Installation of the Barber-Colman 8400 Electric Governor System on the Waukesha VHP-GL Series Engines — L5108, L5790 and L7042. This bulletin gives detailed instructions on attaching parts kit DYNK-10340 to the throttle lever of an Impco Carburetor. When the electric governor is attached, it will constantly reposition the fuel to maintain an isochronous speed with varying loads.

This bulletin contains the following:

Installation of the DYNA 8400 Governor on the Waukesha VHP-GL series engine. The governor is attached to the left side of the engine (looking from the flywheel). It is attached to the governor mounting pad located toward the flywheel, with the throttle linkage running along the side of the engine and attaching to the throttle lever of the Impco carburetor. The governor positions the fuel with varying loads to maintain isochronous speed.

Read all instructions and review the layout drawing before attempting this installation.

I. Installation Instructions

1. Disconnect the battery.

2. Remove and discard any existing throttle linkage attached to the Impco throttle lever. Also remove and discard any unnecessary components attached to the governor mounting pad.

A. Actuator Installation

1. Obtain from the parts kit one actuator mounting bracket, one mounting bracket spacer, two 3/8-16x1.75" screws, two 3/8-16x1.25" screws, two 3/8-16 nuts and four 3/8" lock washers — Items 3, 4, 5, 6, 7 and 8.

2. Align the bracket spacer and the actuator bracket — Items 3 and 4, onto the engine's governor mounting pad as shown in the layout drawing on page 4. Secure both brackets to the governor mounting pad by placing two 3/8-16x1.25" screws and lock washers — Items 7 and 8, through the holes in the backside of the bracket. Secure the front of the brackets using two 3/8-16x1.75" screws, lock washers and nuts — Items 5, 6 and 7.

3. Obtain from the parts kit one actuator, four 5/16-18x1.25" screws and four 5/16" lock washers — Items 1, 15 and 16.

4. Place the governor actuator — Item 1, on the mounting bracket as shown in the layout drawing on page 4. Secure the actuator to the bracket using four 5/16"-18x1.25" screws and lock washers — Items 15 and 16.

B. Throttle Linkage

1. Obtain from the parts kit one actuator lever — Item 9. Once again refer to the layout drawing on page 4 and attach the lever to the actuator as shown, at a 5 degree angle from a horizontal reference. Secure this lever by tightening the socket head cinch screw.

2. Remove the throttle lever from the Impco carburetor and drill a 3/8" clearance hole at a 1" ratio from the center of the throttle shaft. Refer to the layout drawing on page 4 and install the throttle lever as shown, at a 32 degree clockwise angle from a vertical reference.

— Note —

Be certain the throttle plate is in the closed position when setting this angle.

3. Obtain from the parts kit two 3/8" - 16 nuts, two 3/8 lock washers, two 3/8" rod end bearings, two 3/8 - 16x1" screws, two 3/8 - 24x3.5" threaded rod, four 3/8 - 24 nuts and one linkage rod — Items 6, 7, 10, 11, 12, 13 & 14.

4. Place one 3/8 - 24 nut — Item 13, onto each end of the two threaded rods — Item 12. Place one of the threaded rods with the nuts ten complete turns into each end of the linkage rod — Item 14, and tighten the jam nuts.

   Place one rod end bearing — Item 10, onto each end of the linkage rod assembly. With the actuator in the minimum fuel position, attach one rod end bearing onto the actuator lever at a 3.325" radius as shown in the layout drawing on page 4. Use one 3/8 - 16 x 1.75" screw lock washer and nut — Items 5, 6 and 7, to secure it. Hold the throttle lever in the minimum position and adjust the length of the throttle rod assembly so the hole in the throttle lever at a 1" radius aligns with the rod end bearing. Secure this length by tightening all four jam nuts on the threaded rods.

   Attach the rod end bearing to the throttle lever using one 3/8-16x1.75" screw, lock washer and nut—Items 5, 6 & 7.

C. Magnetic Pickup Installation

1. On the right side of the flywheel housing (looking from the flywheel end of the engine), locate a 5/8 - 18 threaded hole over the top of the ring gear. Rotate the flywheel and align a tooth into the center of the threaded hole.

   Obtain the magnetic pickup — Item 17, and screw it into the threaded hole until it bottoms onto the flywheel tooth. Turn the magnetic pickup counterclockwise 1/4 to 1/2 turn and tighten the jam nut. This is approximately .015.

