



WARNING

To prevent electrical shock the following instruction must be followed.

Before the generator can be connected to a building's electrical system, a licensed electrician must install an isolation (transfer) switch in the building's main fuse box. The switch is the connection point for generator power and allows selection of generator or main line power to the building.

This will prevent the generator from charging the main power line (backfeeding) when the main power supply has failed or has been turned off for line repair. Backfeeding can electrocute or injure line maintenance personnel. Also, generator and building electrical system damage can occur when normal operating power returns if unit is used without an isolation switch.

FOREWORD

You are now the proud owner of a KUBOTA Diesel Engine Generator. This generator is a product of KUBOTA quality engineering and manufacturing. It is made of fine materials and under a rigid quality control system. With correct maintenance it will give you long, satisfactory service. To obtain the best use of your generator, please read this manual carefully. It will help you become familiar with the operation of the generator and contains many helpful hints about generator maintenance. It is KUBOTA's policy to utilize, as quickly as possible, every advance in our research. The immediate use of new techniques in the manufacture of products may cause some small parts of this manual to be outdated. KUBOTA distributors and dealers will have the most up-to-date information. Please do not hesitate to consult with them.



SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully. It is essential that you read the instructions and safety regulations before you attempt to assemble or use this unit.



DANGER : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



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



CAUTION : Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

IMPORTANT : Indicates that equipment or property damage could result if instructions are not followed.

NOTE : Gives helpful information.

CONTENTS

| | |
|---|----|
| ▲SAFE OPERATION | 1 |
| SERVICING OF GENERATOR..... | 1 |
| SPECIFICATIONS | 2 |
| Part Names | 3 |
| INSTRUMENT PANEL AND PART NAMES | 5 |
| Control Panel..... | 5 |
| Control Box..... | 6 |
| CIRCUIT PROTECTION | 7 |
| RCBO/RCD Testing | 8 |
| Circuit Protection Components..... | 9 |
| PREPARATION TO SUPPLY ELECTRICAL POWER | 10 |
| CONNECTING THE LOAD | 12 |
| Connection Notes..... | 12 |
| Connecting the Load | 12 |
| PRE-OPERATION CHECK..... | 14 |
| DAILY CHECK..... | 14 |
| How to Open the Door..... | 14 |
| Battery | 14 |
| Engine Oil..... | 15 |
| Coolant..... | 15 |
| Opening and Closing of the Fuel Filler Door | 15 |
| Fuel | 16 |
| CONTROL PANEL (DIGITAL) | 17 |
| Description Of Controls | 17 |
| Function Of Control Buttons | 18 |
| Controller Display | 19 |
| Viewing The Instrument Pages | 23 |
| Event Log | 26 |
| OPERATING THE GENERATOR..... | 27 |
| SAFETY DEVICES..... | 27 |
| STARTING THE ENGINE | 28 |
| ADJUSTING OUTPUT VOLTAGE | 30 |
| STOPPING THE ENGINE | 31 |
| EMERGENCY STOP (E-STOP) BUTTON | 32 |
| REMOTE START/AUTO START | 33 |
| Remote Start/Auto Start Connection | 33 |
| Remote Start/Auto Start Operation..... | 34 |
| MAINTENANCE | 35 |
| SERVICE INTERVALS..... | 36 |

CONTENTS

| | |
|---|----|
| PERIODIC SERVICE | 38 |
| FUEL | 38 |
| Fuel Level Check and Refueling | 38 |
| Cleaning the Fuel Filter Element | 39 |
| Fuel Filter Cartridge Replacement | 39 |
| Cleaning the Water Separator (Sedimenter) | 40 |
| Draining Water in the Fuel Tank..... | 40 |
| ENGINE OIL | 41 |
| Checking Oil Level and Adding Engine Oil..... | 41 |
| Changing Engine Oil | 42 |
| Replacing the Oil Filter Cartridge | 43 |
| RADIATOR..... | 43 |
| Checking Coolant Level, Adding Coolant..... | 43 |
| Changing Coolant..... | 45 |
| Remedies for Rapid Coolant Loss..... | 45 |
| Checking Radiator Hoses and Clamps | 45 |
| Precaution Overheating..... | 45 |
| Cleaning Radiator Core (outside)..... | 46 |
| Cleaning the Radiator (inside)..... | 46 |
| Anti-freeze | 46 |
| AIR CLEANER..... | 46 |
| Cleaning Primary Air Filter Element | 47 |
| Evacuator Valve | 47 |
| For the Air Cleaner with a Dust Cup..... | 47 |
| BATTERY | 48 |
| Battery Charging | 48 |
| Instructions for Long Term Storage..... | 49 |
| Jump Starting | 49 |
| ELECTRIC WIRING AND BATTERY ISOLATOR SWITCH..... | 50 |
| FAN BELT | 50 |
| Adjusting Fan Belt Tension | 50 |
| FULLY BUNDED | 51 |
| TRANSPORTING / STORAGE | 52 |
| Transporting | 52 |
| Lifting Procedure | 52 |
| Storage..... | 53 |
| TROUBLESHOOTING | 54 |
| Digital Control Panel Warning And Shutdown Alarms..... | 54 |
| Engine | 55 |
| When it is Difficult to Start the Engine | 57 |
| When Starter does not Start..... | 57 |
| When Output is Insufficient | 58 |
| When Engine Suddenly Stops..... | 58 |
| When Color of Exhaust Smoke is Black and Excessive..... | 58 |
| When Engine must be Stopped Immediately | 59 |
| When Engine Overheats | 59 |
| Generator Troubleshooting | 60 |
| WIRING DIAGRAM | 61 |



SAFE OPERATION

Careful operation is your best insurance against an accident. Read and understand this operator's manual carefully before operating the generator. All operators, no matter how much experience they may have had, should read this manual and all labels on the generator before operating the generator. It is the owner's responsibility to instruct all operators in safe operation.

Be sure to observe the following for safe operation.

OBSERVE SAFETY INSTRUCTIONS



CAUTION

To avoid personal injury:

- Read and understand carefully this OPERATOR'S MANUAL and LABELS ON THE GENERATOR before attempting to start and operate the generator.
- 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 generator, explain to them how to operate and have them read this manual before operation.
- DO NOT modify the engine by yourself. UNAUTHORIZED MODIFICATIONS to the engine may impair the function and / or safety and affect engine life.



1AAACAAAP008B

WEAR SAFETY CLOTHING



CAUTION

To avoid personal injury:

- DO NOT wear loose, torn or bulky clothing around the generator that may catch on working controls and projections causing personal injury.
- Use additional safety items, e.g. hard hat, safety protections, gloves, etc., as appropriate or required.
- DO NOT operate generator or any equipment attached to it while under the influence of alcohol, medication, or other substances, or while fatigued.
- DO NOT wear radio or music headphones while operating the generator.



1AEAAAAAP0130

CHECK BEFORE OPERATION & STARTING THE ENGINE



CAUTION

To avoid personal injury:

- Always turn off the circuit breaker and all switches for the electrical devices before starting the generator.
- Check the wiring and connections of the electrical devices before starting the generator.
- Be sure to check the engine before operation. If something is wrong with the engine, repair it immediately and before operation.
- Keep all guards and shields in place before operating the generator. Replace any that are damaged or missing.
- Check to see that bystanders are in a safe distance from the generator before starting.
- Always keep the generator at least 1 m away from buildings and other facilities.
- DO NOT allow children or livestock to approach the generator while the engine is running.
- DO NOT start the engine by shorting across starter terminals or bypassing normal starting circuit. The generator may start unexpectedly causing electric shock to others.



1BAABADAP0010

HANDLING ELECTRICAL COMPONENTS



CAUTION

To avoid personal injury:

Always exercise extra caution when handling electrical equipment. Careless handling of electrical components can cause serious personal injury, death by electrocution or property damage.

- DO NOT touch the electrical system during operation.
- Connect or disconnect the load to the AC receptacles or terminals only when the engine is stopped.
- Make certain that all power cables and wiring are in good condition. Bare wire or frayed insulation can cause dangerous electrical shock, burns or death.
- DO NOT use the generator in standing water. Handling terminals and cables with wet hands can result in personal injury or death.
- Always shut the engine off and allow to cool before cleaning. Use water sparingly when cleaning the outside of the generator. Make sure that water does not splash onto the electrical system or into the generator.
- DO NOT touch the generator with wet hands. You may get an electric shock that can cause burns or death.
- DO NOT connect this generator to any building's electrical system unless an isolation switch has been installed by a licensed electrician.
- DO NOT run other generators in parallel.



D-2282



D-2281

KEEP THE AREA AROUND THE ENGINE CLEAN



CAUTION

To avoid personal injury:

- Be sure to stop the engine before cleaning.
- Keep the engine clean and free of accumulated dirt, grease and trash to avoid a fire. Store flammable fluids away from sparks and fire.
- DO NOT stop the engine without idling. Sudden stops can cause temperatures around the engine to rise suddenly. Keep the engine idling for about 5 minutes before stopping.



1AEAAAAAP0120

SAFE HANDLING OF FUEL AND LUBRICANTS



CAUTION

To avoid personal injury:

- Always stop the engine before refueling and/or lubricating.
- DO NOT smoke or allow flames or sparks in the working area. Fuel is extremely flammable and explosive under certain conditions.
- Refuel only when the engine has cooled off. Refuel in a well ventilated and open place. When fuel and lubricants are spilled, clean them up before starting the engine.
- DO NOT mix gasoline or alcohol with diesel fuel. The mixture can cause a fire and damage engine components.
- Operate the generator on a firm and level surface only. DO NOT tilt or move the generator while it is running since this can cause fuel spillage.



1AAACAAAP001A

EXHAUST GASES & FIRE PREVENTION



WARNING

To avoid personal injury:

- Engine exhaust fumes can be very harmful if allowing them to accumulate. Be sure to run the engine in a well ventilated place and where there are no people or livestock near the generator.
- DO NOT operate the generator in a closed area such as inside houses, warehouses, tunnels, wells, ship holds, tanks, etc. or places without proper ventilation.
- DO NOT operate the generator where the building or other obstructions block off air circulation or where exhaust gas can accumulate.
- The exhaust gas from the muffler is very hot. To prevent a fire, DO NOT expose to dry grass, papers, oil and any other combustible materials to exhaust gas. Also, keep the engine and muffler clean at all times.
- To avoid fire, be alert for leaks of flammables from hoses and lines. Be sure to check for leaks from hoses or pipes, such as fuel and engine oil 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 wiring are in good condition.
- Keep all power connections clean and tight. Bare wire or frayed insulation can cause a dangerous electrical shock and personal injury.



HANDS AND BODY AWAY FROM THE ROTATING PARTS



DANGER

To avoid personal injury:

- DO NOT operate the generator with the side covers removed or open. Serious personal injury may result if fingers or clothing are caught in the rotating parts.
- Be sure to stop the engine before checking or adjusting belt tension and cooling fan.
- To avoid personal injury, keep your hands and body away from the rotating parts, such as cooling fan, V-belt, fan drive V-belt, pulleys or flywheel.
- DO NOT run the engine with installed safety guards detached. Install safety guards securely before operation.



1ABAAAAAP1470

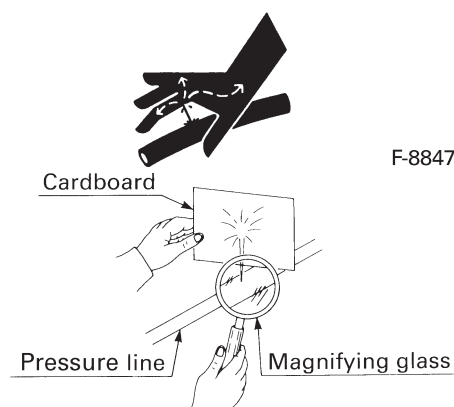
ESCAPING FLUID



CAUTION

To avoid personal injury:

- Relieve all pressure in the oil and the cooling systems before any lines, fittings or related items are removed or disconnected.
- Be alert for possible pressure when disconnecting any device from a system that utilizes pressure.
DO NOT check for pressure leaks with your hand.
High pressure oil or fuel can cause serious personal injury.
- Escaping 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 or body. Use safety goggles or other eye protection when checking for leaks.
- If injured by escaping fluid, see a medical doctor at once.
This fluid can produce gangrene or severe allergic reaction.



F-8847

F-2359

CAUTIONS AGAINST BURNS & BATTERY EXPLOSION



CAUTION

To avoid personal injury:

- To avoid burns, be alert for hot components, e.g. muffler, muffler cover, radiator, pipes, hoses, engine body, coolant, engine oil, etc. during operation and just after the engine has been shut off.
- DO NOT remove the radiator cap while the engine is running or immediately after stopping. Otherwise hot water from the radiator will escape under pressure causing injury by scalding. Wait for more than 10 minutes to allow the coolant to cool down, before removing the cap.
- Make sure to close the drain valve of coolant and engine oil, close radiator pressure cap and tighten hose clamps before operating. If any of these parts are taken off, or left loose, serious personal injury can result.
- 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 when charging the battery. DO NOT strike a match near the battery.
- DO NOT check battery charge by placing a metal object across the terminals. Use a voltmeter or hydrometer.
- DO NOT charge battery if frozen, there is a risk of explosion. When battery is frozen, allow the battery to warm up to 16°C (61°F) before charging.
- DO NOT use or charge the battery if its fluid level is below the LOWER (lower limit level) mark (refillable type battery only).

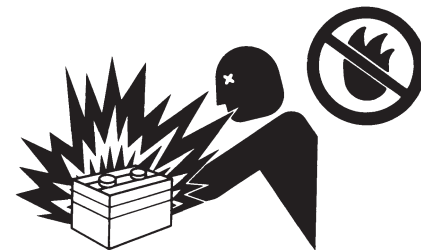
Otherwise, the component parts may deteriorate earlier than expected, which may shorten the service life or cause an explosion. Add distilled water until the fluid level is between the UPPER and LOWER levels.



1AEABAAAP0080



1AAAAABAP0230



1ARAEAAAP0520

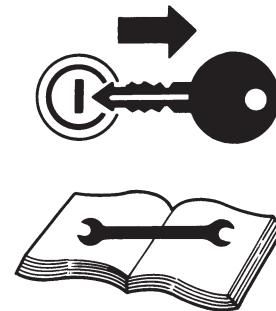
CONDUCTING SAFETY CHECKS & MAINTENANCE



CAUTION

To avoid personal injury:

- Know how to stop the generator quickly, and understand operation of all the controls. DO NOT permit anyone to operate the generator without proper instruction.
- When checking engine or servicing, place the generator in an open area and level ground. DO NOT work on anything that is supported ONLY by lift jacks or a hoist. Always use blocks or safety stands to support the generator before servicing.
- When servicing, disconnect the battery by switching the battery isolator to the "OFF" position. Put a "DO NOT OPERATE!" tag on the key switch and remove the key to avoid accidental starting.
- To avoid sparks from an accidental short circuit, always disconnect the battery's ground cable (-) first and connect it last.
- When conducting any connection/disconnection, repairs, or inspection of the AC electrical system, ensure that all external power sources are disconnected and the generator is correctly isolated from operating.
- Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skins and clothing and cause blindness if splashed into eyes. Keep electrolyte away from eyes, hands and clothing. If you spill electrolyte on yourself, flush with water, and get medical attention immediately.
- 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, coolant, muffler, or muffler cover have cooled off completely.
- Always use the appropriate lifting equipment and make sure safety stands are in good condition when performing any service work. Make sure that you understand how to use the equipment before servicing.
- Use ONLY the correct engine flywheel rotating techniques for manually rotating the engine. DO NOT attempt to rotate the engine by pulling or prying on the cooling fan or V-belt. This practice can cause serious personal injury or premature machine damage to the cooling fan.
- Replace fuel, lubricant and coolant hoses with their hose clamps every 2 years or earlier if required. They are made of rubber and deteriorate over time whether used or not.
- When servicing is performed together by two or more persons, take care to perform all work safely.
- Keep first aid kit and fire extinguisher handy at all times.



1BJABAAAP0200

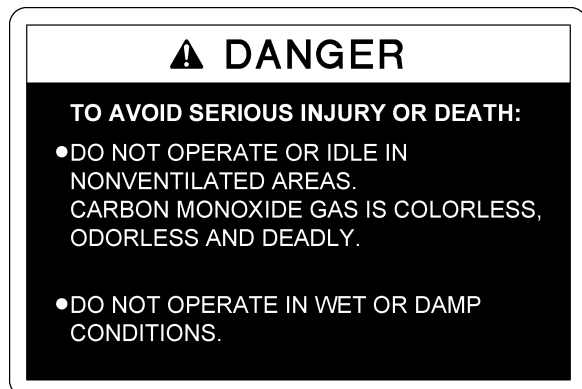
DANGER, WARNING AND CAUTION LABELS

Pay special attention to all labels on the generator.

Refer to following representations for labels used on the KJ-Series Generator. Labels are available individually from your KUBOTA Dealer.

(1) Part No. G3341-8851-0

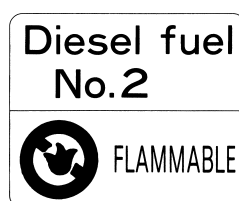
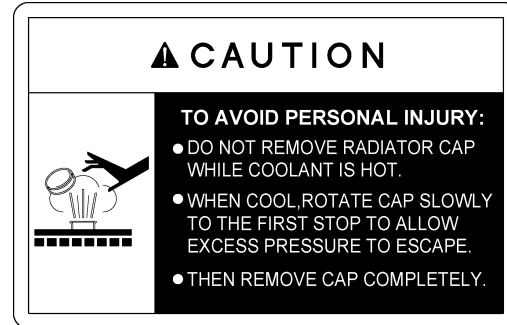
1AEAEAAP0730

(2) Part No. G3341-8824-0

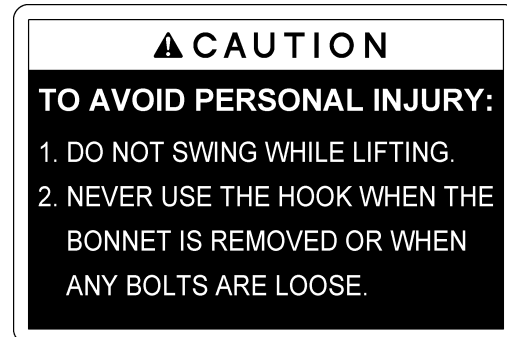
1AEAEAAP0670

(3) Part No. 18620-8806-0

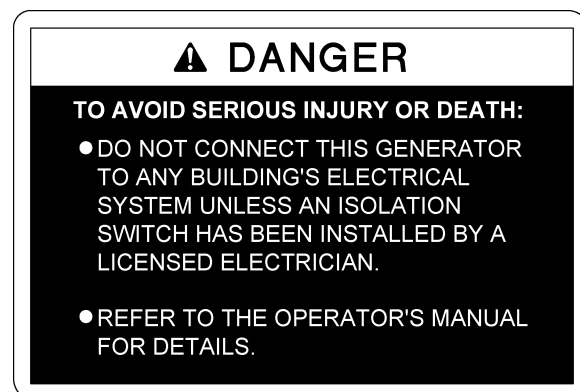
1AEAEAAP0790

(4) Part No. 18901-5090-0**(5) Part No. G3907-8832-0**

1AEAEAAP0800

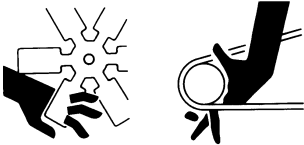

(6) Part No. G3352-8836-0

1AEAEAAP0750




(7) Part No. G3341-8831-0

1AEAEAAP0700

(8) Part No. G3781-8825-0

| | |
|--|---|
| <p>⚠ CAUTION</p>  <p>SERIOUS PERSONAL INJURY MAY RESULT IF FINGERS OR CLOTHING ARE CAUGHT IN ROTATING PARTS.</p> <p>DO NOT OPERATE THE MACHINE WITH THE SIDE COVERS OR ACCESS DOORS REMOVED OR OPEN.</p> | <p>⚠ CAUTION</p>  <p>SERIOUS PERSONAL INJURY MAY RESULT FROM CONTACT WITH LIVE PARTS.</p> <p>DO NOT OPERATE THE MACHINE WITH THE SIDE COVERS OR ACCESS DOORS REMOVED OR OPEN.</p> |
|--|---|

(9) Part No. 3T501-813

| | | | |
|--|--|---|--|
|  | <p>⚠ WARNING</p> <p>AUTO START GENERATOR</p> <p>This generator may start at any time. Lock-out / tagout before servicing.</p> |  | <p>⚠ DANGER</p> <p>ELECTRIC SHOCK HAZARD</p> <p>Equipment may be powered by multiple sources. Lock out all sources before servicing.</p> |
|  | <p>⚠ DANGER</p> <p>HAZARDOUS VOLTAGE ENCLOSED</p> <p>Voltage or current hazard sufficient to cause shock, burn or death. Disconnect and lock out power before servicing.</p> | | |

(10) Part No. 3T501-814

OPERATING INSTRUCTIONS

Before operating the engine, please read the Operator's Manual carefully to ensure safe operation.

1. Check the engine oil level and add, if the level is low.
2. Check the engine coolant level and add, if the level is low.
3. Check the fuel level and add, if the level is low.
4. Make sure the engine room and terminal cover are closed, and the battery isolator is in the ON position.
5. Turn off the electrical device connected to the Generator.
6. Check the Circuit breaker and set to OFF position.
7. Check that the Emergency Stop is reset.
8. For details of other inspection items and notes on safe operation, please read the Operator's Manual.

Starting and operation

1. Turn the key to the RUN position. ⏻
2. Press the START button on the controller to begin the start sequence.

⚠ CAUTION

After 3 automatic attempts to start, the controller will terminate the start sequence. If the generator fails to start, press the STOP button on the controller to reset. Return to Step 2. Do not open the engine room or terminal cover during the start sequence or operation.

3. Make sure that no warnings are showing on the controller.
4. Operate the engine with no load for a few minutes.
5. Turn ON the Circuit breaker.
6. Turn ON the electrical device connected to the Generator.

Stopping the engine

1. Turn OFF the electrical device connected to the Generator.
2. Set the Circuit breaker to OFF.
3. Operate the engine with no load for a few minutes.
4. Press the STOP button on the controller, and turn the key to OFF. ⏻

Remote start / Auto start

Refer to Operator's Manual.

(11) Part No. 4T501-XXX

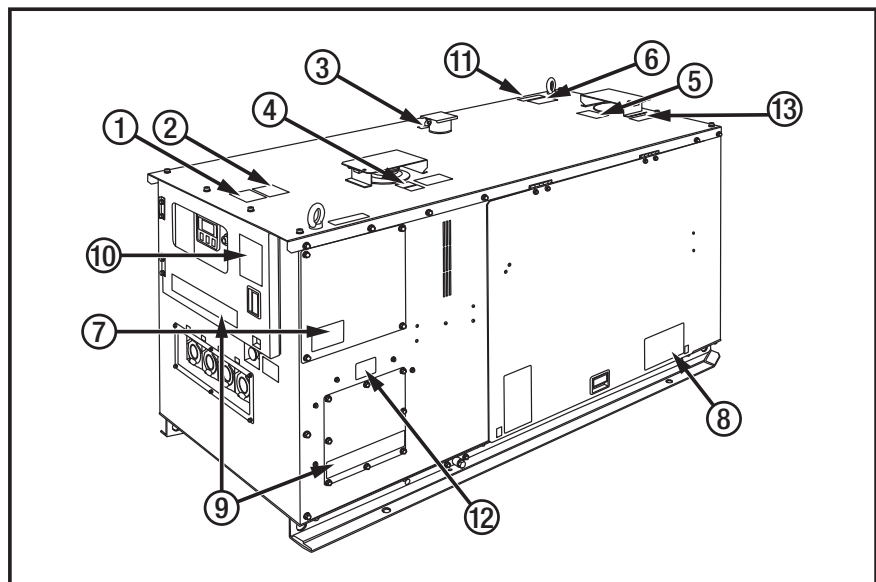


(12) Part No. 4T501-811

NOTICE
MEN LINK FITTED
AT TERMINAL BLOCK 1
See Operator's manual for Details

(13) Part No. TA040-4957-1

Do not get your hands close to engine fan and fan belt.



