WOODWARD

Product Manual 03045
(Revision NEW)
Original Instructions

UG-8 Speed Adjusting Devices

Pneumatic and Manifold Speed Setting for UG Type 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 Out-of-date translations are marked with ⚠.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.

Revisions—Changes in this publication since the last revision are indicated by a black line alongside the text.

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.

Pneumatic and Manifold Speed Setting for UG Type Governors

Introduction

This manual provides general information, installation, adjustment and replacement parts for the Pneumatic Speed Adjustment and the Manual Speed Setting Screw options.

Description

The Pneumatic Speed Adjustment device makes it possible to adjust speed pneumatically from a location remote from the prime mover. It is mounted on top of the UG-8 Lever governor in a separate housing. The housing also accepts Woodward's standard shutdown devices such as solenoid, pneumatic, or low lube units.

The Manual Speed Setting Screw allows for on-site setting of the governor should the pneumatic pressure be lost.

Figure 1 shows a UG-8L with Pneumatic Speed Adjustment, a solenoid shutdown, and Manual Speed Setting Screw.

References

Prod. Spec. 03037	Pneumatic Speed Adjustment for UG-5.7/8/10 Lever Governor
Prod. Spec. 03029	UG-5.7/8/10 Governor
Manual 03036	UG-5.7/8/10 Lever Governor
Manual 03016	Low Lube Oil Pressure Shutdown for the UG Governor

Installation

A connection to an air supply is needed to operate the device on an engine or turbine. See Figure 1 for size and location of the air supply connection.

The Manual Speed Setting Screw is normally installed as a optional feature only on governors with the Pneumatic Speed Adjustment feature. Either feature will operate without association with the other.

The Manuel Speed Setting Screw can be easily installed on any existing UG-8L governor. No special tools are needed. The governor does not have to be disassembled to accept the new pieces, but the nameplate must be removed for the installation of a new stop lever and return spring.

Operation

Two styles of plumbing are available to carry governor pressure oil to the pneumatic head.

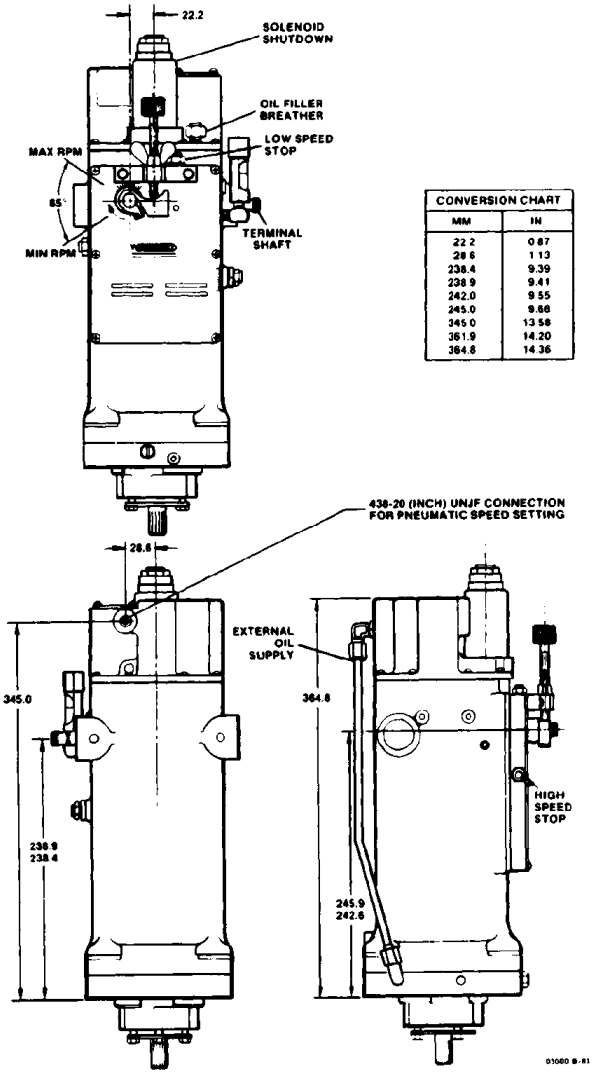

Figure 1. Outline of UG-8 Lever Governor with Pneumatic Speed Adjustment and Manual Speed Setting Screw

Internally plumbed units carry pressure oil from the controlet inside the governor to the speed-setting head. The internally plumbed units require a special pilot-valve bushing to regulate the amount of oil supplied to the head and a specially machined controlet to accept the plumbing connection. The governor is normally returned to the factory for installation of the internally plumbed speed-setting head.

