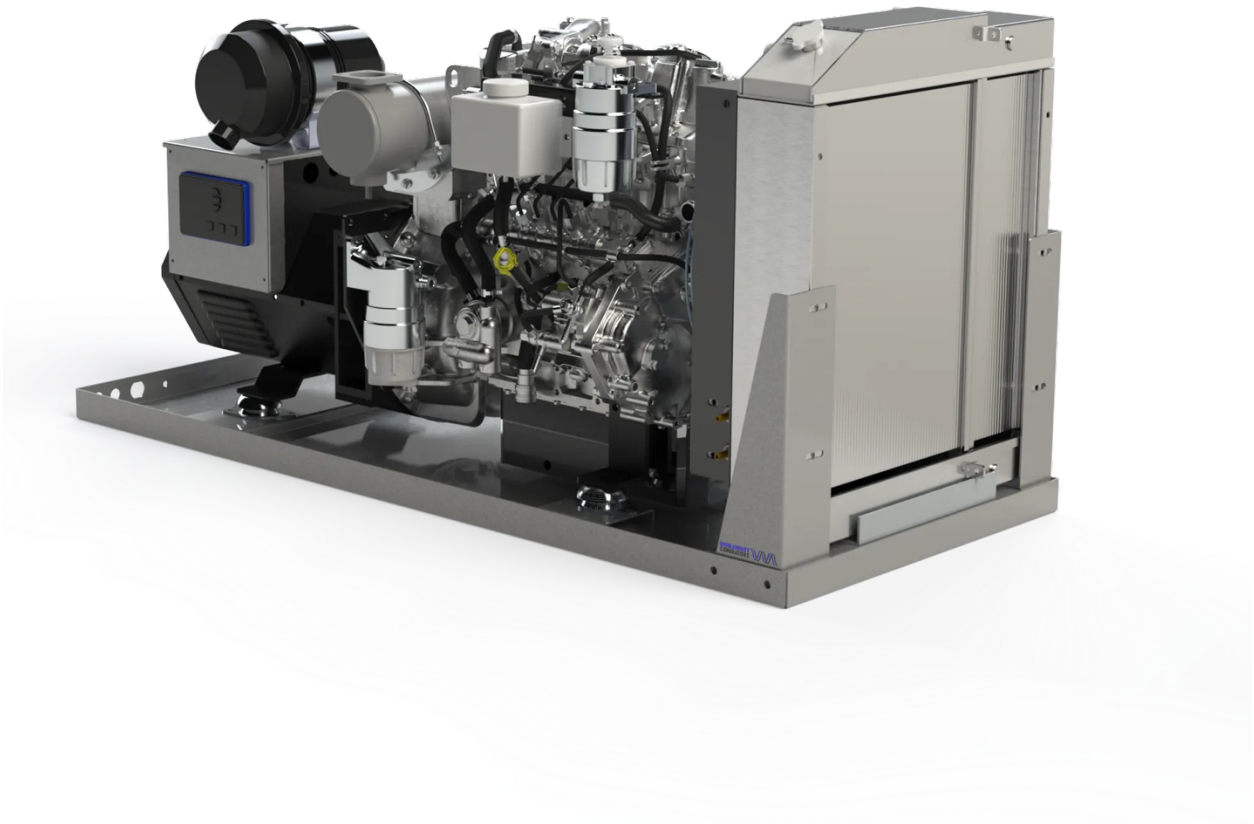
DURAWATT GENERATORS



Model: 80j.OPU Operators Manual

POWERING MOBILE PERFORMANCE

DuraWatt Generators Leesburg, FL 34748-8103 Phone: (352)-315-0322

Model: 80j.OPU Operators Manual
Powering Mobile Performance

You are now the proud owner of a DuraWatt Generators generator set, powered by an Isuzu diesel engine. This DuraWatt Generators is engineered to the highest quality standards and manufactured in a strict quality-controlled environment. To have the best performance from your DuraWatt Generator, please read and understand this manual. This manual was up to date at time of printing there may be changes not reflected in manual. If there are any questions, please contact DuraWatt Generators' customer service department.

