



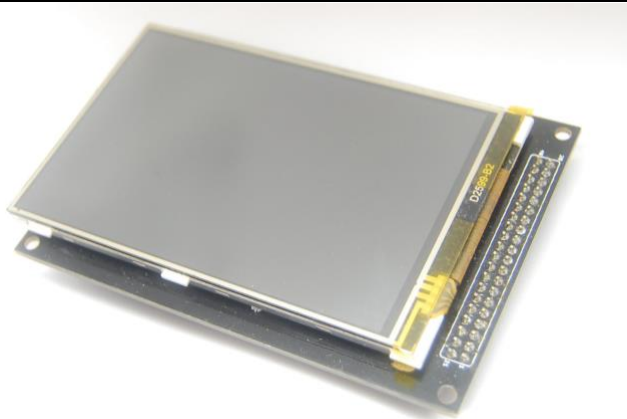

## Caveatron Bill of Materials


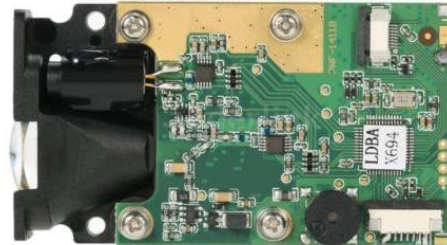

**Hardware Revision: B**

**Date: 2020-02-20**

All the parts in this list have been tested with the Caveatron and integrated into the code. For some parts, alternate options are available.

Item	Qty	Manufacturer	Mfr. P/N	Description	Suggested Vendor Link	Photo
Main Processor	1	PJRC Electronics	Teensy 3.6	Teensy 3.6	<a href="#">PJRC Store</a>	
<b>Notes:</b> <i>The main system processor.</i> Available from multiple vendors. Versions with and without the pins pre-installed are available (link above is with pins).						
Touchscreen LCD  <b>OPTION 1</b>	1	Coldtears Electronics	N/A	3.5 inch TFT LCD module w/Font IC 480x320 full angle Arduino DUE MEGA 3.2 4.3	<a href="#">Ebay</a>	
<b>Notes:</b> <i>The display and user interface.</i> Although slightly smaller, the contrast and viewing angle make this the preferred choice.						

Item	Qty	Manufacturer	Mfr. P/N	Description	Suggested Vendor Link	Photo
Touchscreen LCD  <b>OPTION 2</b>	1	Coldtears Electronics	N/A	4.0" inch TFT LCD module w/Font IC 480x320 ILI arduino DUE MEGA 3.2 2.5 STM32	<a href="#">Ebay</a>	
<b>Notes:</b> <i>Alternate display.</i> Same resolution as the 3.5" but in a larger size. The angle viewing contrast is not as good as the 3.5" display.						
Graphics Module (SPI Flash Memory)	1	Multiple (Winbond IC)	W25Q64 or similar	W25Q64 64Mbit 8MByte Flash Memory Module Data Flash SPI Interface	<a href="#">Amazon</a>	
<b>Notes:</b> <i>Storage for fonts and graphics used in the GUI.</i> SPI Flash memory must be Winbond W25Q32, W25Q64, or W25Q128 (memory size should be 32Mbit or higher.) Winbond W25Q16 (16 Mbit) could be used, but will only hold the fonts and not support the graphics.						