Externally plumbed units receive pressure oil from the governor base through an external pipe. An orifice in the cover regulates the amount of oil available to the speed-setting head. The externally plumbed unit may be installed on a lever governor in the field. Installation instructions are included with a conversion kit.

Figure 2 is a schematic of the UG-8 Lever governor which has a pneumatic speed adjusting device. This description of operation covers only the speed adjusting devices. Manual 03036 covers the UG-8 Lever governor operation. Reference numbs are from Figures 2 and 4 below.

WARNING **To prevent overspeed, return the lever to the minimum speed position before applying control air pressure.**

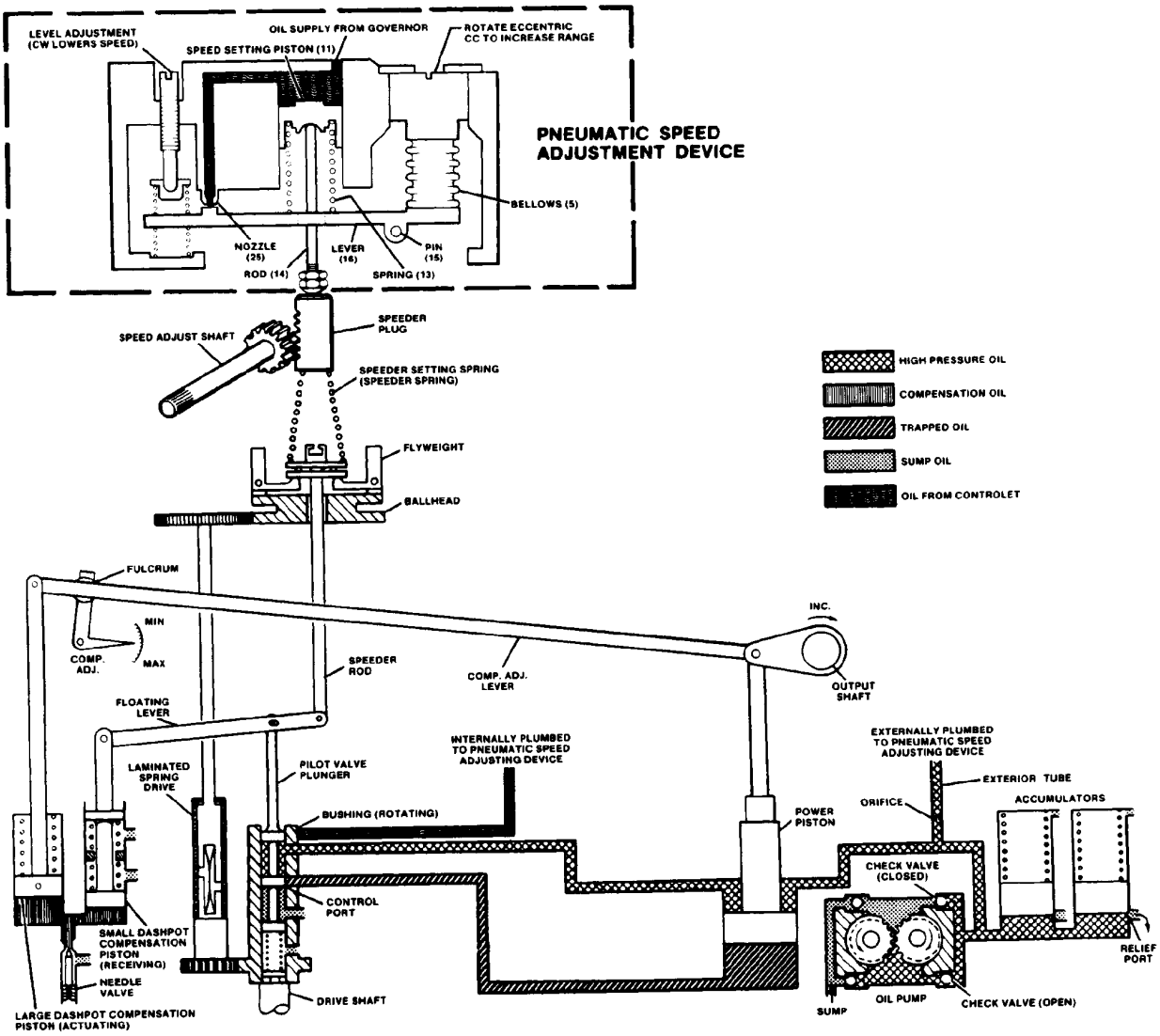

Figure 2. Schematic of UG-8 Lever Governor with Pneumatic Speed Adjustment

The speed setting air signal is connected to the bellows (5). Lever (16) balances between the force of the bellows and the force of spring (13) under the speed setting piston (11). When the bellows force is more than the spring force, the lever rotates about pin (15). The left end of the lever moves up to close nozzle (25). Oil pressure increases on the speed setting piston, moving it down and increasing the spring load on the lever. When the spring force exceeds the value required to balance the lever against the bellows force the lever rotates counterclockwise, releasing oil through the nozzle. Oil pressure stops increasing and piston movement stops.

When the piston moves down, rod (14) increases the load on the speeder spring, which raises the governor speed setting.

The governor will go to minimum fuel or shutdown in case of failure or interruption of the pneumatic signal. The Manual Speed Setting Screw will act as a minimum speed stop if it is not backed out of the way during normal operation.

