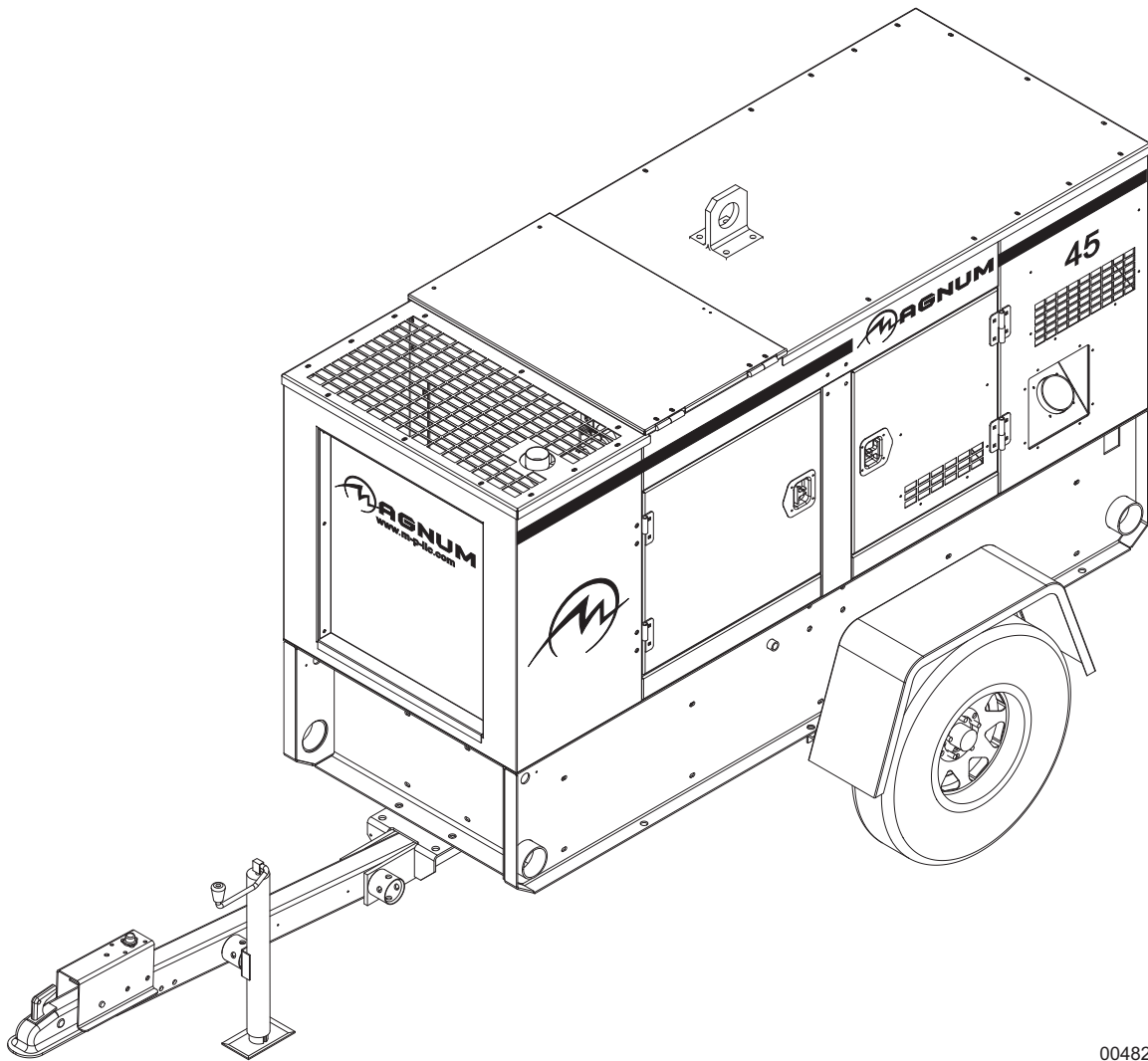




DIESEL GENERATOR MMG45I



00482

OPERATING MANUAL

Parts manuals available online! www.m-p-llc.com

INTRODUCTION

This manual provides information and procedures to safely operate and maintain the Magnum Power Products LLC unit. For your own safety and protection from physical injury, carefully read, understand, and observe the safety instructions described in this manual. Keep a copy of this manual with the unit at all times. Additional copies are available from Magnum Power Products LLC, or can be found at www.m-p-llc.com. *The information contained in this manual was based on machines in production at the time of publication. Magnum Power Products LLC reserves the right to change any portion of this information without notice.*

Read all of the manuals included with the unit. Each manual details specific information regarding items such as setup, use and service requirements. An engine operator's manual provides detailed operation and maintenance procedures for the engine. Additional copies of the engine operator's manual are available from the engine manufacturer.

DO NOT MODIFY or use this equipment for any application other than which it was designed for.

Magnum Power Products LLC recommends that a trained and licensed professional perform all electrical wiring and testing functions. Installation should be in compliance with the National Electrical Code (NEC), state and local regulations and Occupational Safety and Health Association (OSHA) guidelines.

MAGNUM POWER PRODUCTS LLC

215 Power Drive • Berlin, WI 54923

U.S.A.

Phone: 920-361-4442

FAX: 920-361-4416

Toll Free: 1-800-926-9768

www.m-p-llc.com

For technical or parts **QUESTIONS**, please contact the Magnum Power Products LLC Customer Support or Technical Support team at 1-800-926-9768. Please have your serial number available.

To **ORDER SERVICE PARTS**, please contact the dealer from which you purchased the unit, or call Magnum Power Products LLC to locate a dealer in your area.

Engine Make: _____

Engine Serial Number: _____

Engine Model Number: _____

Generator Make: _____

Generator Model Number: _____

Generator Serial Number: _____

Unit Model Number: _____

Unit Serial Number: _____

▲ WARNING

CALIFORNIA PROPOSITION 65 WARNING: Diesel engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects and other reproductive harm.

TABLE OF CONTENTS

| | Page |
|----------------------------------------------------------------------|------|
| INTRODUCTION | 2 |
| SAFETY NOTES | 5 |
| OPERATING SAFETY | 5 |
| ENGINE SAFETY | 6 |
| ELECTRICAL SAFETY | 6 |
| TOWING SAFETY | 7 |
| REPORTING TRAILER SAFETY DEFECTS | 7 |
| SAFETY SYMBOL SUMMARY | 8 |
| SPECIFICATIONS | 9 |
| UNIT DIMENSIONS | 10 |
| UNIT SERIAL NUMBER LOCATIONS | 10 |
| COMPONENT LOCATIONS | 11 |
| MAIN CONTROL PANEL FEATURES | 12 |
| MAGNUM DIGITAL CONTROLLER (MDC) | 14 |
| DIGITAL CONTROLLER FEATURES AND FUNCTIONS | 14 |
| GENERATOR MONITORING | 15 |
| ENGINE MONITORING | 16 |
| WET STACKING | 17 |
| FINE VOLTAGE ADJUSTMENT | 17 |
| PRESTART CHECKLIST | 18 |
| ENGINE BREAK-IN REQUIREMENTS | 18 |
| MANUAL STARTING OF THE UNIT | 19 |
| AUTO (REMOTE) STARTING OF THE UNIT | 20 |
| SHUTTING DOWN THE UNIT | 21 |
| MDC INFORMATION DISPLAYS, FUNCTIONS, AND RESET | 21 |
| MAGNUM DIGITAL CONTROLLER (MDC) - GENERATOR OPERATIONAL STATUS | 21 |
| MAGNUM DIGITAL CONTROLLER (MDC) - ALARM MANAGEMENT | 22 |
| MAGNUM DIGITAL CONTROLLER (MDC) - LIST OF ALARMS | 22 |
| MAGNUM DIGITAL CONTROLLER (MDC) - HISTORY | 23 |
| ADJUSTING THE DISPLAY BACKLIGHTING | 24 |
| RESETTING THE "TIME TO SERVICE" REMINDER | 24 |
| TROUBLESHOOTING AUTOMATIC SHUTDOWN CONDITIONS | 24 |
| LOWERING THE TRAILER TONGUE | 26 |
| GENERATOR OUTPUT CONNECTION LUGS | 27 |
| VOLTAGE SELECTOR SWITCH | 28 |
| EMERGENCY STOP SWITCH | 29 |
| MAIN CIRCUIT BREAKER | 29 |
| VOLTAGE REGULATION | 30 |
| CONTROL PANEL RECEPTACLES | 30 |
| DERATING FOR ALTITUDE AND TEMPERATURE | 31 |
| REMOTE START TERMINAL BLOCK | 31 |
| TRANSFER SWITCH | 31 |
| AUTO EXERCISE TIMER | 32 |
| DAILY WALK AROUND INSPECTION | 32 |
| ENGINE AND GENERATOR MAINTENANCE | 33 |
| BASIC MAINTENANCE SCHEDULE - ISUZU ENGINE | 33 |
| LIFTING THE UNIT | 34 |
| TOWING THE TRAILER | 34 |
| TRAILER WHEEL BEARINGS | 35 |
| JACK MAINTENANCE | 35 |
| CHECKING GENERATOR DRIVE PLATE TORQUE | 35 |
| AC WIRING DIAGRAM - 3 POSITION VOLTAGE SELECTOR SWITCH | 36 |
| AC WIRING DIAGRAMS FOR OPTIONAL EQUIPMENT | 37 |
| DC WIRING DIAGRAM | 38 |
| DC WIRING DIAGRAMS FOR OPTIONAL EQUIPMENT | 39 |
| TRAILER LIGHTS WIRING DIAGRAM | 40 |
| WIRING HARNESS - ELECTRIC BRAKE | 41 |
| SERVICE LOG | 42 |

This Page Intentionally Left Blank

SAFETY NOTES



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.

This manual contains DANGERS, WARNINGS, CAUTIONS, NOTICES and NOTES which must be followed to prevent the possibility of improper service, damage to the equipment, personal injury or death. The following formatting options will apply when calling the reader's attention to the DANGERS, WARNINGS, CAUTIONS, NOTICES and NOTES.

▲ 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, may result in minor or moderate injury.

NOTICE

Indicates a hazardous situation which, if not avoided, may result in property or equipment damage.

Note: Notes contain additional information important to a procedure and will be found within the regular text body of this manual.

OPERATING SAFETY



Before using the unit, be sure you read and understand all of the instructions. This equipment was designed for specific applications; **DO NOT** modify or use this equipment for any application other than which it was designed for. Equipment operated improperly or by untrained personnel can be dangerous. Read the operating instructions and familiarize yourself with the location and proper use of all instruments and controls. Inexperienced operators should receive instruction from someone familiar with the equipment before being allowed to operate or set up the unit. The following points should be practiced at all times:

- The area immediately surrounding the unit should be dry, clean, and free of debris.
- **NEVER** start a unit in need of repair.
- Make certain the unit is securely fastened to a good earthen ground before use.
- **NEVER** operate the unit on a combustible surface.
- **NEVER** operate the unit if any of the following conditions exist during operation:
 1. Noticeable change in engine speed.
 2. Loss of electrical output.
 3. Equipment connected to the unit overheats.
 4. Sparking occurs.
 5. Engine misfires or there is excessive engine/generator vibration.
 6. Protective covers are loose or missing.
 7. If the ambient air temperature is above 120°F (49°C).
- Make sure slings, chains, hooks, ramps, jacks, and other types of lifting devices are attached securely and have enough weight-bearing capacity to lift or hold the equipment safely. Always remain aware of the position of other people around you when lifting the equipment.
- **NEVER** operate a unit while tired, distracted, or under the influence of drugs or alcohol.

ENGINE SAFETY



Internal combustion engines present special hazards during operation and fueling. Failure to follow the safety guidelines described below could result in severe injury or death. Read and follow all safety warnings described in the engine operator's manual. A copy of this manual was supplied with the unit when it was shipped from the factory.

- **DO NOT** run engine indoors or in an area with poor ventilation. Diesel engine exhaust contains carbon monoxide, a deadly, odorless and colorless gas which, if inhaled, can cause nausea, fainting or death. Only use this unit outside and away from windows, doors, and ventilation equipment.
- **DO NOT** fill fuel tank near an open flame, while smoking, or while engine is running. **DO NOT** fill tank in an enclosed area with poor ventilation.
- **DO NOT** operate with the fuel tank cap loose or missing.
- **DO NOT** touch or lean against hot exhaust pipes or engine cylinders.
- **DO NOT** clean air filter with gasoline or other types of low flash point solvents.
- **DO NOT** remove engine coolant cap while engine is hot.
- **DO NOT** operate the unit without a functional exhaust system. Prolonged exposure to sound levels in excess of 85 dB(A) can cause permanent hearing loss. Wear hearing protection when working around a running engine.
- Keep hands, feet and loose clothing away from moving parts on the generator and engine.
- Keep area around exhaust pipes and air ducts free of debris to reduce the chance of an accidental fire.
- Batteries contain sulfuric acid which can cause severe injury or death. Sulfuric acid can cause eye damage, burn flesh or eat holes in clothing. Protective eye wear and clothing are necessary when working on or around the battery. Always disconnect the negative (-) battery cable from the corresponding terminal before performing any service on the engine or other components.

ELECTRICAL SAFETY



The unit is powered by a generator driven by a diesel engine. While the engine is running, potentially lethal voltages are present at the 120V Ground Fault Circuit Interrupt (GFCI) receptacles located on the control panel, and at the connection lugs and cam lock receptacles. Failure to follow the safety guidelines described below could result in severe injury or death.

- Only a qualified and licensed electrician should make connections to the unit.
- **NEVER** wash the unit with high pressure hoses or power washers.
- **NEVER** start the unit under load. The circuit breakers must be in the OFF (O) position when starting the unit in Manual mode. The circuit breakers can be in the ON (I) position only when started in the Auto mode. A transfer switch must be used in the Auto mode to deflect the load upon startup.
- **ALWAYS** disconnect the negative (-) battery cable from the corresponding terminal before performing any service on the engine, generator or any other components. Remove the negative (-) battery cable from the corresponding terminal if the unit is to be stored or transported.
- **ALWAYS** use extreme caution when servicing this unit in damp conditions. Do not service the unit if your skin or clothing is wet. Do not allow water to collect around the base of the unit.
- **ALWAYS** connect the unit to a good earthen ground before use. Follow the National Electrical Code (NEC), state and local regulations.

TOWING SAFETY



Towing a trailer requires care. Both the trailer and vehicle must be in good condition and securely fastened to each other to reduce the possibility of an accident. Also, some states require that large trailers be registered and licensed. Contact your local Department of Transportation office to check on license requirements for your particular unit.

- Check that the hitch and coupling on the towing vehicle are rated equal to, or greater than, the trailer's Gross Vehicle Weight Rating (GVWR).
- Check tires on trailer for tread wear, inflation, and condition.
- **NEVER** tow trailer using defective parts! Inspect the hitch and coupling for wear or damage.
- Make sure the trailer hitch and the coupling are compatible. Make sure the coupling is securely fastened to the vehicle.
- Connect safety chains in a crossing pattern under the tongue and **ATTACH THE BREAKAWAY CABLE TO THE REAR BUMPER OF THE TOWING VEHICLE**. Do not attach the cable to the trailer hitch.
- Make sure directional and brake lights on the trailer are connected and working properly.
- Check that lug nuts holding wheels are tight and that none are missing.
- Maximum recommended speed for highway towing is 45 mph (72 km/h). Recommended off-road towing speed is not to exceed 10 mph (16 km/h) or less, depending on terrain.

