

1250kW QSK45/50G3

Maintenance & Operating Manual

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1.0 Safety Precautions

1.1 GENERAL INFORMATION

- Ensure that the operator reads and understands the decals and consults the manuals before maintenance or operation.
- Ensure that the Operation and Maintenance manual, and the manual holder, are not removed permanently from the machine.
- Make sure that all protective covers are in place and that the canopy/doors are closed during operation.
- The specification of this machine is such that the machine is not suitable for use in flammable gas risk areas.
- Installation of this generator must be in accordance with recognized electrical codes and any local Health and Safety Codes.

1.2 ELECTRICAL POWER

- Prior to installation of the generating set you should check that the electrical load to be applied is within the rated output of the machine at the site ambient conditions.
- Before carrying out any maintenance or repairs to the Engine/Alternator assembly, disconnect the starting battery and isolate the alternator from the switchboard.
- Before carrying out any maintenance repair to the AC and DC circuits, isolate these from external control panel and power supplies.
- Ensure that the generator set and the load it is connected to, are properly grounded.
- The generating set should be connected to the load only by a qualified electrician and in accordance with the applicable regulations.

1.0 Safety Precautions (Cont.)

1.3 OPERATIONAL PRECAUTIONS

- Never operate the engine of this machine inside a building without adequate ventilation. Avoid breathing exhaust fumes when working on or near the machine. Do not alter or modify this machine.
- A battery contains sulphuric acid and can give off gases, which are corrosive and potentially explosive. Avoid contact with skin, eyes and clothing. In case of contact, flush area immediately with water.
- Do not remove the pressure cap from a HOT radiator. Allow radiator to cool down before removing pressure cap.
- Do not use petroleum products (solvents or fuels) under high pressure as this can penetrate the skin and result in serious illness. Wear eye protection while cleaning unit with compressed air to prevent debris from injuring eye(s).
- Rotating fan blade can cause serious injury. Do not operate without guard in place.
- Use care to avoid contacting hot surfaces (engine exhaust manifold and piping, etc.).
- Never operate unit with guards, covers or screens removed. Keep hands, hair, clothing, tools, etc. well away from moving parts.

2.0 Handling

2.1 LIFTING/HANDLING

- The package may be lifted by the four corner castings on the roof of the container.
- **All** lifting and handling equipment must be adequately rated for applicable weights.
- During all lifting and handling operations the following weights must be considered.

Model	Size	Dry Weight (lbs)	Wet Weight (lbs)
NHC20/KTA50-G3	1250kW	41800	44475
NHC20/QSK4G4	1250kW	41226	43640


2.2 TRANSPORTING - The generator unit can be shipped on drop deck trailers, flat bed trailers, container chassis, or by ocean freight.

When shipped by ocean freight, this unit must be top stacked only, as it is not certified for stacking and racking.

3.0 Installation

3.1 LOCATION OF THE PLANT

The generator can be installed on any solid, flat and level surface capable of supporting the full operating load of the package. A dry, well-ventilated area where the atmosphere is as clean as possible is recommended.

 **CAUTION:** A minimum of 1 meter (3 ft) all round the generator is recommended. Hot air will exit from the roof outlet. It is important that this hot air does not re-circulate to the package inlet.

3.2 GROUNDING

An external grounding boss is fitted onto the base frame. This allows a dedicated grounding connection if required.

3.3 REMOTE FUELING

External fuel tank supply can be connected to the generator set.

- One 1" Female NPT Connection (Suction)
- One 1" Female NPT Connection (Return)

4.0 General Data

4.1 DESIGN LOAD CAPACITY

Model	Size	Maximum Prime Power Rating
NHC20/KTA50-G3	1250kW	1165kW
NHC20/QSK4G4	1250kW	1116kW

4.2 DESIGN TEMPERATURES

The NHC40 generator sets can operate through an ambient temperature range of:

- -10°C (14°F) to 45°C (113°F)

4.3 CONTAINER

The engine compartment has 120% capacity of the engine fluids to prevent fluids leaking out of the generator set in the event of a fluid leakage inside the engine space.

