OpenCTD Build Notes

Key website documentation:

https://github.com/OceanographyforEveryone/OpenCTD/tree/main

```
    (26.10.2023)
    Trying to print the base parts:
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OpenCTD_14Bar_Baseplate.3mf
OpenCTD_ElectronicsChassis_Bottom.3mf
OpenCTD_ElectronicsChassis_Top.3mf
Printing using standard high resolution settings (0.1mm)

The manual contain the full list to for the system.

https://github.com/OceanographyforEveryone/OpenCTD/blob/main/Documentation/Manual/OpenCTD_ConstructionOperation.pdf

Table List of Tools

	Item	Description	Link	Price (€)
0	2" Schedule 40 PVC	PVC pipe housing	https://amzn.eu/d/9RE9npF	28.94
1	Oatey/Cherne 270229 Mechanical Test Plug	Test cap for sealing housing	https://amzn.eu/d/hpYW2Dc	21.3
2	Hose clamp (AB-36/46mm to 70mm)	For attaching CTD to line	https://amzn.eu/d/hlP2ToO	12.99
3	1/4" PolyPro Rope	For casting loop	https://amzn.eu/d/96QrTTA	6.04
4	Custom Carrier Board	Custom PCB for M0-based OpenCTD	https://a.co/d/hlJF9NW	12.99
5	Adafruit Feather M0 Adalogger	Microcontroller	https://www.adafruit.com/product/2796	19.95
6	SanDisk MicroSD Memory Card	For data logging (32 GB)	https://amzn.eu/d/2hvkoWo	7.9
7	Adafruit DS3231	Real-time clock	https://www.adafruit.com/product/3013	17.5

	Item	Description	Link	Price (€)
	Precision RTC Breakout			
8	CR1220 3V Coin Cell Battery	To power RTC	https://amzn.eu/d/gCg9msD	6.64
9	Atlas Scientific EZO Conductivity Circuit	Measures conductivity	https://www.atlas-scientific.com/product_pages/circuits/ezo_ec.html	64.34
10	Short Feather Female Headers	For connecting components **Note:** price is $1.50 at https://www.adafruit.com/product/2940	https://amzn.eu/d/8pYWu5n	7.9
11	Short Feather Male Headers	For connecting components	https://amzn.eu/d/7cqgn3I	6.3
12	7-pin JST Header/Cable Bundle	For connecting sensors	https://amzn.to/35Uvh3i	13.24
13	MicroUSB Cable	For programming Adalogger	https://amzn.eu/d/9dhyQFl	9.89
14	10 kΩ Resistor (2)	Pull-up resistors	https://a.co/d/0UemIet	6.75
15	4.7 kΩ Resistor (1)	Pull-up resistor	https://a.co/d/fmMIEwg	6.16
