





2016 – 2017 Legal and Illegal Parts List for *FIRST*® Tech Challenge Robot Inspectors

Revision History		
1	7/1/2016	Initial release
1.1	8/1/2016	<ul style="list-style-type: none">Removed separate line for first version HiTechnic Color Sensor, added V1 and V2 as one line; legalAdded HiTechnic Touch Sensor Multiplexor to legal parts list, removed it from illegal section.
1.2	9/12/2016	Added all allowed Android devices to list
1.3	12/6/2016	<ul style="list-style-type: none">Added Motorola Moto G4 Play to listRemoved legal parts shown that are already part of the legal competition kitsRemoved part numbers for Motors

How To Use This Document:

The Legal and Illegal Parts List is intended to provide visuals of the most common Legal and Illegal parts. This document is to serve as a guide, however is **NOT** an all-inclusive list. Teams and Volunteers should be sure to read all of the Robot build rules in the [Game Manual Part 1](#), and should always reference the [Game Q&A forum](#) for additional build rule clarifications.


The following parts are LEGAL for the 2016-2017 *FIRST* Tech Challenge

Part Number	Description	Picture / Diagram
	<p>TETRIX® <i>FIRST</i>® Tech Challenge Competition Kit (Some components may not be shown in this illustration)</p> <p>Please see the Competition Kit Parts List for full details of items included in this kit.</p>	
	<p>MATRIX Base Set MATRIX Resource Set</p> <p>Please see the Competition Kit Parts List for full details of items included in this kit.</p>	

The following parts are **LEGAL** for the 2016-2017 *FIRST* Tech Challenge

W40384	<p>TETRIX® Prime Starter Set EXCEPT the items listed under the ILLEGAL Parts List</p>	
	<ul style="list-style-type: none"> • Android ZTE Speed • Motorola Moto G 2nd Generation • Motorola Moto G 3rd Generation • Motorola Moto G4 Play • Google Nexus 5 • Samsung Galaxy S5 	
AUA3030	<p>Modern Robotics Core Device Interface Module</p>	

The following parts are LEGAL for the 2016-2017 *FIRST* Tech Challenge

AUL3025	Modern Robotics Core Legacy Module	
AUM3020	Modern Robotics Core Motor Controller	
AUP3010	Modern Robotics Core Power Distribution Module	
AUS3015	Modern Robotics Core Servo Controller	
	Mini USB to OTG (On-The-Go) Cable	



The following parts are **LEGAL** for the 2016-2017 *FIRST* Tech Challenge

	OTG Adapter	
	Logitech F310 Gaming Controller (Not to be used for robot construction)	
	Xbox 360 Controller for Windows	
www.andymark.com/ftc	AndyMark® parts EXCEPT those listed in the ILLEGAL section	<div>  <p>NeverRest Series</p> </div> <div>  <p>Robot Parts</p> </div>
All part numbers	TETRIX® DC Motors	

The following parts are LEGAL for the 2016-2017 *FIRST* Tech Challenge

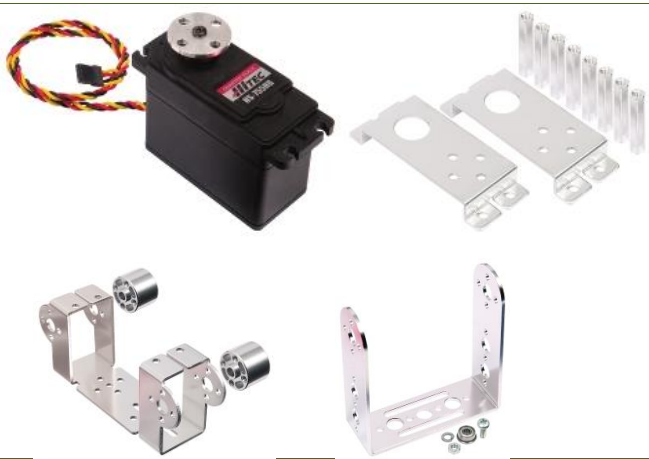



All part numbers	Modern Robotics/MATRIX Motor 9V	
All part numbers	Modern Robotics/MATRIX 12V DC Motors	
All part numbers	AndyMark® NeveRest Motor Series + encoder cables	
All part numbers	REV Robotics HD Hex Motor	
W36468	TETRIX® Tank and Conveyor Treads	

