



Product Manual 36660
(Revision A)
Original Instructions

Speed Setting Fuel Limiter for PG Governors

Operation Manual



General Precautions

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.



Revisions

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Proper Use

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.



Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

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Warnings and Notices

Important Definitions



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.

- **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

**Overspeed /
Overtemperature /
Overpressure**

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.

WARNING

**Personal Protective
Equipment**

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- Eye Protection
- Hearing Protection
- Hard Hat
- Gloves
- Safety Boots
- Respirator

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

WARNING

Start-up

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.

WARNING

**Automotive
Applications**

On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.

NOTICE**Battery Charging
Device**

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.

Electrostatic Discharge Awareness

NOTICE**Electrostatic
Precautions**

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).
- Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.
- Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.

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*.

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
 - Do not touch any part of the PCB except the edges.
 - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
 - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

Speed Setting Fuel Limiter for PG Governors

Several types of fuel (or load) limiters are available for use in Woodward PG governors. One simple device provides a fixed maximum fuel limit without regard to the many variables which affect engine speed and load. Another arrangement varies the maximum fuel allowed the engine as a function of engine speed at any instant. Fuel for turbo-supercharged engines is often limited as a function of supercharger discharge pressure (either gauge pressure or absolute pressure). Some governors have more than one fuel limiter built within them. In such units, the different limiters operate independently, and fuel is limited at the lowest value set by any limiter for the conditions existing.

This manual describes a fuel limit linkage arrangement in which the fuel limit is dependent only upon the governor speed setting. The schematic drawing (Figure 1) shows the linkage arrangement as it relates to the PG governor basic elements.

The position of the left end of lever "A" is determined by the position of the governor speed setting servo piston. As the servo piston moves down to increase the governor speed setting, a screw in the lug attached to the piston rod contacts the left end of lever "A", pushing it downward against the upward force of a yield spring. The lower end of link "B" is connected to the right end of lever "A". Lever "A" thus positions the upper end of the slot in link "B".

The right end of lever "C" is attached to the power piston tailrod; its position is, therefore, a function of fuel setting. The left end of lever "C" is supported by adjustable fulcrum screw "D". The left end of lever "C" is spring-loaded to keep the lever in contact with the nut on the fulcrum screw. Thus, the governor power piston is free to move upward—increasing fuel as it does so—and pivot lever "C" about the adjustable fulcrum screw until the pin in the center of lever "C" reaches the upper end of the slot in link "B".

If the power piston continues to move upward after the pin in lever "C" reaches the upper end of the slot in link "B", the pin acts as a fulcrum as the left end of lever "C" lowers adjustable fulcrum screw "D". This action lowers the right end of lever "F" and raises the left end of lever "F". Lever "F" thus lifts the shutdown nuts and shutdown rod. The shutdown rod is connected to the pilot valve plunger. When the pilot valve plunger is lifted to its centered position, the power piston movement is stopped.

A constant fuel limit is held for all speeds below the speed setting at which the lug in the speed setting servo piston rod loses contact with lever "A" as the speed setting servo piston rises. This constant fuel limit is represented by line MN of the typical fuel limit curve MNP shown in Figure 2. The slope of line NP may be altered by repositioning adjustable pivot "H" in lever "A". In some applications, lever "C" offers a choice of holes for connecting to link "B"; lever "C" may also be turned end-for-end to effect still more changes in the lever ratios affecting the slope of line NP. The adjustable pivot should, however, suffice for the minor changes which might be required after the governor is put into service.

The nut on the end of adjustable fulcrum screw "D" is set with the governor speed setting at the speed below which a constant fuel limit is to be maintained (point N in figure 2) and with the governor power piston at the maximum fuel position for that speed. It is set to position the fuel limit linkage so that any further upward movement of the governor power piston will lift the pilot valve plunger to its centered position.

