WOODWARD

Product Manual 37729
(Revision B)
Original Instructions

Two-Solenoid Speed Setting Mechanism for EGB-10 Governor/Actuator

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:

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 Out-of-date translations are marked with ⚠.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.

Two-Solenoid Speed Setting Mechanism for EGB-10 Governor/Actuator

Description

(Figure 1)

This manual should be used with either manual 37708 or 82340, which covers the EGB-10 governor/actuator. In addition, you should be familiar with the operation of the three sections within the governor/actuator (electric actuator, mechanical governor, and hydraulic amplifier).

The two-solenoid speed setting mechanism, an optional feature used on the EGB-10 governor/actuator, permits remote control of the mechanical governor. The mechanical governor controls the prime mover when starting and when the signal to the electric actuator fails. The mechanism replaces the standard front panel and dials (speed setting, speed droop, and load limit) used to control the mechanical governor. It consists of a speed setting cylinder, speed screw, speed droop bracket, and load limit screw. The speed setting cylinder contains solenoid operated idle and maximum speed pistons, which permit a selection of idle or maximum speed.

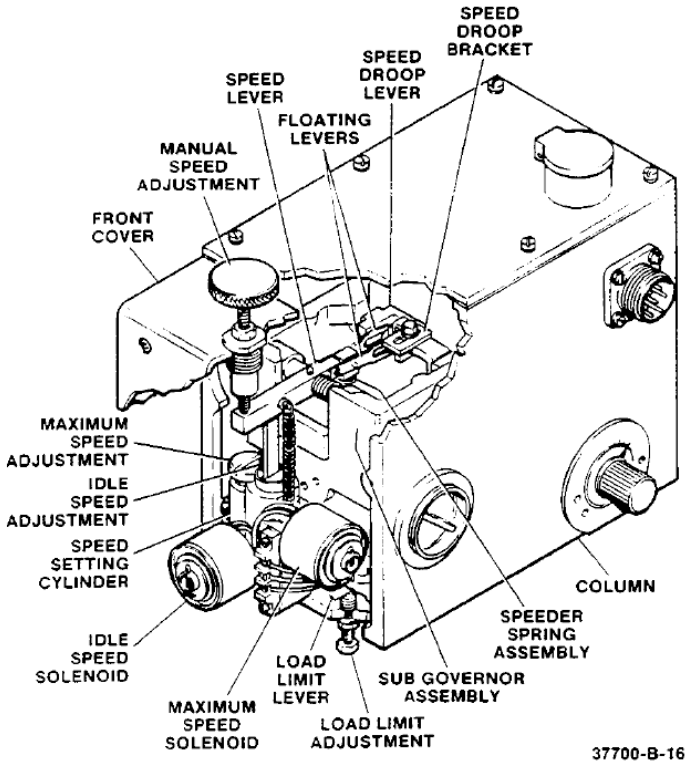

Figure 1. Two-Solenoid Speed Setting Mechanism

Operation

(Figure 2)

Idle Speed

When solenoid A is energized, its plunger is seated and subgovernor pressure oil forces the seal piston up. The seal piston raises the seal spring, idle speed piston, idle speed screw, maximum speed piston, and the piston link. Upward movement of the idle speed screw and attached linkage stops when the idle speed piston contacts the retaining ring. Upward movement of the seal piston stops when it compresses the O-ring, thus preventing oil leakage between the idle speed piston and maximum speed piston areas. The piston link raises the left end of the speed lever. The right end of the speed lever moves down, increasing speeder spring compression. The speeder spring moves the pilot valve plunger down from its centered position. Pressure oil is directed to the buffer piston and moves it to the right. Oil displaced by the buffer piston forces the power piston up which, in turn, moves the loading piston up. When the piston moves up, the hydraulic amplifier section rotates the output shaft in the increase fuel direction, and idle speed is reached.

