Service Manual

Cummins **Onan**

Performance you rely on.™

Home Standby Generator Set

GSAA (Spec A & C)

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Table of Contents

SECTION	PAGE
IMPORTANT SAFETY INSTRUCTIONS	iv
1. INTRODUCTION	1-1
About this Manual	1-1
About the Generator Set	1-1
Generator Set Nameplate	1-3
Loose Parts Shipped with the Generator Set	1-3
How to Obtain Service	1-4
2. MAINTENANCE	2-1
Cleaning the Housing Top	2-1
Exercising the Generator Set	2-1
Complete System Test	2-1
Periodic Maintenance Schedule	2-1
Recommended Engine Oil	2-2
Checking Engine Oil Level	2-2
Changing Engine Oil and Oil Filter	2-2
Replacing the Air Filter Element	2-2
Battery Maintenance	2-4
Spark Plugs	2-4
New Engine Break-In	2-4
Accessory Battery Heater and Carburetor and Oil Heater Kits	2-4
3. SERVICE	3-1
Placing Generator Set Back in Service	3-1
Transfer Switch	3-1
Engine	3-1
Engine-Generator Assembly	3-2
Fuel System	3-4
Control	3-7
Generator	3-9
Generator Set Starts or Stops Without Command – No Fault Code	3-13
No Response – Status Indicator Light Dead	3-14
Starting Battery Runs Down	3-14

SECTION **PAGE**

Starter Engages – Disengages 3-15
No AC Power – Generator Set Running, Status LED On or Flashing 3-15
Generator Set Cranks But Does Not Start – No Fault Code 3-15
Generator Set Runs But Stops When Switch Is Released – No Fault Code . . . 3-16
Genset Warning-Transfer Switch Failed to Transfer to Utility – No Fault Code . 3-16
Genset Warning-Transfer Switch Signal Failure – No Fault Code 3-16
Low Oil Pressure Fault – Fault Code 2 3-17
Service Check Fault – Fault Code 3 3-17
Overcrank – Fault Code 4 3-18
Overvoltage – Fault Code 12 3-19
Undervoltage – Fault Code 13 3-20
Overfrequency – Fault Code 14 3-20
Underfrequency – Fault Code 15 3-22
Governor Actuator Shutdown– Fault Code 19 3-23
Governor Actuator Overload – Fault Code 22 3-23
Voltage Sense Lost – Fault Code 27 3-25
High Battery Voltage – Fault Code 29 3-25
Low Cranking Speed Sense – Fault Code 32 3-26
Control Card Failure – Fault Code 35 3-27
Generator Set Stopped Without Fault Condition – Fault Code 36 3-27
Invalid Set Configuration – Fault Code 37 3-28
Processor Fault – Fault Code 43 3-28
Speed Sense Fault – Fault Code 45 3-28
Generator Set Overload – Fault Code 46 3-29
Alternator Over Temp – Fault Code 76 3-30
Low Fuel Pressure – Fault Code 78 3-30
Failure To Transfer To Generator Set – Fault Code 79 3-31
5. STARTUP AND CONFIGURATION 4-1
Installation Review 4-1
Startup 4-1
Generator Set Configuration 4-1
Generator Adjustments 4-2
APPENDIX A. OPERATION A-1
In-Home Operator Panel A-1
Typical Operation A-1
To Enable / Disable Standby A-3

SECTION **PAGE**

To Manually Start / Stop Generator Set A-3
Fault, Maintenance and New Event Screens A-4
Genset Status A-5
Display Setup and Software Info A-6
Event Log A-7
Fault Log A-8
Ethernet Settings A-9
Exercise Settings A-10
Time Setup A-11
Load Management A-12
APPENDIX B. INTERNET / EMAIL INTERFACE B-1
Introduction B-1
Home Page B-1
Setting Time and Date B-2
Set Exercise Schedule B-2
Load Control (Management) B-2
Event Log B-3
Fault Log B-3
Network Setup B-4
APPENDIX C. CUMMINS ONAN MODEL RS12000 GENERATOR SET NETWORK SETUP GUIDE C-1
Setting up In-Home Network Access to the Generator Set C-2
Setting up Console Internet Access to the Generator Set C-3
Setting up Email Alerts from the Generator Set C-4
Help Hotline C-4
Frequently Asked Questions C-5
APPENDIX D. COMMUNICATION TROUBLESHOOTING D-1
In-Home Network Access to Generator Set Troubleshooting D-1
Remote Internet Access to Generator Set Troubleshooting D-2
Email Alert Troubleshooting D-3
APPENDIX E. SPECIFICATIONS E-1
APPENDIX G.OUTLINE AND SYSTEM DRAWINGS F-1

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS – This manual contains important instructions that should be followed during installation and maintenance of the generator and batteries.