Model	Size	Length (ft)	Width (ft)	Height (ft)
NHC20/KTA50-G3	1250kW	20	8	8.5
NHC20/QSK4G4	1250kW	20	8	8.5

4.0 General Data (Cont.)

4.4 DIESEL ENGINE

1250kW

NHC20/KTA50-G3

Type:	Four Stroke, 16 Cylinder V configuration Water Cooled
Model:	Cummins KTA50-G3
RPM:	1500 / 1800
Nominal Engine Output @ 1800rpm:	1165kW @ Prime Power
Governor:	Cummins EFC
Starting System:	24V Battery System
Fuel Consumption @ Continuous 1800rpm	77.1 US gal/Hr @ 100% Prime Power

1250kW

NHC20/QSK4G4

Type:	Four Stroke, 12 Cylinder V configuration Water Cooled
Model:	Cummins QSK45G4
RPM:	1500 / 1800
Nominal Engine Output @ 1800rpm:	1116kW @ Prime Power
Governor:	Cummins Dominion
Starting System:	24V Battery System
Fuel Consumption @ Continuous 1800rpm	77.2 US gal/Hr @ 100% Prime Power

4.0 General Data (Cont.)

4.5 ENGINE LUBRICATION SYSTEM

The engine oil lubrication system includes pump, strainer and sump all fitted internally within the engine block. Oil filtration is fitted to the side of the engine block for ease of access and maintenance.

Model	Size	Sump Capacity (US gallons)	Filter Capacity (US gallons)	Total Oil Capacity (US gallons)
NHC20/KTA50-G3	1250kW	40	6.7	46.7
NHC20/QSK45G4	1250kW	46.9	7.0	53.9

The Lube oil specification is as per API/ASTM/SAE/CD (equivalent to series MIL-L-415993). Recommended oils are Pennzoil – Quaker State – Shell 15W-40 HDX.

4.0 General Data (Cont.)

4.6 FUEL TANK SELECTION

The fuel tank is located in the engine space in front of the engine. The fuel tank is banded by the engine space to contain any spillage of fuel or engine liquids. Fuel is taken from the internal fuel tank. Fuel is then pumped through the Racor filter to the fine fuel filters and then passed to the injectors and then to the injection nozzles.

The fuel tank fill points are external and have an integral fuel strainer.

1. External fuel supply can be connected to the package using the 1 inch female NPT connections at the side of the container (see Section 4.8). Connect hoses to suction and return fittings.

Model	Size	Fuel Tank Capacity (US Gallons)
NHC20/KTA50-G3	1250kW	44475
NHC20/QSK4G4	1250kW	43640

4.0 General Data (Cont.)

4.7 GENERATOR

Manufacturer:	Newage Stamford, HC734F
Voltage Range 50Hz:	380-440 Volts
60Hz:	440-480 Volts
Excitation System:	Rotating Field self-powered

- Voltage Regulator, within 1% from no load to full load MX321

4.8 ENGINE PARTS



PRIMARY FUEL FILTERS
(RACOR)