Maximum Speed

Both solenoids must be energized to attain maximum speed. Subgovernor pressure oil flows to the rotating pilot valve bushing. With each rotation of the bushing, a slot in the bushing registers with the pressure oil supply and the supply passage to the maximum speed piston area. Intermittent pressure oil is thus passed to the area. When solenoid B is energized, its plunger is seated and intermittent pressure oil forces the maximum speed piston up. Intermittent pressure oil controls the rate at which the piston moves, and hence prime mover acceleration is also controlled. Typically, 15 seconds is required to move the piston up. As the maximum speed piston moves up, it raises the piston link and the left end of the speed lever. As the right end of the speed lever moves down, speeder spring compression increases and the output shaft rotates to the maximum fuel position. Upward movement of the maximum speed piston stops when it contacts the maximum speed screw. The manual speed screw may be turned clockwise to lower the left end of the speed lever and hence reduce prime mover speed.

Shutdown

When solenoid B is de-energized, its plunger moves off its seat. Intermittent pressure oil and oil under the maximum speed piston flow to sump. The loading spring lowers the left end of the speed lever, piston link, and maximum speed piston. As the right end of the speed lever moves up, speeder spring compression decreases and the output shaft rotates in the decrease fuel direction. Downward movement of the maximum speed piston stops when the idle speed screw contacts the idle speed piston. The prime mover is at idle under this condition.

