

Special Tools for PG Governors

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 Out-of-date translations are marked with ⚠.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

Special Tools for PG Governors

General Information

The special tools illustrated and described in this manual are not all essential for the occasional repair job. The number of governors to be repaired should influence the selection of tools to be ordered.

In addition to the tools listed, the standard bench tools are necessary. For instance, "T" handle and 90° Allen wrenches, Phillips screwdriver, plastic mallets, scribe, long nose pliers, and retaining ring pliers. An arbor press may also be required.

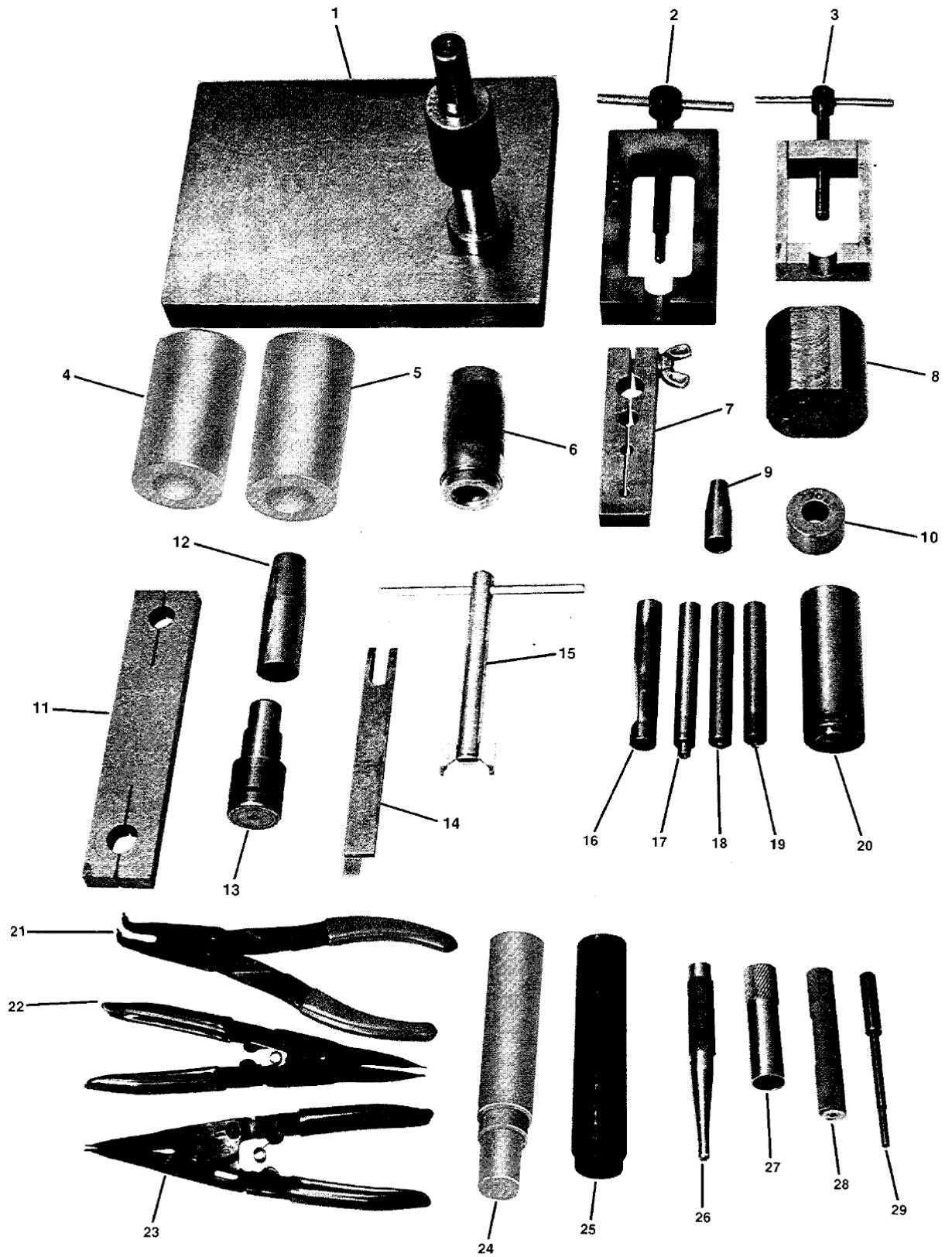
Ordering Tools

When ordering tools or requesting information concerning their use, include the following information with the request or order:

