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Application Information

Bulletin No. 246

Installation of the Barber-Colman 8400 Series Electric Governor connecting directly to the rack on a Detroit Diesel 8V, 12V and 16V-149 Series engine. In order to install this governor, the hydraulic governor housing must be used for the Barber-Colman mounting bracket. Remove and discard the hydraulic governor drive.

This bulletin contains the following:

- I. Installation Instructions
- II. Parts List
- III. Layout Drawing
- IV. Calibration & Basic Wiring Diagram

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

See the appropriate application bulletin for installation on engines equipped with a mechanical governor.

I. Installation Instructions

A. Engine Preparation

1. Disconnect the battery
2. Remove and discard the hydraulic governor and its oil filter or reservoir and any associated hardware. The governor's oil supply must be plugged.
3. Remove the hydraulic governor's vertical and horizontal drive shafts, along with their gear assemblies from the governor drive housing.

B. Actuator Installation

1. Obtain from the parts kit one mounting bracket — Item 3, four 5/16 - 18 screws — Item 4, and four 5/16 lock washers — Item 5. Mount the mounting bracket to the top of the hydraulic housing with Items 4 and 5.
2. Obtain from the parts kit one actuator — Item 1, four 3/8 - 16 screws — Item 6 and four 3/8 lock washers — Item 7. Place the actuator on the mounting bracket with Items 6 and 7.

C. Linkage Installation

1. Obtain from the parts kit one actuator lever — Item 8. Place the lever on the actuator output shaft at 35 degrees from the vertical reference line. *See layout drawing — Figure 1.* Secure the lever at this time by tightening the screw.

2. Obtain from the parts kit one control rod — Item 9, one 5/16 - 24 screw — Item 11, one 5/16 - 24 lock nut — Item 12, and two 5/16 flat washers — Item 10. Place one end of the control rod through the boot and let it lay free at this time. Connect the other end of the control rod to the actuator lever with Items 11 and 12. Place one 5/16 flat washer on each side of the rod end bearing.

3. Set up the linkage such that max rotation of the actuator matches max travel of the fuel rack. This prevents over-driving of the fuel rack and/or binding of the injectors.

4. To make the max travel adjustment, it is necessary to operate the actuator to the max position. To do this, turn engine OFF and power OFF to governor controller jumper TP1 and TP2. Then turn power ON and this will rotate the actuator to max position. *See the layout drawing — Figure 1.*

5. Obtain from the parts kit one 5/16 - 18 screw — Item 13 and two 5/16 flat washers — Item 10. Adjust the control rod to give full rack travel with full rotation of the actuator. Lengthen the control rod 1/2 turn by loosening the jam nut and turning the rod end bearing 1/2 turn. Connect the control rod with Item 13 to the rack and place one 5/16 flat washer on each side of the rod end bearing.

6. Remove the jumper between TP1 and TP2.

D. Magnetic Pickup Installation

1. The magnetic pickup can be mounted in two different locations on the engine's flywheel housing. One way is on the face of the flywheel housing (left side of engine). Remove the plug and install the bushing - Item 16. The other location is on the side of the flywheel housing. Some engines contain 1-1/4" plug; if so, remove the plug and install the bushing - Item 16. Then center a tooth in the center of the hole.

The magnetic pickup can also be installed off the cam gear on 149 Series engines.

— NOTE —

Do not mount the magnetic pickup in the drain plug hole in the bottom of the flywheel housing.

2. Place the magnetic pickup - Item 14 into the threaded bushing until the tip of the pickup makes contact with the top or side of a tooth. Back out the pickup counterclockwise (CCW) 1/4 to 1/2 turn and tighten the jam nut.

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-14800-24	1
2	Controller	See Below (a or b)	1

a) Magnetic Pickup Installed off Ring Gear DYN1-10654-000-0-24

b) Magnetic Pickup Installed off Cam Gear DYN1-10653-000-0-24

B. Table 2. Installation Kit

B-C Part Number DYNK-10352

Item	Description	Barber-Colman Part Number	Qty.
3	Actuator mounting bracket	DYNZ-91-3	1
4	5/16 - 18 x 1/4" screw	BYRF-1472	4
5	5/16 Lock washers	CYRD-560	4
6	3/8 - 16 x 1/2" screws	BYRF-1368	4
7	3/8 Lock Washers	CYRD-561	4
8	Actuator lever	DYNC-174-008	1
9	Control rod assembly	DYNK-69-009	1
10	5/16 Flat washer	CYRD-549	4
11	5/16 - 24 x 1.25" screw	BYRF-2807	1
12	5/16 - 24 Lock nut	DYRF-501	1
13	5/16 - 18 x .87 screw	BYRF-1351	1
14	Magnetic pickup	DYNT-10200	1
15	Magnetic pickup cable	DYNK-44-10	1
16	M.P.U. Bushing	DYNC-338	1