SECONDARY FUEL FILTERS



OIL FILTERS

4.0 General Data (Cont.)

4.8 ENGINE PARTS



AIR FILTER



BATTERY ISOLATOR
BLOCK WATER HEATER



AIR FLAPS



WATER FILTERS



OIL MAKEUP FLOAT VALVE



ENGINE SPACE COOLING
FAN



WASTE OIL/SUMP PUMP



AIR FILTER CHANGE
INDICATOR

4.0 General Data (Cont.)

4.8 ENGINE PARTS



AUX SUPPLY
CONNECTION BOX



OIL MAKEUP TANK



BATTERY BOX



FUEL FILLER
EXTERNAL FUEL TANK
CONNECTIONS



MAIN BREAKER



RADIATOR FLUID LEVEL
GAUGE



AUTO SYNCHRONIZING
PANEL

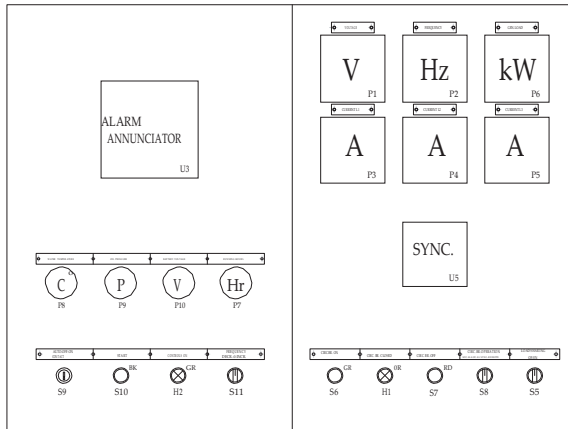
5.0 Operating Instructions

5.1 OPERATING CONTROLS & INSTRUMENTS

5.1.1 CONTROL PANEL

The operating controls and instruments are arranged on the control panel as shown in Section 5. A description of each panel device is given in table 5.

50G3 PANEL LAY-OUT



- P1 VOLTMETER
- P2 FREQUENCY METER
- P3 AMMETER L1 PHASE
- P4 AMMETER L2 PHASE
- P5 AMMETER L3 PHASE
- P6 KWATT METER

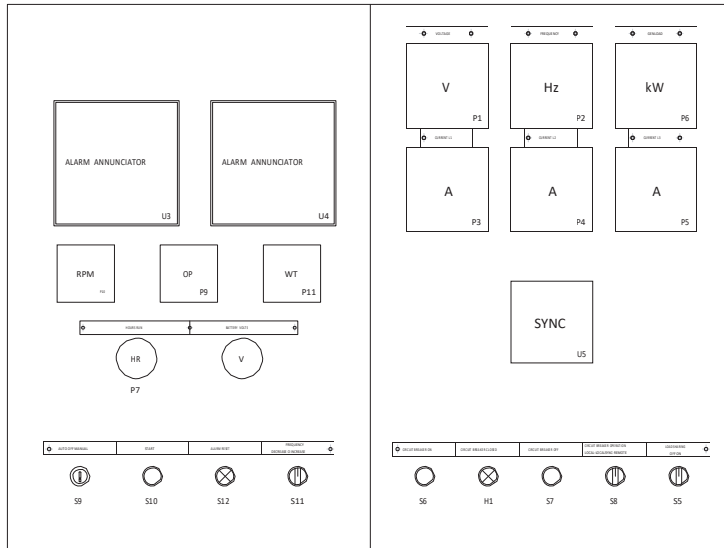
- S5 LOADSHARING OFF/ON
- S6 CIRC. BR. CLOSE
- S7 CIRC. BR. OFF
- S8 CIRC. BR. OPERATION
- S9 AUTO-OFF-MANUAL
- S10 ENGINE START
- S11 MANUAL SPEED ADJUST

- H1 CIRC. BR. CLOSED
- H2 ENGINE SAFETIES ON

5.0 Operating Instructions (Cont.)

5.1 OPERATING CONTROLS & INSTRUMENTS

QSK45 PANEL LAY-OUT



- P1 VOLTMETER
- P2 FREQUENCY METER
- P3 AMMETER L1 PHASE
- P4 AMMETER L2 PHASE
- P5 AMMETER L3 PHASE
- P6 KWATT METER

- S5 LOADSHARING OFF/ON
- S6 CIRC. BR. CLOSE
- S7 CIRC. BR. OFF
- S8 CIRC. BR. OPERATION
- S9 AUTO-OFF-MANUAL
- S10 ENGINE START
- S11 MANUAL SPEED ADJUST
- S12 ALARM RESET
- H1 CIRC. BR. CLOSED

5.0 Operating Instructions (Cont.)

5.2 PRIOR TO START

Execute Daily Maintenance see section 6.3.

5.3 STARTING

1. Check that main battery isolator is on.
2. Turn key to Local.
3. Press the ENGINE START button.

5.3 LOADING

1. Allow the engine to warm-up prior to applying load.
2. Turn Circuit Breaker Operation selector to LOCAL and hold in this position.
3. Press Circuit Breaker On button, circuit breaker will close.
4. Release Circuit Breaker Operation selector switch.

