

LYMAN FILAMENT SPOOL WINDER V3

Construction and Operating Manual

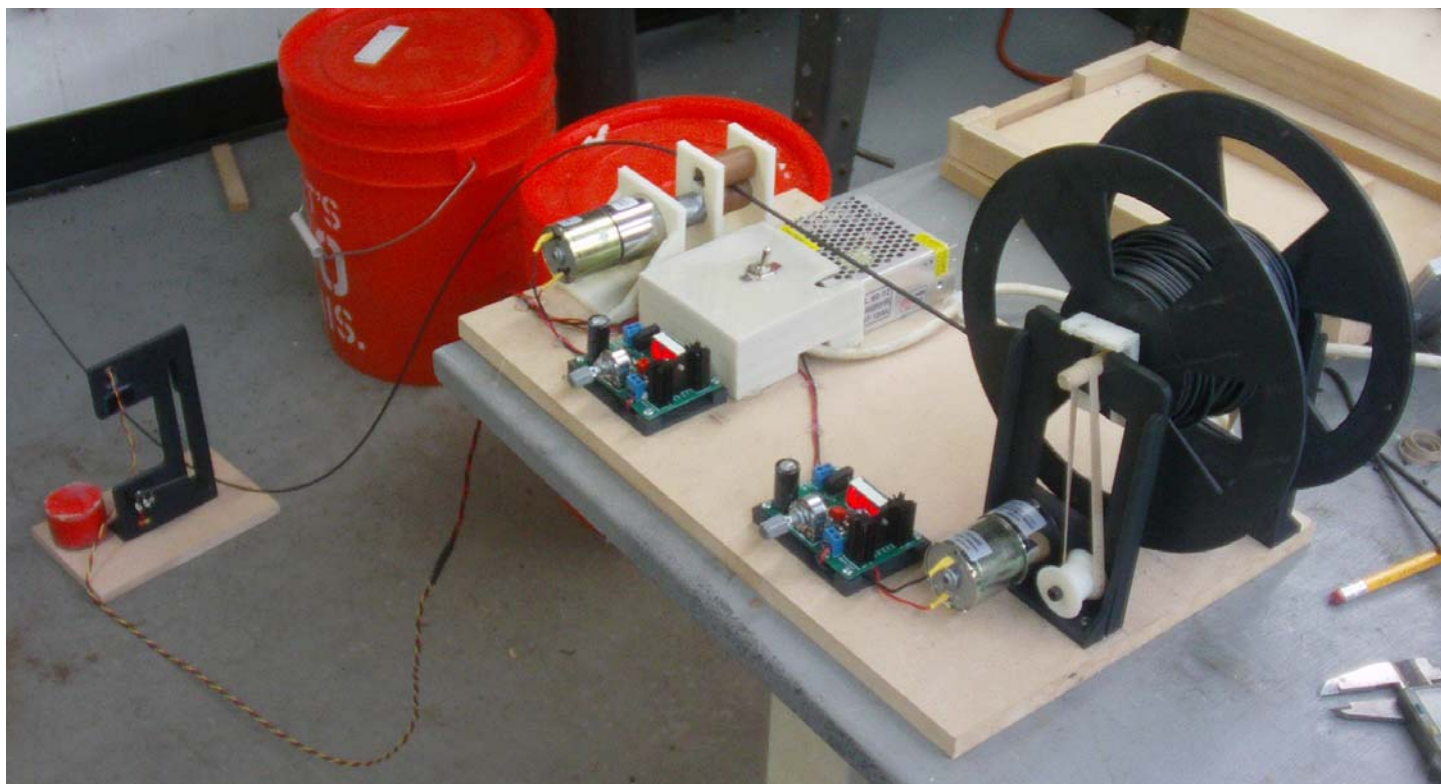


HUGH LYMAN
INVENTOR

Presented in this manual are two different Spool Winders of similar designs. Shown in the below photo is one with two variable voltage regulators and without the level wind mechanism.

Following the photos and comments on this Winder is the second one and it is the one that I currently use.

The red pails are full of ABS pellets.



A third option of the V3 Spool Winder is omitting the switch cover the spool variable voltage regulator and the level wind mechanism, which I show no photos of. However, it is what I would do if I make another one, as it is less expensive and less work to make and works just fine. Being that I print my own spools with an 8 inch diameter and 3 inch core diameter they will hold easily one KG of filament without level winding.

Now, you are to forgive my spelling, grammar and mistakes if you continue as I am now 86 old, some what feeble and forgetful. My picture is 10 years old.

This photo shows the winder while winding 3mm of black ABS filament.

Notice the voltage readout of each is + 6V. The Power Supply is 12V and least expensive I could find on eBay.