II. Parts List

A. Table 1. Governor Assembly

Specify voltage when ordering Items 1 and 2

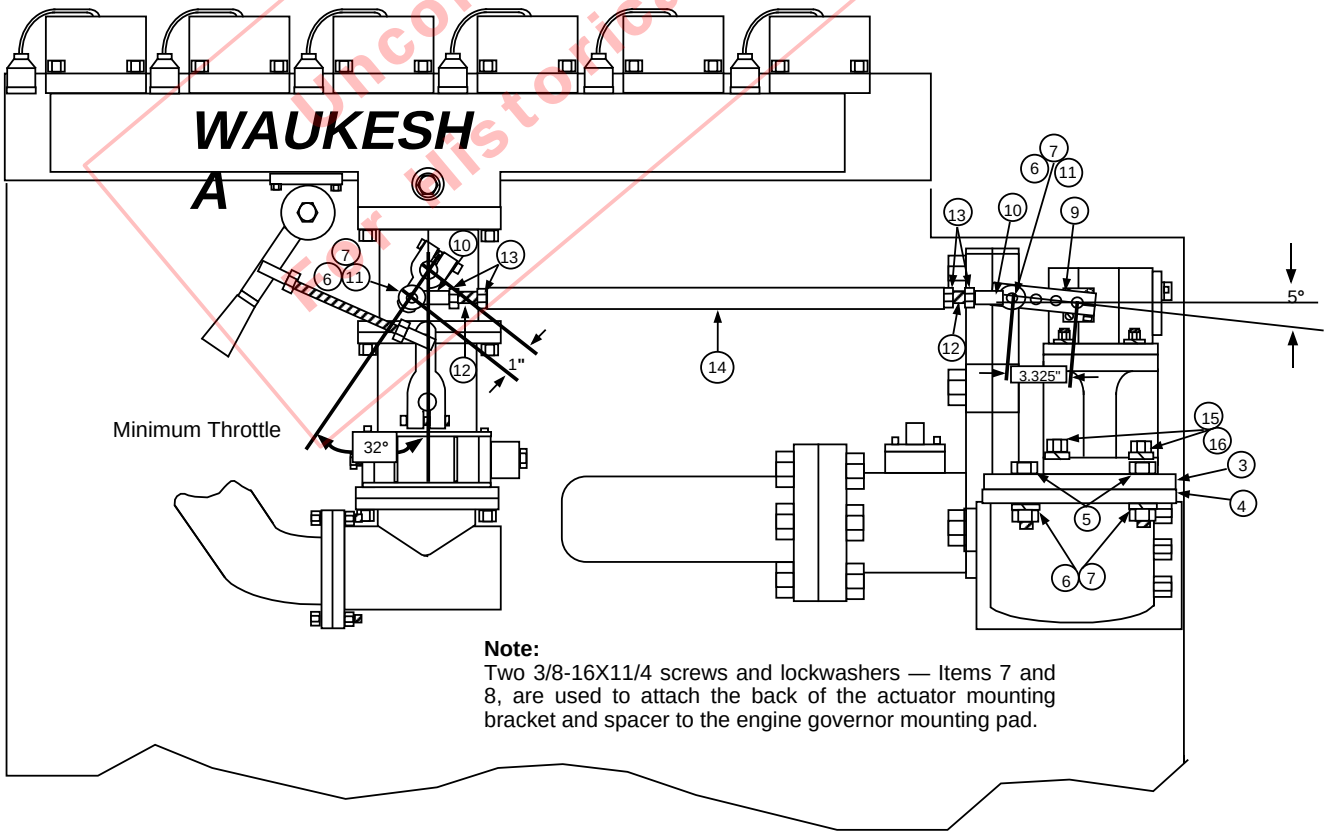
Item	Description	Barber-Colman Part Number	Qty.
1	Governor actuator	DYNC-14800	1
2	Controller	DYN1-10684	1

B. Table 2. Installation Kit

B-C Part Number DYNK-10340

Item	Description	Barber-Colman Part Number	Qty.
3	Actuator mounting bracket	DYNK-144-8	1
4	Mounting bracket spacer	DYNK-144-9	1
5	3/8 - 16 x 1.75" screws	BYRF-1496	2
6	3/8 - 16 Nuts	DYRF-262	4
7	3/8 Lock washers	DYNZ-152	6
8	3/8 - 16 x 1-1/4" screws	BYRF-1494	2
9	Actuator lever	DYNC-174	1
10	Rod end bearings	DYNK-134-3	2
11	3/8 - 16 x 1" screws	BYRF-1363	2
12	3/8 - 24 x 3-1/2" threaded rod	GYRF-44-1	2
13	3/8 - 24 Nut	DYRF-20	4
14	Linkage rod	DYNK-144-10	1
15	5/16 - 18 x 1.25" screws	BYRF-1472	4
16	5/16 Lock washer	CYRD-560	4
17	Magnetic pickup	DYNT-10100	1

III. Layout Drawing



Note:
Two 3/8-16X11/4 screws and lockwashers — Items 7 and 8, are used to attach the back of the actuator mounting bracket and spacer to the engine governor mounting pad.

