

List of Components

Bearings

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
2 Bolt Self-Aligning Flange		Bearing Bag	8	The Torrington Company
Radial Ball Bearing w/Spherical OD	1/2" i.d., self locking collar	Bearing Bag	4	The Torrington Company
Single Row Radial Flanged Ball Bearing	1/4" i.d.	Bearing Bag	4	The Torrington Company
Single Row Radial Flanged Ball Bearing	3/8" i.d.	Bearing Bag	4	The Torrington Company

Control System

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
15 Pin Cable	DB15 Male to Female, 6'	Loose	1	Brevan Electronics
15 Pin Connector	DB15, solder cup, female	Electronics Bag	2	Brevan Electronics
15 Pin Connector	DB15, solder cup, male	Electronics Bag	2	Brevan Electronics
2 Conductor Jacketed Wire	15', #16 AWG	Loose	1	General Cable
2 Conductor Jacketed Wire	#24 AWG	Loose	20'	General Cable
2 Pin Power Connector	Black, European style header	Electronics Bag	2	Augat RDI
2 Pin Power Connector	Green, European style header	Electronics Bag	1	Augat RDI
3 Conductor Shielded Wire	#24 AWG	Loose	20'	General Cable
6 Pin Connector	European style header	Electronics Bag	1	Augat RDI
9 Pin Cable	DB9 Male to Female, 6'	Loose	1	Brevan Electronics
9 Pin Ribbon Cable	12", DB9 Male to Female	Electronics Bag	1	Brevan Electronics
9 Pin Tether Adapter	DB9 F-F, pins: 5->5, 2->3,3->2	Electronics Bag	1	Brevan Electronics
Battery Box	Battery Charger Case	Loose	2	Assembled by Nova Biomedical
Battery Charger		Loose	2	Milwaukee Electric Tool Corp.
Black Project Box		Loose	1	Serco
Circuit Breaker	12 volt, 20 Amp, auto-resetting	Electronics Bag	2	Snap-Action, Inc.
Delco Motor Wiring Harness	5', #16 AWG	Loose	4	Assembled by Nova Biomedical
Diode	1 Amp max	Electronics Bag	2	Brevan Electronics
Flightstick Joystick	7 ft cable with Male DB15	Loose	2	CH Products
Heat Shrink Tubing	3/4"Ø x 1', Black, 2:1 Shrink	Electronics Bag	1	Raychem Corporation
Heat Shrink Tubing	3/8"Ø x 2', Black, 2:1 Shrink	Electronics Bag	1	Raychem Corporation
Jack Screw with Lock Washer	3 screws per bag	Electronics Bag	12	Honeywell - Microswitch Division
Limit Switch	Faint printing on side	Electronics Bag	4	Honeywell - Microswitch Division
Limit Switch	White printing on side	Electronics Bag	4	Honeywell - Microswitch Division
Muffin Fan	12 vdc, 0.90 A	Loose	1	Digital Equipment Corporation
Plastic Hood for 15 Pin Connector	fits DB15	Electronics Bag	3	Brevan Electronics

