Blue Streak Governor
Installation Manual
For the Rotorway
162F

May 2, 2007 Rev. June 6, 2007

Caution: The Blue Streak Governor when correctly installed and operated should perform as advertised, however it is an experimental governor being installed on an experimental helicopter. As clearly stated in the purchase agreement, the buyer assumes full responsibility for any losses incurred during use or associated with the use of this product. The seller, Robert J. Carter d/b/a Blue Streak Engineering stands behind the product and will replace any defective parts, but assumes no responsibility or liability for any losses caused by, or associated with, the use of this product.

Robert J. Carter
Blue Streak Engineering
1320 pleasant Dr.
Dover, PA 17315
bobsbse@aol.com
717-932-2150

BSG Installation Instructions

Congratulations on your purchase of the Blue Streak Governor. This governor is made up from off-the-shelf components that have a proven track record in the industrial community. The microprocessor control module has been programmed specifically for the Rotorway 162F helicopter engine. It has been adjusted for an engine speed of 4250RPM that equals a rotor RPM of 520.

The installation has been broken down into 5 different tasks. It is suggested that the tasks be accomplished in order with the exception of the electrical Task 1 that can be accomplished any time.

Contents:

Task 1 Installation of the power circuit.
Task 2 Removal of the throttle bracket.
Task 3 Installation of the Magnetic Pickup.
Task 4 Installation of the throttle actuator and throttle arm.
Task 5 Installation of the Control module.
Task 6 Checkout.
Operating instruction.

Task 1 (See attached wiring diagram, back page)
In task 1 you will install the wiring to bring 12 volt DC power to the control module. All the components needed to complete this task are contained in a plastic bag marked Task 1. There are three items that must be mounted during this task:



1. The governor on-off switch. The governor on-off switch should be located where the pilot can manipulate it without the removing his or her hands from either control. This means that it must be located on the cyclic grip and or on the end of the collective. I mounted mine on the back of the cyclic grip where it could be turned on and off with my index finger.
2. The governor ON light. The governor light should be mounted in plain sight, near the rotor tachometer. I mounted mine near the rotor tachometer in the 7:30 or 225 degree position. You have choice of red or green. I prefer red.
3. The 10Amp circuit breaker. The 10 amp. circuit breaker can be mounted in the overhead power panel if the DC power is going to be taken from there. Electrically it should be as close to the power source as possible.

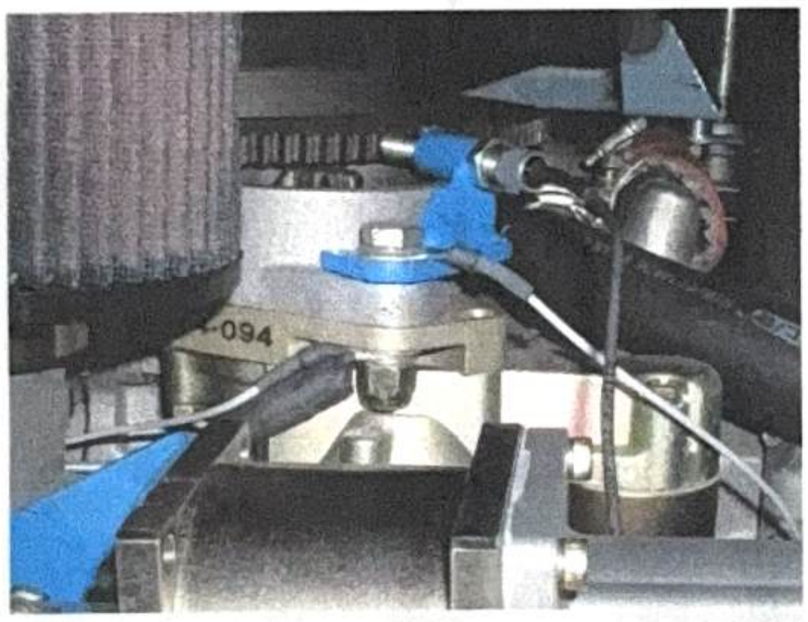
Frame/electrical ground for the unit can be taken from the upper motor mount bolt behind the pilot's seat. Using the wire supplied with a two-pin connector attached connect the short wire to ground and use the long wire to run to where ever you put the switch. I was able to run the necessary wires along with other existing wires already tywraped to the frame. When the wiring is finished you should have a ground wire and a switched DC wire that are long enough to work with when you mount the control module on the low part of the lower pilot seat back. All the wiring should be accomplished with the #18 wire supplied except the indicator light that can be wired with #22 or #24.