The following parts are LEGAL for the 2016-2017 *FIRST* Tech Challenge

W39093	TETRIX® Pivot Bearing	
W39129 W39176	TETRIX® On/Off Switch TETRIX® Switch Mount	
W991445 (*) W991444	HiTechnic Servo Controller HiTechnic DC Motor Controller	
W39197 (*) W39177 (*)	TETRIX® Servo TETRIX® Continuous Turn Servo (Total combined limit of 12 per robot)	
W39375 W39900 W39901	TETRIX® Worm Gear Box TETRIX® 10:1 Worm Gear Pack TETRIX® 20:1 Worm Gear Pack	
W39300 W39282	TETRIX® Rack and Pinion Linear Slide Pack TETRIX® All-Terrain Tire	

(*) For MATRIX Motor/Servo Controllers, currently only MATRIX servos are compatible/allowed.

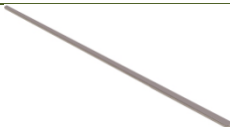




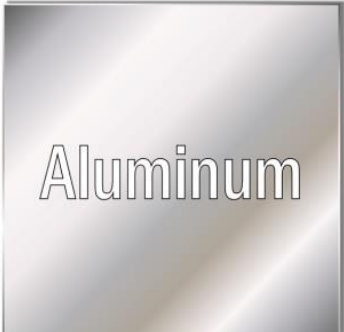

The following parts are LEGAL for the 2016-2017 FIRST Tech Challenge

<p>W39904</p> <p>W39380</p> <p>W39383</p> <p>W39594</p>	<p>TETRIX® HS-755HB Quarter-Scale Servo Motor with Horn</p> <p>TETRIX® Quarter-Scale Servo Front Mount Bracket</p> <p>TETRIX® Quarter-Scale Servo Frame Mounting Bracket</p> <p>TETRIX® Quarter-Scale Pivot Arm with Bearing Pack</p>	
<p>276-2177</p>	<p>VEX EDR 393 Motor (counted as a servo)</p> <p>Please see rule <RE10> for allowed configuration</p>	
<p>W39830</p> <p>W39057</p>	<p>TETRIX® NiMh Battery Pack Charger (not to be used for robot construction)</p> <p>12V Rechargeable NiMh Battery Pack (Exactly 1 allowed)</p>	
<p>14-0014</p>	<p>Modern Robotics 12V Rechargeable NiMh Battery Pack (Exactly 1 allowed)</p>	
<p>REV-31-1302</p>	<p>12v Slim Battery</p>	


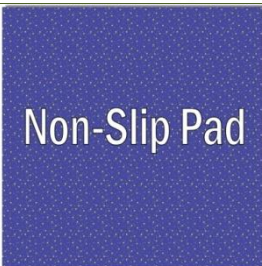
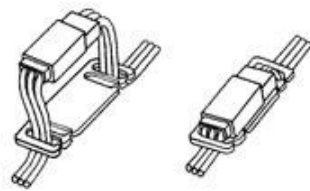


The following parts are LEGAL for the 2016-2017 *FIRST* Tech Challenge

W58335	Non-Metallic Cable Ties	
W39074 W39075 W39076 W39077 W39379 W39378 W39377	TETRIX® Tubes (80 mm) TETRIX® Tubes (145 mm) TETRIX® Tubes (220 mm) TETRIX® Tube Clamps TETRIX® Tubing Coupler TETRIX® Tubing Corner Block TETRIX® Tubing Anchor Block	
W39193	TETRIX® Tube Plugs	
W38007 W38008	TETRIX® Bevel Gears & Delrin Bearings	
W39173 W39171 W39169 W39165	TETRIX® Chain with Links TETRIX® 32 tooth Sprocket Pack TETRIX® 24 tooth Sprocket Pack TETRIX® 16 tooth Sprocket Pack	