CARE OF DANGER, WARNING AND CAUTION LABELS

1. Keep danger, warning and caution labels clean and free from obstructing material.
2. Clean danger, warning and caution labels with soap and water, dry with a soft cloth.
3. Replace damaged or missing danger, warning and caution labels with new labels from your local KUBOTA Dealer.
4. If a component with danger, warning and caution label(s) affixed is replaced with new part, make sure new label(s) is (are) attached in the same location(s) as the replaced component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

SERVICING OF GENERATOR

Your dealer is interested in your new generator and has the desire to help you get the most value from it. After reading this manual thoroughly, you will find that you can do some of the regular maintenance yourself.

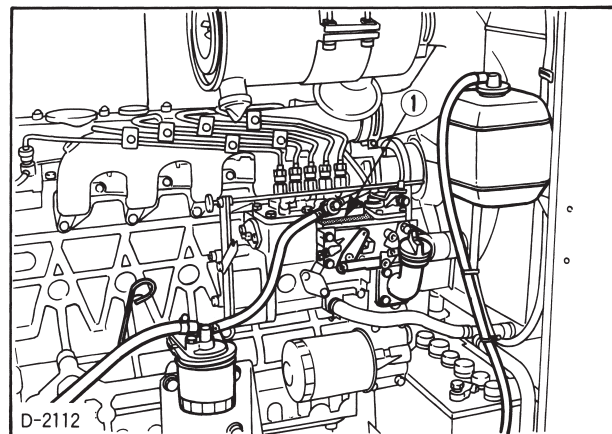
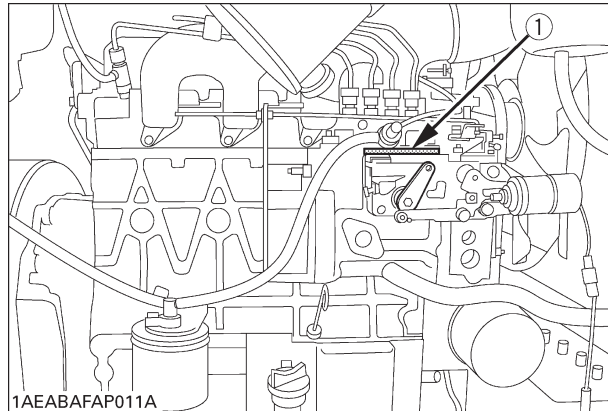
However, when in need of parts or major service, be sure to see your KUBOTA Dealer.

For service, contact the KUBOTA Dealership from which you purchased your generator or your local KUBOTA Dealer.

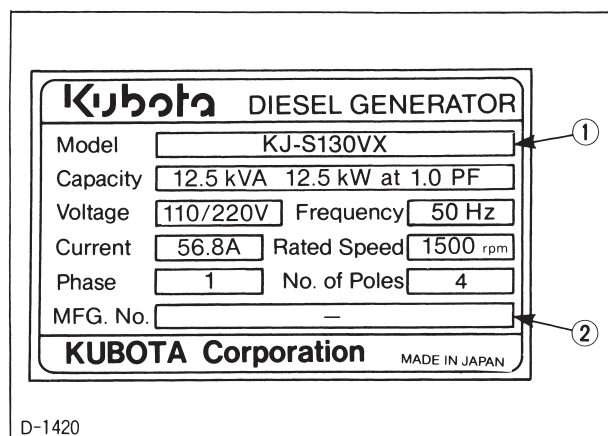
When in need of parts, be prepared to give your dealer the generator and engine serial numbers.

Locate the serial numbers now and record them in the space provided below.

| | Model | Serial No. |
|--------------------------------|-------|------------|
| Generator | | |
| Engine | | |
| Date of Purchase | | |
| Name of Dealer | | |
| (To be filled in by purchaser) | | |



(1) Engine model and serial number



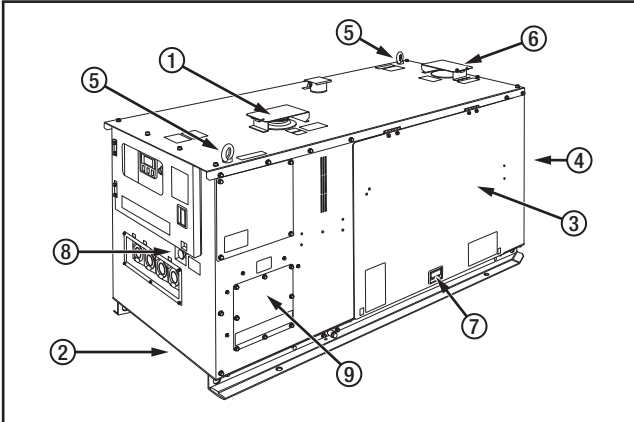
(1) Generator model

(2) Generator serial number

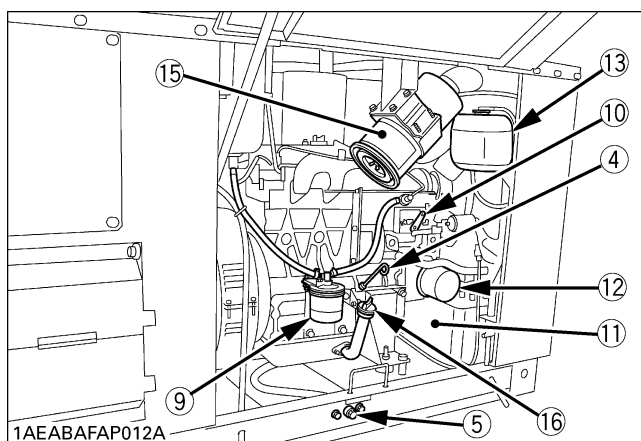
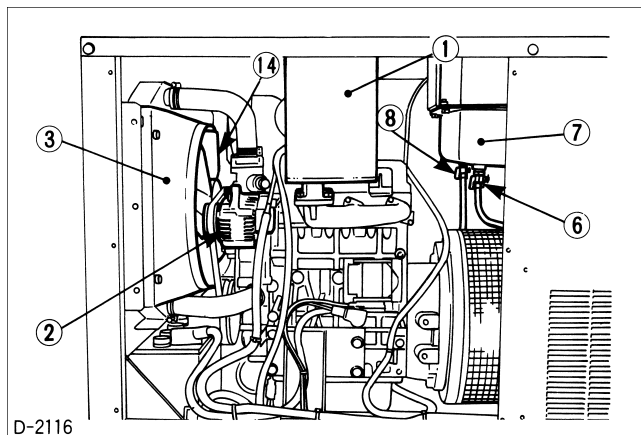
SPECIFICATIONS

| Model | Unit | KJ-S130-AU-B | KJ-T130-AU-B | KJ-T180-AU-B | KJ-S230-AU-B | KJ-T300-AU-B |
|-------------------------------|----------|---|------------------|------------------|-------------------|-------------------|
| Generator | | | | | | |
| Generator type | | PX-316KU1 | PX-312KU3 | PX-316KU3 | PX-322KE1 | PX-322KE3 |
| Design | | Revolving field, self-excited brushless AC generator | | | | |
| Frequency | Hz | 50 | 50 | 50 | 50 | 50 |
| Standby Ouput | kVA | 13.8 | 13.8 | 19.8 | 25.3 | 33.0 |
| | kW | 13.8 | 11.0 | 15.8 | 25.3 | 26.4 |
| Continuous Output | kVA | 12.5 | 12.5 | 18.0 | 23.0 | 30.0 |
| | kW | 12.5 | 10.0 | 14.4 | 23.0 | 24.0 |
| Rated Voltage | V | 240 | 240/415 | 240/415 | 240 | 240/415 |
| No. of Phase | kW | 1 Phase 4 Wire | 3 Phases 12 Wire | 3 Phases 12 Wire | 1 Phase 4 wires | 3 Phases 12 wires |
| Power factor | % | 100 | 80 | 80 | 100 | 80 |
| No. of Poles | | 4-Pole | 4-Pole | 4-Pole | 4-Pole | 4-Pole |
| Insulation Class | | Class H | Class H | Class H | Class H | Class H |
| Voltage Regulation | % | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| Type of Coupling | | Direct drive | Direct drive | Direct drive | Direct drive | Direct drive |
| Diesel Engine | | | | | | |
| Model | | V2203 | D1703 | V2203 | V3300 | V3300 |
| Type | | Vertical, water-cooled, 4-cycle diesel engine | | | | |
| No. of cylinders | | 4 | 3 | 4 | 4 | 4 |
| Bore x Stroke | mm | 87 x 92.4 | 87 x 92.4 | 87 x 92.4 | 98 x 110 | 98 x 110 |
| Displacement | mL | 2197 | 1647 | 2197 | 3318 | 3318 |
| Engine Speed | rpm | 1500 | 1500 | 1500 | 1500 | 1500 |
| Continuous Rated Output | kW | 16.9 | 12.7 | 16.9 | 27.6 | 27.6 |
| Lubricating Oil | | API service class CF or higher | | | | |
| Oil capacity | L | 7.6 | 5.6 | 7.6 | 13.2 | 13.2 |
| Coolant capacity* | L | 9.0 | 8.0 | 9.0 | 9.5 | 9.5 |
| Set | | | | | | |
| Fuel | | Diesel fuel No.2-D (ASTM D975) | | | | |
| Fuel Consumption at full load | L/h | 5.3 | 4 | 5.3 | 7.7 | 7.7 |
| Fuel tank capacity | L | 37 | 37 | 37 | 68 | 68 |
| Continous operating hours | hrs | 7.0 | 9.3 | 7.0 | 8.8 | 8.8 |
| Battery | (AH/5Hr) | 95D31R (12 x 64) | 95D31R (12 x 64) | 95D31R (12 x 64) | 130E41R (12 x 92) | 130E41R (12 x 92) |
| Starting sytem | | Electric | Electric | Electric | Electric | Electric |
| L x W x H | mm | 1518 x 650 x 971 | 1423 x 650 x 971 | 1518 x 650 x 971 | 1785 x 805 x 1046 | 1735 x 805 x 1046 |
| Approx. Net Weight (Wet) | kg | 505 | 505 | 470 | 630 | 880 |
| Controller | | Digital Control Panel DSE4520 | | | | |
| Shutdown system | | In case of abnormal Oil Pressure or water temperature | | | | |
| | | Emergency stop button, Engine Room Door Opened | | | | |
| | | Load Centre Cover removed, Alternator charge fail | | | | |
| | | Over Voltage/Frequency/Current/Power, Under voltage/frequency | | | | |
| Remote Start | | 2 Wire | | | | |
| AMPS | | | | | | |
| Single Phase Current | A | 52.1 | | | 95.8 | |
| Three Phase Current | | | 17.4 | 25.0 | | 41.7 |

*Including reserve tank

Part Names

- (1) Fuel tank cap
- (2) Cooling air inlet
- (3) Door
- (4) Cooling air outlet
- (5) Handling hook
- (6) Radiator top cover
- (7) Door handle
- (8) Emergency stop
- (9) Load center cover



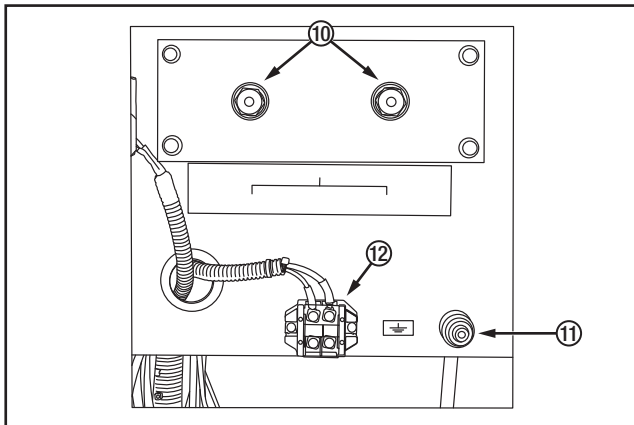
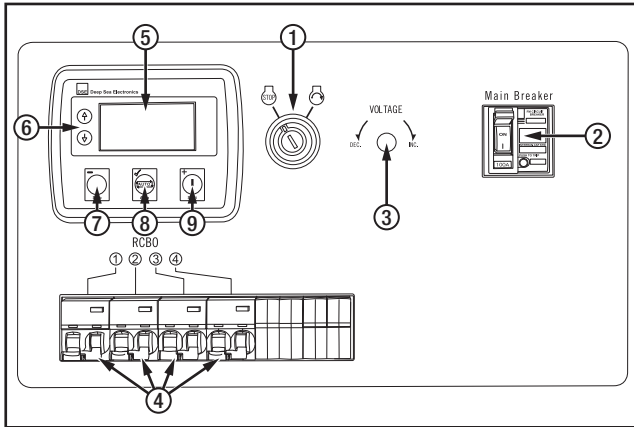
- (1) Muffler
- (2) Alternator
- (3) Radiator
- (4) Oil dipstick
- (5) Engine oil drain plug
- (6) Fuel tank drain tap
- (7) Fuel tank
- (8) Fuel tank tap
- (9) Fuel filter cartridge
- (10) Stop lever
- (11) Battery
- (12) Oil filter cartridge
- (13) Reserve tank
- (14) Fan
- (15) Air cleaner
- (16) Engine oil port

INSTRUMENT PANEL AND PART NAMES

■ Control Panel

◆ 1 Phase Type

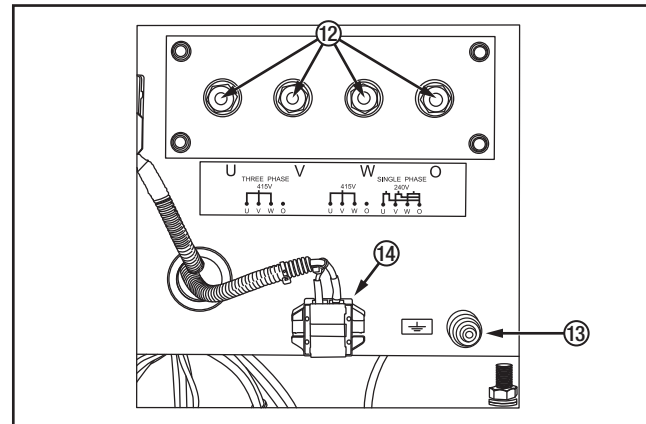
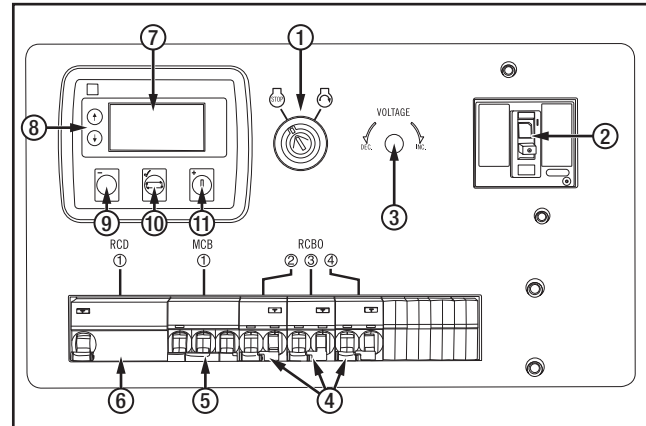
[KJ-S130, KJ-S230]



- (1) Main switch (key)
- (2) Circuit breaker (MCCB)
- (3) Voltage adjuster
- (4) RCBO
- (5) Digital control panel
- (6) Menu navigation button
- (7) Stop / Reset button
- (8) Auto start mode button
- (9) Manual / Start button
- (10) Terminals (load center)
- (11) Ground terminal
- (12) Terminal block

◆ 3 Phase Type

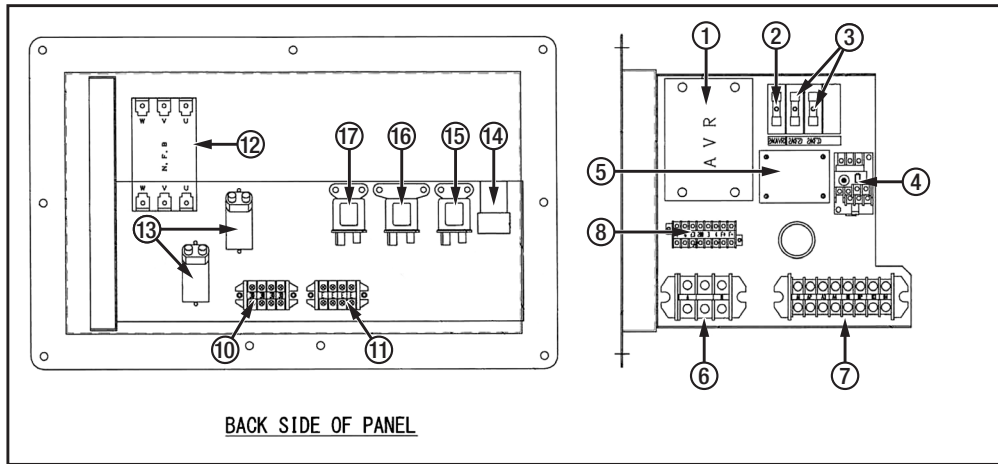
[KJ-T130, KJ-T180, KJ-T300]



- (1) Main switch (key)
- (2) Circuit breaker (MCCB)
- (3) Voltage adjuster
- (4) RCBO
- (5) MCB
- (6) RCD
- (7) Digital control panel
- (8) Menu navigation button
- (9) Stop / Reset button
- (10) Auto start mode button
- (11) Manual / Start button
- (12) Terminals (load center)
- (13) Ground terminal
- (14) Terminal block

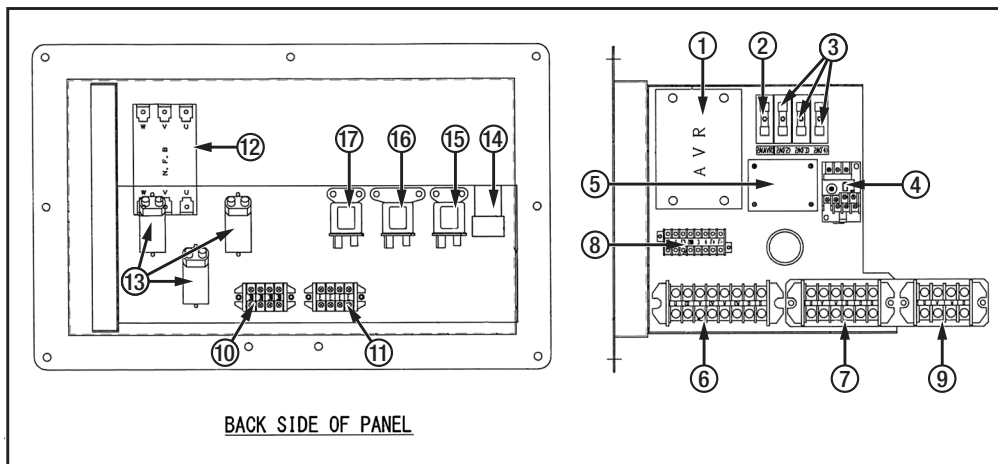
■ Control Box

◆ 1 Phase Type



- (1) AVR
- (2) Fuse for AVR
- (3) Fuse for CT
- (4) Thermal Relay
- (5) Printed Board for Fuse
- (6) Terminal for TB1
- (7) Terminal for TB2
- (8) Terminal for TB3
- (9) Terminal for TB4
- (10) Terminal for TB6
- (11) Terminal for TB7
- (12) Main Circuit Breaker
- (13) Current Transformer
- (14) Relay
- (15) Solenoid Relay
- (16) Glow relay
- (17) Starter Relay

◆ 3 Phase Type



CIRCUIT PROTECTION

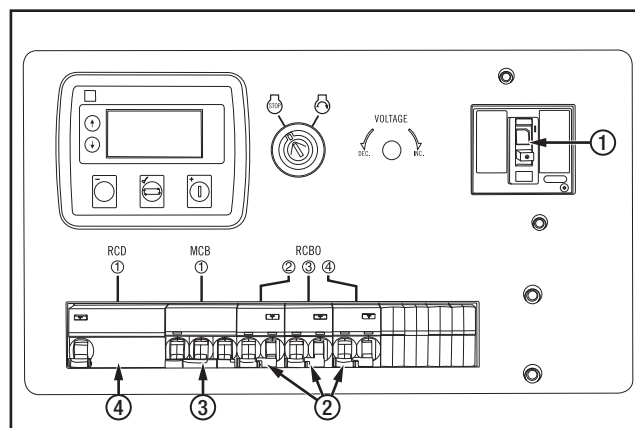


WARNING

- This Generator is fitted with a Neutral-Earth connection at Terminal Block 1 (prior to the MCCB). Removal of this connection will result in non-operable RCD's and risk of electrocution.
- All electrical work must be carried out by a qualified electrician.
- Do not operate in standing water
- The load center terminals are NOT RCD protected. Ensure that an RCD is utilized at the installation as required, and that the installations earth is wired to the generator earthing terminal.
- The load center terminal is supplied by an Neutral-Earth bonded system.
- If the equipment/installation requires the removal of the Neutral-Earth connection at the generator, the Receptacles MUST be locked out from us until the Neutral-Earth connection At Terminal Block 1 is restored.

This generator has been designed and manufactured in accordance with AS/NZS3000 and its reference standards as deemed relevant. Testing has been conducted in accordance with AS/NZS3017.

- Neutral-Earth connection has been installed at the Terminal Block 1. Combined RCD and Circuit breakers (RCBOs) are connected to each single phase receptacle (socket outlet), and RCD protection on the Three Phase receptacle. In accordance with AS/NZS3012, for generators supplying power through RCD protected receptacles, it is not required, nor recommended to fit an earth stake to the generator. Please consult a licensed electrician for advice on earthing requirements for other applications, and installations using the load center terminals.



- (1) MCCB
 (2) RCBO
 (3) MCB (3 phase type)
 (4) RCD (3 phase type)

1. Molded Case Circuit Breaker (MCCB)

To protect the generator from short circuit and thermal overload, a 2-pole (Single Phase) or 3-pole (Three Phase) MCCB is equipped from factory. This circuit breaker also acts as the main AC power switch for the generator. This breaker is fitted with a shunt trip which is operated in the case of thermal overload (from the thermal relay), or by emergency shutdown from the digital controller.

2. Miniature Circuit Breaker (MCB)

To protect the three phase receptacle from short circuit, a 3-pole (Three Phase) MCB is equipped from factory. This breaker operates in the receptacles circuit only (Does not operate for the load center terminals).

3. Residual Current Device (RCD)

To protect the end user from electrocution in case of an electrical fault, the Three phase receptacle is wired to a 4-pole 30mA Residual Current Device (RCD). Each RCD protected outlet is tested at factory in accordance with AS3017 to ensure correct operation.

4. Residual Current Circuit Breaker (RCBO)

To protect the end user from electrocution in case of an electrical fault, each single phase receptacle is wired to a 30mA Residual Current Circuit Breaker (RCBO). An RCBO is a combination of a Residual Current Device (RCD) with a Circuit Breaker, giving protection against short circuit as well as electrocution. Each RCBO protected outlet is tested at factory in accordance with AS3017 to ensure correct operation.

5. IP66 Receptacles (Socket Outlets)

The receptacles fitted are weather proof IP66 rated items.

■ RCBO/RCD Testing

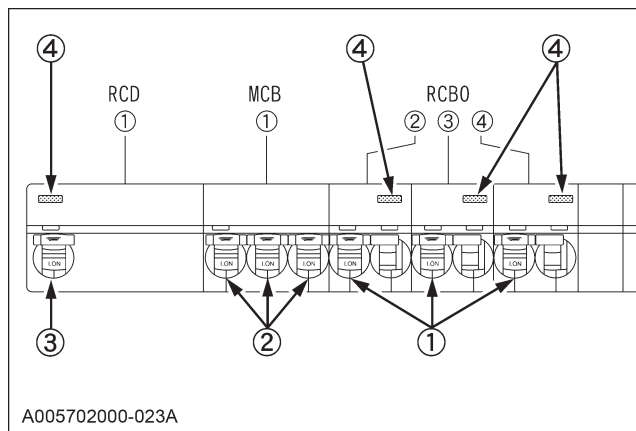
Each RCBO should be tested regularly to ensure correct operation. Testing should be conducted on a weekly basis.