Before towing the trailer, check that the weight of the trailer is equal across all tires. On trailers with adjustable height hitches, adjust the angle of the trailer tongue to keep the trailer as level as possible. On units equipped with a tandem axle trailer, a large angle between the trailer and tow vehicle will cause more weight to be carried by one axle, which could cause premature wear on the tires and axles and cause potentially unsafe operating conditions.

The trailer is equipped with electric surge brakes. Check the operation of the brakes by braking the vehicle at a slow speed before entering traffic. Both the trailer and the vehicle should brake smoothly. If the trailer seems to be pushing, check the level in the surge brake fluid reservoir.

When towing, maintain extra space between vehicles and avoid soft shoulders, curbs and sudden lane changes. If you have not pulled a trailer before, practice turning, stopping, and backing up in an area away from heavy traffic.

A film of grease on the coupler will extend coupler life and eliminate squeaking. Wipe the coupler clean and apply fresh grease each time the trailer is towed.

REPORTING TRAILER SAFETY DEFECTS

If you believe your trailer has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Magnum Power Products LLC.

If NHTSA receives similar complaints, it may open an investigation; and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in an individual problem between you, your dealer, or Magnum Power Products LLC.

To contact NHTSA, you may either call the Auto Safety Hotline toll-free at 1-888-327-4236 (TTY:1-800-424-9153), go to <http://www.safercar.gov>; or write to:

Administrator
NHTSA
1200 New Jersey Avenue S.E.
Washington, DC 20590

You can also obtain other information about motor vehicle safety from <http://www.safercar.gov>.

SAFETY SYMBOL SUMMARY

This equipment has been supplied with numerous safety and operating decals. These decals provide important operating instructions and warn of dangers and hazards. Replace any missing or hard-to-read decals and use care when washing or cleaning the unit. Decal placement and part numbers can be found in the parts manual. Below is a summary of the intended meanings for the symbols used on the decals.

| | | | |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
|  | Safety alert symbol; used to alert you to potential personal injury hazards. |  | Asphyxiation hazard; operate in well ventilated area. |
|  | Hot surface(s) nearby. |  | Dangerous voltage may be present. |
|  | Belt/entanglement hazard; keep body parts clear of this area. |  | Anchor/tie down point. |
|  | Fan hazard; keep body parts clear of this area. |  | Isolate generator to prevent electrocution hazard. |
|  | Never change switch position while engine is running. |  | Use clean diesel fuel only. |
|  | Stop engine before making connections. |  | Remove negative battery cable before performing any service on unit. |
|  | Stop engine before fueling. |  | Read and understand the supplied operator's manual before operating unit. |
|  | Hearing protection required while operating unit with doors open. |  | Unit electrical ground. |
|  | Lift here only. |  | Fire/explosion hazard; keep open flames away from unit. |
|  | Engine running. |  | Burn/scald hazard; pressurized steam. |

00483

SPECIFICATIONS

MAGNUM MODEL

MMG45I

Engine

| | |
|------------------------------------------------------|-------------|
| Make/Brand..... | Isuzu |
| Model | 4LE2XAGV01 |
| EPA Tier | Final 4 |
| Horsepower - prime hp (kW) | 57 (42.8) |
| Horsepower - standby hp (kW) | 63.7 (47.5) |
| Operating Speed rpm | 1800 |
| Displacement in³ (L) | 134 (2.2) |
| Cylinders - qty | 4 |
| Fuel Consumption - 100% prime gph (Lph) | 3.3 (12.5) |
| Battery Type..... | Group 35/55 |
| Battery Voltage (Quantity per Unit) | 12V (1) |
| Battery Rating | 720 CCA |

Generator

| | |
|-----------------------|-------------------|
| Make/Brand..... | Marathon Electric |
| Model | 286PSL1701 |
| Type, Insulation..... | Brushless, H |

Generator Set (Engine/Generator)

| | |
|----------------------------------------------|------------------|
| 3Ø - Standby kW (kVA) | 40 (50) |
| Amps - 3Ø Standby 480V (208V) A | 60 (139) |
| 3Ø - Prime kW (kVA) | 36 (45) |
| Amps - 3Ø Prime 480V (208V) A | 54 (125) |
| 1Ø - Standby kW (kVA) | 37 (37) |
| Amps - 1Ø Standby - 240V A | 154 |
| 1Ø - Prime kW (kVA) | 33 (33) |
| Amps - 1Ø Prime - 240V A | 138 |
| Frequency Hz | 60 |
| Power Factor..... | 1 (1Ø), 0.8 (3Ø) |
| Sound dB(A) 23 ft @ prime | 68 |

Weights

| | |
|----------------------------------------------------------|-------------|
| Dry Weight, Skid Mounted lbs (kg) | 2418 (1097) |
| Operating Weight, Skid Mounted lbs (kg) | 3210 (1456) |
| Dry Weight, Trailer Mounted* lbs (kg) | 2938 (1333) |
| Operating Weight, Trailer Mounted* lbs (kg) | 3730 (1692) |

*Standard single axle trailer only. Consult factory for custom trailer weights.

Capacities

| | |
|--------------------------------------------|-------------|
| Fuel Tank Volume gal (L) | 110 (416) |
| Usable Fuel Volume gal (L) | 100 (379) |
| Coolant (incl. engine) qt (L) | 18 (17) |
| Oil (incl. filter) qt (L) | 11.0 (10.4) |
| Maximum Run Time hrs. | 30.3 |

AC Distribution

| | |
|-----------------------------|------------------------------|
| Circuit Breaker Size | 225 |
| Voltage Selection | 3 Position Switch (lockable) |
| Voltage Regulation | +/- 1% |
| Voltages Available 1Ø | 120, 139, 208, 220, 240, 277 |
| Voltages Available 3Ø | 208, 220, 440, 480 |

Trailer

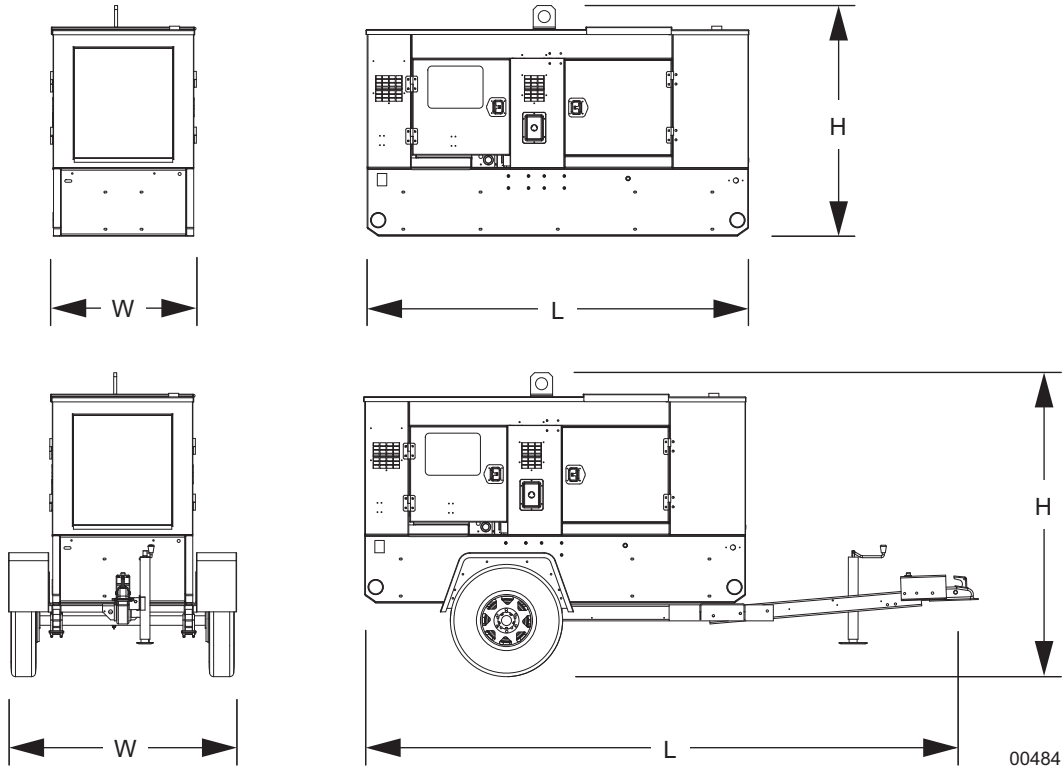
| | |
|----------------------------------------------|-------------|
| Number of Axles | 1 |
| Capacity - Axle Rating lbs (kg) | 5000 (2268) |
| Tire Size in | 15 |
| Brakes..... | Surge |
| Hitch - Standard | 2" ball |
| Maximum Tire Pressure psi | 65 |

Specifications are subject to change without notice.

UNIT DIMENSIONS

Dimensions

| | |
|-----------------------------------|----------------------|
| Skid Mounted (L x W x H) | 95 x 43.5 x 63 in |
| | 2.41 x 1.10 x 1.56 m |
| Trailer Mounted (L x W x H) | 154 x 59 x 81.5 in |
| | 3.91 x 1.50 x 2.07 m |



Specifications are subject to change without notice.

UNIT SERIAL NUMBER LOCATIONS

Refer to the illustration to locate the unit ID tag and Vehicle Identification Number (VIN) tag on the unit. Important information, such as the unit serial number, model number, VIN and tire loading information are found on these tags. Record the information from these tags so it is available if the tags are lost or damaged. When ordering parts or requesting assistance, you may be asked to provide this information.

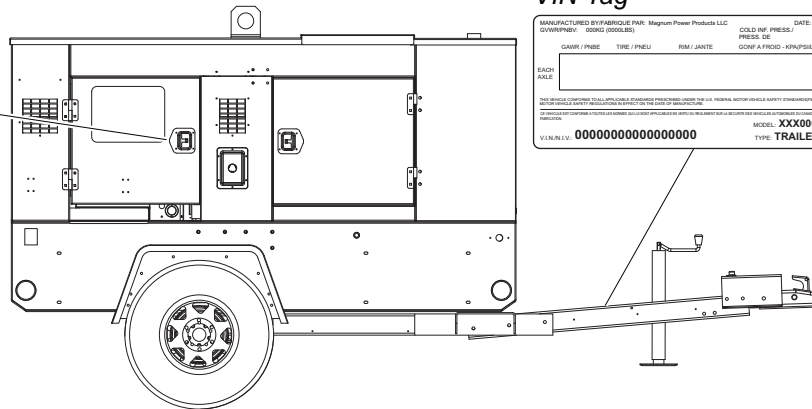
UNIT ID Tag

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Manufactured by MAGNUM POWER PRODUCTS LLC A wholly owned subsidiary of Generac Power Systems, Inc. 2119 Power Drive, Waukegan, IL 60087 1-800-626-6768 | |
| Model | Serial Number |
| Alt. Code | |
| Rated WT (lbs/kg) | net/usa |
| 1 ph. 1.0/0P | 3 ph. 0/0P |
| KVA | |
| V | |
| A | |
| HEATING | |
| | |

Located on control panel.

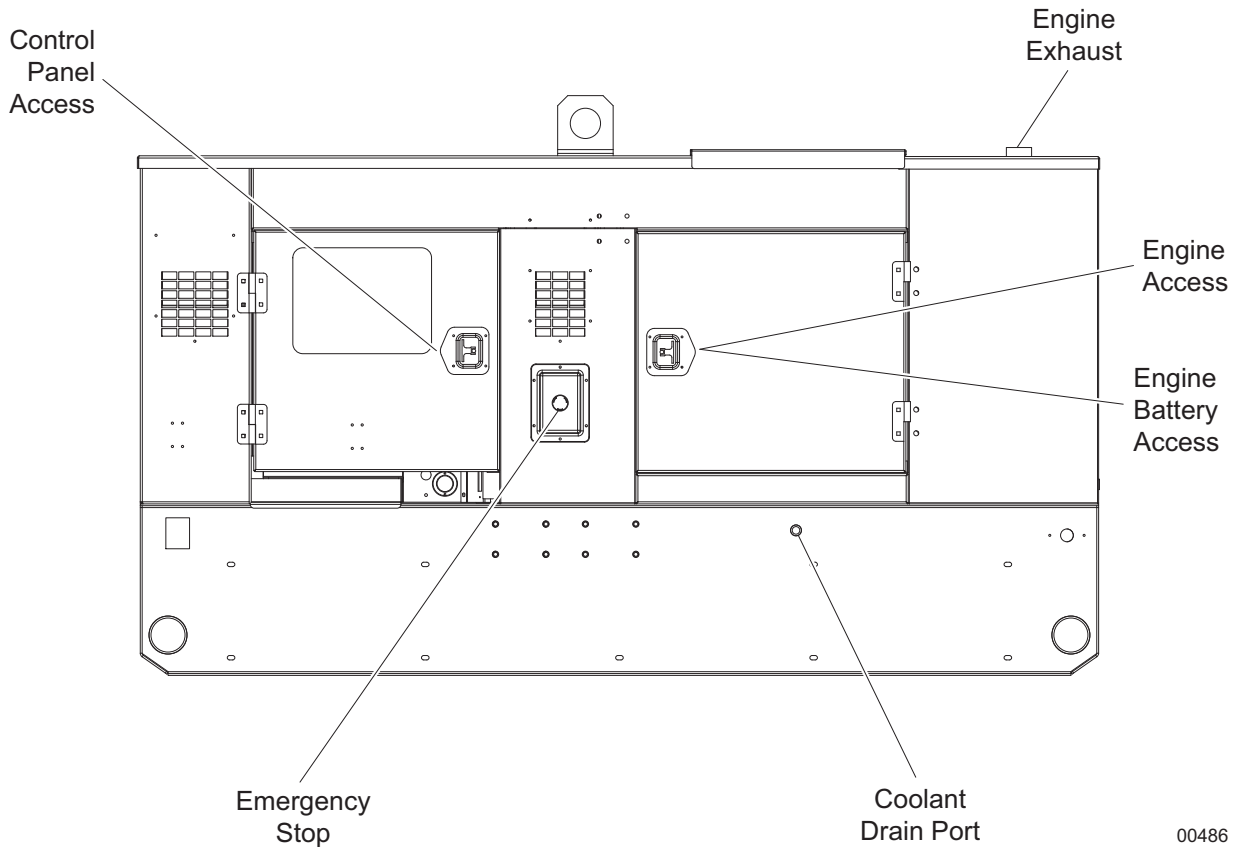
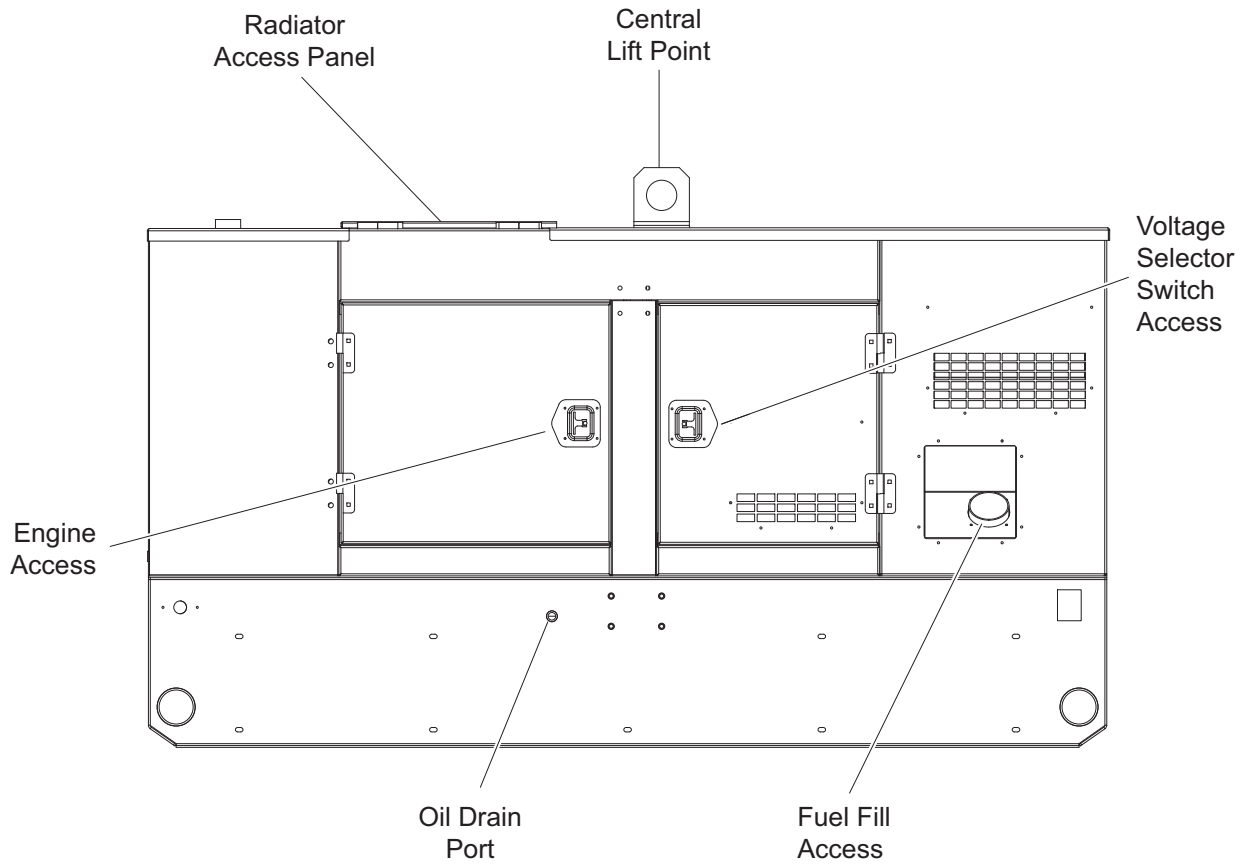
VIN Tag