The following parts are LEGAL for the 2016-2017 FIRST Tech Challenge

W35871	TETRIX® 250mm Axle	
	#25 Chain Half-Lengths #35 Chain Half-Lengths	
W39020	TETRIX® Servo Horn	
W36465	TETRIX® Thermal Fuse for DC Motor Protection	
W20821	Permatex Super Lube Note: Any type of COTS lubricant is allowed. (Only to reduce friction with the Robot. Lubricants are not allowed to contaminate the playing field or other robots).	
Plastic Sheet	Any non-reinforced polymer-based plastic sheet material (e.g. polycarbonate, PVC, acrylic, ABS, Teflon, PETG, etc.) See <RM01>.	
Any metal or plastic flat sheet	Both materials may be used on the robot. No limit to size or quantity. See <RM01>.	 

The following parts are LEGAL for the 2016-2017 *FIRST* Tech Challenge

Any metal or plastic extruded shapes		
Rope	Rope, any size/length	
Non-Slip Pad	No size constraint	
	Universal Security Clips	
45-2018	Modern Robotics Color Sensor	
NSK1042	HiTechnic NXT IRSeeker V2	
NMS1035	HiTechnic NXT Magnet Sensor	
NEO1048	HiTechnic NXT EOPD	







The following parts are LEGAL for the 2016-2017 *FIRST* Tech Challenge

9844	NXT Light Sensor	
NGY1044	HiTechnic NXT Gyro Sensor	
NIL1046	HiTechnic IRLink Sensor	
NIR1032	HiTechnic IR Receiver Sensor	
NAC1040	HiTechnic Acceleration Sensor	
NMC1034	HiTechnic Compass Sensor	
9845	NXT Sound Sensor	
9843	NXT Touch Sensor	





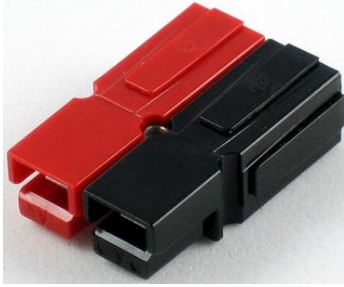
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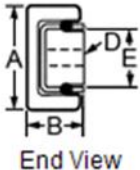

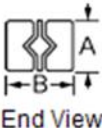




9846	NXT Ultrasonic Sensor	
NAA1030	HiTechnic Angle Sensor	
NBR1036	HiTechnic NXT Barometric Sensor	
NCO1038	HiTechnic NXT Color Sensor V1 and V2	
NFS1074	HiTechnic NXT Force Sensor	
NTX1060	HiTechnic Touch Sensor Multiplexer	
Non-Motorized Turntables and Lazy Susans		<p>Examples:</p> 

The following parts are LEGAL for the 2016-2017 FIRST Tech Challenge

PVC Refer to Game Manual Rules See <R05> m.	PVC, CPVC, or ABS flexible or rigid piping (of any schedule), Commercial PVC couplings (i.e. Tee's, elbows, couplings, caps, etc.) are allowed.	
PVC cement and cleaner	Use only for gluing PVC. Use of PVC cements and cleaners may or may not be allowed in the pits at tournaments based on site-specific rules or requirements.	
Mechanical Fasteners	Compatible nuts, bolts, screws, etc.	
Loctite®	Or similar thread-locking product	
	Plastic/Epoxy Glue or Cement	
Rubber Bands	Any size and quantity	

