

## List of Components

## Bearings

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

## Control System

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
2 Conductor Jacketed Wire	15', #16 AWG	Gray Container	1	General Cable
2 Conductor Jacketed Wire	20', #24 AWG	Gray Container	1	General Cable
2 Pin Power Connector	Black, European style header	Gray Container	1	Augat RDI
25 Pin Cable	DB25 Male to Female, 6' ,	Green	1	Brevan Electronics
25 Pin Connector	DB25, solder cup, male	Gray Container	2	Brevan Electronics
3 Conductor Shielded Wire	20', #24 AWG	Gray Container	1	General Cable
3 Headed Cable	DB9 F, DB9 M, High Density	Green	1	Brevan Electronics
8 Pin Connector	European style header	Gray Container	2	Augat RDI
9 Pin Cable	DB9 Male to Female, 6' ,	Green	2	Brevan Electronics
Battery Charger		Green	2	Emerson Electric
Battery, rechargeable	12 Vdc	Green	4	Emerson Electric
Circuit Breaker for Batteries	12 volt, 30 Amp, auto-resetting	Gray Container	2	Snap-Action, Inc.
Circuit Breaker for Drill Motors	12 volt, 20 Amp, auto-resetting	Gray Container	2	Snap-Action, Inc.
Crimping Tool for Spade Connectors		Green	1	Thomas & Betts Corp.
Diode	1 Amp max	Gray Container	2	Brevan Electronics
Dongle	DB9 Female, #1-8	Kick Off Check	1	Brevan Electronics
Flightstick Joystick	7 ft cable with Male DB15	Green	2	CH Products
Heat Shrink Tubing	3/4"Ø x 1', Black, 2:1 Shrink	Green	1	Raychem Corporation
Heat Shrink Tubing	3/8"Ø x 2', Black, 2:1 Shrink	Green	1	Raychem Corporation
Knob for Potentiometer		Shipped to	2	FIRST
Limit Switch		Gray Container	10	Honeywell - Microswitch Division
Muffin Fan	12 Vdc	Green	1	PAR Associates
Plastic Hood for 25 Pin Connector	fits DB25	Gray Container	1	Brevan Electronics
Potentiometer	50KΩ, linear	Shipped to	4	FIRST

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Power Connector for Valves	12 Vdc, Gray	Green	3	Numatics, Inc.
Power Supply	9 Vdc, 1.0 Amp max	Green	1	Golden Pacific Electronics, Inc.
Programming Software for Control	3.5" HD Floppy	Shipped to	1	FIRST / Parallax, Inc.
Project Box	Black or Almond	Green	1	Serpac
Receiver Box		Shipped to	1	FIRST
Reed Switch	Normally open, magnet	Gray Container	4	CP Clare
RNET 9600slm + Antenna (for	DB9 female	Shipped to	1	Motorola
RNET 9600slms + Antenna (for	High Density DB15 female	Shipped to	1	Motorola
Rocker Switch		Shipped to	8	Honeywell - Microswitch Division
Rocker Switch Cover	Black	Shipped to	1	Honeywell - Microswitch Division
Rocker Switch Cover	Blue	Shipped to	2	Honeywell - Microswitch Division
Rocker Switch Cover	Green	Shipped to	1	Honeywell - Microswitch Division
Rocker Switch Cover	Red	Shipped to	2	Honeywell - Microswitch Division
Rocker Switch Cover	White	Shipped to	1	Honeywell - Microswitch Division
Rocker Switch Cover	Yellow	Shipped to	1	Honeywell - Microswitch Division
Servo	Hitec/JR-style connector, 42	Green	2	Hitec RCD, Inc.
Servo Extension Cable	Hitec/JR-style, 36" long	Green	2	Hitec RCD, Inc.
Servo Y Cable	Hitec/JR-style, 24" long	Green	2	Hitec RCD, Inc.
Spade Connector	female, 12-10 AWG	Shipped to	20	Thomas & Betts Corp.
Spade Connector	female, 16-14 AWG	Shipped to	20	Thomas & Betts Corp.
Spade Connector	female, 22-18 AWG	Green	20	Thomas & Betts Corp.
Spade Connector	male, 12-10 AWG	Green	20	Thomas & Betts Corp.
Spade Connector	male, 16-14 AWG	Shipped to	20	Thomas & Betts Corp.
Spade Connector	male, 22-18 AWG	Green	20	Thomas & Betts Corp.
Speed Controller	7.2 - 12 Vdc, Reversing	Green	4	Tekin Electronics, Inc.
Terminal Strip	6 channel, tubular screw contact	Shipped to	2	Thomas & Betts Corp.
Tether Adapter	DB9 F-F, pins: 2->3, 3->2, 5->5	Green	1	Brevan Electronics
Transmitter Box		Shipped to	1	FIRST
Wire	16', #12 AWG, Black	Gray Container	1	General Cable
Wire	16', #12 AWG, Red	Gray Container	1	General Cable
Wire Nut	for 12 AWG wire	Gray Container	10	Home Depot
Wiring Harness for Air Pumps	fits Textron pumps. 6" leads	Green	2	McCord Winn Textron
Wiring Harness for Seat Motor	5', #16 AWG	Gray Container	4	Nova Biomedical