WARNING

- Using the generator with a nonfunctioning RCBO/RCD can result in electrocution in the event of an electrical fault. Ensure that the RCBO/RCD is tested regularly, and that if a fault is found the unit is locked out of operation immediately.
- All electrical work must be carried out by a qualified electrician.

- (1) Follow the standard starting procedure for the generator
- (2) Remove any items that may be plugged into the receptacles
- (3) Turn the MCCB, MCB and all RCBO/RCD's to the "ON" position (switch up)



- (1) RCBO
- (2) MCB
- (3) RCD
- (4) "T" Test button

- (4) Press the "T" test button at the top of the RCBO/RCD. The RCBO/RCD should trip to the "OFF" position when the test button is depressed. If this does not occur, Stop the generator immediately, remove the keys and lock out the unit from operation. Ensure the fault is rectified by a qualified electrician before using the generator again.

- (5) If the RCBO/RCD tests okay, proceed to plug the load back into the receptacles and operate as normal.

■ Circuit Protection Components

The following table shows the electrical components used on the generator and their rating.

| Item | KJ-S130-AU-B | |
|-------------|---|------|
| | Type | Qty. |
| MCCB | 60A, 2-Pole | 1 |
| RCBO | 16A, Combination RCD/MCB, 2-Pole, 30mA, 6kA, C-Curve, 230V | 4 |
| Receptacles | Series 56, IP66 15A, 240V | 4 |
| Item | KJ-S230-AU-B | |
| | Type | Qty. |
| MCCB | 100A, 2-Pole | 1 |
| RCBO | 16A, Combination RCD/MCB, 2-Pole, 30mA, 6kA, C-Curve, 230V | 4 |
| Receptacles | Series 56, IP66 15A, 240V | 4 |
| Item | KJ-T130-AU-B | |
| | Type | Qty. |
| MCB | 25A, 3-Pole | 1 |
| MCCB | 20A, 2-Pole, 10kA, 415V | 1 |
| RCD | 40A, 4-Pole, 30mA, 10kA, C-Curve, 415V | 1 |
| RCBO | 16A, Combination RCD/MCB, 2-Pole, 30mA, 6kA, C-Curve, 230V | 3 |
| Receptacles | Series 56, IP66 15A, 240V | 3 |
| | Series 56, IP66 32A, 5 Pin 415V | 1 |
| Item | KJ-T180-AU-B | |
| | Type | Qty. |
| MCB | 32A, 3-Pole | 1 |
| MCCB | 30A, 2-Pole, 10kA, 415V | 1 |
| RCD | 40A, 4-Pole, 30mA, 10kA, C-Curve, 415V | 1 |
| RCBO | 16A, Combination RCD/MCB, 2-Pole, 30mA, 6kA, C-Curve, 230V | 3 |
| Receptacles | Series 56, IP66 15A, 240V | 3 |
| | Series 56, IP66 32A, 5 Pin 415V | 1 |
| Item | KJ-T300-AU-B | |
| | Type | Qty. |
| MCB | 32A, 3-Pole | 1 |
| MCCB | 50A, 3-Pole, 10kA, 415V | 1 |
| RCD | 40A, 4-Pole, 30mA, 10kA, C-Curve, 415V | 1 |
| RCBO | 16A, Combination RCD/MCB, 2-Pole, 30mA, 6kA, C-Curve, 230V | 3 |
| Receptacles | Series 56, IP66 15A, 240V | 3 |
| | Series 56, IP66 32A, 5 Pin 415V | 1 |

PREPARATION TO SUPPLY ELECTRICAL POWER



WARNING

- This Generator is fitted with a Neutral-Earth connection at Terminal Block 1 (prior to the MCCB). Removal of this connection will result in non-operable RCD's and risk of electrocution.
- All electrical work must be carried out by a qualified electrician.
- Do not operate in standing water
- The load center terminals are NOT RCD protected. Ensure that an RCD is utilized at the installation as required, and that the installations earth is wired to the generator earthing terminal.
- The load center terminal is supplied by a Neutral-Earth bonded system.
- If the equipment/installation requires the removal of the Neutral-Earth connection at the generator, the Receptacles MUST be locked out from use until the Neutral-Earth connection At Terminal Block 1 is restored.

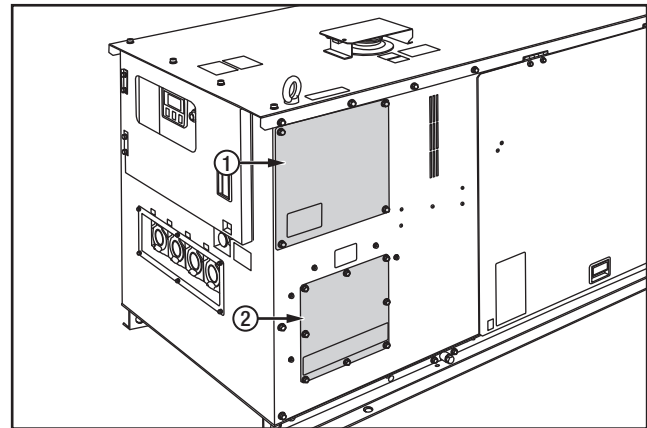
1. Generator connection and grounding

The end user, equipment owner or operator must contact a Licensed Electrician to determine the approved generator grounding and connection method to be used in their application or location.

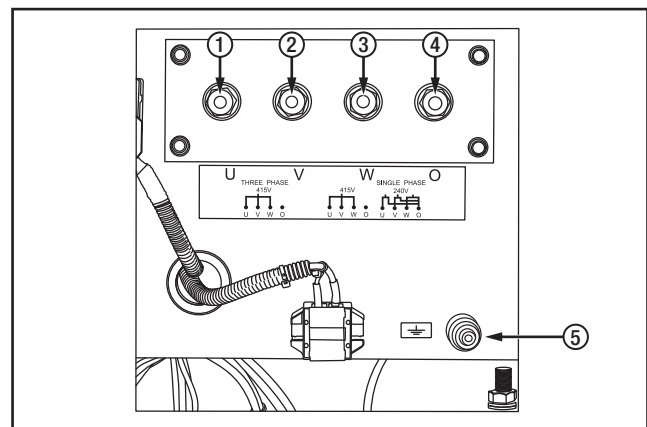
The generator has been designed and manufactured in accordance with AS/NZS3000 and its reference standards as relevant. Testing has been conducted in accordance with AS/NZS3017.

- Neutral-Earth connection has been installed at Terminal Block 1, and RCBO/RCD's are fitted for each receptacle (socket outlet). In accordance with AS/NZS3012, for generators supplying power through RCD protected receptacles it is not required, nor recommended, to fit an earth stake to the generator. Please consult a licensed electrician for advice on earthing requirements for other applications and installations.

Where the load center is used to connect to an external installation (house, site office, distribution board etc), the connection shall be made in accordance with the relevant Australian Standards as deemed by a licensed electrician. The load center terminal is supplied by a Neutral-Earth bonded system. The terminals are NOT RCD protected. RCDs shall be fitted at the external installation in accordance with the relevant Australian Standards. Please consult a licensed electrician for further advice.



(1) Terminal block 2
(2) Load center



(1) L1
(2) L2
(3) L3
(4) Neutral
(5) Earth

2. Recommended capacity of electrical devices

APPLICATION RANGE

You can operate the SQ-series generator in the following range.

| Typical Apparatus | Light and heaters | Commutator motor | Induction motor |
|-------------------|-----------------------|-----------------------|---------------------|
| KJ-S130 | 12.5 kVA (12.5 kW) | 8.0 kVA (6.4 kW) | — |
| KJ-S230 | 23.0 kVA (23.0 kW) | 14.4 kVA (11.5 kW) | — |
| KJ-T130 | 10.0 kVA (10.0 kW) | 7.5 kVA (6.0 kW) | 5.5 kW 3 Phases |
| KJ-T180 | 14.4 kVA (14.4 kW) | 10.5 kVA (8.4 kW) | 7.5 kW 3 Phases |
| KJ-T300 | 24.0 kVA (24.0 kW) | 19.0 kVA (15.2 kW) | 11.0 kW 3 Phases |

NOTE :

- Keep an inverter/battery charger load below 40% of the generator capacity.
- Keep a mercury lamp load below 60% of the generator capacity.
- Make sure that total active mercury lamp load is below 30% or so of the generator capacity. Turn on the mercury lamps one by one. Be careful not to turn off the lamps and on again immediately. The generator voltage may rise to extremely high levels and the AVR may get damaged.
- Before turning on the lamps again, wait for 10 minutes or so until the lamps cool down enough.
- The data shown above is only a guideline to approximate load capacities and may vary from generator model to generator model, with different types of loads at rated outputs. These values may be different from actual applications because of the input characteristics peculiar to each load.
- **Connecting a motor.**
When connecting to a line starting motor, these generators may be used to start a submerged pump of 5.5kW, 7.5kW, 11.0kW (three phase). When starting the motor, the voltage drops immediately. The circuit may be opened if an electromagnetic switch is connected to the same circuit. When connecting two motors or more, make sure the total current capacity of the motors does not exceed the total rated current.

- **Connecting to lights and electric heaters.**

When connecting to lights or electric heaters, the generator can be used up to the rated capacity. When using a single phase, it can be used up to the rated current.

- **Power factor calculations.**

The power factor calculation is used to determine input of the electrical devices.

AC devices

Electric power (W)

$$= \text{Voltage (V)} \times \text{Current (A)} \div \text{Power factor}$$

Power factors of commonly used devices are listed in the following table.

| Load type | Power factor |
|--------------------------------------|--------------|
| Single-phase induction motors | 0.4 to 0.75 |
| 3-phase induction motors | 0.65 to 0.85 |
| Electric heaters, incandescent lamps | 1.0 |
| Commutator motor | 0.8 to 0.95 |
| Fluorescent lamps, mercury lamps | 0.4 to 0.9 |
| AC arc welder | 0.4 to 0.6 |

- Ordinarily, a motor is rated in kW. This does not refer to motor output.

Motor input (kVA)

$$= \frac{\text{Motor output (kW)}}{\text{Motor efficiency} \times \text{power factor}}$$

NOTE :

- If a lighting system is employed together with some types of computers and inverter air-conditioners and/or the regulated power supply for TV sets, the lights might suffer flickering. This phenomenon does not indicate a fault of the generator: it is caused by poor matching between the above-mentioned regulated power supply and the generator's automatic voltage regulator. In such a case, modify the load combination to eliminate the flickering.

CONNECTING THE LOAD

■ Connection Notes



WARNING

To avoid personal injury:

- Before the generator can be connected to a building's electrical system, a licensed electrician must install an isolation (transfer) switch in the building's main fuse box. The switch is the connection point for generator power and allows selection of generator or main line power to the building. This will prevent the generator from charging the main power line (backfeeding) when the main power supply has failed or has been turned off for line repair. Backfeeding can electrocute or injure line maintenance personnel. Also, generator and building electrical system damage can occur when normal operating power returns if unit is used without an isolation switch.

1. Avoid connecting the generator to commercial power outlet.
2. Avoid connecting the generator in parallel with any other generator.

■ Connecting the Load

◆ Load Center Terminals

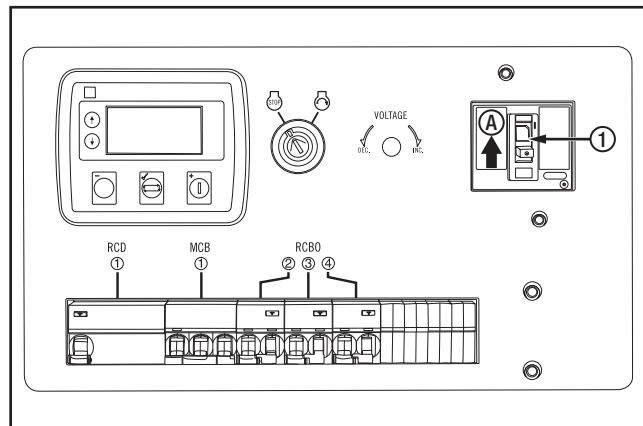


WARNING

To avoid personal injury:

- Connect or disconnect the load to the AC receptacle only when the engine is stopped.
- Stop the engine, remove the key and turn the battery Isolator switch to the "OFF" position.
- The load center terminals are NOT RCD protected. Ensure that an RCD is utilized at the installation as required, and that the installations earth is wired to the generator earthing terminal.

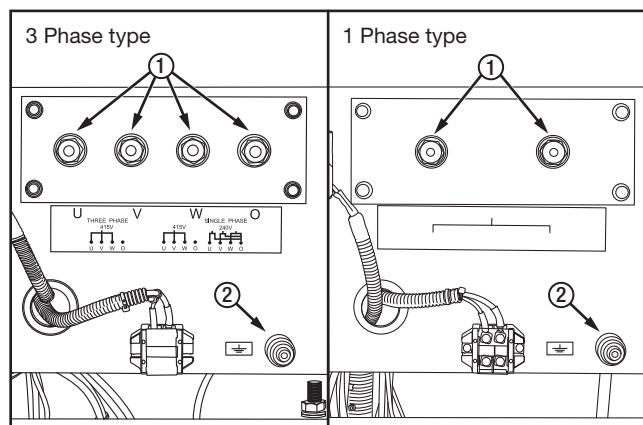
1. Turn OFF the circuit breakers on the control panel.



(1) Circuit breaker

(A) "ON"

2. Connect the load to the A.C. output terminals.

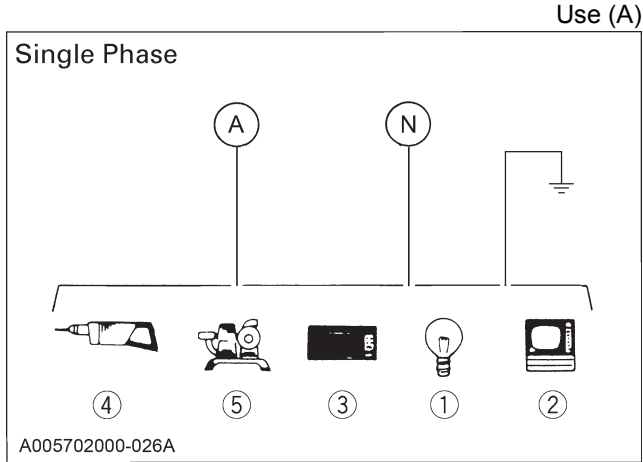


(1) Terminals (output)

(2) Generator Earthing Terminal

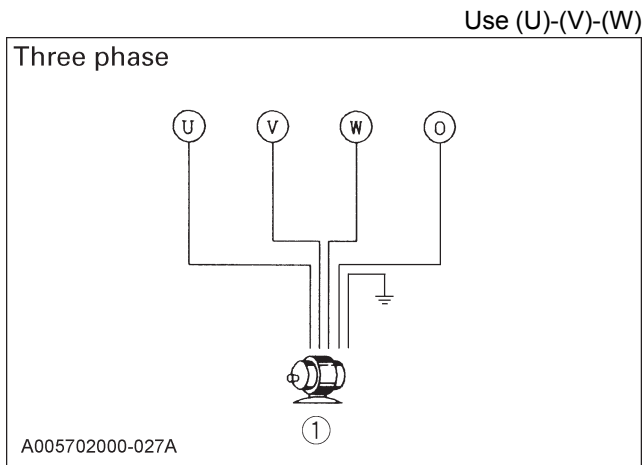
3. Finally be sure to close the cover and tighten up the lock screws.

◆ **Single phase 2 terminals type**
50Hz 240V



- (1) Light
- (2) Television
- (3) Air conditioner
- (4) Electric Drill
- (5) Motor Pump

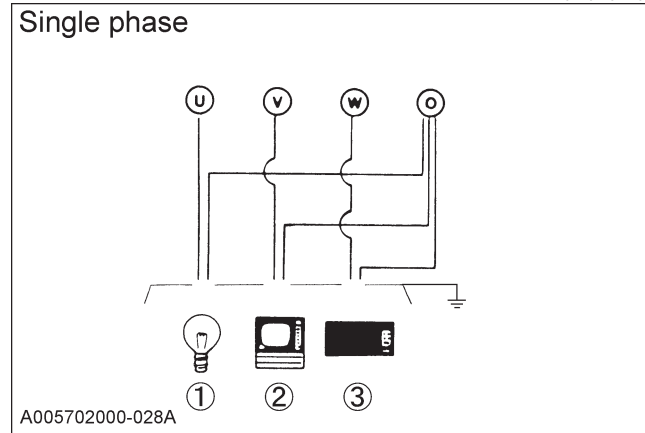
◆ **3 phase and single phase 4 terminals type**
● For 3 phase power source
50Hz 415V



- (1) Motor

● For single phase power source
50Hz 240V

Use (O)-(U)
(O)-(V)
(O)-(W)



- (1) Electric Drill
- (2) Motor Pump
- (3) Air conditioner

◆ **Receptacles**

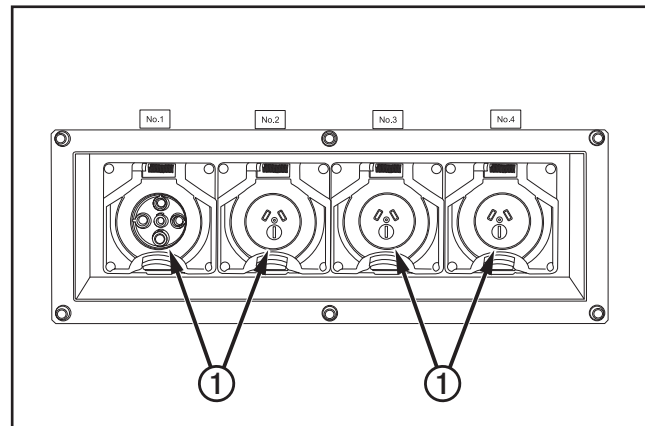


CAUTION

To avoid personal injury:

- Only connect to the receptacle when the MCB and RCBO/RCD is turned off.

1. Turn off the RCBO/RCD for the receptacle being connected to
2. Using thumb and forefinger, squeeze the receptacle cover and lift up
3. Whilst the cover is open, insert the plug of the equipment being connected into the receptacle. If a locking ring is fitted to the plug, fasten it at this point
4. Gently release the Receptacle cover against the plug and lead.
5. Turn on the RCBO/RCD



- (1) Receptacle cover

PRE-OPERATION CHECK

DAILY CHECK

To prevent problems from occurring, it is important to know the condition of the generator. Always perform the following check items before starting the generator.



CAUTION

To avoid personal injury:

- Before checking or servicing the generator, make sure it is on a level surface with the engine shut off.

◆ Check items

- Check for oil, fuel and coolant leakage
 - Check and drain banded base as required
 - Check cooling air inlet and outlet for obstructions or clogging
 - Check radiator fins for clogging
 - Check fan belt tension
 - Check engine oil level
 - Check coolant level
 - Check generator grounding
 - Refuel
- (See "FUEL" in "PERIODIC SERVICE" section.)
- Care of danger, warning and caution labels
- (See "DANGER, WARNING AND CAUTION LABELS" in "SAFE OPERATION" section.)
- Check RCBO/RCD Operation (See "RCBO/RCD TESTING" section)



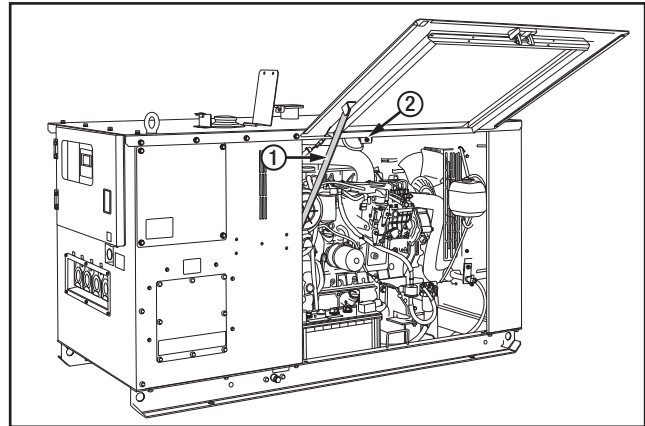
CAUTION

To avoid personal injury from contact with moving parts;

- DO NOT open the door or generator side cover while the engine is running.
- Do not touch muffler or exhaust pipes while they are hot; Severe burns could result.

■ How to Open the Door

Open the machine door and hold it open with the door rod.



(1) Door rod
(2) Safety switch

■ Battery

The battery is shipped in dry, charged condition without electrolyte.

The battery must be charged properly before using for the first time.



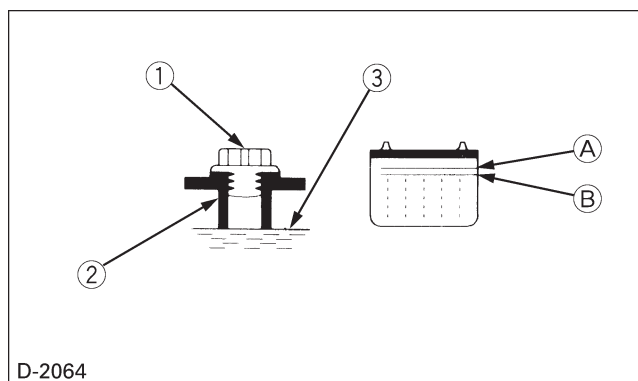
DANGER

To avoid the possibility of battery explosion:

The battery comes in two types: refillable and non-refillable. For using the refillable type battery, follow the instructions below.

- DO NOT use or charge the battery if the fluid level is below the LOWER (lower limit level) mark. Otherwise, the battery component parts may deteriorate prematurely, shorten the battery's service life; which may cause an explosion. Immediately, add distilled water until the battery's fluid level comes somewhere between the UPPER and LOWER levels.
- Keep all sparks and flames away from the battery and fuel tank. A battery, especially when charging, will give off hydrogen and oxygen gases which can explode and cause serious personal injury.

1. Remove the vent plugs.
2. Fill cells up to the upper level with electrolyte.
[Specific gravity of sulfuric acid 1.270 to 1.290 (at 20°C=68°F)]
3. Allow the battery to sit for about one hour after filling.
4. If the electrolyte level is dropped, refill with electrolyte up to the upper level.
5. Replace the vent plugs.
6. Charge the battery at the normal charging rate of 6.0 amperes.
7. Wash off any electrolyte which may have spilled.



- (1) Vent plug opening (A) Upper level
 (2) Electrolyte level indication tube (B) Lower level
 (3) Indicated level

NOTE :

- The duration of dry charged efficiency, will decrease in proportion to the period of time elapsed after shipment and during storage. To obtain the longest service life of the battery, it is necessary for the battery to be charged for a sufficient period of time. Continue to charge until all cells are gassing freely, and the voltage and specific gravity reading in all cells remain constant for 3 or more successive readings taken at 30 minute intervals.
- When the battery has been charged fully, the specific gravity of electrolyte should be 1.270 to 1.290 (at 20°C =68°F).

■Engine Oil

The generator has been shipped without engine oil. Fill with oil to the correct level before attempting to start the engine.

1. Place the machine on a level surface.
2. Remove the oil cap.
3. Add engine oil of grade CF or higher, up to the upper mark on the oil level gauge.

NOTE :

- See "ENGINE OIL" in "PERIODIC SERVICE" section for engine oil capacity and checking engine oil level.

■Coolant**CAUTION**

To avoid personal injury:

- Place the machine on a level surface.
- DO NOT remove the radiator cap while coolant is hot. When cool, rotate the radiator cap slowly to the first stop to allow excess pressure to escape. Then remove cap completely.

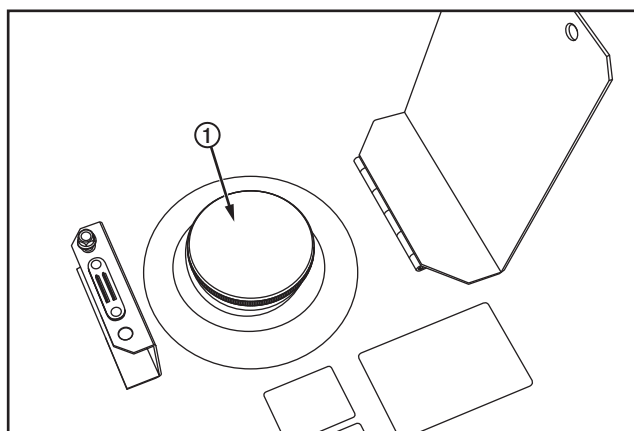
1. Remove the radiator cap and fill with specified coolant until the coolant level is just below the port.
2. Fill with coolant to the "FULL" mark on the recovery tank.
3. Securely tighten radiator cap and recovery tank cap.

