WOODWARD

Product Manual 54120
(Revision NEW)
Original Instructions

EPG 1712/1724 or 512/524 Electric Actuator Installation

On the Robert Bosch Fuel Pump Replacing RQ, RS, or RSV Mechanical Governor

8924-867 Kit for Bosch RQ Pump 1712/24 EPG
8924-877 Kit for Bosch RQ Pump 512/24 EPG
8924-595 Kit for Bosch RS/RSV Pump on Engine LH Side
8923-009 Kit for Bosch RS/RSV Pump on Engine RH Side

Kit Installation Manual

IMPORTANT

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.

DEFINITIONS

- **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

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.

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.

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, be sure to check the *publications page* on the Woodward website:

www.woodward.com/publications

The current revision and distribution restriction of all publications are shown in manual *26311*.

The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

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.

NOTICE

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.

NOTICE

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*.

Woodward reserves the right to update any portion of this publication at any time. Information provided by Woodward is believed to be correct and reliable. However, no responsibility is assumed by Woodward unless otherwise expressly undertaken.

Copyright © Woodward 1990
All Rights Reserved

EPG 1712/24 Or 512/24 Installation Kit on Bosch Fuel Pump (replacing the RQ, RS, or RSV Mechanical Governor)

Introduction

These instructions apply to the EPG 1712/24 and 512/524 (12 or 24 volt) electric actuator manufactured by Woodward as mounted on a Robert Bosch RQ, RS, or RSV fuel pump. The kit permits the removal of the Robert Bosch mechanical governor, replacing it with an electric actuator and an electronic governor system.

The mounting kits for RQ pumps are Woodward part numbers 8924-867 (1712/24) and 8924-877 (512/524).

The mounting kits for RS or RSV pumps are Woodward part numbers 8924-595 (LH engine mounted pumps) and 8923-009 (RH engine mounted pumps). RS or RSV mounting plates allow use of either 512/24 or 1712/24 actuators.

The kit does not include the actuator, the wiring harness, or the magnetic pickup utilized by the electronic control system.

The actuator, when mounted on the fuel pump, operates the Bosch fuel rack.

⚠WARNING

Removal of the Bosch mechanical governor may also remove an overspeed shutdown device from the control system. The engine should not be started until a replacement safety shutdown device has been installed on the engine. An engine which is started without such safety device can overspeed, causing massive equipment damage, possible personal injury, and even death.

NOTICE

Incorrect installation of the actuator mounting kit may damage the injector pump system.

Actuator Mounting

The following information should be used with the figures in this manual to provide satisfactory installation of the actuator.

Remove the Bosch RQ Governor

1. Remove the screws which hold the rear casting to the injection pump. (Oil will spill from the casting.)
2. Pull the rear casting away enough to remove the starting spring.
3. Remove the link member from the control rod. The rear casting and associated hardware can now be removed.

4. Remove the threaded bushing which holds the flyweight assembly to the pump camshaft.

5. Remove the flyweight assembly with a bearing puller.

⚠WARNING

Some Bosch Fuel Pumps have a lever attached to the fuel rack which will force the rack to maximum fuel if the bracket is installed. Should this lever be present DO NOT USE this installation kit as it will cause overspeed and endanger life and equipment. Be sure the bracket does not touch any portion of a fuel control lever before installation.

When looking at the pump, the fuel control rod will be to the right or left of the pump centerline. The location of the fuel control rod determines which side of the plate goes against the governor housing. (Kits for RSQ pumps have specific plates for left- or right-hand installations.)

6. Determine the position of the actuator mounting plate bracket on the pump housing. Determine the actuator position on the plate so the actuator output shaft rotation will move the control rod toward minimum fuel when the actuator rotates toward minimum fuel. Actuator rotation toward maximum is indicated by an arrow on the end of the actuator. The actuator is spring loaded toward minimum. The control rod generally moves out (extends) from the pump in the minimum fuel direction.

The installer must determine the control rod direction toward minimum fuel and then select the correct position of the actuator to make the output correct for the specific installation.