Item	Qty	Manufacturer	Mfr. P/N	Description	Suggested Vendor Link	Photo
Laser Rangefinder  OPTION 1	1	Uni-T	UT390B	Laser Distance Meter	Ebay. Availability very limited and changes frequently.	
<b>Notes:</b> Used for station distance measurements. This item is long since discontinued but can still be found online from a few sources. Do not confuse this with the UT390B+, which is widely available but does not have an accessible serial port, so is not useable. The UT390B+ has a bubble level in the upper left which the UT390B does not. The UT390B must be disassembled and the LCD removed to access the electronics board. The JRT rangefinder (OPTION 2) has wider availability, but has operational disadvantages. The UT390B remains the preferred rangefinder if you can find one.						
Laser Rangefinder  OPTION 2	1	JRT Meter Tech., Co, Ltd.	Unknown	100m Laser Distance Sensor Module	Ebay Availability changes frequently.	
<b>Notes:</b> Used for station distance measurements. This rangefinder module is similar in size to Option 1 above and is easier to find. However, it's method of operation is less well suited to the Caveatron since it has a variable measurement time (rather than the UT390B's fixed 1 sec measurement time) and can take up to 3 sec to acquire a reading or timeout. This means that when scanning in Passage mode, you can end up with fewer reference points and a less accurate scan.						
Laser Rangefinder  OPTION 3	1	JRT Meter Tech., Co, Ltd.	Unknown	40m – 60m Laser Distance Sensor Module	Ebay Availability changes frequently.	
<b>Notes:</b> Used for station distance measurements. This rangefinder module has not been tested but it appears to operate with an identical protocol to the Option 2 rangefinder, so would be compatible. However, it also likely has the same performance considerations. It is significantly smaller than the others.						









[illegible]





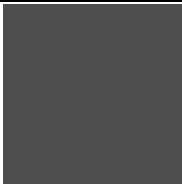


[illegible]



[illegible]

[illegible]

[illegible]



Laser Rangefinder Optical Filter	1	Rosco	299	Roscolux 1.2 Neutral Density Filter, 20x24"	<a href="#">Adorama</a>	
<b>Notes:</b> Filters rangefinder receiver to only accept readings from the retroreflective card.						
Item	Qty	Manufacturer	Mfr. P/N	Description	Suggested Vendor Link	Photo
Screen Protector	1	Supershieldz	N/A	iPhone SE and iPhone 5 Screen Protector	<a href="#">Amazon</a>	
<b>Notes:</b> Protection film for touchscreen. Needs to be cut to length. Most any PET screen protector film for iPhone 4, 4S, 5, 5s, or SE should work as they have the same screen width as the 3.5" LCD. Multiple vendors produce a similar product.						
Strap Attachment Hardware	1	122317	Hillman Group	D-Ring Hangers	<a href="#">Lowes</a>	
<b>Notes:</b> Small D-rings for attaching neck strap. Available from multiple sources and similar parts likely available from other vendors.						

Neck Strap	1	DOROM	N/A	DOROM Universal Adjustable Slim Shoulder Sling Neck Strap for All Camera DSLR SLR	<a href="#">Amazon</a>	
<b>Notes:</b> <i>Neck Strap.</i> This neck strap works well, but other options are available. Recommend a nylon camera strap of 52-60" in length and about 3/8" wide in the ends.						
O-Ring Seals	4 ft	The O-Ring Store	N50.103/10	0.103" (2.62mm) Buna-N 50 O-Ring Cord Stock, 10' Piece, Black	<a href="#">O-Ring Store</a>	
<b>Notes:</b> <i>O-Ring material for seals in main enclosure and LIDAR module.</i> This 50 durometer material is preferred over more readily available 70 durometer since it is softer and can make a tighter seal. Must cut to length and glue ends (this vendor also sells O-ring glue in small quantities.) Other vendors sell similar material.						

#### Other Required Items:

PETG Filament for 3D Printing  
 Caveatron Printed Circuit Board  
 CR2032 Battery  
 Single row male headers  
 Single row female headers  
 Double row female headers 2x20 (for 40 pin LCD Connector)  
 6-32 x 1/2" Flat Head Screws (8x)  
 6-32 x 1/2" Pan Head Screws (2x)  
 6-32 x 3/8" Pan Head Screws (2x)  
 6-32 x 9/16" Pan Head Screw (1x)  
 6-32 Nut (3x)  
 O-Ring Glue  
 Epoxy  
 Single sided foam tape  
 Tape (Kapton or electrical)  
 Heat shrink tubing  
 Solder

**Notes:** *For assembly and electrical interconnections between boards.* Several sizes of standard hardware required. More information in assembly instructions.



**Date: 2019-11-07**

**Notes:** *Provide attachment point to retroreflective card. Place it near one corner on the side without the retroreflective sheet.*