Should the pneumatic pressure fail, the manual speed setting screw may be used to set the speed of the governor mechanically. Speed setting increases when the screw is turned clockwise and decreases when it is turned counterclockwise.

The screw is normally locked with the wing nut at minimum speed setting position with visible clearance between the speed setting screw and the speed setting lever. The wing nut provides positive lock of the speed setting screw.

When the pneumatic signal is used for setting the speed, the screw adjustment must be in the minimum speed setting position. Failure to follow this instruction increases the pneumatic speed setting by the amount of the manual setting.

The speed setting shaft must be free to rotate between high and low speed stops during pneumatic operation.

Adjustment

External

There are two external adjustments on the pneumatic speed adjustment device:
- The eccentric bellows (5 – Figure 4) changes the range.
- Screw (33 – Figure 4) is used to change the speed setting level.

The speed setting functions of the Speed Setting Screw Assembly are all visible. As the screw is threaded down, it increases speed; and retracting it lowers the speed setting.

⚠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.

Internal

Make the initial setting of rod (14) with the unit off the governor.

1. Set the low speed stop on the governor panel approximately 10 rpm lower than the required low air speed setting.

IMPORTANT

Any time the low speed stop is changed, the length of rod (14) must be changed or the new low speed selling may not be attained.

2. See Figure 3. Measure the distance from the top surface of the governor case to the top of the rod with the governors speed setting against the low speed stop.

   This distance should be 2.500 inches +0.005 or –0.010 inches (63.50 mm +0.13 or –0.25 mm).

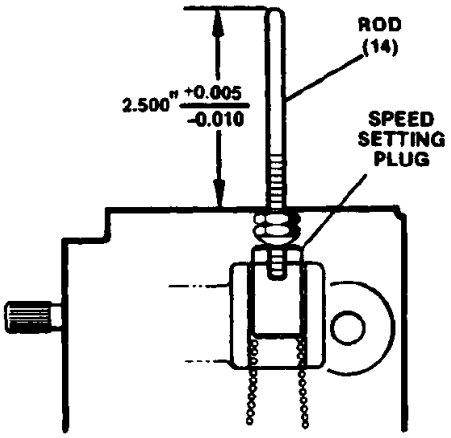

Figure 3. Speed Setting Plug

3, Lock the nuts in place.