5.5 SHUTDOWN

Stand alone operation

1. Push CB OFF switch to open circuit breaker.
2. Allow engine to cool down for 5 minutes.
3. Press ENGINE STOP

5.6 STANDBY OPERATION (OPTIONAL)

1. Connect 480/277 V or 208/120V auxiliary power for block heater and battery charger.
2. Connect battery plus (K1), terminal 37, to remote start contact and bring to (REMS), terminal 14.
3. Turn key to REMOTE.
4. A test run should be carried out on the set.
5. A test run should be carried at least once a week.

6.0 Maintenance

6.1 GENERAL

In addition to periodic inspections, many of the components in these units require periodic servicing to provide maximum output and performance. Servicing may consist of pre-operation and post-operation procedures to be performed by the operating or maintenance personnel. The primary function of preventive maintenance is to prevent failure, and consequently, the need for repair. Preventive maintenance is the easiest and the least expensive type of maintenance. Maintaining your unit and keeping it clean at all times will facilitate servicing.

Ensure that maintenance personnel are adequately trained, competent and have read the Maintenance Manuals.

To assist with ordering spare parts and other service activities, a short form list of Component Manufacturers data has been included in this manual.

Prior to engine starting, check the oil and coolant levels.

Carry out a visual check of the following:

- Any fluid leaks.
- Loose or damaged parts.
- Worn or damaged belts.

Report unusual noise/vibration and/or exhaust smoke and ensure the generator set is kept clean, both inside and out.

6.2 MAINTENANCE SCHEDULE

	Daily	Weekly	Monthly/ 250 Hours	3 Months/ 500 Hours	6 Months/ 1000 Hours	12 Months/ 2000 Hours
Engine Oil Level	C					
Fuel Tank (Fill at end of day)	C					
Gauges / Lamps	C					
Air Filter	C					
Fuel / Water Separator Drain	C					
Battery Connections / Electrolyte	C					
Radiator Coolant Level		C				
Fan / Alternator Belts		C				

R=Replace C=Check (Adjust if Necessary)

6.2 MAINTENANCE SCHEDULE (Cont.)

	Daily	Weekly	Monthly/ 250 Hours	3 Months/ 500 Hours	6 Months/ 1000 Hours	12 Months/ 2000 Hours
Hoses (oil, air, intake, etc.)			C			
Automatic Shutdown System Visual			C			
Fasteners / Guards				C		
Fuel / Water Separator Element			R			
Engine (oil changes, oil & fuel filters, etc.)				R		
Engine Coolant Test					C	R
Shutdown Switch Settings Test						C

R=Replace C=Check (Adjust if Necessary)

Refer to manufacturer's operating and maintenance instructions for additional information and all other maintenance

6.3 DAILY MAINTENANCE

6.3.1 CHECK THE ENGINE OIL LEVEL

1. Stop the engine and wait 5 minutes to allow the oil to drain to the oil pan.
2. Remove the dipstick and check the oil level.
3. Replenish if necessary using a recommended grade of engine oil (see section 7).

⚠ CAUTION: Never operate the engine with the oil level below the 'L' mark or above the 'H' mark. See FIG. 6.1 below.

