WOODWARD

Product Manual 36036
(Revision A)
Original Instructions

Starting 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

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, on the *publications page* of the Woodward website:

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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:

The original source of this publication may have been updated since this translation was made. Be sure to check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, to verify whether this translation is up to date. Out-of-date translations are marked with ⚠. Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

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.

Starting Fuel Limiter for PG Governors

Introduction

The Starting Fuel Limiter minimizes the tendency of engines to flood when starting, and minimizes excessive smoking during engine cranking. This auxiliary device is designed for installation in most of Woodward's long-column PG governors, new or old, in which speeds are set electrically through a solenoid pack or pneumatically through an assembly which increases the governor speed setting as the air pressure signal increases.

The starting fuel limiter linkage consists essentially of a fuel limit lever, an adjustable limit screw, and a lever spring. Two variations of different linkage arrangements are shown in Figures 1 and 2.

Operation—Figure 1

The arrangement in Figure 1 is usually used with electric solenoid speed setting packs. One end of the fuel limit lever attaches to floating lever links and thus takes a position proportional to speed setting. The other end of the limit lever extends over the floating lever between the speed setting servo piston and the power piston tailrod. The tailrod is positioned as a function of the fuel setting. When the tailrod moves up (as fuel increases) sufficiently far, the floating lever lifts the free end of the fuel limit lever. The lever spring continually urges the limit lever down in the direction to contact the floating lever.

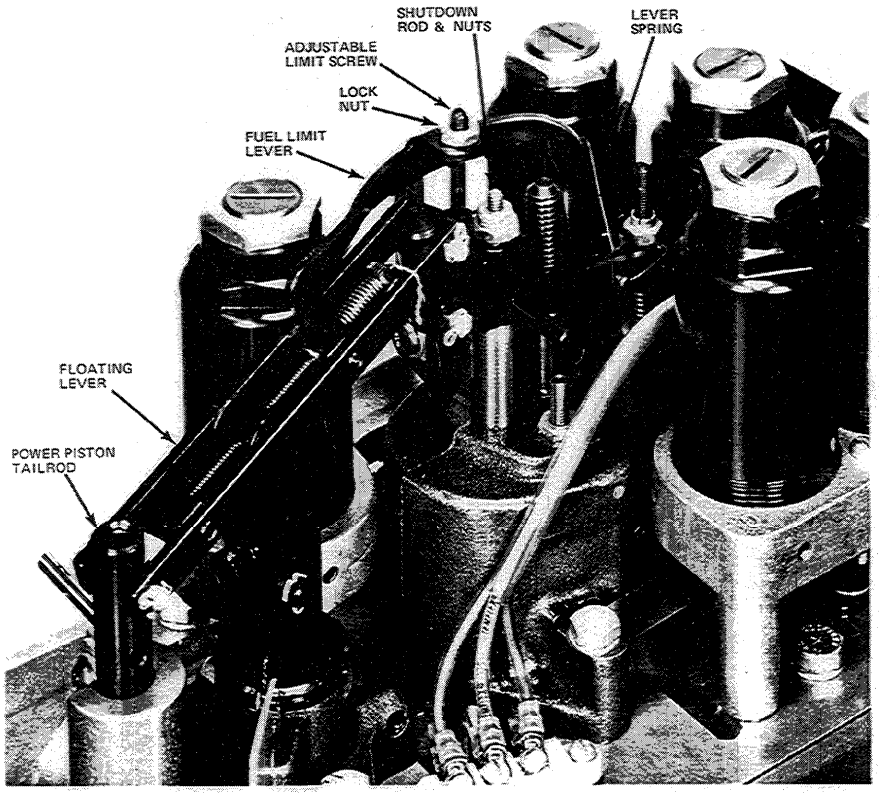

Figure 1. Starting Fuel Limiter Linkage as Used with Electric Solenoid Speed Setting

The adjustable limit screw attaches to a lug in the fuel limit lever. The head of the limit screw fits under the governor shutdown nuts. The limit screw is adjusted so that the shutdown nuts (and shutdown rod) are lifted as the tailrod reaches the point corresponding to the desired maximum starting fuel. Lifting the shutdown nuts and shutdown rod prevents the governor from increasing fuel further.

