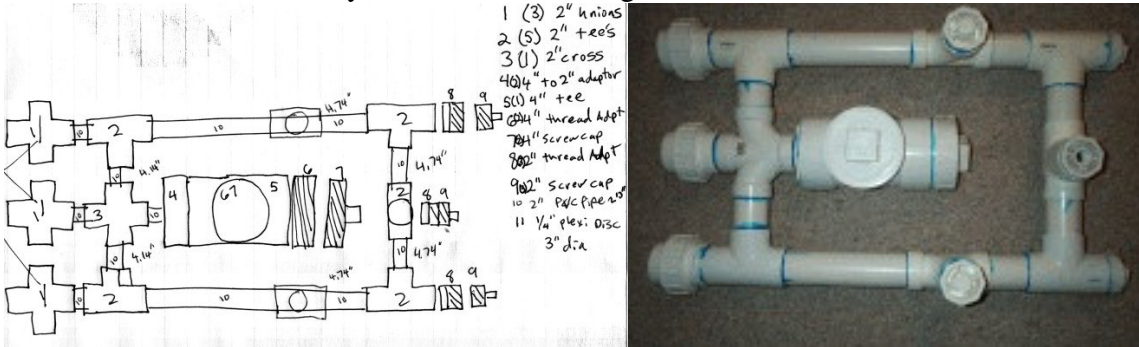


Basics of building the ROV Rev2

www.rollette.com/rovrev2

1. Assemble the PVC pipe hull as shown below. All pieces are off the shelf parts. The only parts that need to be cut to length are the 2" pipe. This can easily be done with any hand saw. Glue all pieces following the direction on the PVC glue you purchased. On any threaded part be sure to use plenty of Teflon plumbers tape to prevent leaks. Part number 1 in the diagram above is the 2" union this part needs to be put on with the rubber gasket closest to the main body of the ROV. These gaskets seal the ROV windows.

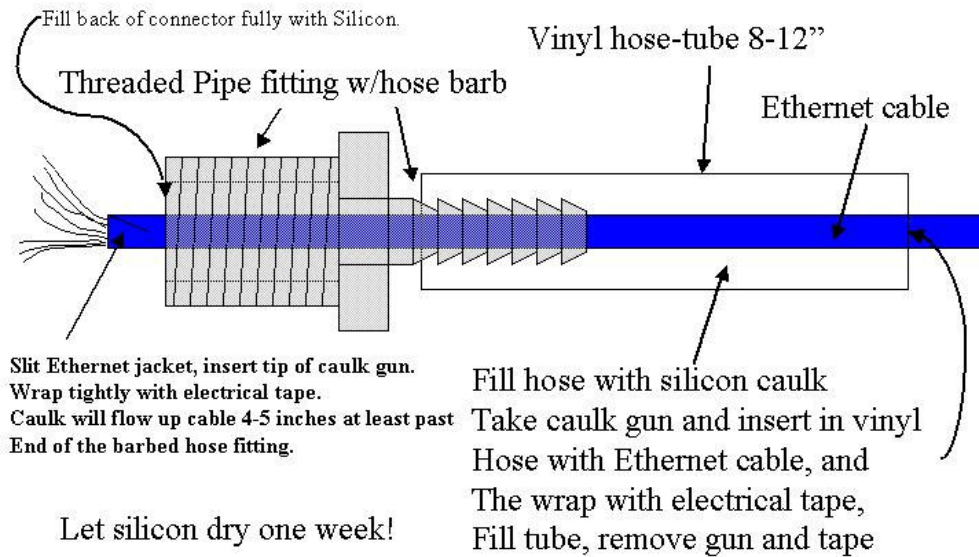


2. Let the PCV glue dry over night, then use white plastic prime to paint the ROV, then after that is dry paint the ROV with Yellow paint. Paint the ceiling tile grate black.
3. Disassemble the Flash lights. Keep only the reflector. Remove the bulb and replace with a 12V low watt bulb. (too high will melt the plastic reflectors) Solder 24" red and black wire to the battery tab and to the metal ring of the reflector. You will have to cut and sand down the reflectors to fit inside the PVC unions, but they are a very close fit.
4. Cut the ceiling tile grate in a U shape to fit between the PVC pipes. Use the black cable ties around the PVC pipe, and through the ceiling tile grate.