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Power Connector for Valves		Pneumatics Bag	3	Numatics
Power Supply	9 Volts DC, 1.2 Amps max	Loose	1	Golden Pacific Electronics, Inc.
Receiver Box		Loose	1	Assembled by Nova Biomedical
Rechargeable Battery	12 Vdc	Loose	4	Milwaukee Electric Tool Corp.
Reed Switch	Normally open	Electronics Bag	4	CP Clare
Relay Box		Loose	1	Assembled by Nova Biomedical
RNET 9600slm + Antenna		Loose	2	Motorola
Rocker Switch		Electronics Bag	4	Honeywell - Microswitch Division
Rocker Switch Cover	Blue	Electronics Bag	1	Honeywell - Microswitch Division
Rocker Switch Cover	Green	Electronics Bag	1	Honeywell - Microswitch Division
Rocker Switch Cover	Red	Electronics Bag	1	Honeywell - Microswitch Division
Rocker Switch Cover	White	Electronics Bag	1	Honeywell - Microswitch Division
Servo	Hitec/JR-style connector, 42	Electronics Bag	2	Hitec RCD, Inc.
Servo Arms & Mounting Hardware	Fits HS300 Servo	Electronics Bag	2	Hitec RCD, Inc.
Servo Extension Cable	Hitec/JR-style, 36" long	Electronics Bag	2	Hitec RCD, Inc.
Servo Y Cable	Hitec/JR-style, 24" long	Electronics Bag	2	Hitec RCD, Inc.
Spade Connector	female, 22-18 AWG	Electronics Bag	20	Thomas & Betts Corp.
Spade Connector	male, 22-18 AWG	Electronics Bag	20	Thomas & Betts Corp.
Speed Controller	7.2 - 12 vdc, Reversing	Loose	2	Tekin Electronics, Inc.
Terminal Strip	6 channel, tubular screw	Electronics Bag	2	Thomas & Betts Corp.
Transmitter Box		Loose	1	Assembled by Nova Biomedical
Wire	#12 AWG, Black	Loose	12'	General Cable
Wire	#12 AWG, Red	Loose	12'	General Cable
Wire Nut	for 12 AWG wire	Electronics Bag	10	Home Depot
Wiring Harness for Air Pumps	fits Textron pumps, 6" leads	Pneumatics Bag	2	McCord Winn Textron

Documentation

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Kent™ Connect Flyer		Loose	1	Value Plastics, Inc.
Numacalc	manual and software for IBM	Loose	1	Numatics
Numatics Training Manual		Loose	1	Numatics
Small Parts Catalog		Loose	2	Small Parts, Inc.
Spec Sheets for Constant Force Spring		Loose	1	Associated Spring Raymond
Spring Hinge Instructions	comes with Spring Hinge	Hardware Bag	1	Stanley Hardware

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Fasteners

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
5 Minute Epoxy Gel	resealable 1 oz. dual syringe	Small Parts Bag	1	McMaster-Carr Supply Company
Cable Tie	11.10" x 0.140"	Small Parts Bag	20	Thomas & Betts Corp.
Cable Tie	7.00" x 0.091"	Small Parts Bag	20	Thomas & Betts Corp.
Cable Tie Mounting Base	self-adhesive, holes for #8	Small Parts Bag	25	Thomas & Betts Corp.
Chuck Screw	left handed thread, Torx P20	Drill Bag	2	Milwaukee Electric Tool Corp.
Helical Plastic Wire Wrap	1/4" Ø x 24"	Small Parts Bag	1	McMaster-Carr Supply Company
Hook & Loop Fastener	1" x 2', stick-on	Small Parts Bag	1	McMaster-Carr Supply Company
Mushroom-Head Fastener	1" x 2', stick on	Small Parts Bag	1	McMaster-Carr Supply Company
Rubber Band, Large	3-1/2" x 1/4" wide	Small Parts Bag	5	Alliance Rubber Company
Rubber Band, Small	3-1/2" x 1/8" wide	Small Parts Bag	5	Alliance Rubber Company
Velcro Back Pack Strap		Velcro Bag	1	Velcro USA, Inc.
Velcro Heavy Duty Hold It		Velcro Bag	1	Velcro USA, Inc.
Velcro Pen /Pencil Holders		Velcro Bag	1	Velcro USA, Inc.
Velcro Plant Ties		Velcro Bag	1	Velcro USA, Inc.
Velcro Self Gripping Discs		Velcro Bag	1	Velcro USA, Inc.
Velcro Self Gripping Discs		Velcro Bag	1	Velcro USA, Inc.
Velcro Sticky back Hook & Loop Tape		Velcro Bag	1	Velcro USA, Inc.
Velcro Trunk Strap		Velcro Bag	1	Velcro USA, Inc.

