically - If the PT480 phototransistor is being used in U\$2, then the 22K resistors should be replaced with a resistor in the range of 10+ megaohms. In fact, R17 can be left open and the PT480 phototransistor will still work well.
- U\$2** (*light sensor*) Mounting depends on phototransistor used. If the PT480 from the 'official' IGORE kit is used, this phototransistor must be mounted with the long lead towards the inside of the PCB. Mount the phototransistor so that it stands off the board as much as possible. This mounts the phototransistor facing backwards. After mounting, it should be bent over 90 degrees so that it faces upwards to the front.
- R18** (*resistor*) Mounted vertically - If the PT480 phototransistor is being used in U\$3, then the 22K resistors should be replaced with a resistor in the range of 10+ megaohms. In fact, R18 can be left open and the PT480 phototransistor will still work well.
- U\$3** (*light sensor*) Mounting depends on phototransistor used. If the PT480 from the 'official' IGORE kit is used, this phototransistor must be mounted with the long lead towards the inside of the PCB. Mount the phototransistor so that it stands off the board as much as possible. This mounts the phototransistor facing forwards. After mounting, it should be bent slightly backwards so that it faces upwards to the front.
- JP21** (*4 pin header*) Slightly bend two leads before placing on the board.
- JP19** (*4 pin header*) Slightly bend two leads before placing on the board.
- JP20** (*4 pin header*) Slightly bend two leads before placing on the board.
- JP13** (*10 pin header*) Slightly bend two or more leads before placing on the board.
- JP17** (*3 pin header*) Slightly bend two leads before placing on the board.
- JP16** (*3 pin header*) Slightly bend two leads before placing on the board.
- JP18** (*3 pin header*) Slightly bend two leads before placing on the board.

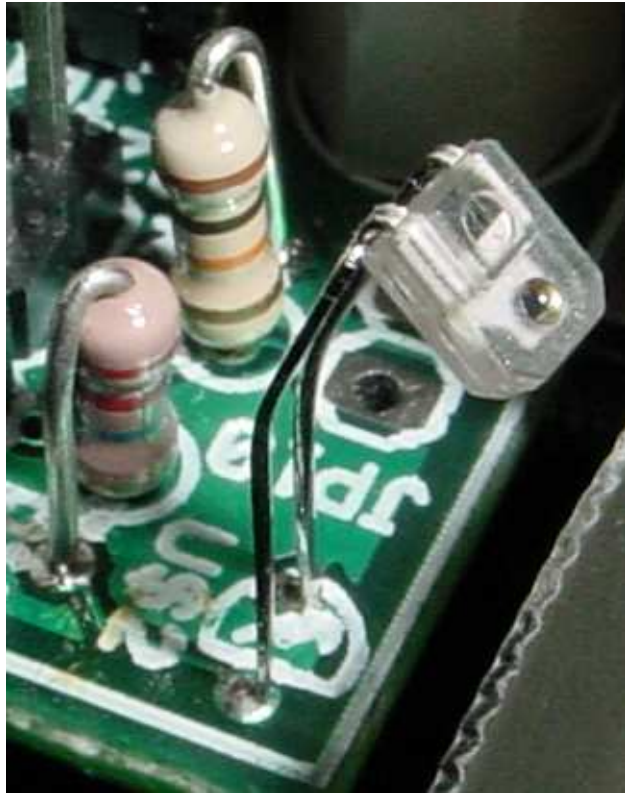
DONE : Mount motors and have fun!



Vertically Mounted Capacitor



Vertically Mounted Resistor



Left PT480 Phototransistor Mounting



Right PT480 Phototransistor Mounting