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Flexible Shaft Coupling	Black	Gray Container	4	FIRST
Folding Table Brace	9-1/2"	Green	4	Stanley Hardware
Hinged Hasp	3" Strap	Green	1	Stanley Hardware
Magnet	1/4-20 Plastic Thread	Gray Container	1	Honeywell - Microswitch Division
Magnet	8-32 Thread Mount	Gray Container	3	Honeywell - Microswitch Division
Pivot for Steel Track		Green	2	Stanley Hardware
Roller Guide for Steel Track	7/8" Ø x 1/4" wheel	Green	4	Stanley Hardware
Sash Guide w/Triangular Mount (LH)		Gray Container	1	Delphi Interior and Lighting
Sash Guide w/Triangular Mount (RH)		Gray Container	1	Delphi Interior and Lighting
Side Release Buckle	Fits 3/4" Strap	Gray Container	1	McMaster-Carr Supply Company
Steel Hinge w/ screws	3-1/2" x 3-1/2"	Green	2	Stanley Hardware
Steel Track w/Endstop	2'	Green	2	Stanley Hardware
Tape for Window Actuator (additional)	16'	Gray Container	1	Delphi Interior and Lighting
Trantorque Coupling	3/8" i.d, 3/4" o.d.	Gray Container	2	Small Parts, Inc.
Utility Draw Pull Latch	1-3/4" high x 3-9/32" wide,	Gray Container	1	McMaster-Carr Supply Company
Wheelchair Wheel	6" Ø, 5/16" i.d. bearings,	Gray Container	2	Skyway Recreation Products
Wheelchair Wheel	8" Ø, 5/16" i.d. bearings,	Gray Container	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"	Gray Container	1	Associated Spring Raymond
Constant Force Spring, Large	1.02" i.d.	Gray Container	2	Associated Spring Raymond
Constant Force Spring, Medium	0.85" i.d.	Gray Container	1	Associated Spring Raymond
Constant Force Spring, Small	0.51" i.d.	Gray Container	2	Associated Spring Raymond
Latex Tubing	1/4" i.d., 3/8" o.d., 5'	Green	1	Totalmed
Small Tension Spring	0.650" o.d. x 2.875-3.000" long	Gray Container	1	Associated Spring Raymond
Snugger (Spring for Steel Track)		Green	4	Stanley Hardware
Spring Loaded Hinge	4" x 4", 30 in/lb max	Green	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 1/2" Ø, for 5/8" Rope	Green	2	Stanley Hardware
Pulley with Fixed Eye	1" Ø, for 5/16" Rope	Green	1	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	Green	1	Stanley Hardware

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Wiring Harness for Window Lift Motor	5', #16 AWG	Gray Container	2	Nova Biomedical
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Documentation

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
Kee Klamp Pipe Fitting Catalog + 2		Gray Container	1	Kee Industrial Products
Numacalc	manual and software for IBM	Green	1	Numatics, Inc.
Numatics Training Manual		Kick Off Check	1	Numatics, Inc.
Small Parts Catalog		Gray Container	2	Small Parts, Inc.