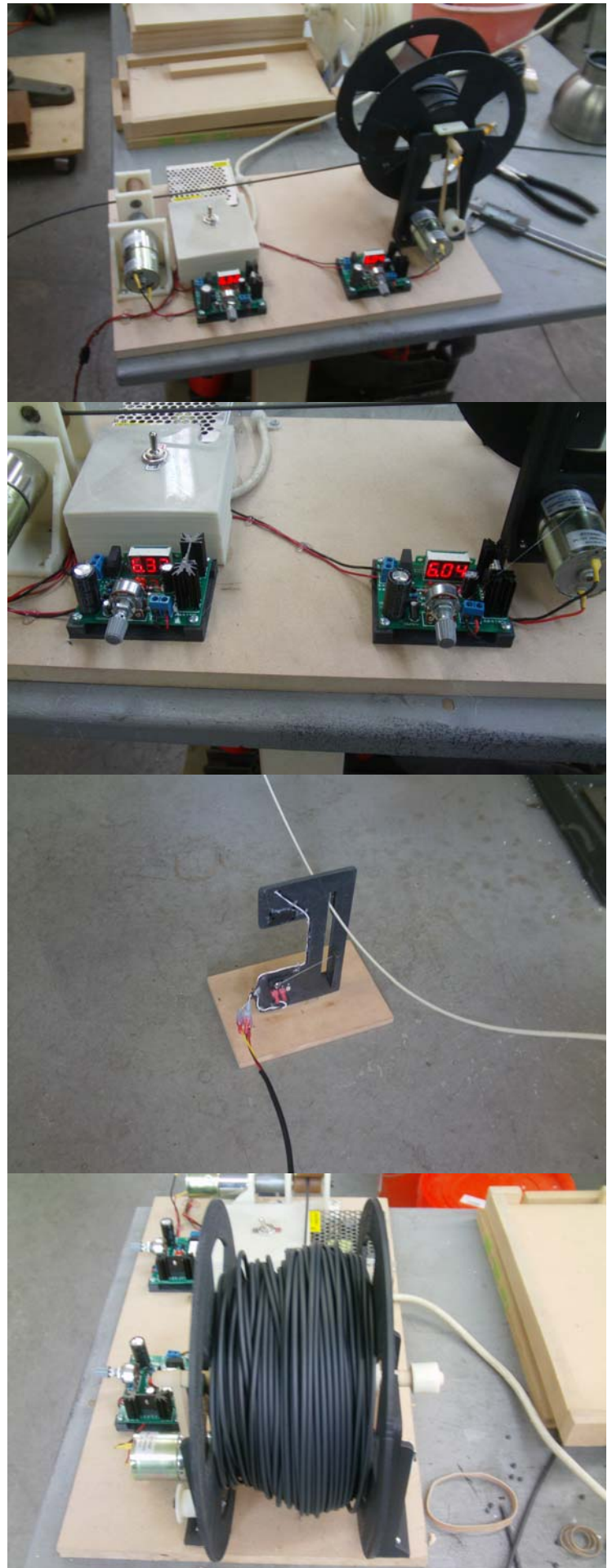
The system is mounted on a 1/2 x 16 x 10" MDF board.

The diameter of the latex cogs are 20mm which equals about 62mm circumference. At 9 RPM the pullers are feeding about 565mm or 22 inches per minute. The regulators full output is just less than 10V which gives me a speed of 39" per minute. At 4.5V the speed is 17" per minute.

You want to be running the winder a little faster than the extruder is extruding so the filament loop will always be moving up and down in the loop controller. This insures that the filament never touches the floor or gets tangle up. This happened to me once and I had a mess of filament on the floor.

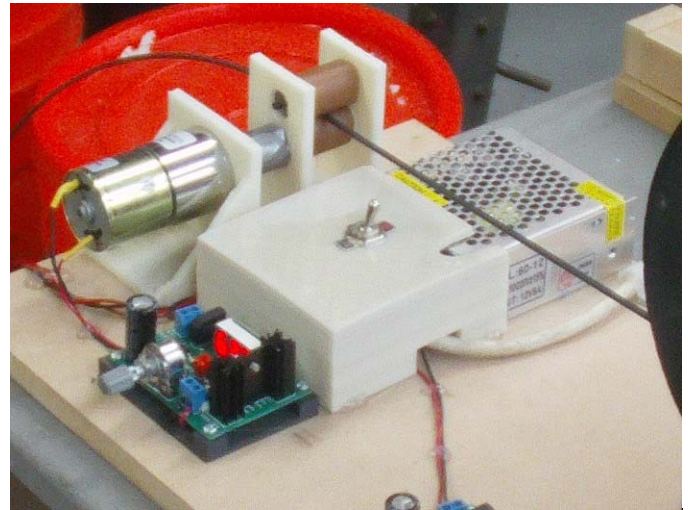
The loop controller consists of two small limit switches with thin wire triggers. As the filament loop touches the top limit it shuts off the winder and when touches the bottom limit it starts the winder. Simple and no maintenance.

This picture shows how the filament winds without the level wind mechanism.

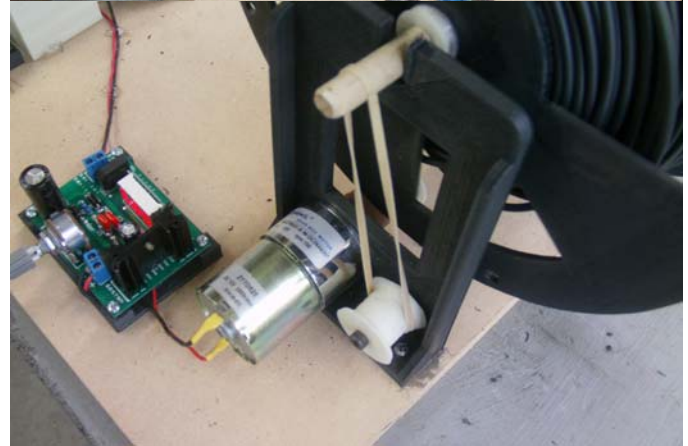


Notice the silver color of the coupler. I cut the ABS coupler in half and then wrapped duct tape around the two halves and it made a simple flexible coupler. The latex pullers is 1/2" ID latex tubing available on eBay.

Under the optional switch cover is the relay that controls the filament loop limit switches. The Relay is shown in another photo.



