WOODWARD

Product Manual 54110
(Revision NEW)
Original Instructions

3161 EGB Governor/Actuator

Installation Manual

IMPORTANT

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DEFINITIONS

- **DANGER**—Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING**—Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION**—Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE**—Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT**—Designates an operating tip or maintenance suggestion.

WARNING

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions. Failure to follow instructions can cause personal injury and/or property damage.

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Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

NOTICE

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

NOTICE

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

3161 EGB Governor/Actuator Installation

General Information

The 3161-EGB governor/actuator is a precision instrument and should be handled as such. Damage can occur if the unit is dropped or set on the drive shaft, output shaft, speed adjusting shaft, or electrical connector.

Storage

The unit may be stored for a short period of time as received from the factory. If long-term storage or storage in a hostile environment is necessary, refer to manual 25075, *Commercial Preservation and Packaging for Storage of Mechanical-Hydraulic Controls*.

⚠WARNING

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Installation Requirements

Cleaning or calibration of the governor is not required before installation on the prime mover. Hydraulic fluid is drained from the governor before it is shipped from the factory and must be replaced prior to operation.

Governor pump rotation is set at the factory. If a different rotation is required, do the following:

1. Loosen and remove the four screws that secure the pump housing to the base.
2. Turn the pump housing 180 degrees.
3. Match the arrow on the pump housing with the arrow on the base for the drive rotation required for your engine.
4. Install four screws to secure the pump housing to the base. Torque the screws to 90 lb-in (10 N·m).

IMPORTANT

Clockwise or counterclockwise rotation is by definition as viewed from the top of the governor.

Installation of the Governor/Actuator

NOTICE

Careless alignment or improper mating of parts can result in premature wear or shaft seizure.

Be sure the actuator drive shaft turns freely before installing the actuator. The actuator drive shaft and coupling must slip freely into the engine drive. Do not apply external force.

Be sure there is no binding, side loading of the drive shaft, or looseness in the drive coupling. The maximum run-out of the drive shaft to the mounting pad pilot should be less than 0.004 inch (0.10 mm).

Output Shaft Linkage

⚠WARNING

Be sure to allow sufficient overtravel at each end of output-shaft travel so the governor can shut down the engine and also give maximum fuel when required.

Refer to Figure 1, and attach the prime mover linkage to the output shaft of the governor. The maximum work output of the 3161 governor is 18 ft-lb (24 J) over the full 42 degrees travel of its output shaft. The recommended travel of the output shaft is 28 degrees between the no load and full load positions. This provides a maximum useful work of 4.0 ft-lb (5.4 J) for the 28 degrees output shaft travel.

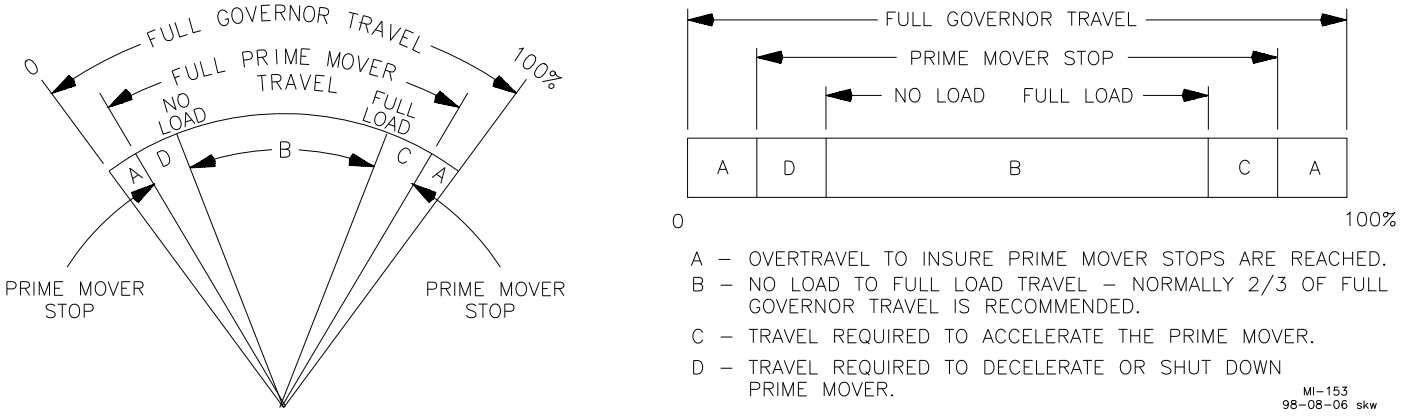

Figure 1. Recommended Travel of the Governor Output Shaft

Electrical Connection

Plug in all electrical connections from the electronic control to the governor.

Select a LOW SPEED setting on the electronic control to give low engine speed at the initial start-up.

Oil Supply

In general, the oil used in the prime mover will be satisfactory for use in the governor.

NOTICE

Oil must be introduced to the governor to ensure governor lubrication during the initial start-up.

Fill the governor with approximately 2 US quarts (1.9 L) of clean, non-corrosive, oxidation and rust-inhibiting oil that has minimum foaming or air retention qualities. The oil should have a viscosity of 100 to 300 SUS at operating temperature of typically 140 to 200 °F (60 to 93 °C).

