

LIST OF COMPONENTS

Bearings

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
2-Bolt Self-Aligning Flange		Bag 6	8	The Torrington Company
Radial Ball Bearing w/Spherical OD	1/2" i.d., self locking collar	Bag 6	4	The Torrington Company
Single Row Radial Flanged Ball Bearing	1/4" i.d.	Bag 6	4	The Torrington Company
Single Row Radial Flanged Ball Bearing	3/8" i.d.	Bag 6	4	The Torrington Company

Control System

Part Name/Description	Dimensions	Location	Qty /Kit	Product Supplier
15 pin connector, female	solder cup	Bag 4	1	Brevan Electronics
15 pin connector, male	solder cup	Bag 4	2	Brevan Electronics
15-pin Cable	DB15 Male to Female, 6', unshielded	Loose	1	Brevan Electronics
2 conductor jacketed wire	#16 AGW	Loose	15'	General Cable
2 conductor jacketed wire	#24 AGW	Loose	20'	General Cable
3 conductor shielded wire	#24 AGW	Loose	20'	General Cable
7 pin DIN connector, female	bulkhead mount, solder connect, 270°	Bag 4	1	Brevan Electronics
9-pin Cable	DB9 Male to Female, 6', unshielded	Loose	1	Brevan Electronics
9-pin Ribbon Cable	12", DB9 Male to Female	Bag 4	1	Brevan Electronics
9-pin Tether Adapter	DB9 Fem-Fem, pins: 5->5, 2->3, 3->2	Bag 4	1	Brevan Electronics
Battery Charger		Loose	2	Milwaukee Electric Tool Corp.
Blue project box	6" x 3" x 2"	Loose	1	Radio Shack
Circuit Breaker	12 volt, 20 Amp, auto-resetting	Battery	2	Snap-Action, Inc.
Delco Motor Wiring Harness	5'	Bag 4	4	Assembled by Nova Biomedical
Diode	1 Amp max	Bag 4	2	DEKA
Flightstick Joystick	7 ft cable with Male DB15	Loose	2	CH Products
Jack Screw with Lock Washer	3 screws per bag	Bag 4	12	Honeywell - Microswitch Division
Joypad Controller	7 pin (270°) male DIN connector	Loose	1	Imaging Automation
Limit Switch	Faint printing on side	Bag 4	4	Honeywell - Microswitch Division
Limit Switch	White printing on side	Bag 4	4	Honeywell - Microswitch Division
Milwaukee Battery Box	Battery Charger Case	Loose	2	Assembled by Nova Biomedical
Milwaukee Rechargeable Battery		Loose	4	Milwaukee Electric Tool Corp.

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Muffin Fan	12 vdc	Loose	1	Digital Equipment Corporation
Plastic Hood for DB15		Bag 4	2	Brevan Electronics
Power Supply	9 Volts DC, 1.2 Amps max	Loose	1	Golden Pacific Electronics, Inc.
Receiver and Relay Box Power Connector	2-pin European style header	Bag 4	2	Augat RDI
Receiver Box		Loose	1	Assembled by Nova Biomedical
Reed Switch	Normally open	Bag 4	4	CP Clare
Relay Box		Loose	1	Assembled by Nova Biomedical
Relay Box Output Connector	12-pin European style header	Bag 4	1	Augat RDI
RNETs + Antenna		Bag 4	1 pair	Motorola
Rocker Switch		Bag 4	4	Honeywell - Microswitch Division
Rocker Switch Cover	Blue	Bag 4	1	Honeywell - Microswitch Division
Rocker Switch Cover	Green	Bag 4	1	Honeywell - Microswitch Division
Rocker Switch Cover	Red	Bag 4	1	Honeywell - Microswitch Division
Rocker Switch Cover	White	Bag 4	1	Honeywell - Microswitch Division
Servo	Hitec/JR-style connector, 42 oz. in.	Bag 4	2	Hitec RCD, Inc.
Servo extension cable	Hitec/JR-style, 36" long	Bag 4	2	Hitec RCD, Inc.
Servo Y cable	Hitec/JR-style, 24" long	Bag 4	2	Hitec RCD, Inc.
Tekin Reversing Speed Controller		Loose	2	Tekin Electronics, Inc.
Transmitter Box		Loose	1	Assembled by Nova Biomedical
Wire, Black	#12 AWG	Bag 4	8'	General Cable
Wire Nut	for 12 AWG wire	Bag 4	10	Home Depot
Wire, Red	#12 AWG	Bag 4	8'	General Cable
Wiring harness for Textron pumps	fits Textron pumps, 6" leads	Bag 5	2	McCord Winn Textron