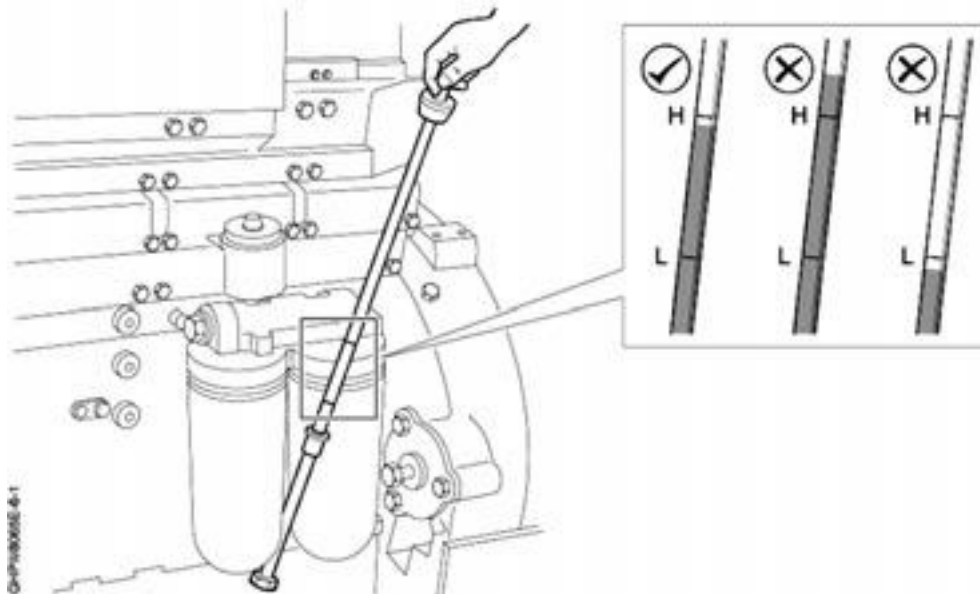


Figure 6.1 - Engine Oil Level Check

6.3.2 CHECK THE FUEL TANK LEVEL

Check the fuel level gauge on the side of the container.

Replenish as necessary using clean, good quality, #2 diesel fuel. Always ensure that the filler cap is replaced after replenishment.

6.3.3 CHECK THAT ALL METERS AND GAUGES FUNCTION CORRECTLY

Start the generator and inspect the following items:

- Oil pressure gauge is between 40 & 75psi.
- After 5 minutes check that the engine oil temperature gauge reads between 45°C & 55°C.
- The voltage and frequency gauges are within specification.
- Fuel gauge indicates the fuel level.
- Engine hours display increases after 10 minutes.
- No alarms are displayed.

6.3.4 CHECK THE AIR FILTER

 **NOTE: In dusty conditions clean the primary filters regularly.**

Check the air filter restriction indicator next to the air filter above the engine. If this has changed to the restricted position, then the filter will need replaced.

6.3 DAILY MAINTENANCE (Cont.)

6.3.5 CHECK THE BATTERY

Check that the battery connections are properly installed and that the electrolyte level in each cell covers the top plates.

If necessary, top up with clean distilled water.

6.3.6 CHECK FOR LEAKS

There are several fluids used inside the generator, e.g. diesel, oil, coolant. Look for signs of leakage all around the engine.

Any source of leak should be checked and fixed. Clean up any fluid lying inside the generator and dispose of according to the appropriate local regulations.

6.4 WEEKLY MAINTENANCE

6.4.1 CHECK THE WATER/ANTIFREEZE LEVEL

Stop the engine and wait for the temperature to cool before checking the coolant level.

Check the coolant level (See Figure 5.1). Replenish with the correct coolant fluid as necessary.

Remove the pressure cap slowly to relieve the pressure of the cooling system. Failure to do so could result in personal injury from heated coolant spray (See Figure 7.2).

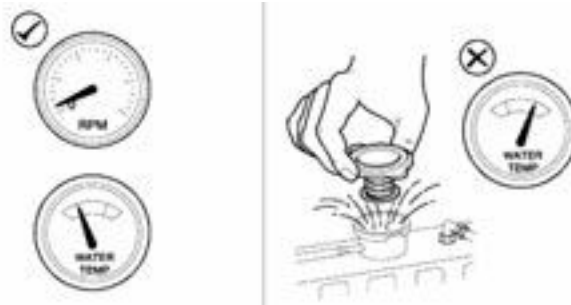


Figure 7.2 - Adding Coolant

6.4.2 CARRY OUT A VISUAL CHECK OF THE DRIVE BELTS

The cooling pump, alternator and radiator fan are driven by a dual belt arrangement from the engine pulley.

Check the belts for signs of wear. Check the belt tension

! **NOTE: Do not remove guards**

7.0 Lubrication

7.1 GENERATOR OIL CHANGE

These units are normally furnished with an initial supply of oil sufficient to allow operation of the unit for approximately 1 month or 250 hours, whichever comes first. The unit will however need to be topped up with oil during this period. If a unit has been completely drained of all oil, it must be refilled with new oil before it is placed in operation. Refer to specifications in Lubrication Table.