I am quite please with the new spool winding motor arrangement. It is fixed to the spool holder arm so the spool rests on top of the latex covered cog. It is held against the cog with the rubber band belt which rotates with the idler pulley. There is the same arrangement on the opposite side of the spool.



Here is the different winder and is my current spool winder. It has just started extruding 1.75mm filament for my Busmart 3D Pen.

The following pages show the close up photos.



This view shows the same layout with different gear motors as they were on hand in my motor box.

It shows my duct taped coupler, the relay and voltage controller.

The relay took me some time to get the connections right, so I will attempt to get them shown in the wiring diagram.

I have found that having all the wires and electronics exposed makes for simplified maintenance. This is what I did on my two DIY 3D printers that are now running and printing parts.

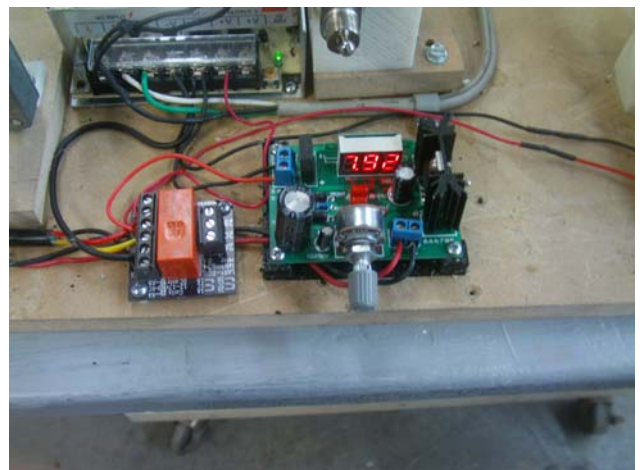
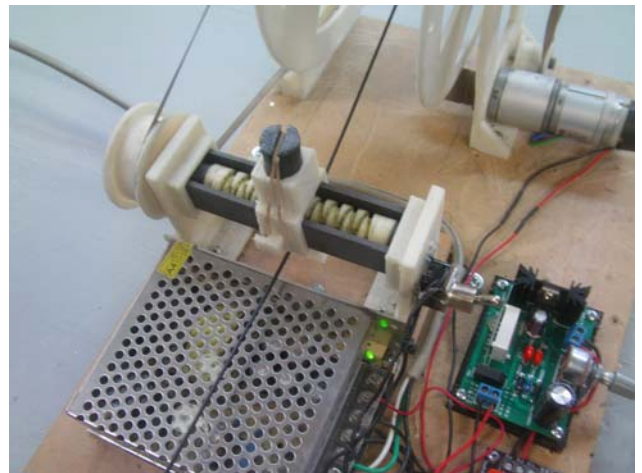
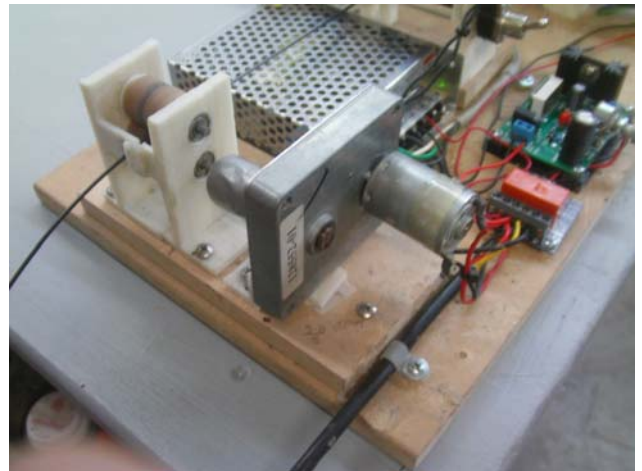
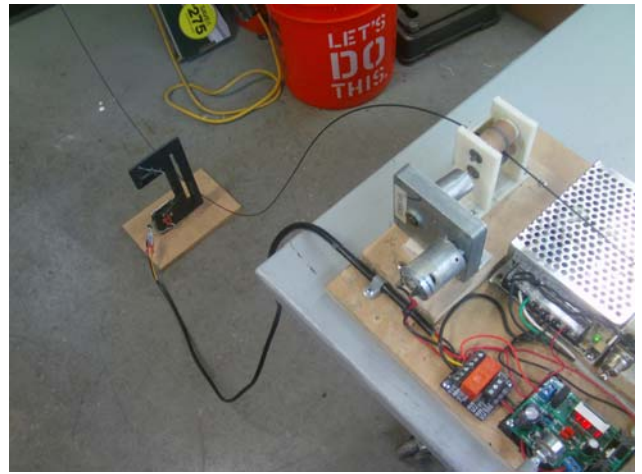
Here shows the optional level wind mechanism. It is totally mechanical requiring no electronics. It is simple to build except for the worn gear which is the hardest part I have ever made. It is documented in my V5 Extruder if you wish to make one. I won't make anymore.

The only maintenance is replacing the rubber band belt that drives it.

Shown left of the variable voltage regulator is the Relay that controls the loop limit switches.

They are mounted with a grommet under each attachment screw.

I printed a mount for the voltage regulator with standoffs so wires could be fed under the unit.



You gotta love my duct tape flexible coupler.

The latex puller discs have 4mm cap screws shafts.

The puller bracket assembly is in two parts for easy assembly.

An option in lieu of the latex tube is to wrap the cylinders with duct tape to the right diameter. This is what I now use on both the feed rollers and the spool roller so I don't have to replace the latex tube on spool roller.

If your gear motor for winding the spool is 50 rpm you may not need a variable voltage regulator. I only use one now for the feed rollers.