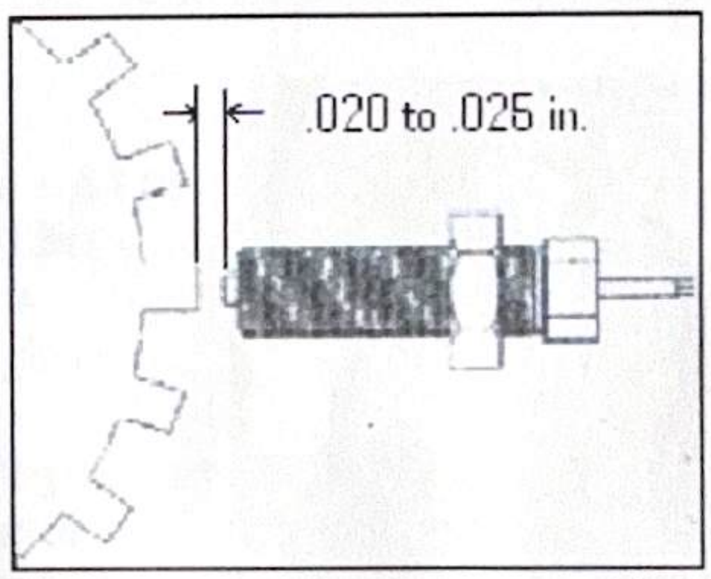
Task 2

Ref: R.I.162F Engine Manual, page 84 Plenum and Manifold Assembly. Disconnect the throttle cable from the throttle arm (20) and the plenum cable bracket (25). Remove the plenum cable bracket (25) and spring (23). Remove the throttle arm (20). Remove the ball stud (21) from the throttle arm (20) and install it in the new stainless steel throttle arm provided. Install the new throttle arm on the throttle shaft.

Task 3

Remove the forward starter bolt. Using the longer bolt provided and placing the thin washer provided between the bracket and the starter mount, install the magnetic pickup bracket. The bracket is designed to have a tight fit. If necessary the hole may need to be filed. Hold the bracket tight against the start mount as you tighten the bolt.





Screw the magnetic pickup into the bracket. Caution! Do not let the end of the magnetic pickup rub against the ring gear. Move the ring gear until one tooth is directly in line with the center of the magnetic pickup. Using a feeler gage, adjust the pickup so that the end is .020 to .025 inch from the ring gear. Secure the locking nut with some of the blue locktite provided.

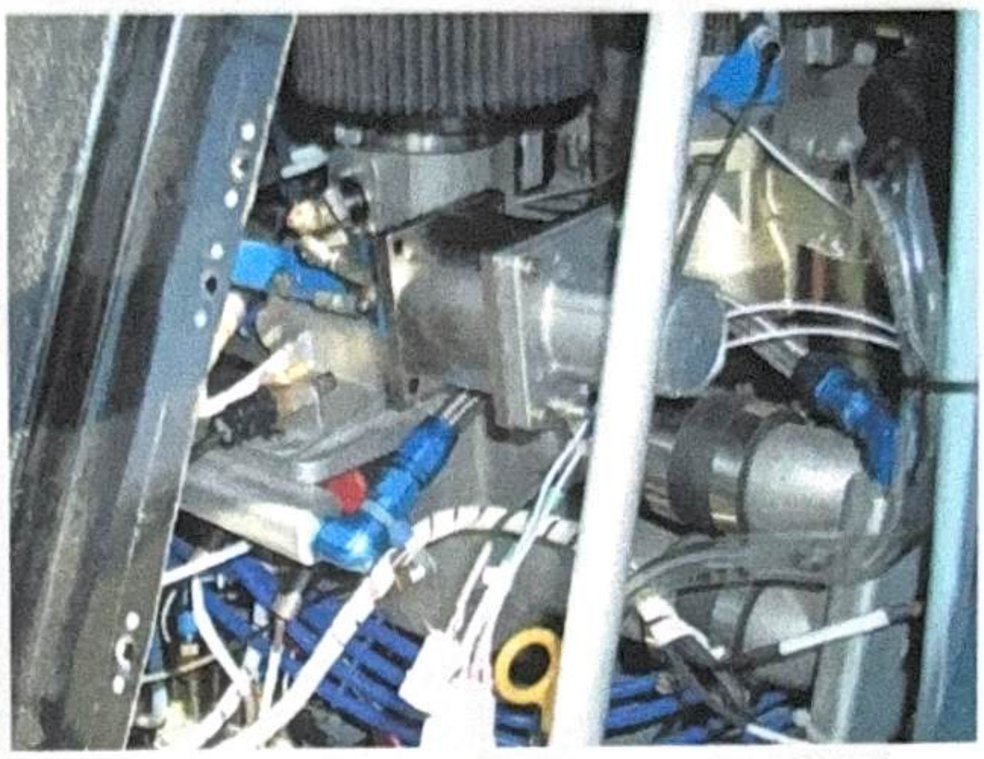
The magnetic pickup generates a 2 volt AC sine wave that represents the engine speed or RPM. The controller uses this reference engine RPM, compares it with the desired speed and makes the appropriate adjustments to the throttle arm.