IV. Calibration Procedure for DYNA 8000 Series Governor Controllers

Part Number	Input Signal Frequency Maximum
DYN1-10682-000-0-12 DYN1-10682-000-0-24	250 to 1200 Hz
DYN1-10683-000-0-12 DYN1-10683-000-0-24	1200 to 2500 Hz
DYN1-10684-000-0-12 DYN1-10684-000-0-24	2500 to 5000 Hz
DYN1-10686-000-0-12 DYN1-10686-000-0-24	5000 to 9000 Hz

NOTE

See Step 4.0 for proper procedures for setting switches S1 and S2, if you have a controller that has the two switches located on top of the controller.

1.0 CALIBRATION PROCEDURE

1.1 Observe that potentiometer settings are adjustable from zero to 100%. Each small division is 10%. The speed potentiometer is 10K, 20 turn.

1.2 Set the small dip switch, S1, for the correct engine. (See paragraph 4) Set switch S2 in the "OFF" position for actuator DYNA 8000 or in the "ON" position for DYNA 8200 and 8400.

1.3 If a remote speed potentiometer is used for narrow range, set to mid range.

2.0 INITIAL POTENTIOMETER SETTINGS

GAIN	20%
I	20%
D	30%
DROOP	Zero

2.1 For isochronous operation, set DROOP counterclockwise to minimum position as shown in Figure 1.

2.2 For DROOP operation, set DROOP potentiometer clockwise to obtain desired amount of DROOP from no-load to full load. Turning potentiometer clockwise increases DROOP.

3.0 START ENGINE (NO LOAD)

3.1 Adjust the controller speed potentiometer for desired engine speed.

NOTE

A warm engine is normally more stable than a cold one. If the governor is adjusted on a warm engine, turn the adjustment potentiometers counterclockwise 5% (1/2 div.) to ensure a stable engine when started cold.

3.2 Adjust the GAIN potentiometer clockwise until the engine begins to hunt. (If the engine remains stable at 100% GAIN, physically disrupt the actuator linkage by hand.) With the engine hunting, turn the GAIN potentiometer counterclockwise until stable.

3.3 Repeat step 3.2 for the "D" setting.

3.4 Repeat step 3.2 for the "I" setting.

3.5 After calibration, it may be necessary to readjust the speed.

3.6 Following the above calibration, conduct the following test. With the engine operating at rated speed, turn the electric governor off. When engine speed slows to approximately half of rated speed, turn the electric governor back on. Observe the overshoot. If the overshoot is too great, turn the "I" potentiometer clockwise to lessen the overshoot. If there is a small hunt at steady state, slightly turn the "I" potentiometer counterclockwise until stable. In some cases, 2 to 3 Hz overshoot may be acceptable.

WARNING

For gas engines, make certain that method used does not put gas in exhaust which might result in an explosion.