Before operating the generator set (genset), read the Operator Manual (983–0104) and become familiar with it and the equipment.

Note: Safe and efficient operation can be achieved only if the equipment is properly operated and maintained. Many accidents are caused by failure to follow fundamental rules and precautions.

The following symbols, found throughout this manual, alert you to potentially dangerous conditions to the operator, service personnel, or the equipment.

⚠ DANGER ***This symbol warns of immediate hazards which will result in severe personal injury or death.***

⚠WARNING ***This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.***

⚠ CAUTION ***This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.***

FUEL AND FUMES ARE FLAMMABLE

Fire, explosion, and personal injury or death can result from improper practices.

- All persons handling propane are required to be trained and qualified, according to NFPA code.
  - Natural gas is lighter than air, and will tend to gather under hoods. Propane is heavier than air, and will tend to gather in sumps or low areas.
- Be sure all fuel supplies have a positive shutoff valve.
- Be sure battery area has been well-ventilated prior to servicing near it.
  - Lead-acid batteries emit a highly explosive hydrogen gas that can be ignited by arcing, sparking, smoking, etc.

EXHAUST GASES ARE DEADLY

⚠WARNING ***Engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.***

- Be sure the unit is well ventilated.
  - Provide an adequate exhaust system to properly expel discharged gases away from enclosed or sheltered areas and areas where individuals are likely to congregate.
  - Exhaust height should be tall enough to help clear gases, avoid accumulation of snow or in accordance with local mechanical code.
- Do not use exhaust gases to heat a compartment.
- Visually and audibly inspect the exhaust daily for leaks per the maintenance schedule.
  - Make sure that exhaust manifolds are secured and not warped.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not wear loose clothing or jewelery and keep your hands away from all moving parts.
  - Loose clothing and jewelry can become caught in moving parts.
  - If adjustment must be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.
- Before starting work on the generator set, disconnect battery charger from its AC source, then disconnect starting batteries, negative (-) cable first. This will prevent accidental starting.
- To prevent accidental air starting, make sure the air supply line is connected until the generator set is ready to start.
- Make sure that fasteners on the generator set are secure. Tighten supports and clamps, keep guards in position over fans, drive belts, etc.

BATTERIES CAN EXPLODE CAUSING SEVERE SKIN AND EYE BURNS AND RELEASE TOXIC ELECTROLYTES

- Wear safety glasses.
- Do not smoke.
- Do not dispose of the battery in a fire.
  - The battery is capable of exploding.
- Do not open or mutilate the battery.
  - Released electrolytes has been known to be harmful to the skin and eyes, and be toxic.
- Remove watches, rings and other metal objects, and use tools with insulated handles.
  - Batteries present the risk of high short circuit current.
- To prevent arcing when disconnecting the battery, first disconnect the battery charger, then the negative (–) battery cable and finally the positive (+) cable.
- To prevent arcing when reconnecting the battery, first reconnect the positive (+) cable, then the negative (–) cable, and finally, reconnect the battery charger.
- When replacing the generator set battery, always use a 26 R, maintenance free, 12 volt battery with a minimum battery CCA of 530.

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

⚠ DANGER ***Use extreme caution when working on electrical components. High voltages can cause injury or death. DO NOT tamper with interlocks.***

- Follow all applicable state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag and lock open switches to avoid accidental closure.
- Do not connect the generator set directly to any building electrical system.

⚠ CAUTION ***Hazardous voltages can flow from the generator set into the utility line. This creates a potential for electrocution or property damage. Connect only through an approved isolation switch or an approved paralleling device.***

- Remove electric power before removing protective shields or touching electrical equipment.
- Use rubber insulative mats placed on dry wood platforms over floors that are metal or concrete when around electrical equipment.
- Do not wear damp clothing (particularly wet shoes) or allow skin surface to be damp when handling electrical equipment.
- Do not wear jewelry.
  - Jewelry can short out electrical contacts and cause shock or burning.