Fasteners

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
5 Minute Epoxy Gel	resealable 1 oz. dual syringe	Gray Container	1	McMaster-Carr Supply Company
Cable Tie	11.10" x 0.140"	Green	20	Thomas & Betts Corp.
Cable Tie	7.00" x 0.091"	Green	20	Thomas & Betts Corp.
Cable Tie Mounting Base	self-adhesive, holes for #8	Green	25	Thomas & Betts Corp.
Helical Plastic Wire Wrap	1/4" Ø x 24"	Gray Container	1	McMaster-Carr Supply Company
Hook & Loop Fastener	1" x 2', stick-on	Green	1	McMaster-Carr Supply Company
Rubber Band, Large	3-1/2" x 1/4" wide	Gray Container	5	Staples
Rubber Band, Small	3-1/2" x 1/8" wide	Gray Container	5	Staples
Velcro Stick Back Coins	5/8"Ø, 15 sets per pack	Green	1	Velcro USA, Inc.
Velcro Sticky back Hook & Loop Tape	3/4" x 18"	Green	1	Velcro USA, Inc.
Velcro Trunk Strap	5/8" x 15'	Green	1	Velcro USA, Inc.

Field Components

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
Apex Bracket for Game Goal	3 legged top joining bracket	Gray Container	1	Sylvester Sheet Metal
Rubber Inner Tube	KR14/15	Green	1	Carol Tire

Motors & Pumps

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
Battery Contact Assembly		Green	2	Emerson Electric
Battery Retaining Clip		Green	2	Emerson Electric
Drill Gear Shift Lever		Green	2	Emerson Electric
Drill Gearbox	1100/400 RPM, slip clutch	Green	2	Emerson Electric
Drill Housing, Right and Left Half	Holds motor, gearbox, battery	Gray Container	2	Emerson Electric
Drill Housing Screws	Torx Head T10 pan head	Green	14	Emerson Electric
Drill Motor	12 Vdc, with Metal Pinion	Green	2	Emerson Electric
High Output Lumbar Pump MWT Motor	12 vdc, 22 psi max, 3/16" o.d.	Green	1	McCord Winn Textron
Low Output Lumbar Pump Johnson Motor	12.vdc, 4 psi max, 3/16" o.d.	Green	1	McCord Winn Textron

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Seat Motor	12 Vdc	Gray Container	4	Delco Electronics Corporation
Window Lift Motor with Tape Drive	left hand side	Gray Container	1	Delphi Interior and Lighting
Window Lift Motor with Tape Drive	right hand side	Gray Container	1	Delphi Interior and Lighting

Other

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
Carpet Sample	12" x 12", 20 oz., closed loop	Gray Container	1	FIRST
Co-Polymer Gutter Guard	6" x 24"	Gray Container	1	Home Depot

Pneumatics

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
Adapter fitting for Pressure Switch	1/4" NPT female to 1/8" barb	Shipped to	2	Numatics, Inc.
Air Cylinder	1-1/16" bore, 4" stroke	Gray Container	1	Numatics, Inc.
Air Cylinder	7/16" bore, 12" stroke	Gray Container	1	Numatics, Inc.
Barbed Fitting	1/8" i.d. to 1/8 NPTF	Green	4	Numatics, Inc.
Barbed Fitting	1/8" i.d. to 10-32 UNF	Green	12	Numatics, Inc.
Barbed T-Connector	1/8" Ø barbs	Green	2	Value Plastics, Inc.
Check Valve	1/8" Ø barbs	Green	2	Air Logic
Detachable Barbed Connector	1/8"Ø to 1/8"Ø	Green	3	Value Plastics, Inc.
Detachable Barbed Reducing Connector	1/8"Ø barb to 1/4"Ø PTF	Green	1	Value Plastics, Inc.
Detachable Barbed Reducing Connector	3/16"Ø to 1/8"Ø	Green	1	Value Plastics, inc.
Detachable Barbed Reducing Connector -	3/16"Ø to 1/8"Ø	Green	1	Value Plastics, inc.
Detachable Rotating Barbed Connector	1/8"Ø to 1/8"Ø	Green	1	Value Plastics, Inc.
Double Solenoid Valve	12 VDC, 10-32 UNF-3B	Green	1	Numatics, Inc.
Numatrol Tubing	1/4" o.d., 1/8" i.d., 15'	Gray Container	1	Numatics, Inc.
Plug for Valves	10-32 UNF	Green	5	Numatics, Inc.
Plug for Volume Chamber	1/4"Ø PTF	Green	1	Value Plastics, Inc.
Polyurethane Tubing	3/16" i.d., 5/16"o.d. x 4'	Gray Container	1	Value Plastics, Inc.
Pressure Switch	1/4" NPT male thread	Green	2	Numatics, Inc.
Single Solenoid Valve	12 VDC, 10-32 UNF-3B	Green	1	Numatics, Inc.
Syringe	140 cc, Luer Lock Tip	Green	1	Lowell Medical Instrument
Volume Chamber	approx 1 liter, 1/4NPTF ports	Gray Container	1	Numatics, Inc.