NOTE :

- See "RADIATOR" in "PERIODIC SERVICE" section for changing coolant.

■Opening and Closing of the Fuel Filler Door

1. Turn the tank cap counterclockwise to open.



(1) Fuel tank cap

2. To close the tank cap, turn clockwise. Shut the fuel filler door.

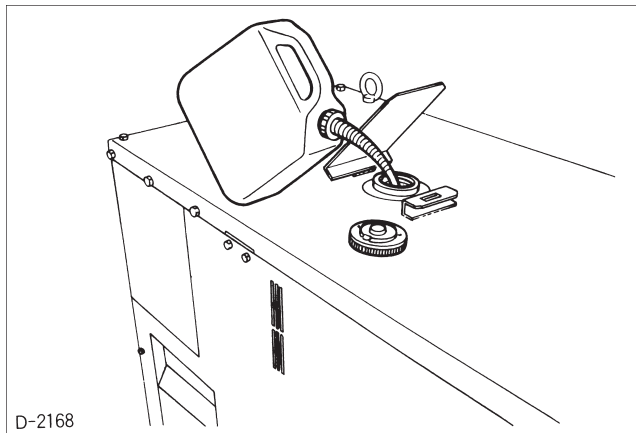
■ Fuel

**WARNING**

To avoid personal injury:

- **DO NOT** refuel when engine is running or hot.
- **Always** shut off the engine before refueling.
- **DO NOT** overfill fuel system. If any fuel overflows, wipe it up completely before starting operation.
- **When** refueling, keep all flames, sparks and cigarettes away from generator.

1. Always fill the fuel through the fuel tank strainer.
2. Make sure that dirt or water does not enter the fuel tank.
3. Fill with Diesel fuel No.2-D (ASTMD975).
4. Below 0°C (32°F) a mix of No.1-D and No.2-D is acceptable.
5. Fuel level is read by fuel gauge placed on the control panel.
Fuel gauge is activated with the main switch key "ON".

**NOTE :**

- If the fuel tank should empty completely causing the engine to stop, then the fuel system requires air bleeding after filling the tank and before restarting the engine.
(See "Air Bleeding the Fuel System" in "PERIODIC SERVICE" section.)

CONTROL PANEL (DIGITAL)



WARNING

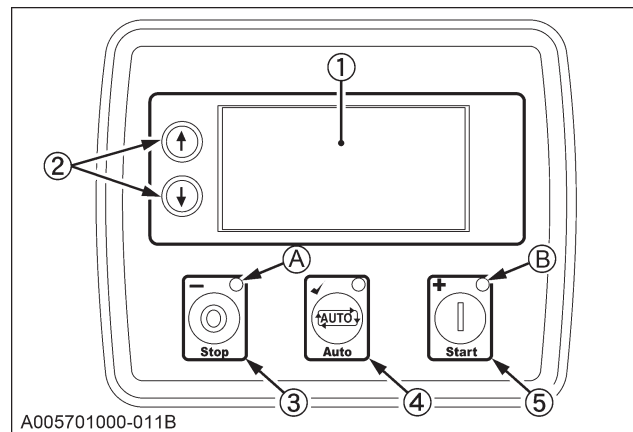
To avoid personal injury:

- When the controller is in “Auto” mode, and remote start/Auto start is connected, the generator can start at any time without warning. Do not conduct servicing, fit up, or maintenance unless the generator has been switched off, key removed, and battery and external power isolated.

The KJ-B generators are fitted with a Deep Sea Electronics 4520 Digital control panel. The following information pertains to the Controller in its standard KJ-B configuration. For custom configurations please see your local KUBOTA Dealer.

■ Description Of Controls

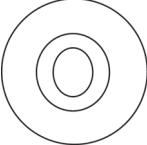



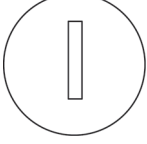
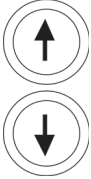
Control of the panel is via push-buttons mounted on its face. The main buttons are Stop Reset Mode, Auto Mode, and Manual/Start Mode. For normal operation, these are the only controls on the panel that need to be operated. Further functionality/information can be found using the Menu navigation buttons.



- (1) Module display
- (2) Menu navigation
- (3) Stop / Reset mode button
- (4) Auto mode button
- (5) Manual / Start mode button

- (A) Stop / Reset mode LED.
- (B) Manual / Start mode LED.

■ Function Of Control Buttons

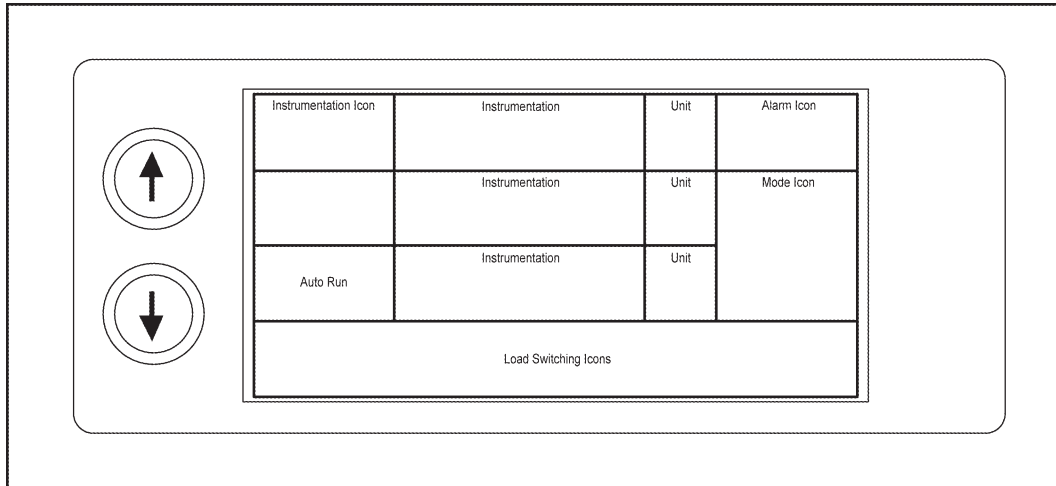
| Icon | Description |
|---|--|
|  | <p>Stop / Reset Mode </p> <p>This button places the controller into Stop/Reset Mode. When an alarm is present, this button will clear any alarm conditions for which the fault has been removed. If the engine is running and the controller is put into Stop mode, the controller will automatically instruct the stop solenoid to active and the engine will shut down. Should any form of remote start signal be present while operating in this mode, a start will not occur.</p> |
|  | <p>Auto Mode </p> <p>This button places the controller into Auto Mode. This mode allows the controller to command starting of the generator automatically. The controller will monitor the remote start input and once a start request is made, the generator will be automatically started.</p> <p>Upon removal of the starting signal, the controller will instruct the stop solenoid to active and the engine will shut down. The controller will then await the next start event. For further details please see the 'Remote Start/Auto Start' section of this manual.</p> |
|  | <p>Manual / Start Mode</p> <p>This button will start the generator. The generator will not start if any alarm conditions are present. (such as engine room door open, or emergency stop button activated). For further details please see the 'Controller Display' and 'Trouble Shooting' sections of this manual.</p> |
|  | <p>Menu Navigation</p> <p>Used for navigating the instrumentation, event log and configuration screens. For further details please see the 'Controller Display' section of this manual.</p> |

Stop / Reset Mode LED : Will flash upon electrical trip and shutdown fault.

Manual / Start Mode LED : Will flash upon waiting in manual mode.

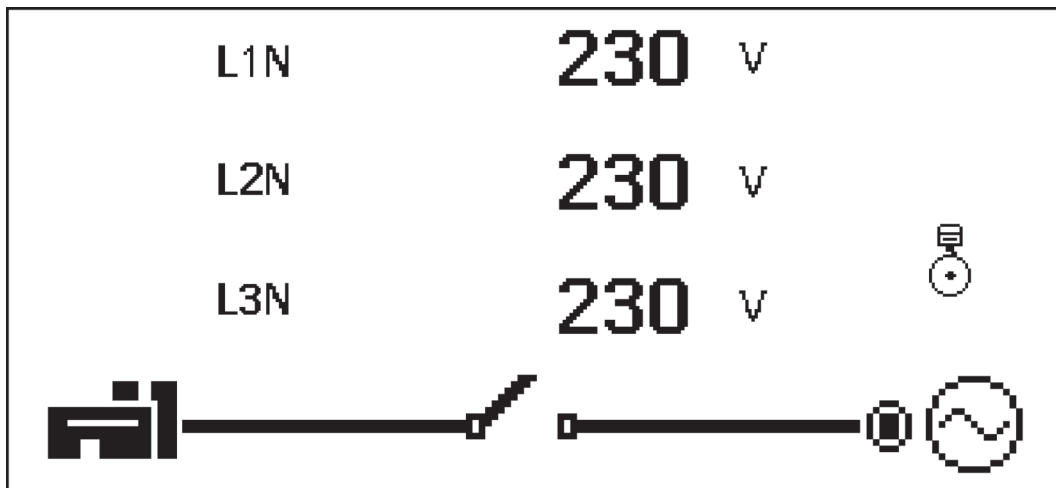
■ Controller Display

The controller's display contains the following sections.

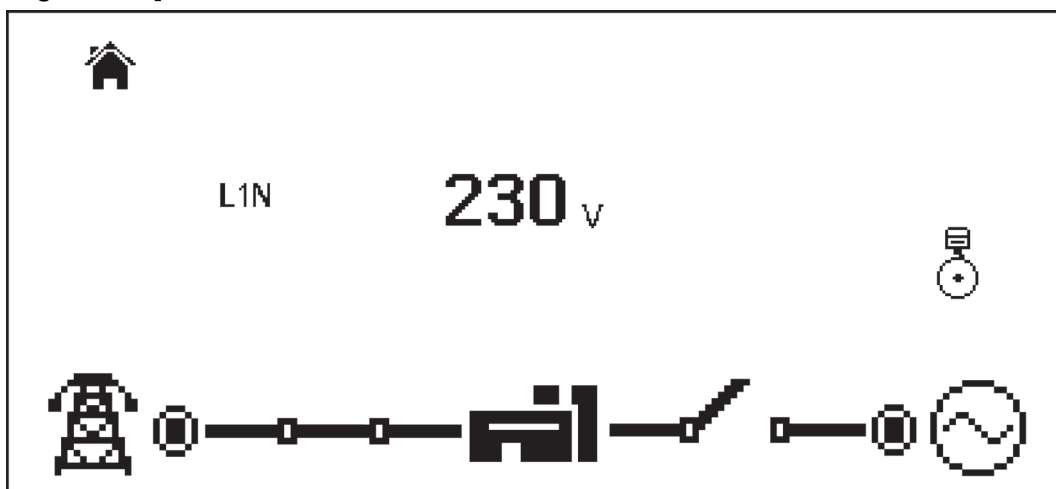


Example of the Digital Controller home screen with generator running.

[Three Phase]













[Single Phase]




◆ Instrumentation Icons

When viewing the instrumentation pages, an icon is displayed in the Instrumentation Icon section to indicate what section is currently being displayed.

| Icon | Details |
|---|--|
|  | Generator voltage and frequency instrumentation screen |
|  | Generator current instrumentation screen |
|  | Load power instrumentation screen |
|  | Engine speed instrumentation screen |
|  | Hours run instrumentation screen |
|  | Alternator charge voltage instrumentation screen |
|  | Battery voltage instrumentation screen |
|  | Fuel level instrumentation screen |
|  | Appears when the event log is being displayed |
|  | Current time held in the unit |









◆ Auto Run Icon

When running in Auto Mode and on the Home page, an icon is displayed in the Auto Run section to indicate the source of the auto start signal.

| Icon | Auto Run Reason |
|---|---|
|  | Appears when a remote start input is active |



◆ Mode Icon

An icon is displayed in the Mode Icon section to indicate the mode the controller is currently in.

| Icon | Details |
|---|---|
|  | Appears when the engine is at rest and the unit is in stop mode. |
|  | Appears when the engine is at rest and the unit is in auto mode. |
|  | Appears when the engine is at rest and the unit is waiting for a manual start. |
|  | Appears when a timer is active, for example cranking time, crank rest etc. |
|  | Appears when the engine is running, and all timers have expired, either on or off load. The animation speed is reduced when running in idle mode. |
|  | Appears when the unit is in the front panel editor. |
|  | Appears when a USB connection is made to the controller. |
|  | Appears if either the configuration file or engine file becomes corrupted. |

◆ Load Switching Icon

An icon is displayed in the Load Switching Icon section to indicate the current operation status of the controller.


| Icon | Details |
|---|---|
|  | Appears when the generator is at rest and is not connected to an Auto Transfer Switch (ATS) system. |
|  | Appears when the generator is available and is not connected to an Auto Transfer Switch (ATS) system. |

NOTE :

- In standard configuration the Controller is not setup for Mains Fail or Auto Transfer Switch (ATS) control. Please see your local KUBOTA dealer for configuration of these applications.

◆ Alarm Icon











An icon is displayed in the **Alarm Icon** section to indicate the alarm that is current active on the controller.

In the event of a warning alarm, the LCD only displays the **Alarm Icon**. In the event of an electrical trip or shutdown alarm, the module displays the **Alarm Icon** and the Stop/Reset Mode  button LED begins to flash along with the sounding of a buzzer. To reset the alarm icon and buzzer, rectify the fault/cause then press the Stop/Reset Button.

If multiple alarms are active at the same time, the **Alarm Icon** automatically cycles through all the appropriate icons to indicate each alarm which is active.

◆ Warning Alarm Icons

Warnings are non-critical alarm conditions and do not affect the operation of the generator system. They serve to draw the operator's attention to an undesirable condition. Warning alarms are self-resetting when the fault condition is removed.

| Icon | Fault | Description |
|---|----------------------------------|--|
|  | Fail To Stop | The module has detected a condition that indicates that the engine is running when it has been instructed to stop. |
|  | Charge Failure | The auxiliary charge alternator voltage is low as measured from the alternator terminal. |
|  | Battery Under Voltage | The DC supply has fallen below the low volts pre-set pre-alarm setting. |
|  | Battery Over Voltage | The DC supply has risen above the high volts pre-set pre-alarm setting. |
|  | Generator Under Voltage | The generator output voltage has fallen below the pre-set pre-alarm setting. |
|  | Generator Over Voltage | The generator output voltage has risen above the pre-set pre-alarm setting. |
|  | Generator Under Frequency | The generator output frequency has fallen below the pre-set pre- alarm setting. |
|  | Generator Over Frequency | The generator output frequency has risen above the pre-set pre- alarm setting. |
|  | Immediate Over Current | The measured current has risen above the configured trip level. |
|  | Delayed Over Current | The measured current has risen above the configured trip level for a configured duration. |














◆ Shutdown Alarm Icons

Shutdown Alarms are latching and stop the Generator. The alarm must be accepted and cleared, and the fault removed to reset the module.

To clear the alarm, press the Stop/Reset Mode  button on the module.

NOTE :

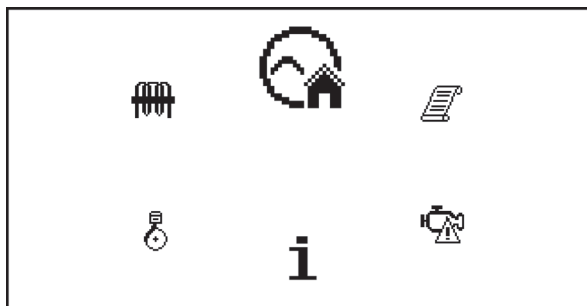
- The alarm condition must be rectified before a reset can take place. If the alarm condition remains, it is not possible to reset the controller.



| Icon | Fault | Description |
|---|--|---|
|  | Engine Room Door Open/Load Center Cover Removed | The controller detects that engine room door is open and/or the Load center cover is removed. |
|  | Insufficient Oil Pressure | The controller detects that the engine oil pressure sender has been activated indicating insufficient oil pressure. |
|  | High Coolant Temperature | The controller detects that the engine coolant sender has been activated indicating high coolant temperature. |
|  | Fail To Start | The engine has failed to start after three start attempts |
|  | Low Fuel Level | The level detected by the fuel level sensor is below the low fuel level pre-set shutdown setting (SQ models only) |
|  | Generator Under Voltage | The generator output voltage has fallen below the pre-set alarm setting. |
|  | Generator Over Voltage | The generator output voltage has risen above the pre-set alarm setting. |
|  | Generator Under Frequency | The generator output frequency has fallen below the pre-set alarm setting after the Safety On timer has expired. |
|  | Generator Over Frequency | The generator output frequency has risen above the pre-set alarm setting. |
|  | Delayed Over Current | The measured current has risen above the configured trip level for a configured duration. |
|  | kW Overload | The measured kW has risen above the configured trip level for a configured duration. |
|  | Emergency Stop | The emergency stop button has been depressed. |
|  | Charge Failure | The auxiliary charge alternator voltage is has dropped below the pre-set shutdown point. |

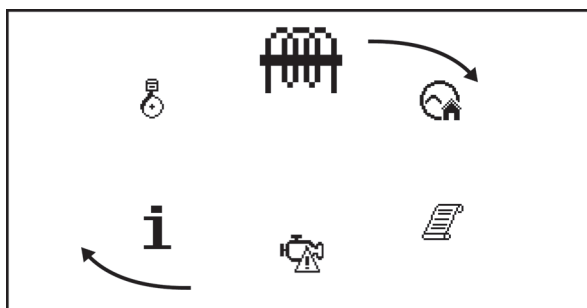
■ Viewing The Instrument Pages


◆ Navigation Menu


To enter the navigation menu, press both the  (up) and  (down) buttons simultaneously.











To select the required icon, press the  (up) button to cycle right or the  (down) button to cycle left until the desired instrumentation section is reached.





Once the desired icon is at the top, press the Auto Mode  button to enter that instrumentation section.

If the Auto Mode  button is not pressed, the display automatically returns to the Home page after the configured setting of the LCD Scroll Timer.



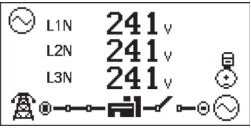

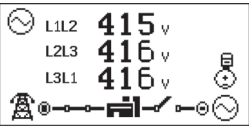



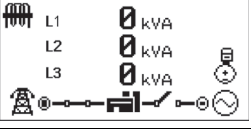



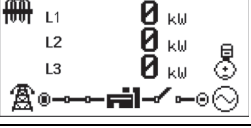



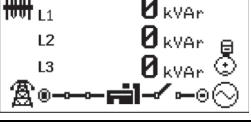
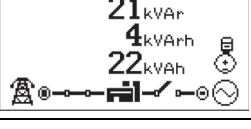

◆ Navigation Menu Icons

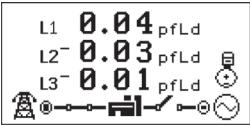

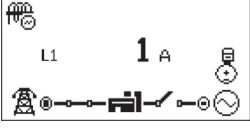
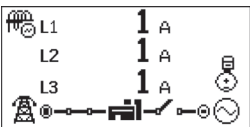

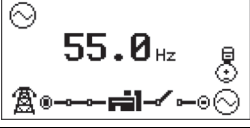

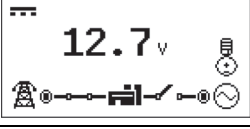

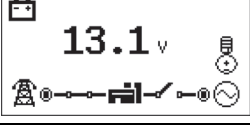







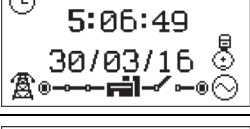
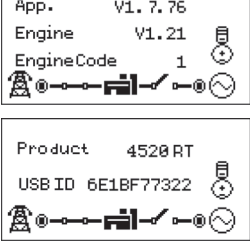
| Icon | Description |
|---|--|
|  | Generator voltage instrumentation |
|  | Generator instrumentation |
|  | Mains instrumentation (Disabled in standard configuration) |
|  | Current and load instrumentation |
|  | Engine instrumentation |
|  | Module information |
|  | Engine DTCs (Diagnostic Trouble Codes) (Not applicable to GL Series) |
|  | Event Log |

◆ **General Navigation**

It is possible to scroll through the display to view different pages of information by repeatedly operating the  (up) or  (down) navigation buttons.

Once selected, the page will remain on the LCD display until the user selects a different page or, after an extended period of inactivity (Page Delay Timer), the module reverts back to the Home page.

| Icon | Designation | Description | Screen View |
|---|---------------------------------------|--|--|
|  | Home | This is the page that is displayed when no other page has been selected and is automatically displayed after a period of inactivity (Page Delay Timer) of the module facia buttons. It also contains the voltage reading (L-N) of the generator that is measured from the controller's voltage inputs. | <p>[Single Phase]</p>  <p>[Three Phase]</p>  |
|  | Voltage (L-L) | Displays the phase to phase voltage for each phase (3 Phase models only) |  |
|  | Load Power (Total kVA) | Displays the total kVA of the load connected to the generator |  |
|  | Load Power (per Phase kVA) | Displays the per phase kVA of the load connected to the generator. (3 Phase models only) |  |
|  | Load Power (Total kW) | Displays the total kW of the load connected to the generator. Also shows the percentage of the generators Continuous Rated Output. |  |
|  | Load Power (per Phase kW) | Displays the per phase kW of the load connected to the generator. (3 Phase models only) |  |
|  | Reactive Power (Total kVA) | Displays the total reactive power (kVA) of the load connected to the generator. |  |
|  | Reactive Power (per Phase kVA) | Displays the per phase reactive power (kVA) of the load connected to the generator. (3 Phase models only) |  |
| | Total Accumulated Power | Displays the total accumulated power output of the generator since first operation. (kWh, kVAh, kVAh) |  |
| | Power Factor (total) | Displays the total power factor for all loads connected to the generator. |  |

| Icon | Designation | Description | Screen View |
|---|--------------------------------------|---|---|
| | Power Factor (per Phase) | Displays the per phase power factor for all loads connected to the generator. (3 Phase models only) |  |
|  | Generator Current (per Phase) | Displays the per phase current draw (A) of the load connected to the generator. | [Single Phase]  [Three Phase]  |
|  | Frequency | Displays the frequency of the generators AC output |  |
|  | Alternator Charge Voltage | Shows the charge voltage as measured at the alternator |  |
|  | Battery Voltage | Shows voltage of the Generators 12V starting battery |  |
|  | Fuel Level | Shows fuel level of generators fuel tank (SQ models only) |  |
|  | Engine Speed | Displays current engine speed (Calculated from generator output frequency) |  |
|  | Generator Hours Run | Displays the total operating hours and minutes of the generator |  |
|  | Control Panel Date and Time | Displays the date and time set within the Digital Control Panel |  |
| | Controller Information | Designates the Model and version of the controller and software |  |


◆ Digital Controller Time and Date Setting

This controller contains an onboard clock for event log and operational purposes. If the date or time displayed is incorrect, please consult your local Kubota dealer for instructions on resetting.

■ Event Log

This controller's event log contains a list of the last 50 record shutdown events and the engine hours at which they occurred. Once the log is full, any subsequent electrical trip or shutdown alarms overwrites the oldest entry in the log. Hence, the log always contains the most recent shutdown alarms. The controller logs the alarm, along with the engine running hours.

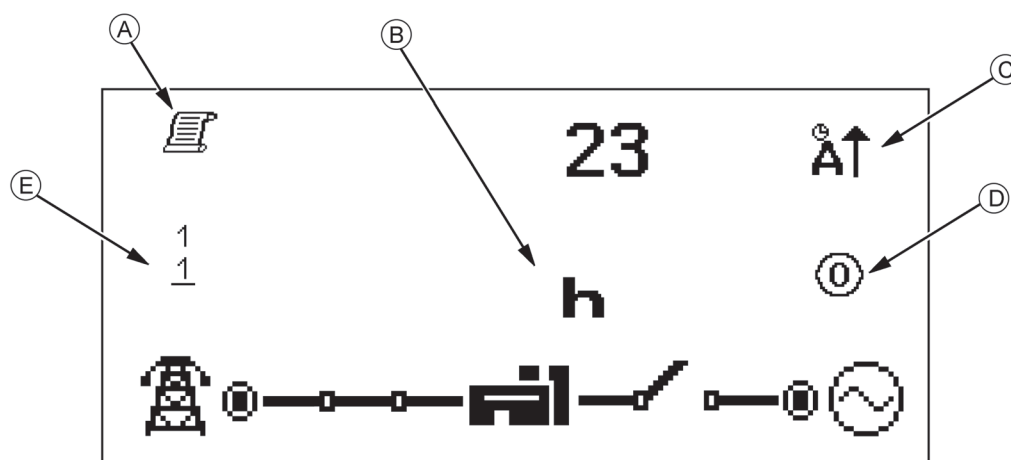
◆ Viewing The Event Log

To view the event log, press both \uparrow (up) and \downarrow (down) buttons simultaneously, the navigation menu is then displayed. Once entered, cycle to the event log () section and enter.