C. Table 3. Optional Control Components

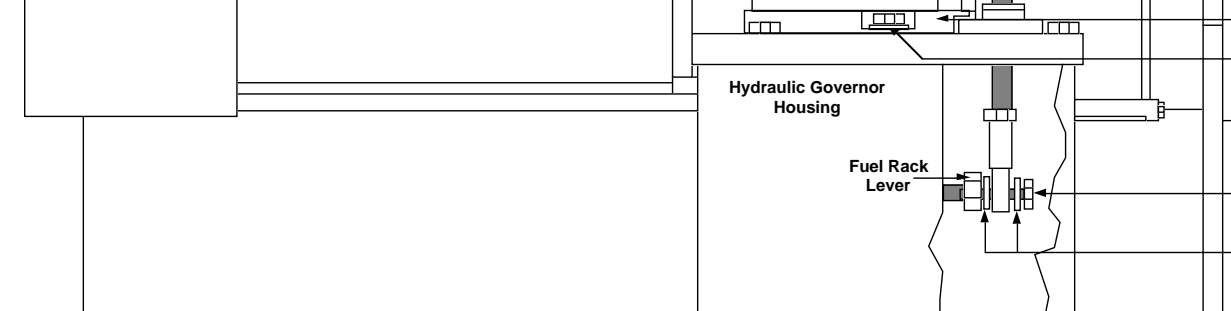
Item	Description	Barber-Colman Part Number	Qty.
17	Remote speed pot 5K	DYNS-10000	1
18	Power switch 25 amp	E23-21	1
19	Smoke limit controller	See Below (a or b)	1
20	2 conductor shielded cable	E26-23	*
21	3 conductor shielded cable	E26-22	*

a) Magnetic Pickup Installed off Ring Gear DYN1-10694-001-0-24

b) Magnetic Pickup Installed off Cam Gear DYN1-10693-001-0-24

* Specify length

Technical drawing of the Fuel Rack Lever assembly, showing a side view of the lever mechanism. A dimension of 1.143 inches is indicated between two points on the lever. The label "Fuel Rack Lever" points to the lever arm.



IV. Calibration & Basic Wiring Diagram

Part Number	Input Signal Frequency Maximum	Part Number	Input Signal Frequency Maximum
DYN1-10652-000-0-12] DYN1-10652-000-0-24]	250 to 1200 Hz	DYN1-10654-000-0-12] DYN1-10654-000-0-24]	2500 to 5000 Hz
DYN1-10653-000-0-12] DYN1-10653-000-0-24]	1200 to 2500 Hz	DYN1-10656-000-0-12] DYN1-10656-000-0-24]	5000 to 9000 Hz

NOTE

See Step 3.0 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 Connection Information

1.1 When using an ILS unit, the remote speed potentiometer may be left connected to terminal 9 of the controller as shown, or connected to the ILS.

1.2 When an ILS unit is used, connect 3-wire shielded cable to terminals 6, 7 and 8. Connect drain shield wire to terminal 10 at the controller only. Other end of drain shield wire is to be cut off and taped.

2.0 Calibration And Adjustments

2.1 See *Figure 2* for a reference guide before making any adjustments of the potentiometers, DROOP, I, GAIN and SPEED.

2.2 Power OFF — engine not operating.

2.3 Initial potentiometer settings:

2.3.1 Set the I adjustment three divisions from zero and the GAIN at the second division from zero.

2.3.2 For isochronous operation, set DROOP counterclockwise to minimum position as shown in *Figure 2*.

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

— NOTE —

If the full 35° rotation of the actuator shaft is used and the linkage adjusted to use only the active fuel range, the maximum obtainable DROOP would be approximately 12% at full load.

2.3.4 See step 3.0 for setting switches S1 and S2.

2.4 If a remote speed potentiometer is used for narrow range, set it to mid-range. If the remote speed potentiometer is connected to terminals 6, 7 and 9, a resistor "R" in the wiper is not needed. This will provide approximately a $\pm 5\%$ adjustable speed range.

2.5 Start the engine.

2.5.1 Adjust the controller speed potentiometer until the engine is operating at the desired engine RPM. Clockwise increases engine RPM.

2.5.2 If the governor system is unstable, reduce the GAIN setting until stable.

— NOTE —

Except for the speed adjustment, the potentiometers have internal stops at the 0 and 100% positions.

2.6 With the engine unloaded, finalize the settings, I and GAIN adjustments as follows:

2.6.1 Turn the GAIN adjustment clockwise slowly until the actuator lever oscillates. (One may need to disturb actuator lever to cause oscillation.) Reduce the GAIN adjustment slowly counterclockwise until the lever is stable. Upset the lever by hand. If the lever oscillates 3 to 5 diminishing oscillations and stops, the setting is correct.

If system performance to load changes is satisfactory, omit step 2.6.2.

2.6.2 Reduce the GAIN setting counterclockwise one division. Next, turn the I adjustment fully clockwise while observing the actuator lever. If the lever does not become unstable, upset it by hand. When the lever slowly oscillates, turn the adjustment counterclockwise slowly until the lever is stable. Upset the lever again; it should oscillate 3 to 5 times and then become stable for optimum response.