Thank you for your purchase of a DuraWatt Generator. In the event you experience a problem with your generator please contact the selling dealer, one of our authorized service centers, or DuraWatt's Customer Service Department directly 1-352-315-0322 from 8:00 a.m. to 5:00 p.m. EST. Please have the generator model and serial numbers available when you call.
Parts may be obtained directly through DuraWatt Generators and shipped the same day if ordered by 2:00 p.m. EST.

Parts may be ordered any time at WWW.DURAWATTGEN.COM or to find a list of our dealers.

CALIFORNIA Proposition 65 Warning:
Diesel Engine Exhaust and some of its constituents are known by the State of California to cause Cancer, Birth Defects and Other Reproductive harm.

SAFE OPERATION
Observe Safety Instructions
Wear Safety Clothing
Check Before Operating the Engine
Keep Area around the engine clean
Safe Handling of Fuel and Lubricants
Exhaust Gases and Fire Prevention
Escaping Fluids
Cautions against Burns and Battery Explosion Keep Hands and Body Away from Rotating Parts
Anti-Freeze and Disposal of Fluids
Conducting Safety Checks and Maintenance

It is essential that you carefully read the instructions and safety regulations before you attempt to assemble or use this unit.
WARNING: Indicates a potentially hazardous situation, which may possibly result in serious injury or possible death.
CAUTION: Indicates a potentially hazardous situation, which may possibly result in minor injury.
IMPORTANT: Indicates that equipment or property damage may result if instructions are not followed. NOTE: Indicates helpful information.

Read and understand this section carefully before operating the engine. All operators, no matter how knowledgeable they may be, should read this and other related manuals before operating the engine or any equipment attached to it. It is the owner's responsibility to instruct all operators in safe operation. Be sure to observe the following for safe operation.

<u>OBSERVE SAFETY INSTRUCTIONS</u>
Read, understand, and follow this 'OPERATORS MANUAL' and 'LABELS ON THE ENGINE' before starting and operating.
Learn how to operate and work safely. Know your equipment and its limitations. Always keep the generator in good condition.
Before allowing other people to use your engine, explain how to operate and have them read this manual before operation.
DO NOT modify the engine. UNAUTHORIZED MODIFICATIONS to the engine may impair the function and/or safety and affect engine life, and void warranty.

WEAR SAFETY CLOTHING

DO NOT wear loose, torn, or bulky clothing around machinery. Entanglement in rotating parts, controls or projections may cause personal injury.

Use additional safety items, e.g., hardhat, eye protection, gloves, etc., as appropriate or required.

DO NOT operate machinery or equipment while under the influence of alcohol, medication, or other drugs, or while fatigued.

DO NOT wear radio or music headphones while operating engine.

CHECK BEFORE OPERATING THE ENGINE

If the engine is malfunctioning DO NOT operate until repairs are made.

Be sure all guards and shields are in place before operating the engine. Replace any that are damaged or missing.

Check to see that the area around the engine is clear of foreign objects before starting.

Always keep the engine at least 3 feet (1 meter) away from buildings or other facilities.

DO NOT allow children or livestock to approach the machine while in operation.

DO NOT start the engine by shorting across starter terminals.

KEEP AREA AROUND THE ENGINE CLEAN

Be sure to stop the engine before cleaning.

Keep the engine clean and free of accumulated dirt, grease and trash.

DO NOT stop the engine without idling, Temperatures around the
genset rises suddenly. Keep the genset idling for about 5 minutes before stopping?

SAFE HANDLING OF FUEL AND LUBRICANTS

Always stop the engine before refueling or lubricating.

DO NOT smoke or allow flames or sparks in your working area. Fuel is extremely flammable and explosive. Never store flammable liquids in the engine compartment.

Refuel at a well-ventilated and open place. If fuel or lubricants spill, clean up immediately and properly dispose of.