| | | | |
|-------------------------------------------------------|---------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| MANUFACTURED BY/FABRIQUE PAR GOW/PMV: 0000 (0000S) | Magnum Power Products LLC | DATE: 000000 | TIRE AND LOADING INFORMATION RENSEIGNEMENTS SUR LES PNEUS ET LE CHARGEMENT |
| GAWR / PNEU | TIRE / PNEU | PSM / JAANTE | SEE OWNERS MANUAL FOR ADDITIONAL INFORMATION VIRE LE MANUE SUSSE POUR PLUS DE RENSEIGNEMENTS |
| GOLD INF. PRESS./ PNEUS DE | | GOLF A FROID - XP/PSI/PSI/PSI/ DUAL | The weight of cargo should never exceed 10000 (10000) lbs. Le poids de chargement ne doit jamais dépasser 10000 (10000) lbs. |
| SACH AUCI | | MODEL: XX000 | |
| VIN: 0000000000000000 | | TYPE: TRAILER | |



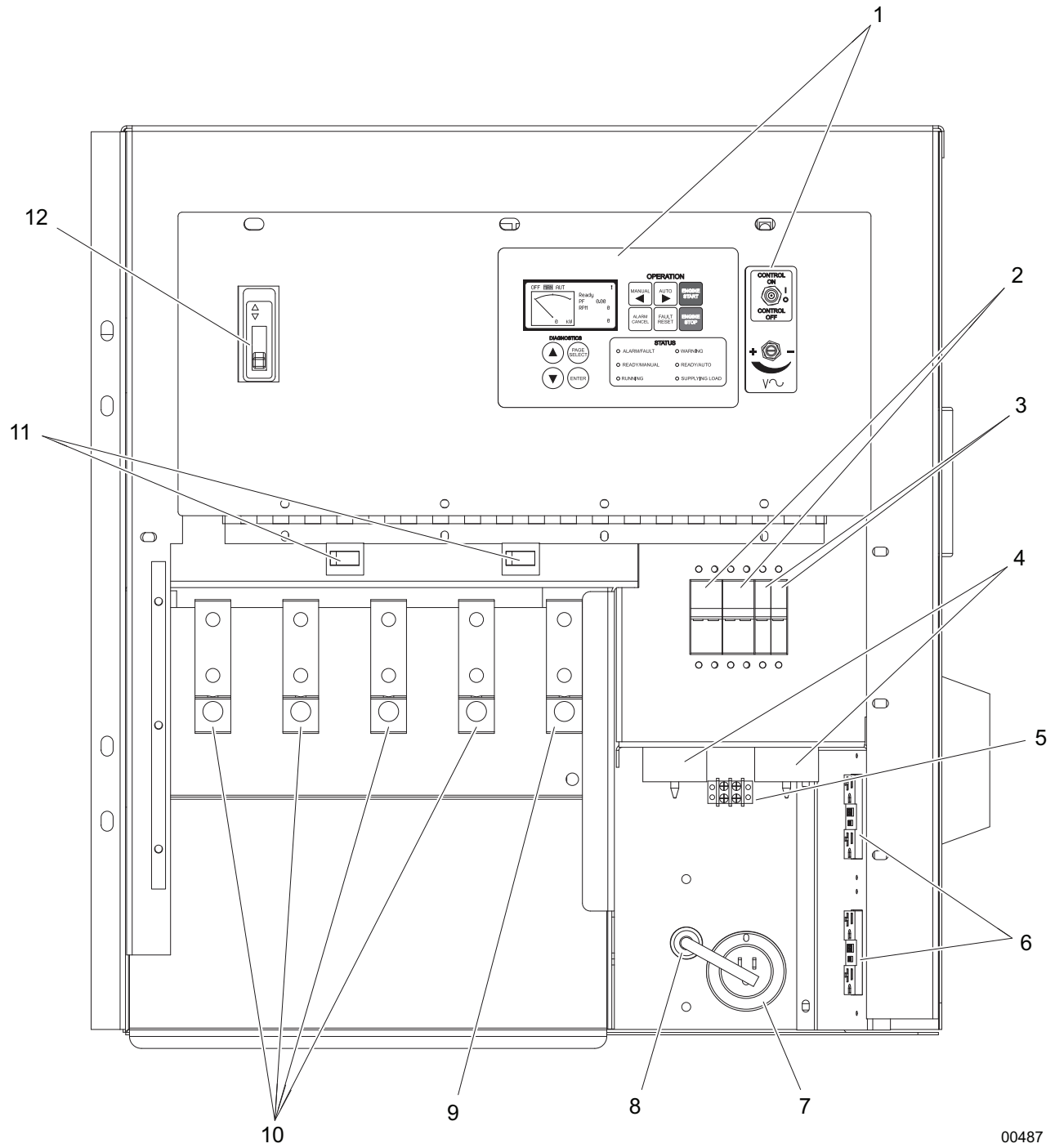
00485

COMPONENT LOCATIONS



00486

MAIN CONTROL PANEL FEATURES

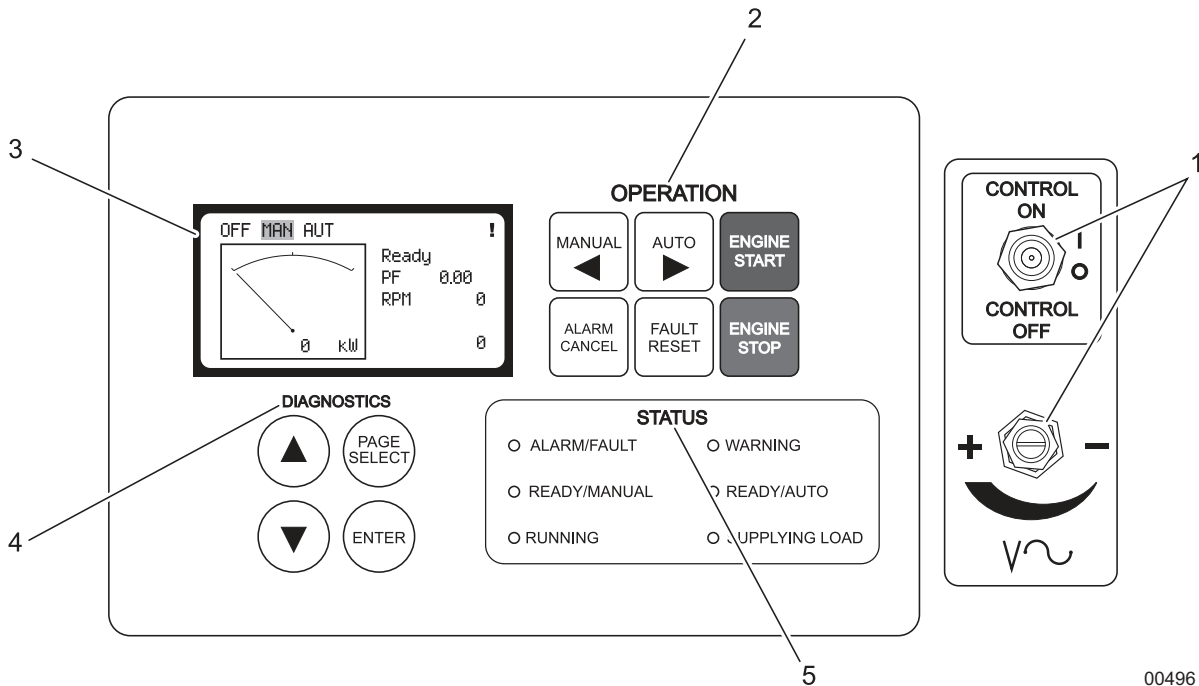


1. **MAGNUM DIGITAL CONTROLLER (MDC):** The Magnum digital controller controls and monitors engine and generator operation. Refer to [page 14](#) for more information.
2. **50A CIRCUIT BREAKERS (2):** Disconnects power to the 120/240V twist-lock receptacles.
3. **20A CIRCUIT BREAKERS (2):** Disconnects power to the 120V GFCI receptacles.
4. **120/240V TWIST-LOCK RECEPTACLES (2):** These receptacles are used for connecting additional loads or equipment to the generator in 240 and 208 voltage selections only.
5. **REMOTE START TERMINAL BLOCK:** Allows the unit to be started from a remote location with a dry-contact closure switch when the generator is used for standby or remote power.
6. **120V GFCI RECEPTACLES (2):** These two receptacles are used for connecting additional loads or equipment to the generator.
7. **ENGINE ACCESSORY CONNECTION (OPTIONAL):** This connection powers the optional battery charger or other engine accessories.
8. **BATTERY DISCONNECT SWITCH (OPTIONAL):** This switch disconnects power to the battery.
9. **GENERATOR GROUND CONNECTION LUG:** This lug is for connecting a good earthen ground per the National Electrical Code (NEC), state and local regulations before starting the generator.
10. **GENERATOR OUTPUT CONNECTION LUGS:** These lugs allow appropriate loads to be wired directly to the generator.
11. **DOOR SAFETY SWITCHES:** The connection lug door is equipped with safety interlock switches that will trip the main circuit breaker and disable the voltage regulator if the door is opened while the unit is operating.
12. **MAIN CIRCUIT BREAKER:** This breaker will disconnect power to the connection lugs and cam lock receptacles (items 8-9). It **WILL NOT** disconnect power to the receptacles when the engine is running.

MAGNUM DIGITAL CONTROLLER (MDC)

The MDC is an enhanced digital generator controller used to start, stop and monitor the operation of the generator and the engine. The controller constantly monitors vital generator and engine functions for a number of pre-programmed alarm and fault conditions. When a fault condition occurs, the engine will shut down automatically and the Liquid Crystal Display (LCD) window will display the fault that caused the shutdown; to resume operation, the fault condition must be resolved. The controller has the ability to provide the display readout in English and Spanish; other languages are available. A print out of the screen is also available. This controller also records a history of the unit's performance which may be viewed at any time and will not be removed or lost when the controller is powered down.

The MDC panel consists of five sections: the Control Power switch and Fine Voltage Adjustment screw, the Operation keypad, the LCD window, the Diagnostics keypad, and the Status Light Emitting Diodes (LED's).



00496

DIGITAL CONTROLLER FEATURES AND FUNCTIONS

1. The Control Power Switch and Fine Voltage Adjustment Screw

- **Control Power Switch:** This toggle switch powers-up and switches off the control panel and the controller.
- **Fine Voltage Adjustment Screw:** This screw may be adjusted to set the generator output voltage after the link board or voltage selector switch has been changed from one phase to another. This adjustment **MUST** be accomplished within 45 seconds of startup, during the "V Detect," so that the unit does not experience a shutdown alarm for "over or under voltage." Refer to "[Fine Voltage Adjustment](#)" on page 17 for more information.

2. The Operation Keypad

- **Engine Start:** Press the green Engine Start button to start the unit. The unit must be in the "MAN" mode in the upper left corner of the LCD window and the Ready/Manual LED lit in the Status portion of the controller.
- **Engine Stop:** Press the red Engine Stop button to shut down the unit and start the stop value timer.
- **Manual ◀:** Press this button to change from the Automatic (Remote) mode to Manual mode.
- **Auto ▶:** Press this button to change from Manual mode to Automatic (Remote) mode.
- **Alarm Cancel:** When an alarm is activated, either visually or audibly, press this button to silence or cancel the alarm.
- **Fault Reset:** Press this button to clear the fault from the LCD window after the fault has been corrected.

3. The Liquid Crystal Display (LCD)

- This window will toggle between the Generator screen and the Engine screen upon startup of the unit. By viewing these screens, the operator will be able to monitor both the engine and generator status while the unit is running.

4. The Diagnostics Keypad

- **▲**: Press this button to scroll up within the LCD window.
- **▼**: Press this button to scroll down within the LCD window.
- **Page Select**: Pressing this button will select the next screen.
- **Enter**: Pressing this button will place you inside the particular display to review the generator's preprogrammed setpoints or parameters.

5. The Status Light Emitting Diodes (LED's)

- These six LED's will illuminate to display the current operational status of the generator:
 - **Alarm/Fault**: Indicates active or inactive alarms, but not reset shutdown alarms.
 - **Warning**: Indicates an active or inactive alarm, or a warning alarm that has not been reset.
 - **Ready/Manual**: Indicates the controller is ready to start and in the Manual mode.
 - **Ready/Auto**: Indicates the unit is in the Auto mode ready for the remote start signal.
 - **Running**: Indicates the unit is running.
 - **Supplying Load**: Indicates a load is being applied to the generator.

GENERATOR MONITORING

Generator information is shown in a toggling manner with the engine information after the first 60 seconds of operation, then every five seconds thereafter. The Generator screen will show frequency, nominal voltage, nominal amperage, line to neutral voltage, line to line voltage and amperage.

Note: When loading the generator, it is important to observe the amperage to determine the load balance on each line of the generator. Minor load unbalances, usually 10% or less, will not cause any particular problems. Every effort should be made to distribute the load equally between all lines.

- **Hertz**: Displays output frequency.
- **NomVolt**: Displays nominal voltage.
- **NomAmps**: Displays nominal amperage.
- **Generator Output Voltage**: Line to Neutral display, single phase (1Ø).
- **Generator Output Voltage**: Line to Line display, 3-phase (3Ø).
- **Amps**: Displays the AC output amperage produced by the generator.