— NOTE —

Use the settings of step 2.6.1 or step 2.6.2, whichever provides the best performance.

2.6.3 Unit is now calibrated.

3.0 All Controllers With Revision J And Above Have Switches S1 And S2

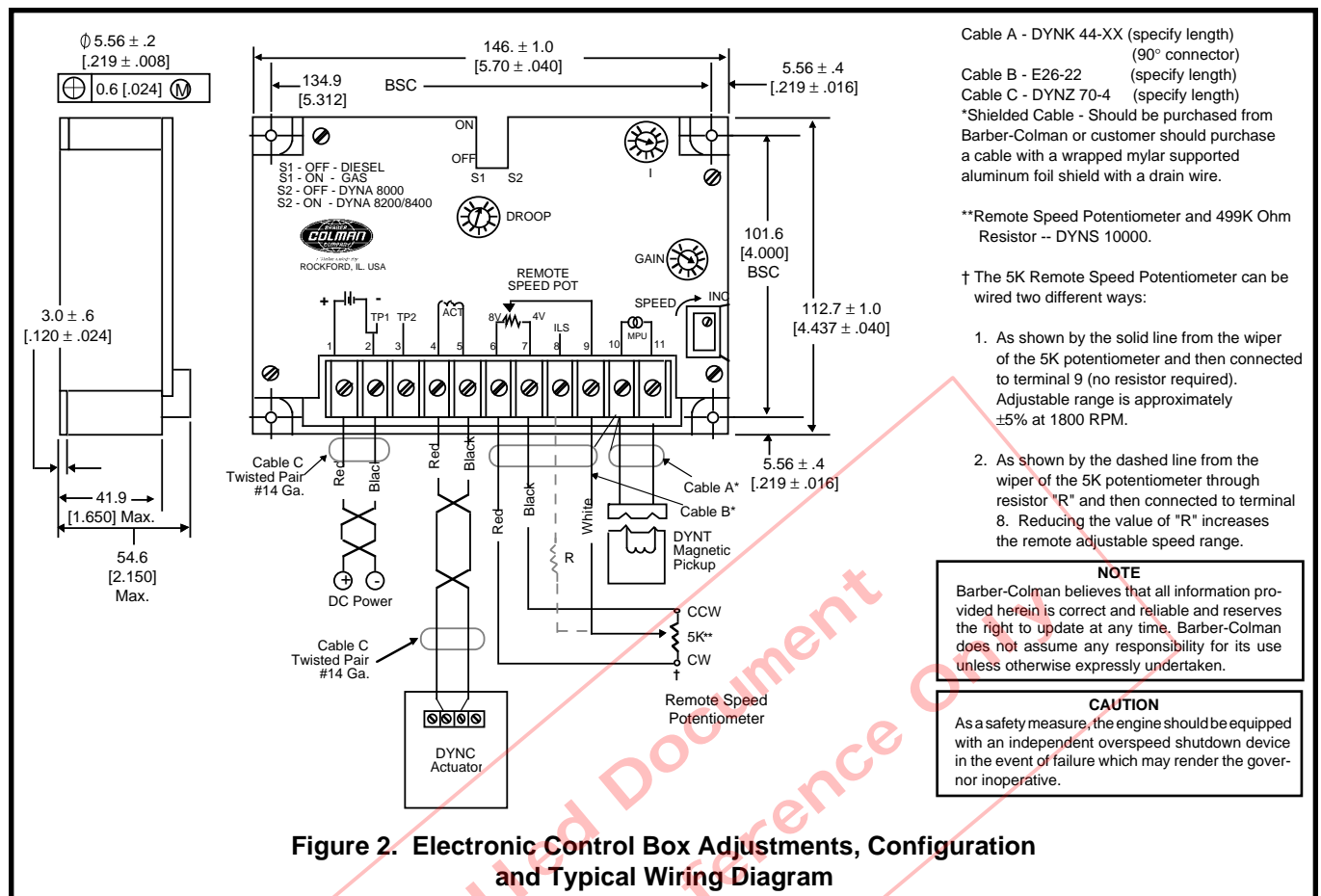
These units have two new features now added to the DYN1 1065X series controllers. They are:

3.1 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.

3.2 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.



4.0 General Information On S1 & 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

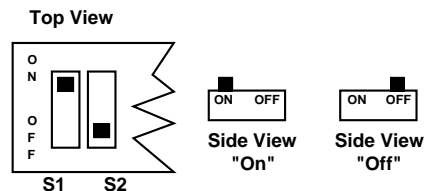
These actuators do not have a potentiometer feedback transducer.

— NOTE —

For some diesel engines, better operation may be obtained by placing SW1 in "ON" position. If difficulty is experienced in "OFF" position, try SW1 "ON" and recalibrate.

5.0 Proper Procedures For Setting Switches S1 & 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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