! NOTICE: Some oil types are incompatible when mixed and result in the formation of varnishes, shellacs, or lacquers that may be insoluble. Such deposits can cause serious problems including clogging of the filters. Where possible, do NOT mix oils of different types and avoid mixing different brands. A type or brand change is best made at the time of a complete oil drain and refill.

If the unit has been operated for the time/ hours mentioned above, it should be completely drained of oil. If the unit has been operated under adverse conditions, or after long periods in storage, an earlier change period may be necessary as oil deteriorates with time as well as by operating conditions.

An oil change is good insurance against the accumulation of dirt, sludge, or oxidized oil products.

Completely drain the reservoir and piping. If the oil is drained immediately after the unit has been run for some time, most of the sediment will be in suspension and, therefore, will drain more readily. However, the fluid will be hot and care must be taken to avoid contact with the skin or eyes.

After the unit has been completely drained of all old fluid, close the drain valve. Add oil in the specified quantity at the filler plug. Tighten the filler plug and run the machine to circulate the oil. Check the oil level when unit is warm and not running. If not near the middle of the dipstick, stop the unit and make corrections. DO NOT OVERFILL.

7.2 OIL SPECIFICATIONS

The oil required for this engine is: **Pennzoil - Quaker State - Shell**
Product Name: 15W-40 HDX

8.0 Trouble Shooting

8.1 INTRODUCTION

Trouble shooting for a generator set is an organized study of a particular problem or series of problems and a planned method of procedure for investigation and correction. The trouble-shooting chart that follows in Section 8.3 includes some of the problems that an operator may encounter during the operation of a generator set.

The chart does not attempt to list all of the troubles that may occur, nor does it attempt to give all of the answers for correction of the problems. The chart does give those problems that are most probable to occur. To use the trouble shooting chart:

- 1) Find the problem being experienced in the Symptom column on the far left.
- 2) Proceed to work through the possible causes in the next column, instigating the appropriate corrective action where required from the next column.

8.2 ACTION PLAN

A. **Think Before Acting:** Study the problem thoroughly and ask yourself these questions:

- 1) What were the warning signals that preceded the trouble?
- 2) Has a similar trouble occurred before?
- 3) What previous maintenance work has been done?

If the generator will still operate, is it safe to continue operating it to make further checks?

B. **Do The Simplest Things First:** Most problems are simple and easily corrected. Always check the easiest and most obvious things first, following this simple rule will save time and trouble.



Note: For trouble shooting electrical problems, refer to the Wiring Diagram Schematic found in Appendix C.

8.0 Trouble Shooting (Cont.)

8.2 ACTION PLAN (Cont.)

C. **Double Check Before Disassembly:** The source of most generator troubles can be traced not to one component alone, but to the relationship of one component with another. Too often, a generator can be partially disassembled in search of the cause of a certain trouble and all evidence is destroyed during disassembly. Check again to be sure an easy solution to the problem has not been overlooked.

D. **Find And Correct Basic Cause:** After a mechanical failure has been corrected, be sure to locate and correct the cause of the trouble so the same failure will not be repeated. A complaint of "premature breakdown" may be corrected by repairing any improper wiring connections, but something caused the defective wiring. The cause may be excessive vibration.

8.3 TROUBLE SHOOTING CHART

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
ENGINE DOES NOT CRANK WITH 24V STARTER MOTOR	Battery isolator off	Turn battery isolator on
	Batteries flat or bad. Read value on battery voltage meter (must be 24V).	Replace or charge batteries.
	Mini circuit breaker of 10A in terminal box is open.	Reset
	Start relay at cranking motor defective.	Measure the voltage over the start relay.
ENGINE CRANKS BUT DOES NOT START	Fuel tank empty	Fill up fuel tank.
	Air in fuel system	Check system for leaks. Bleed the fuel system.
	Dirty fuel filters	Replace fuel filters.
	Check voltage (12V or 24V) over fuel shut-off valve during crank.	Call for support.
	Optional air shutdown valves closed	Open air shutdown valve.
	Overspeed protection activated	Put key back to 0 and try to start the engine again.

