DYNA Controllers

GENERAL

The controllers for the DYNA governor series are all solid state design that measures three parameters to provide precise engine control. Separate circuits measure the proportional (amount of offspeed), integral (time of offspeed) and derivative (rate of change of offspeed) values. These three circuits provide control that results in fast, stable engine response to offspeed changes and precise speed regulation.

To provide a governing system, these controllers must be used with one of the following DYNA actuators. The actuator specification can be obtained from the product information sheet.

   Plus 1 or Plus 4 ................................................. F-18080
   Plus 6 (Standard and Explosion-proof) ............. F-18081
   Plus 8 or Plus 16 ............................................... F-18082

SPEED SENSING

The DYNA all-electric governor requires a frequency signal to read engine speed. Typically, a hole is drilled and tapped in the flywheel housing perpendicular to the crankshaft, and a magnetic pickup is inserted into it so it senses the teeth on the flywheel. Many other techniques may be used to obtain a speed reference signal.

SPEED CONTROL RANGE

The governed speed control range for the DYNA I Controller can be as much as 10 to 1. The actual range attainable depends upon the type of engine, controller and load.

REMOTE SPEED ADJUSTMENT

A remote speed adjustment can be added to any DYNA controller by simply connecting a remote speed potentiometer to the three electrical wires provided in the Barber-Colman standard wiring harness The Barber-Colman part number for the remote speed potentiometer is DYNS-10000.

FAILSAFE

The DYNA Governor has two failsafe modes: 1) If d-c power to the governor is interrupted, the armature spring automatically moves the output shaft to the “minimum fuel” position. 2) If the speed reference signal is lost, a failsafe circuit in the control instantly removes d-c power from the governor actuator, returning the output shaft to the “minimum fuel” position.

TYPICAL APPLICATIONS

• Speed governing
• Tandem engine governing
• No-break engine governing
• Propulsion engine governing
• Tandem propulsion governing
• Wide speed range governing
• Tailshaft governing

STANDARD CONTROLLER FEATURES

• All-electric
• All engine compatibility
• Mounts in any position
• Engine mounted or can be off mounted
• High reliability
• No special maintenance
• Temperature stable

ALL-ENGINE COMPATIBILITY

Since the DYNA all-electric governor requires no mechanical drive or oil supply, it can be used on any engine, even if the engine never had a precision governor before or, for that matter, never had a governor at all. Newly-built engines may be ordered without a governor drive for a substantial savings.

DIRECT ENGINE INSTALLATION

The DYNA governor and control mount directly on the engine, usually with a simple bracket, and withstand the temperatures usually common to this environment. Since no mechanical drive or hydraulic oil lines are needed, simple electrical wiring permits mounting the governor in any location in any position convenient to connect to the fuel control linkage.
SPECIFICATIONS

Available Operating Voltages 12, 24 or 32 volts, +20%. Other voltages on special request.

Input Signal Frequency

\[
\text{Engine RPM x Number of Gear Teeth on Flywheel} = \frac{\text{Input Signal Frequency In Hertz}}{60 \text{ Seconds}}
\]

Select your controller for the correct input signal frequency range generated by the magnetic pickup at the maximum engine operated (RPM) speed.

Steady State Speed Band +0.2 percent, isochronous control.

Ambient Operating Temperature -65°F (-55°C) to +200°F (+95°C).

Temperature Stability Better than +0.5 percent over a temperature range of -55 to 95°C (-65° to 200°F)

Speed Regulation (Droop) Adjustable from 0 to 15 percent. Remote adjustment optional.

Mechanical Vibration Tested 5 to 500 Hz @ 25 G’s (peak level on the governor).

Output Signal Pulse width modulated current to DYNA actuator. Maximum output current is 14 amperes.

Circuit Boards Boards are covered with a heavy conformal coating for moisture and vibration protection.

Enclosure Aluminum extrusion.

Weight 635 grams (1.4 lbs.)

SPEED GOVERNING

DYNA controllers are available for engine governing for speed and power control of piston and gas turbine engines where the fuel is controlled by the governor’s output shaft. The controllers are also applicable for controlling steam and water turbines.

TANDEM ENGINE GOVERNING

DYNA controllers are available for tandem engine operation. The controller provides the precise positioning required for accurate tracking of two governor actuators used for controlling tandem-coupled engines.

NO-BREAK ENGINE GOVERNING

DYNA controllers are available for no-break operation. The controller is designed to provide dual-mode operation. The controller functions with fixed gain when the engine is declutched and with an adjustable high gain when the engine is coupled to the load.

PROSPECTION GOVERNING

DYNA controllers are available for engine governing of propulsion engine applications. The control has an adjustable low limit feature which is required to maintain correct engine operation due to the loading characteristics of the propeller. The same controller should be used on tandem-coupled propulsion engine applications.

WIDE SPEED RANGE GOVERNING

DYNA controllers are available for wide speed range governing for speed and power control of piston and gas turbine engines where the fuel is controlled by the governor’s output shaft. The controller is designed to provide improved governor performance and control over a wider speed range than the standard speed governor.

DIMENSIONS

Dimensions in mm
Inches in Brackets [ ]
AVAILABLE DYNA CONTROLLER
PART NUMBERS
Specify voltage 12, 24 or 32 volt d-c when ordering.