To view the individual events in the event log, scroll through by pressing the \uparrow (up) or \downarrow (down) buttons until the LCD screen displays the desired event.

Continuing to press down the \uparrow (up) or \downarrow (down) buttons will cycle through the past alarms after which the display shows the most recent alarm and the cycle begins again.

To exit the event log, press the \uparrow (up) and \downarrow (down) buttons simultaneously to enter the navigation menu. Once entered, cycle to the desired instrumentation section.



- (A) Icon to indicate that the event log is currently displayed.
- (B) The engine hours at which the event occurred.
- (C) Icon to indicate shutdown alarm that has been recorded.
- (D) Current operating state of the module.
- (E) Number of event displayed.

OPERATING THE GENERATOR



CAUTION

To avoid personal injury:

- Read "▲SAFE OPERATION" in the front of this manual.
- Read the danger, warning and caution labels located on the generator.
- To avoid the danger of exhaust fume poisoning, do not operate the engine in a closed building without proper ventilation.
- Always turn OFF the Main circuit breaker before starting the generator.
- Turn OFF all switches on the electrical devices and on the receptacles.
- Check the wiring and connections of the electrical devices before starting the machine.
- DO NOT touch the live parts during operation.

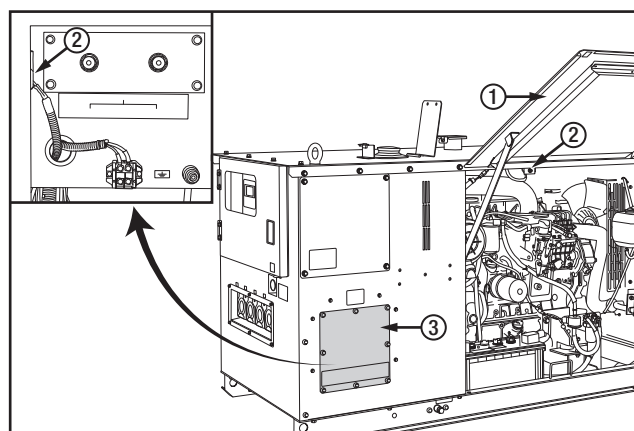
SAFETY DEVICES



DANGER

To avoid serious injury or death:

- DO NOT modify or remove the safety devices. Unauthorized modification or removal may affect the function and safety of the machine, which may result in serious injury or death.
1. The engine room door and load center cover are equipped with safety devices to detect the opening and/or closing condition of door/cover.
 2. The safety switch (2) is located on the engine room door and behind the load center cover. If you turn the key switch to "RUN" and press the "START" button on the controller with the engine room door open or load center cover removed, the starter of engine will not activate. An Alarm icon will appear on the controller screen.
 3. Close the engine room door and secure the load center cover, clear the Alarm by pressing the "STOP" button on the controller. Restart the engine.



- (1) Engine room door
 (2) Safety switch
 (3) Load Center cover

4. If you open the engine room door, or remove the load center cover while the engine is running, the emergency stop system will stop the engine. To maintain the battery's life as much as possible, turn the key switch to "OFF" position.

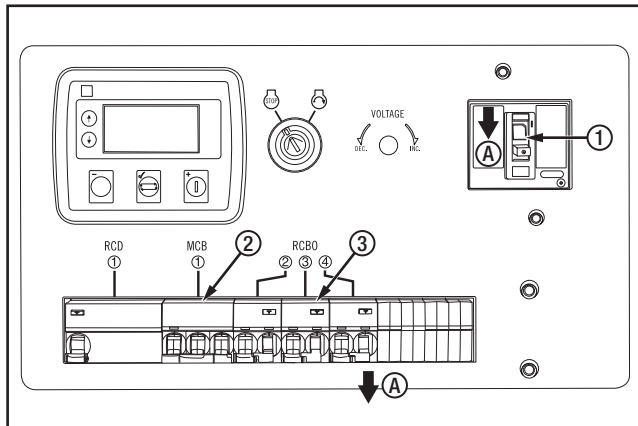
STARTING THE ENGINE

CAUTION

To avoid personal injury:

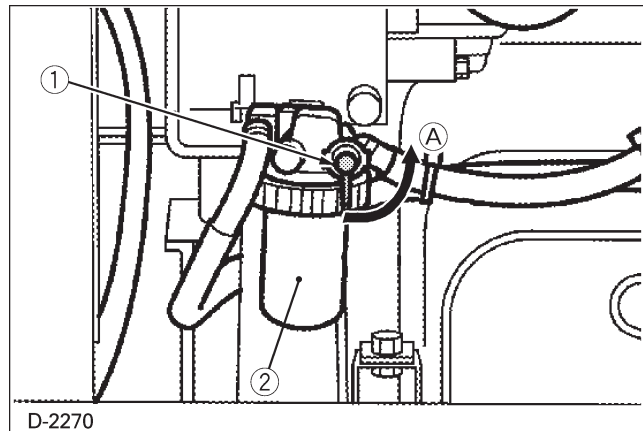
- To prevent contact with live components or rotating parts, the engine automatically stops when load center cover or access door is opened.
- While the load center cover or access door remains open, the starter will not activate.
- Be sure to stop the engine according to proper procedure before you open the load center cover or engine room door. Otherwise the power supply will be shut down instantaneously.
- DO NOT apply any tape or anything else that would keep the safety switch inactive.

1. Turn OFF all switches on the electrical devices.
2. Turn OFF the Main Circuit breaker and turn the MCB / RCBOs "OFF".



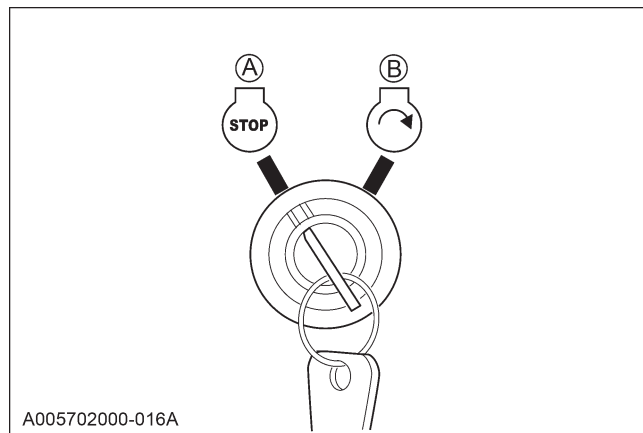
(1) Circuit breaker (A) "OFF"
 (2) MCB
 (3) RCBO

3. Ensure that the fuel lever is set to the "OPEN" Position.



(1) Fuel lever (A) "OPEN"
 (2) Water separator

4. Insert the key into the main switch and turn it to the "RUN" position.



(A) "STOP"
 (B) "RUN"

6. Press the “START” button on the control panel to initiate the start sequence.

NOTE :

- If the generator fails to start on the first attempt, the controller will automatically try a further two times. After the third automatic attempt to start, the controller will terminate the start sequence. If the generator fails to start, press the “STOP” button on the controller to reset the alarm. Return to Step 6. Refer to the TROUBLE SHOOTING section of this manual if the generator fails to start after repeated attempts.

IMPORTANT :

- Do not use ether or any starting fluid for starting the engine, or severe engine damage will occur.
- When there is a severe overload or short circuit in the wiring of the generator, the circuit breaker turns OFF. If this happens, eliminate the cause and then turn the circuit breaker ON again.

NOTE :

- The thermal relay does not work if the battery voltage falls below the prescribed level, which will detect overload on the meter. Therefore, be aware of the battery condition.

7. Check for Alarm Icons on the controller screen (top right corner).

Whenever the generator stops automatically during operation, check for alarm icons on the controller and correct the fault before restarting the generator.

IMPORTANT :

- Be sure to warm up the engine, not only in winter, also in warmer seasons. An insufficiently warmed engine can shorten its service life.
- When there is possibility of temperature drops below -15°C (5°F) detach the battery from the machine, and keep it indoor in a safe area. Reinstalled the battery before the next operation.

◆ Warm-up in cold ambient temperatures

In cold weather, the engine oil may be cold with increased viscosity. This can delay oil circulation or abnormally low oil pressure for some time after engine start-up. This can result trouble in the lubrication circuit or damage to the engine moving parts.

To prevent the above problems, perform the following instructions:

Warm up the engine at rated revolution with no load.

| Ambient temperature | Warm-up time requirement |
|----------------------------|--------------------------|
| Above 0°C (32°F) | At least 10 minutes |
| 0°C (32°F) to -10°C (14°F) | 10 to 20 minutes |
| Below -10°C (14°F) | More than 20 minutes |

8. Turn ON the Main circuit breaker, MCB/RCBO/RCD’s and the electrical device switches for the connections.

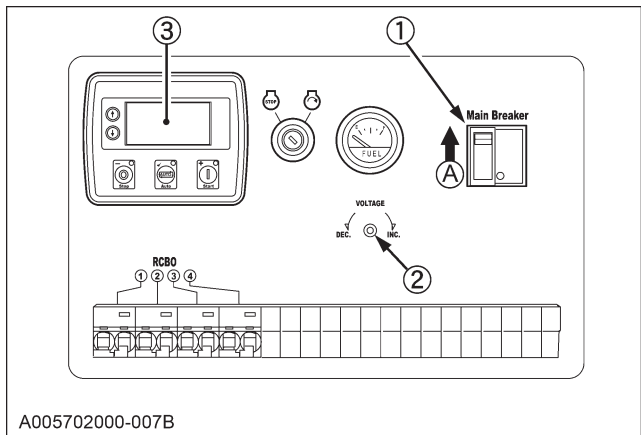
ADJUSTING OUTPUT VOLTAGE

Fine adjustment of output voltage can be made using the voltage adjust screw. To access the adjustment screw, first remove the rubber cover. The voltage adjustment can then be made using a blade screw driver through the hole to the adjuster shaft. Clockwise rotation increases set voltage, Anti-clockwise decreases set voltage. The generator set voltage is displayed through the digital control panel.

IMPORTANT :

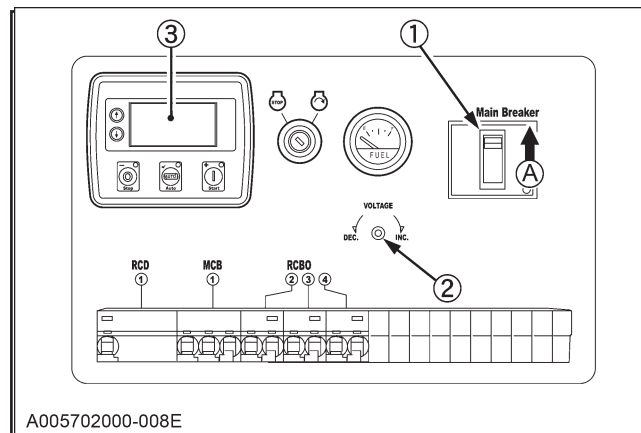
- The output voltage is preset at the factory and under normal circumstances does not require adjustment, DO NOT ADJUST the voltage unless the output has drifted more than 5% from the nominal voltage of 240V single phase or 415V three phase. Unnecessary or large adjustments of the output voltage may trip the Generator Under/Over Voltage Alarm causing the generator to shutdown. Adjusting the voltage away from the standard setting may also cause fault or damage with the equipment being powered by the generator.

Single Phase Type



- (1) Circuit breaker (A) "ON"
 (2) Voltage adjuster (Potentiometer)
 (3) Digital control panel

3 Phase Type

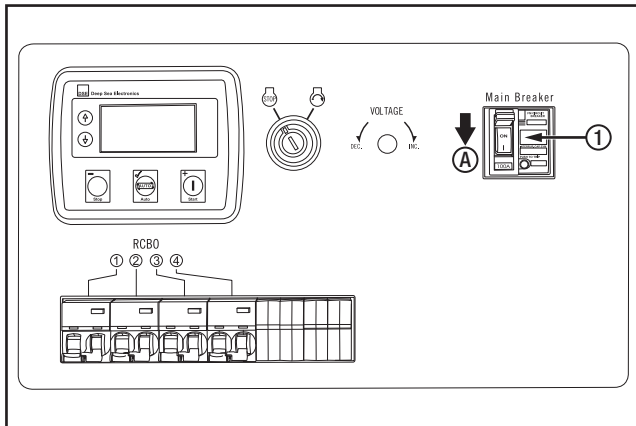


- (1) Circuit breaker (A) "ON"
 (2) Voltage adjuster (Potentiometer)
 (3) Digital control panel

STOPPING THE ENGINE

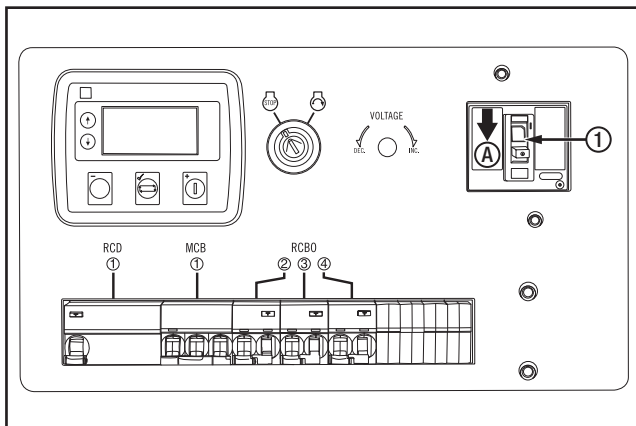
1. Turn OFF all electrical device switches for connected loads.
2. Turn OFF the circuit breakers.

Single Phase Type



(1) Circuit breaker (A) "OFF"

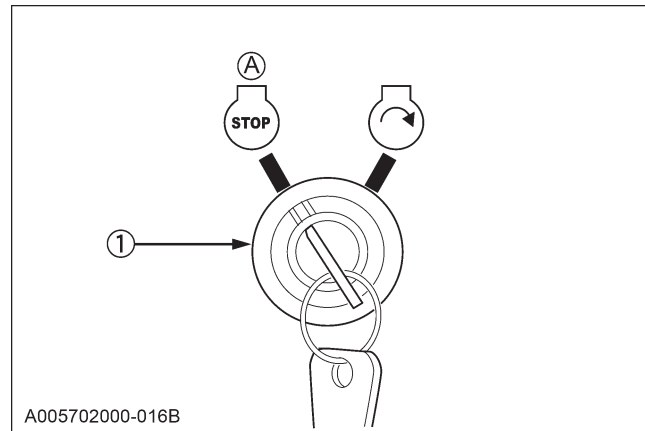
3 Phase Type



(1) Circuit breaker (A) "OFF"

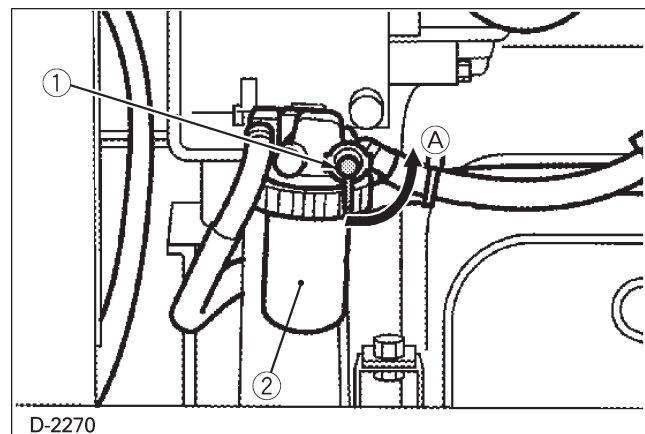
3. Allow the engine to run with no load for about 5 minutes before stopping the engine completely.

4. Press the "STOP" button on the controller.
5. Turn the main switch (key) to the "STOP" position.



(1) Main switch (Key) (A) "STOP"

6. Turn the fuel lever to the "CLOSE" position.



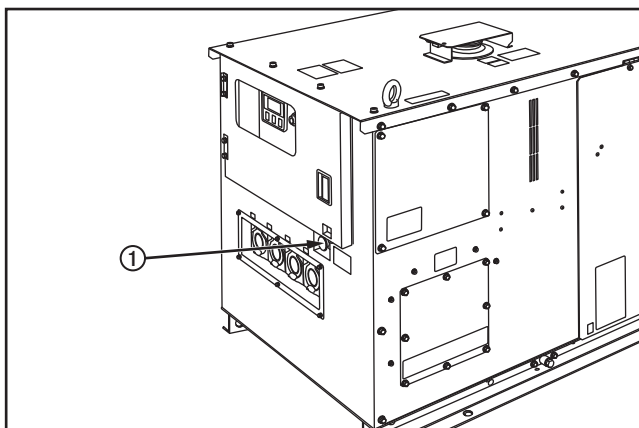
(1) Fuel lever (2) Filter bowl (A) "CLOSE"

EMERGENCY STOP (E-STOP) BUTTON

In case of emergency, the generator can be shut down instantly by pressing the emergency stop button next to the control panel.

IMPORTANT :

- Do not use the E-Stop button to shut the engine down under normal circumstance. The generator may become damaged due to the load not being switched off and the engine not being allowed to cool before shutdown.



(1) Emergency stop switch

1. With the palm of your hand, depress the Emergency Stop button. The engine will shut down instantly and an alarm icon will be displayed on the digital controller.
2. If an emergency situation exists, ensure the generator is clear of hazards before switching the key to the "OFF" position.
3. If it is safe to do so, open the engine room door and turn the fuel tap "OFF".
4. DO NOT restart until all hazards or faults have been cleared.
5. To reset the Emergency Stop button, turn clockwise to release. If the digital controller is on, the alarm condition can be reset by pressing the "STOP" button. The generator will not restart until the Emergency Stop button has been reset.

REMOTE START/AUTO START



DANGER

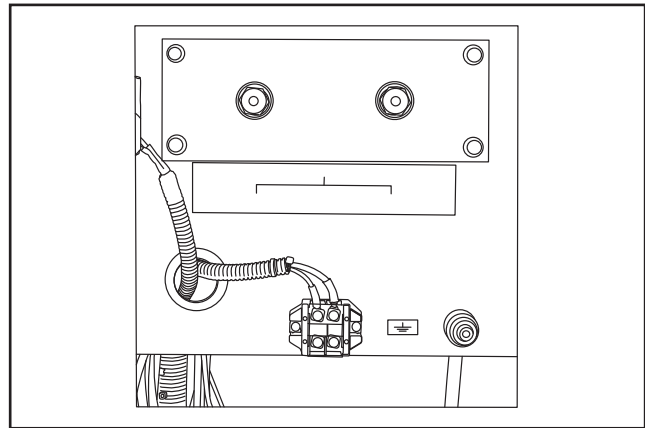
To avoid personal injury:

- Ensure that the generator is turned off and the key removed before connecting Remote Start/Auto Start.
- Isolate all external power sources (AC and DC)
- Do not apply power to the Remote/Auto start terminals

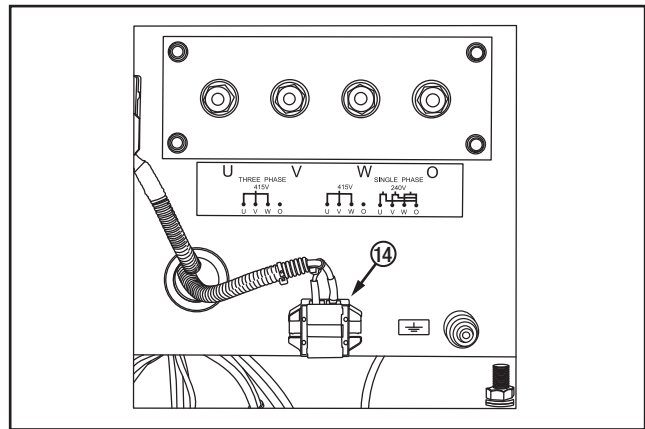
5. Connect the remote start wires of your external switch or appliance to Terminal 14 and Terminal E (Control Sensor Ground)
6. Ensure the remote start wire is suitably routed and fixed to prevent damage.
7. Replace the terminal tap cover and refit the Load Center cover.

For nomenclature and connection of terminal taps are referred to the "WIRING DIAGRAMS" section. (See page 61-64)

[1 Phase type]



[3 Phase type]

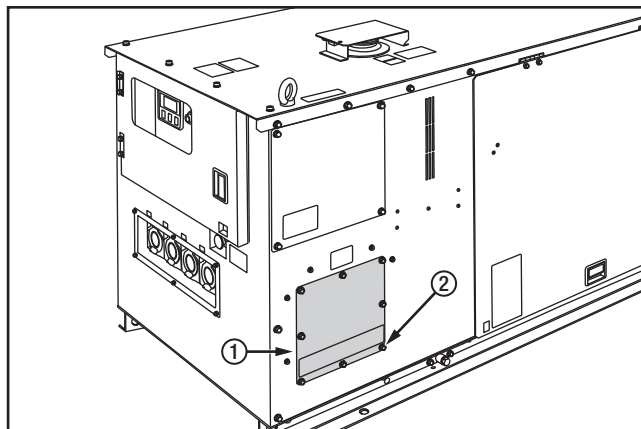


Remote Start/Auto Start Connection

The SQ Series Generators are fitted with a DSE4520 control panel which has two wire Remote/Auto start capability. This system utilizes connection between Terminal 14 and Terminal E (Control Sensor Ground) on the controller to initiate the start sequence when in Auto mode. The generator will shut down when the connection between Terminal 14 and Earth is removed (open circuit). An unpowered switch can be used remote to the generator when connected as described below. Alternatively, any device such as an Inverter or ATS system can be utilized provided it has two wire unpowered switching for generator remote start control.

To connect the exterior apparatus with the machine, perform the following instructions;

1. Stop engine, remove Key, and switch the battery isolator switch to the "OFF" position.
2. Isolate all external power supplies
3. Remove the eight bolts holding the load center cover on.



- (1) Load center cover
- (2) Bolts x 8

4. Remove the terminal tap cover from the remote start terminal panel.

Remote Start/Auto Start Operation



WARNING

To avoid personal injury:

- **When the controller is in “Auto” mode, and remote start/Auto start is connected, the generator can start at any time without warning. Do not conduct servicing, fit up, or maintenance unless the generator has been switched off, key removed, and battery and external power isolated.**

To operate the Auto Start function, perform the following instructions;

1. Turn the key switch to the “ON” position.
2. Once the digital panel has run through its opening sequence, press the “AUTO” button on the control panel.
3. The Auto Mode symbol will appear in the Mode Icon section of the screen.
4. The controller will remain on standby until a signal (connection between Terminal 14 and Terminal E (Control Sensor Ground)) is received at the Remote start terminal.
5. When a signal is received at the Remote start terminal, the generator start sequence will be initiated.
6. The generator will continue to run until the remote start signal is removed (connection between Terminal 14 and Terminal E (Control sensor ground) is opened). Once the signal is removed, the generator will stop and return to Auto Mode Standby. Restart will not occur until Terminal 14 and Terminal E are connected again.

NOTE :

- In standard configuration the Controller is not setup for Mains Fail or Auto Transfer Switch (ATS) control. Please see your local KUBOTA dealer for configuration of these applications.
- Although the power draw from the Digital control panel in Auto Mode Standby is low, it is recommended to fit the optional battery charger for float charging of the generator battery when used in this mode.