Field Components

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Inflation Needle for 4-Square Ball	fits bicycle tire pump	Loose	1	Sport Fun, Inc.
U-Bolt Wire Rope Clip	for 3/16" Ø rope, galvanized	Hardware Bag	1	McMaster-Carr Supply Company

Motors & Pumps

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Delco Seat Motor	12 vdc motor w/ socket for	Loose	4	Delco Electronics Corporation
Drill Gear Shift Link		Drill Bag	2	Milwaukee Electric Tool Corp.
Drill Gearbox	1000/300 RPM transmission	Drill Bag	2	Milwaukee Electric Tool Corp.
Drill Housing, Left Half	Holds motor and gearbox	Loose	2	Milwaukee Electric Tool Corp.
Drill Housing, Right Half	Holds motor and gearbox	Loose	2	Milwaukee Electric Tool Corp.
Drill Motor	12 V DC	Drill Bag	2	Milwaukee Electric Tool Corp.
Drill Shell Screws	5/8" x 4-20 sheet metal screw	Drill Bag	16	U.S. FIRST
Drill Shifter Button		Drill Bag	2	Milwaukee Electric Tool Corp.

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Drill Shifter Spring	large	Drill Bag	4	Milwaukee Electric Tool Corp.
Drill Shifter Spring	small	Drill Bag	2	Milwaukee Electric Tool Corp.
High Output Lumbar Pump MWT Motor	12 vdc, 22 psi max, 3/16" o.d.	Pneumatics Bag	1	McCord Winn Textron
Low Output Lumbar Pump Johnson	12 vdc, 4 psi max, 3/16" o.d.	Pneumatics Bag	1	McCord Winn Textron

Other

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
Carpet Sample	12" x 12"	Loose	1	
Co-Polymer Gutter Guard	6" x 24"	Loose	1	Home Depot
Fiberglass Matting	4' x 4' x up to 1/8"	Additional	1	TEAM
Kent™ Connect Key Ring Kit		Pneumatics Bag	1	Value Plastics, Inc.

Pneumatics

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
Adapter Fitting	1/4" NPTF male to 1/8" NPTF	Pneumatics Bag	1	Sprague Fluid Connectors
Air Cylinder	1-1/16" bore, 4" stroke	Loose	1	Numatics
Air Cylinder	7/16" bore, 12" stroke	Loose	1	Numatics
Barbed Fitting	1/8" i.d. to 1/8 NPTF	Pneumatics Bag	4	Numatics
Barbed Fitting	1/8" i.d. to 10-32 UNF	Pneumatics Bag	12	Numatics
Barbed T-Connector	1/8" Ø barbs	Pneumatics Bag	2	Value Plastics, Inc.
Check Valve	1/8" Ø barbs	Pneumatics Bag	2	Air Logic
Detachable Barbed Reducing Connector	3/16"Ø to 1/8"Ø	Pneumatics Bag	2	Value Plastics, Inc.
Double Solenoid Valve	12 VDC, 10-32 UNF-3B	Pneumatics Bag	1	Numatics
Numatrol Tubing	1/4" o.d., 1/8" i.d., 15'	Pneumatics Bag	1	Numatics
PIAB Suction Cup	53 mm Ø, 1/8" NPSF	Pneumatics Bag	1	PIAB, U.S.A.
Plug for Air Accumulator	1/4" NPTF	Pneumatics Bag	1	Sprague Fluid Connectors
Plug for Valves	10-32 UNF	Pneumatics Bag	5	Numatics
Polyurethane Tubing	3/16" i.d., 5/16"o.d. x 4'	Pneumatics Bag	1	Value Plastics, Inc.
Pressure Switch	1/8" Ø barb	Pneumatics Bag	2	Numatics
Single Solenoid Valve	12 VDC, 10-32 UNF-3B	Pneumatics Bag	1	Numatics
Syringe	140 cc, Luer Lock Tip	Pneumatics Bag	1	Lowell Medical Instrument
Volume Chamber	approximately 1 liter volume	Loose	1	American Cylinder Company, Inc.