When the governor speed setting is increased, the speed setting servo piston moves down. This action moves the floating lever down away from the fuel limit lever so that the limit lever no longer restricts fuel.

Operation—Figure 2

The arrangement shown in Figure 2 is used in governors equipped with precise pneumatic speed setting. Speed droop linkage is incorporated in the arrangement in Figure 2, though it is not needed with—and has no effect upon—the starting fuel limiter linkage.

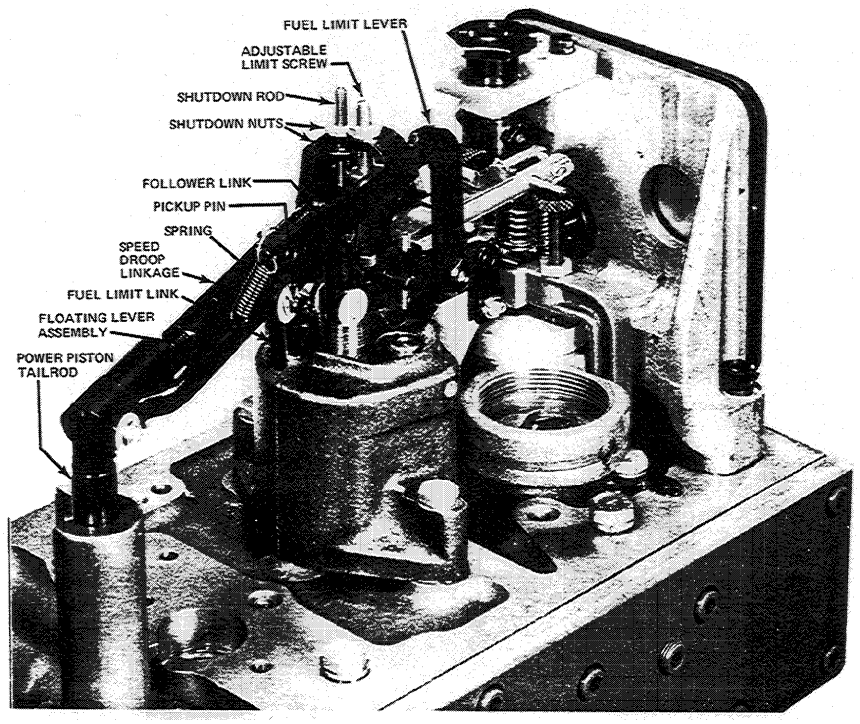

Figure 2. Starting Fuel Limiter Linkage
as Used with Pneumatic Speed Setting

One end of the fuel limit lever attaches to the follower link and takes a position which is proportional to speed setting; the other end (the “free” end) attaches to the fuel limit link. The slotted end of the fuel limit link fits about the pickup pin in the floating lever assembly. The pickup pin takes a position which is a function of speed setting and tailrod (fuel) position. A spring continually pulls down on the fuel limit lever. The spring attempts to keep the end of the slot in the fuel limit link in contact with the pickup pin in the floating lever assembly. When the tailrod moves up (as fuel increases) sufficiently far, the floating lever lifts the link and with it the fuel limit lever.

The adjustable limit screw attaches to a lug in the fuel limit lever. The head of the limit screw fits under the governor shutdown nuts. The limit screw is adjusted so that the shutdown nuts (and shutdown rod) are lifted as the tailrod reaches the point corresponding to the desired maximum starting fuel. Lifting the shutdown nuts and shutdown rod prevents the governor from increasing fuel further.

When the governor speed setting is increased, the speed setting servo piston and follower link move down. This action moves the floating lever and pickup pin down away from the end of the slot in the fuel limit link. The lowered position of the pickup pin allows the tailrod to move up (as fuel increases) without raising the fuel limit lever to restrict fuel.