IMPORTANT **If the rod length is too long or too short, it may not be possible to attain the low air set speed.**

4. Install the speed adjusting device on the governor. Rod (14) should enter the hole in lever (16) below the piston. (Figure 4).

5. Use a thin screwdriver and force the oil pipe into the hole in the cover until the O-ring enters the hole.

6. Tighten screws (34).

7. Connect the air supply pipe.

8. Apply the minimum air signal.

9. Adjust screw (33) until the specified speed, at minimum air signal, is reached. Turn the screw clockwise to decrease the speed and counterclockwise to increase the speed.

10. Apply the maximum speed air signal and check the speed. A range adjustment must be made if speed is incorrect at the maximum air signal.

    To make a range adjustment:
    A. Reduce the air signal to zero.
    B. Loosen the bellows clamp screws.
    C. Rotate the bellows clockwise to increase the range and counterclockwise to decrease the range.

IMPORTANT **Adjustment is limited to 90 degrees in either direction from the alignment marks on the cover and the top of the eccentric.**

11. Re-check the minimum and maximum speeds and repeat steps 8 through 10 as required.

12. Set the maximum speed stop screw located on the front panel.

Parts List For Figure 4

Ref. No.	Part Name	Quantity
03045-1	Cover	1
03045-2	Screw, 10-32 x 0.500	2
03045-3	Lock Washer, No. 10, 0.190 ID	9
03045-4	Strap	1
03045-5	Eccentric Bellows	1
03045-6	O-ring, 1.364 ID x 0.070	1
03045-7	O-ring, 1.234 ID x 0.070	1
03045-8	O-ring, 0.145 ID x 0.070, See Fig. 6	1
03045-9	Tube, See Fig. 6	1
03045-10	O-ring, 0.208 ID x 0.070, See Fig. 6	1
03045-11	Piston	1
03045-12	Rod Seat	1
03045-13	Spring	1
03045-14	Rod	1
03045-15	Shaft	1
03045-16	Lever	1
03045-17	Needle Bearing	2
03045-18	Nozzle Seat	1
03045-19	Nut, 10-32	1
03045-20	Spring	1
03045-21	Nut	1
03045-22	Spring	1
03045-23	Spring Seat	1
03045-24	Ball, 0.156	1
03045-25	Nozzle	1
03045-26	Filler Cap	1
03045-27	Retaining ring, 0.338	1
03045-28	Rod	1
03045-29	Body	1
03045-30	Spring	1
03045-31	Cap	1
03045-32	O-ring, 0.176 ID x 0.070	2
03045-33	Screw	1
03045-34	Screw	7
03045-35	Screw	1
03045-36	Plug	1
03045-37	Gasket	1
03045-38	Plug, See Fig.6	1
03045-39	O-ring, See Fig. 6	1
03045-40	Not Used	
03045-41	Not Used	
03045-42	Not Used	
03045-43	See Fig. 6	
03045-44	See Fig. 6	
03045-45	Not Used	
03045-46	Jet Insert	1
03045-47	Expander Pin	1
03045-48–50	Not Used	
03045-51–55	See Fig. 6	
03045-56	Not Used	
03045-57	Not Used	
03045-58–66	See Fig. 6	
03045-67	Not Used	
03045-68	Filter	1
03045-69	Spring	1
03045-70	O-ring	1
03045-71	Plug	1
03045-72	Elbow, Straight Thread	1
03045-73	Orifice Assy .1251 -4 Elbow	1
03045-74	Tube Assy	1
03045-75–100	Not Used	