- Tool number
- Manual number (this is manual 36405)
- Serial number of governor

Tool List

Ref. Number	Tool Description	Tool Number	Application	Used On
36405-1	Fixture Tool for Rotary Servo	8995-097	To install bearings in rotary servo.	all PG
36405-2	Rod End Puller (large)	012281	To pull rod end from piston rod.	all PG
36405-3	Rod End Puller (small)	8995-098	To pull rod end from piston rod.	all PG
36405-4	Seal Installing Tool (small)	8995-099	To install seals on small diameter terminal shaft.	all PG
36405-5	Seal Installing Tool (large)	8995-100	To install seals on large diameter terminal shaft.	all PG
36405-6	Seal Installing Tool	8995-105	To install oil seal/dust wiper on 12 ft-lb spring loaded and 29 ft-lb differential power cylinder.	all PG
36405-7	Hand Vise	360687	To install the diaphragm plunger in the low lube oil shutdown or the low water shutdown device.	all PG
36405-8	Pin Removal Block	011971	To remove pins.	all PG
36405-9	Seal Protector, Small (used with 8995-099)	360066	To install oil seals on terminal shaft.	all PG
36405-10	Idle Gear Stud Tool	8995-103	To install idler gear stud in power case.	all PG
36405-11	Hand Vise	8995-104	To fasten lift nut to piston rod.	all PG
36405-12	Seal Protector, Large (used with 8995-100)	361029A	To install oil seals on terminal shaft.	all PG
36405-13	Accumulator Springs Tool	030955	To install accumulator springs with an arbor press.	all PG
36405-14	Shutdown Nut Adjusting Tool	360912	To adjust shutdown nut.	all PG
36405-15	Vane Servo Rotor Adjusting Tool	360747	To adjust electric vane servo rotor.	PGE
36405-16	Check Valve Installing Tool	011966	To install check valve in speed setting servo.	all PG
36405-17	Plug Installing Tool	8995-106	To install oil flow plugs in power case.	all PG
36405-18	Check Valve Installing Tool	360690	To install gravity type check valve in power case.	all PG
36405-19	Spring Loaded Check Valve Installing Tool	360689	To install spring loaded check valve in power case.	all PG
36405-20	Seal Installing Tool	8995-107	To press seal into retainer for drive shaft.	all PG
36405-21	Truarc #03 Pliers, bent 90°	8995-001	To replace retaining ring on accumulator spring.	all PG
36405-22	Truarc #01 Pliers, Internal	190497	To replace retaining rings on governor.	all PG
36405-23	Truarc #02 Pliers, External	190862	To replace retaining ring on drive shaft and power case.	all PG
36405-24	Time Delay Sleeve Installing Tool	8995-111	To seat time delay sleeve in the column.	all PG
36405-25	Spacer Installing Tool	8995-110	To install spacer in automatic reset low water shutdown. Also, to install stop ring.	PGA,PGE
36405-26	Swaging Tool	8995-112	To swage linkage pins.	all PG
36405-27	Load Control Adjusting Tool	360692	To adjust load control spring collar.	all PG
36405-28	Pneumatic Receiver Pin Installing Tool	8995-113	To install spring pin in pneumatic receiver.	all PG
36405-29	Pneumatic Receiver Roll Pin Installing Tool	8995-114	To install roll pin in adjusting screw in pneumatic receiver.	all PG
36405-30	Truarc Pliers, Internal, Similar to No. 190497, only larger	189791	To install snap ring on the buffer plug.	all PG



36000-B-12

Figure 1. PG Tools

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Send comments to: icinfo@woodward.com

Please reference publication 36405A.



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