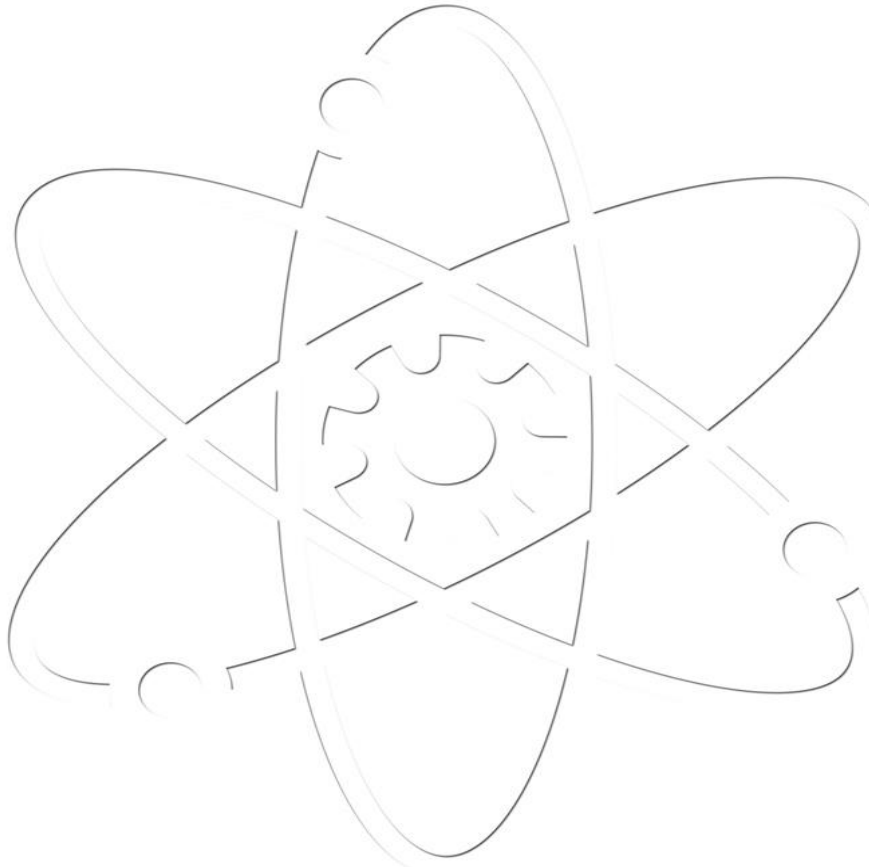


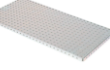






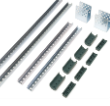



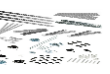



























VEX Principles of Engineering Kit
(270-1921)