Documentation

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Data sheet for Reed Switch		Manual	1	CP Clare
Material Safety Data Sheet for Welding Rods		Manual	1	McMaster-Carr Supply Company
Numasize Lite	manual and software for IBM PC	Manual	1	Numatics
Performance Data for Delco Motors		Manual	1	U.S. FIRST
Rohacell® Technical Manual	1" x 24" x 49"	Manual	1	Rohm Tech, Inc.

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Small Parts Catalog		Loose	1	Small Parts, Inc.
Spec sheet for PIAB suction cup		Manual	1	U.S. FIRST
Spec sheet for Volume Chamber		Manual	0	American Cylinder
Spec Sheets for Bearings & Flanges		Manual	1	The Torrington Company
Spec Sheets for Constant Force Spring		Manual	1	Associated Spring Raymond
Spec sheets for Numatics components		Manual	1	Numatics
Spec sheets for Textron Pumps		Manual	1	McCord Winn Textron
Spring Hinge Instructions		Bag 2	1	Stanley Hardware

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	Bag 1	1	McMaster-Carr Supply Company
Bar Lock Tie	11"	Bag 1	5	ESS
Bar Lock Tie	7"	Bag 1	5	ESS
Chuck Screw	left handed thread, Torx P20 head	Gearmotor	2	Milwaukee Electric Tool Corp.
Drill Rod	5/16" Ø x 18"	Tube	2	McMaster-Carr Supply Company
Helical Plastic Wire Wrap	1/4" Ø x 24"	Loose	1	McMaster-Carr Supply Company
Rubber band, Large	3-1/2" x 1/4" wide	Bag 1	5	Alliance Rubber Company
Rubber band, Small	3-1/2" x 1/8" wide	Bag 1	5	Alliance Rubber Company
Velcro Strip, Hook	1" x 3"	Bag 1	10	U.S. FIRST
Velcro Strip, Loop	1" x 3"	Bag 1	10	U.S. FIRST
Velcro Strip, Mushroom Cap	1" x 12"	Bag 1	1	McMaster-Carr Supply Company

Field Components

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
U-Bolt Wire Rope Clips	for 3/16" Ø rope, galvanized iron	Bag 1	1	McMaster-Carr Supply Company

Gears, Sprockets & Pulleys

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
1" Pulley with Fixed Eye for 5/16" Rope	1" Ø x 5/16" Ø	Bag 2	3	Stanley Hardware

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 Packard	Loose	4	Delco Electronics Corporation
Drill gear shift link		Bag 7	2	Milwaukee Electric Tool Corp.

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Drill shifter button		Bag 7	2	Milwaukee Electric Tool Corp.
Drill shifter spring-large		Bag 7	4	Milwaukee Electric Tool Corp.
Drill shifter spring-small		Bag 7	2	Milwaukee Electric Tool Corp.
High Output Lumbar Pump MWT Motor	12 vdc, 22 psi max, 3/16" o.d. barbed	Bag 5	1	McCord Winn Textron
Low Output Lumbar Pump Johnson Motor	12 vdc, 4 psi max, 3/16" o.d. barbed	Bag 5	1	McCord Winn Textron
Milwaukee Drill motor	12 V DC	Gearmotor	2	Milwaukee Electric Tool Corp.
Milwaukee Drill shell screws	5/8" x 4-20 sheet metal screw	Bag 7	16	U.S. FIRST
Milwaukee Gearbox	1000/300 RPM transmission	Gearmotor	2	Milwaukee Electric Tool Corp.

