EG1069X

Generator Automatic Voltage Regulator
Operation Manual

Smoke Limit Controller

Compatible with Barber Colman Dyn1-1069X series

*Use for reference purpose only and not a genuine Barber Colman product

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1. SPECIFICATIONS

1.1 Electronic Specifications

Operating Voltage

12 or 24 VDC ±20% Select by DIP Switch

Output Current

Max. 15 A

Power Input

Voltage	12 or 24 VDC ±20%
Current	Rated above maximum actuator stall current

Temp. Stability

Better than ± 0.5% between -40 ~ 75℃

Speed Band

± 0.25 % at steady state

Remote Speed Adjustment

Build-in speed setting: 20 turn potentiometer.

Connect 5KΩ potentiometer to terminals 6, 7 and 9.

Adjustable range is approximately 5%.

Remote speed adjust terminals 6,7 and 8.

Adjustment

Speed、GAIN、and DROOPI

Start-up Fuel Limit

Ramp Time 10 Sec

Mechanical Vibration

1G @ 18 ~ 30 Hz, 2.5G @ 48 ~ 70 Hz

Relative Humidity

< 95%

Operating Temperature

-40 ~ 85℃

Storage Temperature

-40 ~ 85℃

Dimensions

150mm L * 135mm W * 40mm H

Weight

860g ± 2%

1.2 Compatible Products

DYN1-10693-001-0-12/24	1200 ~ 2500 Hz
DYN1-10693-002-0-12/24	1200 ~ 2500 Hz
DYN1-10694-001-0-12/24	2500 ~ 5000 Hz
DYN1-10694-002-0-12/24	2500 ~ 5000 Hz
DYN1-10695-000-0-12/24	2500 ~ 5000 Hz

*Speed Input Signal Frequency

$$\text{Speed Input Signal Frequency(Hz)} = \frac{\text{Engine RPM} \times \text{Number of Fly Wheel Gear Teeth}}{\text{60 seconds}}$$

Change Switch(s) for the correct Speed Input Signal Frequency range generated by the magnetic pickup at the maximum engine operated (RPM) speed.

2. FUNCTIONS

The EG1069X provides smoke control on start up for diesel engines using the actuator. The controller also provides isochronous or droop speed control with both adjustable start up fuel limit and ramp time.

2.1 EG1069X—Electronic Controller

EG1069X is the processing (Control) unit for the Actuator governor assembly.

It contains the electronics which process the signal from the magnetic pickup which controls the engine to the desired speed/ RPM set by the customer.

The governor system (Actuator & Controller) receives its power from the batteries or an AC to DC power supply supplying 12 or 24 VDC ±20% to match the governor voltage. The average operating current consumption is 2.5 to 3.5 amperes and the highest consumption is 14.75 amperes during engine start-up or during a large load change.

2.2 Component Location

1. The controller EG1069X is mounted or installed in the engine control panel or cabinet.
2. The Actuator is mounted on the engine next to the fuel injection system
3. The magnetic pickup is normally mounted in the flywheel housing in such a way that it can count the teeth on the starter ring gear.

2.3 Smoke Limiting Features

EG1069X has two features for smoke limiting:

1. Restrictive Fuel Limiting

The start-up fuel limit potentiometer will allow the operator to set a specific fuel limit on start-up.

- Before starting the engine, turn the Fuel Limiting to ”0” and turn the Ramp Time to”10”.
- Fuel limit is set by cranking the engine and turning the fuel limit potentiometer clockwise until the engine starts.
- Repeat step (2) until the engine can start and keep in the lowest speed.
- After engine starts, turn potentiometer an additional 3 to 5% to ensure positive starts.

2. Fuel Ramp

- On warm or hot engines, a specific fuel limit setting will control start-up smoke, but not completely. A warm or hot engine does not need the same fuel limit to start as a cold engine does.
- Ramp time can be set from 0 to 10 seconds. The ramp time starts from release of the failsafe, allowing fuel setting to increase over the selected ramp time.

2.4 Isochronous Operation

Isochronous operation is obtained by setting droop potentiometer fully counterclockwise.

EG1069X is normally operated in the isochronous mode; i.e., engine RPM is constant (±0.25%) , under steady state load conditions, up to the engine’s maximum capability, regardless of load on the engine.

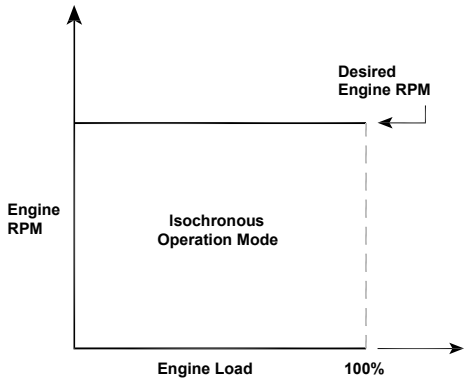


Figure 1

2.5 DROOP Operation

Droop operation is obtained by setting the droop potentiometer. Clockwise increases the droop. The amount of droop for a given setting depends on the magnetic pickup frequency and no load to full load actuator shaft rotation.

