MCFA Laptop Diagnostic Monitor

User Manual

WARNING

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.

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.

CAUTION

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.

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.**

IMPORTANT DEFINITIONS

WARNING—indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION—indicates a potentially hazardous situation which, if not avoided, could result in damage to equipment.

NOTE—provides other helpful information that does not fall under the warning or caution categories.

Revisions—Text changes are indicated by a black line alongside the text.

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Electrostatic Discharge Awareness

All electronic equipment is static-sensitive, some components more than others. To protect these components from static damage, you must take special precautions to minimize or eliminate electrostatic discharges.

Follow these precautions when working with or near the control.

1. Before doing maintenance on the electronic control, discharge the static electricity on your body to ground by touching and holding a grounded metal object (pipes, cabinets, equipment, etc.).

2. 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.

3. Keep plastic, vinyl, and Styrofoam materials (such as plastic or Styrofoam cups, cup holders, cigarette packages, cellophane wrappers, vinyl books or folders, plastic bottles, and plastic ash trays) away from the control, the modules, and the work area as much as possible.

4. 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.

CAUTION

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*.

Chapter 1.
General Information

Introduction

This software is designed to provide diagnostic information from Mitsubishi/ Caterpillar forklift trucks equipped with the S-15G or LS-20 industrial engine management systems. It is used with a Windows compatible PC.

INSTALLATION

Insert the MCFA Diagnostic installation disk into the drive.

1. Click on START, RUN and browse to a:\Setup.exe
2. Click on OPEN
3. Click on OK
4. Follow installation instructions

SYSTEM REQUIREMENTS

Pentium I or greater

Windows 95, 98 or NT

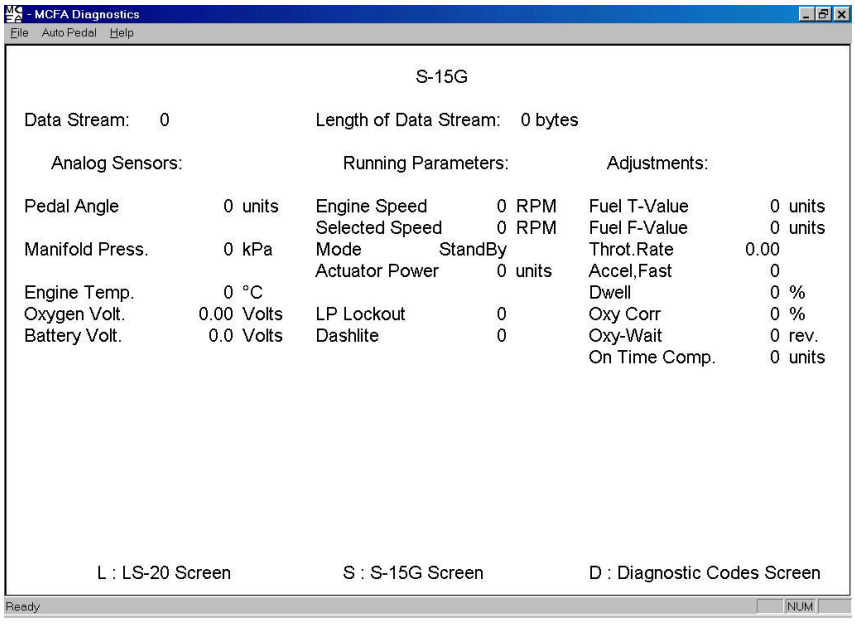
16 MB memory

Disk space: 86 KB

OPERATION

1. Double click on the MCFA Diagnostic Shortcut icon.
2. On first startup, the warning box “configuration file not found” will be displayed.
3. Once a COM port is selected from the file menu, this warning will not be displayed.

S-15G Diagnostic Screen



S-15G DIAGNOSTIC MONITOR SCREEN
Select S-15G Diagnostic Screen by typing S.

The first screen displayed contains S-15G diagnostic information. Other screens may be selected to display LS-20 diagnostic information and general diagnostic codes:

S-15 Diagnostic Screen

Data Stream: Must be scrolling for proper connection to ECU
Length of Data Stream: Typically 91 bytes

Analog Sensors

Pedal Angle: 0-255 Units (Typical range, 45-225 units)
Manifold Press: ~30 kPa at no load to 100 kPa at full load
Engine Temp: Current value, in Deg C
Oxygen Volt: Displays oxy sensor voltage between 0.10 V and 1.00 V
Battery Volt: Approximately 14.5v when charging

