

Application Note 51465 (Revision A, 3/2013) Original Instructions

F-Series Cleaning Procedure



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:

www.woodward.com/publications

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.



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.



If the cover of this publication states "Translation of the Original Instructions" please note:

Translated Publications

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 Out-of-date translations are marked with .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.

MARNING

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.



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.



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.

- 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.
- 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.

Chapter 1. F-Series Cleaning Procedure

Precautions



Make sure that the power is disconnected before removing the F-Series main connector.

NOTICE

When cleaning the metering element and the inside of the valve body, do not use sharp objects that may scrape or dent the metering elements, as this could degrade the accuracy of the valve. Any damage to the internal geometry of the F-Series, especially the valve plate or bore area around the valve plate, will change the calibration of the valve and void the warranty.

NOTICE

High-pressure washing is NOT recommended.

There are no metering components of the F-Series that are replaceable or serviceable.

IMPORTANT

Deposits near the metering area of the F-Series valve can develop depending on the quality of the gas being metered. This build-up can affect the performance of the F-Series and may appear as degradation of actual flow vs. command flow accuracy, or as flow control instability. Severe deposits can cause the F-Series internal positioning mechanism to seize.

IMPORTANT

Periodic cleaning may be performed and needed to ensure the best operation of the F-Series. It is the customer's responsibility to monitor the need for valid scheduled maintenance, as this will vary depending on the quality of the gas in the particular application. It is recommended that an initial inspection happen at the 1000 hour/ 3 month and/or 2000 hour/ 6 month timeframe to determine the nature and rate of any deposit buildup if fuel quality is a factor in the installed location. The cleaning procedure listed herein is acceptable to perform at the customer site.

Removing Contamination

Use this procedure for cleaning minimal contamination on the F-Series. Minimal contamination may consist of film/patina build up that may become present on the F-Series after usage in the field.

1. Obtain an aerosol-can-style petrochemical spray solvent. The spray solvent chosen should be comparable to Sumico Sumimold Cleaner.



Figure 1. Solvent Spray Can Front



Figure 2. Solvent Spray Can Back

2. Spray the solvent into the bore and on the metering elements.



Figure 3. Spraying Solvent into Throttle Bore

3. Use a plastic or brass bottle brush to gently scrub the inside of the bore and metering elements. This will begin to remove the built up contamination.



Figure 4. Using Plastic Bottle Brush to Clean Bore



Figure 5. Alternative Brass Bottle Brush

4. Final clean the bore and metering elements by wrapping the bottle brush in cloth. Wipe the inside of the bore with the cloth covered bottle brush to remove any remaining contamination.



Figure 6. Cloth Wrapped Bottle Brush



Figure 7. Final Cleaning the Bore with the Cloth Wrapped Bottle Brush

- 5. Rinse the bore and metering surface thoroughly with water.
- 6. Inspect the throttle plate and bore as well as surrounding areas for any remaining contamination.
- 7. If contamination still remains on the throttle plate or bore, or the valve motion does not improve, repeat steps 1 through 6 above until all contamination is removed.
- 8. Dry the unit completely before returning it to service.

Cleaning Results



Figure 8. Bore and Plate Before Cleaning - Bottom



Figure 9. Bore and Plate After Cleaning – Bottom



Figure 10. Bore and Plate Before Cleaning – Top



Figure 11. Bore and Plate After Cleaning – Top



Figure 12. Inside of Open Bore Before Cleaning



Figure 13. Inside of Open Bore After Cleaning

Non-Removable Contamination

If contamination still remains on the unit that cannot be removed by the previously advised cleaning procedure, the unit may need to be replaced. In this case, please follow the provided Returning Equipment for Repair procedure listed in the following section.

Chapter 2. Product Support and Service Options

Product Support Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:

- 1. Consult the troubleshooting guide in the manual.
- 2. Contact the **OE Manufacturer or Packager** of your system.
- 3. Contact the **Woodward Business Partner** serving your area.
- Contact Woodward technical assistance via email
 (EngineHelpDesk@Woodward.com) with detailed information on the
 product, application, and symptoms. Your email will be forwarded to an
 appropriate expert on the product and application to respond by telephone
 or return email.
- 5. If the issue cannot be resolved, you can select a further course of action to pursue based on the available services listed in this chapter.