MAINTENANCE

ANTI-FREEZE & DISPOSAL OF FLUIDS

- DO NOT run the engine with installed safety guards detached.
- Anti-freeze contains poison. Wear rubber gloves to avoid personal injury. In case of contact with skin, wash it off immediately.
- DO NOT mix different types of Anti-freeze. The mixture can produce chemical reaction causing harmful substances. Use approved or genuine KUBOTA Anti-freeze.
- Be mindful of the environment and the ecology. Before draining any fluids, find out the correct way of disposing of them. Observe the relevant environmental protection regulations when disposing of oil, fuel, coolant, filters and batteries.
- When draining fluids from the engine, place a suitable container underneath the engine body.
- DO NOT pour waste onto the ground, down a drain, or into any water source.



B-1508



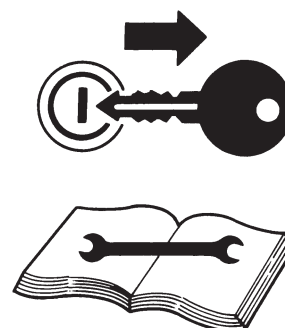
B-1507



CAUTION

To avoid personal injury:

- Be sure to conduct daily checks, periodic maintenance, refueling or cleaning on a level surface with the engine shut off and the key removed. Before allowing other people to use your generator, explain how to operate, and have them read and understand this manual before operation.
- When cleaning any parts, do not use gasoline. Use a regular cleanser.
- Always use proper tools that are in good condition. Make sure you understand how to use them before performing any service work.
- When installing, be sure to tighten all nuts and bolts lest they should be loose. Tighten the nuts and bolts to the specified torque.
- DO NOT put any tools on the battery, or battery terminals may short out. Severe burns or fire could result. Detach the battery from the engine before maintenance.
- DO NOT touch muffler or exhaust pipes while they are hot; severe burns could result.



B-1509



B-1497

SERVICE INTERVALS

Observe the following for service and maintenance.

The lubricating oil change intervals listed in the table below are for Classes CF, CE and CD lubricating oils of API classification with a low-sulfur fuel in use. If the CF-4 or CG-4 lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals than recommended in the table below depending on the operating condition.

| No. | Check point | Interval | | | | | | | | | | Ref. page | | | |
|-----|--|----------------|-------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|--------------|---------------|-----------|--|----|------|
| | | First 50 hours | Every day | Every 100 hours | Every 250 hours | Every 500 hours | Every 1000 hours | Every 1500 hours | Every 3000 hours | Every 1 year | Every 2 years | | | | |
| 1 | Check of fuel pipes and clamp bands | | | ○ | | | | | | | | | | - | @ |
| 2 | Change of engine oil | ◎ | Level check | | ○ | | | | | | | | | 29 | |
| 3 | Cleaning of air cleaner element | | | ○ | | | | | | | | | | 27 | *1 @ |
| 4 | Check of battery electrolyte level | | | ○ | | | | | | | | | | 29 | |
| 5 | Check of fan belt tightness | ◎ | | | ○ | | | | | | | | | 30 | |
| 6 | Check of radiator hoses and clamp bands | | | | ○ | | | | | | | | | 30 | |
| 7 | Check of intake air line | | | | ○ | | | | | | | | | - | @ |
| 8 | Replacement of oil filter cartridge | ◎ | | | | | | | | | | | | 31 | |
| 9 | Replacement of fuel filter cartridge | | | | | ○ | | | | | | | | 31 | @ |
| 10 | Cleaning of sedimenter (water separator) | | | | ○ | | | | | | | | | 32 | |
| 11 | Cleaning of water jacket (radiator interior) | | | | | | ○ | | | | | | | - | |
| 12 | Replacement of fan belt | | | | | | ○ | | | | | | | - | |
| 13 | Check of valve clearance | | | | | | ○ | | | | | | | - | |
| 14 | Replacement of air cleaner element | | | | | | | | | ○ | | | | 27 | *2 @ |
| 15 | Check of damage in electric wiring and loose connections | | | | ○ | | | | | | | | | - | |
| 16 | Check of fuel injection nozzle injection pressure | | | | | | | ○ | | | | | | - | *3 @ |
| 17 | Check of injection pump | | | | | | | | ○ | | | | | - | *3 @ |
| 18 | Replacement of fuel pipes, fuel gauge and clamp bands | | | | | | | | | | ○ | | | - | *3 @ |
| 19 | Replacement of radiator hoses and clamp bands | | | | | | | | | | ○ | | | 30 | |
| 20 | Replacement of battery | | | | | | | | | | ○ | | | 33 | |
| 21 | Change of radiator coolant (L.L.C.) | | Level check | | | | | | | | ○ | | | 8 | |
| 22 | Replacement of intake air line | | | | | | | | | | ○ | | | - | *4 @ |

IMPORTANT

- The jobs indicated by ◎ must be done after the first 50 hours of operation.
- *1 Air cleaner should be cleaned more often in dusty conditions than in normal conditions.
- *2 After 6 times of cleaning.
- *3 Consult your local KUBOTA Dealer for this service.
- *4 Replace earlier if necessary.
- The items listed above (@ marked) are registered as emission related critical parts by KUBOTA in the U.S. EPA non-road emission regulation. As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instruction. Please see the Warranty Statement in detail.
- When the battery is used for less than 100 hours in a year, check its electrolyte yearly. (for refillable battery's only)

NOTE:

Lubricating oil

With the emission control now in effect, the CF-4 and CG-4 lubricating oils have been developed for use of a low-sulfur fuel for on-road vehicle engines. When an off-road vehicle engine runs on a high-sulfur fuel, it is advisable to employ the CF, CD or CE lubricating oil with a high total base number. If the CF-4 or CG-4 lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals.

- **Lubricating oil recommended when a low-sulfur or high-sulfur fuel is employed.**

: Recommendable X : Not recommendable

| Lubricating oil class | Fuel | Low-sulfur | High-sulfur | Remarks |
|-----------------------|------|------------|-------------|---------|
| | CF | | ○ | |
| CF-4 | | ○ | X | |
| CG-4 | | ○ | X | |

TBN : Total Base Number

DAILY CHECK

For your own safety and maximum service life of the machine, make a thorough daily inspection before starting the engine.



CAUTION:

To avoid personal injury:

- **Be sure to check or service the generator on a flat place with the engine shut off .**

Walk around Inspection

Look around and under the generator for such items as loose bolts, trash build-up, oil or coolant leaks, broken or worn parts.

Checking Engine Oil Level



CAUTION:

To avoid personal injury:

- **Be sure to stop the engine before checking the oil level.**

1. Make sure the machine is on a flat surface.
2. Check engine oil before starting the engine or 5 minutes or more after the engine has stopped.
3. To check the oil level, draw out the dipstick, wipe it clean, replace it, and draw it out again. Check to see that the oil level lies between the two notches.

If the level is too low, add new oil to the prescribed level.

(See "Adding Engine Oil" in PREPARATION FOR FIRST OPERATION Section)

IMPORTANT:

- When using an oil of different maker or viscosity from the previous one, remove all of the old oil. Do not mix two different types of oil.
- If oil level is low, do not run engine.

PERIODIC SERVICE

FUEL

Fuel is flammable and can be dangerous. You should handle fuel with care.



CAUTION

To avoid personal injury:

- **DO NOT mix gasoline or alcohol with diesel fuel. This mixture can cause an explosion.**
- **Be careful not to spill fuel during refueling. If fuel should spill, wipe it off at once, or it may cause a fire.**
- **Stop the engine before refueling. Keep the machine away from the fire.**
- **Be sure to stop the engine while refueling or bleeding and when cleaning or changing fuel filter or fuel pipes. DO NOT smoke when working around the machine or when refueling.**
- **Check the above fuel systems in a well ventilated and open place.**
- **When fuel and lubricant are spilled, refuel after the machine cooled down.**

■ Fuel Level Check and Refueling

1. Check to see that the fuel level is above the lower limit of the fuel level gauge.
 2. If the fuel is too low, add fuel to the upper limit. Do not overfill.
- No.2-D is a distillate fuel oil of lower volatility for engines in industrial and heavy mobile service. (SAE J313 JUN87)
 - Diesel fuels specified to EN 590 or ASTM D975 are recommended.

| Flash Point, °C (°F) | Water and Sediment, volume % | Carbon Residue on, 10 percent Residuum, % | Ash, weight % |
|----------------------------|---------------------------------------|--|------------------|
| Min | Max | Max | Max |
| 52 (125) | 0.05 | 0.35 | 0.01 |

| Distillation Tempera- tures, °C (°F) 90% Point | | Viscosity Kinematic cSt or mm ² /s at 40°C | | Viscosity Sayboit, SUS at 100°F | | Sulfur, weight % | Copper strip Corro- sion | Cetane Num- ber |
|---|--------------|--|-----|--|------|------------------------|-----------------------------------|-----------------------|
| Min | Max | Min | Max | Min | Max | Max | Max | Min |
| 282 (540) | 338 (640) | 1.9 | 4.1 | 32.6 | 40.1 | 0.50 | No.3 | 40 |

- Cetane Rating : The minimum recommended Fuel Cetane Rating is 45. A cetane rating greater than 50 is preferred, especially for ambient temperatures below - 20 °C (-4 °F) or elevations above 1500 m.
- Diesel Fuel Specification Type and Sulfur Content % (ppm) used, must be compliant with all applicable emission regulations for the area in which the engine is operated.
- Use of diesel fuel with sulfur content less than 0.10 % (1000 ppm) is strongly recommended.
- If high-sulfur fuel (sulfur content 0.50 % (5000 ppm) to 1.0 % (10000 ppm)) is used as a diesel fuel, change the engine oil and oil filter at shorter intervals. (approximately half).
- DO NOT USE Fuels that have sulfur content greater than 1.0 % (10000 ppm).

IMPORTANT :

- Be sure to use a strainer when filling the fuel tank, or dirt or sand in the fuel may cause trouble in the fuel injection pump.
- Always use diesel fuel. You are required not to use alternative fuel, because its quality is unknown and affect the generator performance. Kerosene, which is very low in cetane rating, adversely affects the engine. Diesel fuel differs in grades depending on the temperature.
- Be careful not to let the fuel tank become empty, or air can enter the fuel system, necessitating bleeding before next engine start.

Fuel tank capacity

L

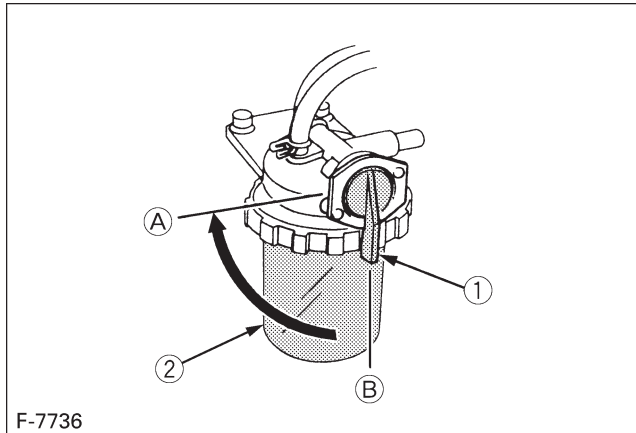
| Model | Capacity |
|--|----------|
| KJ-S130VX, KJ-T130DX, KJ-T180VX, KJ-S150VX, KJ-T160DX, KJ-T210VX, KJ-S130VX-AUS, KJ-T130DX-AUS, KJ-T180VX-AUS | 37 |
| KJ-T300, KJ-S240-AUS, KJ-T300-AUS | 60 |

■ Cleaning the Fuel Filter Element

[Engine model : D1703-EBG, V2203-EBG]

Replace the fuel filter element every 500 hours of use, using the following procedure.

1. Close the fuel filter lever.

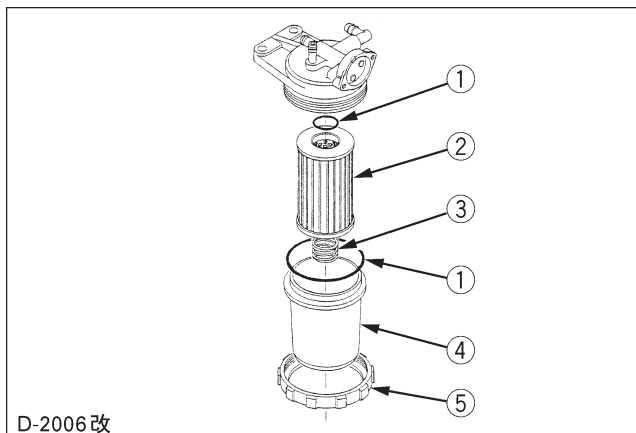


- (1) Fuel filter lever (A) "CLOSE"
 (2) Fuel filter pot (B) "OPEN"

2. Remove the top cap, and rinse the inside with diesel fuel.
3. Take out the element, and replace the element.
4. After cleaning, reinstall the fuel filter to keep dust and dirt out.
5. Air-bleed the fuel line.
6. Properly dispose of used fuel filter element.

IMPORTANT :

- Entrance of dust, water and dirt can cause a malfunction of the fuel injection pump and the injection nozzle. Wash the fuel filter cup periodically.



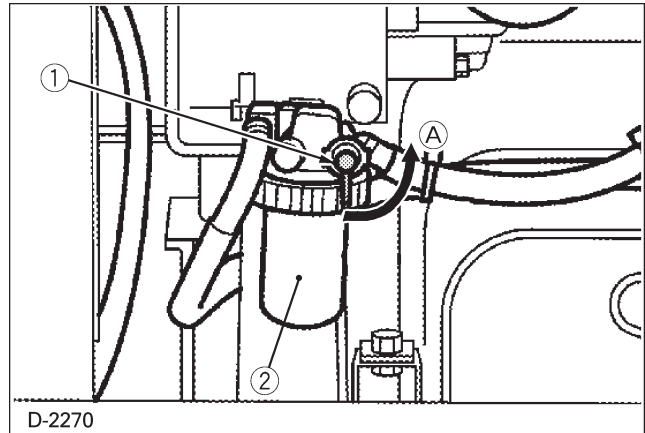
- D-2006改
- (1) O ring
 (2) Filter element
 (3) Spring
 (4) Filter bowl
 (5) Screw ring

■ Fuel Filter Cartridge Replacement

[Engine model : V3300-EBG]

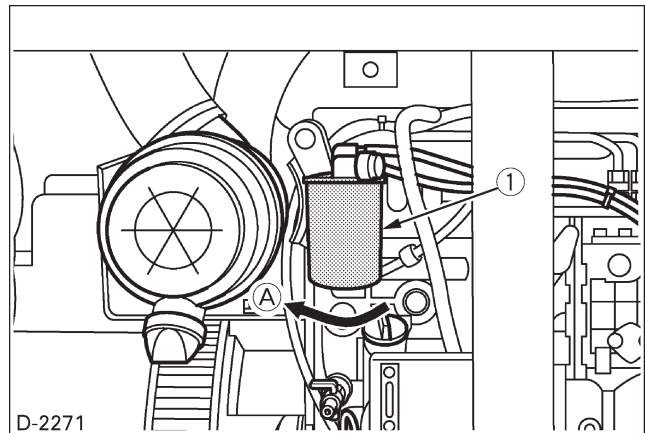
Replace the fuel filter cartridge every 500 hours of use, using the following procedure.

1. Turn the fuel lever to the "CLOSE" position.



- (1) Fuel lever (A) "CLOSE"
 (2) Water separator

2. Remove the fuel filter cartridge by using ring spanner.

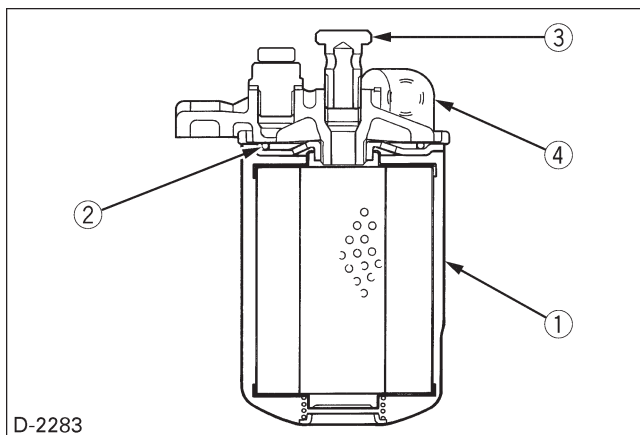


- (1) Fuel filter cartridge (A) "REMOVE"

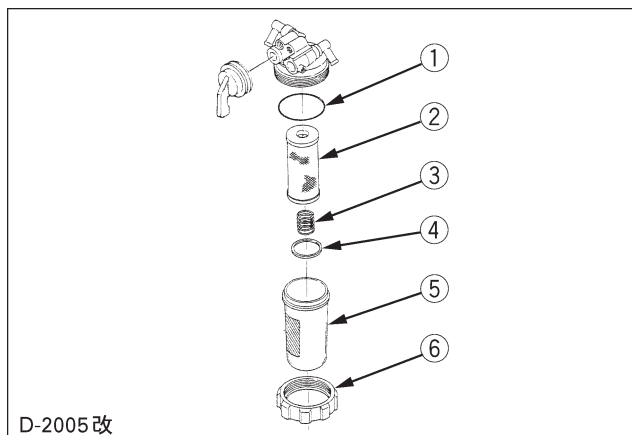
3. Apply fuel oil thinly over the gasket and tighten the cartridge into position by hand-tightening only.
4. Air-bleed the fuel line.
5. Properly dispose the used fuel filter cartridge.

IMPORTANT :

- Replace the fuel filter cartridge periodically to prevent wear of the fuel injection pump plunger or the injection nozzle, due to dirt or water in the fuel.



- (1) Fuel filter cartridge
- (2) O ring
- (3) Pipe joint
- (4) Cover

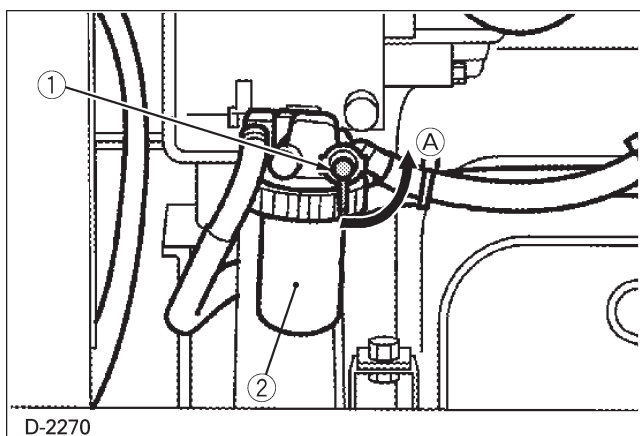


- (1) O ring
- (2) Filter element
- (3) Spring
- (4) Marker
- (5) Filter bowl
- (6) Screw ring

■ Cleaning the Water Separator (Sedimenter)

- Every 250 hours of operation, clean the fuel filter in a clean place to prevent dust contamination.
- When the marker comes close to the drain out level, remove the screw ring and let water flow out of the filter bowl.

1. Turn the fuel lever to the "CLOSE" position.



- (1) Fuel lever
- (A) "CLOSE"
- (2) Water separator

2. Remove the filter bowl, and rinse the inside with diesel fuel.
3. Take out the element, and rinse it with diesel fuel.
4. After cleaning, reinstall the fuel filter to keep out dust and dirt.
5. Air-bleed the fuel line.

IMPORTANT :

- Entrance of water, dust and dirt can cause a malfunction of the fuel injection pump and the injection nozzle. Wash the fuel filter cup periodically.

ENGINE OIL

CAUTION

To avoid personal injury:

- Be sure to stop the engine before checking and changing the engine oil and the oil filter cartridge.
- DO NOT touch muffler or exhaust pipes while they are hot; severe burns could result. Always stop the engine and allow it to cool before conducting inspections, maintenance, or cleaning.
- Contact with engine oil can damage your skin. Put on gloves when handling engine oil. If you come in contact with engine oil, wash it off immediately.

NOTE :

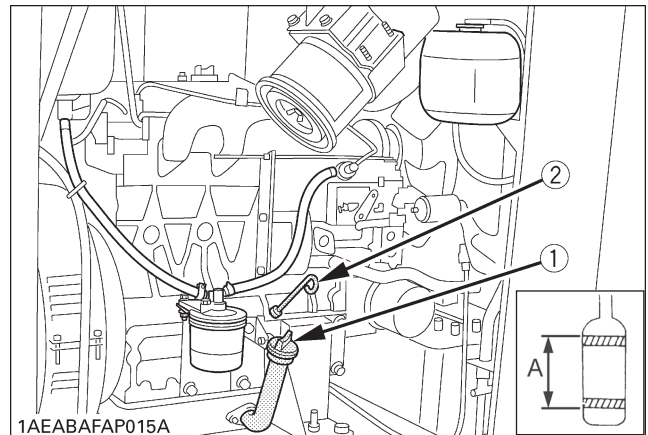
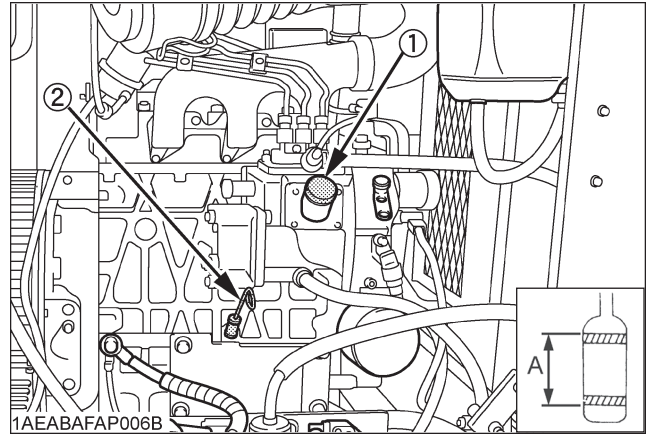
- Be sure to check the engine oil on a level surface. If placed on gradients, oil quantity can not be measured accurately.

IMPORTANT :

- Do not operate a diesel engine when engine oil is overfilled. This can effect the air intake system which could result in engine damage or malfunction.

■ Checking Oil Level and Adding Engine Oil

1. Check the engine oil level before starting or more than 5 minutes after stopping the engine.
2. Remove the oil level gauge, wipe it clean and reinstall it.
3. Take the oil level gauge out again, and check the oil level.



(1) Oil port
(2) Oil level gauge

[Lower end of oil level gauge]
(A) Engine oil level within this range is proper.

4. If the oil level is too low, remove the oil port, and add new oil to the prescribed level.
5. After adding oil, wait more than 5 minutes and check the oil level again. It takes some time for the oil to drain down to the oil pan.
6. If the engine is operated with the oil level nearing the lower limit, the oil may deteriorate more quickly than normal, therefore, keeping the oil level near the upper limit is recommended.

Engine oil capacity L

| Model | Capacity |
|-------------------------------|----------|
| KJ-T130-AU-B | 5.6 |
| KJ-S130-AU-B, KJ-T180-AU-B | 7.6 |
| KJ-S230-AU-B, KJ-T300-AU-B | 13.2 |

IMPORTANT :

- CJ-4 classification oil is intended for use in engines equipped with DPF (Diesel Particulate Filter) and is Not Recommended for use in Kubota E3 specification engines.
- Oil used in the engine should have API classification and Proper SAE Engine Oil Viscosity according to the ambient temperatures where the engine is operated.
- With strict emission control regulations now in effect, the CF-4 and CG-4 engine oils have been developed for use with low sulfur fuels, for On-Highway vehicle engines. When a Non-Road engine runs on high sulfur fuel, it is advisable to use a "CF or better" classification engine oil with a high Total Base Number (a minimum TBN of 10 is recommended).

| | |
|-------------------------|----------------------------------|
| above 25 °C (77°F) | SAE30 or SAE10W-30 SAE10W-40 |
| 0 to 25 °C (32 to 77°F) | SAE20 or SAE10W-30 SAE10W-40 |
| below 0 °C (32°F) | SAE10W or SAE10W-30 SAE10W-40 |

- When using oil of different brands from the previous one, be sure to drain all the previous oil before adding the new engine oil.