5. Mount the bilge pump motors as shown, with the nozzles pointing in the correct direction. The bilge pumps are mounted to the ceiling tile grate via 1/4-20 bolts and nuts and large fender washers.
6. The wires are bundled together and woven between the grates and cable tied. The wires are not long enough from the bilge pumps so there need to be wires soldered or butt connectors put on them. (they need to be extended about 3 feet) For the enter in the sub all 12 wire must fit into through a hose barb and vinyl hose. Run wires into center 4" tee.

Jason Rollette's Water proof connector

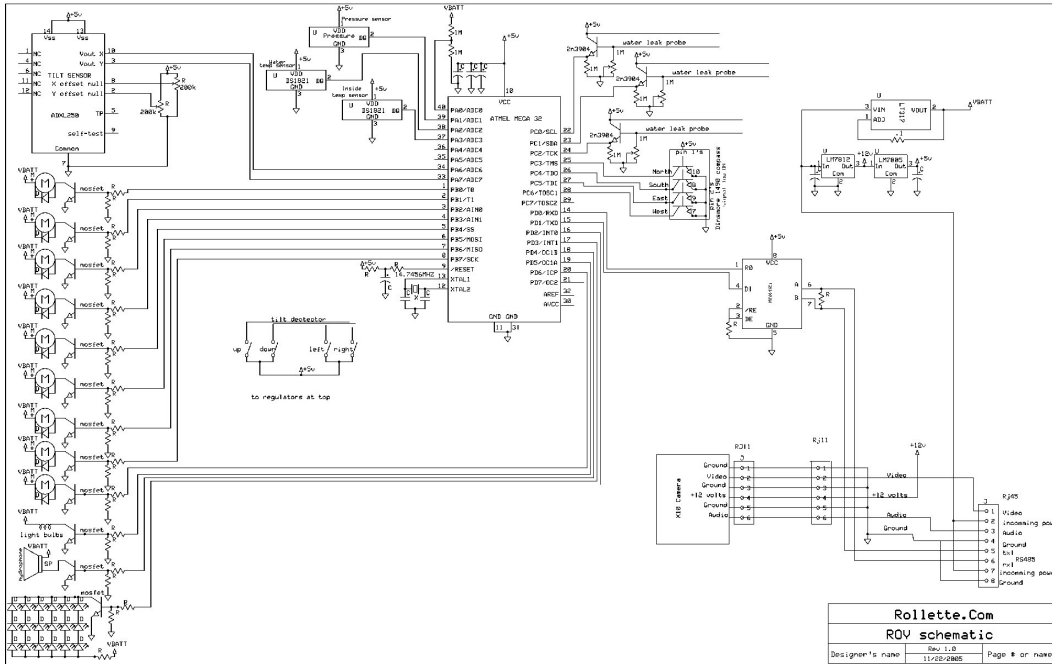
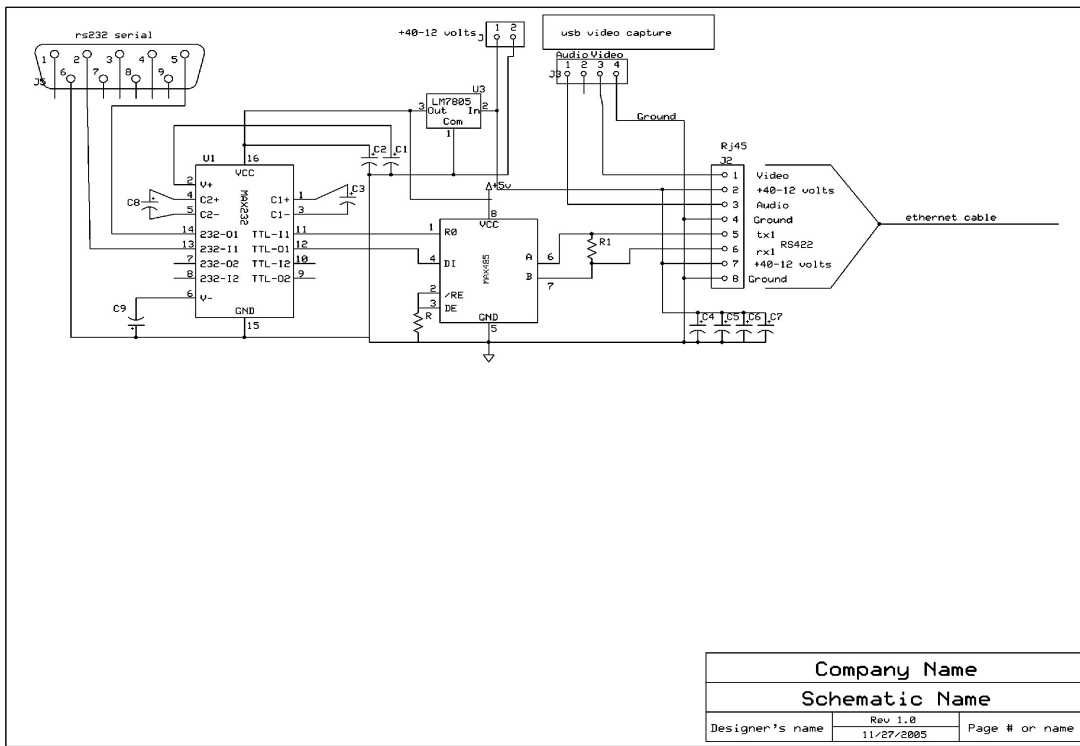