Task 4

Install the actuator and actuator bracket where you removed the plenum cable bracket. Install the 3/16 bolts using the blue locktite provided. Carefully torque the bolts to 75-80 in. lbs.

Safety wire as tightly as possible.

Connect the throttle arm linkage to the actuator. Adjust linkage until the throttle is at full idle when the actuator is fully retracted. When linkage is the correct length, apply some blue locktite to the locking nut and tighten the actuator locking 1/8 turn and the linkage nut until tight. Make sure the two rod-ends are lined up and free to rotate.



Connect the actuator leads the two red matching terminals coming from the controller.

Task 5

Mount the control module on the lower left-hand part of the pilot seat back lower half with the wires running up. Mount the Adel clamps 1.5 inches above the controller. With the lower half of the seat back laying on the bench with the engine side up the controller will be mounted in the lower right, bottom half. See picture. Important: Keep the magnetic P/U lead and the Actuator lead separated as much as possible, they will cross talk.

Caution: All helicopters have vibration, some worse than others. Be sure to use heats-shrink tubing on all connectors. It is also important to anchor the wires coming out of the control module. Use a small tywrap around both connectors.



Weight & Balance: Major components Total weight = 6 Lbs.
FORE/AFT WT. 6 Lb, Arm 80 ins., Moment 480 in Lbs.
Lateral Wt. 6 Lbs., ARM -5 in., Moment –30 in. Lbs.
For a more accurate W&B the helicopter must be weighed.

Check Out: After everything is hooked up and before you start the engine turn the system on. The red light will come on for one second and then go out. This indicates that the controller is getting power. The red light will remain out until the unit is receiving a good signal from the magnetic pickup. As soon as the engine is started and the governor is turned on the red light will come on, go out, then come back on and remain on. DO NOT TURN THE GOVERNOR ON WHILE THE ENGINE IS IDLING OR DURING THE WARM UP PERIOD. If you do turn the governor on before you're ready, it will take control of the engine and increase the RPM directly to 4250.

The control modules are shipped with the sensitivity correctly adjusted for your engine and the engine RPM set to 4250. Due to subtle differences in engines it may be necessary to adjust one or both of these controls. Try it first before you adjust anything.

With the governor off, start the engine and engage the rotor blades. Using the Rotorway procedure, warm the engine up until the thermostat opens and the coolant temperature recedes.

Check the engine gages to make sure they are all in the normal range. With the collective just above the pocket, increase the throttle to 90%. **Caution! Do not roll the throttle off until the governor has taken control.** Keeping your finger on the governor switch, turn the governor on. There will be a 2 to 4 second delay while the controller initializes, then the engine speed will start to increase. The engine speed will ramp up to 100% rotor RPM and stabilize. IF ANYTHING UNEXPECTED HAPPENS TURN THE GOVERNOR OFF.

If the governor hunts, decrease the gain pot on the controller by ½ unit and try again.

Adjust the speed control pot (21 turn pot) for 100% rotor rpm or the RPM you want. The adjustment range is from 3800 to 4500 RPM. Note: You can check the engine speed on the FADEC display.

When you are satisfied that the governor is set at the desired speed, and it is not hunting, you are ready to go. It is important that the manual throttle is rolled off so it doesn't interfere with the governor. Too much manual throttle takes control of the throttle shaft away from the governor which can result in an unstable condition. The governor tries to slow the engine down but can't. Then when you reduce manual throttle the governor comes back in and takes control.

To disengage the throttle:
On the ground you can just shut the governor off and the engine will go to where ever the manual throttle is set.

In the air you must increase the manual throttle until there is a slight increase in rotor RPM, then shut the governor off. If you follow this procedure you will smoothly transition to manual throttle

Preflight: While checking the oil during preflight check the throttle bracket and actuator . Make sure that the bracket is secure and not loose or cracked. Check all the wiring and connectors for sign of wear or chaffing due to vibration. Make sure the ball joints have a little lubrication. If dry, touch them with the end of the dipstick to supply a little oil.