Changing Engine Oil

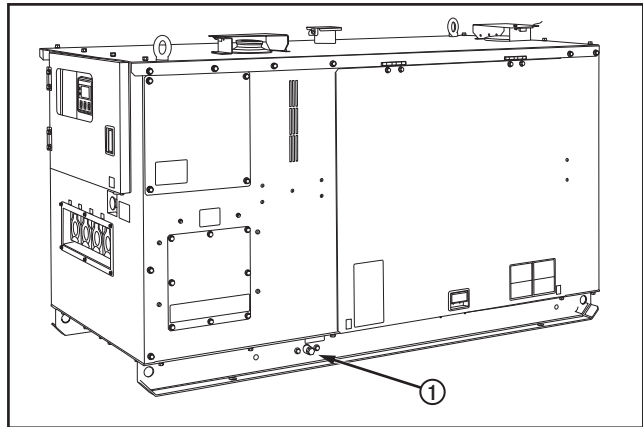


CAUTION

To avoid personal injury:

- Be sure to stop the engine before draining engine oil.
- When draining engine oil, place a suitable container underneath the engine and dispose of it according to local regulations.
- **DO NOT** drain oil from a hot engine. Allow engine to cool down sufficiently to avoid being burned.

1. Change oil after the initial 50 hours of operation and every 250 hours thereafter.
2. Remove the drain plug to drain the engine oil. Drain all the old oil, drains easier and completely when the engine is warm. Inspect drain plug gasket. Replace if damaged.



(1) Engine oil drain plug

3. Install the oil drain plug and gasket.
4. Add new engine oil up to the upper line of the oil level gauge.

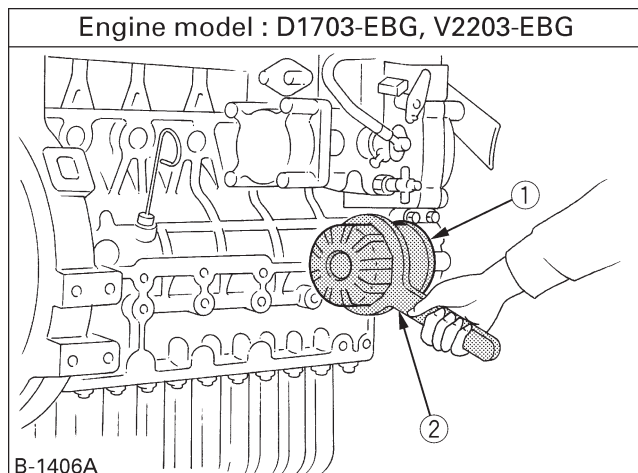
■ Replacing the Oil Filter Cartridge

CAUTION

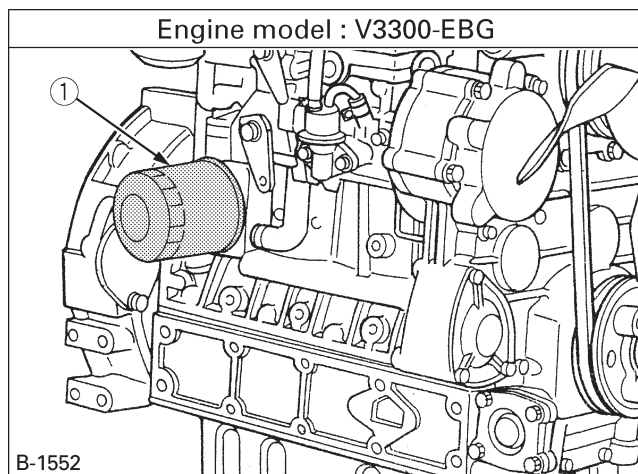
To avoid personal injury:

- Be sure to stop the engine before changing the oil filter cartridge.
- Allow engine to cool down sufficiently. Oil can be hot and cause burns.

1. Replace the oil filter cartridge every 500 hours of operation.
2. Remove the old oil filter cartridge with a filter wrench. Dispose of filter properly.
3. Apply a film of oil to the gasket of the new cartridge.
4. Screw in the cartridge by hand. When the gasket contacts the seal surface, tighten the cartridge firmly only by hand. If you tighten the cartridge with a wrench, it will be tightened too much.



- (1) Oil filter cartridge
- (2) Remove with a filter wrench
(Tighten with your hand)



- (1) Oil filter cartridge

5. After the new cartridge has been replaced, the engine oil level normally decreases a little. Therefore run the engine for a while and check for oil leaks through the seal before checking the engine oil level. Add oil if necessary.

NOTE :

- Completely wipe off any oil sticking to the machine in the filter area.

RADIATOR

Make it a rule to check the coolant level before every operation.

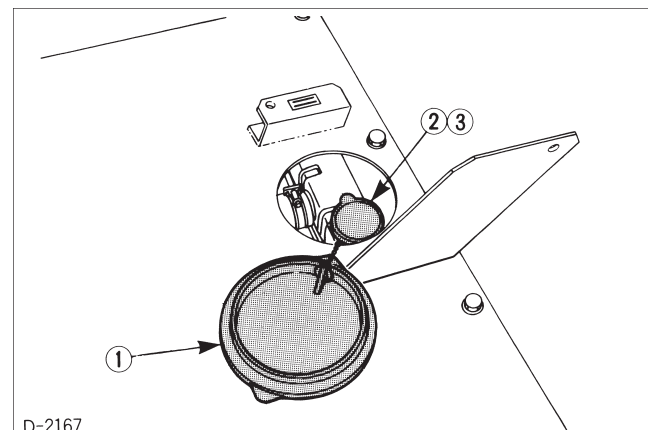
CAUTION

To avoid personal injury:

- DO NOT stop the engine suddenly, stop it after about 5 minutes of unloaded idling.
- Work only after letting the engine and radiator cool off completely (more than 30 minutes after it has been stopped).
- DO NOT remove the radiator cap while coolant is hot. When cool, rotate cap slowly to the first stop to allow excess pressure to escape. Then remove cap completely. If overheating should occur, steam gushes out from the radiator or recovery tank; Allow the engine to cool before attempting to open the cap. Severe burns could result.

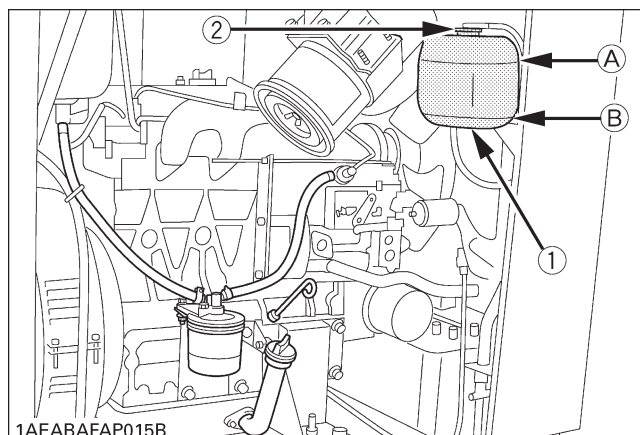
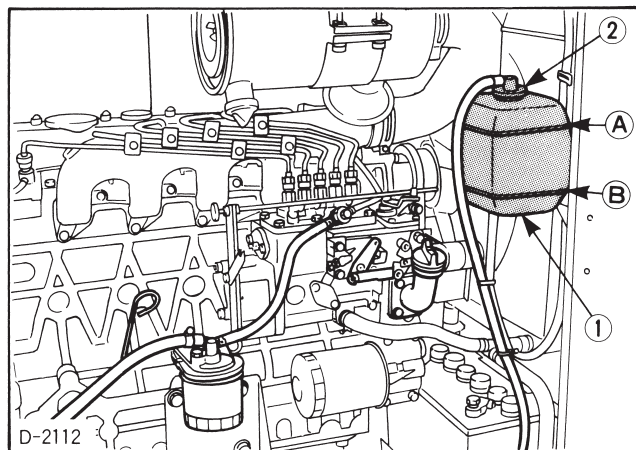
■ Checking Coolant Level, Adding Coolant

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



- (1) Radiator top cover
- (2) Radiator cap
- (3) Coolant filling port

- If the radiator is provided with a recovery tank, check the coolant level of the recovery tank. When it is between the "FULL" and "LOW" marks, the coolant will usually last for one day's work.

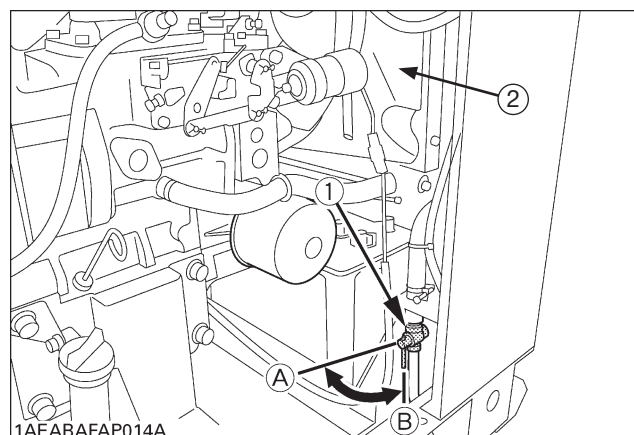


(1) Recovery tank (A) "FULL"
 (2) Cap Upper line 1.1 L
 (B) "LOW"

- When the coolant level drops due to evaporation, add only coolant up to the full level.

[Engine model : D1703-EBG, V2203-EBG]

- Check to see by a drain plug;



(1) Coolant drain plug
 (2) Radiator

IMPORTANT :

- If the radiator cap has to be removed, proceed with caution and securely retighten the cap.
- If coolant is leaking, consult your local KUBOTA Dealer.
- Make sure that muddy or sea water is not used in the radiator.
- Use clean, fresh water and 50% anti-freeze to fill the recovery tank.
- Do not refill recovery tank with coolant over the "FULL" level mark.
- Be sure to close the radiator cap securely. If the cap is loose or improperly closed, coolant may leak out and decrease the level quickly.
- When coolant is added, coolant level may drop the first time the engine is started. Stop the engine, and add coolant if necessary.

■ Changing Coolant

1. To drain coolant, always remove both drain plugs and simultaneously open the radiator cap as well. With the radiator cap kept closed, the coolant will not drain completely. Dispose of used coolant properly.
2. Remove the overflow pipe of the radiator pressure cap to drain the recovery tank.
3. Prescribed coolant volume

L

| Model | Capacity |
|-------------------------------|----------|
| KJ-T130-AU-B | 8.0 |
| KJ-S130-AU-B, KJ-T180-AU-B | 9.0 |
| KJ-S230-AU-B, KJ-T300-AU-B | 9.5 |

4. An improperly tightened radiator cap or a gap between the cap and the seat increases loss of coolant.
5. Coolant (Radiator cleaner and anti-freeze)

| Season | Coolant |
|--|---|
| Summer | Pure water and radiator cleaner |
| Winter (When temperature drops below 0 °C (32 °F)) or all season | Pure water and anti-freeze (See "Anti-freeze" in "RADIATOR" section.) |

■ Remedies for Rapid Coolant Loss

1. Check for dust and dirt between the radiator fins and cooling tube. Clean the fins and the tubes as if necessary.
2. Check the tension of the fan belt. If loose, tighten it securely.
3. Check the internal blockage in the radiator cooling tubes. If scale forms in the tubes, clean with the scale inhibitor or its equivalent.

■ Checking Radiator Hoses and Clamps



CAUTION

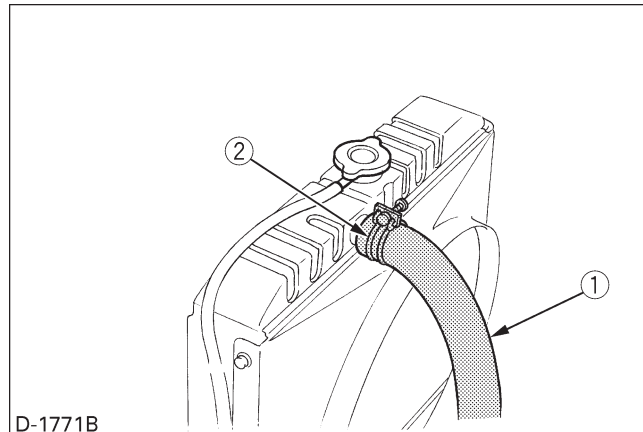
To avoid personal injury:

- Be sure to check radiator hoses and hose clamps periodically. If radiator hoses are damaged or coolant leaks out, overheating can occur.

Check to see if radiator hoses are properly fixed every 250 hours of operation or 6 months, whichever comes first.

1. If hose clamps are loose or water leaks, tighten hose clamps securely.
2. Replace hoses and hose clamps if radiator hoses are swollen, hardened or cracked.

Replace hoses and hose clamps every 2 years, or earlier as required, if hoses are found to be swollen, hardened or cracked.



D-1771B

- (1) Radiator hose
- (2) Hose clamp

■ Precaution Overheating

Take the following actions in the event the coolant temperature is nearly or more than the boiling point, which is called "Precaution overheating". Take these actions if the engine's the alarm lamp lights up.

1. Turn off all output circuit breakers and keep the engine running without load.
2. Do not stop the engine suddenly. Stop it after about 5 minutes of unloaded idling.
3. If the engine stops within about 5 minutes of running under no load, immediately leave and keep yourself away from the machine. Do not open the hood and any other part.
4. Keep yourself and others well away from the engine for an additional 10 minutes or while the steam continues to blow out.
5. Checking that there is no danger of being burned eliminate the causes of overheating according to the manual, see "TROUBLESHOOTING" section. And then restart the engine.

■ Cleaning Radiator Core (outside)

If dust is between the fin and tube, wash it away with running water.

IMPORTANT :

- Do not clean radiator with firm tools such as spatulas or screwdrivers. They may damage the delicate fins or tubes. It can cause coolant leaks or decrease cooling performance.
- Be careful to keep water off of electrical parts.

■ Cleaning the Radiator (inside)

1. Clean up the coolant line inside in the following cases.
 - As per the SERVICE INTERVALS list.
 - When changing the coolant.
2. Use a **radiator cleaning agent**. This helps wash away scale deposits.

■ Anti-freeze



CAUTION

To avoid personal injury:

- When using anti-freeze, put on some protection such as rubber gloves (Anti-freeze contains poison.).
- If should drink anti-freeze, throw up at once and take medical attention.
- When anti-freeze comes in contact with the skin or clothing, wash it off immediately.
- Do not mix different types of anti-freeze. The mixture can produce chemical reaction causing harmful substances.
- Anti-freeze is extremely flammable and explosive under certain conditions. Keep fire and children away from anti-freeze.
- When draining fluids from the engine, place some container underneath the engine body.
- Do not pour waste onto the grounds, down a drain, or into any water source.
- Also, observe the relevant environmental protection regulations when disposing of anti-freeze.

Always use a 50/50 mix of long-life coolant and clean soft water in KUBOTA engines.

Contact KUBOTA concerning coolant for extreme conditions.

1. Long-life coolant (hereafter LLC) comes in several types. Use ethylene glycol (EG) type for this engine.

2. Before employing LLC-mixed cooling water, flush the radiator with fresh water. Repeat this procedure 2 or 3 times to clean up the radiator and engine block from inside.
3. Mixing the LLC
Premix 50% LLC with 50% clean soft water. When mixing, stir it up well, and then fill into the radiator.
4. The procedure for the mixing of water and anti-freeze differs according to the make of the anti-freeze. Refer to SAE J1034 standard, more specifically also to SAE J814c.

| Vol % Anti-freeze | Freezing Point | | Boiling Point* | |
|----------------------|----------------|-----|----------------|-----|
| | C° | °F | °C | °F |
| 50 | -37 | -34 | 108 | 226 |

* At 1.013 x 10⁵Pa (760 mmHg) pressure (atmospheric). A higher boiling point is obtained by using a radiator pressure cap which permits the development of pressure within the cooling system.

5. Adding the LLC
 - (1) Add only water if the coolant level reduces in the cooling system by evaporation.
 - (2) If there is a coolant leak, add the LLC of the same manufacturer and type in the same coolant percentage.

*Never add any long-life coolant of different manufacturer. (Different brands may have different additive components, and the engine may fail to perform as specified.)
6. When the LLC is mixed, do not employ any radiator cleaning agent. The LLC contains anticorrosive agent. If mixed with the cleaning agent, sludge may build up, adversely affecting the engine parts.
7. Kubota's genuine long-life coolant has a service life of 2 years. Be sure to change the coolant every 2 years.

NOTE :

- The above data represent industry standards that necessitate minimum glycol content in the concentrated anti-freeze.

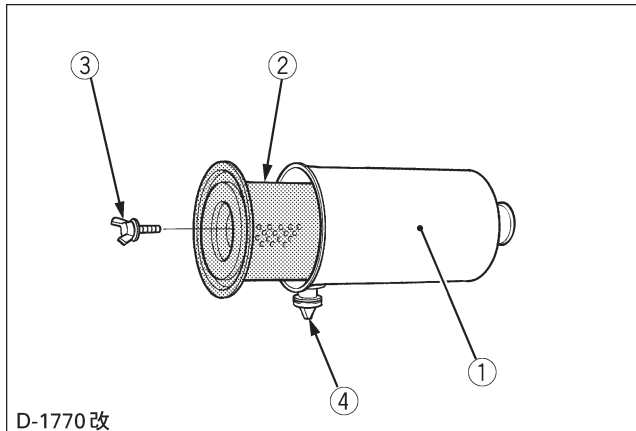
AIR CLEANER

Since the air cleaner employed on this engine is a dry type, never apply oil to it.

1. Open the evacuator valve once a week under ordinary conditions - or daily when used in severe or dusty conditions. This will get rid of large particles of dust and dirt.
2. Wipe the inside air cleaner clean with cloth if it is dirty or wet.
3. Avoid touching the element except when cleaning.
4. When dry dust adheres to the element, blow compressed air from the inside turning the element. Pressure of compressed air must be under 205 kPa (2.1 kgf/cm², 30 psi).

[Engine model : D1703-EBG, V2203-EBG]

5. Replace the element every year or every 6 cleanings.



D-1770改

- (1) Air cleaner body
- (2) Element
- (3) Wing bolt
- (4) Evacuator valve

IMPORTANT :

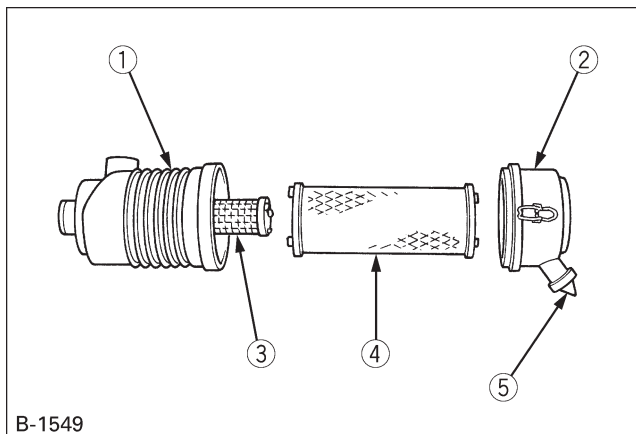
- Make sure the wing bolt for the element is tight enough. If it is loose, dust and dirt may be sucked into the engine, causing premature wearing down the cylinder liner and piston ring earlier, and thereby resulting in poor power output and need for engine repair.

[Engine model : V3300-EBG]

If the air cleaner is equipped with the secondary element, start it in the following manner :

Take steps (1) through (4) foregoing.

5. Replace the primary element every year or every 6 cleanings. If the primary element is heavily stained, replace it sooner. At this time, also replace the secondary element.
6. The secondary element should be removed only if it is to be replaced.
7. To protect the engine, do not remove the secondary element in normal servicing of the primary element.



B-1549

- (1) Air cleaner body
- (2) Cover
- (3) Secondary element
- (4) Primary element
- (5) Evacuator valve

IMPORTANT :

- Make sure hooking clip is tight enough. If it is loose, dust and dirt may be sucked into the engine, causing excessive wear or premature engine failure and need for engine repair.

■Cleaning Primary Air Filter Element

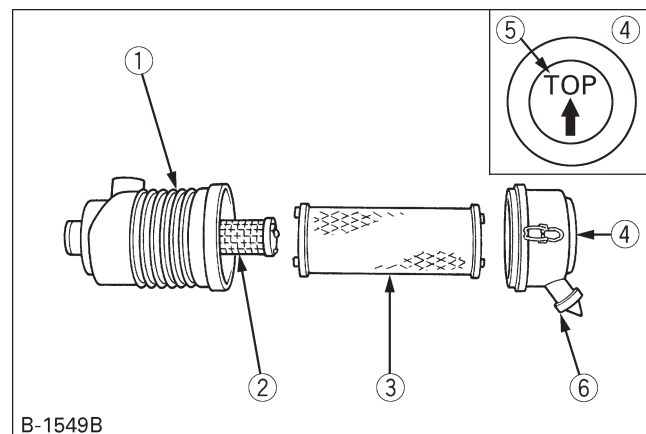
1. To clean the element, use clean dry compressed air on the inside of the element.
Air pressure at the nozzle must not exceed 205 kPa (2.1 kgf/cm², 30 psi).
Maintain reasonable distance between the nozzle and filter.

■Evacuator Valve

Open the evacuator valve once a week under ordinary conditions - or daily when used in dusty condition - to get rid of large particles of dust and dirt.

IMPORTANT :

- If the dust cup is mounted incorrectly, dust or dirt will not collect in the cup and allow the dust to come into direct contact with the element and thus require the element be replaced prematurely.



B-1549B

- (1) Air cleaner body
- (2) Secondary element
- (3) Primary element
- (4) Dust cup
- (5) "TOP" mark
- (6) Evacuator valve

■For the Air Cleaner with a Dust Cup

Remove and clean out the dust cup once a week under normal conditions or daily in extreme conditions.

Do not allow the dust cup to fill above half way regardless of conditions.

Install the air cleaner dust cup with "TOP" indicated on the rear of the cup in the upward position with horizontally mounted air cleaner bodies or vertically mounted air cleaner bodies, the cup may be mounted in any direction.

BATTERY



WARNING

To avoid personal injury:

- Be careful not to let the battery electrolyte contact your body or clothing.
- Wear eye protection and rubber gloves, since the diluted sulfuric acid solution burns skin and eyes, and eats holes in clothing. Should this occur, immediately wash it off with running water and get medical attention.

Mishandling of the battery shortens the service life and adds to maintenance costs. Obtain the maximum performance and the longest life of the battery by handling properly and with care.

Engine starting will be difficult, if the battery charge is low. Be sure to keep the battery in a fully charged state for best performance and battery life.

■ Battery Charging



DANGER

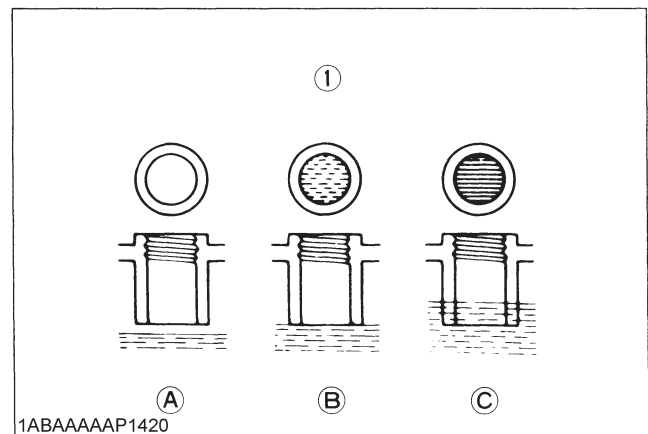
To avoid the possibility of battery explosion:

The batteries come in two types: refillable and non-refillable. For using the refillable type battery, follow the instructions below.

- **DO NOT** use or charge the battery if the fluid level is below the **LOWER** (lower limit level) mark. Otherwise, the battery component parts may deteriorate prematurely, which will shorten the battery's service life or may cause an explosion. Immediately, add distilled water until the battery's fluid level comes somewhere between the **UPPER** and **LOWER** levels.
- When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.