8.3 TROUBLE SHOOTING CHART (Cont.)

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
ENGINE STARTS UP BUT STOPS AFTERWARDS	Air in the fuel system.	Check system for leaks. Bleed the fuel system.
	Dirty fuel filters.	Replace fuel filters.
	Overspeed during acceleration.	Decrease frequency setting.
	Shutdown after 6 seconds.	Check safeties: Oil pressure – Water temperature – Water pressure – Oil temperature (option)
ENGINE OVERSPEEDS	Frequency too high.	Adjust frequency to the correct level.
	Connection between governor and fuel pump interrupted.	Repair connection.
	Air in the fuel system.	Check system for leaks. Bleed the fuel system.

8.3 TROUBLE SHOOTING CHART (Cont.)

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
ENGINE SPEED NOT STABLE	Engine not yet at operating temperature.	Wait until engine has reached the normal operating temperature of 80-90°C.
	Dirty fuel filters.	Replace fuel filters.
	Wear in ball eyes, linkage governor / fuel pump.	Replace ball eyes.
ENGINE SHOWS EXCESS SMOKE AND / OR LACK OF POWER	Dirty air filters.	Replace air filters.
	Dirty fuel filters.	Replace fuel filters.
	Air in the fuel system.	Check system for leaks. Bleed the fuel system.
	Overload.	Check load.
ALTERNATOR DOESN'T GENERATE VOLTAGE	EXCT'N Tripped	Reset EXCT'N
	Voltmeter defective.	Measure voltage at outlet terminals of alternator. If voltage measured replace voltmeter.
	Voltage regulator defective.	Replace voltage regulator.

8.3 TROUBLE SHOOTING CHART (Cont.)

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
ALTERNATOR VOLTAGE TOO HIGH / LOW	Speed frequency too high / low.	Check frequency meter and adjust if required.
	Incorrect voltage setting.	Adjust voltage regulator.
ALTERNATOR VOLTAGE NOT STABLE	Engine speed not stable.	Check stability of engine speed.
	Incorrect stability adjustment.	Adjust stability on the voltage regulator.
MAIN CIRCUIT BREAKER WILL NOT CLOSE	Circuit breaker tripped.	Reset circuit breaker.
	Lamp 'CIRCUIT BREAKER CLOSED' defective.	Replace lamp.
MAIN CIRCUIT BREAKER CLOSES BUT TRIPS AGAIN	Switch on overload or short circuit.	Remove load.

Spare Parts Listings

KTA50G3 Spares List & Manufacturers Data

Description	QTY	Manufacturer/ Supplier	Supplier Part No.	Part No.
Charging Belt / Fan Belt	1	Cummins	3031485	N/A
Starter Motor	2	Cummins	3332269	N/A
Battery Charging Alternator	1	Cummins	3332211	N/A
Generator Control Module	1	SELCO	M1000	N/A
Lube Oil Filter	5	Baldwin	B196	N/A
Combustion Air Filter	4	Baldwin	PA1784	055664A
Secondary Fuel Filter	2	Baldwin	BF596	N/A
Primary Fuel Filter	3	Baldwin	BF590-30	N/A
Container Air Inlet Filter	6	Baldwin	PA3872	N/A
Water Filter	4	Baldwin	BW5071	N/A

Spare Parts Listings

QSK45G4 Spares List & Manufacturers Data

Description	QTY	Manufacturer/ Supplier	Supplier Part No.	Part No.
Starter Motor	1	Cummins	3039376	N/A
Battery Charging Alternator	2	Cummins	3332269	N/A
Generator Control Module	1	Cummins	3332211	N/A
Lube Oil Filter	2	SELCO	M1000	N/A
Combustion Air Filter	5	Baldwin	BD7176	N/A
Secondary Fuel Filter	2	Baldwin	PA2724	055664A
Primary Fuel Filter	3	Baldwin	BF1262	N/A
Container Air Inlet Filter	4	Baldwin	BF590-30	N/A
Water Filter	8	Baldwin	PA3873	N/A
	2	Baldwin	BW5071	N/A

Notes

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Notes

