CALIBRATION PROCEDURE AND TROUBLESHOOTING FOR LINEAR GOVERNOR CONTROLLERS

Part Number	Input Signal Frequency Maximum
DYN1-10752-000-0-12/24 DYN1-10752-001-0-12/24*	250 to 1200 Hz
DYN1-10753-000-0-12/24 DYN1-10753-001-0-12/24*	1200 to 2500 Hz
DYN1-10754-000-0-12/24 DYN1-10754-001-0-12/24*	2500 to 5000 Hz
DYN1-10756-000-0-12/24 DYN1-10756-001-0-12/24*	5000 to 9000 Hz

* CE

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 DYNC 10200 and DYNC 10202 or in the "ON" position for DYNC 10500 and DYNC 10502

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.

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.

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.

3.3 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 If the engine is a diesel, 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 counterclockwise 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 5 Hz overshoot may be acceptable.

3.7 If the engine is an ignition type using compressed fuel such as natural gas or LP, stop the engine and restart in the normal manner to check overshoot.

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 1075X 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.

4.2 Two actuator selections, so the same controller can be used on the DYNA 2000 or DYNA 2500 actuator.*

- Set S2 to the OFF position when using a DYNA 2000 actuator or DYN1-1020X.

- Set S2 to the ON position when using a DYNA 2500 actuator or DYN1-1050X.

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 varies for 12 and 24 volt as shown below.

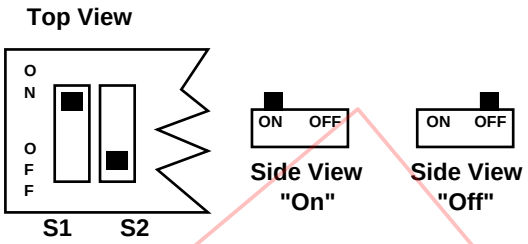
	12 Volt	24 Volt
DYNA 2000 — S2 OFF	5.1A	2.3A
DYNA 2500 — S2 ON	7.2A	3.4A

* DYNA 2000 — DYNC 10200 and DYNC 10202
DYNA 2500 — DYNC 10500 and DYNC 10502

These actuators do not have a potentiometer feedback transducer.

6.0 PROPER PROCEDURES FOR SETTING SWITCHES S1 AND S2

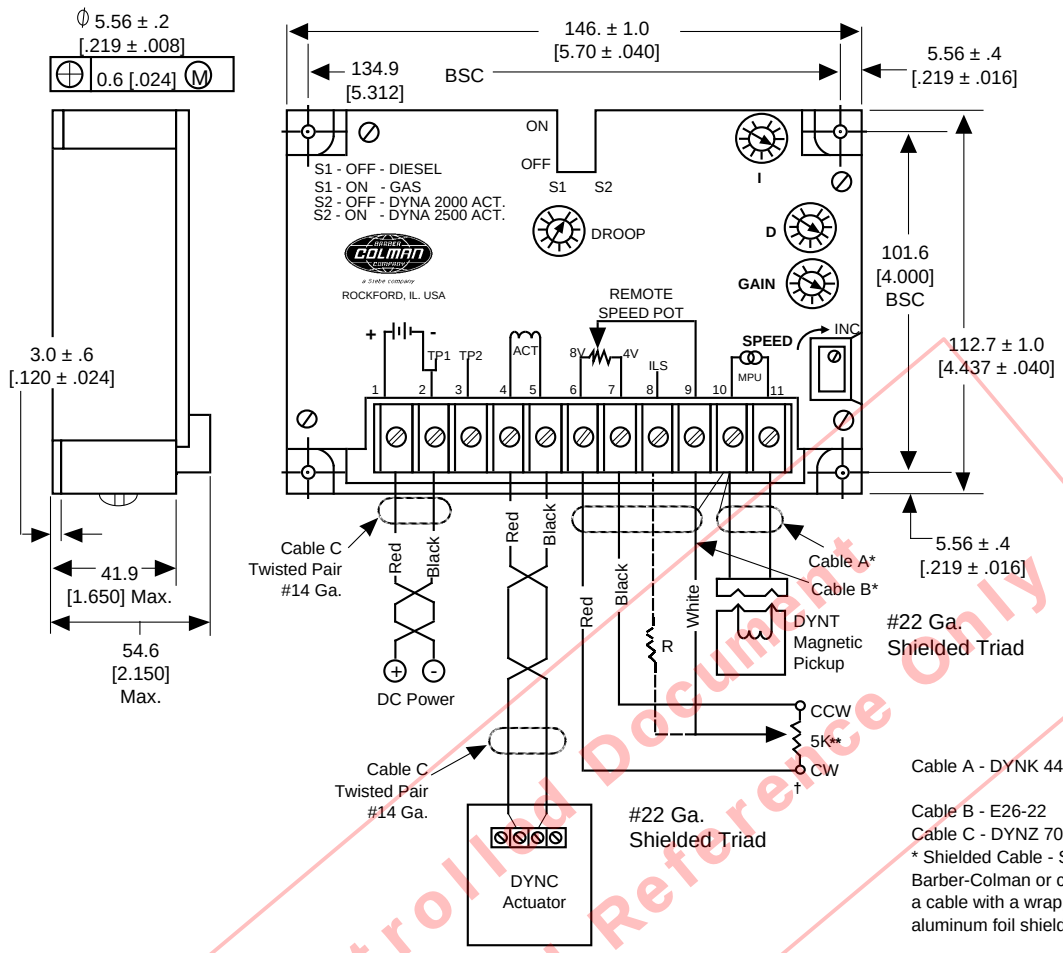
Question: How do I know if the switches in the dual-in-line packages are correctly set as far as being in the OFF position or the ON position?