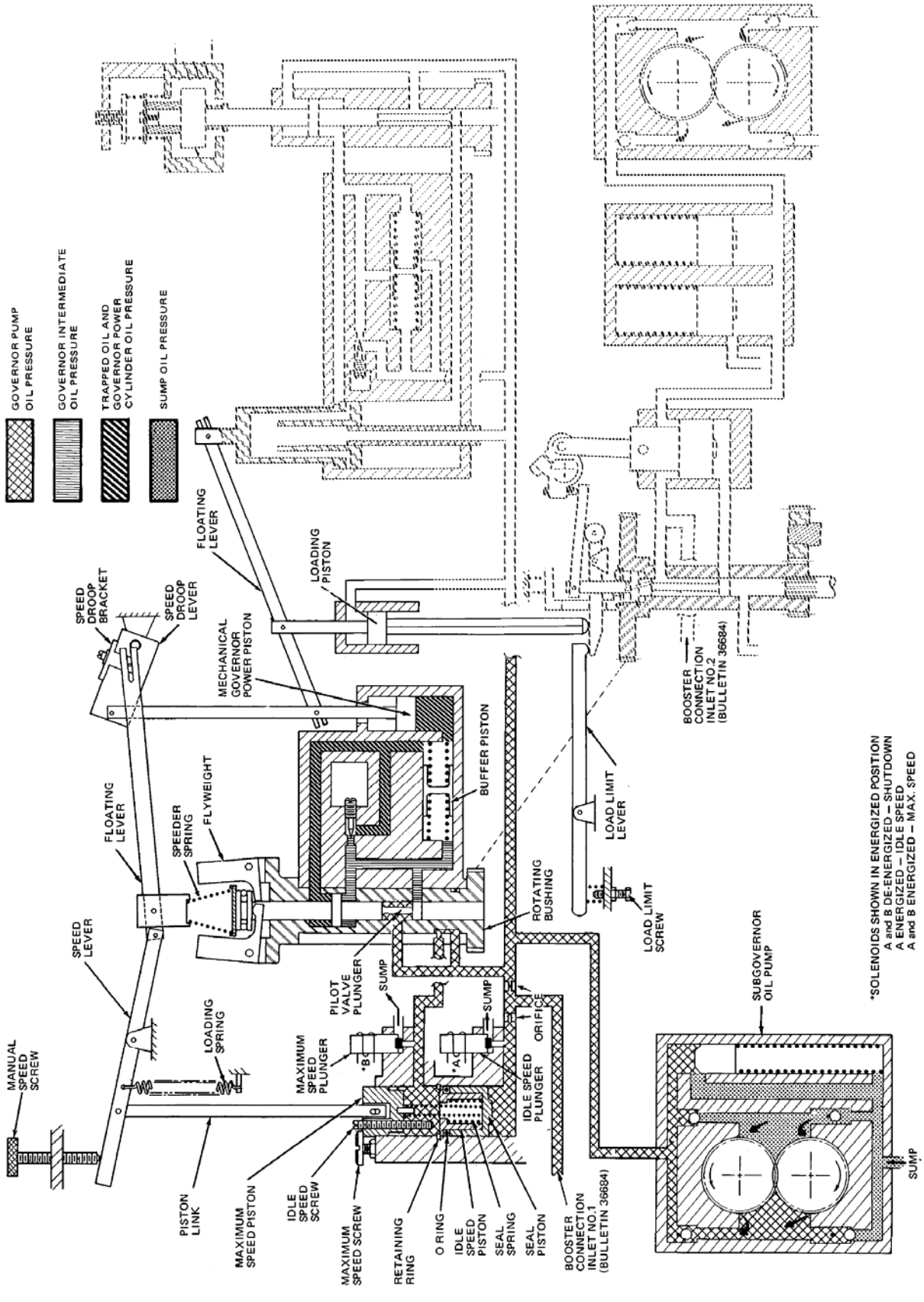

Figure 2. Schematic Diagram, Two-Solenoid Speed Setting Mechanism

When solenoid A is de-energized, its plunger moves off its seat. Subgovernor pressure oil and oil under the seal piston flow to sump. The seal spring forces the seal piston down, breaking the seal established by the 0-ring and seal piston. The loading spring lowers the left end of this speed lever, attached linkage, idle speed screw, idle speed piston, seal spring, and seal piston. As the right end of the speed lever moves up, speeder spring compression decreases and the output shaft rotates to the fuel off position.

Adjustments

(Figure 1)

Table 1 describes the function and adjustment procedures for the two-solenoid speed setting adjustment components. See manual 37708 or 82340 for complete adjustment information on the EGB-10 governor/actuator.

⚠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.

Table 1. Adjustments

Component	Function	Adjustment
Maximum Speed Screw	Sets the speed at which the centrifugal governor assumes control. This speed must be higher (3–5%) than that for which the electric governor is set.	Remove front cover. Loosen lock nut. Turn screw clockwise to decrease maximum speed, counterclockwise to increase. Tighten lock nut and reinstall front cover.
Manual Speed Screw	Permits manual speed setting when centrifugal governor is controlling and both solenoids are energized.	(1) Loosen lock nut. Turn screw clockwise to reduce speed. Tighten lock nut. (2) When electric governor is controlling, turn screw counter-clockwise until it clears the speed lever.
Idle Speed Screw	Sets idle speed when centrifugal governor is controlling.	Remove front cover. Turn screw clockwise to increase idle speed, counterclockwise to decrease. Reinstall front cover.
Speed Droop Bracket	Sets the percent of droop when centrifugal governor is controlling.	Remove top cover. Loosen lock screw. Slide bracket forward to increase droop. Tighten lock screw and reinstall top cover.
Load Limit Screw	Sets maximum output shaft travel when either centrifugal or electric governor is controlling,	Loosen lock nut. Turn screw clockwise to decrease output shaft travel; counterclockwise to increase.

Parts Information

When ordering parts, supply the following information:

- Actuator serial number shown on nameplate
- Manual number (this is manual 37729)
- Figure number, reference number, and the part name given in the parts list
- The quantity desired