Rods & Shafts

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
Aluminum Rod	1/2" Ø x 24"	Gray Container	2	McMaster-Carr Supply Company
Brazing Rod	1/16" Ø x 18"	Gray Container	6	McMaster-Carr Supply Company
Brazing Rod	1/8" Ø x 18"	Gray Container	2	McMaster-Carr Supply Company

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Delrin (Acetal) Rod	1/4" Ø x 24"	Gray Container	1	McMaster-Carr Supply Company
Drill Rod	1/2" Ø x 18"	Gray Container	2	McMaster-Carr Supply Company
Drill Rod	1/4" Ø x 18"	Gray Container	2	McMaster-Carr Supply Company
Drill Rod	3/8" Ø x 18"	Gray Container	2	McMaster-Carr Supply Company
Drill Rod	5/16" Ø x 18"	Gray Container	2	McMaster-Carr Supply Company
Drill Rod for Goal	1" Ø x 5"	Gray Container	1	McMaster-Carr Supply Company
Flexible Motor Shaft	13.5" long, Fits Seat Motor	Gray Container	4	Delco Electronics Corporation
LDPE Rod	1" Ø x 24"	Gray Container	1	McMaster-Carr Supply Company
Threaded Rod with 8 Hex Nuts	1/4" Ø x 24", 20 pitch coarse	Gray Container	1	McMaster-Carr Supply Company
Wooden Dowel	1/4" Ø x 18"	Gray Container	2	McMaster-Carr Supply Company

Sheets & Boards

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
Aluminum Plate	1/4" x 3" x 12"	Gray Container	1	McMaster-Carr Supply Company
Aluminum Sheet	1/16" x 12" x 18"	Gray Container	1	McMaster-Carr Supply Company
HDPE Block	1" x 2" x 6"	Gray Container	1	McMaster-Carr Supply Company
Masonite Board	1/4"x12" x 12"	Gray Container	1	Home Depot
Particle Board - Sample (see Add'l	5/8" x 6" x 12"	Gray Container	1	Home Depot
Pine Board	3/4" x 1-1/2" x 9"	Gray Container	1	Home Depot
Pine Board	3/4" x 2-1/2" x 9"	Gray Container	1	Home Depot
Pine Board - Sample (see Add'l Hardware	3/4" x 3-1/2" x 9"	Gray Container	1	Home Depot
Plywood	3/8" x 6" x 12"	Gray Container	1	Home Depot
Plywood - Sample (see Add'l Hardware	1/2" x 6" x 12"	Gray Container	1	Home Depot
Polycarbonate Sheet	1/16" x 12" x 12"	Gray Container	1	McMaster-Carr Supply Company
Rohacell® P170 Structural Foam	1" x 24" x 49"	Shipped to	1	Richmond Aircraft Products
Rubber Sheet, Black	3/32" x 6" x 18"	Gray Container	1	McMaster-Carr Supply Company
Rubber Sheet, Red	1/16" x 6" x 18"	Gray Container	1	McMaster-Carr Supply Company

Small Parts

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
4 - Tooth Tape Engaging Snap Clip		Gray Container	8	Delphi Interior and Lighting
Cabinet Catch Magnet w/ Plastic Case		Green	1	Stanley Hardware
Channel for Tape Drive	left hand side	Gray Container	1	Delphi Interior and Lighting
Channel for Tape Drive	right hand side	Gray Container	1	Delphi Interior and Lighting
Double Magnet Cabinet Catch		Green	1	Stanley Hardware
Flat Washers	1/4" i.d., 7/8" o.d.	Gray Container	4	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 Section 3.4.

#### Fasteners

Hose Clamp	up to 10 of any size
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#### Other

Fiberglass Matting	4' x 4' x up to 1/8"
Resin + Hardner	as needed for Fiberglass

#### Rods & Shafts

Closet 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 (ENT)	1/2" Ø x 10', PVC
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

#### Rope, Belts, & Chain

Nylon Braided Rope	5/16"Ø x 20'
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#### Sheets & Boards

1/2" Plywood, 5/8" Chipboard OR 7/16" Particle Board	4' x 4'
Aluminum Plate	1' x 2' x 1/4"
Aluminum Plate	4' x 4' x 1/32"
Pine Board	3/4" x 3-1/2" x 10'
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