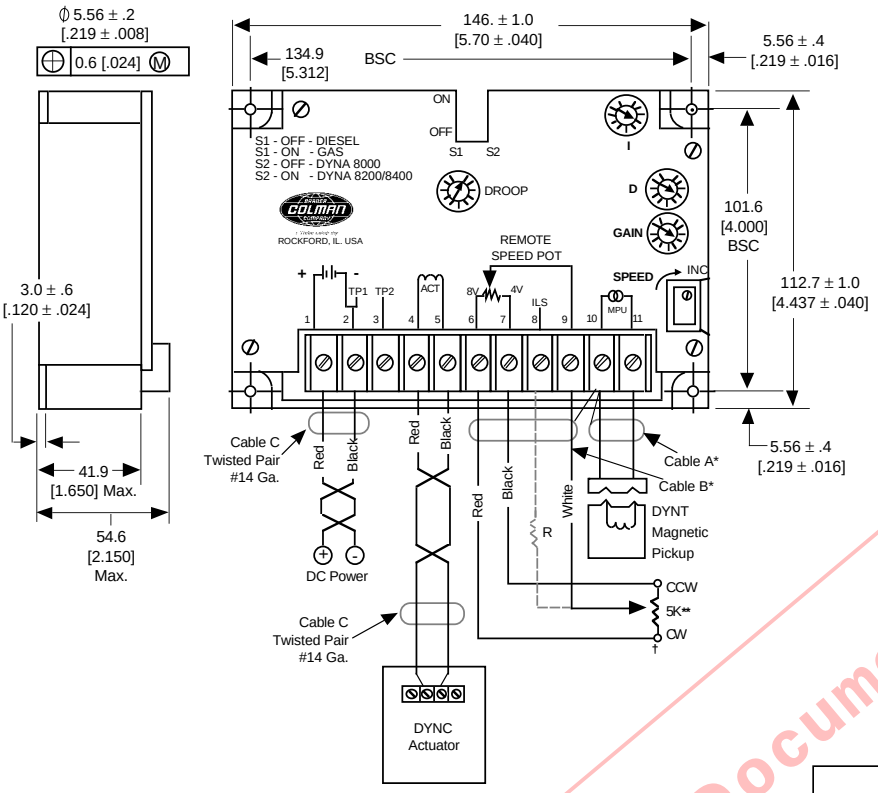
If possible, operate the unit through various load ranges up to 100% to ensure stability.

4.0 CONTROLLERS HAVE SWITCHES S1 AND S2

These units have two features now added to the DYN1 1068X series controllers. They are:

4.1 Two response ranges for matching either the diesel or gas engine dynamics.

- Set S1 to the OFF position for diesel engine applications.
- Set S1 to the ON position for gas/gasoline engine applications.



Cable A - DYNK 44-XX (specify length)
(90° connector)
Cable B - E26-22 (specify length)
Cable C - DYNZ 70-4 (specify length)
* Shielded Cable - Should be purchased from Barber-Colman or customer should purchase a cable with a wrapped mylar supported aluminum foil shield with a drain wire.

**Remote Speed Potentiometer
- DYNS 10000

† The 5K Remote Speed Potentiometer can be wired two different ways:

1. As shown by the solid line from the wiper of the 5K potentiometer and then connected to terminal 9 (no resistor required). Adjustable range is approximately ±5% at 1800 RPM.

2. As shown by the dashed line from the wiper of the 5K potentiometer through resistor "R" and then connected to terminal 8. Reducing the value of "R" increases the remote adjustable speed range.

NOTE
Barber-Colman believes that all information provided herein is correct and reliable and reserves the right to update at any time. Barber-Colman does not assume any responsibility for its use unless otherwise expressly undertaken.

Figure 1
Electronic Control Box Adjustments, Configuration and Typical Wiring Diagram

4.2 Two actuator selections, so the same controller can be used on the DYNA 8000, DYNA 8200 or DYNA 8400 actuator.*

- Set S2 to the OFF position when using a DYNA 8000 actuator.
- Set S2 to the ON position when using a DYNA 8200 or DYNA 8400 actuator.

5.0 GENERAL INFORMATION ON S1 AND S2

- Switch S1 selects one of two integrating rate ranges. The diesel version integrates at twice the rate of the gas version.
- Switch S2 selects the point at which actuator coil current level causes the integrator limit to be actuated. This level is nominally 6.3 amperes for the DYNA 8000 and 7.3 amperes for the DYNA 8200 and 8400 actuator.

* DYNA 8000 — DYNC 11020 Series
DYNA 8200 — DYNC 12000 Series
DYNA 8400 — DYNC 14800 Series

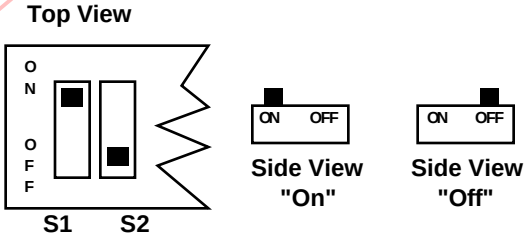
These actuators do not have a potentiometer feedback transducer.

CAUTION

As a safety measure, the engine should be equipped with an independent overspeed shutdown device in the event of failure which may render the governor inoperative.

6.0 PROPER PROCEDURES FOR SETTING SWITCHES S1 AND S2

Question: How do I know if the switches in the dual-in-line packages are correctly set as far as being in the OFF position or the ON position?



Answer: The drawings above should clarify any confusion about switch settings. The easiest way to set the switches is to apply pressure with a small pointed object until the switch clicks into position.

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