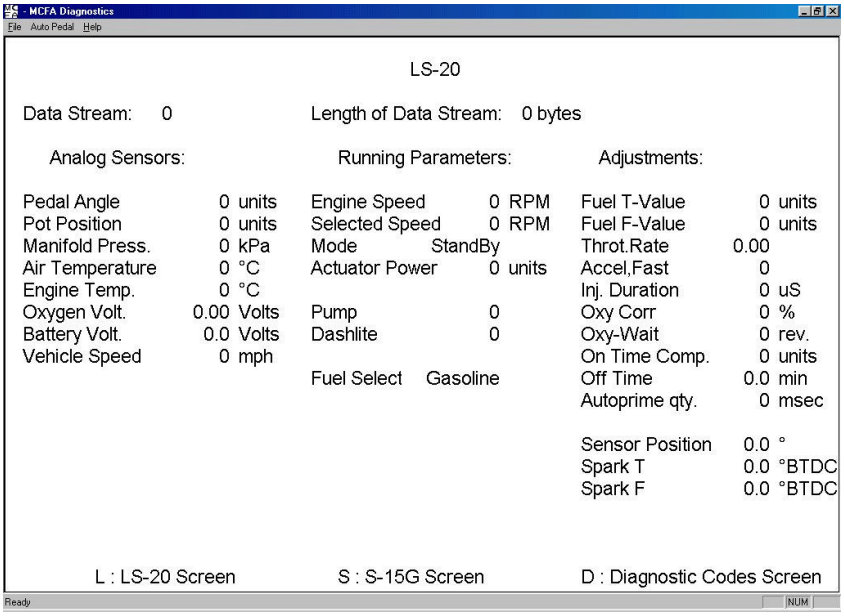
Running Parameters

Engine Speed: Current value
Selected Speed: Goal speed for system based on pedal position
Mode: 0 Standby
1 Cranking
2 Idle
4 Normal
6 Overspeed shutoff
Actuator Power: Throttle valve opening power 0-250 units
LP Lockout: 0 off, 1 on
Dashlite: 0 off, 1 on

Adjustments

Fuel T-Value: Fuel table value
Fuel F-Value: Final value after compensations
Throt. Rate: Rate of change in MAP
Accel, Fast: + for acceleration, - for deceleration
Dwell: Duty Cycle of Air/fuel Ratio Control Solenoid, 0-100%
Oxy-Corr: % of fuel adjustment due to the oxy sensor feedback
Oxy-Wait: Count down timer before oxy feedback starts
On Time Comp: Fast Acting Choke, depletes with revolutions completed

LS-20 Diagnostic Screen



LS-20 DIAGNOSTIC MONITOR SCREEN
Select LS-20 Diagnostic Screen by typing L.

LS-20 Diagnostic Screen
Data Stream: Must be scrolling for proper connection to ECU
Length of Data Stream: Typically 91 bytes

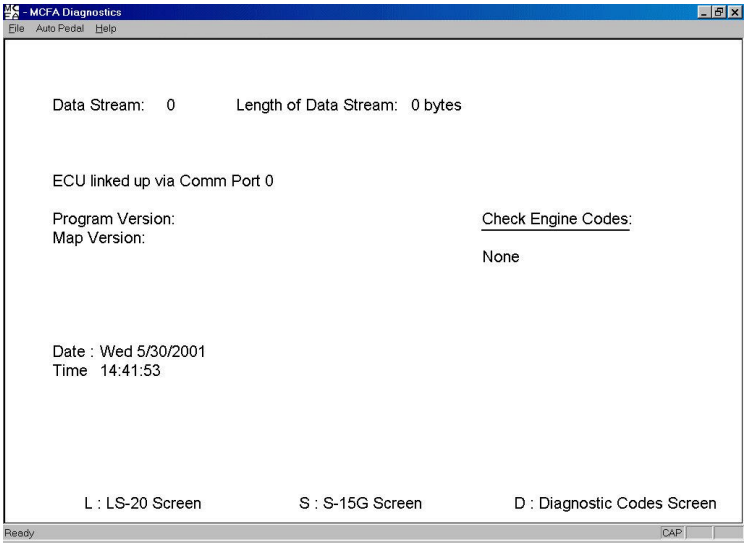
Analog Sensors
Pedal Angle: 0-255 Units (Typically range, 45-225 units)
Pot Position: Secondary Speed Select, 0-255 Units
Manifold Press: ~30 kPa at no load to 100 kPa at full load
Air Temperature: Current value, in Deg C
Engine Temp: Current value, in Deg C
Oxygen Volt: Displays oxy sensor voltage between 0.10 V and 1.00 V
Battery Volt: Approximately 14.5 V when charging
Vehicle Speed: MPH

Running Parameters
Engine Speed: Current value
Selected Speed: Goal speed for system based on pedal position
Mode: 0 Standby
1 Cranking
2 Idle
4 Normal
6 Overspeed shutoff
Actuator Power: Throttle valve opening power 0-250 units
Pump: 0 off, 1 on
Dashlite: 0 off, 1 on

Adjustments
Fuel T-Value: Fuel table value
Fuel F-Value: Final value after compensations
Fuel Selected: Gasoline or Propane