Rods & Shafts

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
Aluminum Rod	1/2" Ø x 12"	Tube	1	McMaster-Carr Supply Company
Aluminum Rod	1/2" Ø x 24"	Tube	1	McMaster-Carr Supply Company

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Brazing Rod	1/16" Ø x 18"	Tube	6	McMaster-Carr Supply Company
Brazing Rod	1/8" Ø x 18"	Tube	2	McMaster-Carr Supply Company
Delrin (Acetal) Rod	1/4" Ø x 24"	Tube	1	McMaster-Carr Supply Company
Drill Rod	1/2" Ø x 18"	Tube	2	New Hampshire Industrial
Drill Rod	1/4" Ø x 18"	Tube	2	McMaster-Carr Supply Company
Drill Rod	3/8" Ø x 18"	Tube	2	McMaster-Carr Supply Company
Drill Rod	5/16" Ø x 18"	Tube	2	McMaster-Carr Supply Company
Flexible Motor Shaft	13.5" long, Fits Delco Seat	Loose	4	Delco Electronics Corporation
LDPE Rod	1" Ø x 24"	Tube	1	McMaster-Carr Supply Company
Threaded Rod with 8 Hex Nuts	1/4" Ø x 24", 20 pitch coarse	Tube	1	McMaster-Carr Supply Company
Wooden Dowel	1/4" Ø x 12"	Tube	1	McMaster-Carr Supply Company
Wooden Dowel	1/4" Ø x 24"	Tube	1	McMaster-Carr Supply Company

Sheets & Boards

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
Aluminum Plate	1/4" x 3" x 12"	Loose	1	McMaster-Carr Supply Company
Aluminum Sheet	1/16" x 12" x 18"	Loose	1	McMaster-Carr Supply Company
Chipboard - Sample	1/2" x 6" x 12"	Loose	1	Home Depot
HDPE Block	1" x 2" x 6"	Loose	1	McMaster-Carr Supply Company
Masonite Board	12" x 18"	Loose	1	Home Depot
Particle Board - Sample	5/8" x 6" x 12"	Loose	1	Home Depot
Pine Board - Sample	1" x 1-1/2" x 9"	Loose	1	Home Depot
Pine Board - Sample	1" x 2-1/2" x 9"	Loose	1	Home Depot
Pine Board - Sample	1" x 3-1/2" x 9"	Loose	1	Home Depot
Plywood	1/4" x 6" x 12"	Loose	1	Home Depot
Plywood - Sample	1/2" x 6" x 12"	Loose	1	Home Depot
Polycarbonate Sheet	1/16" x 12" x 12"	Loose	1	Plastic Supply Inc.
Rohacel® P170 Structural Foam	1" x 24" x 49"	Loose	1	Richmond Aircraft Products
Rubber Sheet, Black	3/32" x 6" x 18"	Loose	1	McMaster-Carr Supply Company
Rubber Sheet, Red	1/16" x 6" x 18"	Loose	1	McMaster-Carr Supply Company

Small Parts

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
Assorted Brass Screws	comes with Spring Hinge	Hardware Bag	1	Stanley Hardware
Cabinet Catch Magnet w/ Plastic Case		Hardware Bag	1	Stanley Hardware
Double Magnet Cabinet Catch		Hardware Bag	1	Stanley Hardware