Replaceable Parts

When requesting information concerning governor operation and maintenance, or when ordering replacement parts, it is essential that the following information be included:

- Governor serial number and part number shown on nameplate
- Manual number (this is manual 36036)
- Part reference number, name of part, or description of part

Ref. No.	Part Name	Ref. No.	Part Name
36036-1	Hex nut (#10-32)	36036-23	Droop plunger cam
36036-2	Adjusting screw	36036-24	Link assembly
36036-3	Shutdown rod	36036-25	Spacer
36036-4	Hex nut (#10-32)	36036-26	Power piston assembly
36036-5	Shutdown nut	36036-27	Droop plunger assembly
36036-6	Link	36036-28	Droop pin
36036-8	Flat head screw (#6-32 x 1/4”)	36036-29	Washer
36036-9	Speed droop cam	36036-30	Spring
36036-10	Nut	36036-31	Fuel limit link
36036-11	Turnbuckle	36036-32	Floating lever link
36036-12	Speed droop fork	36036-33	Fulcrum block assembly
36036-13	Pin	36036-34	Speed setting piston assembly
36036-14	Spacer	36036-51	Headed pin
36036-15	Floating lever assembly	36036-52	Washer
36036-16	Roll pin	36036-53	Cotter pin
36036-17	Fuel limit lever	36036-54	Lock nut
36036-18	Fuel limit lever pivot	36036-55	Shutdown nut
36036-19	Nyloc screw	36036-56	Power piston fulcrum assembly
36036-20	Headed pin	36036-57	Adjustable limit screw
36036-21	Follower link	36036-58	Fuel limit lever
36036-22	Fulcrum assembly	36036-59	Lever spring