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.

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.



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.

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

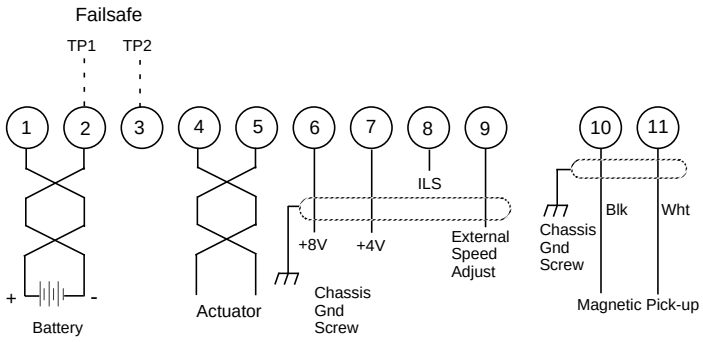


Figure 2
Typical CE Wiring Diagram

Linear Troubleshooting Chart for DYN1-1075X Controllers

1. PROBLEM: SYSTEM IS COMPLETELY DEAD. ACTUATOR LEVER STAYS AT MINIMUM.

	Means of Detection	Corrective Action
1.1	Check for battery voltage at controller on terminals 1 and 2. Terminal 1 is positive.	Check battery connections and contacts for turning power "ON" to the controllers.
1.2	Check for proper linkage set up.	Correct and free linkage.
1.3	Magnetic pickup signal absent or too low. Measure AC volt across terminals 10 & 11 while cranking the engine. Voltage should be at least 2.5 VAC. **NOTE:** The voltmeter should have an impedance of 5000 ohms/volts or higher.	Check pole tip gap over gear tooth. It should be 0.37 ± 0.127mm (0.015" ± 0.005") or adjusted to obtain 2.5 VAC or greater. Verify magnetic pickup wiring.
1.4	Measure the resistance of the magnetic pickup coil. This should be from 150 ohms (250 ohms max).	If there is an open or shorted coil, replace the magnetic pickup.
1.5	Measure the resistance of each pin to the metal case of the magnetic pickup. No continuity should be evident.	If there is continuity to case, replace the magnetic pickup.
1.6	**DC SUPPLY OFF**. Place an insulated jumper between terminals 2 & 3 (TP1 & TP2). With DC "ON" the actuator should go to full stroke. DC voltage at terminals 4 & 5 should be within 3 volts of the supply.	If the actuator still does not move to full stroke, continue with steps below.
1.7	Measure actuator coil resistance: • 12 VDC unit. Coil resistance 1.8 ± 0.2 ohms. • 24 VDC unit. Coil resistance 7.3 ± 1.0 ohms.	If actuator coil is open or shorted to case, replace actuator. If governor still does not operate, continue with steps below.
1.8	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 detected, replace the actuator.
1.9	With the DC to the governor "ON" and the engine "OFF" measure the DC voltage from terminal 6 (+) to 2 (-). This should be approximately 8 VDC.	If 8 VDC is not present, replace the controller.
1.10	Between terminal 7 (+) to 2 (-), the voltage should be approximately 4 VDC.	If 4 VDC is not present, replace the controller.
1.11	The following should be found when measuring current in series with one of the actuator leads from terminal 4 or 5: 12 V Act. - 2.5A to 5.9A 24 V Act. - 1.0A to 3.0A (Values may indicate negative if polarity of meter reversed.)	If no output current, replace the controller.