*Images are not to scale

Picture	Part Number	Description	Quantity
	275-1030	3/32" Allen Wrench (8-pack): High Strength Allen Wrench 3/32" for the serious VEX builder. Fits the 8-32 screws.	1
	275-1031	5/64" Allen Wrench (8-pack): High Strength Allen Wrench 5/64" for the serious VEX builder. Fits the 6-32 screws and shaft collars.	1
	276-1341	Base Plate Pack: VEX Base Plates are designed to serve as a foundation for a variety of robotic applications. Use them to create a large stationary robotic arm, or interlock them to build larger manufacturing type systems. These pieces can also be used as large structural pieces in other robotic applications.	1
	276-1403	USB A-A Tether Cable, 6' (1.8m): Cable for connecting VEXnet components to sync and run in tether mode	2
	276-1424	3-Wire PWM Cables (Large Bundle): Are used to extend the length of a 3-wire cable such that a motor/servo or sensor can be farther from the VEX Microcontroller. "Y"-cables allow 2 motors/servos to be driven by a single microcontroller output.	1
	276-1456	7.2V Robot Battery NiMH 2000mAh: Battery provides a rechargeable power source for use with your VEX robots	2
	276-1546	Winch and Pulley Kit: This kit provides the ability to implement a winch and pulley system and create block and tackle mechanisms to utilize mechanical advantage.	1
	276-1622	8-Bay AA/AAA Smart Battery Charger: This Smart Battery Charger is capable of charging up to eight Ni-MH or Ni-Cd rechargeable AA or AAA batteries. Smart Charger technology provides automatic trickle charging and temperature cutoff during the charge cycle while LEDs provide user feedback on the status of each charging battery.	1
	276-1696	AAA NiMH Rechargeable Battery (6-pack): A 6-pack of AAA NiMH Rechargeable Batteries designed for use in the VEXnet Joystick.	1
	276-1926	Linear Motion Kit: The Linear Motion Kit provides a method for VEX builders to create linear mechanisms utilizing low-friction plastic slides and metal tracks. (2) 12" Long Linear Slide Track (2) 17.5" Long Linear Slide Track (2) Rack Bracket (4) Inner Delrin Slide Truck (4) Outer Delrin Slide Truck	1
	276-1149	Drive Shaft 12" (4-pack): The square shaft has rounded corners which allow it to spin easily in a round hole, while locking to a square hole.	1
	276-2154	Line Tracker: Program your robot to follow a line. This sensor can also be used as a beam trigger. Includes (3) IR emitter/receivers.	1
	276-2159	Bumper Switch (2-pack): Includes a pair of simple bumper switches custom built for the VEX Robotics Design System. Ruggedized Bumpers allow the switch to be triggered by large impacts without sustaining damage.	1
	276-2161	Metal & Hardware Kit: More tools for building the ultimate robot. Additional metal and hardware pieces let you create more complex devices. Steel Plates & Bars (2) Plate 15x5 holes (4) Bar 1x25 holes (4) Angle, Slotted 30 holes Steel Gussets (2) Gusset, Angle (2) Gusset, Plus (2) Gusset, Pivot Collars & Shafts & Bearings (16) Shaft Collar (4) Shaft 2in (4) Shaft 3in (2) Shaft 12in (16) Bearing, Flat (6) Bearing, Pillow Block (4) Lock Plate, Plastic Standoffs & Spacers (10) Standoff 1/2in (8) Standoff 1in (4) Standoff 2in (4) Standoff 3in (20) Spacer, Thin 4.6mm (20) Spacer, Thick 8mm Screws & Nuts & Washers (70) Screw 8-32 1/4in (28) Screw 8-32 3/8in (28) Screw 8-32 1/2in (14) Screw 8-32 3/4in (30) Washer, Steel (10) Washer, Plastic (65) Nut, Keys 8-32 (14) Nut, Nylock 8-32 Steel Chassis (2) Chassis Bumper 2x2x15 (4) Chassis Rail 2x1x16	1

Picture	Part Number	Description	Quantity
	276-1496	2.75" Wheel (4-pack): A pack of (4) of the VEX 2.75" diameter Wheels. These wheels include a smooth grippy tire which has high traction on smooth surfaces.	1
	276-2169	Gear Kit: This kit contains four sizes of VEX Spur Gears (12-, 36-, 60-, and 84-tooth gears). The 60- and 84-tooth gears have extra mounting holes for attaching metal bars or parts to these gears when using them as part of a turntable system or similar design. (4)12-tooth gears (4)36-tooth gears (4)60-tooth gears (2)84-tooth gears	1
	276-2162	3-Wire Servo: Servo motors are a type of motor that can be directed to turn to face a specific direction, rather than just spin forward or backward.	1
	276-2168	Tank Tread Kit: Contains over five feet of tank tread designed specifically for the VEX Robotics Design System. Use this tank tread to build robot tracks which can overcome tough terrain, or build a conveyor belt for scooping up objects. (170) Tread Links (4) Tank tread drive/idler wheels (4) Double Bogie wheel assemblies (2) Single Bogie wheel assemblies (12) 8-32 x 1" Bogie wheel support screws (12) Keps nuts	1
	276-2174	Limit Switch (2-pack): Includes a pair of simple limit switch sensors custom built for the VEX Robotics Design System. Switches send a signal to the Microcontroller when they are triggered. These switches are great for signaling when a robot arm has reached the top or bottom of its motion.	2
	276-2176	LED Indicator Pack: Compatible with VEX Microcontroller Digital Outputs. Use these for feedback indicators, to debug code, verify Microcontroller mode, or for cool light patterns.	1
	276-2245	VEXnet USB Adapter Key: The VEXnet USB Adapter Key provides 802.11b/g wireless communication between VEX Microcontrollers and VEXnet Joysticks.	2
	276-2243	VEXnet Backup Battery Holder: The VEXnet Backup Battery allows you to mount and connect (1) 9V battery. This battery keep VEXnet alive when the main battery fails.	1
	276-2177	2-Wire Motor 393: The 2-Wire Motor 393 is the primary actuator used in the VEX Robotics Design System. Build rotational mechanisms, drive bases, rotational joints, conveyor belts - anything that spins can be built using the 2-wire Motor 393.	2
	276-2193	Motor Controller 29: The VEX Motor Controller 29 uses a standard PWM signal (like that originating from the 3-wire ports on VEX Microcontrollers) to drive a VEX 2-Wire Motor.	2
	276-2184	Advanced Gear Kit: This kit provides several options for advanced motion. These parts allow advanced mechanical VEX designers to create new ingenious mechanisms. (8) 19-tooth rack gear (2) 12-tooth pinion gear (4) Worm gears (4) Worm wheel (1) Differential frame (7) 24-tooth bevel gear (16) 6-32 x 1/4 inch Button Head Screws	1
	276-2906	C-Channel 1x2x1x35 (2-pack): VEX C-channel has holes on 0.500" increments. This structural member is perfect for building bigger robots. Excellent strength and twist resistance.	1
	276-2192	VEX net Joystick: The VEXnet Joystick is the next generation of robot control for VEX Robots with the Cortex Microcontroller.	1