This design is simple and only requires removing two rubber band belts to remove the spool.

Notice the twist in the rubber band. It was put on straight but a small misalignment will twist it.

Note the rubber band belt at the right which is wrapped around the spool pulley, the level wind pulley and not seen here is the idler pulley at the bottom which holds the spool down equal to the opposite side.

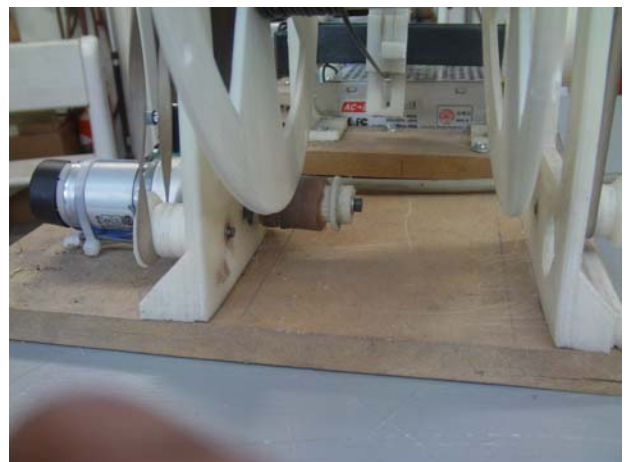
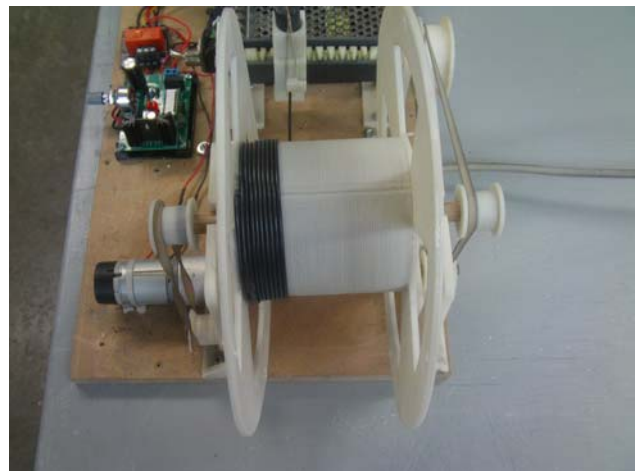
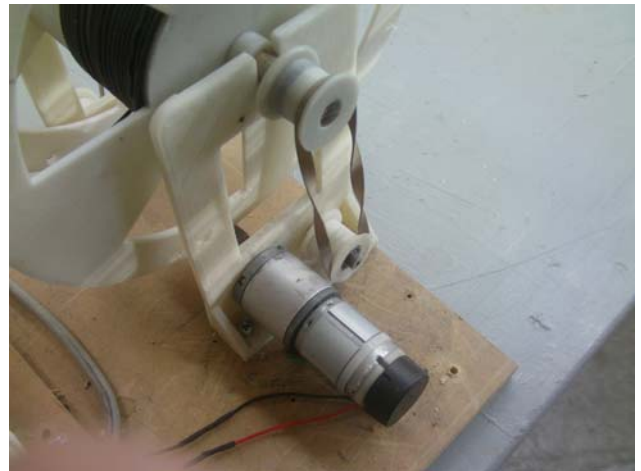
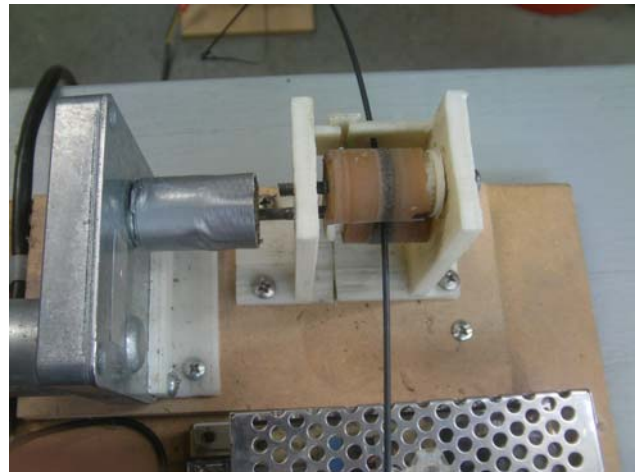
So here we are level winding. What a nice job. I love it.

This shows the latex drive cog which is turning the spool.

This is the only major maintenance of the system. The latex tube has to be replaced or adjusted after many spool winds.

Note the end of the cog has a removable flanged disc that is removed to replace the latex tube. I have since wrapped duct tape around the cog.