Parts List for Figure 3

Ref. No.	Part Name	Quantity
37729-1	Screw, fil. hd., 1/4-28 x 5/8 (MS35266-80)	6
37729-2	Washer, lock, 1/4 (MS35338-44)	6
37729-3	Top cover	1
37729-4	Cover gasket	1
37729-5	Screw, soc. hd., 1/4-28 x 3	6
37729-6	Washer, lock, 1/4 (MS518481	6
37729-7	Front cover	1
37729-8	Cover gasket	1
37729-9	Nut, hex, 5/16-24 (MS35690-522)	1
37729-10	Speed adjusting screw (manual)	1
37729-11	Nut, hex., 3/4-16 (MS35691-1224)	1
37729-12	Washer, lock, int. tooth, 3/4 (MS35333-47)	1
37729-13	Sleeve	1
37729-14	Shutdown spring	1
37729-15	Washer, plain, 0.198 ID x 0.340 OD x 0.031	1
37729-16	Screw, soc. hd., 1/4-28 x 3/4 (MS16998-43)	2
37729-17	Washer, lock, 1/4 (MS35338-44)	2
37729-18	Preformed packing, 0.441 OD (NAS1593-011)	1
37729-19	Preformed packing, 0.316 OD (NAS1593-008)	1
37729-20	Speed setting cylinder (see Fig. 4)	1
37729-21	Loading spring (load limit lever)	1
37729-22	Nut, hex., 1/4-28	1
37729-23	Screw, hex. hd., drilled, full thd., 1/4-28x 1-1/4	1
37729-24	Washer, copper, 1/4 ID x 1/2 OD x 1/32	1
37729-25	Cotter pin, 1/32 x 3/8 (MS24665-3)	2
37729-26	Straight pin, drilled	1
37729-27	Cotter pin, 3/32 x 5/8 (MS24685-299)	1
37729-28	Speed setting shaft	1
37729-29	Spring	1
37729-30	Speed adjusting lever	1
37729-31	Spacer	1
37729-32	Floating lever	2
37729-33	Screw, hex. hd., 10-32 x 1/2 (M59518-061	1
37729-34	Washer, lock, #10 (MS35338-43)	1
37729-35	Washer, plain, #10 (AN960-10)	1
37729-36	Droop adjusting bracket	1
37729-37	Spacer	2
37729-38	Needle bearing	2
37729-39	Orifice plug	2
37729-40	Subgovernor base	1
37729-41	Column	1
37729-42	Nameplate	1
37729-43	Screw, Phillips, rd. hd., 5-40x 1/4	4