DO NOT mix gasoline or alcohol with diesel fuel. The mixture can cause a fire.

EXHAUST GASES AND FIRE PREVENTION

Engine exhaust fumes can be very harmful if allowed to accumulate. Be sure to run the engine in a well-ventilated area where there are no people or livestock nearby.

 The exhaust gas from the muffler is very hot. To prevent a fire, do not expose dry grass, oil, or any other combustible materials to exhaust gas. Keep the engine and mufflers clean all the time.

To avoid a fire, be alert for leaks of flammables from hoses and lines. Be sure to check for leaks from hoses and pipes, such as fuel and hydraulic by following the maintenance check list.

To avoid a fire, do not short across power cables and wires.

Check to see that all power cables and wires are in good condition. Keep all power connections clean. Bare wire or frayed insulation can cause a dangerous electrical shock and personal injury.

Escaping fluids

Relieve all pressure in the air, oil and cooling systems before any lines, fittings or related items are removed or disconnected.

Be alert for possible pressure release when disconnecting any device from a system that is pressurized. DO NOT check for pressure leaks with your hands. High-pressure oil or fuel can cause personal injury.

Escaping hydraulic fluid under pressure has sufficient force to penetrate skin causing serious personal injury.

Fluid escaping from pinholes may be invisible. Use a piece of cardboard or wood to search for suspected leaks: do not use hands and body. Use safety goggles or other eye protection when checking for leaks.

If injured by escaping fluid, see a medical doctor immediately. This fluid can produce gangrene or severe allergic reaction.

CAUTIONS AGAINST BURNS AND BATTERY EXPLOSION

To avoid burns, be alert for hot components during operation and after the engine has been shut off. Such as the muffler, muffler cover, radiator, piping, engine body, coolants, engine oil, etc.

DO NOT remove the radiator cap while the engine is running or immediately after stopping. Wait approximately ten minutes for the radiator to cool before removing the cap.

Be sure the radiator drain valve / petcock and hose clamps are tightened. Check radiator pressure cap and oil fill cap before operating the engine.

The battery presents an explosive hazard. When the battery is being activated, hydrogen and oxygen gases are extremely explosive.

Keep sparks and open flames away from the battery, especially during charging. DO NOT strike a match near the battery.

DO NOT check batteries charge by placing a metal object across the terminals (Yes, we had to put this in the manual). Use a voltmeter or hydrometer.

DO NOT charge a battery if frozen, it may possibly explode. Frozen batteries must be warm up to at least 61°F (16°C) before charging.

KEEP HANDS AND BODY AWAY FROM ROTATING PARTS

Keep your hands and body away from all rotating parts, such as cooling fan, v-belts, pulleys, and flywheel. Contact with these rotating parts can cause serious personal injury.

Be sure to stop the engine before adjusting belt tension or checking the cooling fan.

DO NOT run the engine without safety guards installed. Be sure the safety guards are properly aligned and securely fastened before operating the engine.

ANTI-FREEZE AND DISPOSAL OF FLUIDS

Anti-freeze contains toxic chemicals. Wear rubber gloves when handling anti-freeze. In case of contact with skin, wash immediately to avoid personal injury.

DO NOT mix different types of Anti-freeze. The mixture can produce a chemical reaction resulting
in the formation of harmful substances. Only use anti-freeze that is recommended and approved
by Engine Manufacturer.
Be mindful of the environment. Before draining any fluids, be prepared to dispose of them in a manner consistent with environmental protection regulations in your location.
When draining fluids from the engine, use appropriate containers to hold the different fluids, do
not mix fuel, oil, or coolant together. Dispose of spent filter cartridges and batteries properly.
DO NOT pollute the soil, or any water source. Never pour fluids down a drain.