GENERATOR DISPLAY SCREEN

| | | |
|---------------|-----|--------|
| Gen Freq | 0.0 | Hz |
| NomVolt (3PY) | 277 | V |
| NomAmps | 40 | A |
| L1N | 0V | L12 0V |
| L2N | 0V | L23 0V |
| L3N | 0V | L31 0V |
| G | 0 | 0 0 A |

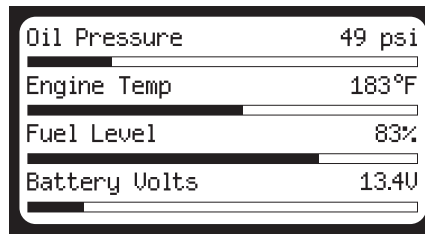
00494

ENGINE MONITORING

Engine information is shown in a toggling manner with the generator information after the first 60 seconds of operation and then every five seconds thereafter. The Engine screen will show oil pressure, engine coolant temperature, fuel level and battery voltage.

- **Oil Pressure:** Displays engine oil pressure. The display registers oil pressure between 0-100 psi (0-689 kPa). Normal operating pressure is between 35-80 psi (241-552 kPa).
- **Engine Temp:** Displays the temperature of the engine's coolant. If the coolant temperature exceeds the maximum water temperature of 230°F (110°C) the engine will automatically shut down. Zero will be displayed until a minimum temperature of 100°F (38°C) is reached.
- **Fuel Level:** Displays the level of fuel in the tank by percentage (50% = 1/2 tank, 75% = 3/4 tank, etc.). If the fuel level drops below a programmed low fuel point, usually at 15%, a low fuel warning and optional audio alarm will be activated. If the fuel level drops below the programmed low fuel limit, usually at five percent, the engine will automatically shut down.
- **Battery Volts:** Displays the engine battery voltage. A normal reading is 13-14V on 12 volt systems and 24-26V on 24 volt systems (with the engine running).

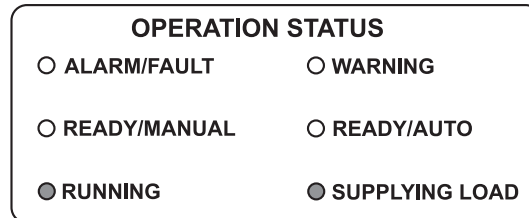
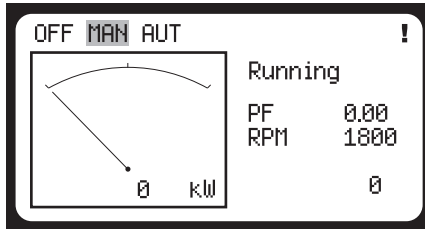
ENGINE DISPLAY SCREEN



00493

Additional information may be viewed while the unit is in Manual or Auto mode. By pressing the Page Select button, the operator will select one of the following screens; Running screen, Password screen, or History screen. In each of these page selections the operator may press the ▲ or ▼ buttons to display additional information as follows:

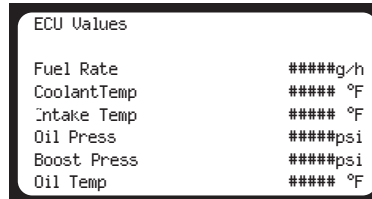
- **Running screen:** The operator may press the ▲ or ▼ buttons to display the Alarm List screen, ECU Alarm List screen, Run Hours screen, ECU Values screen, Binary Inputs screen, Binary Outputs screen, ECU State screen, Engine screen and Generator screen. In the Binary Inputs and Binary Outputs screens, 0 mean inactive and I means active.



RUN HOURS SCREEN



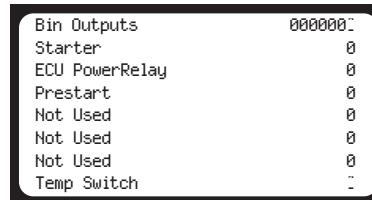
ECU VALUES SCREEN



BINARY INPUTS SCREEN

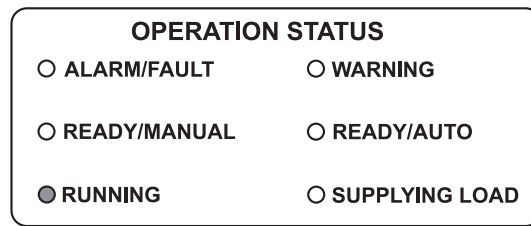
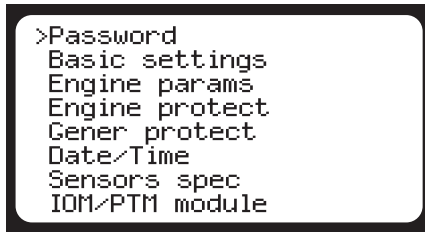


BINARY OUTPUTS SCREEN



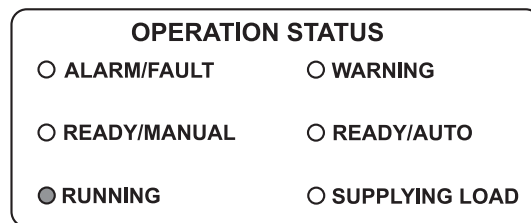
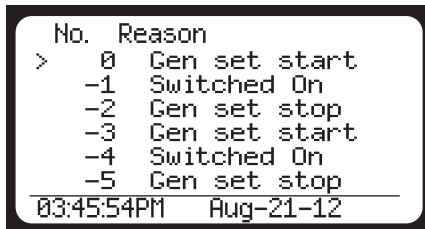
00492

- **Password screen:** The operator may press the ▲ or ▼ buttons to move the cursor (>) up or down a list of text.



00128

- **History screen:** The operator may press the ▲ or ▼ buttons to move the cursor (>) up or down a list of recent alarm or shutdown codes. Pressing the Enter button at a particular selection will allow the operator to scroll to the right in the LCD window to view the generator operating parameters at the time of the alarm or shutdown. The history of alarms or codes is saved in the digital controller. The most recent alarm or code is the first to be listed, with the time/date of the alarm or code at the bottom of the screen. The controller stores up to 117 codes. When full, the controller will automatically remove the oldest file. These codes will not be lost when the Control Power switch is powered off.



00495

Note: To view the display screens longer, push PAGE SELECT until you reach the Ready screen. Then press ▲ or ▼ to navigate to the screen you want. The screen will display for approximately 45 seconds.

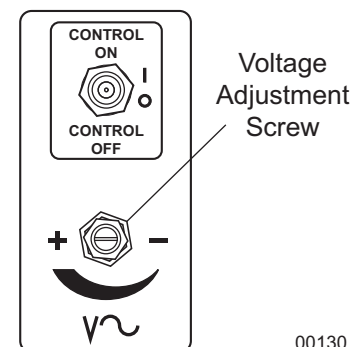
WET STACKING

The unit is powered by a diesel engine. Diesel engines are susceptible to wet stacking if lightly loaded. Wet stacking occurs when an engine is run at less than 30% of its full load capacity, causing unburned fuel to accumulate in the exhaust system. Wet stacking can be detected by continuous black exhaust when the unit is under a constant load. It can also cause fouling of injectors and buildup on engine valves. Diesel engines operate properly when applied loads are between 30% and 100% capacity. Appropriate generator sizing is determined by the anticipated load. If the unit is in a wet stack condition, load the unit heavily for five hours or until the exhaust is clear.

FINE VOLTAGE ADJUSTMENT

Upon startup of the unit, the Running screen will display “V Detect” and will countdown from 45 seconds to zero. This is a safety feature of the controller to protect the generator from over or under voltage upon startup.

V Detect is a 45 second time delay and count down process before the digital controller records the generator nominal output voltage. This nominal generator voltage is then compared to the current set point voltage of the voltage selector switch. If the nominal voltage recorded by the controller is greater than or lower than the current set point voltage of the voltage selector switch setting by 10% or more, the controller will shut the generator down automatically. The display will read: “Wrn Gen L1 <V,” “Wrn Gen L2 <V,” “Wrn Gen L3 <V” or “Sd Gen L1 <V,” “Sd Gen L2 <V,” “Sd Gen L3 <V.” This means the controller warned (“WRN”) or shut down (“SD”) the unit due to an output voltage irregularity.



00130

The output voltage of the generator may be adjusted after the generator is running by using the fine voltage adjustment screw. The adjustment screw is located directly below the Control Power switch on the control panel. This screw turns a rheostat that will provide an increase (+) or a decrease (-) in the generator output voltage as displayed on the Generator screen on the digital control panel. If the voltage is increased or decreased too fast or too slow, the unit will automatically shut down. This adjustment needs to be made within the 45 second delay and countdown to

zero period.

To adjust the output voltage, check the output voltage on the Generator screen. Look at the “L1N” voltage or the “L12” voltage on the display. The generator nominal output voltage should be within 10% of the voltage rating on the voltage selector switch.

To adjust the output voltage, use a flat head screwdriver to turn the screw in the desired direction until the required voltage shown on the LCD window matches the stated voltage on the voltage selector switch.

For Example: With the voltage selector switch set to 208/120V 3 phase position, the voltage shown on the Generator screen must be within $\pm 10\%$ of the 208/120V position (188-228V line to line/108-132V line to neutral).

Note: *Each time the voltage selector switch is changed from one setting to another, an adjustment will need to be made to the fine voltage using this adjustment screw.*

PRESTART CHECKLIST

Before starting the unit, carefully read the prestart checklist. Make sure that all of the items are checked before trying to start the unit. This checklist applies to both manual and remote starting of the unit.

- Read and understand **ALL** safety sections at the beginning of this manual.
- Make sure the Control On/Off toggle switch is in the OFF (O) position.
- Make sure the circuit breakers (main and convenience) are switched OFF (O).
- Check that the generator is properly grounded to a good earthen ground per the National Electrical Code (NEC), state and local regulations.
- Check all electrical connections at the connection lugs. Are they wired correctly?
- Are the connection lugs tight?
- Check the voltage selector switch and make sure that it is set to the desired voltage.
- Is the voltage selector switch locked?
- Is the unit sitting level?
- Thoroughly check for any water inside, on, or near the unit. Dry the unit before starting.
- Check the oil, coolant, and fuel levels and engine battery connections.
- Check the engine fan belt tension and condition.
- Check the engine fan belt guard.
- Check the engine exhaust system for loose or rusted components.
- Check radiator and surrounding shroud for debris.
- Are any of the generator covers loose or missing?
- Are all preventive maintenance procedures up to date?
- Check that the battery disconnect switch is on, if equipped.

ENGINE BREAK-IN REQUIREMENTS

Note: *The EPA final tier 4 Isuzu engines have an engine break-in duration that will prohibit the unit from providing rated standby power upon factory delivery. The unit is tested at the factory and is initially capable of a prime standby power output. The engine performance will increase to 95% of full rated power during the first 20 hours of loaded operation. The unit will provide full rated power after the complete engine break-in period of 70 hours of loaded operation.*

Operate the engine at heavy loads (60-90% [24-36kW] of rated output maximum) as much as possible during the break-in period. If the engine has spent significant time at idle, constant speed(s) and/or light load or if makeup oil is required, a longer break in period may be needed. Refer to the engine operator's manual for a full description of necessary procedures on the addition of oil and extension of the break-in period. For more information on regular maintenance intervals, refer to [“Basic Maintenance Schedule - Isuzu Engine” on page 33](#).

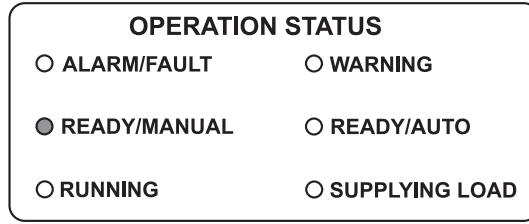
MANUAL STARTING OF THE UNIT

1. Move the Control Power switch to the ON (I) position.

⚠ DANGER

CARBON MONOXIDE: USING A GENERATOR INDOORS CAN KILL YOU IN MINUTES.

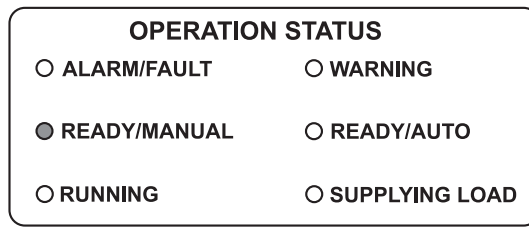
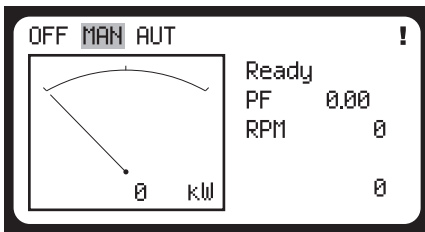
2. The Liquid Crystal Display (LCD) window will quickly display system information, all Light Emitting Diodes (LED's) will flash.



00497

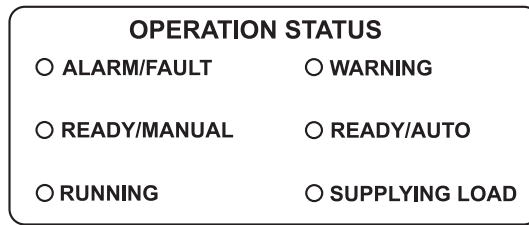
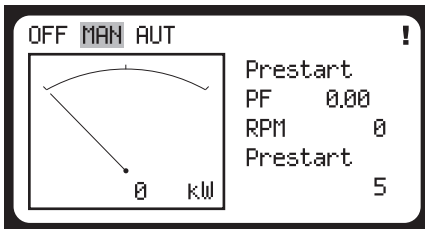
3. The Ready screen will be displayed and the LCD window will indicate Manual mode. The Ready/Manual LED will be lit.

Note: The unit must be in the Manual mode with the Ready/Manual LED lit to start the unit.



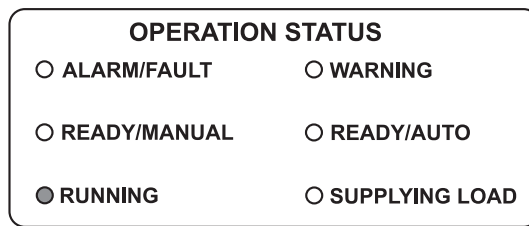
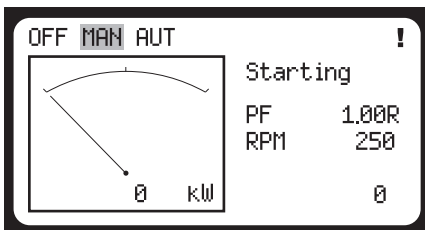
00498

4. Press ENGINE START. The Prestart screen will be displayed (if equipped) and a countdown will begin from 20 seconds to 0.



00499

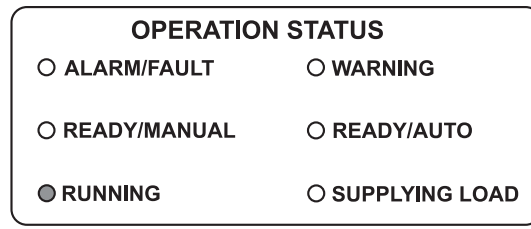
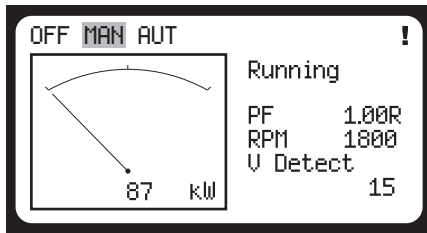
5. The Starting screen will be displayed. The engine will crank and start running.