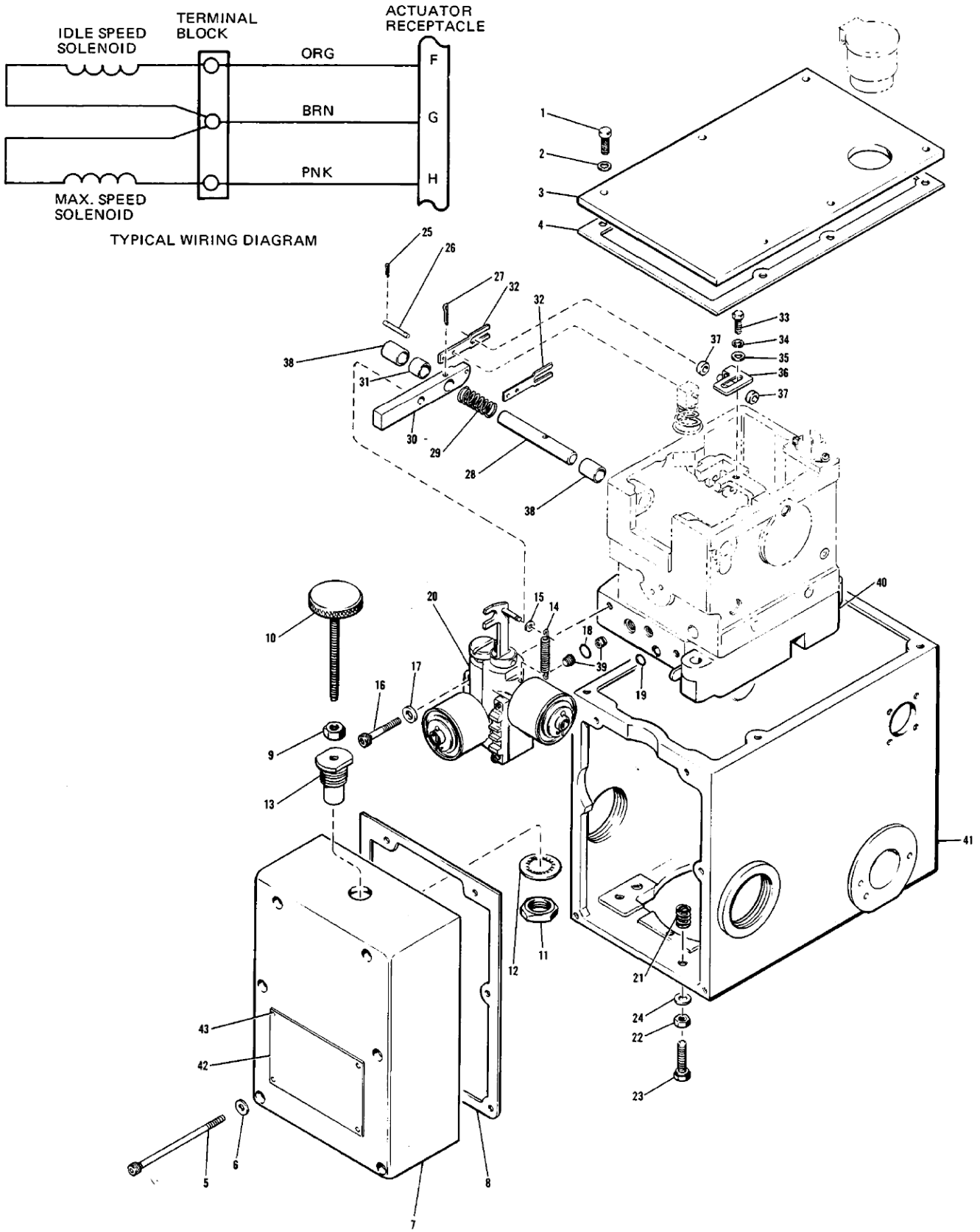

Figure 3. Two-Solenoid Speed Setting Mechanism Parts

Parts List For Figure 4

Ref. No.	Part Name	Quantity
37729-101	Screw, rd. hd., 6-32 x 5/16	1
37729-102	Screw, rd. hd., 6-32 x 3/8	1
37729-103	Washer, lock, int. tooth, #6 (MS35333-37)	2
37729-104	Terminal block, 3 position	1
37729-105	Insulation strip	1
37729-106	Orifice	2
37729-107	Cotter pin, 1/16 x 1 (MS24665-136)	2
37729-108	Solenoid	2
37729-109	Washer	2
37729-110	Spring washer	2
37729-111	Cover	2
37729-112	Plunger	2
37729-113	Washer, lock, copper	2
37729-114	Nut, hex., 5/16-24 (1/2 inch across corners)	1
37729-115	Maximum speed screw	1
37729-116	Setscrew (idle speed)	1
37729-117	Preformed packing, 0.210 OD (NASI 593.004)	1
37729-118	Shoulder pin	1
37729-119	Piston link	1
37729-120	Maximum speed piston	1
37729-121	Headed pin	1
37729-122	Retaining ring, internal (MS26625-1 100)	1
37729-123	Plug	1
37729-124	Preformed packing, 0.880 OD (NAS1593-115)	2
37729-125	Seal piston	1
37729-126	Seal spring	1
37729-127	Loading spring	1
37729-128	Idle speed piston	1
37729-129	Retaining ring, internal (MS16627-1087)	1
37729-130	Speed setting cylinder	1
37729-131	Thread insert, 5/16-24 x 0.469	1
37729-132	Terminal lug, insulated, AWG 18-22	4