7. Attach the stop bracket to the actuator as shown. The stop bracket will provide positive stops of the actuator lever. Torque to 90 lb-in (10.2 N·m). Assemble the set screws and jam nuts onto the stop bracket as shown. Do not tighten the jam nuts.

8. (Refer to the figures.) Place one of the metric bolts (M6 x 1 x 20), flat washer, and split lock washer, through the hole in the center of the actuator mounting area. (This bolt will thread into the Bosch casting.)

9. Attach the actuator and spacers (spacers are used with RQ kits only) to the plate. The two 0.375 thick aluminum spacers go between the actuator and the plate. Use the 0.250 nitryl thread seal on the 0.250-20 bolt through the round hole in the plate which will be inside the Bosch casting (RQ kit only). Use lock washers and flat washers between the bolt heads and the plate. Attach with the four 0.250-20 x 1.250 or 0.875 bolts, flat washers, and lock washers supplied with the kit. Torque to 90 lb-in (10.2 N·m).

IMPORTANT

The inside slotted mounting hole in the 8924-877 kit plate for the 512/524 actuator will be inside the sump area of the RQ Bosch pump. Seal this hole with the 0.875 outside diameter washer between the 0.250-20 mounting bolt and the inside of the mounting plate. Seal the hole with R.T.V. sealant, gasket material, gasket seal, or similar product to prevent the sump from leaking around the mounting bolt and the actuator.

10. Assemble the bushing seal and rubber boot onto the mounting plate assembly. (Use a retaining compound, such as Loctite 290, between the bushing seal and the rubber boot.)

11. Attach the larger rod end (the one without a grease fitting) to the Bosch fuel control rod. Use the 3/8 inch thick spacer on a "P" pump and the 1/16 inch spacer on an "A" pump between the rod end and the control shaft to prevent binding. Attach with a 10-32 x 1.000 screw, two hi-collar lock washers, and 10-32 elastic stop nut. Use a lock washer on each side of the rod-end ball. (Do not run the nut on and off the bolt as this will destroy the stop-nut feature.)

12. Thread a jam nut onto the threaded rod and install the threaded rod five turns into the rod end on the control rod. Tighten the jam nut. (The threaded rod must move the control rod in and out without binding.)

13. Use the gasket supplied and attach the actuator-plate assembly to the fuel-control casting with the metric bolts, flat washers, and split lock washers supplied. One of the metric bolts was installed through the plate before the actuator was attached. (Attach the gasket to the mounting plate with gasket cement, if necessary.) Carefully fit the threaded rod through the rubber bushing as the assembly is placed on the casting.

14. Add a jam nut and rod end to the threaded rod, threading in 5 turns.

15. Attach the rod end in the fifth hole of the actuator lever. Use a 0.250-20 x 1.000 bolt, 2 hi-collar lock washers, and elastic stop nut to install the rod end onto the actuator lever. Use a lock washer on both sides of the rod-end ball. It may be necessary to move the rod end to a different hole in the actuator lever to achieve maximum actuator rotation between minimum and maximum fuel.

16. Move the threaded rod to minimum fuel position, turn the actuator output shaft about 5 degrees toward more fuel and attach the actuator lever to the output shaft. Use a 0.250-20 x 1.000 screw and elastic stop nut to attach the lever to the actuator shaft.

17. Tighten the jam nut on the threaded rod. The linkage must not bind when it is moved from minimum- to maximum-fuel positions.

18. Fill the injection pump with the oil recommended by the pump manufacturer until oil spills from the level hole in the mounting plate. Plug the level hole with the 0.375-16 x 0.500 screw, washer and nitryl thread seal supplied. The seal washer goes against the mounting plate, followed by the flat washer.

Setting the Stop Bracket Screws

The stop bracket is provided to prevent the actuator from moving the control rod to a limit position where it may bind. Set the stop screws to provide the maximum- and minimum-fuel position desired, while still preventing over-movement of the control rod. The jam nuts must be tightened before engine operation to prevent possible overspeed or possible minimum-fuel limitation.