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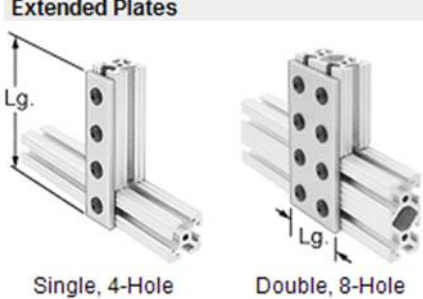
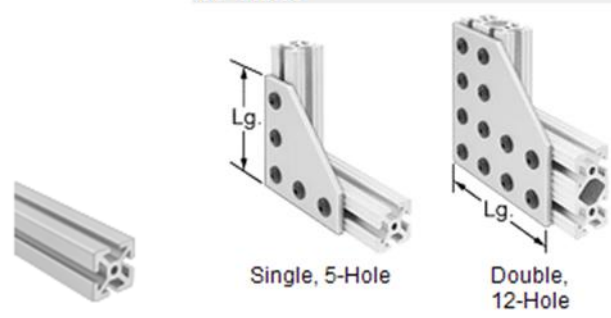
Surgical Tubing	No size or length limit	 <p>Sample, color may vary</p>
PWM Extension cable	Either purchased or fabricated by the team	
Threaded Rod	All-thread & lead-screw	
Power Distribution Panel/Splitter	This is an example. Similar parts are allowed.	
Anderson Powerpole connectors		

Linear Slides		<p>Telescopic Slides</p>   <p>End View</p> <p>Roller Bearing Slide Sets</p>   <p>End View</p> <p>Ball-Bearing Carriages and Guide</p>  <p>Through-Hole Carriage and Guide Rail (Sold Separately)</p>
Telescoping Rods		 
Wago Connector	Series 222 Lever-Nuts	

The following parts are LEGAL for the 2016-2017 *FIRST* Tech Challenge

	<p>Timing Belts any size and pitch</p> <p>Gears of any size and pitch</p> <p>Sprockets of any size and pitch</p>	 <p>The image shows a collection of mechanical parts. On the left, there are two black timing belts of different sizes. On the right, there is a large assortment of metal gears of various sizes and tooth counts. Below the gears, there are several sprockets of different sizes.</p>
	<p>Pulleys</p> <p>Springs of any type used in a safe manner (Rules <RM01>, <RM02>)</p>	 <p>The image displays various mechanical components. On the left, there are two metal pulleys with a single V-groove. To the right, there is a variety of springs, including coiled metal springs of different sizes and a blue plastic spring. There are also some small metal fasteners and pins.</p>
	<p>Wheels of any type, and the manufacturer provided wheel hub used to mount the wheel to an axle EXCEPT AndyMark® AM-2256. Individual components of a legal wheel assembly can be used on the robot.</p>	 <p>The image shows a single wheel assembly. It consists of a black, treaded rubber wheel mounted on a silver-colored metal hub with four mounting holes.</p>







The following parts are LEGAL for the 2016-2017 *FIRST* Tech Challenge

T-Slot Aluminum	Extruded aluminum pieces from various manufacturers such as 80-20, McMaster-Carr, Macron, etc. All fasteners and compatible hardware are allowed	<div><div><p>Plates</p><p>Single, 2-Hole Double, 4-Hole</p></div><div><p>Extended Plates</p><p>Single, 4-Hole Double, 8-Hole</p></div><div><p>90° Plates</p><p>Single, 5-Hole Double, 12-Hole</p></div></div>
MISC (No Images Available)	<ul style="list-style-type: none">• Material strictly used for Light Sensor color filter.• Hook and loop (Velcro, 3M Dual Lock. (May not be used as tape).• Electrical Tape and Heat Shrink tubing for electrical insulation only<ul style="list-style-type: none">• Plastic Coated Wire Rope<ul style="list-style-type: none">• Electrical wire• Aluminum or Nylon/Plastic Pop Rivets<ul style="list-style-type: none">• Magnets• Washers• Visible light LEDs per rule <RE12>	
COTS Parts (No Images Available) <RM01>, <RM02>	<p>Teams may use additional materials and COTS (Commercial Off The Shelf) components to construct their Robots subject to the following restrictions:</p> <ul style="list-style-type: none">• All raw materials are allowed provided they are readily available to the majority of teams from standard distributors (e.g. McMaster-Carr, Home Depot, Grainger, AndyMark®, etc.).• All post-processed materials are allowed provided they are readily available to the majority of teams from standard distributors (e.g. McMaster-Carr, Home Depot, AndyMark®, etc.).• COTS parts and assemblies may only have a maximum of a single degree of freedom. It is the intent of <i>FIRST</i> that teams design and build their devices to achieve the game	


