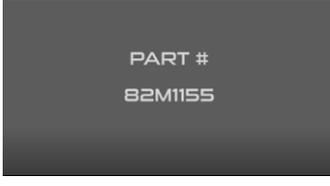
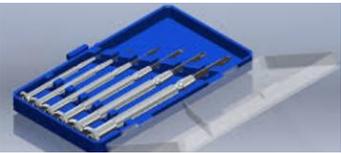


**ROBOTICS 101: WORKSHOP 2.3 HAND TOOLS KIT FOR ELECTRONICS and PROTOTYPING**

In this workshop we have been looking at breadboards, and how to use them to build temporary electronic circuits. In order to work with wires, electronic components and test circuits, you will need some small hand tools in order to cut and strip wires, and place the electronic components on the breadboard. Check out our video on electronics tools.

<p><b>SIDE CUTTERS</b></p> 	<p><b>PART # 72M1760</b></p> 	<p>Precision electronics-type clippers are important to cut breadboard and other wires to the correct length, also to shorten the length of wires on electronics components where required. Purchase clippers like the ones in the video. Once you are skilled you may be able to use the clippers to strip insulation, but you could nick and damage the wire while trying to strip away the insulation so it would be better to buy a dedicated wire stripping tool.</p>
<p><b>LONG NOSE PLIERS</b></p> 	<p><b>PART # 72M1858</b></p> 	<p>Precision long nose pliers are required to hold small parts, and bend wires to the required shapes. Make sure that inside the "jaws" the long nose pliers are serrated as parts will jump out of the jaws of pliers that have smooth jaws. Long nose pliers can be used in tightening and loosening nuts and bolts, but it is better to use the proper tools for that purpose and get a set of fine screwdrivers and a socket set for that purpose.</p>
<p><b>TWEEZERS</b></p> 	<p><b>PART # 15M5806</b></p>	<p>Tweezers can be used to hold very small parts, and get into difficult to reach places. However, if one has to choose between long nose pliers and tweezers then long nose pliers would be the more useful choice. Pay about R20 for one.</p>
<p><b>PEN TYPE SCREWDRIVER</b></p> 	<p><b>PART # 330M1957</b></p> 	<p>Fine pointed screwdrivers are required for electronics. Save some money and get a double-sided pen-type screwdriver that will fit in your pocket with four points, two flat tips and two star point tips. Alternatively, if you have a larger budget get a variety of quality screwdrivers with fine points that will be suitable for working on electronic equipment.</p>
<p><b>HEX KEYS</b></p> 	<p><b>PART # 14M2638</b></p> 	<p>Hex keys [also known as allen keys] are useful for working on many types of professional electronic equipment that use this type of fastener. Where equipment does not have screws with star or slot point screwdrivers, held together with cap head type screws, these are handy for opening things up. The most important thing to remember is if equipment is not broken do not try to fix it, as most often once you are done it won't work any more.</p>
<p><b>WIRE STRIPPING TOOL</b></p> 	<p><b>PART # 82M1155</b></p> 	<p>There are many different wire stripping tools, and while some are easier to operate than others there are many options. From a simple small knife, operated skilfully, to some fancy items that will take you a while to figure out how to operate successfully, buy the best you can afford according to your budget because it may have to last decades if you have decided to make robotics/electronics your career.</p>
<p><b>PLEASE TURN THE PAGE ...</b></p>		

<p><b>BREAK-OFF BLADE KNIFE</b></p> 	<p><b>PART # 82M1652</b></p> <p>PART # 82M1652</p>	<p>A small knife with break-off blades WILL cut your fingers if you are not careful, but it is also a very useful tool in many situations. Try and find a small one that fits comfortably in your hand with a positive blade locking mechanism as the blades are razor sharp. Wear safety glasses to protect your eyes when breaking off the blunt tip of the blade to get a new sharp point as the old tip can fly into your eyes when the blade breaks.</p>
<p><b>PRESTIK</b></p> 	<p>Get a pack of Prestik at any stationery, crafting store or PnA.</p>	<p>Probably one of the handiest tools ever invented, and the best value for money of any tool you will buy, there is no substitute for this extra set of hands that I use almost every time I ever make anything. Perfect for temporarily holding small parts in place while soldering them into place permanently this “tool” is a must for any inventor.</p>
<p><b>MULTIMETER</b></p> 	<p><b>PART # 330M0159</b></p> <p>PART # 330M0159</p>	<p>A multimeter can test voltage, resistance [ohms], current [amps] and continuity.</p>
<p><b>JEWELLERS SCREWDRIVERS</b></p> 	<p><b>PART # 15M3264</b></p>	<p>You can buy a really cheap set of jewellers screwdrivers, which should suffice, but if you spend more money there are some really fancy high quality sets that can last a lifetime if you look after them and don't loan them to your buddies who just might not return them.</p>
<p><b>SOCKET SET</b></p> 	<p><b>PART # 15M1100</b></p>	<p>Do not buy a socket set unless it has a 5.5mm size socket included because this is the most common size nut for M3. It is important to note that most socket sets do not include a 5.5mm socket so do not buy the first one you find.</p>
<p><b>SOLDERING IRON</b></p> 	<p><b>PART # 330M4992</b></p> <p>PART # 330M4992</p>	<p>Do not buy a hardware or department store soldering iron, as they are not suitable for fine electronics work and will damage the electronic parts and printed circuit board [PCB]. Watch our video on how to buy a quality soldering iron for electronics at a reasonable price:</p> <p><a href="http://www.youtube.com/electronicsafrica">www.youtube.com/electronicsafrica</a></p>
<p><b>SOLDER IRON STAND</b></p> 	<p><b>PART # 330M0105</b></p> <p>PART # 330M0105</p>	<p>SAFETY is always the most important consideration, so along with a decent soldering iron get a soldering iron stand with a heavy cast iron base so that the soldering iron will not fall over and potentially burn you or someone sitting near you on the hands, arms or legs. Keep a wet cellulose sponge on the base of the stand and wipe the tip of the soldering iron every time you pick it up as you can only do quality soldering with a perfectly clean soldering iron tip.</p>
<p><b>SOLDER [wire]</b></p> 	<p><b>PART # 14M9056 [10m]</b> <b>PART # 340M0155 [ROLL]</b></p>	<p>We recommend “no clean” type solder because it does not require a “wash” stage when your circuit is built</p>