A droop potentiometer setting of 10 o'clock will give about 4% droop, no load to full load when the pickup frequency is 4260Hz and actuator shaft rotation is approximately 30 degrees from no load to full load. Lower pickup frequency or smaller shaft rotation results in less droop for the system.

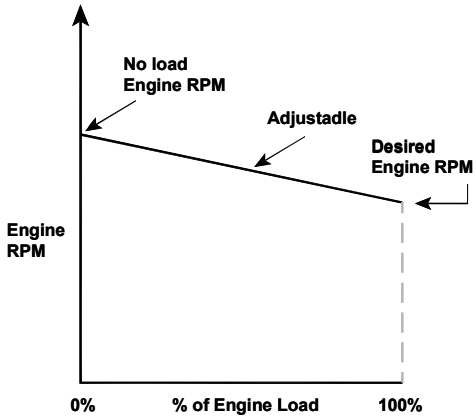


Figure 2

2.6 Remote Speed Adjustment

An optional remote speed selector is available for adjusting engine RPM from up to 90 meters (300 ft.) away from the engine. See 3.4 Electrical Wiring Schematic. The potentiometer can be connected for a narrow (fine) or wide speed range control.

3. INSTALLATION

3.1 Mount EG1069X in the control panel.

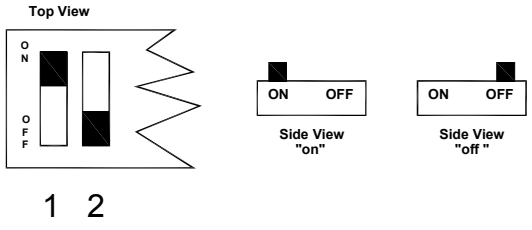
3.2 Connect the wiring as shown in Section 3.4 or according to other particular wiring diagram.

1. Choose a hole in actuator arm which causes actuator to rotate through its maximum rotation to provide minimum to maximum fuel. (Do not bottom out the Actuator leave 2 to 3 degrees before the off position)
2. Non-Linear linkage to actuator is proper for best operation on Gas Engine providing low GAIN at light loads and high GAIN at heavy loads. But linear in preferred for Diesel Engines.

3.3 Proper Procedures for Setting Switches SW1 and SW2

EG1069X has two response ranges for matching either the diesel or gas engine dynamics.

- Set SW1 to the OFF position for diesel engine applications.
- Set SW1 to the ON position for gas/gasoline engine applications.
- Set SW2 to OFF, this level is nominally 6.3 amperes for actuators with lower current level.
- Set SW2 to ON, this level is nominally 7.3 amperes for actuators with lower current level.



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.

SW1 in the above drawing is in "ON" position, and SW2 in the above drawing is in "OFF" position.