Build Ethernet connector as shown above leaving feet of wire on the inside.

7. Run the hoses for the thrusters as follows, and cable tie where appropriate. The hoses can be tipped with hose barb reducers to increase thrust if needed. I used U bolts to go around the back and entry point to the large center tube. To help aim the up/down and forward hoses.

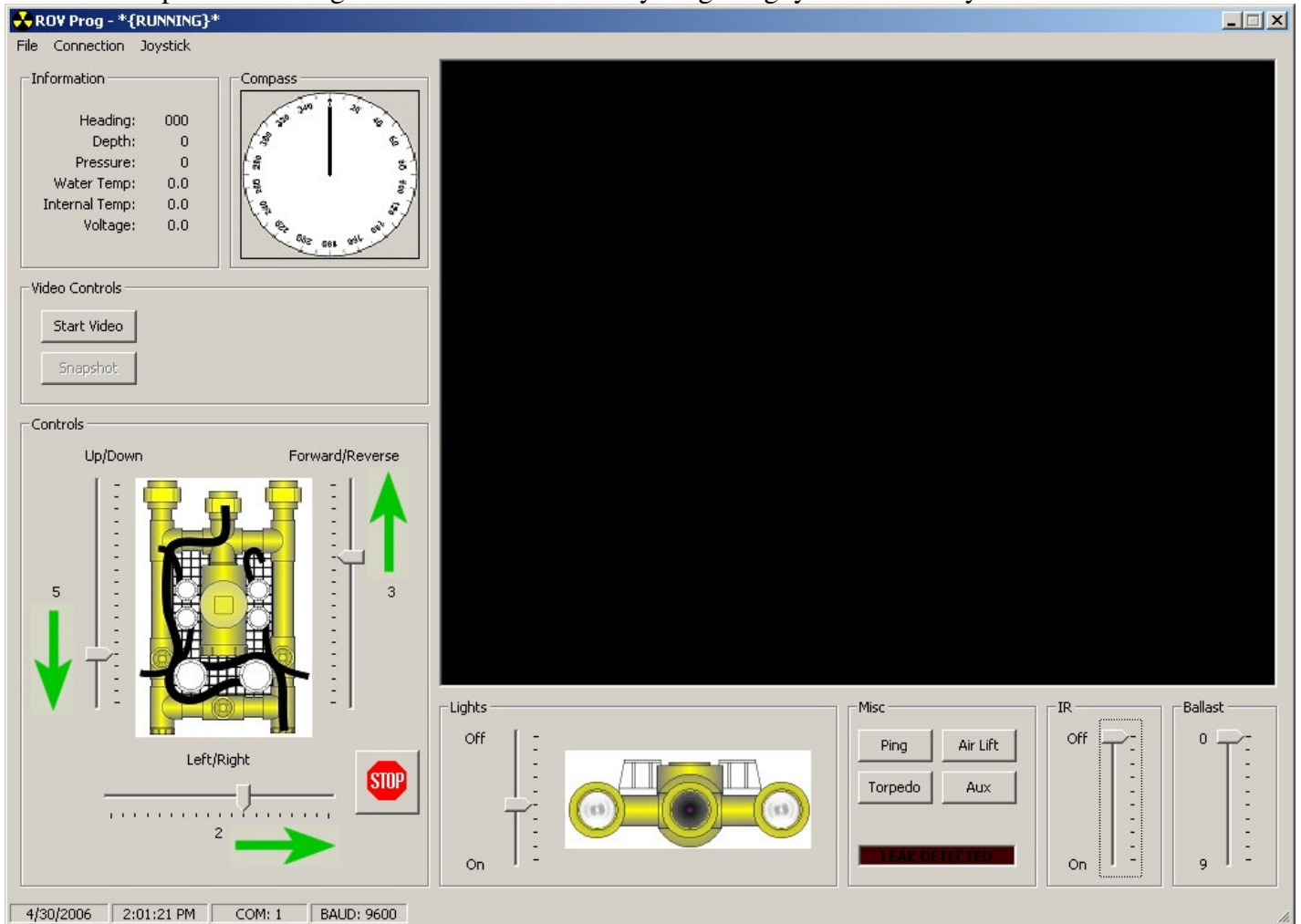


8. Build circuit by either making circuit board if you are familiar with that or build the circuits on perf board following these schematics. If you need more detail, or the board layouts they are available at my web site www.rollette.com/rovrev2



9. The program for the Mega32 is available from my web site. It is written in basic using the Bascom Program from MCS ELECTRONICS. It can be downloaded here. http://www.mcselec.com/index.php?option=com_docman&task=cat_view&gid=99&Itemid=54 there are tons of user groups to help with AVR programming I use this one www.avrfreaks.com

10. The ROV is controlled via a visual basic interface that looks like this. There are commands are sent via the RS232 serial port. This Program was written for me by I a great guy that found my web site Bill Travis.



Here are the serial commands from Visual Basic or HyperTerminal. The values are a lower case letter each followed by a value from 0-9 and a carriage return. Value "0" being off. a0-9 = Forward, b0-9 = Reverse, c0-9 = Left, d0-9 = Right, e0-9 = Up, f0-9 = Down, g = Ping, h = Air Lift, i = Torpedo, j = Aux1, k0-9 = ballast, l0-9 = Lights, m0-9 = IR lights,

Commands received from processor: When the sub is first turned on it sends back "Ready"

Commands are in UPPER CASE followed by a number in the range ex.: C56 means the compass is sending back a reading of 56 degrees. C Compass direction (in degrees) 1-360, L Leak message 0 = no leak, 1 = leak, P Pressure (in PSI) 0-500, TI Internal ROV temperature (in degrees Fahrenheit) 0-100, TW Water temperature (in degrees Fahrenheit) 0-100, V Battery Voltage 1-20, X -90 - +90 tilt angle(front to back vertical), Y -90 to +90 tilt angle(left to right horizontal).

11. The Ethernet cable needs to have floats every 10 feet or so to keep it semi afloat I used hose insulation cut in 1.5" lengths and cable tied every 10 feet or so.