19. Review the installation to be certain that the actuator will move from minimum to maximum without binding. Make sure that the actuator rotation is correct to move the fuel control to minimum and maximum.

Wiring Suggestions

Use a minimum of 14 AWG (2.0 mm²), stranded, insulated wire from the battery to the control box to the actuator. Using 14 AWG wire the 12 volt actuator will operate with a maximum of 10 ft (3.0 m) between the control box and the actuator. The total distance in the wiring circuit, from the battery to the control box to the actuator, must not exceed 40 ft (12.1 m).

Using 12 AWG (3.0 mm²) wire in the circuit for the 12 volt actuator allows these maximum distances to be 35 ft (10.7 m) from the control box to the actuator and a total of 140 ft (43 m) in the circuit.

The 24 volt actuator will allow the maximum distances to be 35 ft (10.7 m) between the control box and the actuator for 14 AWG (2.0 mm²) wire and a total of 140 ft (43 m) in the system. Using 12 AWG (3.0 mm²) wire with the 24 volt actuator will permit 70 ft (21 m) between the control box and the actuator and 280 ft (85 m) in the circuit.

The feed from the battery to the control box must be direct, not through a distribution point.

The wire used must not be kinked and ties should be of a non-conducting material. Use only new, well insulated, stranded wire in the installation. The wire is not supplied in the mounting kit, but special harnesses are available from Woodward.

Wiring Terminal Fittings

Attach AMP 54941 or AMP 52961 crimp-on number 6, slotted, insulated terminals, or equivalent, on the control-box end of 12 AWG (3.0 mm²) wires from the actuator and the battery. If 14 AWG (2.0 mm²) wire is used, attach AMP 52935 or AMP 52955 crimp-on, slotted, number 6, insulated terminals, or equivalent.

The actuator end of the wires should be fitted with a number 8 ring terminal, AMP 351098 or equivalent, for 12 AWG wire or AMP 32236, or equivalent, for 14 AWG wire.