Picture	Part Number	Description	Quantity
	276-2194	VEX Cortex Microcontroller: The brain of every VEX robot. Coordinates the flow of information and power on the robot. All other electronic system components must interface to the Microcontroller.	2
	276-2210	Flashlight: Turn night into day with this powerful 4-LED flashlight. It draws power directly from the VEX Controller. Switch it on, and see in the dark. Easy to mount up off your robot using the included threaded standoffs. (1) LED Flashlight Module (2) 3 inch Threaded Standoffs (4) 8-32 1/4" Screws	1
	276-2214	Tank Treads Upgrade Kit: These upgrade links should be useful to designers wishing to create more advanced mechanisms utilizing the tank tread. (25) Tank Tread Traction Links (30) Conveyor-belt Base Links (10) Short Conveyor-belt Inserts (10) Medium Conveyor-belt Inserts (10) Tall Conveyor-belt Inserts	1
	276-2252	VEX High Strength Sprocket & Chain Kit: These reinforced sprockets and chain can transmit higher loads over long distances. Use this kit to withstand higher stresses and lift heavier loads. For any application where regular chain just won't cut it. (4) High Strength 6-tooth Sprocket (-0.97" OD) (2) High Strength 12-tooth Sprocket (-1.69" OD) (2) High Strength 18-tooth Sprocket (-2.43" OD) (2) High Strength 24-tooth Sprocket (-3.16" OD) (2) High Strength 30-tooth Sprocket (-3.90" OD) (140) High Strength Chain Links (20) Chain Attachment Links	1
	276-2216	Potentiometer (2-pack): With the Potentiometer you can determine both position and direction of rotation. Use this sensor to get an analog measurement of angular position. This measurement can help to understand the position of robot arms or other mechanisms.	1
	276-2156	Optical Shaft Encoder (2-pack): With the Quadrature Encoder's two output channels you can measure both the position and direction of rotation of a VEX shaft. This will allow you to calculate the speed of the shaft, as well as the distance it has traveled; these are very useful measurements for autonomous programming. A Programming Kit is needed to change the program in the VEX Controller to use the Quadrature Encoder.	1
	276-2155	Ultrasonic Range Finder: Avoid obstacles and measure distances with the ultrasonic range finder. Device emits a high-frequency sound wave that alerts the robot to things in its path. A Programming Kit is needed to change the program in the VEX Controller.	1
	276-2158	Light Sensor: The light sensor uses a photocell that allows your robot to detect and react to light. With the light sensor, you can program a whole new range of capabilities to your robot. A Programming Kit is needed to change the program in the VEX Controller.	1
	276-1986	Heliocentris Alternative Energy Kit: Includes (2) Heliocentris Solar Cells and (2) Heliocentris Fuel Cells along with required connectors.	1
	276-2219	Battery Strap (2-pack): Are used to mount the 7.2v battery to your robot. The strap is reusable. Two Battery Straps and Mounting Hardware included	1
	276-2519	Smart Charger: The VEX Smart Charger is capable of charging ALL VEX rechargeable power packs.	2
	276-2520	Power Cord - North America (Type A): Brings power to the Smart Charger.	2