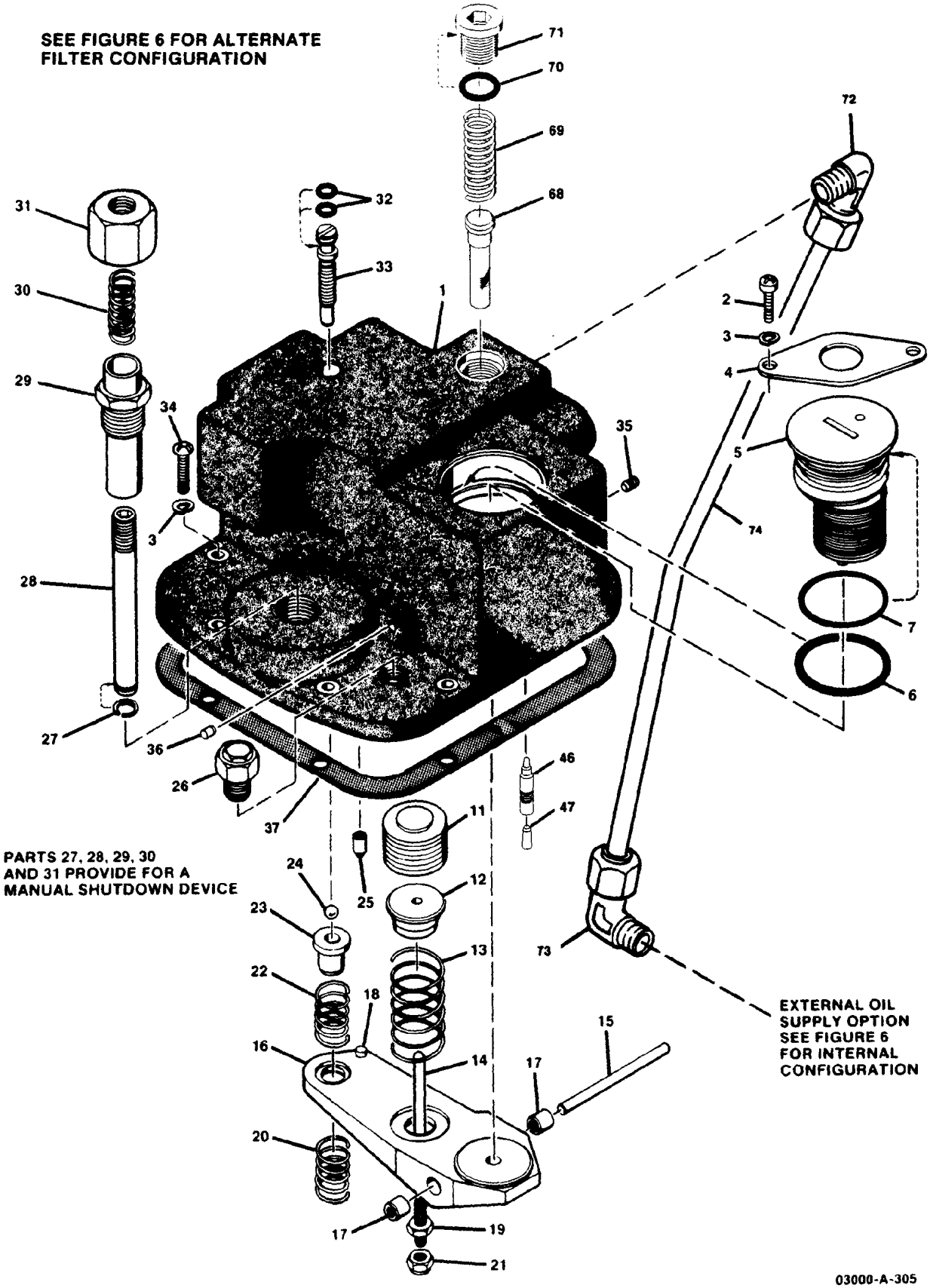

Figure 4. Parts of UG-8 Pneumatic Speed Adjustment with Manual Shutdown

Parts List For Figure 6

Ref. No.	Part Name	Quantity
03045-1	Not Used	
03045-2	Screw, 10-32 x 0.500	2
03045-3	Lock Washer, No. 10, 0.190 ID	9
03045-4	Strap	1
03045-5	Eccentric Bellows	1
03045-6	O-ring, 1.364 ID x 0.070	1
03045-7	O-ring, 1.234 ID x 0.070	1
03045-8	O-ring, 0.145 ID x 0.070	1
03045-9	Tube	1
03045-10	O-ring, 0.208 ID x 0.070	1
03045-11	Piston	1
03045-12	Rod Seat	1
03045-13	Spring	1
03045-14	Rod	1
03045-15	Shaft	1
03045-16	Lever	1
03045-17	Needle Bearing	2
03045-18	Nozzle Seat	1
03045-19	Nut, 10-32	1
03045-20	Spring	1
03045-21	Nut	1
03045-22	Spring	1
03045-23	Spring Seat	1
03045-24	Ball, 0.156	1
03045-25	Nozzle	1
03045-26	Filler Cap	1
03045-27–31	Not Used	
03045-32	O-ring, 0.176 ID X 0.070, See Fig. 4	2
03045-33	Screw, See Fig. 4	1
03045-34	Screw	7
03045-35	Screw	1
03045-36	Plug	1
03045-37	Gasket	1
03045-38	Plug, Hex Head	1
03045-39	O-ring	1
03045-40	Not Used	
03045-41	Not Used	
03045-42	Not Used	
03045-43	Screw, Filter Retention	1
03045-44	Filter	1
03045045	Not Used	
03045-46	See Fig. 4	
03045-47	See Fig. 4	
03045-48–50	Not Used	
03045-51	Screw	2
03045-52	Lockwasher	2
03045-53	Clamp. 0.188 ID	2
03045-54	Tube, 0.337 ID	2
03045-55	Connector, No. 16	1
03045-56	Not Used	
03045-57	Not Used	
03045-58	Bushing	1
03045-59	Potting Stop	1
03045-60	Solenoid Assembly (see manual 03013 for individual parts)	1
03045-61	Cover	1
03045-62	Tubing	2
03045-63	Set Screw 10-32 x 0.250	1
03045-64	Diode	1
03045-65	Lock Washer	1
03045-66	Screw	1
03045-67	Not Used	
03045-68–74	See Fig. 4	
03045-75–-100	Not Used	