Oil Viscosities

Table 1 shows the viscosity of oil at the different operating temperatures. The pour point (low temperature) is shown on the left and the temperature at which the performance of the oil begins to decrease is on the right side.

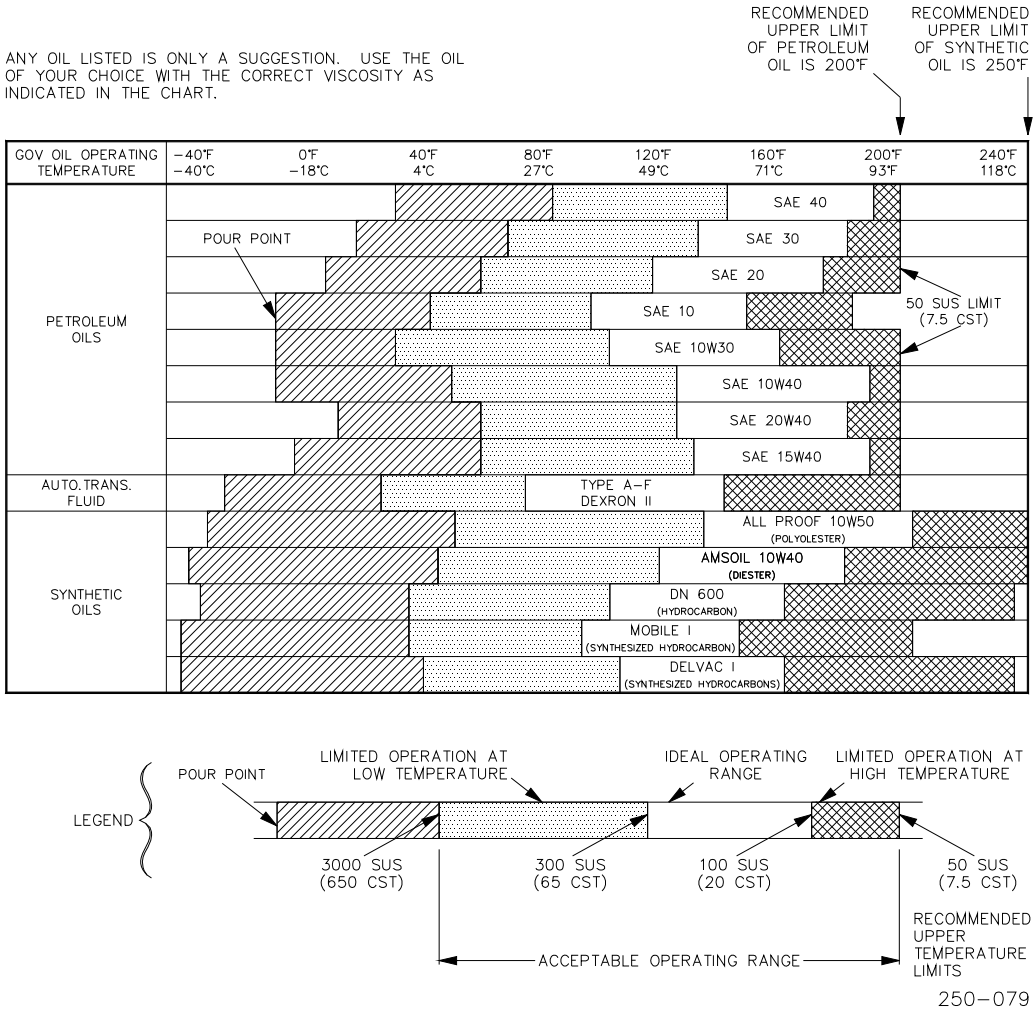

Table 1. Oil Viscosity Chart

The governor will operate at temperatures near the pour point of the oil, but governor operation will be slow, and may be unstable. Do not operate the governor at a temperature less than the pour point of the oil.

Operating the governor at temperatures greater than the high limit (50 SUS) will decrease the stability of the governor, and may result in an inability to restart hot. Operating the governor at a temperature greater than the point at which the performance of the oil decreases can cause governor failure.

For specific oil recommendations, see Woodward manual 25071, *Oils for Hydraulic Controls*.

Engine Start-up

⚠WARNING

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

Follow the engine manufacturer's instructions to start the engine. Adjust the selected speed setting on the electronic control as necessary to bring the engine to rated speed.

Needle Valve Adjustment

Ballhead Control

IMPORTANT

When the 3161-EGB is operating on ballhead control, the speed setting must be set 5% higher than the rated speed on the electronics.

After the prime mover has started and the governor is controlling, open the needle valve (turn it counterclockwise) until governor operation just becomes unstable. Then slowly close the needle valve (turn it clockwise) until the governor just becomes stable.

Allow the governor and prime mover to reach operating temperature. As the governor warms up, it may become unstable. If so, slowly close the needle valve until the governor just becomes stable. DO NOT fully close the needle valve. This may cause excessive overspeed or load rejection on start-up.

Electrical Input Control

When the 3161 is on electronic control, stability adjustments are made through the electronics, and additional needle valve adjustment is not required.

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Please reference publication 54110.

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