Picture	Part Number	Description	Quantity
	276-2600	<p align="center">Clawbot Kit:</p> <p>The VEX Clawbot Kit is the foundation robot kit in the VEX Robotics Design System. Included as the basic robot in all kits, the step-by-step instructions guide users in assembling the robot as they learn to work with the VEX Robotics Design system.</p> <p>Motion (3) 2-Wire Motor 393 (4) 2-Wire Motor 393 High Speed Gear Sets (1) Claw Kit Assembly (includes motor) (2) Shaft Collar (4) Shaft Coupler (8) Shaft, 3" Long (18) Bearing Flat (2) Spur Gear, 12-tooth (6) Spur Gear, 60-tooth (2) Spur Gear, 64-tooth (4) 4" Wheel</p> <p>Metal (2) Bar, 20-hole (2) Chassis Bumper (20-hole) (4) Chassis Rail (16-hole) (2) C-Channel, 1x2x1x15 hole (1) C-Channel, 1x2x1x20 hole</p> <p>Electrical (2) Motor Controller 29 (1) Battery Strap (2-pack)</p> <p>Hardware (32) Screw, 8-32 x 1/4" Long (14) Screw, 8-32 x 1/2" Long (3) Screw, 8-32 x 1 1/2" Long (8) Locking Screw, 6-32 x 1/4" Long (6) Locking Screw, 6-32 x 1/2" Long (4) Nut, 8-32 Keps (2) Nut, 8-32 Nylon (6) Shaft Spacer, Thin (4.6mm) (50) 4" Tie Wraps (32) Bearing Pop-Rivet (1) Standoff 1.00"</p> <p>Equipment (2) Tool, Allen Wrench Small (5/64") (2) Tool, Allen Wrench Large (3/32") (2) Tool, VEX Open-Ended Wrench (1) Quick Start Guide, Clawbot</p>	1
	276-2232	<p align="center">Booster Kit:</p> <p>Includes pieces specifically recommended by VEX builders to maximize versatility. Contains over 600 pieces of VEX Structural and Motion Components</p> <p>Steel Chassis (2) Chassis Bumper 2x2x25 holes (4) Chassis Rail 2x1x25 holes</p> <p>Steel Plates & Bars (2) Plate 5x5 holes (2) Plate 5x15 holes (2) Plate 5x25 holes (8) Bar 1x25 holes</p> <p>Steel Angles (2) Angle, Slotted 30 holes (2) Angle, Slotted 30 holes Inverse (2) Angle, Segmented 25 holes</p> <p>Steel C-Channels (2) C-Channel 1x2x1x15 holes (2) C-Channel 1x2x1x25 holes (2) C-Channel 1x2x1x25 holes</p> <p>Steel Gussets (4) Gusset, Pivot (4) Gusset, Angle (4) Gusset, Plus</p> <p>Gears & Rollers & Clutches (4) Intake Roller (4) Gear 12 tooth (4) Gear 28 tooth (4) Gear 60 tooth (2) Gear 64 tooth (4) Gear, Rack, 19 tooth (3) Motor Clutch</p> <p>Collars & Shafts & Bearings (18) Shaft Collar (4) Shaft 1mm (4) Shaft 2mm (4) Shaft 3mm (2) Shaft 4mm (4) Shaft 12mm (26) Bearing, Flat (6) Bearing, Pillow Block (4) Lock Plate, Plastic</p> <p>Standoffs & Spacers (10) Standoff 1.2mm (8) Standoff 1mm (4) Standoff 2mm (4) Standoff 3mm (20) Shaft Spacer, Thin 4.6mm (50) Shaft Spacer, Thick 6mm</p> <p>Screws & Nuts & Washers (70) Screw 8-32 x 1/4in (28) Screw 8-32 x 3/8in (28) Screw 8-32 x 1/2in (14) Screw 8-32 x 3/4in (10) Screw 6-32 x 1/4in (10) Screw 6-32 x 1/2in (30) Washer, Steel (10) Washer, Plastic (130) Nut, Keps 8-32 (28) Nut, Nylon 8-32 (50) Bearing Pop-Rivet</p>	1