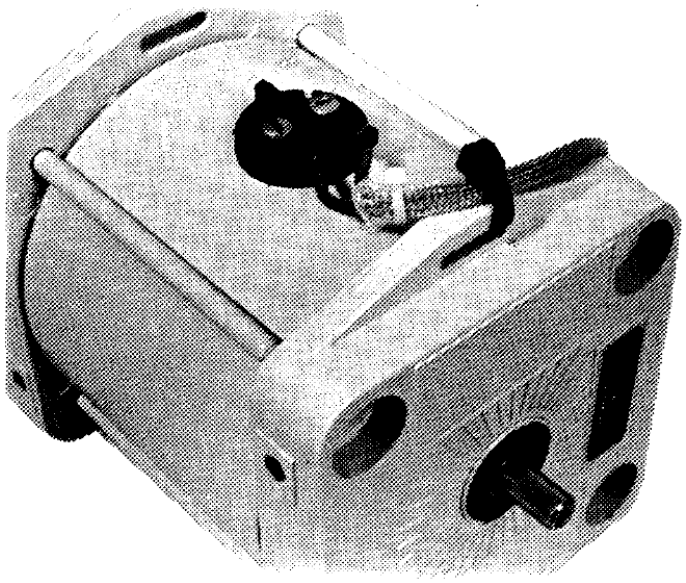
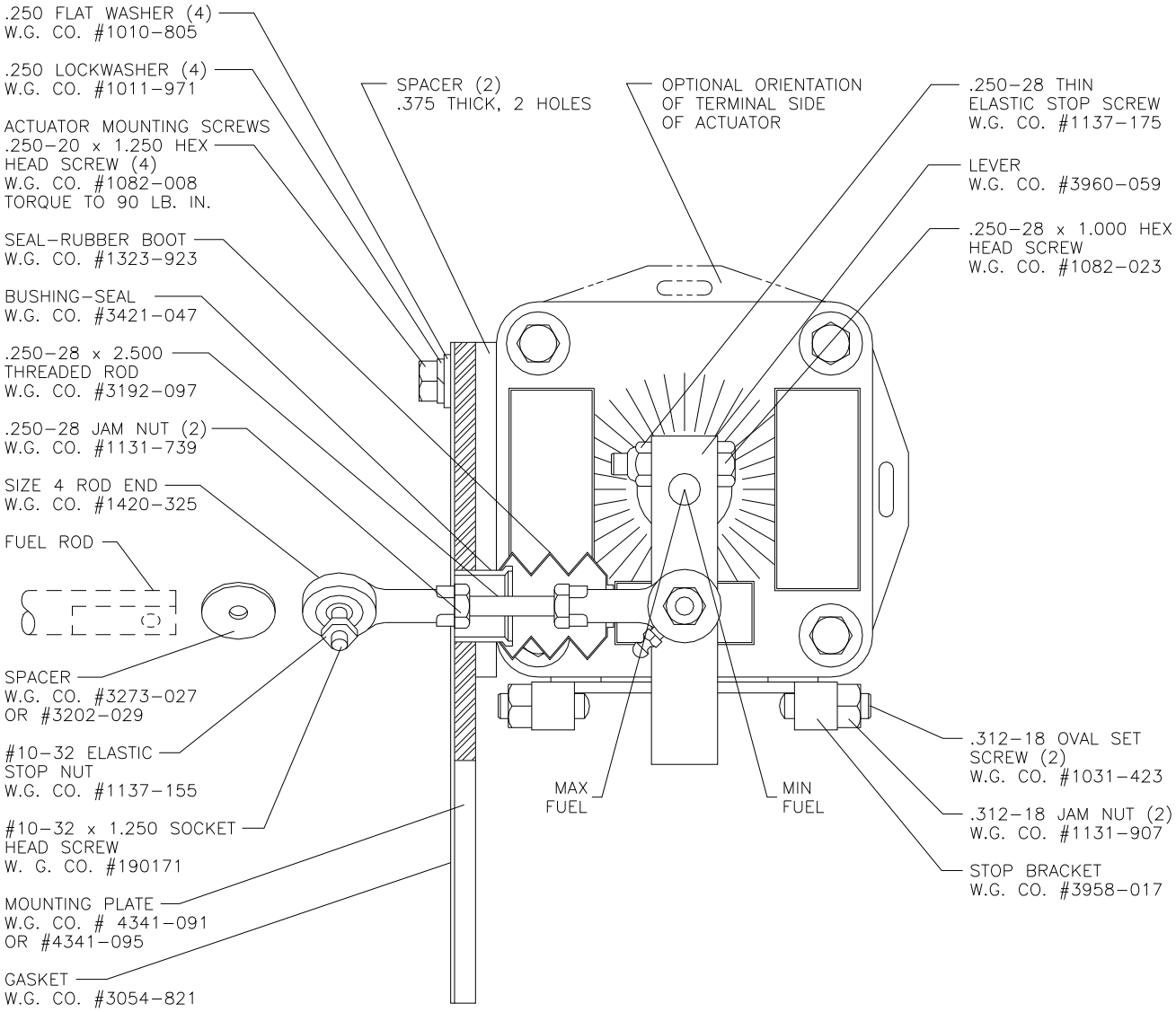


Figure 1. Actuator with Wiring Attached
(Note the tie of the actuator wire to the slot in the side of the actuator.)

RQ Installation (Kits 8924-867 and 8924-877)



FINAL ADJUSTMENTS:

1. ATTACH THE STOP BRACKET (3958-017) TO THE ACTUATOR WITH .250-20 x .625 SCREWS (1082-005) AND LOCKWASHERS (1011-971).
2. ADJUST THE MIN FUEL STOP (1031-423) TO WHERE THE ACTUATOR LEVER TRAVEL IS TERNINATED BY THE STOP. MAKE SURE THAT FUEL MAY BE SHUT DOWN IN THE MIN POSITION. TIGHTEN THE JAM NUT (1131-907).
3. RUN THE ENGINE AT RATED SPEED AND APPLY A FULL LOAD. ADJUST THE MAX STOP (1031-423) TO THE LEVER, THEN BACK THE SCREW AWAY APPROXIMATELY TWO TURNS.
4. REMOVE THE LOAD AND THEN APPLY A FULL LOAD AGAIN. IF THE ENGINE IS NOT GETTING SUFFICIENT FUEL NEAR FULL LOAD, BACK THE STOP AWAY ANOTHER TURN. TIGHTEN THE JAM NUT (1131-907).