### Speed Controllers

<table>
<thead>
<tr>
<th>Configuration A</th>
<th>Input Signal Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Number</td>
<td></td>
</tr>
<tr>
<td>DYN1 10002-2</td>
<td>250 to 1200 Hz</td>
</tr>
<tr>
<td>DYN1 10003-2</td>
<td>1200 to 2500 Hz</td>
</tr>
<tr>
<td>DYN1 10004-2</td>
<td>2500 to 5000 Hz</td>
</tr>
<tr>
<td>DYN1 10006-2</td>
<td>5000 to 9500 Hz</td>
</tr>
</tbody>
</table>

Adjustments available: A, Gain, D, I, L, Droop and Speed (under controller cover).

### Tandem Controller

<table>
<thead>
<tr>
<th>Configuration A</th>
<th>Input Signal Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Number</td>
<td></td>
</tr>
<tr>
<td>DYN1 10008-2</td>
<td>2500 to 5000 Hz</td>
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</tbody>
</table>

### No-Break Controller

<table>
<thead>
<tr>
<th>Configuration A</th>
<th>Input Signal Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Number</td>
<td></td>
</tr>
<tr>
<td>DYN1 10010</td>
<td>2500 to 5000 Hz</td>
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### Propulsion Controllers

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<tr>
<th>Configuration B</th>
<th>Input Signal Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Number</td>
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</tr>
<tr>
<td>DYN1 10024-2</td>
<td>250 to 1200 Hz</td>
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<tr>
<td>DYN1 10025-2</td>
<td>1200 to 2500 Hz</td>
</tr>
<tr>
<td>DYN1 10026-2</td>
<td>2500 to 5000 Hz</td>
</tr>
</tbody>
</table>

Adjustments available: A, Gain, D, I, Droop, High Limit, Low Limit and Speed (under controller cover).

### Speed Controllers

<table>
<thead>
<tr>
<th>Configuration C</th>
<th>Input Signal Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Number</td>
<td></td>
</tr>
<tr>
<td>DYN1 10112-0</td>
<td>250 to 1500 Hz</td>
</tr>
<tr>
<td>DYN1 10113-0</td>
<td>(Obsolete) 1200 to 3000 Hz</td>
</tr>
<tr>
<td>DYN1 10114-0</td>
<td>2500 to 6000 Hz</td>
</tr>
<tr>
<td>DYN1 10116-0</td>
<td>5000 to 10000 Hz</td>
</tr>
</tbody>
</table>

Adjustments available: I, Droop and Speed (under controller cover); Stability and Speed Trim (on side of controller).

### Speed Controllers

<table>
<thead>
<tr>
<th>Configuration D</th>
<th>Input Signal Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Number</td>
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<tr>
<td>DYN1 10212-0</td>
<td>250 to 1500 Hz</td>
</tr>
<tr>
<td>DYN1 10213-0</td>
<td>(Obsolete) 1200 to 3000 Hz</td>
</tr>
<tr>
<td>DYN1 10214-0</td>
<td>2500 to 6000 Hz</td>
</tr>
<tr>
<td>DYN1 10216-0</td>
<td>5000 to 10000 Hz</td>
</tr>
</tbody>
</table>

Adjustments available: Gain, I, Droop and Speed (under controller cover).

### Wide Speed Range Controllers

<table>
<thead>
<tr>
<th>Configuration E</th>
<th>Input Signal Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Number</td>
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</tr>
<tr>
<td>DYN1 10312-0</td>
<td>250 to 1500 Hz</td>
</tr>
<tr>
<td>DYN1 10313-0</td>
<td>(Obsolete) 500 to 3000 Hz</td>
</tr>
<tr>
<td>DYN1 10314-0</td>
<td>1000 to 6000 Hz</td>
</tr>
<tr>
<td>DYN1 10316-0</td>
<td>2000 to 12000 Hz</td>
</tr>
</tbody>
</table>

Adjustments available: Gain, D, I, Droop and Speed (under controller cover).
DYNA Controller Inputs

- Modify speed with respect to:
  - Remote Speed Setting
  - Time (Ramp Generator)
  - Electrical Load Change (Load Pulse)
  - Electrical Load (Isochronous Load Sharing)
  - Electrical Phase Angle (Synchronizer)

- On Pump Applications:
  - Output Pressure
  - Output Temperature
  - Liquid Level
  - (Controller/Recorder Output)

- Limit fuel (rack or throttle position) with respect to:
  - Maximum Fuel Permitted (Load Limit)
  - Temperature (Exhaust)
  - Manifold Pressure (Smoke Limit)
  - Oil Pressure
  - Time (some ramp generator applications)
  - Requested Speed (Torque Limit)
  - Actual Speed (Torque Limit)

AUXILIARY CONTROL MODULES

Four auxiliary control modules are available: Isochronous Load Sharing Control, Auto-Synchronizer, Ramp Generator, and Single Phase Load Pulse Control. These and other auxiliary functions can be installed at the time of the initial governor installation or, just as easily, added later when the need arises. No modification is required to the basic governor when these modules are added.

FEATURES ARE EASY TO ADD

It is easy to add features to the electric governor to provide benefits the customer needs. Remote speed setting, isochronous load sharing, automatic synchronizing, ramp generator, single phase load pulse and KW limits can be added at the time of initial governor installation or, just as easily, added later when the need arises. No modification is required when these features are added. In fact, if the prewired harness is used, the wires necessary to add these features are often already provided, so it is indeed easy to add features.

--- 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.