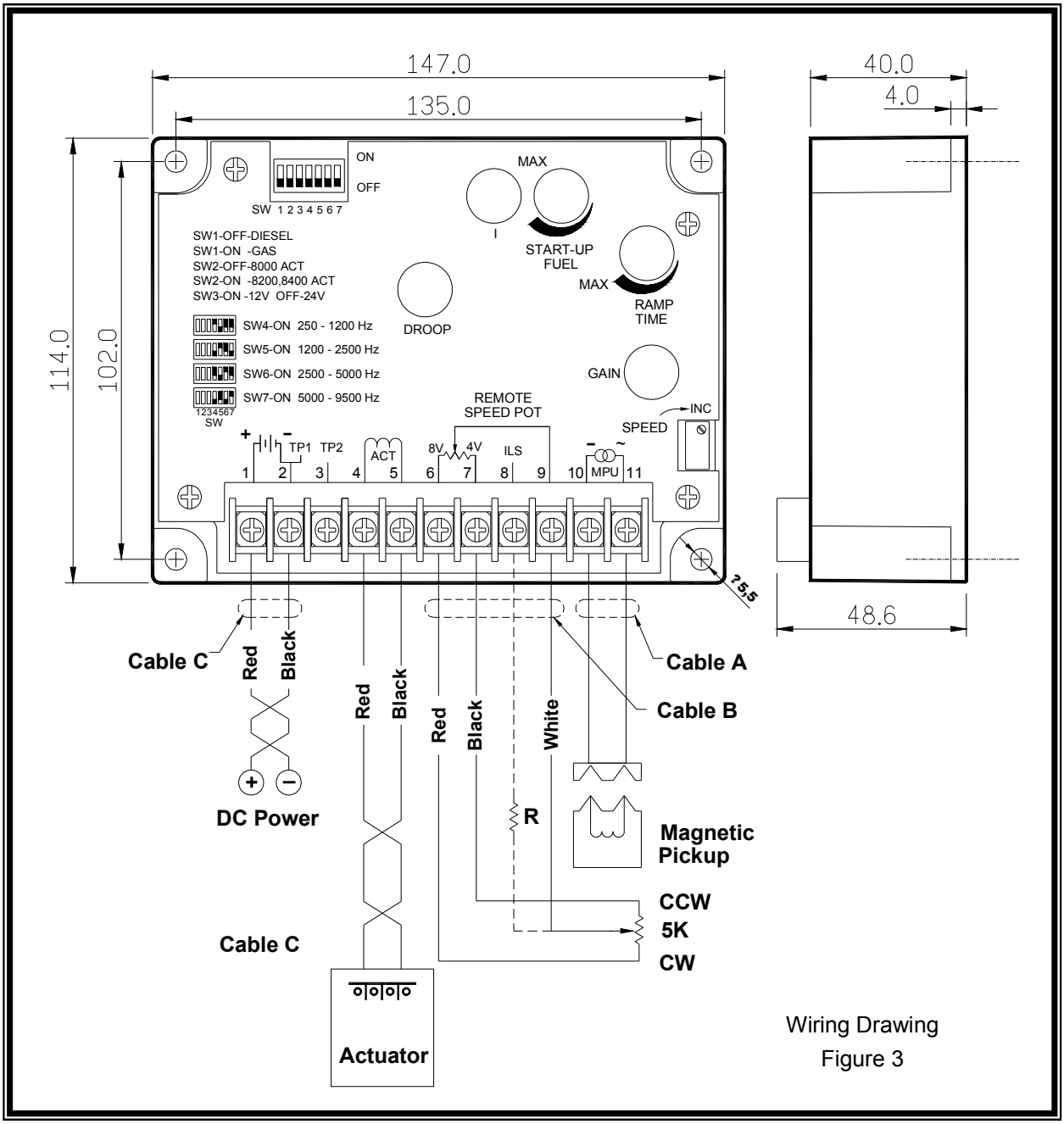
CAUTION!!

As a safety measure, the engine should be equipped with and independent overspeed shutdown device in the event of failure cutting power to governor system.

NOTE：

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

3.4. Typical Wiring Diagram & Controller Installation Dimensions



Wiring Drawing
Figure 3

*The 5K remote speed potentiometer can be wired two different ways: See Section 4.1.

1. Connect 5K potentiometer T to terminal #9. Adjustable range is approximately 5% at 18000 RMP. (See Figure 3)
2. Connect 5K potentiometer through resistor R to terminal #8. Reducing the value if R (499K) increases the remote adjustable speed range. (See Figure 3)

**Cable A, B, C -- should purchase a cable with a wrapped Mylar supported aluminum foil shield with a drain wire.

DIP SW Positions

DIP Switch Description	
SW1	OFF for Diesel Engine ON for Gas Engine
SW2	OFF for DYNA8000 actuator
	ON for DYNA8200 / 8400 actuator
SW3	OFF for 24V I/O, ON for 12V I/O
SW4	ON for 250 ~ 1200 Hz
SW5	ON for 1200 ~ 2500 Hz
SW6	ON for 2500 ~ 5000 Hz
SW7	ON for 5000 ~ 9500 Hz

*When one of the SW4~7 is ON, set others of SW4~7 OFF

Governor Controls	
DROOP	Droop Rate Adjustment
GAIN	MPU Output Gain Adjustment
I	Engine Stability Adjustment
SPEED	Engine Speed Adjustment
START-UP FUEL	Start-Up Fuel Limit
RAMP TIME	Ramp Time

4. CALIBRATION OF DYN1-1069X

4.1 Connection Information

1 When using an ILS unit, the remote speed potentiometer may be left connected to the controller as shown in the Figure 3.

2 When an ILS unit is used, connect 3-wire shielded cable to terminals 6, 7 and 8. Connect drain shield wire is to terminal 10 at EG1069X only. Other end of drain shield wire is to be cut off and taped.

4.2 Calibrations and Adjustments

1. See Figure 3 for a reference guide before making any adjustments of the potentiometers, DROOP, I, GAIN and SPEED.
2. Power OFF - engine not operating.
3. Initial potentiometer settings:

- Set the “I” adjustment three divisions from zero and the GAIN at the second division from zero.
- For isochronous operation, set DROOP counterclockwise to minimum position as shown in Section 3.3 and 3.4.
- 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.

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 5% adjustable speed range.
5. Start the engine.

- Adjust the controller speed potentiometer until the engine is operating at the desired engine RPM. Clockwise increases engine RPM.
- If the governor system is unstable, slightly reduce the GAIN setting.

NOTE：

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

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

(1) Turn the GAIN adjustment clockwise slowly until the actuator lever oscillates. (One may need to disturb the actuator lever to cause oscillation.)