54000-A-115
89-7-10 GA

Figure 2. Assembly of Actuator to Mounting Plate

RQ Pump Actuator Assembly (Kits 8924-867 and 8924-877)

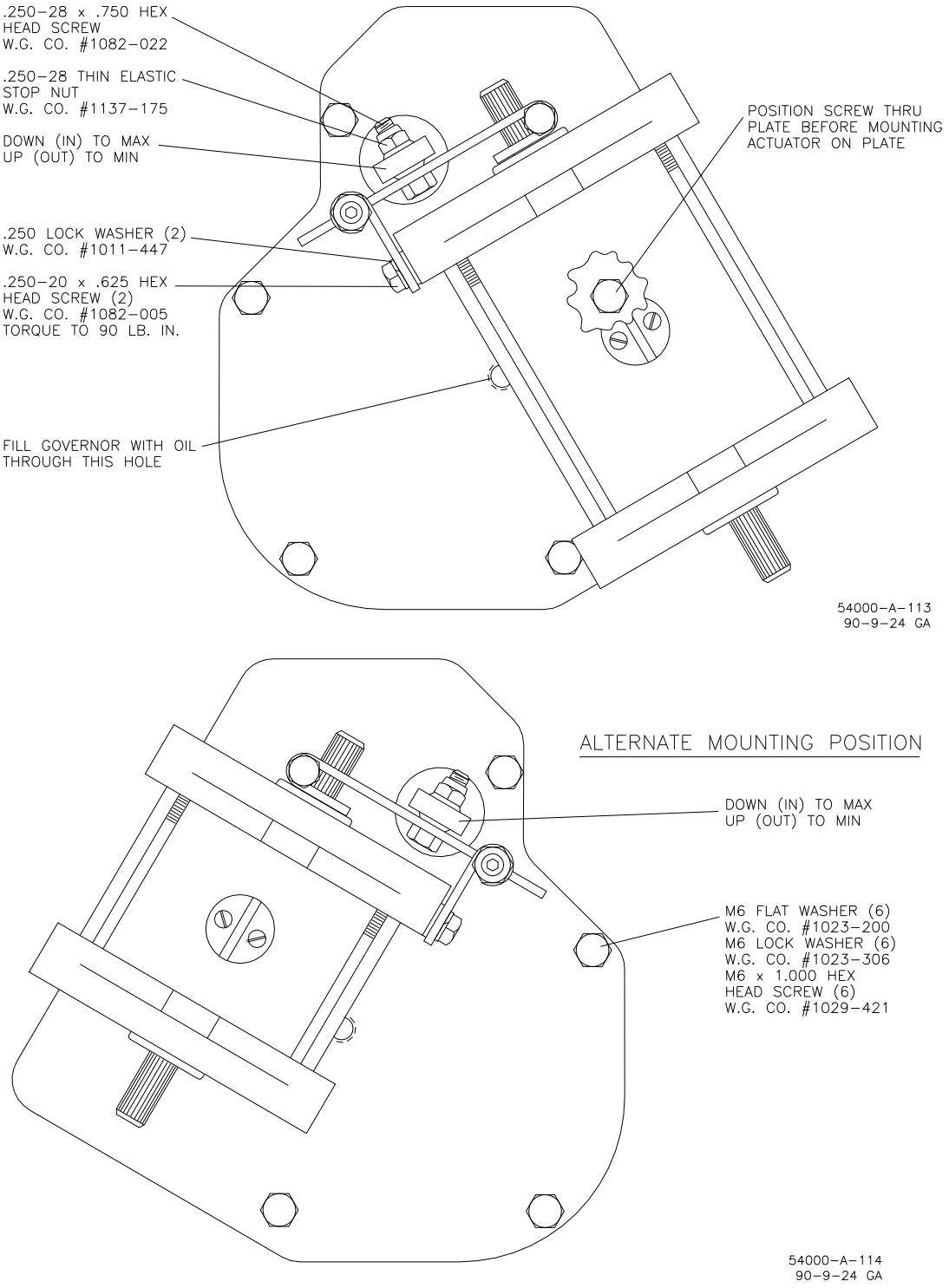
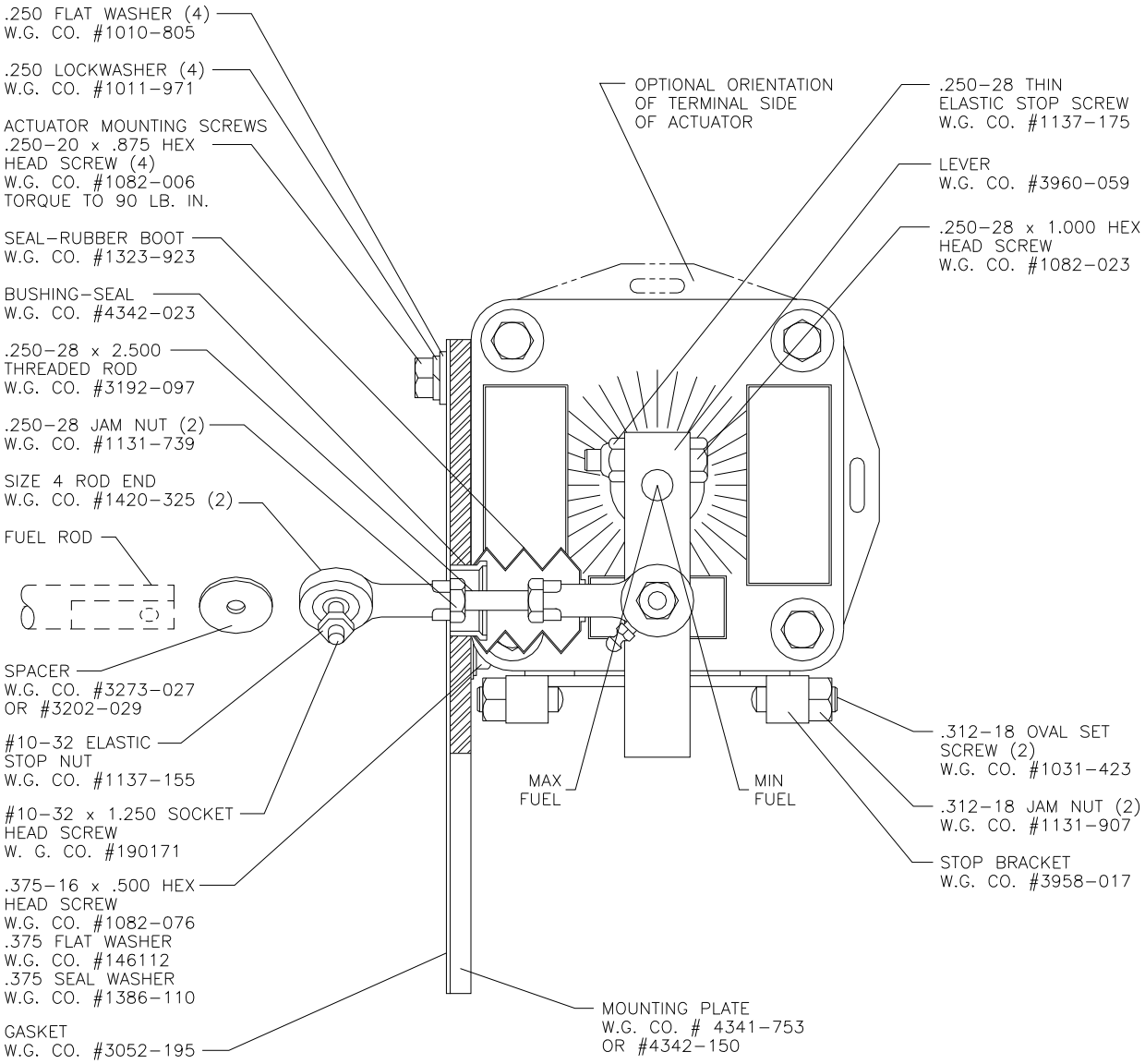