2. PROBLEM: ACTUATOR LEVER GOES TO FULL STROKE WHEN DC POWER IS TURNED "ON" (ENGINE IS NOT OPERATING.)

	Means of Detection	Corrective Action
2.1	Check magnetic pickup leads for proper shielded wire or open shield.	Verify and correct wiring as necessary.
2.2	Be sure there is no jumper between terminals 2 & 3.	Verify and correct wiring as necessary.
2.3	Fail-safe circuit in the controller may be damaged or defective.	Replace controller.
2.4	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 the controller.	If continuity is detected, replace the controller.
2.5	Check for shorted actuator lead.	Correct or replace actuator leads as necessary.
2.6	If remote speed potentiometer has been connected to terminals 6, 7 and 8, or 9 of the controller, DISCONNECT THESE LEADS.	Turn DC power "ON" to the governor if the actuator is now normal. Proceed as follows.

3. PROBLEM: IMPROPER OPERATION WITH REMOTE SPEED POTENTIOMETER CONNECTED

	Means of Detection	Corrective Action
3.1	Investigate wiring to remote speed potentiometer for open or shorted circuits.	Check wiring.
3.2	If the leads at terminals 6 & 7 to the remote speed potentiometer are reversed, speed control by the remote speed potentiometer will be reversed.	Correct wiring.
3.3	Lead wire to remote speed setting potentiometer should be 3-wire shielded cable.	Verify that the drain shield wire is isolated from ground at the potentiometer.
3.4	If terminal 7 lead to the remote speed potentiometer is open, engine speed will go high.	Correct the wiring.
3.5	If wiper lead to remote potentiometer is open, there will be no control by the remote speed potentiometer.	Verify and correct wiring.
3.6	If terminal 6 lead to the clockwise terminal of the remote speed potentiometer is open, speed will remain at the value set in the controller.	Verify and correct wiring.

4. PROBLEM: ERRATIC GOVERNOR OPERATION

	Means of Detection	Corrective Action
4.1	Measure DC voltage at 1 & 2 on controller terminal strip. Nominal battery voltage should be indicated.	If nominal voltage is present, wiring is correct.
4.2	Battery voltage must be 80% or greater for governor to operate.	Check battery and charging system.
4.3	RFI noise due to incorrect shielding.	Correct wiring per applicable wiring diagram.
4.4	RFI noise fed through power supply leads.	Connect twisted pair power leads direct to the battery.

5. PROBLEM: SLOW, SMALL AMPLITUDE, HUNTING OF SPEED OR FREQUENCY

	Means of Detection	Corrective Action
5.1	Sticking or very loose linkage.	Correct linkage.
5.2	Improper linkage arrangement. (Stroke too short or improper.)	See installation information.

6. PROBLEM: FAST OSCILLATION OF GOVERNOR LINKAGE

	Means of Detection	Corrective Action
6.1	Verify calibration settings of the controller.	Readjust settings.

7. PROBLEM: ENGINE WILL NOT START — ACTUATOR AT FULL STROKE DURING CRANKING

	Means of Detection	Corrective Action
7.1	Make sure fuel is available. Air may be trapped in fuel line. Try to operate engine manually.	Check fuel to engine and check for correct wiring to shut downs.

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.

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.

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