16	Adafruit DS3231 Precision RTC FeatherWing	Real-time clock	https://amzn.eu/d/ilk9QE7	21.99
17	Adafruit Stacking Headers	For connecting RTC	https://amzn.eu/d/4mRsWOw	2.8
18	Adafruit Perma-Proto Small Breadboard PCB	For protoboard version	https://www.adafruit.com/product/1214	7.52
19	Right Angle Female PCB Header	For connecting sensors	https://amzn.eu/d/3GeCrMg	8.69

	Item	Description	Link	Price (€)
20	Solid Core Wire	For wiring protoboard	https://a.co/d/1AvOppX	6.77
21	DS18B20 Temperature Sensor in Stainless Steel Housing	Measures temperature	https://a.co/d/24QHySY	7.99
22	Atlas Scientific K 1.0 Mini Conductivity Probe	Measures conductivity	https://www.atlas-scientific.com/product_pages/probes/ec_k1-0-mini.html	123.99
23	Atlas Scientific K 1.0 Conductivity Probe	Measures conductivity	https://www.atlas-scientific.com/product_pages/probes/ec_k1-0.html	157.99
24	MS5803-14BA Pressure Sensor Breakout	Measures pressure	https://amzn.eu/d/5gxiEdw	79.23
25	MS5803-14BA Pressure Sensor SMC	Pressure sensor chip	https://www.digikey.de/en/products/detail/te-connectivity-measurement-specialties/MS580314BA01-00/5277631	23.63
26	SOIC to DIP Adapter	For pressure sensor	https://amzn.eu/d/af9ZiLB	8.9
27	0.1 uF Capacitor	For pressure sensor	https://amzn.eu/d/1xP2igW	3.29
28	Lithium Ion Battery Pack 3.7V 2000 mAh	Battery for OpenCTD	https://amzn.eu/d/fCoCx4s	17.09
29	Board-mounted switch	Internal power switch	https://amzn.eu/d/fWvyRN0	1.39
30	10mm X 3mm Round Rare Earth Magnet (2)	For external power switch	https://amzn.eu/d/9pozHcp	5.45
31	10mm round double-sided adhesive	For external power switch	https://amzn.eu/d/1QpS0St	3.99

	Item	Description	Link	Price (€)
	mounting dots (2)			
32	3-ounce fishing weights	For ballasting CTD	https://amzn.eu/d/6NfMGLj	12.99
33	Half-size breadboard	For testing circuits	https://amzn.eu/d/2MireJq	11.99
34	Screw Terminal Block Extra Long Pins for Breadboarding (3)	For connecting sensors during testing	https://amzn.eu/d/iAapgTb	8.15
35	Alligator Clip	For connecting sensors during testing	https://amzn.eu/d/3pOo5o1	16.94