Throt. Rate: Rate of change in MAP
Accel, Fast: + for acceleration, - for deceleration
Inj. Duration: Injector Pulse width
Oxy-Corr: % of fuel adjustment due to the oxy sensor feedback
Oxy-Wait: Count down timer before oxy feedback starts
On Time Comp: Fast Acting Choke, depletes with revolutions completed
Off Time: Time since last run, used for choke calculation
Autoprime Qty: Injector Pulse time (ms) for starting
Sensor Position: Location of crank pickup (deg BTDC)
Spark T: Current value, from Spark Advance table (deg BTDC)
Spark F: Final Advance after Temperature Compensation

Diagnostic Codes Screen



DIAGNOSTIC CODES SCREEN
Select Diagnostic Codes Screen by typing D.

Data Stream: Must be scrolling for proper connection to ECU
Length of Data Stream: Typically 91 bytes

Com Port: Shows Com Port selected from pull-down menu

Program Version: Indicates EPROM installed in ECU
Map Version: Indicates ECU calibration

Check Engine Codes
NONE: No check engine codes
ATMP: Air Temp Sensor Error
BAT: Battery Voltage Error
CHRG: Charging System Error
ETMP: Engine Block Temperature Sensor Error
HTMP: High Engine Block Temperature
KILL: Emergency Engine Shutdown Activated
MAP: Manifold Absolute Pressure signal Error
OIL: Low Oil Pressure
OXY: Oxygen Sensor Error/Fuel System Error
THR: Pedal Sensor out of Range/Open Circuit
TRIG: RPM Signal Error

MFCA DIAGNOSTIC MONITOR PEDAL TEST
In the MCFA diagnostic monitor, Pedal Angle is displayed in units from 0-255.

1 unit = .0196V
Idle is shown at 22 units at .43V

With Pedal Sensor installed:

1. Connect the laptop PC to ECU data port.
2. Turn key to Run position.
3. Select S-15G Data Screen that shows Pedal Angle.
4. Adjust pedal sensor so that with pedal in Idle position, Pedal Angle = 22 units +/-2.

As a double check, full pedal position should not exceed 238 units.

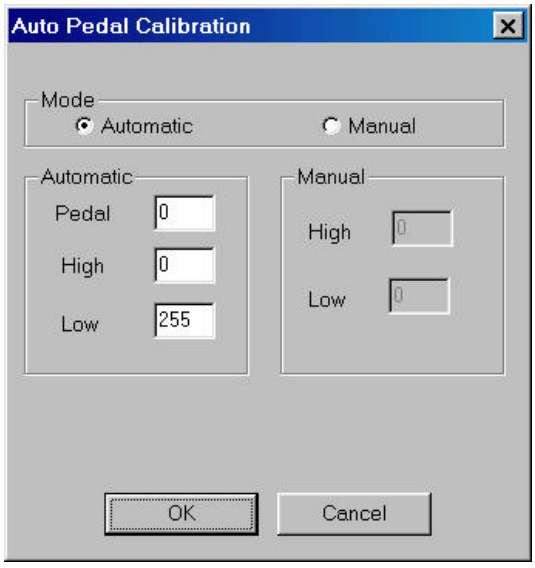
PEDAL SCALING
In some cases (if a different style pedal is substituted), it may be preferable to change the scaling of the pedal input inside the ECU. This may be performed with the MCFA laptop diagnostic software.

AUTO PEDAL SCALING
With Pedal Sensor installed.

1. Connect laptop PC to ECU data port.
2. Turn key to Run position.
3. Select Auto Pedal Scaling from the menu.
4. Depress pedal fully.
5. Release pedal.
6. Accept these new values and click OK.

MANUAL PEDAL SCALING
With Pedal Sensor installed:

1. Connect laptop PC to ECU data port.
2. Turn key to Run position.
3. Select Manual Pedal Scaling from the menu.
4. Type in the desired lower pedal setting (0-255 units).
5. Type in the desired upper pedal setting (0-255 units).
6. Accept these new values by clicking OK.



Chapter 2.
Service Options

Product Service Options

The following factory options are available for servicing Woodward equipment, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is purchased from Woodward or the service is performed:

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

If you are experiencing problems with installation or unsatisfactory performance of an installed system, the following options are available:

- Consult the troubleshooting guide in the manual.
- Contact Woodward technical assistance (see "How to Contact Woodward" later in this chapter) and discuss your problem. In most cases, your problem can be resolved over the phone. If not, you can select which course of action you wish to pursue based on the available services listed in this section.

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 is also a flat rate structured program and includes the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

This option allows you to call 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 Woodward facility as explained below (see "Returning Equipment for Repair" later in this chapter).