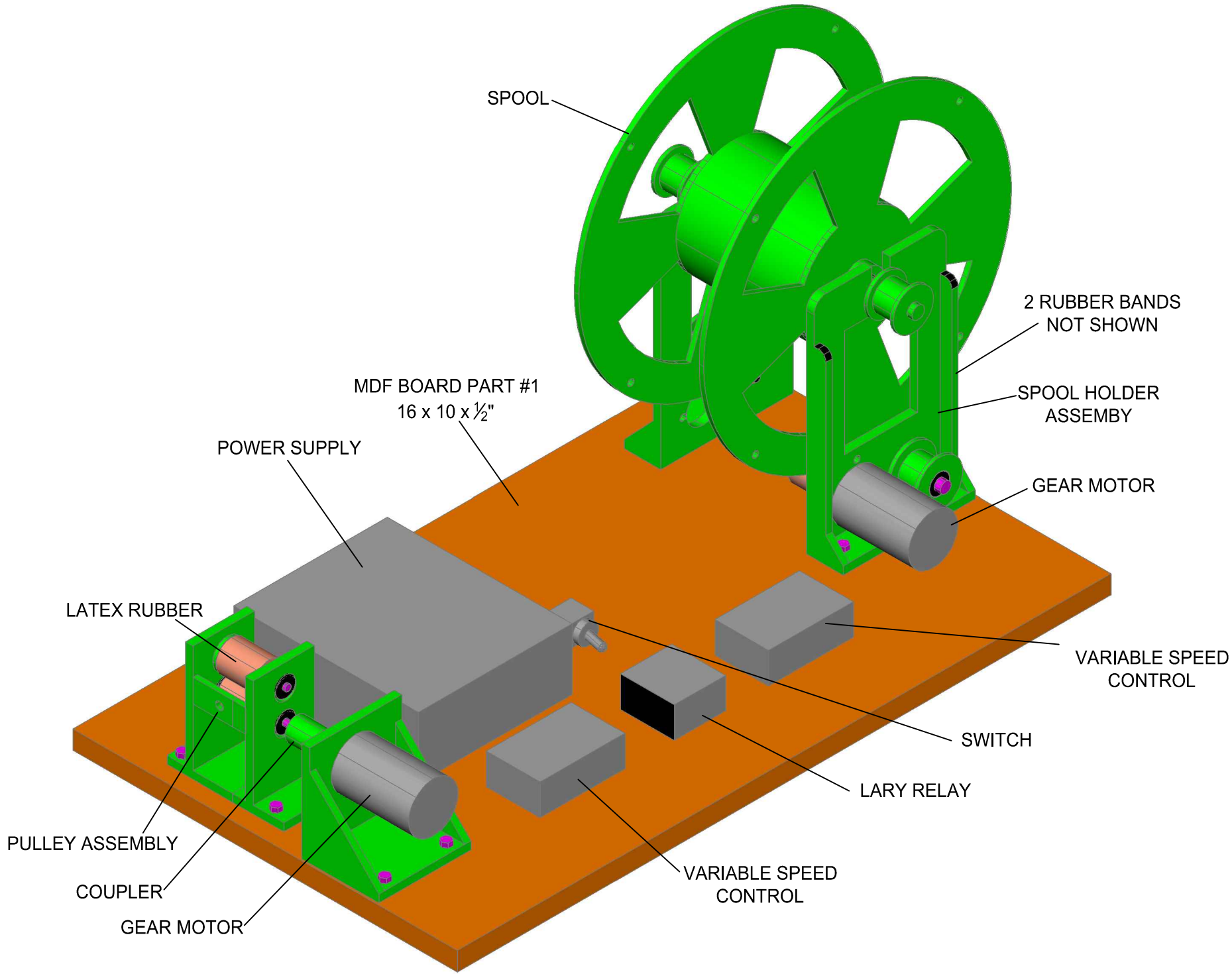
End of photos, next are drawings.



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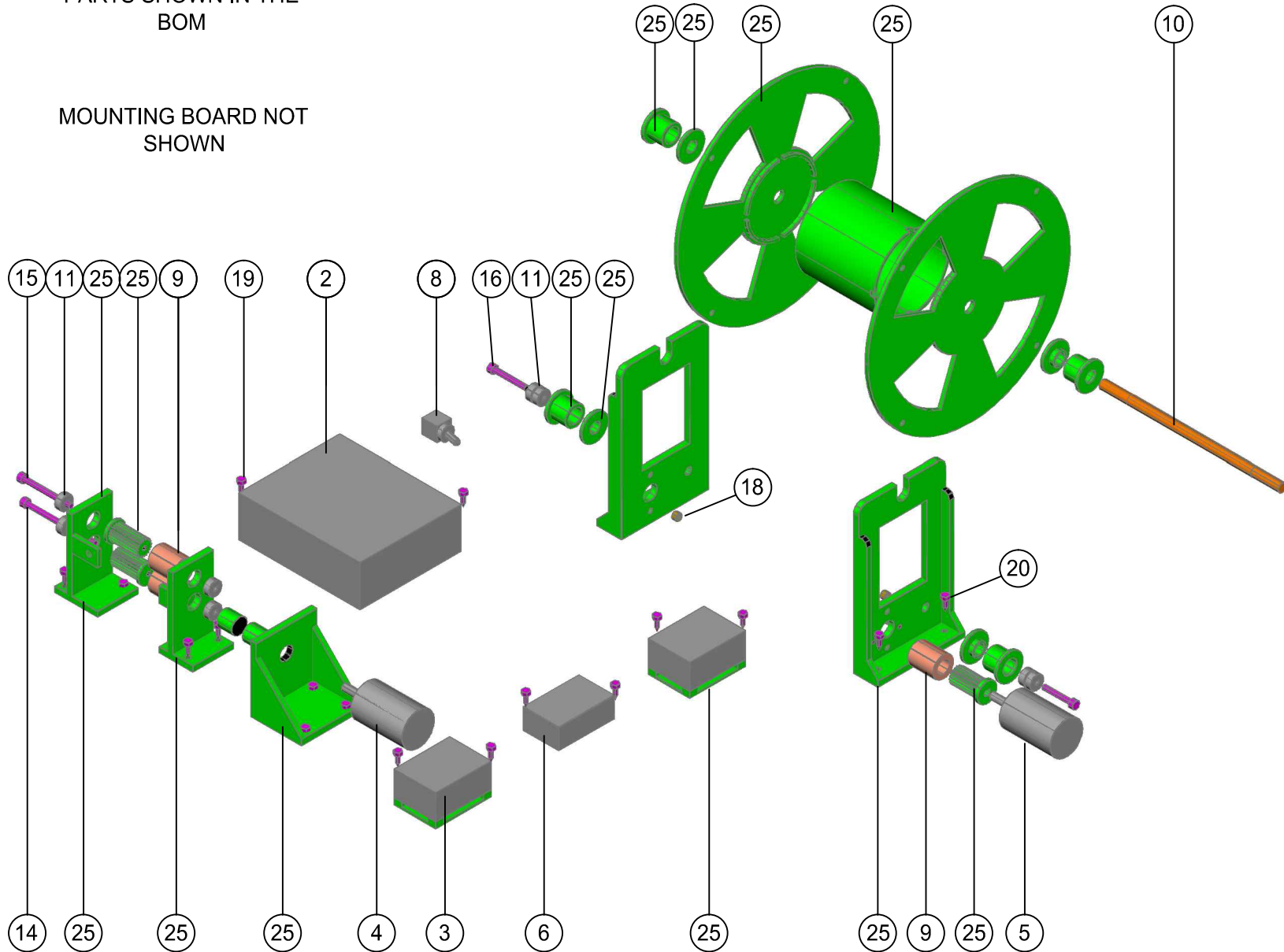
WINDER ASSEMBLED
 LYMAN FILAMENT SPOOL WINDER V6