Other

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Carpet Sample	12" x 12"	Loose	1	U.S. FIRST
Co-Polymer Gutter Guard	6" x 24"	Loose	1	Home Depot
DEC LA75 Printer		Loose	1	Digital Equipment Corporation
Torx L-Key	Torx T20 Heads, 3-3/4" Length	Bag 4	1	McMaster-Carr Supply Company

Pneumatics

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Air Accumulator	approximately 1 liter volume, 1/8" Ø	Loose	1	American Cylinder (Sprague Air
Barbed Fitting	1/8" i.d. to 1/8" NPSF	Bag 3	1	Parker Fluid Connectors
Barbed Fitting	1/8" i.d. to 1/8" NPTF	Bag 3	2	Numatics
Barbed Fitting	1/8" i.d. to 10-32 UNF	Bag 3	12	Numatics
Barbed Reducing Connector	3/16" i.d. to 1/8" i.d.	Bag 3	2	Value Plastics, Inc.
"F" connector	3/16" o.d. barbed fittings	Bag 3	2	McCord Winn Textron
F-Connector	3/16" o.d. barbed fitting	Bag 5	2	McCord Winn Textron
Mark 3 Double Solenoid Valve, DIN connector	12 VDC, 10-32 UNF-3B	Loose	1	Numatics
Mark 3 Single Solenoid Valve, Spring Return,	12 VDC, 10-32 UNF-3B	Loose	1	Numatics
Numatics Air Cylinder	1-1/16" bore x 4" stroke	Loose	1	Numatics
Numatics Air Cylinder	7/16" bore x 12" stroke	Loose	1	Numatics
Numatrol Tubing	1/4" o.d., 1/8" i.d.	Loose	15'	Numatics
PIAB Suction Cup	53 mm Ø, 1/8" NPSF	Bag 3	1	PIAB
Plug	10-32 UNF	Bag 3	5	Numatics

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Polyurethane Tubing	3/16" i.d.	Bag 3	4'	Value Plastics, Inc.
Power Connector for Valves		Bag 3	3	Numatics
Syringe	140 cc, Luer Lock Tip	Loose	1	Lowell Medical Instrument Company,

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
Brazing Rod	1/16" Ø x 18"	Tube	2	McMaster-Carr Supply Company
Brazing Rod	1/8" Ø x 18"	Tube	6	McMaster-Carr Supply Company
Closet Rod - Sample		Bag 1	1	Home Depot
Copper Water Pipe - Sample	1/2" Ø	Bag 1	1	Home Depot
Delrin (Acetal) Rod	1/4" Ø x 24"	Loose	1	McMaster-Carr Supply Company
Drill Rod	1/2" Ø x 18"	Tube	2	McMaster-Carr Supply Company
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
Electrical Conduit Pipe - Sample	1" i.d.	Bag 1	1	Home Depot
Electrical Conduit Pipe - Sample	1/2" i.d.	Bag 1	1	Home Depot
Electrical Conduit Pipe - Sample	3/4" i.d.	Bag 1	1	Home Depot
Flexible Motor Shaft	13.5" long, Fits Delco Seat Motor	Loose	4	Delco Electronics Corporation
Flexible Steel Conduit - Sample	4"	Bag 1	1	Home Depot
LDPE Rod	1" Ø x 24"	Tube	1	U.S. FIRST
PVC Pipe - Sample	1" i.d.	Bag 1	1	Home Depot
PVC Pipe - Sample	1-1/2" i.d.	Bag 1	1	Home Depot
PVC Pipe - Sample	1/2" i.d.	Bag 1	1	Home Depot
PVC Pipe - Sample	3/4" i.d.	Bag 1	1	Home Depot
Threaded Rod	1/4" Ø x 24", 20 pitch coarse thread	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

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Rope, Belts, & Chain

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Nylon Braided Rope - Sample	5/16" Ø x 1'	Bag 1	1'	U.S. FIRST

Sheets & Boards

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
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	1" x 2" x 6"	Loose	1	McMaster-Carr Supply Company
Masonite Board	12" x 18"	Loose	1	Home Depot
Particle Board - Sample	1/2" 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	U.S. FIRST
Rohacell® P170 Structural Foam	1" x 24" x 49"	USPS	1	Rohm Tech, Inc.
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