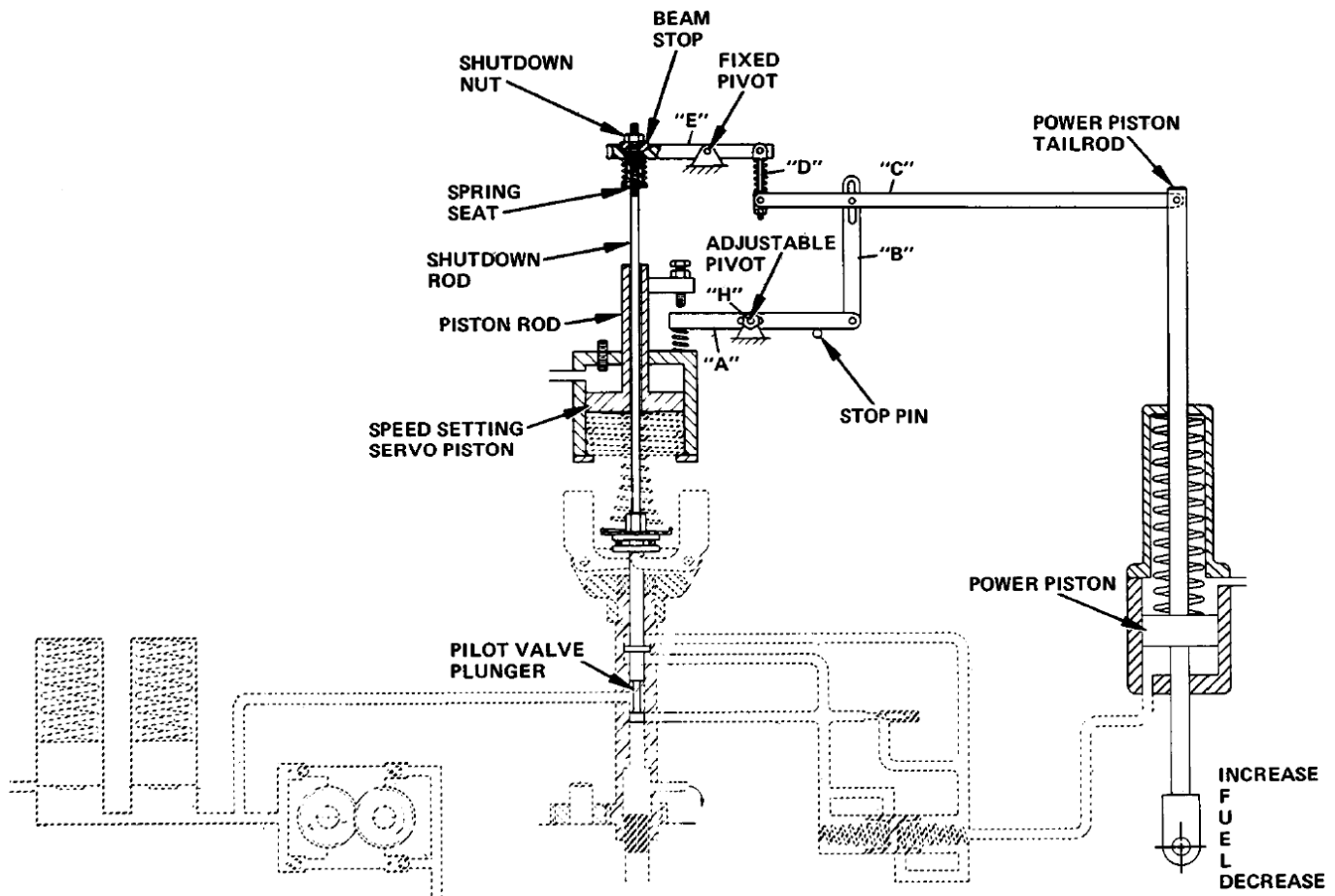


Figure 1. Speed Setting Fuel Limiter

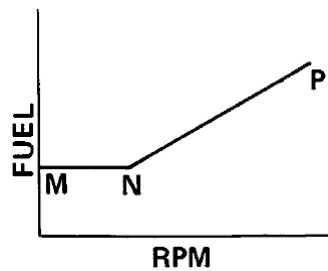


Figure 2. Fuel vs RPM

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