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SCALE	NONE
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NUMBERS REFER TO
PARTS SHOWN IN THE
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MOUNTING BOARD NOT
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FILAMENT WINDER EXPLODED VIEW
LYMAN FILAMENT SPOOL WINDER V6

DRW BY
H.LYMAN
DATE
7/1/15

CKD BY
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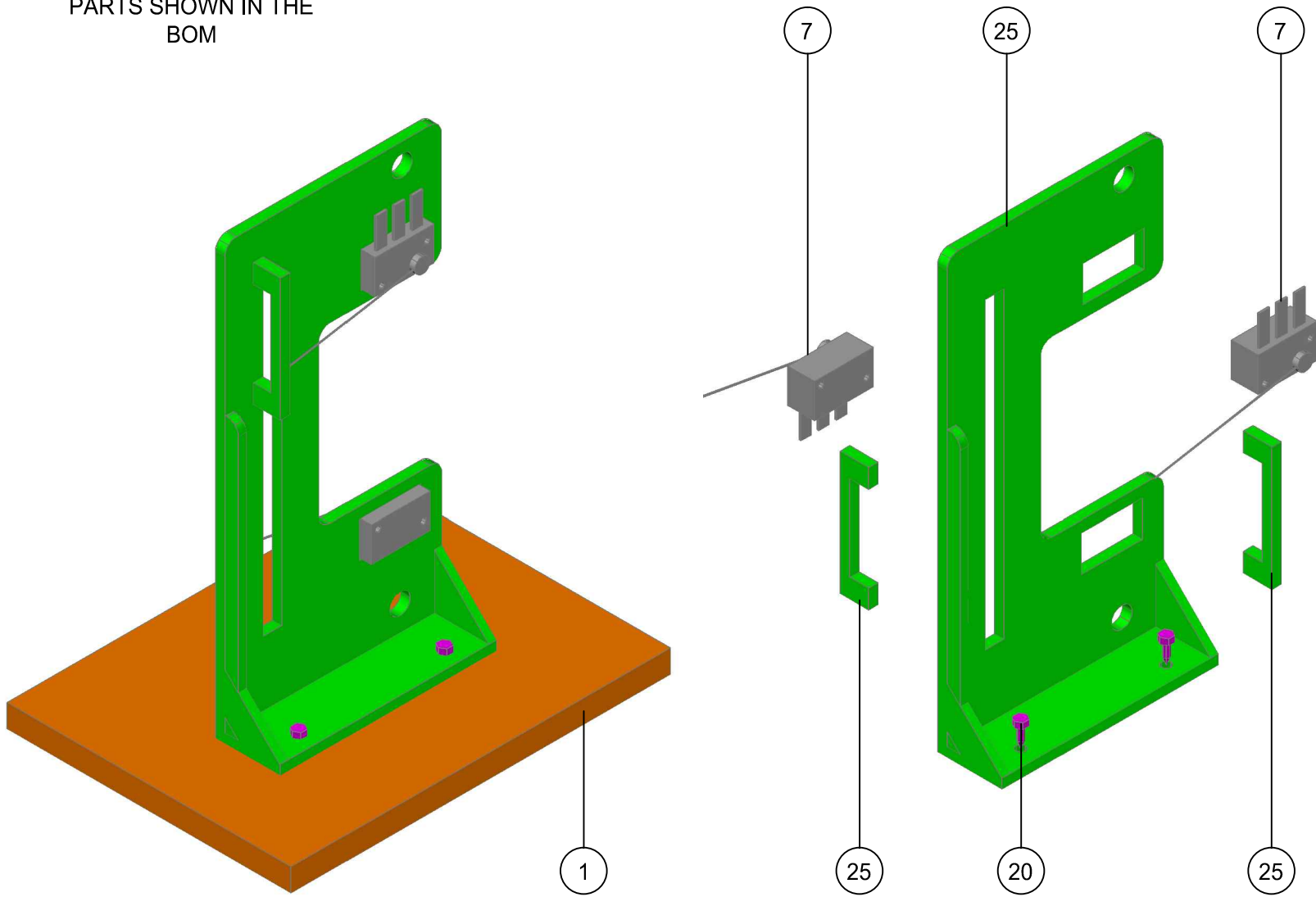
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FILAMENT LOOP CONTROL ASSEMBLY
LYMAN FILAMENT SPOOL WINDER V6