Flight Operation: Warm the engine up and complete all preflight checks before engaging the governor. When all preflight checks have been completed, with the collective raised just above the pocket, manually increase the rotor RPM to 90%. Engage the governor. **Caution! Do not roll the throttle off until the governor has taken control. Caution! If the collective is too high, the helicopter will lift off.** The rotor RPM will gradually increase to 100% and stabilize. Be sure that the manual throttle is not interfering with the governor operation. You are ready to fly using the governor.

The governor will hold the engine/rotor RPM constant as long as engine power limitations are not exceeded. If the load exceeds the engines capability, the rotor RPM will start to drop. Lowering the collective will quickly restore the rotor RPM to 100%.

Flight Test:
Hover Test the governor before committing to forward flight. Perform all hover maneuvers which should include: Stable hover at two or three feet, Lift off and set downs, Peddle turns left

and right, Slow hover taxi, Fast hover taxi, Quick stops, etc. Watch the engine RPM on the FADEC display to verify that it isn't changing. Watch the manifold pressure to see that it is increasing and decreasing as demands on the engine change. Continue hovering the helicopter until you are confident that the governor is working correctly and you are comfortable with it.

Forward flight is the least demanding phase from the governor's prospective. The transition from hover to forward flight is exactly the same using the governor. The big difference is that the governor will manage the engine. The rotor RPM will remain constant at 100% and you can watch the manifold pressure drop off. When you lower the collective for the approach the manifold pressure will decrease further. The manifold pressure will increase as you come into a hover at the end of the approach.

Note: If the collective is lowered too far, the rotor system will go into an autorotation mode and the rotor RPM may increase above 100%. Raising the collective will stabilize the rotor RPM back at 100%. Normal approaches should be made with the collective above the autorotation mode.

Autorotation: It is suggested that you disengage the governor when practicing autorotations.

In-flight governor disengagement: Manually increase the throttle until you see a slight increase in rotor RPM. Turn the governor off.

On the ground governor disengagement: Use the in-flight procedure for a smooth transition. Or just turn the governor off and the throttle will go to wherever the manual throttle is set.

Post Flight Be sure the governor is turned off.

Note: If the rotor tachometer seems to drifting a little, it may be the tachometer system. Check the FADEC engine Tachometer to see if the engine RPM is drifting. The Rotorway rotor tachometer seems to drift with changes in temperature, voltage etc.

Governor Maintenance: There is very little maintenance required by the Blue Streak Governor. When checking the engine oil look over the governor. Check all the brackets for cracks and security. Check all wiring for security and signs of wear. Exercise the actuator by hand to make sure it is smooth and free. Check the linkage for slop and end play. If necessary, apply a small amount of light grease to the actuator shaft and rod end balls. Keep all components clean and free of oil and dirt.

Have a good flight!

Notice/Caution

The 162F engine, without the governor, must be running smoothly, without any roughness or instability for the governor to be smooth and stable.

Any erratic engine behavior will be intensified by the governor attempting to stabilize the RPM.