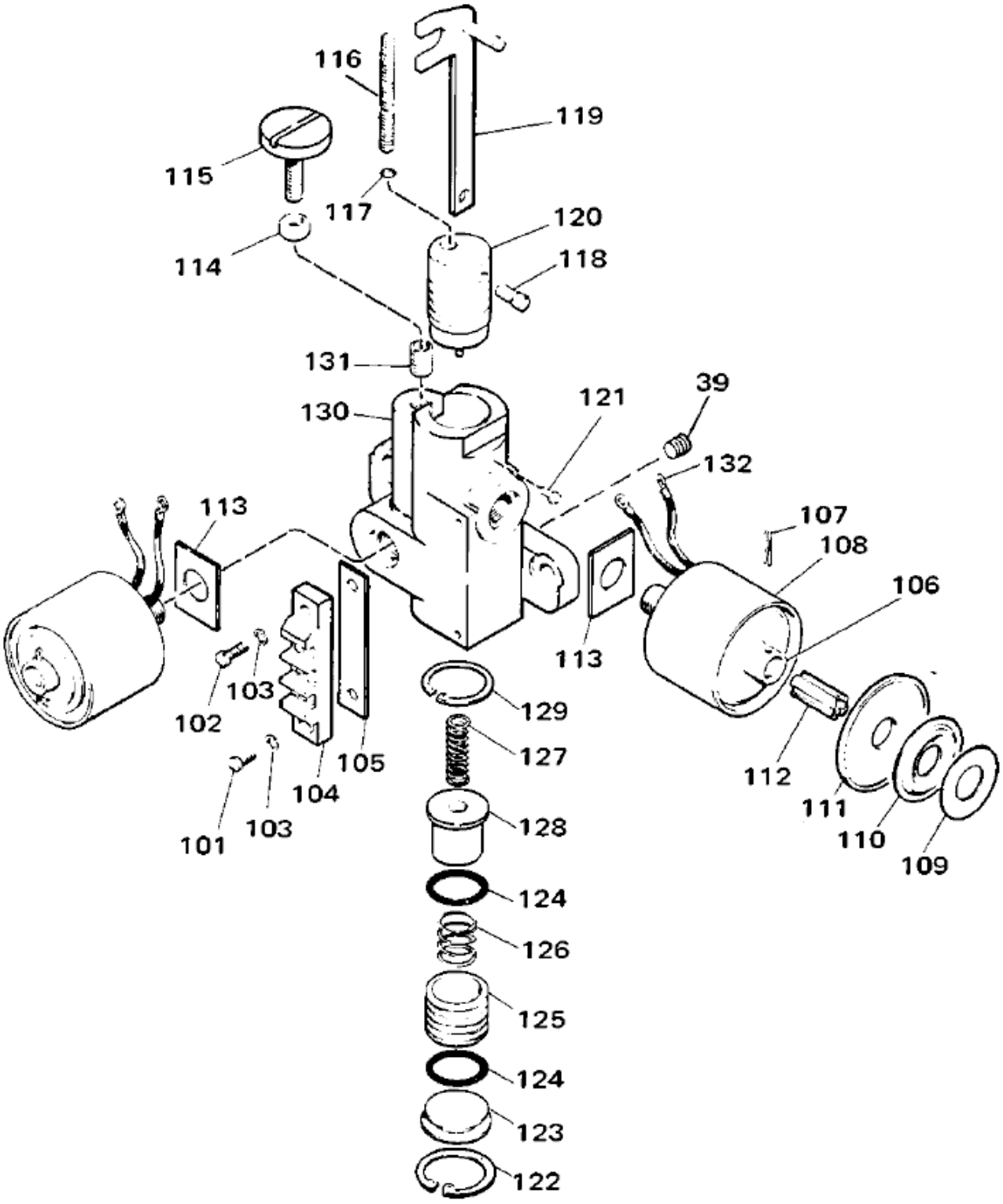

Figure 4. Speed Setting Cylinder Parts

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Send comments to: icinfo@woodward.com

Please reference publication 37729B.

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