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H.LYMAN
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7/1/15

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SPOOL WINDER PRINTED PARTS
LYMAN FILAMENT SPOOL WINDER V6

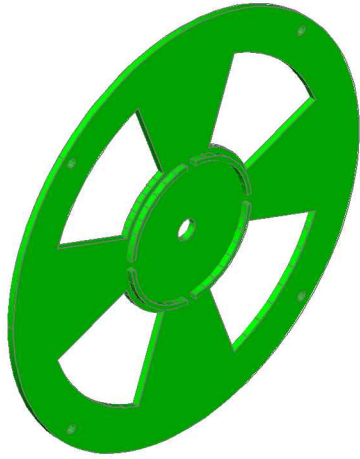
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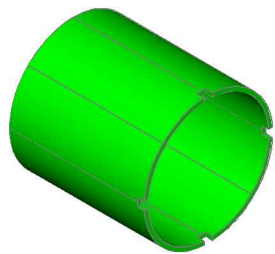
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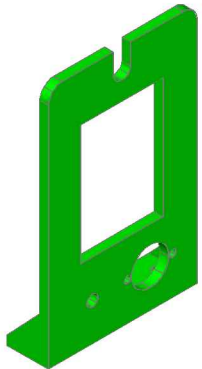
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SPOOL DISC
STL 1
2 REQ'D