36	Jumper Wire	For breadboard connections	https://amzn.eu/d/1Gj9Boa	5.94
37	SD Card Reader	For reading data off SD card	https://amzn.eu/d/5UwB0Bg	8.99
38	Polymaker Polyterra Matte PLA Filament 1.75mm	For 3D printing OpenCTD parts	https://amzn.eu/d/1IaV7zc	19.99
39	Lead Free Solder Wire	For soldering	https://amzn.eu/d/0mmwid1	7.99
40	3M Scotch #35 Electrical Tape	For protecting wires	https://amzn.eu/d/bbKJci3	9.97
41	Hook-up Wire Spool Set - 22AWG Solid Core	For wiring protoboard version	https://amzn.eu/d/gTsIFTj	16.98
42	Hook-up Wire Spool Set - 22AWG Stranded-Core	For wiring connections	https://amzn.eu/d/hW4vHQd	19.99
43	Multi-Colored Heat Shrink Pack	For protecting solder joints	https://amzn.eu/d/3ALWADp	11.99
44	3M Garnet Sandpaper, 9-	For sanding housing	https://amzn.to/3vCfaQ9	5.19

	Item	Description	Link	Price (€)
	Inch by 11-Inch			
45	Loctite 219298 Gray E-90FL Hysol Epoxy	For potting sensors	https://amzn.to/315kQ6V	28.43
46	3M Static Mixing Nozzle, 38193, 50 mL	For mixing epoxy	https://amzn.eu/d/4XpFAMl	14.39
47	Loctite Epoxy Five Minute Instant Mix	For potting pressure sensor	https://amzn.eu/d/holQKbk	11.44
48	Soldering Irons (various options)	For soldering work	nan	
49	Solder Tip Cleaner	For cleaning soldering iron tip	https://amzn.eu/d/fnkOCpw	
50	Helping Hands	For holding boards during soldering	https://a.co/d/diWIlU2	35.99
51	Needle-nosed pliers	For electronics work	nan	
52	Utility knife	For cutting/stripping wire	nan	
53	Hand saw	For cutting PVC housing	nan	
54	Epoxy gun	For dispensing epoxy	https://a.co/d/ib49yFm	15.95
55	Glue gun	For gluing parts	nan	
56	Drill	For drilling housing	nan	
57	1-inch spade bit	For drilling housing	https://a.co/d/52iOvDd	5.91
58	Router	For cutting slots in housing	nan	
59	Chop saw	For cutting PVC housing	nan	
60	3D printer	For printing parts	nan	
61	Deburring tool	For finishing 3D printed parts	https://amzn.eu/d/1uufYkG	14.59
62	Computer	For programming Adalogger	nan	
63	Micro-USB cable	For connecting Adalogger to computer	nan	
64	Conductivity calibration	For calibrating conductivity probe	https://atlas-scientific.com/calibration-solutions/conductivity-calibration-k-1-0-set/	15.89