<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)		Bag 2	1	Stanley Hardware
Assorted Brass Screws (comes with spring)		Bag 2	1	Stanley Hardware
Cabinet Catch Magnet w/plastic case		Bag 2	1	Stanley Hardware
Caster Wheel	6" Ø, 5/16" i.d. bearings, 1-1/2" wide	Loose	2	Skyway Recreation Products
Caster Wheel	8" Ø, 5/16" i.d. bearings, 1-1/2" wide	Loose	2	Skyway Recreation Products
Double Magnet Cabinet Catch		Bag 2	1	Stanley Hardware
Flat Washers	1/4" i.d., 7/8" o.d.	Bag 1	4	McMaster-Carr Supply Company
Flexible Shaft Coupling		Bag 1	4	U.S. FIRST

LIST OF COMPONENTS

Additional Hardware List

Only those parts listed here that are not available through Small Parts, Inc., may be

Folding Table Brace	9-1/2"	Bag 2	4	Stanley Hardware
Hex Nuts	1/4" i.d., 20 pitch coarse thread	Tube	8	McMaster-Carr Supply Company
Hinged Hasp	3" Strap	Bag 2	1	Stanley Hardware
Locking Screw for Spring Hinge (comes with		Bag 2	1	Stanley Hardware
Pivot for Steel Track		Bag 2	2	Stanley Hardware
Rectangular Magnet		Bag 1	4	Radio Shack
Roller Guide for Steel Track	7/8" Ø x 1/4" wheel	Bag 2	4	Stanley Hardware
Rubber Strap		Bag 1	2	U.S. FIRST
Shrink Fit Tubing	3/8" Ø x 10"	Bag 1	1	U.S. FIRST
Side Release Buckle	Fits 3/4" Strap	Bag 2	1	McMaster-Carr Supply Company
Steel Hinge	3-1/2" x 3-1/2"	Bag 2	2	Stanley Hardware
Steel Track w/Endstop	2'	Loose	2	Stanley Hardware
Trantorque Coupling	3/8" i.d, 3/4" o.d.	Loose	2	Small Parts, Inc.
Utility Draw Pull Latch	1-3/4" high x 3-9/32" wide, Nickel Plated	Bag 2	1	McMaster-Carr Supply Company

Springs

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Location</u>	<u>Qty/Kit</u>	<u>Product Supplier</u>
Compression Spring		Bag 1	1	Associated Spring Raymond
Constant Force Spring, Large	1.02" i.d.	Bag 1	2	Associated Spring Raymond
Constant Force Spring, Medium	0.85" i.d.	Bag 1	1	Associated Spring Raymond
Constant Force Spring, Small	0.51" i.d.	Bag 1	2	Associated Spring Raymond
Small Tension Spring		Bag 1	1	Associated Spring Raymond
Snugger (Spring for Steel Track)		Bag 2	4	Stanley Hardware
Spring Loaded Hinge, 30 in/lb max	4" x 4"	Bag 2	1	Stanley Hardware

Aluminum Plate	3" x 2" x 1/4"
Aluminum Plate	4" x 4" x 1/32"
Pine Board	1" x 3-1/2" x 10"
Plywood, Clipped 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"

LIST OF COMPONENTS

Additional Hardware List

Only those parts listed here that are not available through Small Parts, Inc., may be purchased from outside sources. You may not purchase 'nearly equivalent' parts, special or custom orders. There are some samples of these materials provided in The Kit. These may also be used in your device.

Fasteners

Hose Clamp	up to 10 of any size
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Gears, Sprockets & Pulleys

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

Other

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

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	1/2" Ø x 10'
PVC Pipe	1" i.d. x 10'
PVC Pipe	1-1/2" i.d. x 10'
PVC Pipe	1/2" i.d. x 10'
PVC Pipe	3/4" i.d. x 10'

Rope, Belts, & Chain

Nylon Braided Rope	5/16" Ø x 20'
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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'