OEM or Packager Support: Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

Woodward Business Partner Support: Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

- A Full-Service Distributor has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.
- An Authorized Independent Service Facility (AISF) provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission.
- A Recognized Engine Retrofitter (RER) is an independent company that
 does retrofits and upgrades on reciprocating gas engines and dual-fuel
 conversions, and can provide the full line of Woodward systems and
 components for the retrofits and overhauls, emission compliance upgrades,
 long term service contracts, emergency repairs, etc.

A current list of Woodward Business Partners is available at www.woodward.com/directory.

Product Service Options

Depending on the type of product, the following options for servicing Woodward products may be available through your local Full-Service Distributor or the OEM or Packager of the equipment system.

- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime.

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

Flat Rate Repair: Flat Rate Repair is available for many of the standard mechanical products and some of the electronic products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be.

Flat Rate Remanufacture: Flat Rate Remanufacture is very similar to the Flat Rate Repair option, with the exception that the unit will be returned to you in "likenew" condition. This option is applicable to mechanical products only.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

When shipping the item(s), attach a tag with the following information:

- return number:
- name and location where the control is installed;
- name and phone number of contact person;
- complete Woodward part number(s) and serial number(s);
- description of the problem;
- instructions describing the desired type of repair.

Packing a Control

Use the following materials when returning a complete control:

- protective caps on any connectors;
- antistatic protective bags on all electronic modules;
- packing materials that will not damage the surface of the unit;
- at least 100 mm (4 inches) of tightly packed, industry-approved packing material;
- a packing carton with double walls;
- a strong tape around the outside of the carton for increased strength.



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*.

Replacement Parts

When ordering replacement parts for controls, include the following information:

- the part number(s) (XXXX-XXXX) that is on the enclosure nameplate;
- the unit serial number, which is also on the nameplate.

Engineering Services

Woodward's Full-Service Distributors offer various Engineering Services for our products. For these services, you can contact the Distributor by telephone or by email.

- Technical Support
- Product Training
- Field Service

Technical Support is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact.

Product Training is available as standard classes at many Distributor locations. Customized classes are also available, which can be tailored to your needs and held at one of our Distributor locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability.

Field Service engineering on-site support is available, depending on the product and location, from one of our Full-Service Distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface.

For information on these services, please contact one of the Full-Service Distributors listed at www.woodward.com/directory.

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory published at www.woodward.com/directory.

You can also contact the Woodward Customer Service Department at one of the following Woodward facilities to obtain the address and phone number of the nearest facility at which you can obtain information and service.

Products Used In Products Used In Products Used In **Electrical Power Systems Engine Systems Industrial Turbomachinery Systems** Facility-----Phone Number Facility-----Phone Number Facility-----Phone Number Brazil ----+55 (19) 3708 4800 Brazil ----+55 (19) 3708 4800 Brazil ----+55 (19) 3708 4800 China -----+86 (512) 6762 6727 China -----+86 (512) 6762 6727 China -----+86 (512) 6762 6727 Germany-----+49 (711) 78954-510 India -----+91 (129) 4097100 Germany: India ----+91 (129) 4097100 Kempen----+49 (0) 21 52 14 51 Japan-----+81 (43) 213-2191 Japan-----+81 (43) 213-2191 Stuttgart--+49 (711) 78954-510 Korea -----+82 (51) 636-7080 India ----+91 (129) 4097100 Korea -----+82 (51) 636-7080 The Netherlands - +31 (23) 5661111 Japan-----+81 (43) 213-2191 The Netherlands-+31 (23) 5661111 Poland-----+48 12 295 13 00 Korea -----+82 (51) 636-7080 United States ---- +1 (970) 482-5811 United States ---- +1 (970) 482-5811 Poland-----+48 12 295 13 00 United States ---- +1 (970) 482-5811

For the most current product support and contact information, please visit our website directory at www.woodward.com/directory.

Technical Assistance

If you need to contact technical assistance, you will need to provide the following information. Please write it down here before contacting the Engine OEM, the Packager, a Woodward Business Partner, or the Woodward factory:

General	
Your Name	
Site Location	
Phone Number	
Fax Number	
Prime Mover Information	
Manufacturer	
Engine Model Number	
Number of Cylinders	
Type of Fuel (gas, gaseous, diesel, dual-fuel, etc.)	
Power Output Rating	
Application (power generation, marine, etc.)	
Control/Governor Information	
Control/Governor #1	
Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	
Control/Governor #2	
Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	
Control/Governor #3	
Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	
Symptoms	
Description	

If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 51465A.



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.