Figure 3. Actuator/Plate Assembly

Parts List for Kits 8924-867 and 8924-877

Item	Quantity
Washer, 0.265 x 0.875 x 0.125 (512/24 kit only)	1
Washer, 0.390 x 0.625 x. 0.064	1
Washer, 0.250 hi collar lock	4
Washer, 0.250 split lock	6
Washer, metric 6 split lock	6
Washer, No. 10 lock	1
Washer, metric 6, flat	6
Screw, 0.312-18 x 1.000, set	2
Screw, 0.250-20 x 0.625 cap	2
Screw, 0.250-20 x 1.250 cap	4
Screw, 0.250-28 x 0.750	1
Screw, 0.250-28 x 1.000,cap	1
Screw, 0.375-16 x 0.500 cap	1
Screw, metric 6 x 1 x 20 cap	6
Nut, 0.312-18 Hex Jam	2
Nut, 0.250-28 thin, hex	2
Nut, 0.250-28 Elastic lock	2
Nut, 10-32 Elastic lock	1
Spacer, 0.375 thick, two holes	2
Spacer, 0.375 thick	1
Spacer, 0.062 thick	1
Boot, Rubber Accordion	1
Seal, 0.250 nitryl	1
Seal, 0.375 Nitryl thread	1
Rod End, with grease fitting	1
Rod End, without grease fitting	1
Rod, 0.250-28 x 2.875, threaded	1
Gasket, RQ Mounting	1
Bushing, Boot	1
Bracket, Stop	1
Lever, 75 mm	1
Plate, EPG to RQ Gov. Housing	1
Manual, 54120	1

RS/RSV Installation (Kits 8924-595 and 8923-009)



FINAL ADJUSTMENTS:

1. ATTACH THE STOP BRACKET (3958–017) TO THE ACTUATOR WITH .250–20 x .625 SCREWS (1082–005) AND LOCKWASHERS (1011–971).
2. ADJUST THE MIN FUEL STOP (1031–423) TO WHERE THE ACTUATOR LEVER TRAVEL IS TERNINATED BY THE STOP. MAKE SURE THAT FUEL MAY BE SHUT DOWN IN THE MIN POSITION. TIGHTEN THE JAM NUT (1131–907).
3. RUN THE ENGINE AT RATED SPEED AND APPLY A FULL LOAD. ADJUST THE MAX STOP (1031–423) TO THE LEVER, THEN BACK THE SCREW AWAY APPROXIMATELY TWO TURNS.
4. REMOVE THE LOAD AND THEN APPLY A FULL LOAD AGAIN. IF THE ENGINE IS NOT GETTING SUFFICIENT FUEL NEAR FULL LOAD, BACK THE STOP AWAY ANOTHER TURN. TIGHTEN THE JAM NUT (1131–907).

54000–A–118
90–10–04 GA

Figure 4. Assembly of Actuator to Mounting Plate

RS/RSV Pump Actuator Assembly (Kits 8924-595 and 8923-009)