CONDUCTING SAFETY CHECKS AND MAINTENANCE

When performing safety checks or engine service, be sure the engine is level and well supported. Use approved stands designed for this type of service.
DO NOT service an engine that is only supported by a lift jack or hoist.
Detach the battery from the engine before conducting service.
To avoid sparks from an accidental short circuit always disconnect the 12V DC power at the battery.
Be sure to stop the engine and remove the key when conducting daily and periodic maintenance,
servicing and cleaning.
Check or conduct maintenance after the engine, radiator, muffler, or muffler cover has cooled off
completely.
Always use the appropriate tools and jig-fixture when performing any service work. Be sure to understand and follow the instructions included with these tools.
Use ONLY correct engine barring techniques for manually rotating the engine. DO NOT attempt to rotate the engine by pulling or prying on the cooling fan and V-belt. Serious personal injury or
damage to the cooling fan may occur.
Replace fuel hoses and hose clamps every 2 years or earlier whether they are damaged or not. They are made of rubber and are aged gradually.
When service is performed with two or more people present, take care to perform all work safely.
Be aware of their location especially when starting the engine.
Always keep a first aid kit and fire extinguisher handy.

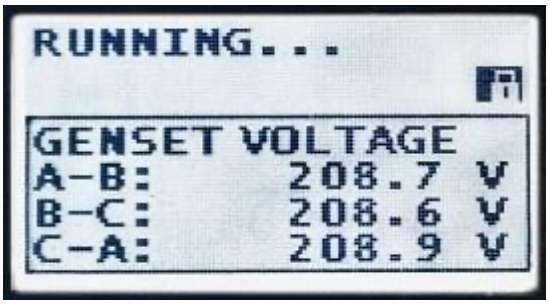
Operating the Generator

Daily Pre-Operational Checks:

Check the engine oil level to be appropriate level
Check for tightness of battery cables/terminals
Check battery terminals for absence of corrosion
Check coolant level for proper Fill (add if necessary)
Check for absence of water in fuel (drain if necessary)
Check for absence of DTC or failures
Check for absence of excessive fan belt looseness

Using the DURAWATT Controller

The LCD display is the primary source of information of the controller. The LCD allows you to view/change settings and monitor the status of sensors and other engine parameters.



* NOTE: The genset mounted controller must be in 'AUTO' mode to enable the remote panel functionality.

Front Panel Items

Item	Name	Description
	Off Button	Used for turning off the engine or exiting out of Auto mode. This is not intended to function as an Emergency Stop as there are conditions in which it will not shutdown the engine.
	Auto Button	Used for placing the controller into Auto mode. Once in Auto the controller waits for a start command to be received.
	Run Button	Used to start the engine manually. Must use the Off button to shut down the engine if started from front panel.
	Up Button	Used for moving around in the menu, changing a settings value, or changing the currently displayed parameter page.
	Enter Button	Used for entering the menu system, accepting settings, or locking the LCD screen when viewing parameters.
	Down Button	Used for moving around in the menu, changing a settings value, or changing the currently displayed parameter page.
	Generator LED	Green = Engine running with no issues Amber = Engine running with warnings Red = Engine shutdown on failure

Using the Menu System

Task	Description
Entering Menu	When in the OFF mode, press the enter button to bring up the menu.
Navigating Menu	Once in the menu, use the up and down arrows to navigate. Pressing enter will move you into that menu.
Scroll Parameters	When in Auto or Running mode, pressing the up and down arrows will scroll through the parameters pages.
Lock Screen	When in Auto or Running mode, you can lock the screen onto a certain parameter page by pressing enter. You can unlock the screen by pressing enter again.
Events History	Once in the menu, select Events History to view the most recent controller event. Use the up and down arrows to navigate to other events. The controller can store up to 150 events. If more than 150 events occur, the oldest event is deleted to make room for the next event.

Modes, Starting and Stopping Methods

The following table describes the different operating modes of the controller:

Mode / State	Description
OFF	When in the OFF mode, the engine cannot be remotely started.
Auto	When in the Auto mode, the engine waits to receive a start command.
Running	When engine is Running, the controller monitors engine parameters and waits to receive a stop command.
Failure	When a failure occurs, the controller shuts down the engine and displays reason for failure. The unit must be reset using the front panel OFF button except for Modbus.
Menu	When in the menu you can change settings and view the events history.