List of Components

Flexible Shaft Coupling	Black	Small Parts Bag	4	U.S. FIRST
Folding Table Brace w/ screws	9-1/2"	Hardware Bag	4	Stanley Hardware
Hinged Hasp	3" Strap	Hardware Bag	1	Stanley Hardware
Pivot for Steel Track		Hardware Bag	2	Stanley Hardware
Rectangular Magnet		Small Parts Bag	4	Radio Shack
Roller Guide for Steel Track	7/8" Ø x 1/4" wheel	Hardware Bag	4	Stanley Hardware
Side Release Buckle	Fits 3/4" Strap	Small Parts Bag	1	McMaster-Carr Supply Company
Steel Hinge w/ screws	3-1/2" x 3-1/2"	Hardware Bag	2	Stanley Hardware
Steel Track w/Endstop	2'	Loose	2	Stanley Hardware
Trantorque Coupling	3/8" i.d, 3/4" o.d.	Small Parts Bag	2	Small Parts, Inc.
Utility Draw Pull Latch	1-3/4" high x 3-9/32" wide,	Hardware Bag	1	McMaster-Carr Supply Company
Wheelchair Wheel	6" Ø, 5/16" i.d. bearings, 1-1/2"	Loose	2	Skyway Recreation Products
Wheelchair Wheel	8" Ø, 5/16" i.d. bearings, 1-1/2"	Loose	2	Skyway Recreation Products

Springs

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Compression Spring	0.600" o.d. x 3" long x 0.059"	Small Parts Bag	1	Associated Spring Raymond
Constant Force Spring, Large	1.02" i.d.	Small Parts Bag	2	Associated Spring Raymond
Constant Force Spring, Medium	0.85" i.d.	Small Parts Bag	1	Associated Spring Raymond
Constant Force Spring, Small	0.51" i.d.	Small Parts Bag	2	Associated Spring Raymond
Latex Tubing	1/4" i.d., 3/8" o.d., 5'	Loose	1	Totalmed
Small Tension Spring	0.650" o.d. x 2.875-3.000"	Small Parts Bag	1	Associated Spring Raymond
Snugger (Spring for Steel Track)		Hardware Bag	4	Stanley Hardware
Spring Loaded Hinge	4" x 4", 30 in/lb max	Hardware Bag	1	Stanley Hardware

Sprockets & Pulleys

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Pulley with Fixed Eye	1" Ø, for 5/16" Rope	Hardware Bag	3	Stanley Hardware

Tools

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
5/32" Allen Wrench	comes with Spring Hinge	Hardware Bag	1	Stanley Hardware
Torx L-Key	Torx T20 Heads, 3-3/4" Length	Hardware Bag	1	McMaster-Carr Supply Company

3.6 Additional Hardware List

The parts listed on this page may be purchased from Small Parts, Inc. or other sources, and are subject to the limitations mentioned in rule K1.

Fasteners

Hose Clamp	up to 10 of any size
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Other

Fiberglass Resin + Hardner	as needed
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Rods & Shafts

Closët Rod	1 1/4" Ø x 6'
Copper Water Pipe	1/2" Ø x 10'
Electrical Conduit Pipe (EMT)	1" Ø x 10'
Electrical Conduit Pipe (EMT)	1/2" Ø x 10'
Electrical Conduit Pipe (EMT)	3/4" Ø x 10'
Flexible Conduit	1/2" Ø x 10'
PVC Pipe	1" i.d. x 10', schedule 40
PVC Pipe	1-1/2" i.d. x 10', schedule 40
PVC Pipe	1/2" i.d. x 10', schedule 40
PVC Pipe	3/4" i.d. x 10', schedule 40

Sheets & Boards

Aluminum Plate	1' x 2' x 1/4"
Aluminum Plate	4' x 4' x 1/32"
Pine Board	1" x 3-1/2" x 10'
Plywood, Chipboard OR Particle Board	1/2" x 4' x 4'
Polycarbonate Sheet	1/4" x 4' x 4'
Polycarbonate Sheet	3/8" x 2' x 4'

Sprockets & Pulleys

Chain/Belt to match Sprocket/Pulley	up to 10' total, any combo
Sprockets or Pulleys	up to 4 total, any size/combo