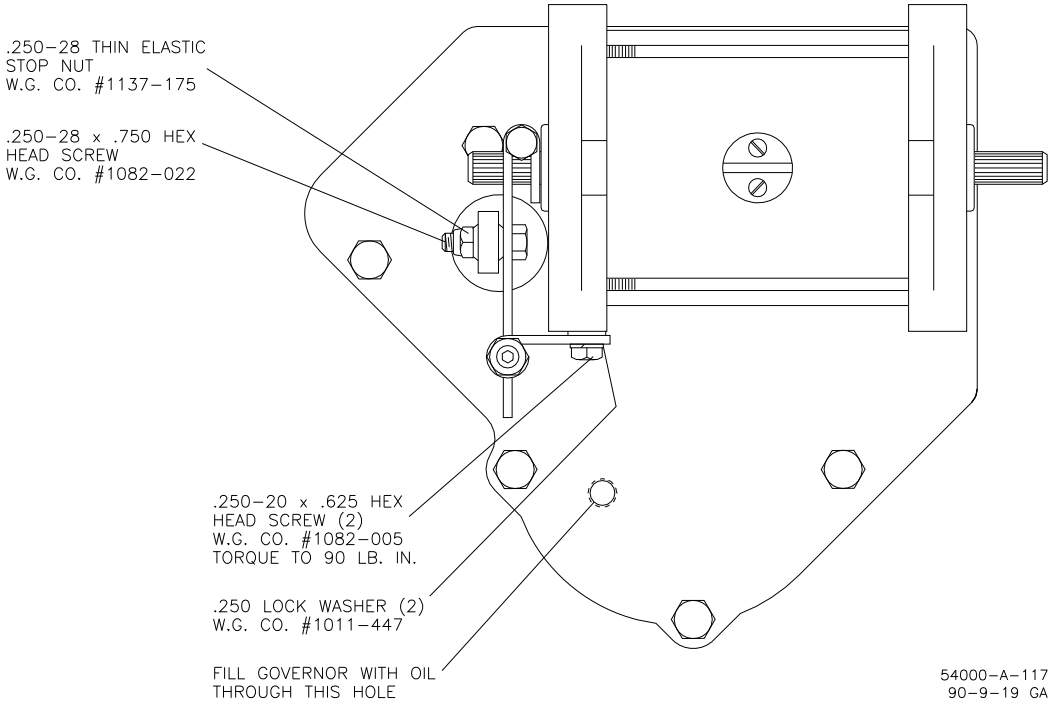


Figure 5. Actuator/Plate Assembly

Parts List for Kits 8924-595 and 8923-009

Item	Quantity
Washer, 0.390 x 0.625 x. 0.064	1
Washer, 0.250 hi collar lock	4
Washer, 0.250 split lock	6
Washer, metric 6 split lock	6
Washer, No. 10 lock	2
Washer, metric 6, flat	6
Screw, 0.312-18 x 1.000, set	2
Screw, 0.250-20 x 0.625 cap	2
Screw, 0.250-20 x 0.875 cap	4
Screw, 0.250-28 x 0.750	1
Screw, 0.250-28 x 1.000,cap	1
Screw, 0.375-16 x 0.500 cap	1
Screw, metric 6 x 1 x 20 cap	6
Nut, 0.312-18 Hex Jam	2
Nut, 0.250-28 thin, hex	2
Nut, 0.250-28 Elastic lock	2
Nut, 10-32 Elastic lock	1
Spacer, 0.375 thick	1
Spacer, 0.062 thick	1
Boot, Rubber Accordion	1
Seal, 0.375 Nitryl thread	1
Rod End, with grease fitting	1
Rod End, without grease fitting	1
Rod, 0.250-28 x 2.500, threaded	1
Gasket, RS/RSV Mounting	1
Bushing, Boot	1
Bracket, Stop	1
Lever, 75 mm	1
Plate, EPG to RS/RSV Gov. Housing	1
Manual, 54120	1

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 54120.

PO Box 1519, Fort Collins CO 80522-1519, USA
1000 East Drake Road, Fort Collins CO 80525, USA
Phone +1 (970) 482-5811 • Fax +1 (970) 498-3058

Email and Website—www.woodward.com

**Woodward has company-owned plants, subsidiaries, and branches,
as well as authorized distributors and other authorized service and sales facilities throughout the world.**

Complete address / phone / fax / email information for all locations is available on our website.

2012/9/Colorado