Engine Specifications Models: 80j.QB

Engine Make:	**JCB**
Engine Model:	**444TA-4**
EPA Tier	**Tier 4 Final**
Oil type	**SAE 10W-40 (API Class)**
Oil capacity	**3.5 U.S. Gallons (12.9L)**
Cooling System Capacity	**4.8 U.S. Gallons (18.4L)**
Primary Air Filter P/N	**28-0087**
Safety Air Filter P/N	**28-0083**
Primary Fuel Filter P/N	**28-0084**
Secondary Fuel Filter P/N	**28-0085**
Oil Filter P/N	**28-0083**

Engine Maintenance Schedule

Maintenance Service Item	See notes	Daily	100 Hour Interval	500 Hour Interval	1000 Hour Interval	Remarks
Engine Oil Level deterioration & Leakage		x				
Engine Oil Change	x			x		Or Once a Year
Oil Filter Change				x		Or Once a Year
Coolant Level		x				
Coolant Leakage		x				
Coolant Change					x	See Pg. 13
Fuel Level		x				
Fuel Leakage		x				
Water in Fuel	x	x				
Primary Fuel filter Replacement	x			x		Or Once a Year
Secondary Fuel Filter Replacement	x			x		Or Once a Year
Air filter Replacement	x			x		Or Once a Year
Damaged, Worn, or loose belts	x					Or Two-Year Intervals
Replace Fuel Lines/Hoses					x	Or Two-Year Intervals
Radiator Hoses and Clamps					x	Or Once a Year
Abnormal Engine Noise		x				
Exhausts Gas Condition		x				

*Filter replacement intervals vary depending on quality of air, fuel, etc.

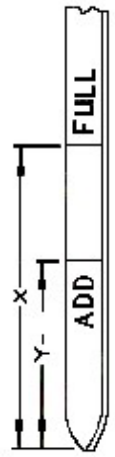
Engine Oil Maintenance

Checking the Engine Oil Level

1) Maintain Proper Oil Level

Between 'ADD' (Y) and 'Full' (X) on the oil level Gauge. DO NOT fill above 'Full' mark as catastrophic engine damage will occur.

2) Remove the oil filler cap and add oil if necessary. Clean the oil filler cap with a clean rag or towel. Reinstall the oil filler cap by hand.



Lubricating Oil Specifications

Use only good quality Lubricating Oil, which meets the following Specifications. API Class CJ-4

Engine Oil

LUBRICATING OIL VISCOSITY RECOMMENDATIONS

The minimum ambient temperature during cold engine start-up and the maximum ambient temperature during engine operation determine the proper SAE viscosity grade of oil.

Refer to the Engine Oil Viscosity Table below (Lowest Ambient Temperature) to determine the required oil viscosity for starting an engine in cold conditions.

Refer to the Engine Oil Viscosity Table below to select the oil viscosity for engine operation at the ambient temperature range that is anticipated.

Ambient Temperature Range

Above 25 C (77° F)	SAE 10W-30 or 15W-40
-10°C to 25°C (14° to 77° F)	SAE 10w-30 or 15W-40
Below -10° C (14°F)	SAE 10W-30

COOLANT RECOMMENDATIONS

For optimum performance, DuraWatt Generators recommends a 1:1 mixture of water / glycol.
NOTE: Use a mixture that will provide protection against the lowest ambient temperature.
NOTE: 100 percent pure glycol will freeze at a temperature of –23°C (-9°F).
Most conventional heavy-duty coolant / antifreezes use Ethylene Glycol. Propylene Glycol may also be used in a 1:1 mixture with water. Ethylene and Propylene Glycol provide similar protection against freezing and boiling. See the tables below.