(2) Reduce the GAIN adjustment slowly counterclockwise until the lever is stable. Upset the lever by hand..

(3) If the lever oscillates 3 to 5 diminishing oscillations and stops, the setting is correct

(4) If system performance to load changes is satisfactory, omit step (5) and (6).

(5) Reduce the GAIN setting counterclockwise one division. Next, turn the “I” adjustment fully clockwise while observing the actuator lever.

(6) 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.

(7) Upset the lever again; it should oscillate 3 to 5 times and then become stable for optimum response.

5. TROUBLESHOOTING CHART

Governor is completely dead and actuator lever stays at minimum position when power is applied to governor.	1. Check battery voltage at terminals 1 and 2 on controller. Terminal 1 is positive. Check battery connections and contacts for turning power ON to the controller. 2. Check for proper linkage setup. Correct and free linkage. 3. Magnetic pickup signal absent or too low. Measure AC voltage across terminals 10 and 11 while cranking the engine. Voltage should be min. 2.5 VAC. NOTE: The voltmeter should have an impedance of 5000 ohms / volts or higher. Check pole tip gap over gear tooth. Should be 0.037 mm ~ / - 0.127 mm. 4. Measure the resistance of the magnetic pickup coil. This should be above 150 ohm. If there is an open or shorted coil, replace the magnetic pickup 5. Measure the resistance of each pin to the metal case of the magnetic pickup. No continuity should be evident. If there is continuity to the case, replace the magnetic pickup. 6. DC SUPPLY OFF. Place an insulated jumper between terminals 2 and 3 (TP1 and TP2). With DC ON, the actuator should go to full stroke. DC voltage at terminals 4 and 5 should be within 3voltas of the supply. If the actuator still does not move to full stroke, continue with steps below. 7. Measure actuator coil resistance: If actuator coil is open or shorted to case, replace the actuator. If governor still does not operate, continue with steps below. 8. Measuring the resistance of each coil lead to the actuator case should indicate an open circuit on a low scale of the ohm meter. If continuity is defected, replace the actuator. 9. With DC to the governor ON and the engine OFF, measure the DC voltage from terminal 6(+) to terminal 2(-). This should be approx. 8VCD. If 8 VCD is not present, replace the controller. 10. Between terminal 7(+) and terminal 2(-), the voltage should be approx. 4 VDC. If 4VDC is not present, replace the controller.
Actuator goes to full stroke when DC power is turned on (Engine is not operating)	1. Check magnetic pickup leads for proper shielded wire or open shield. Verify and correct wiring as necessary. Be sure there is no jumper between terminals 2 and 3. 2. Failsafe circuit in the controller may be damaged or defective. Replace EG1069X. 3. With DC power OFF remove leads at actuator. Check continuity of each terminal to case. There should be no continuity between any terminal and case of EG1069X. If continuity is defected, replace the controller. 4. If remote speed potentiometer has been connected to terminals 6, 7 and 9 of the controller, DISCONNECT THESE LEADS. Turn DC power ON to the governor if the actuator is now normal. Proceed to corrective actions for the next problem.

Improper operation from remote speed potentiometer	1. Investigate wiring to remote speed potentiometer for open or shorted circuits. Checking wiring. 2. If the leads at terminals 6 and 7 to the remote speed potentiometer are reversed, speed control by the remote speed potentiometer will be reversed. Correct wiring. 3. Lead wire to remote speed setting potentiometer should be 3-wire shielded cable. Verity that the drain shield wire is isolated from ground at the potentiometer. If terminal 7 lead to the remote speed potentiometer is open, engine speed will go high. Correct the wiring. 4. If lead 9 (wiper lead to remote potentiometer) is open, there will be no control by the remote speed potentiometer. Verify and correct wiring. 5. If lead 6 to the clockwise terminal of the remote speed potentiometer is open, speed will remain at the value set in EG1069X.
Erratic governor operation	1. Measure DC voltage at 1 and 2 on controller terminal strip. Normal battery voltage should be indicated. If nominal voltage is present, wiring is correct. 2. Low battery voltage 20% below rated can cause erratic operation. Check battery and charging system. 3. RFI noise due to incorrect shielding. Correct wiring. 4. RFI noise fed through power supply leads. Connect power leads directly to the battery.
Slow, small amplitude hunting of speed or frequency	Sticking or very loose linkage. Correct linkage.
Fast oscillation of governor linkage	Verity calibration setting of the controller. Readjust setting as necessary.
Engine will not start — Actuator goes to full fuel during cranking	1. Make sure fuel is available. Check fuel to engine. Check for correct wiring to the automatic shutdown circuits. 2. Air may be trapped in fuel line. Check fuel lines for leaks. 3. Try to operate engine manually.

P.S. Please use the fuse of the original plant.