	Item	Description	Link	Price (€)
	solution			
65	openrov 30bar IMU	Waterproof IMU	https://amzn.eu/d/fEwTTNr	10.99

Screenshots of the Parts and tools

3D-printed parts

Magnetic Switch Assembly

Sensor Baseplate for Sparkfun/DIY Pressure Sensor

Electronics Chassis for Protoboard Option

Sensor Baseplate for OpenROV IMU

Protective Cap

Sensor protector

Housing

Schedule 40 PVC Pipe

Oatey Plumber's Test Cap

46 to 70mm Hose Clamp

Short Length of Polypro Rope

OpenCTD Rev6 Custom Carrier Board

Custom Carrier Board

Adafruit Adalogger M0

SD Card

Real-time Clock Module

CR1220 Coin Cell Battery

Atlas EZO Conductivity Circuit

Female Headers

Male Headers
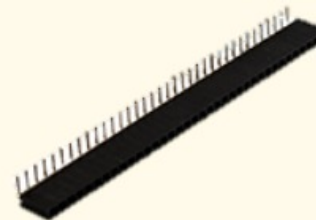
7-pin JST Header

MicroUSB Cable

10 kOhm resistor

4.7 kOhm Resistor

Protoboard Control Unit
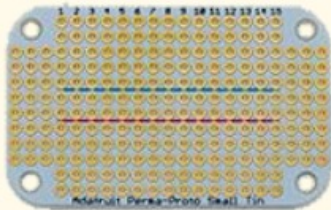
Atlas EZO Conductivity Circuit

Right angle headers

Solid core wire

10 kOhm resistor

4.7 kOhm Resistor

Sensors

Temperature Sensor

Conductivity Probe

Sparkfun 14-Bar Pressure Sensor
Breakout Board

JST Female Connector

Adafruit Adalogger M0 and Real-time Clock Featherwing

Adafruit Adalogger M0

Adafruit Real-time Clock Featherwing

Male Headers

Female Headers

Extra Long Headers

MicroUSB Cable

3V CR 1220 Coin Cell Battery

SD Card

Alternative Pressure Sensors

DIP to SOIC Adapter

Pressure Chip on DOIC to SOIC Adapter

10 kOhm Resistor

0.1 uF Capacitor

OpenROV

OpenROV 30bar IMU

Baseplate for 30 bar IMU

Power and Ballast

Battery

Board-mounted Switch

10 mm Magnet for External Switch

Assorted weights for ballasting CTD

String of weights to ballast the OpenCTD

10mm double-sided stickers for external switch

Accessories

Solderless Breadboard

Screw Terminals

Alligator Clip
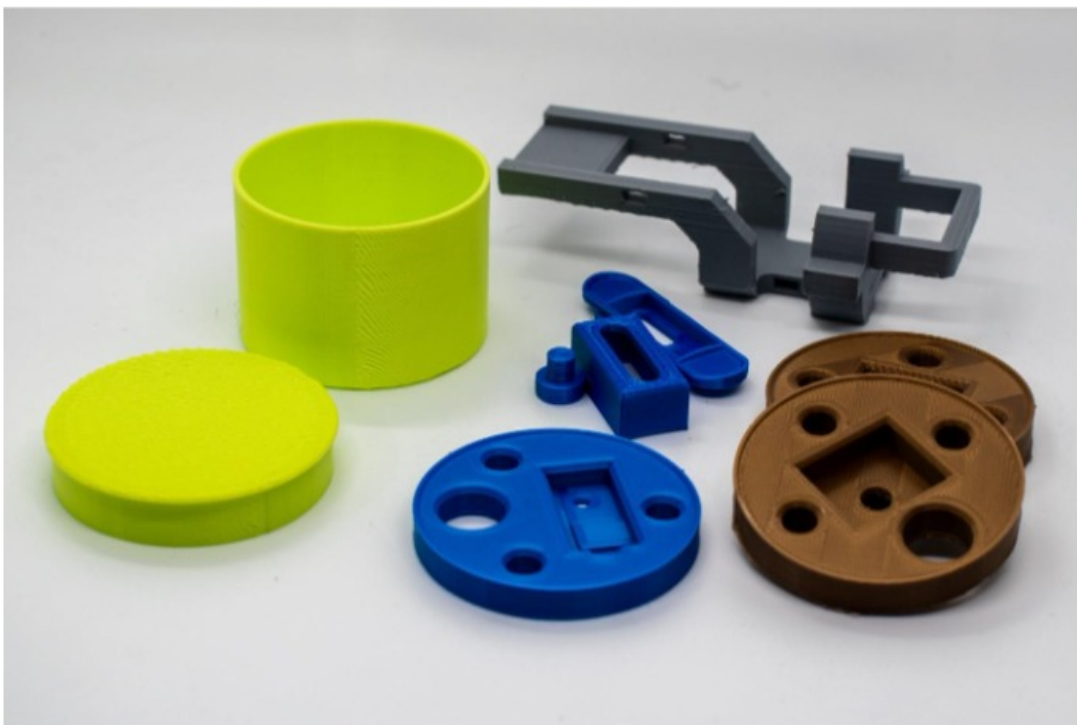

Jumper wire

SD Card Reader

Figure 2: 3D-Printed parts for OpenCTD.
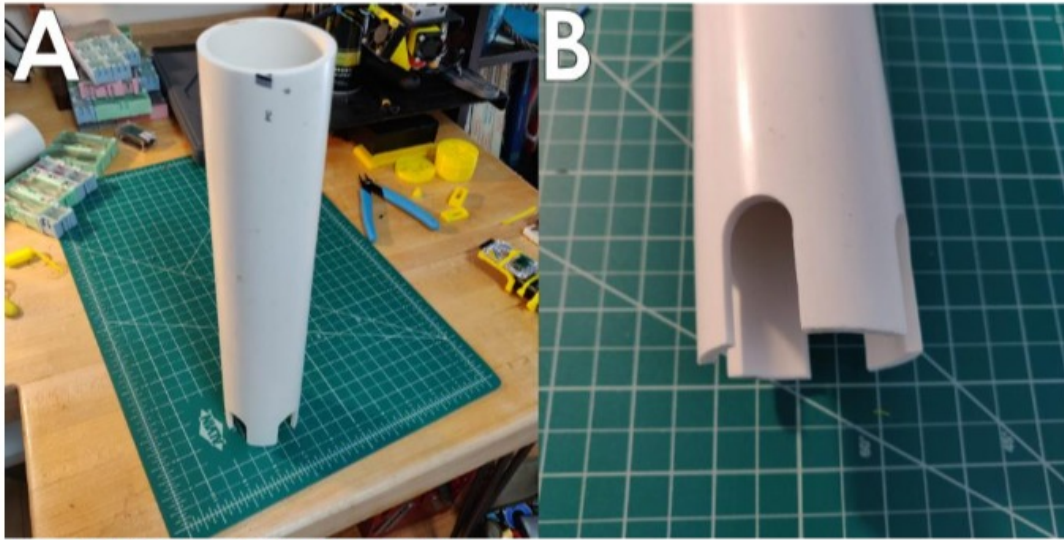
OpenCTD 3D Printed Structural Components:

Figure 3. 12" PVC pipe (A) with notches cut at the base (B).

Some Tools Available