00500

6. The Running screen will display.

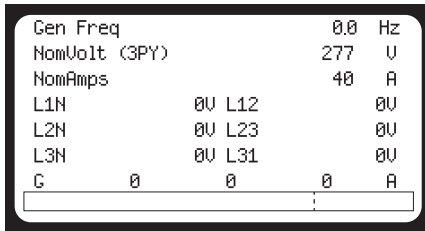
Note: It may take a few seconds for the engine to run smoothly and reach its governed operating speed. The 45 second V Detect time delay will start to count down.



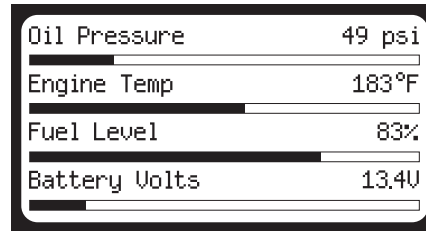
00501

7. The LCD window will then toggle from the Running screen to the Generator screen and then to the Engine screen.

GENERATOR DISPLAY SCREEN



ENGINE DISPLAY SCREEN



00502

8. If the engine does not start after the first cranking attempt, the engine will pause for 15 seconds to allow the starter to cool. The LCD window will show "PAUSE." The engine will make two more attempts to start for a total of three crank cycles.
9. Should the engine not start and run within three starting cycles, the LCD window will show "SD START FAIL". The starting sequence may be repeated after the starter has had a minimum of two minutes to cool. Press FAULT RESET to clear the controller. To start the unit, press ENGINE START.

Note: The engine controller may skip the preheat engine steps on some of the larger models.

10. Once the engine starts, it will immediately begin speeding up to a constant 1800 rpm. The engine may hunt or change speeds until operating speed is reached. After a few minutes of operation, the engine will be warmed up and the LCD window will show engine and generator operating parameters. Temperature will be shown as "0" until the engine temperature is approximately 100°F (38°C).
11. Check the generator for excessive noise or vibration and any coolant, oil, or fuel leaks before applying any loads.
12. Check that the AC output voltage is correct. The output voltage can be fine adjusted by using the fine voltage adjustment screw (rheostat), as described on [page 17](#).
13. Check that the frequency (Hz) is correct. With no loads connected to the generator, the frequency should read approximately 60 Hz, depending on the type of engine governing used.
14. If all wiring connections have been made correctly, switch the main circuit breaker to the ON (I) position and then add any loads attached to the convenience receptacles by switching the respective circuit breaker to the ON (I) position. You will notice a slight change in engine sound when a load is applied to the unit.

AUTO (REMOTE) STARTING OF THE UNIT

The Auto button is used when the unit is started from a location other than the control panel and by using a transfer switch. Auto (remote) start is the normal setting when the generator is being used as a standby power supply. Before putting the unit in the Auto mode, review "[Prestart Checklist](#)" on [page 18](#) and "[Manual Starting of the Unit](#)" on [page 19](#). Also follow all safety warnings and information on isolating the generator with a transfer switch if the unit is to be used as a standby power supply. Refer to "[Transfer Switch](#)" on [page 31](#). Then continue with the steps described below:

1. Perform a manual start of the unit at least once to verify that the engine is operating correctly.
2. If a check of the remote start circuit is desired, remove the wires from the remote start terminal block. Press AUTO, LCD window should highlight "AUT" in the upper left corner. Attach a jumper wire (minimum 16 gauge) across the two terminals on the remote start terminal block. This applies a ground to the Digital Controller to close the starting circuit contacts. The engine should crank, start and run.
3. Remove the jumper wire from the remote start terminal block and the engine will stop. Reconnect any necessary wires from the remote start switch (transfer switch) to the remote start terminal block.
4. Confirm unit is in Auto mode. The LCD window should have "AUT" highlighted in the upper left corner.
5. Close the main circuit breaker (set to ON (I) position).
6. Secure the generator by closing and locking all access doors.
7. The generator is now ready for remote starting.

SHUTTING DOWN THE UNIT

Check with personnel using power supplied by the unit and let them know that the power is going to be turned off. Make sure the power shut down will not create any hazards by accidentally turning off equipment that needs to be kept on (pumps, compressors, lights, etc.).

1. Remove all loads from the generator by opening all circuit breakers (turn to the OFF (O) position).
2. Let the engine run for approximately five minutes to allow it to cool down.
3. Push ENGINE STOP. Pressing the red Engine Stop button will result in the unit going into the shutdown cycle and starting a 15 second shutdown timer called stop value. If the unit does not shut down within 15 seconds, a stop fail alarm will be displayed on the Liquid Crystal Display (LCD) window.
4. Move the Control Power switch to the OFF (O) position.

Note: For extended storage time, disconnect the battery. Refer to the engine operator's manual for extended storage requirements.

MDC INFORMATION DISPLAYS, FUNCTIONS, AND RESET

The Magnum Digital Controller (MDC) constantly monitors vital generator and engine functions for a number of operation, alarm, and fault conditions. When a fault condition occurs, the engine will shut down automatically and the screen will show the fault that has caused the shutdown. To resume operation, the fault condition must be resolved. To reset the controller and resume operation, press FAULT RESET.

The operation of the MDC is divided into the following sections:

MAGNUM DIGITAL CONTROLLER (MDC) - GENERATOR OPERATIONAL STATUS

The Magnum Digital Controller (MDC) displays the operational status of the generator using the following codes:

| No. | Engine State | Description |
|-----|--------------|--------------------------------------------------------------------|
| 1 | AfterCool | Engine aftercooling, cooling pump output is closed. |
| 2 | Cooling | The unit is cooling before stop. |
| 3 | Cranking | Engine is cranking. |
| 4 | EmergMan | Emergency manual gen-set operation. |
| 5 | Init | Autotest during controller power on. |
| 6 | Loaded | The unit is running at nominal speed and GCB OPEN/CLOSE is closed. |
| 7 | Not Ready | The unit is not ready to start. |
| 8 | Pause | Pause between start attempts. |
| 9 | Prestart | Prestart sequence in process, prestart output is closed. |
| 10 | Ready | The unit is ready to run. |
| 11 | Running | The unit is running at nominal speed. |

| No. | Engine State | Description |
|-----|--------------|-----------------------------------------------------------------|
| 12 | Shutdown | Shutdown alarm is activated. |
| 13 | Starting | Starting speed is reached and the <i>idle timer</i> is running. |
| 14 | Stop | Stop. |

| No. | Electrical State | Description |
|-----|------------------|------------------------|
| 1 | StabilTO | Stabilization Timeout. |

MAGNUM DIGITAL CONTROLLER (MDC) - ALARM MANAGEMENT

The Magnum Digital Controller (MDC) is capable of displaying the following alarms:

| No. | Type | Description |
|-----|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Sensor fail (FLS) | Sensor fail is detected when measured value is 6% out of the selected characteristic. Sensor fail is indicated by ##### symbol instead of measured value. |
| 2 | Warning (WRN) | When warning comes up, refer to list of possible alarms. |
| 3 | Shutdown (SD) | When the shutdown alarm comes up, the digital controller opens outputs GCB CLOSE/OPEN, FUEL, SOLENOID, STARTER and PRESTART to stop the engine immediately. |

MAGNUM DIGITAL CONTROLLER (MDC) - LIST OF ALARMS

Shutdown and warning fault conditions and the displayed message are described in the following table:

| No. | Events Specification | Protection Type | Information on Binary Output Available | Description |
|-----|----------------------------|-----------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | AnInIOM Sd | SD | YES | Shutdown alarm configurable on the input of IG-IOM/IGS-PTM. |
| 2 | AnInIOM Wrn | WRN | YES | Warning alarm configurable on the input of IG-IOM/IGS-PTM. |
| 3 | Battery Flat (low battery) | SD | YES | If the controller switches off during starting sequence due to bad battery condition, it doesn't try to start again and activates this protection. |
| 4 | Binary Input | CONFIG. | YES | Configurable Warning/Shutdown alarms on the inputs of IL-NT. |
| 5 | ChrgAlternFail | WRN | YES | Failure of the alternator to charge the battery. |
| 6 | EmergencyStop | SD | NO | If the red <i>Emergency Stop</i> switch is pushed or opened, shutdown is immediately activated. |
| 7 | Engine Temp Sd | SD | NO | Water temperature is greater than <i>Sd Water Temp</i> setpoint. |
| 8 | Engine Temp Wrn | WRN | YES | Water temperature is greater than <i>Wrn Water Temp</i> setpoint. |
| 9 | Fgen<, > | SD | YES | The generator frequency is out of limits given by <i>Gen >f</i> and <i>Gen <f</i> setpoints. |
| 10 | Fuel Level Sd | SD | YES | Fuel level is smaller than <i>Sd Fuel Level</i> setpoint (5%). |
| 11 | Fuel Level Wrn | WRN | YES | Fuel level is smaller than <i>Wrn Fuel Level</i> setpoint (15%). |
| 12 | GCB fail | SD | NO | Failure of the generator circuit breaker. |
| 13 | Igen unbl | SD | NO | The generator current is unbalanced. |

| No. | Events Specification | Protection Type | Information on Binary Output Available | Description |
|-----|----------------------|-----------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14 | Low BackupBatt | WRN | NO | RTC backup battery is flat (low). |
| 15 | Oil Press Sd | SD | NO | Oil pressure is smaller than <i>Sd Oil Press</i> setpoint. |
| 16 | Oil Press Wrn | WRN | YES | Oil pressure is smaller than <i>Wrn Oil Press</i> setpoint. |
| 17 | Overload | SD | YES | The load is greater than the value given by <i>Overload</i> setpoint. |
| 18 | Overspeed | SD | YES | The protection comes active if the speed is greater than <i>Overspeed</i> setpoint. |
| 19 | ParamFail | NONE | NO | Wrong checksum of parameters. Happens typically after downloading new firmware or changing of the parameter. The controller stays in INIT mode. Check all parameters, write at least one new parameter. |
| 20 | PickupFault | SD | NO | Failure of the magnetic pick up sensor for speed measurement. |
| 21 | Sd IOM fail | SD | NO | Shutdown alarm in case of lost connection to IOM/IGS-PTM module. |
| 22 | SprinklActive | WRN | NO | The protection is active if the output <i>Sprinkler</i> is closed. |
| 23 | Start failed | SD | YES | Unit did not start. |
| 24 | Stop fail | SD | YES | Unit did not stop. |
| 25 | Ubat | WRN | YES | Battery voltage is out of limits given by <i>Batt Undervolt</i> setpoints. |
| 26 | Underspeed | SD | YES | During starting of the engine, when the RPM reaches the value of <i>Starting RPM</i> setpoint, the starter is switched off and the speed of the engine can drop under <i>Start RPM</i> again. Then the <i>Underspeed</i> protection becomes active. Protection evaluation starts 5 seconds after startup. |
| 27 | Vgen<, > | SD | YES | The generator voltage is out of limits given by <i>Gen <V</i> and <i>Gen >V</i> setpoints. |
| 28 | Vgen unbal | SD | NO | The generator voltage is unbalanced more than the value of <i>Volt unbal</i> setpoint. |
| 29 | Wrn ECU Alarm | WRN | NO | ECU alarm list is not empty. |
| 30 | Wrn RA15 fail | WRN | NO | Warning alarm in case of lost connection to IGL=RA15 module. |
| 31 | WrnMaintenance | WRN | NO | The period for servicing is set by the <i>WrnMaintenance</i> setpoint. The protection comes active if the running hours of the engine reach this value. |

MAGNUM DIGITAL CONTROLLER (MDC) - HISTORY

The Digital Controller stores a record of each important event in the history file of the controller. The history file seats 117 records. When the history file is full, the oldest records are removed.

| No. | Record Structure Abbreviation | Historical Value |
|-----|-------------------------------|------------------------------------------------------------------------|
| 1 | AIM1 | IG-IOM, IGS-PTM analog input 1 value (when configured IG-IOM, IGS-PTM) |
| 2 | Date | Date of historical event in format DD/MM/YY |
| 3 | OilP | IL-NT analog input 1 value (default: oil pressure) |
| 4 | FC | ECU alarm FailureCode |
| 5 | Vg2 | Generator voltage L2 |
| 6 | RPM | Engine speed |

| No. | Record Structure Abbreviation | Historical Value |
|-----|-------------------------------|---------------------------------------------------------|
| 7 | Ig2 | Generator current L2 |
| 8 | Ubat | Battery voltage |
| 9 | FMI | ECU alarm failure mode identifier |
| 10 | EngT | IL-NT analog input 2 value (default: water temperature) |

ADJUSTING THE DISPLAY BACKLIGHTING

The brightness may be adjusted by the operator whenever the Magnum Digital Controller (MDC) is powered up.

1. Press and hold ENTER, then press ▲ or ▼ to increase or decrease the brightness as needed.
2. Release ENTER when the desired brightness is attained.

RESETTING THE “TIME TO SERVICE” REMINDER

The Magnum Digital Controller (MDC) will display “WrnMaintenance” when the unit is due for maintenance or service. The maintenance or service interval is set at 250 hours of engine running time. Once the unit has been serviced, the Time to Service reminder needs to be reset to the 250 hour interval. The following procedure demonstrates how to reset the running hours to 250:

1. With the unit shut down, power up the controller with the Control Power switch. The Initialization screen will be displayed. The controller will toggle automatically to the Ready screen.
2. Press PAGE SELECT. The next screen will display lines of text; starting with the word Password, then Basic Settings, Engine Params, Engine Protect, etc. The top line has a cursor (>) before the word Password.
3. Press ▼ to move the cursor (>) down to Engine Protect.
4. Press ENTER. “WrnMaintenance” will appear at the top left of the screen. The current service time hour setting remaining (0) will be one line below it on the right side.
5. Press ENTER. The current run time in hours will now appear on the left side of the screen, directly under “WrnMaintenance.”
6. Press ▲ and reset the current run time hour setting to 250. If you pass the 250 time interval, use ▼ to get back to the 250 time interval.
7. Press ENTER to save the current run time hour setting.
8. Move the Control Power switch to the OFF (O) position.

TROUBLESHOOTING AUTOMATIC SHUTDOWN CONDITIONS

▲ WARNING

Allow engine to cool before performing any troubleshooting procedures. Contacting the engine when it is hot will cause severe personal injury.

LOW FUEL LEVEL SHUTDOWN

1. Check the fuel level on the Liquid Crystal Display (LCD) window. Confirm that the unit is sitting level to ensure an accurate reading.
2. Check for leaks in the fuel tank. The fuel tank should not run dry under normal circumstances. The engine controller will shut the engine down when there is five percent of fuel remaining in the tank. This is done to keep the fuel lines from running dry.
3. If the fuel level is good and no leaks are found, check the fuel level sender and the connecting wiring for damage. To check for continuity between the sender and the engine controller, remove the appropriate bolts from the control panel to access the inside of the control box. Refer to the appropriate DC wiring diagram in the back of this manual for the proper path between the engine controller and the fuel level sender.

LOW OIL PRESSURE SHUTDOWN

1. Check the level of the engine oil with the dipstick. The engine controller will shut the engine down when the oil pressure is less than 20 psi (138 kPa). Add oil if required.
2. Visually inspect the engine for oil leaks.
3. If the oil level is good, restart the unit and verify the loss of oil pressure. Shut the engine down immediately if the oil pressure value does not read 5 psi (34 kPa) within five seconds.
4. Check the oil pressure sender. To identify corrective action, refer to the troubleshooting section of the engine operator's manual provided with the unit.