ETHYLENE GLYCOL

Concentration	Freeze Protection	Boil Protection
50 Percent	-36°C (-33°F)	106°C (223°F)
60 Percent	-51°C (-60°F)	111°C (232°F)

PROPYLENE GLYCOL

Concentration	Freeze Protection	Boil Protection
50 Percent	-29°C (-20°F)	106°C (223°F)

NOTE: Do not use Propylene Glycol in concentrations that exceed 50 percent glycol because of Propylene Glycol's reduced heat transfer capability. Use Ethylene Glycol in conditions that require additional protection against boiling or freezing.

CHECKING RADIATOR COOLANT LEVEL

Remove the radiator cap after the engine has completely cooled and check to see that coolant reaches the supply port.

1. Fill to the bottom of the fill neck and check after every 25 hours of operation.

COOLANT SERVICE LIFE

Commercial Heavy-Duty Coolant/Antifreeze that Meets 'ASTM D5345'
600 Service Hours or One Year

Commercial Heavy-Duty Coolant/Antifreeze that Meets 'ASTM D4985'
1000 Service Hours or One Year

NOTE: Do not use a commercial coolant/antifreeze that only meets the ASTM D3306 or D4656 specification. This type of coolant/antifreeze is made for light duty automotive applications.

CHECKING RESERVOIR TANK COOLANT LEVEL

(At a Minimum of 25 Hours of Operation) Ensure that the coolant level of the radiator reservoir tank is between the upper limit (FULL) and the lower limit (LOW) on the side of the reservoir tank.

CLEANING RADIATOR CORE

Visually inspect the core for any obstructions such as dirt or debris. Use running water to clean particles from between fins.

IMPORTANT: Never use hard objects to clean radiator core, damage to core could result.

IMPORTANT: If your generator is equipped with remote radiator assemblies to cool the engine, DO NOT run water through the electric fan. Removal of the fan is required before cleaning of radiator.

OPERATING HOURS and SERVICE LOG

THIS SERVICE LOG IS PROVIDED TO HELP YOU KEEP AN ACCUMULATIVE RECORD OF OPERATION HOURS ON YOUR GENERATOR
SET AND THE DATES REQUIRED SERVICES WERE PERFORMED. ENTER TIME TO THE NEAREST HOUR.

Operating Hours			Service Record	
Date	Timer	Cumulative	Date	Service performed

GENERATOR ASSEMBLY INFORMATION

EXCITER TYPE GENERATOR

The exciter pole pieces contain residual magnetism, which sets up lines of force across the air gap to the exciter armature. When the exciter begins to rotate a voltage is induced and current flow is initiated in the exciter armature AC windings. This voltage is fed to the rotating rectifier assembly, rectified, and fed to the alternator field, which sets up lines of force across the air gap to the alternator stator windings and to the output circuit. A static voltage regulator is connected to the generator output. The regulator will rectify part of the output voltage to provide a DC voltage to the exciter field coils. This will increase the density of the lines of force in the exciter, increasing the voltage induced into the exciter armature windings, and therefore, to the rotating rectifiers. The rotating rectifier output will be increased which increase the alternator field strength and generator output will build up its rated voltage. Adjustment of the generator output to the rated voltage level is accomplished by controlling the current fed to the exciter field coils. Regulation is automatic with the static type of voltage regulator. An additional voltage adjustment range is provided if desired by turning the Voltage Adjust Rheostat.

ELECTRONIC VOLTAGE REGULATION

Electronic Voltage Regulator (EVR) also referred to, as an Automatic Voltage Regulator (AVR) is a very reliable device, which uses solid-state electronics to maintain voltage accuracy at ±2% of the regulated voltage. The Voltage Regulator is designed to automatically regulate and maintain the generated AC voltage throughout the load range that is from no load to full load.

VOLTAGE CONNECTION

The generator may be connected at the terminal board to deliver 120/240 volts to a 3-wire grounded neutral system.

If all equipment requires 120-volts then the 120-volt connection is preferred, even if two lines leave the same switch box. The two lines at the inputs to the switch box are both connected to the un-grounded 120-volt lines from the generator.