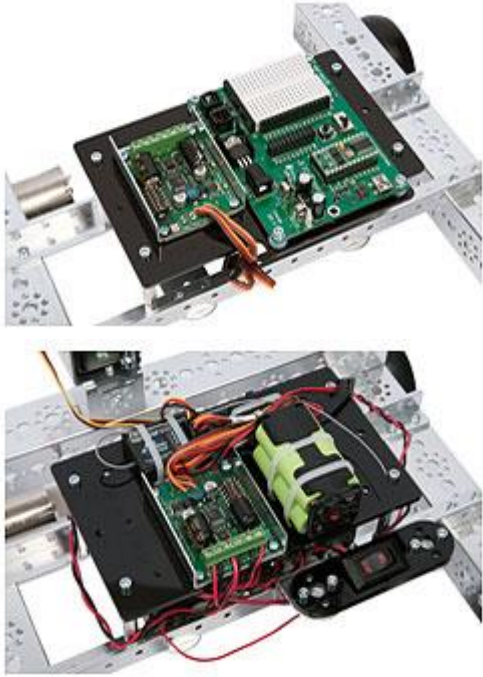

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	<p>challenge. Assemblies of COTS components, such as linear slides, and gearboxes are allowed while a pre-fabricated gripper assembly designed to grab the game elements is not. Holonomic wheels (omni or mecanum) are exempt from the one degree of freedom limitation.</p> <ul style="list-style-type: none">• Raw materials, and COTS may be modified (e.g. drilled, cut, painted, etc.) provided no other rules are violated.
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The following parts are ILLEGAL for the 2016-2017 *FIRST* Tech Challenge

Part Number	Description	Picture / Diagram
	Microprocessors such as Raspberry Pi or Arduino	
W34243 or W36117	TETRIX® R/C Controller	
W35496	TETRIX® R/C Receiver	
W34244	TETRIX™ DC Motor Speed Controller	
W991458	Infrared Electronic Ball	
W739136	TETRIX® Battery Holder	



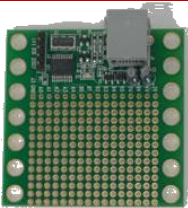

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Part Number	Description	Picture / Diagram
W37291	TETRIX® Wireless Camera Kit	
W37799 W37663	TETRIX® Autonomous Mounting Deck TETRIX R/C Mounting Deck	
W40234 <R 02 L>	TETRIX® Prime Gripper Arm Kit	

The following parts are ILLEGAL for the 2016-2017 *FIRST* Tech Challenge

Part Number	Description	Picture / Diagram
W40235 <RE03>b.i.	TETRIX® Prime 6 V NiMH Battery Pack	
LEGO® # W778881 & W778878	LEGO® Power Function Battery Packs	
AndyMark® AM-2256	4 inch HiGrip Wheel	
	Rough top Tread	
	LEGO® EV3 or LEGO® NXT	

The following parts are ILLEGAL for the 2016-2017 *FIRST* Tech Challenge

Part Number	Description	Picture / Diagram
NSX2020	HiTechnic Sensor Multiplexer	
W778882 W979670 W978883	XL Power Function Motor E Power Function Motor M Power Function Motor	
NPT1050	HiTechnic Prototype Board - Solderable	
NPT1055	HiTechnic Prototype Board - Solderless	
SPR2010	HiTechnic Super Prototype Board	