12. Here is the finished ROV in the water.



13. Part list

ROV PARTS LIST

X	item qty	part desc	where aquired	part number	cost
	1	3 2" pcv Union (must have rubber gaskets in the middle)	hardware store/Home Depot type place		
	2	7 2" pvc tee	hardware store/Home Depot type place		
	3	1 2" 4 way pcv cross	hardware store/Home Depot type place		5
	4	2 4" to 2" pcv adapter	hardware store/Home Depot type place		
	5	1 4" pvc tee	hardware store/Home Depot type place		
	6	2 4" threaded adapter	hardware store/Home Depot type place		
	7	2 4" screw pcv cap(might come with above part)	hardware store/Home Depot type place		
	8	2 2" pcv threaded adaptor	hardware store/Home Depot type place		
	9	2 2" screw pcv cap(might come with above part)	hardware store/Home Depot type place		
	10	1 2" pvc pipe long than 3 feet	hardware store/Home Depot type place		
	11	3 1/4" thick 3" dia plexi glass disc	msmaster.com	8581K34	2.24
	12	3 2" to 1" threaded reducer(for add on's, and rear ethernet cable entry)	hardware store/Home Depot type place		
	13	2 1" plug(for add on's plugs)	hardware store/Home Depot type place		
	14	1 light grate 2'x4' ceiling tile type (cut to shape to fit between pipes)	hardware store/Home Depot type place	(find a broken one and ask for a discount)	
	15	2 flashlights 2"(to seal reflectors, bulbs) 2 C battery size	hardware store/Home Depot type place		
	16	3 yellow paint (for painting pvc hull)	hardware store/Home Depot type place		
	17	2 black paint to paint ceiling light grate, and ribbed hoses	hardware store/Home Depot type place		
	18	1 white primer (for plastics) (pcv hull)	hardware store/Home Depot type place		
	19	1 pcv glue	hardware store/Home Depot type place		
	20	1 pcv glue primer/cleaner	hardware store/Home Depot type place		
	21	2 Attwood 1250 builge pumps (rule pumps also acceptable)	http://www.sportsmansguide.com/		29
	22	4 Attwood 500 builge pumps (rule pumps also acceptable)	http://www.sportsmansguide.com/	pg56	13
	23	2 12v Sealed lead acid battery 7"X1.3"X2.4" 12V/2.3MAH (TY-12-2.3)	http://www.jameco.com/	264031PS	15.5
	24	1 black cable ties 14" (pack of 100)	hardware store/Home Depot type place		
	25	1 1 1/8" I.D. plastic ribbed hose	hardware store/Home Depot type place		
	26	2 1.25 hose clamps	hardware store/Home Depot type place		
	27	1 3/4" I.D plastic ribbed hose	hardware store/Home Depot type place		
	28	4 3/4" hose clamps	hardware store/Home Depot type place		
	29	1 camera (composite video out) (just make sure it is small) I used x10 xcam	http://x10-store.esurfnet.com/X10/camerasystems/wired_xcam.html		
	30	100-500ft ethernet cable	computer store/online		
	31	2 3/4" threaded to 1/2 barbed hose nylon adaptor(wire extrenal connectors)	hardware store/Home Depot type place		
	32	1 10 foot rool of 1/2 clear hose (wire extrenal connectors)	hardware store/Home Depot type place		
	33	1 tube of clear silicon caulk (wire extrenal connectors squirt in plastic tube)	hardware store/Home Depot type place		
	34	1 bag 1/2 foam pipe isulator (cut in 1.25" lenghts and cable tie to ethernet cable)	hardware store/Home Depot type place		
	35	16 1/4-20 bolts, fender washers, nuts (to bolt down builge pumps)	hardware store/Home Depot type place		
	36	3 1/4-20 U bolts with plate (forgot size I think they were 3" and 5" long)	hardware store/Home Depot type place		
	37	2 deep cycle marine batteries 12v or 24-35 volt power supply			
	38	50ft red and black 16 guage wire	hardware store/Home Depot type place		
	39	1 USB to avi capture device (to view and record video to laptop)	http://www.hauppauge.com/pages/products/data_usblive.html		
	40	1 laptop computer (specs based on video capture device) and 1 serial port	hopefully you have one already		
	41	1 motor for manuliptor hand	http://www.robotobjects.com/scripts/prodView.asp?idproduct=390		
	42	1 Elder reach extender (used for manipulator)	Medline 31" Reacher (not the exact one I used but very close)		
	43				

Electronics

top side board					
X	item qty	part desc	where aquired	part number	cost
	1	Description			
	2	9 pin Sub D connector	Allied Electronics	512-0460	
	3	RS232 converter	Allied Electronics	773-0034	
	4	(4)1uF radial Electrolytic	Allied Electronics	613-0204	
	5	485 converter(max485)			
	6	100uF Radial Electrolytic	Allied Electronics	613-0210	
	7	(5).1uf radial cap	Allied Electronics	507-0608	
	8	7805 5 volt regulator	Allied Electronics	288-0001	
	9	RJ45 connector	Allied Electronics	625-0360	
	10	1k .25 watt	Allied Electronics		
	11	Copper clad 4x6 single side	Allied Electronics	661-0450	
Bottom side board/s					
	1	7812 12 volt regulator	Allied Electronics	288-0264	
	2	7805 5 volt regulator	Allied Electronics	288-0001	
	3	lm317t constant current	Allied Electronics	288-1251	