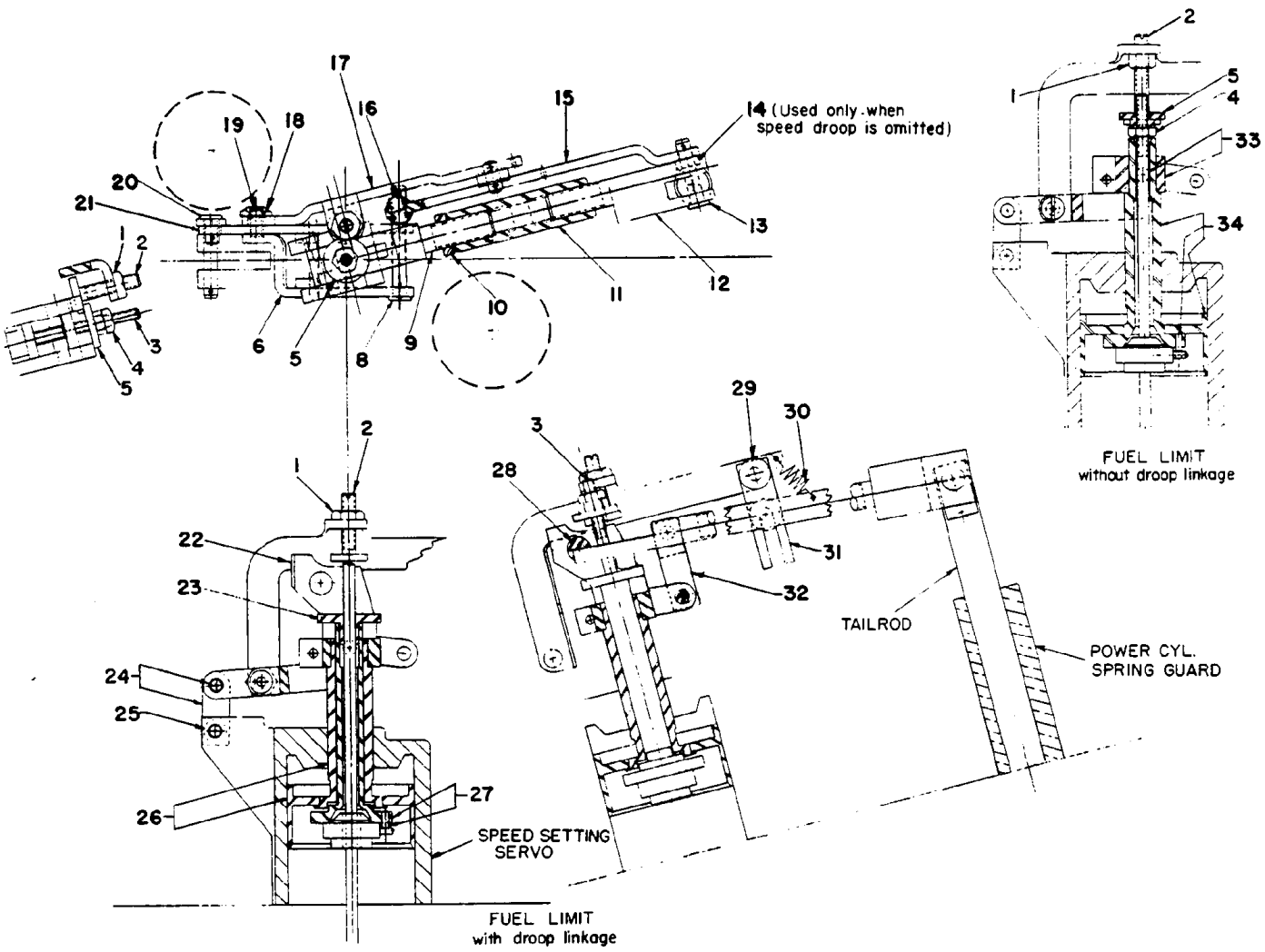

Figure 3. Starting Fuel Limiter Cutaway Views

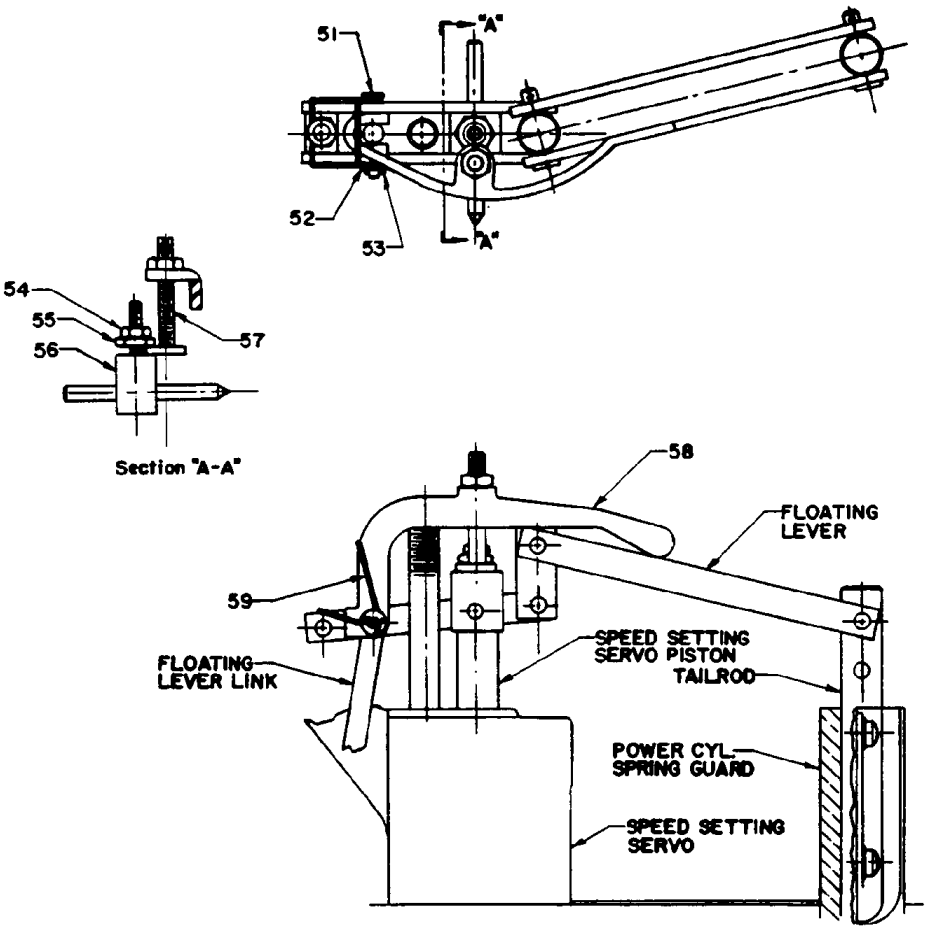

Figure 4. Starting Fuel Limiter

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Send comments to: icinfo@woodward.com

Please reference publication 36036A.

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