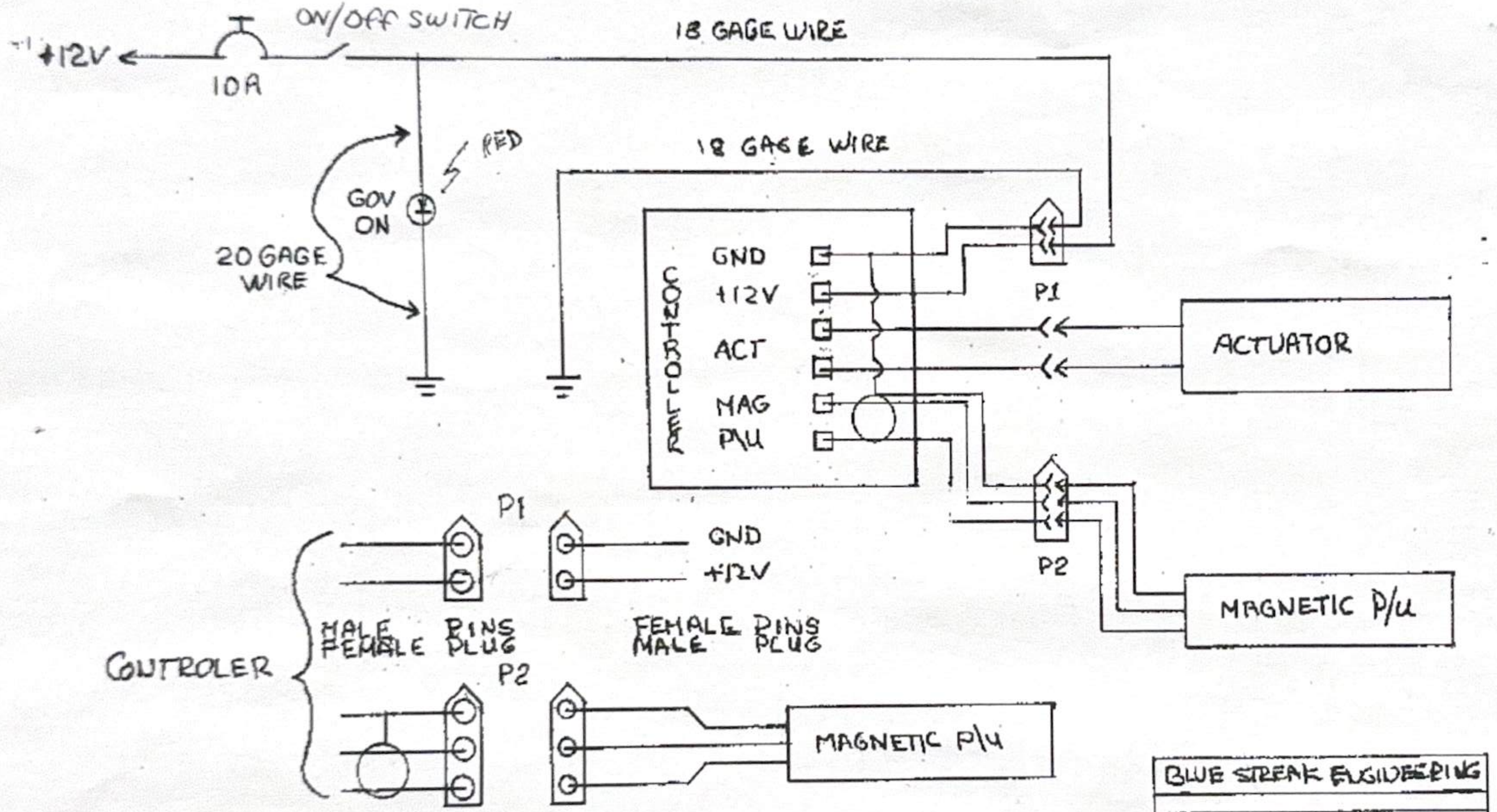
7/8/2007

Mr. Gary C. Boyd
8040 Resurrection Dr.
Anchorage, AK 99504-3760

Hi Gary,
Here's your Blue Streak Governor. Please read the instructions through completely before you start the installation. Call me if you have any questions. 717-932-2150 or cell 717-645-2658 I would also like any feed back you might have on the kit or the instructions. Thanks for your order. Good luck!

Regards, Bob Carter

For	Gary Boyd	
Serial#	09	
Date	7/10/2007	
Packed by:	Clark	
		Packed
1	Installation Instruction Manual	✓
Task 1 Wiring		
Num	Item	Packed
1	Switch	✓
1	Green LED	✓
1	Red LED	✓
5	Ft. Wire #20	✓
20	Ft. Wire #18	✓
1	Label Light	✓
1	Label Switch	✓
1	Red Ring Terminal 7/16	✓
1	Red Ring Terminal 3/8	✓
2	Red PIDG Faston Recp.	✓
1	Circuit Breaker	✓
1	Ft. Red Heat Shrink Tubing	✓
5	4 In. Tywraps	✓
5	8 In. Tywraps	✓
Task 3 Magnetic Pick/up		
Num	Item	Packed
1	Mag-pickup	✓
1	Mag-pickup Bracket	✓
2	Mag-pickup Bolt	✓
1	Washer	✓
Task 4, Actuator		
Num	Item	Packed
1	Actuator SN 09	✓
1	Act Bracket ~~SS~~	✓
1	Throttle Arm	✓
1	Rod End Female	✓
1	Rod End Male	✓
1	Clevis	✓
1	Bolt AN3-6A	✓
1	Lock Nut	✓
1	Stop nut	✓
1	Locktite	✓
3FT	Safety wire	✓
Task 5 Contoller		
Num	Item	Packed
1	Controler SN 09	✓
2	Adel Clamp	✓
3	Screw nut washer 10-32	✓



BLUE STREAK ENGINEERING
BSG WIRING DIAGRAM
ROBERT J. CARTER
6/3/2007