The 120-volt connection enables the Electronic Voltage Regulator (EVR) to hold the voltage very close to the 115 or 120 volts, as initially adjusted, regardless of the power distribution amount the different distribution lines. The 120-volt connection is recommended if the entire electrical load requires only 115 or 120 volts. Although the 120/240-volt connection may also be used when all loads require only 110 volts, this connection, the 240-volts, is regulated and the lightly loaded phase, or line, will deliver a high line to neutral voltage and the heavily loaded phase will deliver a low line to neutral voltage. The heavily loaded line may have such a low voltage that air conditioning will have more difficulty in starting, and long starting lines may overload generator and trip circuit breakers.

For three phase connections, please contact DuraWatt Generators Technical Support Department.

EXCITER FIELD COIL VOLTAGE SOURCE

Field coil DC voltage is obtained by rectifying the voltage from the phase to neutral line of the generator output, or appropriate terminal to provide the needed voltage reference.
The rectifier bridge is an internal part of the static regulator. The static regulator senses a change in the generator output and automatically regulates current flow in the exciter field coil circuit to increase or decrease the exciter field strength. An adjustable rheostat sized to be compatible with the regulator is used to provide adjustment of the regulator sensing circuit.

ROTATING FIELD ASSEMBLY (ROTOR)

The rotating field assembly consists basically of four members: 1) the shaft assembly, 2) the core assembly, 3) the field coil damper windings, and 4) balance lugs to provide a high degree of static
and dynamic balance.

CORE ASSEMBLY

The core assembly consists of a quantity of thin steel plates compressed and fastened together to form a single laminated assembly. The field windings are wound around this assembly.

FIELD COIL

Field coils of heavily insulated wire are 'wet' wound directly onto the poles. Field coil leads are brought out to the rectifier assembly for connection to the source of DC excitation voltage.

BALANCE

The rotor assembly is precision balanced to a high degree of static and dynamic balance. Although the balance will remain dynamically stable at speeds more than the design frequencies, the prime mover should be adequately governed to prevent excessive over speed. High centrifugal forces created by excessive over speed may damage the rotor windings and field coils.

BEARING

The generator rotor assembly is suspended on a shielded factory lubricated ball bearing. A visual inspection of the bearing is recommended at typical service intervals. If signs of abnormal wear or leakage are observed, the bearing should be replaced. Never use liquids of any kind to clean the generator end and bearing.

STATOR ASSEMBLY

The stator assembly consists of laminations of steel mounted in a rolled steel frame. Random wound stator coils are fitted into the insulated slots.

Model: 60j.OPU

Your generators cooling air flow cannot be restricted by any means. DO NOT block genset openings, by doing this the generator will be starved for air and not cool properly and eventually overheat and potentially cause damage to the generator's engine. All your generator's connections (fuel, battery, electrical outputs, and remote starting connections) are integrated into your generator. All these connections outside the generator are to be supported adequately to prevent chafing or breakage.

TROUBLESHOOTING

TROUBLE	POSSIBLE CAUSE	SUGGESTED ACTION
Generator will not start via remote panel or other source	Generator is not in "auto" mode	Put Generator in Auto mode via controller
	Remote connection plug is not connected	Reconnect Remote control Plug
Engine does not crank from local controller	Battery is low or terminals are dirty.	Clean terminals and re-charge battery. Replace battery if necessary.
	Crank circuitry wiring improperly connected.	Refer to engine control wiring and check crank connections.
	Cranking fuse blown	Replace fuse with new of identical size
Engine cranks but doesn't start	Out of fuel.	Check fuel level, add fuel if necessary.
	Fuse Blown	Replace fuse in control box
	Fuel relay damaged	Check fuel relay and replace if damaged.
	Fuel System lost prime	Use Primer on top of fuel filter
Engine Starts but shuts down after a few seconds	See failure on controller LCD Display	
Engine Starts but genset not producing Voltage	Main breaker is in the "off" position	Turn Main Breaker to the "on" position
	Visually inspect all Generator Output leads for connectivity	.

For all other trouble shooting issues please contact one of our dealers on our website.
www.DuraWattGen.com