MEDIUM VOLTAGE GENERATOR SETS (601V to 15kV)

⚠ DANGER ***Improper use or procedures will result in severe personal injury or death.***

- Special equipment and training is required to work on or around medium voltage equipment. Operation and maintenance must be done only by persons trained and qualified to work on such devices.

⚠ WARNING ***Do not work on energized equipment, as this can cause severe personal injury or death.***

- Plan the time for maintenance with authorized personnel so that the equipment can be de-energized and safely grounded.
  - Due to the nature of medium voltage electrical equipment, induced voltage remains even after the equipment is disconnected from the power source.
- Unauthorized personnel must not be permitted near energized equipment.

GENERAL SAFETY PRECAUTIONS

⚠WARNING ***DO NOT open a radiator or heat exchanger pressure cap while the engine is running.***

- Allow the generator set to cool and bleed the system pressure first.
  - Coolants under pressure have a higher boiling point than water.

⚠WARNING ***Used engine oils have been identified by some state or federal agencies as causing cancer or reproductive toxicity.***

- When checking or changing engine oil, take care not to ingest, breathe the fumes, or contact used oil.
- Keep multi-class ABC fire extinguishers handy.
  - Class A fires involve ordinary combustible materials such as wood and cloth (ref. NFPA No. 10)
  - Class B fires, combustible and flammable liquid fuels and gaseous fuels (ref. NFPA No. 10)
  - Class C fires, live electrical equipment. (ref. NFPA No. 10)
- Make sure that rags are not left on or near the engine.
- Make sure generator set is mounted in a manner to prevent combustible materials from accumulating under the unit.
- Remove all unnecessary grease and oil from the unit.
  - Accumulated grease and oil can cause overheating and engine damage which present a potential fire hazard.
- Keep the generator set and the surrounding area clean and free from obstructions. Remove any debris from the set and keep the floor clean and dry.
- Do not work on this equipment when mentally or physically fatigued, or after consuming any alcohol or drug that makes the operation of equipment unsafe.

⚠WARNING ***Substances in exhaust gases have been identified by some state or federal agencies as causing cancer or reproductive toxicity.***

- Take care not to breathe or ingest or come into contact with exhaust gases.
- Do not store any flammable liquids, such as fuel, cleaners, oil, etc., near the generator set. A fire or explosion could result.
- Wear hearing protection when going near an operating generator set.

⚠WARNING ***Avoid contact with hot metal parts such as the radiator, turbo charger and exhaust system to prevent serious burns.***

KEEP THIS MANUAL NEAR THE GENSET FOR EASY REFERENCE

1. Introduction

ABOUT THIS MANUAL

This is the Service Manual for the Model GSAA Generator Set. Read and carefully observe all of the instructions and precautions in this manual.

Refer to *Appendix A. Operation* to operate and monitor the generator set.

Refer to *Section 2. Maintenance* for periodic maintenance that must be performed. The operator is responsible for generator set maintenance in accordance with the PERIODIC MAINTENANCE SCHEDULE (page 2-1).

Refer to *Section 3. Troubleshooting* for steps that can be taken to diagnose and correct a problem that causes a generator set shutdown.

⚠WARNING ***This generator set is not for life support. It can stop without warning. Children, persons with physical or mental limitations, and pets could suffer personal injury or death. A personal attendant, redundant power or alarm system must be used if power system operation is critical.***

ABOUT THE GENERATOR SET

The Model GSAA Generator Set is an engine-powered generator set fueled by Natural Gas or Propane (Figure 1-1). It is for installation as a standby generator set only in conjunction with the Model RSS Automatic Transfer Switch produced under the Cummins® Power Generation brand name. See *Appendix E. Specifications* for specific information about the generator set.

⚠CAUTION ***The Model GSAA generator set Warranty is void unless it is installed with the Model RSS automatic transfer switch by a trained and experienced electrician or authorized Cummins Onan service representative.***

The generator set is intended as a back up to utility power. Whenever utility power is interrupted, the house electrical loads are automatically switched by the transfer switch from the utility (normal power source) to the generator set (emergency power source). When utility power is restored, the loads are automatically switched back to the utility. To do this, the generator set and transfer switch together perform the following functions:

1. Sense an interruption of utility power
2. Start the generator set
3. Transfer the load to the generator set when operation has stabilized and the generator set is ready to accept the loads
4. Sense the return of utility power
5. Retransfer the load to the utility
6. Stop the generator set.