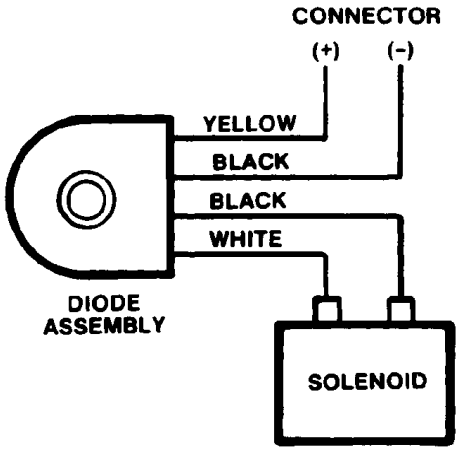

Figure 5. Wiring Diagram

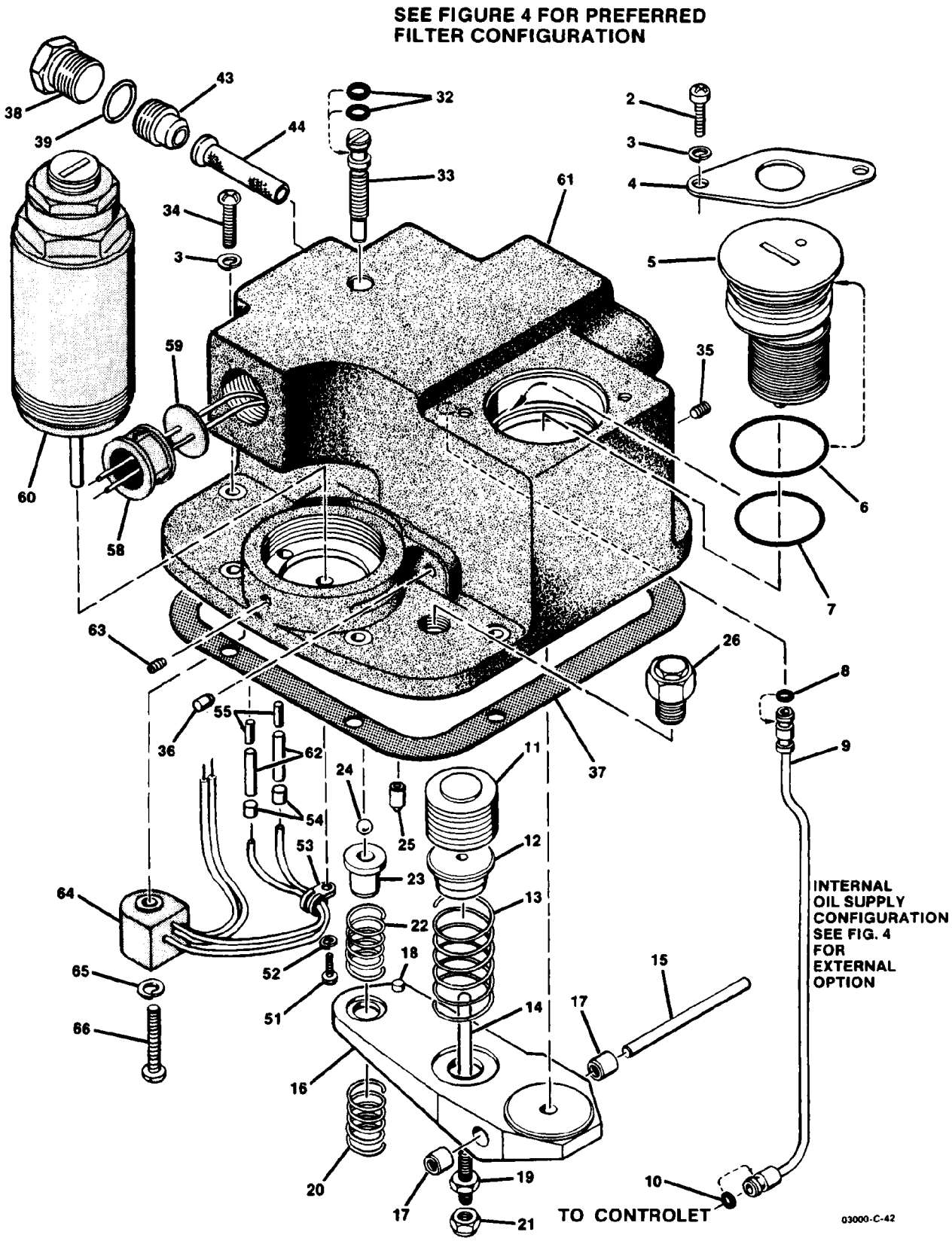

Figure 6. Parts for UG-8 Pneumatic Speed Adjustment with Solenoid Shutdown

Parts List For Figure 7

Ref. No.	Part Name ..... Quantity
03045-101	Front Plate .....
03045-102	Screw. 8-32 x .250 Soc. Set .....
03045-103	Disc.....
03045-104	Lever, Speed Setting .....
03045-105	Washer, Spring Lock No. 10.....
03045-106	Screw, 10-32 x .500 Soc. Hd Cap.....
03045-107	Bracket .....
03045-108	Washer. Spring Lock No. 10.....
03045-109	Screw. 10-32 x 1.250 Socket Cap .....
03045-110	Nut. M8 Wing.....
03045-111	Screw. M8. Knurled Head.....
03045-112	Stop Lever .....
03045-113	Lock Washer.....
03045-114	Screw, 10-32 Socket Cap .....
03045-115	Return Spring.....