LOW COOLANT LEVEL SHUTDOWN

1. Allow the engine to cool.
2. Check the coolant level in the radiator. To access the radiator cap, you must remove the access panel from the top of the enclosure directly above the radiator. Add coolant until it is 3/4 in. (1.9 cm) below the filler neck. Secure the radiator cap back into its original position.
3. Inspect coolant hoses, engine block and water pump for visible leaks.
4. Check engine oil to verify no coolant has mixed with it (oil will appear milky if coolant is present). Refer to the engine operator's manual for additional information.

HIGH COOLANT TEMPERATURE SHUTDOWN

1. Check the coolant level in the overflow jug.
2. Restart the engine and read the coolant temperature to verify High Coolant Temperature Shut down. Stop the engine immediately if the coolant temperature is 230°F (110°C) or more.
3. Allow the engine to cool. Add coolant to the overflow jug if it is low and then check the level of coolant in the radiator. To access the radiator cap, you must remove the access panel from the top of the enclosure directly above the radiator. Add coolant until it is 3/4 in (1.9 cm) below the filler neck. Secure the radiator cap back into its original position.
4. Check the radiator shroud and ducting for blockage and remove any foreign matter.
5. Inspect coolant hoses, engine block and water pump for visible leaks.
6. Check the tension of the serpentine drive belt for the water pump.
7. If no other problems are found, remove the load on the generator and restart the engine. Check the coolant temperature and shut the engine down immediately if it starts to overheat. Refer to the engine operator's manual for additional information on engine overheating.

OVERCRANK SHUTDOWN

1. Check the fuel level in the tank.
2. Check for proper operation of the fuel pump.
3. Check air filter for blockage.
4. If the engine will not start, consult the engine operator's manual for additional information on troubleshooting starting problems.

OVERSPEED OR UNDERSPEED SHUTDOWN

1. Disconnect all loads and restart the generator. Read the frequency (Hz) on the LCD display. With no loads on the generator, the frequency should read 60.0 Hz.
2. If the frequency is above or below 60.0 Hz, the engine speed will have to be adjusted. Refer to the engine operator's manual for throttle adjustments on mechanically governed units and refer to the electronic governor manual for electronically controlled units.

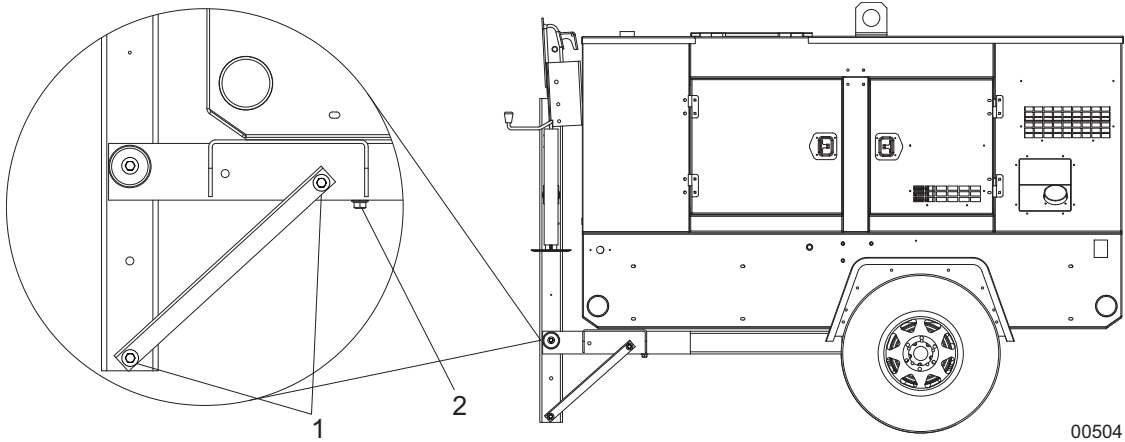
LOWERING THE TRAILER TONGUE

For units shipped with the trailer tongue in the upright position, follow the steps below to lower the tongue.

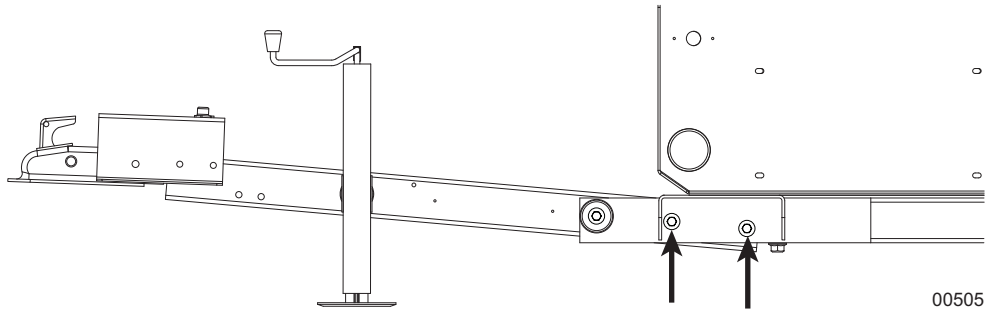
1. Elevate the unit using a hoist or forklift, or use the jack located on the trailer tongue.

Note: If using the front jack for support, it must first be moved to the jack mount location nearest the frame.

2. Remove the mounting hardware securing the tongue shipping brace to the trailer frame (1).



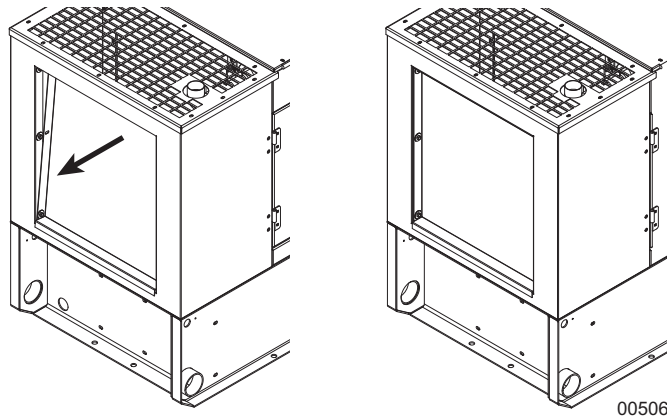
3. Remove the shipping brace and slide it into the trailer tube opening. Secure the brace to the trailer with the bolt located on the underside of the trailer (2) and a new nylon locking nut.
4. Flip the trailer tongue down and reinstall the bolts and washers removed in step 2 using two new nylon locking nuts. **DO NOT** reuse nylon locking nuts. Tighten the bolts to 80-109 ft-lbs (108-148 Nm).



Note: If the jack was used to support the unit while removing the shipping brace, the jack must be moved back to the tongue location before the unit can be towed. Connect the trailer tongue to a vehicle or other support and move the jack to the tongue location.

5. Tighten the bolt inside the jack mounting tube nearest the frame.

6. Remove the mounting hardware from the top four holes of the front enclosure panel. Tilt the front flip insert panel forward so that the holes line up with the holes from the enclosure panel. Reinstall the hardware to secure the panel.



GENERATOR OUTPUT CONNECTION LUGS

The generator is equipped with connection lugs behind the lug box door located on the lower portion of the control box. The lugs provide connection points for attachment of external loads to the generator. A large decal on the inside of the connection lug door details the proper connections for selected voltages.

⚠ WARNING

It is **HIGHLY RECOMMENDED** that only a trained and licensed electrician perform any wiring and related connections to the generator. Installation should be in compliance with the National Electrical Code (NEC), state and local regulations. Failure to follow proper installation requirements may result in equipment or property damage, personal injury or death.

⚠ WARNING

Before any connections are made to the generator, make sure that the main circuit breaker and the Control Power switch are in the OFF (O) position and that the negative (-) battery cable is disconnected. Potentially lethal voltages may be present at the generator connection lugs.

⚠ DANGER

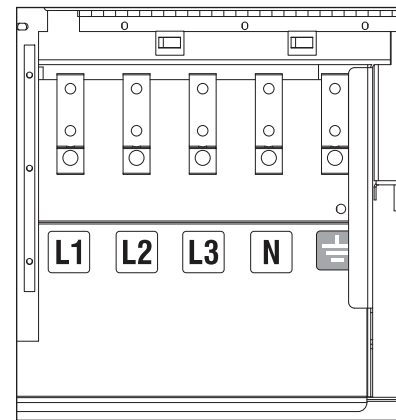
IMPROPER OR INCORRECT CONNECTIONS TO A BUILDING'S ELECTRICAL SYSTEM CAN CAUSE POTENTIALLY LETHAL VOLTAGES TO BACKFEED INTO UTILITY LINES. THIS MAY RESULT IN INJURY OR ELECTROCUTION TO UTILITY WORKERS NEARBY. MAKE SURE THE GENERATOR IS SUPPLYING POWER TO AN ISOLATED OBJECT OR BUILDING THAT IS NOT CONNECTED TO ANY UTILITY LINES.

Connection to the lugs should be made by running the power cables through the opening at the base of the lug box. **DO NOT** make any connections directly to the lugs. Use a hex-wrench to tighten the cable connections. The lug door is equipped with safety interlock switches that will trip the main circuit breaker and disable the voltage regulator, dropping the operator output to residual voltage, if the door is opened while the unit is operating.

▲ WARNING

Never attempt to disable or modify the connection lug door safety switches. Equipment damage, personal injury or death may result.

RUN CABLES THROUGH OPENING IN BOTTOM OF LUG BOX



00488

A ground connection is located next to the connection lugs. The unit **MUST HAVE** this ground lug connected to a good earthen ground for proper operating safety. The generator neutral is bonded to ground when it is shipped from the factory. The bonding plate will need to be removed when the generator is used as a standby power source. **INSTALLATION SHOULD BE IN COMPLIANCE WITH THE NATIONAL ELECTRICAL CODE (NEC), STATE AND LOCAL REGULATIONS.**

VOLTAGE SELECTOR SWITCH

The voltage selector switch mechanically changes the connections between the generator output leads and the connection lugs on the main control panel. Voltage ranges are selected by rotating the handle on the switch to the desired voltage.

NOTICE

NEVER change the voltage selector switch while the engine is running or the controller is on. If the engine is running or starts while the setting is changed, severe arcing will occur causing damage to the switch and generator windings.

The voltage selector switch is equipped with a lockout mechanism. Once the proper voltage has been selected, insert a padlock through the lockout hole(s). By locking the handle in place, unauthorized changing of the voltage setting is prevented.

277/480V 3-PHASE

Switch styles vary by model.

L1-L2 = 480V L1-N = 277V N = \perp

L2-L3 = 480V L2-N = 277V

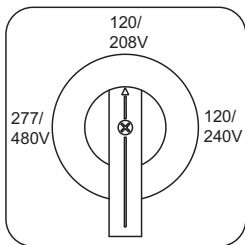
L3-L1 = 480V L3-N = 277V

| VOLTAGES AT RECEPTACLES | | |
|-------------------------|------|------|
| RECEPTACLE | L-L | L-N |
| GFCI Duplex | - | 139V |
| GFCI Duplex w/Buck | - | 120V |
| Twist-locks | 240V | 139V |

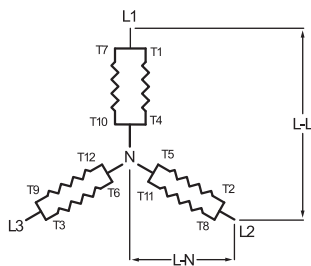
00083

= Not recommended for normal use.

120/208V 3-PHASE



Switch styles vary by model.



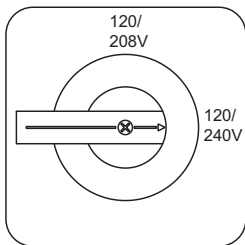
L1-L2 = 208V L1-N = 120V N = \perp
 L2-L3 = 208V L2-N = 120V
 L3-L1 = 208V L3-N = 120V

VOLTAGES AT RECEPTACLES

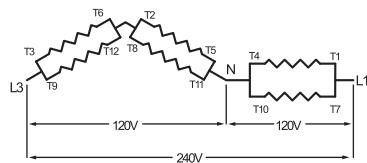
| RECEPTACLE | L-L | L-N |
|--------------------|------|------|
| GFCI Duplex | - | 120V |
| GFCI Duplex w/Buck | - | 120V |
| Twist-locks | 208V | 120V |

00085

120/240V 1-PHASE



Switch styles vary by model.



L1-L2 = - L1-N = 120V N = \perp
 L2-L3 = - L2-N = -
 L3-L1 = 240V L3-N = 120V

VOLTAGES AT RECEPTACLES

| RECEPTACLE | L-L | L-N |
|--------------------|------|------|
| GFCI Duplex | - | 120V |
| GFCI Duplex w/Buck | - | 120V |
| Twist-locks | 240V | 120V |

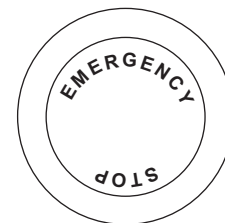
00087

 = Not recommended for normal use.

EMERGENCY STOP SWITCH

The unit is equipped with one emergency stop switch. For location of the emergency stop switch, refer to [“Component Locations” on page 11](#). The red switch is clearly labeled “EMERGENCY STOP.” The switch can be accessed and activated with all doors closed and locked.

Activate the emergency stop switch by pushing the red button in until it locks down. This will trip the main circuit breaker which will open the contact, disconnecting the load to the connection lugs. This will also open the fuel circuit, shutting down the engine. The emergency stop fault will be displayed on the control panel.



00230

The switch will remain closed until it is pulled out.

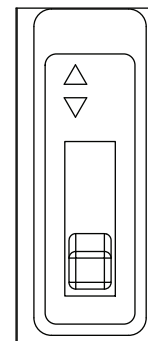
NOTICE

Use the emergency stop switch only when the unit must be shut down immediately. For any other shut down, refer to [“Shutting Down the Unit” on page 21](#).

MAIN CIRCUIT BREAKER

The main circuit breaker is located on the main control panel. When the breaker is in the OFF (O) position, power is interrupted between the connection lugs (and optional cam lock receptacles) and the generator. Once the connections have been made to the connection lugs and/or cam lock receptacles, and the generator has been started and allowed to reach normal operating temperature, the breaker may be switched to the ON (I) position.

The main circuit breaker will be tripped, disconnecting power to the connection lugs and cam lock receptacles, if equipped, if any of the following items occur while the unit is running:



00489

- Overload of the generator circuits to the connection lugs or cam lock receptacles (208/120V only).
- The door covering the connection lugs and/or cam lock receptacles is opened.
- The emergency stop switch is activated.

Make sure that any problems that cause the main circuit breaker to trip are corrected before returning the switch to the ON (I) position.

⚠ WARNING

The main circuit breaker interrupts power to the connection lugs and cam lock receptacles only. The receptacles have power even if the main circuit breaker is in the OFF (O) position. To disconnect power to the receptacles, use the individual circuit breakers located near each receptacle.

VOLTAGE REGULATION

The electronic voltage regulator controls the output of the generator by regulating the current into the exciter field. The regulator has three screwdriver adjustable potentiometers that may be adjusted for voltage, stability and voltage roll-off (U/F). The voltage regulator on your unit is adjusted before shipment from the factory. Contact Magnum Power Products LLC for additional information before attempting to adjust the voltage regulator.