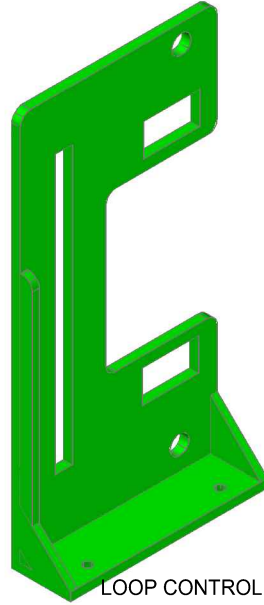
SPOOL CYLINDER
STL 2



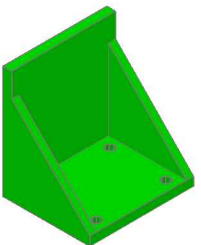
SPOOL HOLDER
STL 3
2 REQ'D



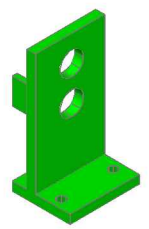
SWITCH WIRE GUIDE
STL 4
2 REQ'D



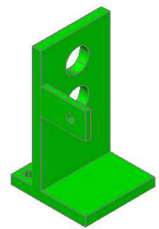
LOOP CONTROL STAND
STL 5



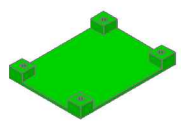
PULLER MOTOR BRKT
STL 6



PULLER BRT LT
STL 7



PULLER BRT RT
STL 8



VAR VOLT STANDOFF
STL 9
2 REQ'D



PULLER COG
STL 12
2 REQ'D



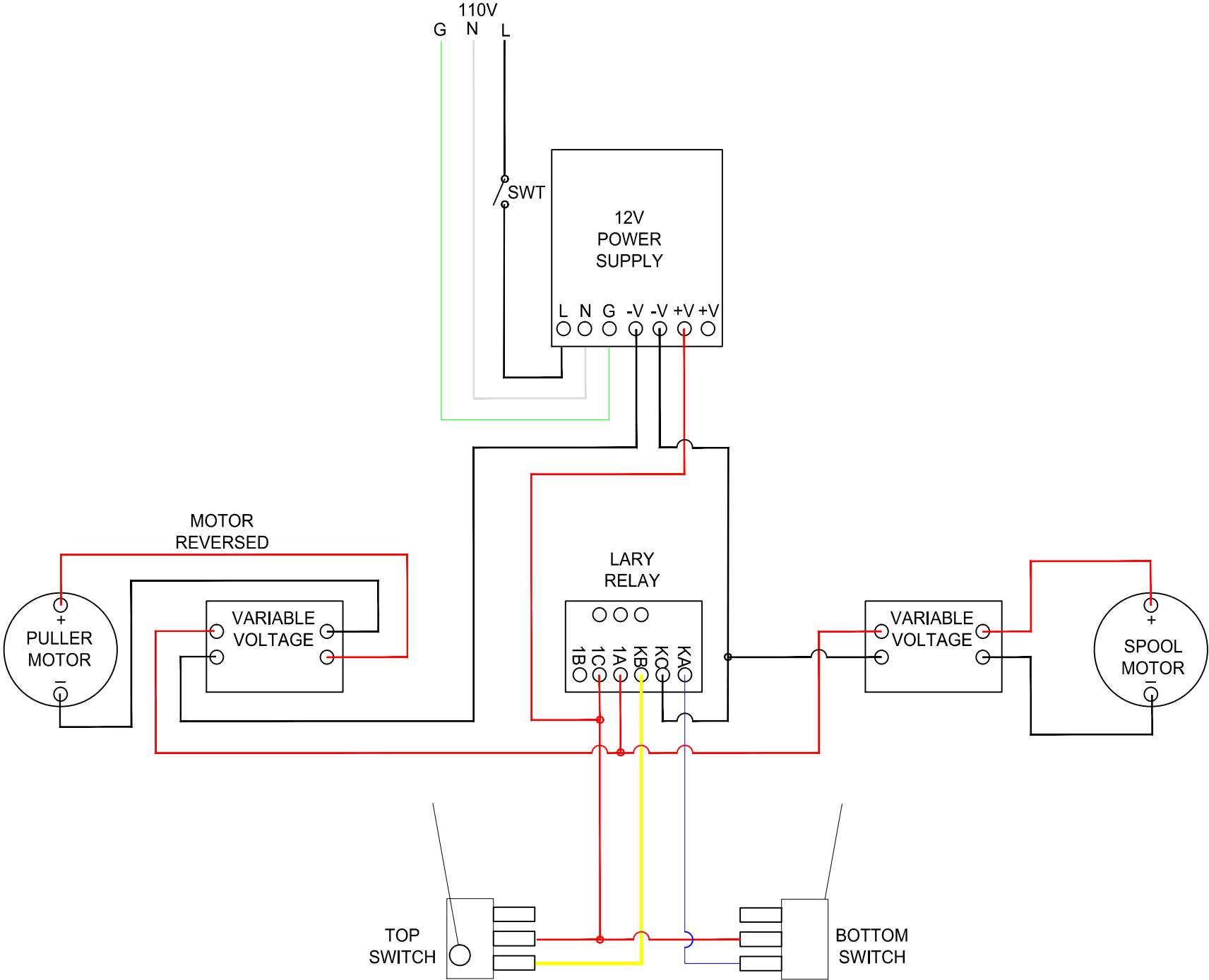
PULLEY PRT A
STL 10



PULLEY PRT B
STL 11



WINDER MOTOR COG
STL 13



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SPOOL WINDER WIRING DIAGRAM
LYMAN FILAMENT SPOOL WINDER V6

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H. LYMAN
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BOM - LYMAN FILAMENT SPOOL WINDER V3									
Part #	DESCRIPTION	SIZE	UNIT	QTY	FOB UNIT PRICE	SUBTOTAL	SUPPLIER	SUPPLIER PART #	NOTES
1	MDF BOARD	16X10X.5"	SQ FT	1.185	\$1.11	\$1.32	HOME DEPOT		
2	POWER SUPPLY	12V 5A	EA	1	\$8.99	\$8.99	eshoppixig		eBay
3	VOLTAGE REGULATOR	12V	EA	1	\$3.83	\$3.83	whitesibrgn		eBay
4	GEARMOTOR 30 RPM	12V	EA	1	\$12.95	\$12.95	MJPA	32204 MD	http://www.mpja.com/
5	GEARMOTOR 100 RPM	12V	EA	1	\$12.95	\$12.95	MJPA	32206 MD	http://www.mpja.com/
6	RELAY DPDT	12V	EA	1	\$19.20	\$19.20	AZATRAX	LARY-DC	http://www.azatrax.com/
7	LIMIT SWT W/WIRE	12V	EA	2	\$8.39	\$16.78	ADAFRUIT	820	http://www.adafruit.com/product/820
8	SWITCH OFF ON	110V	EA	1	\$1.50	\$1.50	HARDWARE STORE		
9	LATEX RUBBER TUBE	1/2" ID	IN	4	\$0.50	\$2.00	eBay		fishsinker823
10	WOOD DOWEL BIRCH	3/8"	FT	1	\$0.25	\$0.25	HARDWARE STORE		
11	BEARINGS	4x13x5mm	EA	8	\$1.28	\$10.24	VXB	KIT843	http://www.vxb.com/
12	M3 SHCS	8mm	EA	4	\$0.15	\$0.60	FASTENAL	11103296	
13	M3 WASHER		EA	4	\$0.03	\$0.12	FASTENAL		
13	M4 WASHER		EA	4	\$0.03	\$0.12	FASTENAL	1140353	
14	M4 SHCS	65mm	EA	1	\$0.75	\$0.75	FASTENAL	unknown	I got this at the local Fastenal store
15	M4 SHCS	50mm	EA	1	\$0.45	\$0.45	FASTENAL	11103319	
16	M4 SHCS	30mm	EA	2	\$0.23	\$0.46	FASTENAL	11103315	
17	M4 NLOCK NUT	4mm	EA	2	\$0.11	\$0.22	FASTENAL	40147	
18	M4 BRASS HEAT INSERT	3mm	EA	3	\$0.13	\$0.39	McMASTER CARR	94180A331	Used in the feed roller coupler
19	SCREW #4	1/2"	EA	4	\$0.05	\$0.20	HARDWARE STORE		
20	SCREW #6	5/8"	EA	14	\$0.05	\$0.70	HARDWARE STORE		
21	ELECTRICAL WIRE		LOT	1	\$5.00	\$5.00	YOUR CHOICE		
22	WIRE CONNECTORS		LOT	1	\$2.00	\$2.00	YOUR CHOICE		
23	CORD CLAMP		EA	3	\$0.10	\$0.30	YOUR CHOICE		
24	TTT (this that & the other)		LOT	1	\$2.00	\$2.00	YOUR CHOICE		
25	PRINTED PARTS 12 EA	3mm	mm	60000	\$0.00004	\$2.40	PELLETS	PRINTED	
37	ABS SOLVENT CEMENT		oz	0.25	\$2.00	\$0.50	eBay		
38	RUBBER BANDS			2	\$0.02	\$0.04	ON HAND		
	SUB TOTAL COST					\$106.26	Some items include shipping		
	ESTIMATED FRT IN		@	10%		\$10.63			
	TOTAL COST					\$116.88			