Charges for the Replacement/Exchange service are based on a flat rate plus shipping expenses. You are invoiced the flat rate replacement/exchange charge plus a core charge at the time the replacement unit is shipped. If the core (field unit) is returned to Woodward within 60 days, Woodward will issue a credit for the core charge. [The core charge is the average difference between the flat rate replacement/exchange charge and the current list price of a new unit.]

Return Shipment Authorization Label. To ensure prompt receipt of the core, and avoid additional charges, the package must be properly marked. A return authorization label is included with every Replacement/Exchange unit that leaves Woodward. The core should be repackaged and the return authorization label affixed to the outside of the package. Without the authorization label, receipt of the returned core could be delayed and cause additional charges to be applied.

Flat Rate Repair

Flat Rate Repair is available for the majority of standard 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. All repair work carries the standard Woodward service warranty (Woodward Product and Service Warranty 5-01-1205) on replaced parts and labor.

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 “like-new” condition and carry with it the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205). 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 to Woodward for repair, please contact Woodward in advance to obtain a Return Authorization Number. When shipping the item(s), attach a tag with the following information:

- 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.

CAUTION

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*.

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.

Return Authorization Number

When returning equipment to Woodward, please telephone and ask for the Customer Service Department [1 (800) 523-2831 in North America or +1 (970) 482-5811]. They will help expedite the processing of your order through our distributors or local service facility. To expedite the repair process, contact Woodward in advance to obtain a Return Authorization Number, and arrange for issue of a purchase order for the item(s) to be repaired. No work can be started until a purchase order is received.

NOTE

We highly recommend that you make arrangement in advance for return shipments. Contact a Woodward customer service representative at 1 (800) 523-2831 in North America or +1 (970) 482-5811 for instructions and for a Return Authorization Number.

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.

How to Contact Woodward

In North America use the following address when shipping or corresponding:

Woodward Governor Company
PO Box 1519
1000 East Drake Rd
Fort Collins CO 80522-1519, USA

Telephone—+1 (970) 482-5811 (24 hours a day)
Toll-free Phone (in North America)—1 (800) 523-2831
Fax—+1 (970) 498-3058

For assistance outside North America, call one of the following international Woodward facilities to obtain the address and phone number of the facility nearest your location where you will be able to get information and service.

Facility	Phone Number
Brazil	+55 (19) 3708 4800
India	+91 (129) 230 7111
Japan	+81 (476) 93-4661
The Netherlands	+31 (23) 5661111

You can also contact the Woodward Customer Service Department or consult our worldwide directory on Woodward's website (**www.woodward.com**) for the name of your nearest Woodward distributor or service facility. [For worldwide directory information, go to **www.woodward.com/ic/locations**.]

Engineering Services

Woodward Industrial Controls Engineering Services offers the following after-sales support for Woodward products. For these services, you can contact us by telephone, by email, or through the Woodward website.

- Technical Support
- Product Training
- Field Service

Contact information:

Telephone—+1 (970) 482-5811
Toll-free Phone (in North America)—1 (800) 523-2831
Email—icinfo@woodward.com
Website—**www.woodward.com/ic**

Technical Support is available through our many worldwide locations or our authorized distributors, depending upon the product. This service can assist you with technical questions or problem solving during normal business hours. Emergency assistance is also available during non-business hours by phoning our toll-free number and stating the urgency of your problem. For technical support, please contact us via telephone, email us, or use our website and reference ***Customer Services*** and then ***Technical Support***.

Product Training is available at many of our worldwide locations (standard classes). We also offer customized classes, which can be tailored to your needs and can be held at one of our locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability. For information concerning training, please contact us via telephone, email us, or use our website and reference ***Customer Services*** and then ***Product Training***.

Field Service engineering on-site support is available, depending on the product and location, from one of our many worldwide locations or from one of our authorized 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 field service engineering assistance, please contact us via telephone, email us, or use our website and reference ***Customer Services*** and then ***Technical Support***.

Technical Assistance

If you need to telephone for technical assistance, you will need to provide the following information. Please write it down here before phoning:

General

Your Name_____
Site Location_____
Phone Number_____
Fax Number_____

Prime Mover Information

Engine/Turbine Model Number_____
Manufacturer_____
Number of Cylinders (if applicable)_____
Type of Fuel (gas, gaseous, steam, etc)_____
Rating_____
Application_____

Control/Governor Information

Please list all Woodward governors, actuators, and electronic controls in your system:

Woodward Part Number and Revision Letter

_____

Control Description or Governor Type

_____

Serial Number _____

Woodward Part Number and Revision Letter

_____

Control Description or Governor Type

_____

Serial Number _____

Woodward Part Number and Revision Letter

_____

Control Description or Governor Type

_____

Serial Number _____

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 include the manual number from the front cover of this publication.

WOODWARD

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Email and Website—www.woodward.com

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**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.

04/4/M