CONTROL PANEL RECEPTACLES

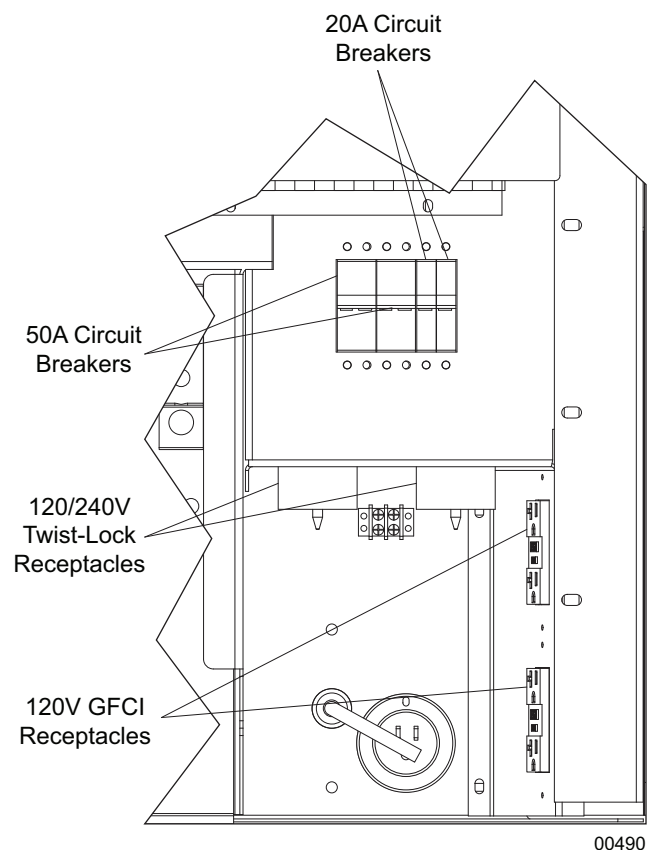
The unit is equipped with four receptacles. The large receptacles are 240/129VAC twist-lock receptacles rated at 50A each. The smaller duplex receptacles are 120 VAC rated at 20A each with Ground Fault Circuit Interrupt (GFCI) protection. These receptacles are not routed through the main circuit breaker. Each receptacle has its own circuit breaker, located above the receptacles. Each breaker is sized to the maximum rating of the corresponding receptacle.

NOTICE

Power to the receptacles is available any time the unit is running, even if the main circuit breaker is in the OFF (O) position.

MAKE SURE THAT ANY EQUIPMENT CONNECTED TO THE RECEPTACLES IS TURNED OFF BEFORE TURNING THE BREAKERS ON.

Make sure that the voltage selector switch is in the proper position and that the output voltage is correct for the equipment that is connected to the receptacles. Improper voltage may cause equipment damage or malfunction.



00490

Note: When the voltage selector switch is in position for 480/277V 3Ø, voltage at the two GFCI receptacles is 139 volts and the voltage at the three twist-lock receptacles is 240/139 volts. When the shorting board is in position for 208/120V 3Ø, voltage at the three twist-lock receptacles and the two GFCI receptacles is 208/120 volts.

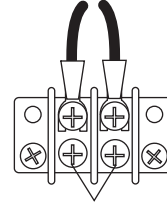
DERATING FOR ALTITUDE AND TEMPERATURE

All units are subject to derating for altitude and temperature; this will reduce the available power for operating tools and accessories connected to the receptacles. Typical reductions in performance are two to four percent for every 1000 ft (305 m) of elevation and one percent per 10°F (5.6°C) increase in ambient air temperature over 77°F (25°C).

REMOTE START TERMINAL BLOCK

The remote start terminal block provides a connection for installation of a remote start switch which will allow the unit to be started by a remote dry-contact closure switch. For location of the remote start terminal block, refer to [“Main Control Panel Features” on page 12](#)

Before entering Auto mode, verify that the contacts on any remote switch linked to the unit are **OPEN**. If the contacts on a remote switch are closed, the engine will crank and start when Auto mode is entered. Attach the switch leads to the two unused terminals on the unit’s remote start terminal block. For additional information, refer to [“Auto \(Remote\) Starting of the Unit” on page 20](#).



Remote Start Switch Terminals 00231

TRANSFER SWITCH

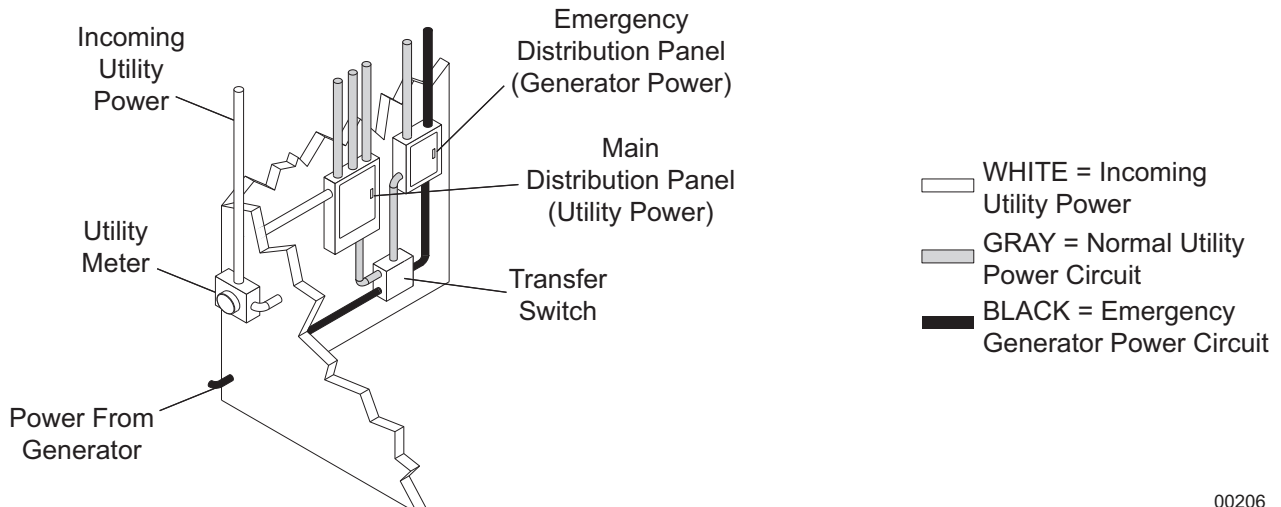
NOTICE

The generator neutral is bonded to ground when it is shipped from the factory. The bonding plate will need to be removed when the generator is used as a standby power source. Installation should be in compliance with the National Electrical Code (NEC), state and local regulations.

When the generator is used as a standby power supply, it must be equipped with a transfer switch which isolates it from the utility’s distribution system. A transfer switch is designed to transfer electrical loads from the normal power source (utility) to the emergency power source (generator) when normal voltage falls below a prescribed level. The transfer switch automatically returns the load back to the normal source when power is restored back to operating levels.

⚠ DANGER

FAILURE TO ISOLATE THE GENERATOR FROM THE NORMAL POWER UTILITY CAN CAUSE POTENTIALLY LETHAL VOLTAGE TO BACKFEED INTO THE UTILITY LINES. THIS MAY RESULT IN INJURY OR ELECTROCUTION OF UTILITY WORKERS NEARBY. MAKE SURE THE GENERATOR IS ISOLATED BY A TRANSFER SWITCH FROM ANY LOCAL UTILITY LINES. THIS ALSO APPLIES IF THE GENERATOR IS BEING USED AS A BACKUP TO SOME OTHER TYPE OF POWER SUPPLY.



00206

Installation of a transfer switch or other type of remote starting device is the responsibility of the generator user. Installation of such devices must be performed by following all directions supplied by the manufacturer of the switch. If attaching generator to a power supply normally serviced by a utility company, notify the utility company and check local and state regulations. Familiarize yourself with all instructions and warning labels supplied with the switch.

⚠ WARNING

ONLY a licensed electrician should perform any wiring and any related connections to the generator. Installation should be in compliance of the National Electrical Code (NEC), state and local regulations. Failure to follow these procedures could result in property damage, personal injury or death. Before any connections are attempted, make sure the main circuit breaker and the Control Power switch are in the OFF (O) position and that the negative (-) battery cable has been disconnected from the engine starting battery.

NOTICE

When using the generator as a standby or substitute power supply, make sure the output voltage and phase rotation of the generator match those of the local power utility. Improper voltage or phase rotation may cause equipment damage or malfunction.

AUTO EXERCISE TIMER

Generators installed in a standby application should be exercised regularly to maintain operating condition and to ensure responsiveness in an emergency situation. The following procedure demonstrates how to run (exercise) the generator on a time schedule:

1. Press PAGE SELECT until "Password" appears at the top of the screen.
2. Press ▼ until "Date/Time" is selected and press ENTER.
3. Press ▼ until "Timer1 Repeat" is selected and press ENTER.
4. Choose the day or days the unit should run and press ENTER.
5. Press ▼ until "Timer1 ON Time" is selected and press ENTER.
6. Adjust the desired time to start running and press ENTER.
7. Press ▼ until "Timer1Duration" is selected and press ENTER.
8. Adjust the time period to the length of time the unit should run after starting and press ENTER.
9. Press PAGE SELECT three times to return to the Main menu.
10. Press AUTO to switch modes to automatic.

Note: *The controller must be in Auto mode to run at the programmed time. Use a trickle battery charger or solargizer to prevent the controller from draining the battery while in Auto mode.*

DAILY WALK AROUND INSPECTION

Look for conditions that could hinder performance or safety, such as (but not limited to) oil/coolant/fuel leakage, blocked vents, loose/missing hardware and electrical connections.

Visually inspect the fan belt for cracks, fraying, stretching and that the belt is properly seated in pulley grooves. Replace the belt according to the manufacturer's recommendations.

⚠ CAUTION

Failure to perform a daily inspection may result in serious damage to the prime mover.

Note: *At the 500 hour/12 month service interval, it is recommended that the belt be removed and checked for wear. While the belt is removed, inspect pulleys and bearings. Rotate and feel for hard turning or unusual sounds. If pulleys or bearings need replacement, contact engine manufacturer.*

ENGINE AND GENERATOR MAINTENANCE

Check the engine oil level daily before starting the engine. **DO NOT** start the generator if the oil level is below the add mark on the dipstick. The normal operating level for the engine oil is anywhere in the crosshatch pattern between the full and add markings. Add oil to the engine only if the level is below the add mark on the bottom of the crosshatch pattern. **DO NOT OVERFILL** the crankcase. Refer to the engine operator's manual for the proper grade of oil, including special operating conditions such as a change in season or climate.

Check the coolant level daily. The coolant is checked by visually inspecting the level in the coolant overflow jug, located near the radiator. The normal operating level is anywhere between the full and add markings on the overflow jug, with the optimum level noted as normal range. **WHEN THE ENGINE IS STOPPED AND COMPLETELY COOL**, coolant may be added directly to the overflow jug. Refer to the engine operator's manual for coolant recommendations and proper mixture.

Check the condition of the air filter by viewing the level of vacuum draw on the filter minder gauge. Replace the air filter when the yellow center bar reaches the red section on the gauge (20 in. H₂O).

Poorly maintained equipment can become a safety hazard. In order for the equipment to operate safely and properly over a long period of time, periodic maintenance and occasional repairs are necessary. **NEVER** perform even routine service (oil/filter changes, cleaning, etc.) unless all electrical components are shut off. When servicing this equipment always follow the instructions listed below.

- Make sure the Control Power switch is turned to the OFF (O) position.
- Verify that all circuit breakers are open (OFF (O) position).
- Activate (push in) the emergency stop button.
- Disconnect the negative (-) terminal on the battery.
- Attach a "Do Not Start" sign to the control panel. This will notify everyone that the unit is being serviced and will reduce the chance of someone inadvertently trying to start the unit.
- If the unit is connected to a remote start or transfer switch, make sure the remote switch is also off and tagged.
- Never wash the unit with a high pressure hose or with any kind of power washer.
- Never wash the engine block or fuel tank with a power washer or steam cleaner. Water may enter the cabinet and collect in the generator windings or other electrical parts, causing damage.
- If the unit is stored outside, check for water inside the cabinet and generator before each use. If wet, dry the unit thoroughly before starting.

BASIC MAINTENANCE SCHEDULE - ISUZU ENGINE

NOTICE

Refer to the original equipment manufacturer's operating manual for a complete list of maintenance requirements. Failure to comply with the procedures as described in the engine operator manual will nullify the warranty, decrease performance and cause equipment damage or premature equipment failure. Maintenance records may be required to complete a warranty request.

Use the schedule in the following table as a guide for regular maintenance intervals. For additional or replacement copies of the engine operator's manual, contact an authorized dealer in your area.

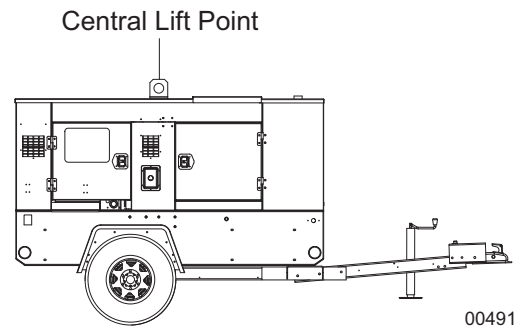
| Item | Daily | 250 Hours | 500 Hours |
|-----------------------------------------------|-------|-----------|-----------|
| Check Oil Level* | ◆ | | |
| Check Coolant Level | ◆ | | |
| Check Fuel Level | ◆ | | |
| Drain Fuel Filter | ◆ | | |
| Check Tire Pressure | ◆ | | |
| Check All Electrical Connections | ◆ | | |
| Clean Battery | ◆ | | |
| Check Fan Belt Tension (Replace If Necessary) | ◆ | | |

| Item | Daily | 250 Hours | 500 Hours |
|------------------------------------------------------------------------|-------|-----------|-----------|
| Inspect Radiator Fins For Debris, Clean As Required | ◆ | | |
| Preheating Condition Check | ◆ | | |
| Check Engine Starting Conditions and Noise Conditions | ◆ | | |
| Check Exhaust Smoke Condition | ◆ | | |
| Replace Engine Oil | | ◆ | |
| Replace Fuel Filter Element | | ◆ | |
| Clean Water Sedimenter Element | | ◆ | |
| Electromagnetic Pump Filter Replacement or Cleaning | | ◆ | |
| Check Fan Belt Tension (Replace If Necessary) | | | ◆ |
| Oil Filter Element Replacement | | | ◆ |
| Replace Air Filter Element | | | ◆ |
| Lubricate Leveling Jacks | | | ◆ |
| Check Generator Drive Plate Torque (refer to page 35) | | | ◆ |

* *Change the oil after the first 50 hours.*

LIFTING THE UNIT

A central lift point is located on the top of the unit. The central lift point is connected to a lift structure inside the unit. Attach a sling or hook directly to the central lift point only if the devices are in good condition and the equipment being used to raise the unit has sufficient capacity. For approximate weights, refer to [“Specifications” on page 9](#). Always remain aware of others around you when moving or lifting the unit. Keep the cabinet doors closed and locked.