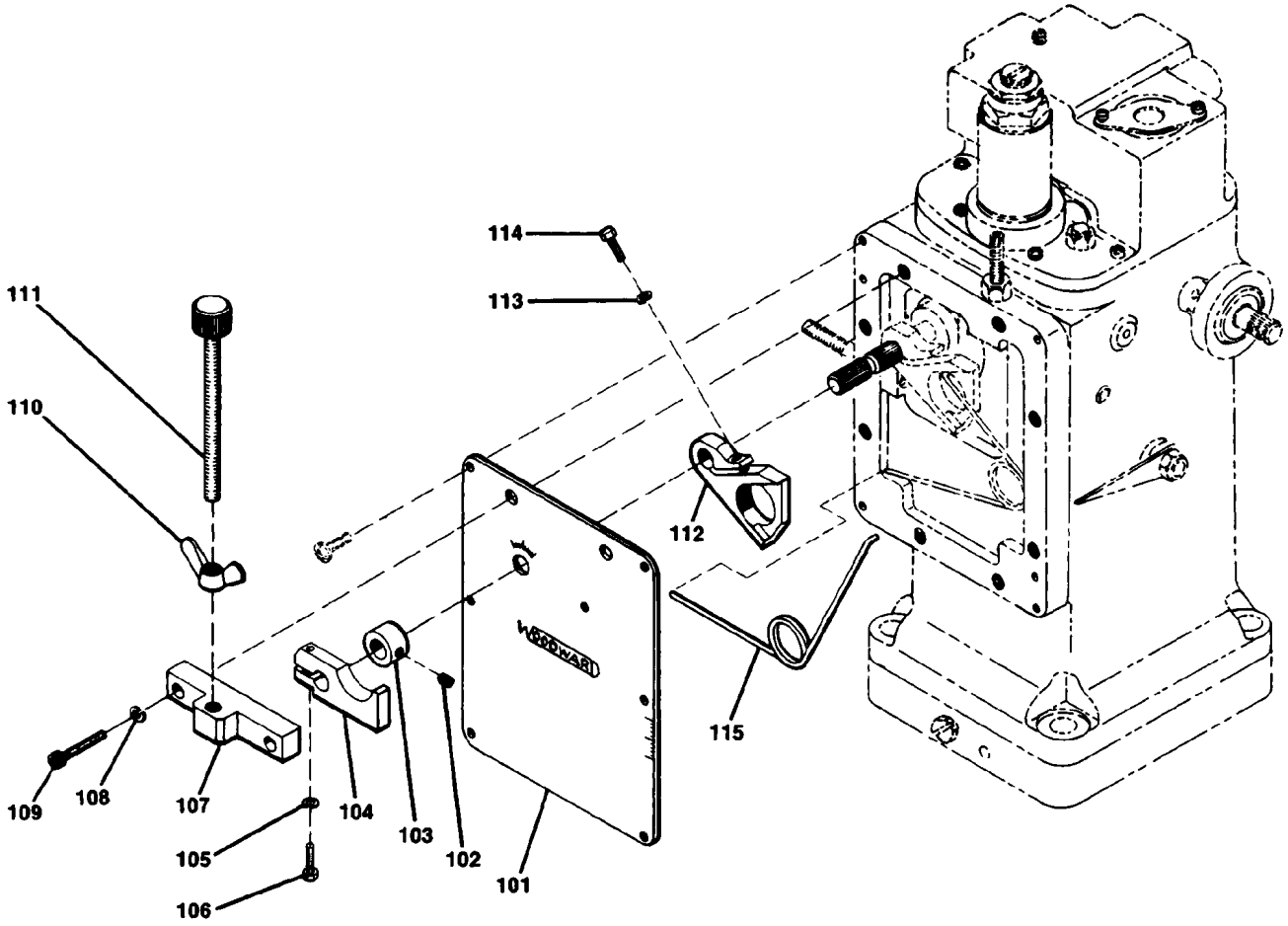

Figure 7. Parts for UG-8 Manual Speed Adjustment

Speed Setting Filter

The speed setting filter is provided to protect the small orifices In the head from accumulations of dirt. The filter should be removed and backflushed if the speed setting head becomes sluggish or during overhaul of the governor.

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Please reference publication 03045.

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