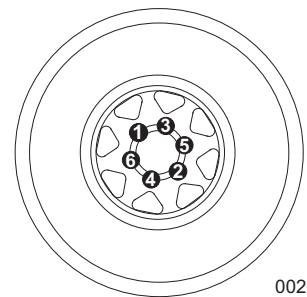


00491

TOWING THE TRAILER

1. Use the jack to raise or lower the trailer onto the hitch of the towing vehicle. Lock the hitch coupling and attach the safety chains or cables to the vehicle. Release the jack locking pin and rotate the jack into the travel position. Make sure the locking pin snaps into place.
2. Connect any trailer wiring to the tow vehicle. Check for proper operation of the directional and brake lights.
3. Make sure all doors are closed and secure.
4. Check for proper inflation of the trailer tires. Maximum tire pressures can be found on [page 9](#).
5. Check the wheel lugs. Tighten or replace any that are loose or missing. If a tire has been removed for axle service or replaced, tighten the lugs in the order shown, to the following specifications:

- A. Start all lug nuts by hand.
- B. First pass tighten to 20-25 ft-lbs (27-33 Nm).
- C. Second pass tighten to 50-60 ft-lbs (67-81 Nm).
- D. Third pass tighten to 90-120 ft-lbs (122-162 Nm).



00205

Note: *After the first road use, re-torque the lug nuts in sequence.*

6. Maximum recommended speed for highway towing is 45 mph (72 km/h). Recommended off-road towing speed is not to exceed 10 mph (16 km/h) or less, depending on terrain.

TRAILER WHEEL BEARINGS

The trailer axles are equipped with a grease zerk fitting to allow lubrication of the wheel bearings without the need to disassemble the axle hub. To lubricate the axle bearings, remove the small rubber plug on the grease cap, attach a standard grease gun fitting to the grease zerk fitting and pump grease into the fitting until new grease is visible around the nozzle of the grease gun. Use only a high quality grease made specifically for lubrication of wheel bearings. Wipe any excess grease from the hub with a clean cloth and replace the rubber plug when finished. The minimum recommended lubrication is every 12 months or 12,000 miles (19,312 km). More frequent lubrication may be required under extremely dusty or damp operating conditions.

JACK MAINTENANCE

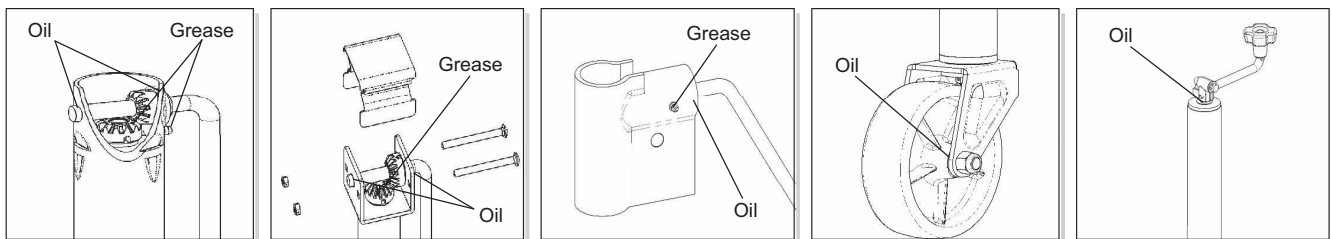
The following procedures should be performed at least annually.

SIDE-WIND MODELS

- The internal gearing and bushings of the jack must be kept lubricated. Apply a small amount of automotive grease to the internal gearing by removing the jack cover, or if equipped, use a needle nose applicator or standard grease gun on the lubrication point found on the side of the jack near the crank. Rotate the jack handle to distribute the grease evenly.
- A lightweight oil must be applied to the handle unit at both sides of the tube.
- If equipped, the axle bolt and nut assembly of the caster wheel must also be lubricated with the same lightweight oil.

TOP-WIND MODELS

- Apply a lightweight oil to the screw stem.



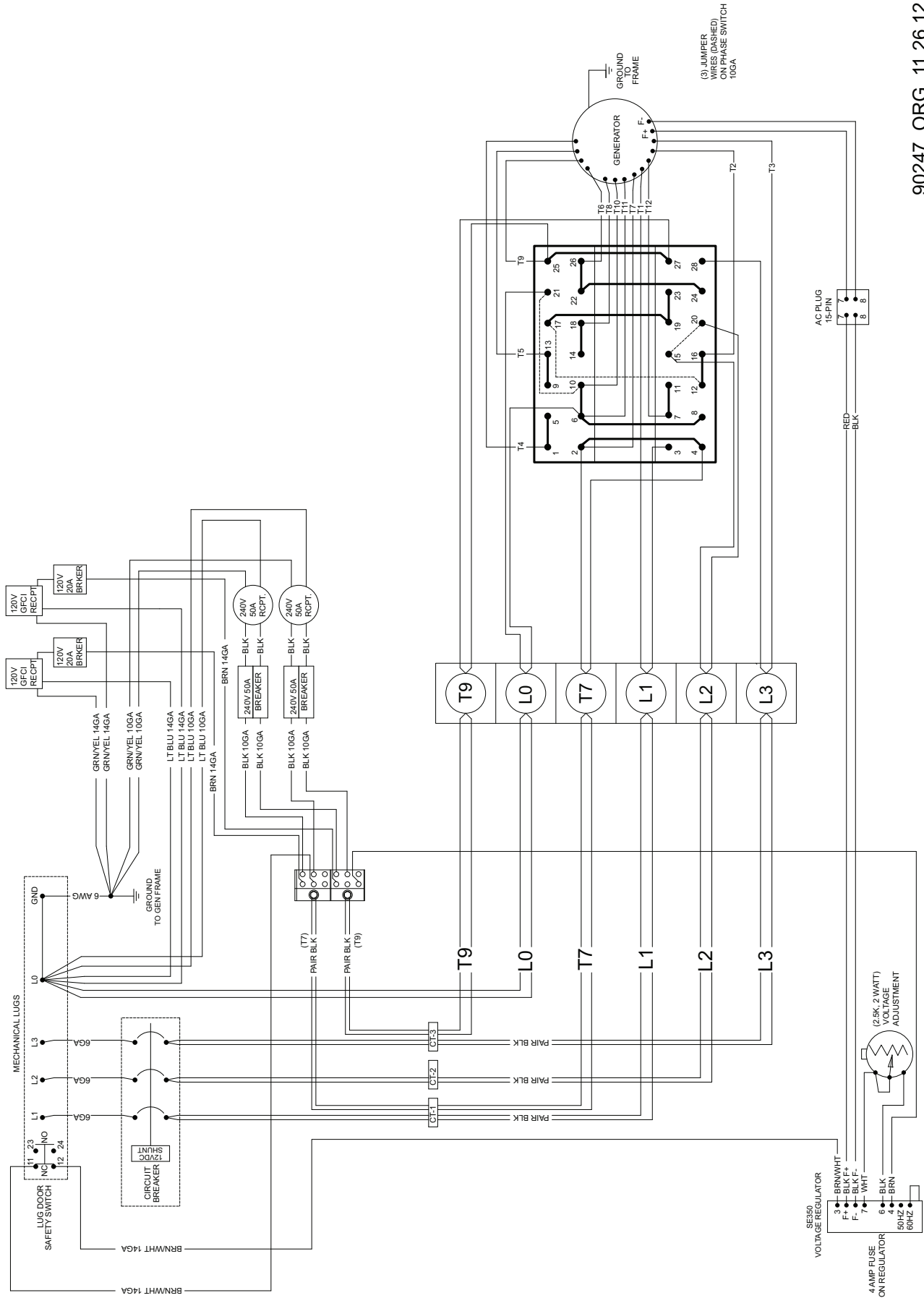
00243

CHECKING GENERATOR DRIVE PLATE TORQUE

Follow the procedure below to check the torque of the generator drive plate bolts in accordance with the maintenance chart beginning on [page 33](#).

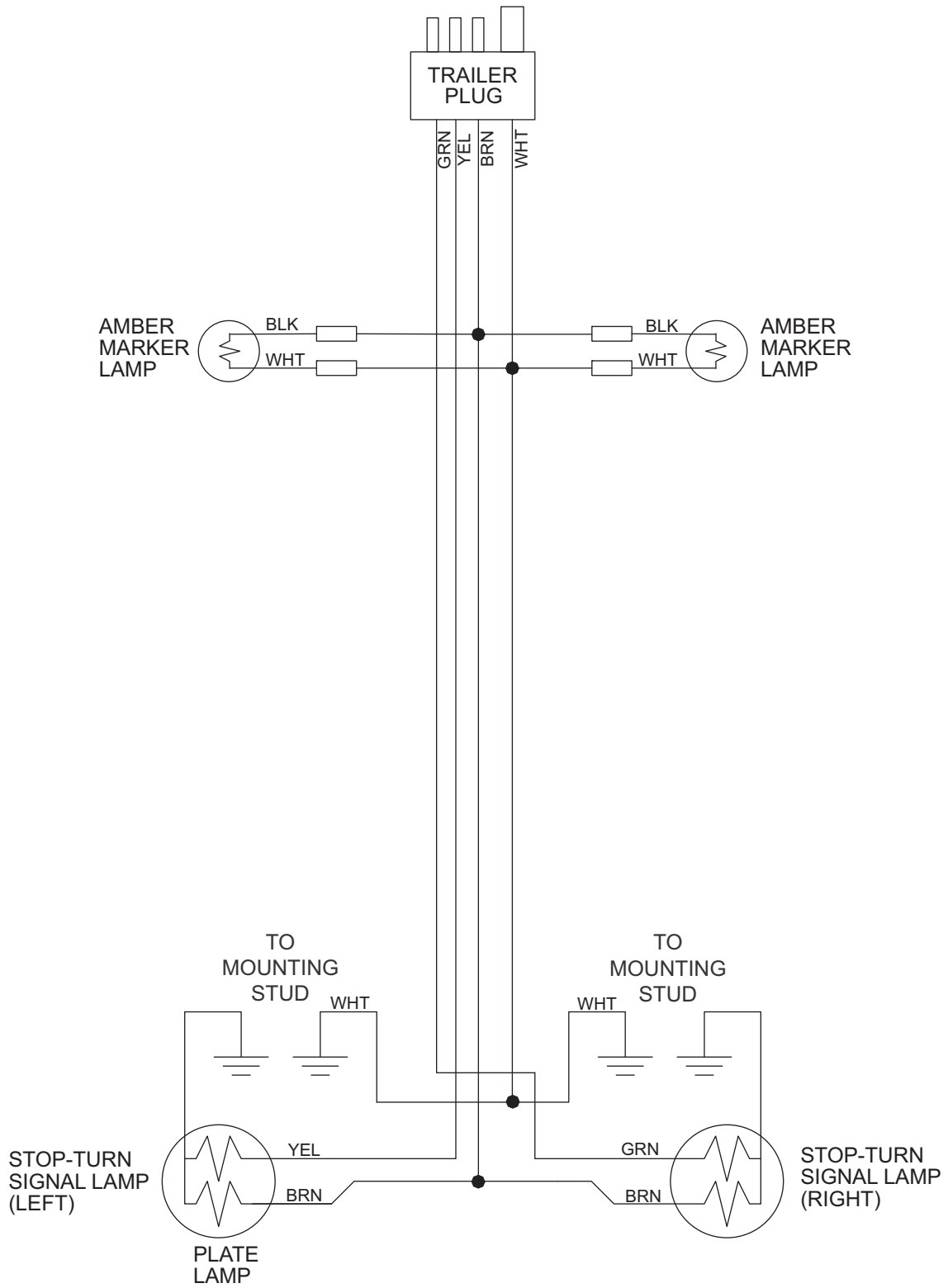
1. Disconnect the engine starting battery.
2. Remove the generator fan guard.
3. Torque each of the drive plate bolts to 36 ft-lbs (49 Nm).
4. Reinstall the generator fan guard. Reconnect the battery.

AC WIRING DIAGRAM - 3 POSITION VOLTAGE SELECTOR SWITCH



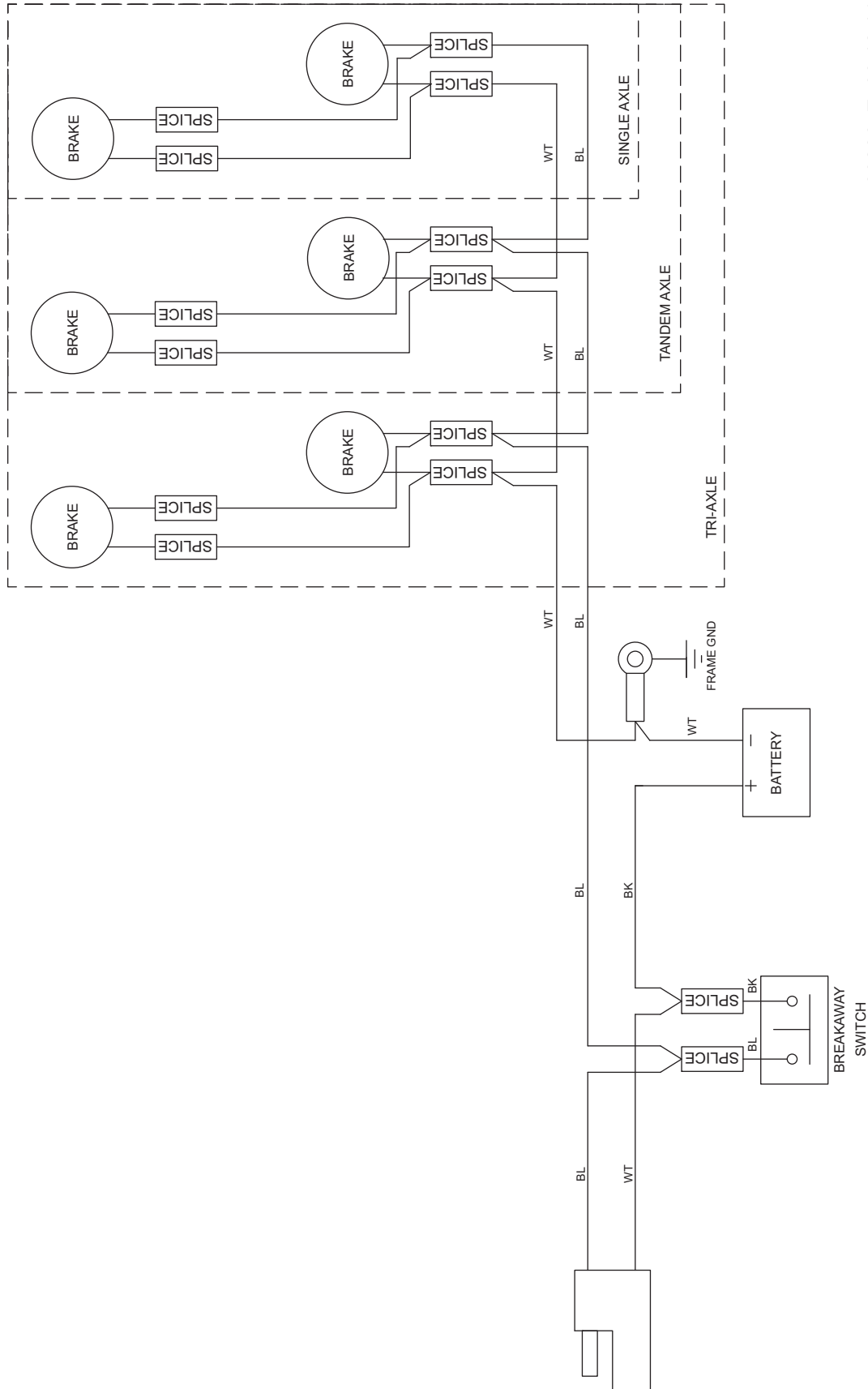
90247_ORG_11.26.12

TRAILER LIGHTS WIRING DIAGRAM



90228_ORG_05.09.12

WIRING HARNESS - ELECTRIC BRAKE



90286_E_03.18.14

REV: ORG
PART NO: 35061
04.10.14