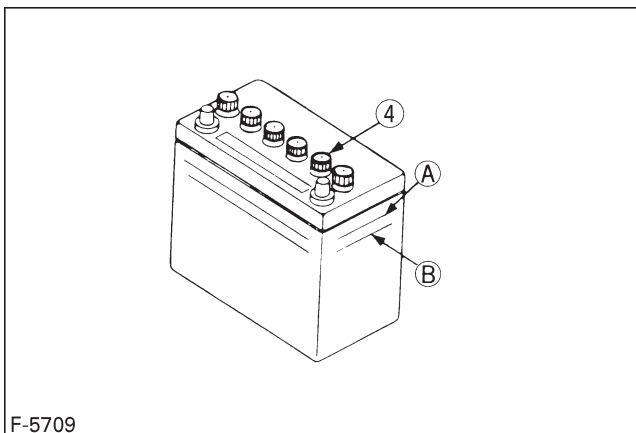
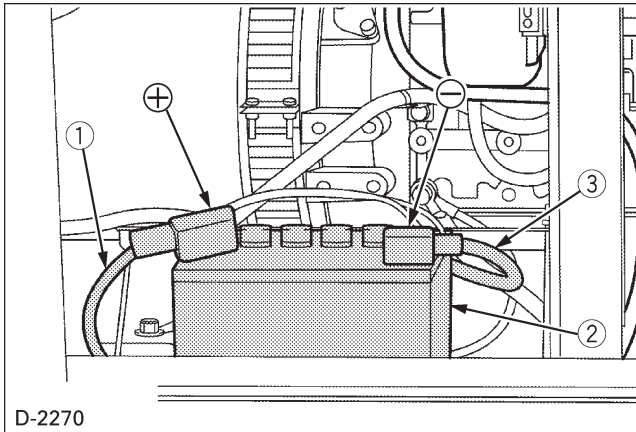
- When charging the battery, ensure the vent caps are securely in place (if equipped).
- When disconnecting the cable from the battery, start with the negative terminal, and when connecting them, start with the positive terminal first.
- **DO NOT** check the battery charge by placing a metal object across the terminals. Use a voltmeter or hydrometer.

1. Make sure that each electrolyte level is to the bottom of vent wells, if necessary, add only distilled water in a well-ventilated place.



1ABAAAAAP1420

- (1) Battery electrolyte level
- (A) "TOO LOW"
 (B) "PROPER"
 (C) "TOO HIGH"
2. To slow charge the battery, connect the charger positive terminal to the battery positive terminal, and the negative to the negative, then recharge in the normal manner.
 3. Quick recharging charges the battery at a high rate in a short time. This is only for emergencies.
 4. Recharge the battery as early as possible, or battery life will be extremely shortened.
 5. When exchanging an old battery for a new one, use a battery of equal specifications shown in page 2.



- (1) Thick cable red (+)
- (2) Battery case
- (3) Negative / ground cable black (-)
- (4) Plug
- (A) "HIGHEST LEVEL"
- (B) "LOWEST LEVEL"

IMPORTANT :

- Connect the charger positive terminal to the battery positive terminal, and negative to the negative.
- When disconnecting the cable from the battery, start with the negative terminal first. When connecting the cable to the battery, start with the positive terminal first. If reversed, the contact of tools on the battery may cause a shortage.

■ Instructions for Long Term Storage

1. When storing the generator for long periods of time, remove the battery, adjust the electrolyte to the proper level, and store in a dry and dark place.
2. The battery naturally discharges while it is stored. Recharge it once a month in summer, and every 2 months in winter.

■ Jump Starting

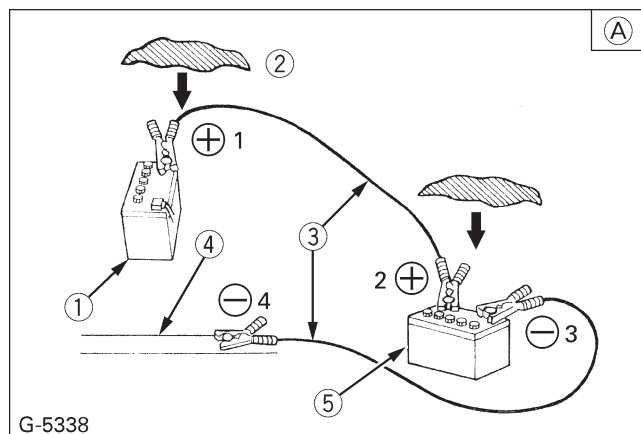
⚠ DANGER

To avoid serious personal injury.

- Battery gases can explode. Keep cigarettes, sparks, and flames away from battery.
- If generator battery is frozen, do not battery boost start engine.
- DO NOT connect other end of negative (-) jumper cable to negative (-) terminal of generator battery.

When battery boost starting engine, follow the instructions below to safely start the engine.

1. Bring helper battery of the same voltage as disabled generator within easy cable reach.
2. Put on safety goggles and rubber gloves.
3. Ensure the vent caps are securely in place. (if equipped)
4. Cover vent caps with damp rags. Do not allow the rag to touch the battery terminals.
5. Attach the red clamp to the positive (red, (+) or pos.) terminal of the dead battery and clamp the other end of the same cable to the positive (red, (+) or pos.) terminal of the helper battery.



- (1) Dead battery
- (2) Lay a damp rag over vent caps.
- (3) Jumper cables
- (4) Engine block or frame
- (5) Helper battery
- (A) Connect cables in numerical order. Disconnect in reverse order after use.

6. Clamp the other cable to the negative (black, (-) or neg.) terminal of the helper battery.
7. Clamp the other end to the engine block or frame of the generator as far from the dead battery as possible.
8. Start the disabled generator.
9. Disconnect the jumper cables in the exact reverse order of attachment. (Steps 7, 6 and 5).
10. Remove and discard the damp rags.

IMPORTANT :

- This machine has a 12 volt negative (-) ground starting system.
- Use only same voltage for jump starting.
- Use of a higher voltage source on generators electrical system could result in severe damage to generators electrical system.

ELECTRIC WIRING



CAUTION

To avoid personal injury:

Shorting of electric cable or wiring may cause a fire.

- **Check to see if electric cables and wiring are swollen, hardened or cracked.**
- **Keep dust and water away from all power connections.**

Loose wiring and terminal parts make bad connections, be sure to repair them before starting the engine.

Damaged wiring reduces the capacity of electrical parts. Change or repair damaged wiring immediately.

FAN BELT

■ Adjusting Fan Belt Tension



CAUTION

To avoid personal injury:

- Be sure to stop the engine and remove the key before checking the belt tension.
- Be sure to reinstall the detached safety shield after maintenance or checking.

[Engine model : D1703-EBG, V2203-EBG]

| | |
|-------------------------|---|
| Proper fan belt tension | A deflection of between 7 to 9 mm when the belt is pressed in the middle or the span. |
|-------------------------|---|

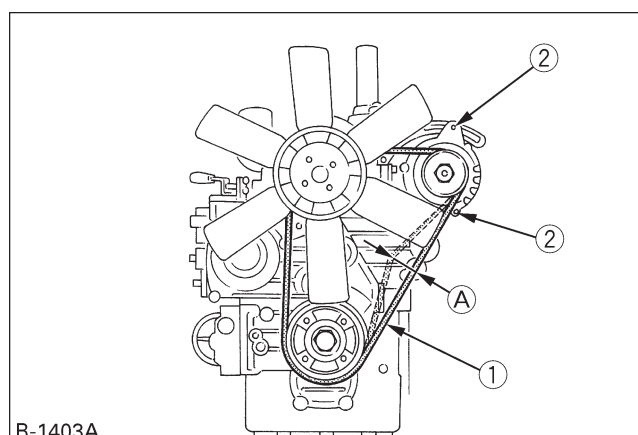
[Engine model : V3300-EBG]

| | |
|-------------------------|---|
| Proper fan belt tension | A deflection of between 10 to 12 mm when the belt is pressed in the middle of the span. |
|-------------------------|---|

1. Stop the engine and remove the key.
2. Apply moderate thumb pressure to belt between pulleys.
3. If tension is incorrect, loosen the alternator mounting bolts and, using a lever placed between the alternator and the engine block, pull the alternator out until the deflection of the belt falls within acceptable limits.
4. Replace fan belt if it is damaged.

IMPORTANT :

- If belt is loosen or damaged and the fan is damaged, it could result in overheating or insufficient charging. Adjust correctly or replace the belt.



B-1403A

- (1) Fan belt
(2) Bolt and nut

[D1703-EBG, V2203-EBG]

(A) 7 to 9 mm (under load of 98 N)

[V3300-EBG]

(A) 10 to 12 mm (under load of 64 N)

TRANSPORTING / STORAGE

■ Transporting



CAUTION:

To avoid personal injury:

- When transporting the generator, remove the negative ⊖ battery cable, close the fuel tank tap, and keep the generator level to prevent from fuel spillage.

■ Checking Before Storage

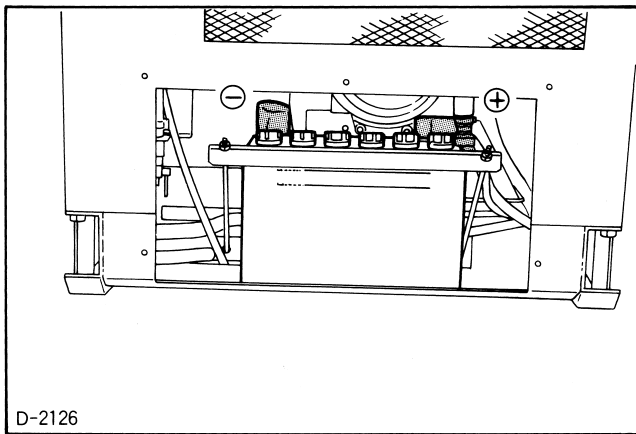


CAUTION:

To avoid personal injury:

- DO NOT cover the engine with a cover until it is cool to touch.

1. Remove the negative ⊖ cable of the battery.



2. Close the fuel tank tap.
3. Drain the coolant from the radiator or change antifreeze solution.
4. Cover the generator with a sheet and store in a dry and clean area.

■ Lifting Procedure

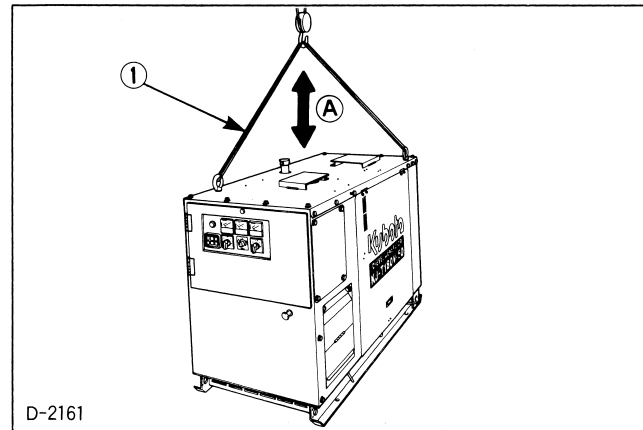


CAUTION:

To avoid personal injury:

- Use hangers and wire ropes which are strong enough to withstand the weight of the machine.
- The apex of the wire rope (distance "A") must be a minimum of 127 cm. Or use a spreader bar.

When lifting the generator for loading it onto a truck or a ship, follow the method shown below.



(1) Wire Rope

(A) Minimum of 127 cm

■ Storage**CAUTION**

To avoid personal injury:

- **DO NOT** clean the machine with engine running.
- **To avoid the danger of exhaust fume poisoning, do not operate the engine in a closed building without proper ventilation.**
- **When storing the generator just after running, let the engine cool off.**

















Before storing the generator for more than a few months, remove any dirt on the machine, and:

1. Remove dirty engine coolant, fill with new coolant and run the engine for about 5 minutes.
When coolant is added, coolant level drops the first time the engine is started, stop the engine and add more coolant.
2. Remove dirty engine oil, fill with new oil and run the engine for about 5 minutes to let the oil penetrate to all the parts.
3. Check all the bolts and nuts, and tighten if necessary.
4. Remove the battery from the generator, adjust the electrolyte level, and recharge it. Store the battery in a dry and dark place.
5. When the engine is not used for a long period of time, run it for about 5 minutes under no load every 2 to 3 months to keep it free from rust. If the engine is stored without any running, moisture in the air may condense into dew over the sliding parts of the engine, resulting in rust.
6. If you forget to run the engine for longer than 5 to 6 months, apply enough engine oil to the valve guide and valve stem seal and make sure the valves work smoothly before starting the engine.
7. Store the generator in a flat place and remove the key.
8. Do not store the generator in a place where flammable materials such as dry grass or straw are present.
9. When covering the generator for storage, let engine and muffler cool off completely.
10. Operate the engine after checking and repairing damaged wiring or pipes, and clearing flammable materials carried by rodents, insects or birds.

TROUBLESHOOTING

If the engine does not function properly, use the following charts to identify and correct the cause.

■ Digital Control Panel Warning And Shutdown Alarms

| Trouble | Cause | Countermeasure |
|---|---|---|
| Not Starting |  Engine Room Door open. | • Close engine room door. |
| |  Emergency Stop Button | • Turn button Clockwise to release & press "STOP" on the control panel to reset |
| |  Engine system issue (Fail to start) • Stop Solenoid not receiving power • Fuel Shortage | • Check Stop Solenoid connection • Add Fuel and prime fuel system |
| Engine starts but stops immediately. |  Insufficient oil pressure | • Add engine oil to upper limit of gauge. |
| Engine suddenly stops. |  Generator under voltage | • Check electrical load, ensure it is not over limitation. Consult KUBOTA dealer • Check for fuel shortage • If voltage adjustment has been altered, return to original setting |
| |  Generator over voltage | • Check electrical load, ensure it is not over limitation. Consult KUBOTA dealer • If voltage adjustment has been altered, return to original setting |
| |  Engine under speed (Generator under Frequency) | • Check electrical load, ensure it is not over limitation. Consult KUBOTA dealer • Check for fuel shortage |
| |  Engine over speed (Generator over Frequency) | • Check electrical load, ensure it is not over limitation. Consult KUBOTA dealer |
| |  Delayed Over Current | • Check electrical load, ensure it is not over limitation. Consult KUBOTA dealer |
| |  kW Overload | • Check electrical load, ensure it is not over limitation. Consult KUBOTA dealer |
| |  Alternator Charge Fail | • Check fan belt and replace if required, • Check alternator and replace if required. |
| |  Water temperature is too high. • Insufficient cooling water. • Loosened water pump belt. • Blockage of radiator. | • Fill cooling water. • Adjust belt tension. • Clean. |
| |  Fuel level is too low (SQ models only) | • Fill with Fuel |
| Warning |  Low battery Voltage • Battery trouble • Alternator not charging | • Charge or replace battery • Check alternator charge, replace if required |
| |  High battery Voltage • Wrong battery Voltage • Alternator not regulating | • Replace with correct 12V battery • Check alternator charge, replace if required |
| |  Immediate Over Current | • Check electrical load, ensure it is not over limitation. |
| Panel not functioning | - Battery Isolator Switch | • Turn Switch to the "ON" position |
| | - Key Switch | • Turn Switch to the "RUN" position |

NOTE :

- Under/Over Generator Voltage, Over Current/kW, Frequency, and Battery Voltage alarms are in two stages. First stage is a "warning" where the alarm symbol will appear on the controller screen. This occurs at a predetermined setting, if this setting is then exceeded the "Shutdown" alarm will occur. The generator will automatically shut down. Once shutdown has occurred, the warning symbol will remain on the control panel screen until it is cleared with the "STOP" button. The fault must be rectified before the fault is cleared.

■ Engine

| Trouble | | Cause | Countermeasure |
|--------------------------------------|---|--|--|
| Not starting | Not turning or slow turning. | Battery trouble. | • Replacement of battery. |
| | | Insufficient battery charge. | • Recharge battery. |
| | | Slow turning at cold circumstance due to high viscosity of engine oil. Fuse blown out (Slow blow fuse) | • Replace engine oil to D5W40 or D10W30 for cold. • Replace fuse. |
| | | Engine Room Door open or Load Center cover removed | • Close engine room door. • Refit load center cover |
| | | Emergency Stop Button | • Turn button Clockwise to release |
| | | Battery Isolator Switch | • Turn Switch to the "ON" position |
| | Normal turning, but not started. | Fuel shortage. | • Refuel. |
| | | Fuel does not flow. | • Check fuel filter. If filter is dirty, replace. • Check fuel tank. Remove the settled impurities or moisture. |
| | | Air and water are contained in fuel supply line. | • Check pipe and fastening clamp. If any damage exists, replace or repair. • Relieve air. • Remove water inside of fuel tank and filter. |
| | | Injection pipe is loosened. | • Re-tighten. |
| | | Stop Solenoid (Energise to Run) not receiving power | • Check connector and wiring loom |
| Engine starts but stops immediately. | Insufficient oil pressure | • Add engine oil to upper limit of gauge. | |
| | Engine Over/Under speed | • Check electrical load, ensure it is not over limitation. Consult KUBOTA dealer | |
| | Voltage Over/Under | • Check electrical load, ensure it is not over limitation. Consult KUBOTA dealer | |
| Rotation is irregular. | Fuel shortage. | • Refuel. | |
| | Fuel does not flow. | • Check fuel filter. If filter is dirty, replace. • Check fuel tank. Remove the settled impurities or moisture. | |
| | Air and water are contained in the fuel supply line. | • Check pipe and fastening clamp. If any damage exists, replace it, or repair. • Relieve air. | |
| | | • Remove water inside of fuel tank and filter. | |
| | Injection pipe is loosened. | • Re-tighten. | |
| Engine suddenly stops. | Fuel shortage. | • Refuel. | |
| | Insufficient engine oil. | • Fill oil. | |
| | Water temperature is too high. • Insufficient cooling water. • Loosened water pump belt. • Blockage of radiator. | • Fill cooling water. • Adjust belt tension. • Clean. | |
| | Engine Room Door open or Load Center cover removed | • Close engine room door. • Refit load center cover | |
| | Engine Over/Under speed | • Check electrical load, ensure it is not over limitation. Consult dealer | |
| | Voltage Over/Under | • Check electrical load, ensure it is not over limitation. Consult dealer | |
| | Over Current/over kW | • Check electrical load, ensure it is not over limitation. Consult dealer | |

| Trouble | Cause | Countermeasure |
|--|----------------------------------|--|
| Insufficient output. When loaded, rotation goes slow. | Choke of air cleaner element. | • Replace air cleaner element. |
| | Choke of fuel system. | • Check. |
| | Choke of fuel filter. | • Element cleaning. |
| | Oil deterioration. | • Replace engine oil. |
| | Overload. | • Refer to generator. |
| Coolant leaks out. | Insufficient cooling water. | • Fill cooling water. |
| | Loosened fan belt. | • Adjust belt tension. |
| | Blockage of radiator. | • Clean. |
| Exhaust gas is bad. | Choke of air cleaner element. | • Clean air cleaner element. |
| | Engine oil is over filled. | • Remove oil to upper limit of gauge. |
| | Fuel quality is bad. | • Replace fuel with good quality fuel. |
| Abnormal sound Large vibration. | Crack of vibration-proof rubber. | • Replace. |
| | Others. | • Check, repair. |

■ When it is Difficult to Start the Engine

| Cause | Countermeasures |
|--|--|
| Fuel is thick and doesn't flow. | *Check the fuel tank and fuel filter. Remove water, dirt and other impurities. *As all fuel will be filtered by the filter, if there should be water or other foreign matters on the filter, clean the filter with kerosene or replace the filter. |
| Air or water mixed in fuel system. | *If air is in the fuel filter or injection lines, the fuel pump will not work properly. To attain proper fuel injection pressure, check carefully for loosened fuel line coupling, cap nut and etc. *Loosen joint bolt atop fuel filter and air vent screws of fuel injection pump to eliminate all the air in the fuel system. |
| Thick carbon deposits on orifice of injection nozzle. | *This is caused when water or dirt is mixed in the fuel. Clean the nozzle injection piece, being careful not to damage the orifice. *Check to see if nozzle is working properly or not. If not, install a new nozzle. |
| Valve clearance is wrong. | * [Engine model : D1703-EBG, V2203-EBG] Adjust valve clearance to 0.18 to 0.22 mm when the engine is cold. * [Engine model : V3300-EBG] Adjust valve clearance to 0.23 to 0.27 mm when the engine is cold. |
| Leaking valves | *Grind valves. |
| Fuel injection timing is wrong. | *Adjust injection timing * [Engine model : D1703-EBG] The injection timing 15.5° before top dead center. * [Engine model : V2203-EBG] The injection timing 17.0° before top dead center. * [Engine model : V3300-EBG] The injection timing 10.0° before top dead center. |
| Engine oil becomes thick in cold weather and engine cranks slow. | *Change grade of oil according to the weather (temperature). |
| Low compression | *Bad valve or excessive wear of rings, pistons and liners cause insufficient compression. Replace with new parts. |

| Cause | Countermeasures |
|--|--|
| Battery is discharged and the engine will not crank. | *Charge battery. *In winter, always remove battery from machine, charge fully and keep indoors. Install in machine at time of use. |

NOTE :

- If the cause of trouble cannot be found, contact your local KUBOTA Dealer.

■ When Starter does not Start

| Cause | Countermeasures |
|--|---|
| Emergency Stop Button is "ON" | *Rotate button to reset emergency stop. |
| Battery Voltage is low | *Recharge battery. |
| Engine room door or Load center cover is opened. | *Close the door. |
| Defect of contact point or shortage of alternator L-shaped coupler | *Check wiring and repair. |
| Alternator defect | *Replace. |
| Fuse blown. | *Replace. |
| Battery Isolator switch is "OFF" | *Turn Battery Isolator switch "ON". |

■ When Output is Insufficient

| Cause | Countermeasures |
|--|---|
| Carbon stuck around orifice of nozzle piece | *Clean orifice and needle valve, being very careful not to damage the nozzle orifice. *Check nozzle to see if good. If not, replace with new parts. |
| Compression is insufficient. Leaking valves | *Bad valve and excessive wear of rings, pistons and liners cause insufficient compression. Replace with new parts. *Grind valves. |
| Fuel is insufficient. | *Check fuel system. |
| Overheating of moving parts | *Check lubricating oil system. *Check to see if lubricating oil filter is working properly. *Filter element deposited with impurities would cause poor lubrication. Change element. *Check that bearing clearances are within factory specs. *Check injection timing. |
| Valve clearance is wrong. | [Engine model : D1703-EBG, V2203-EBG] *Adjust valve clearance to 0.18 to 0.22 mm with the engine is cold. [Engine model : V3300-EBG] *Adjust valve clearance to 0.23 to 0.27 mm with the engine is cold. |
| Air cleaner is dirty | *Clean the element every 250 hours of operation. |
| Fuel injection pressure is wrong. | *Adjust to proper pressure. 13.7 Mpa (140 kgf/cm ² , 1991 psi) |
| Injection pump wear | *Do not use poor quality fuel as it will cause wear of the pump. Only use No.2-D diesel fuel. *Check the fuel injection pump element and delivery valve assembly and replace as necessary. |

■ When Engine Suddenly Stops

| Cause | Countermeasures |
|---|--|
| Lack of fuel | *Check the fuel tank and refill the fuel, if necessary. *Also check the fuel system for air or leaks. |
| Bad nozzle | *If necessary, replace with a new nozzle. |
| Moving parts are overheated due to shortage of lubrication oil or improper lubrication. | *Check amount of engine oil with oil level gauge. *Check lubricating oil system. *At every second oil change, oil filter cartridge should be replaced. *Check to see if the engine bearing clearances are within factory specs. |

■ When Color of Exhaust Smoke is Black and Excessive

| Cause | Countermeasures |
|--|---|
| Fuel governing device bad | *Contact dealer for repairs. |
| Fuel is of extremely poor quality. | *Select good quality fuel. Use No.2-D diesel fuel only. |
| Nozzle is bad. | *If necessary, replace with new nozzle. |
| Combustion is incomplete. | *Cause is poor atomization, improper injection timing, etc. Because of trouble in injection system or in poor valve adjustment, or compression leakage, poor compression, etc. Check for the cause. |
| Engine is operating in overload condition. | *Diagnose and eliminate reason for overload. |

■ When Engine must be Stopped Immediately

| Cause | Countermeasures |
|--|--|
| Engine revolution suddenly decreases or increases. | *Check the adjustments, injection timing and the fuel system. |
| Unusual sound is heard suddenly. | *Check all moving parts carefully. |
| Color of exhaust suddenly turns dark. | *Check the fuel injection system, especially the fuel injection nozzle. *Check for overload condition. |
| Bearing parts are overheated. | *Check the lubricating system. |
| Oil lamp lights up during operation. | *Check the lubricating system. *Check, if the engine bearing clearances are within factory specs. *Check the function of the relieve valve in the lubricating system. *Check pressure switch. *Check filter base gasket. |

■ When Engine Overheats

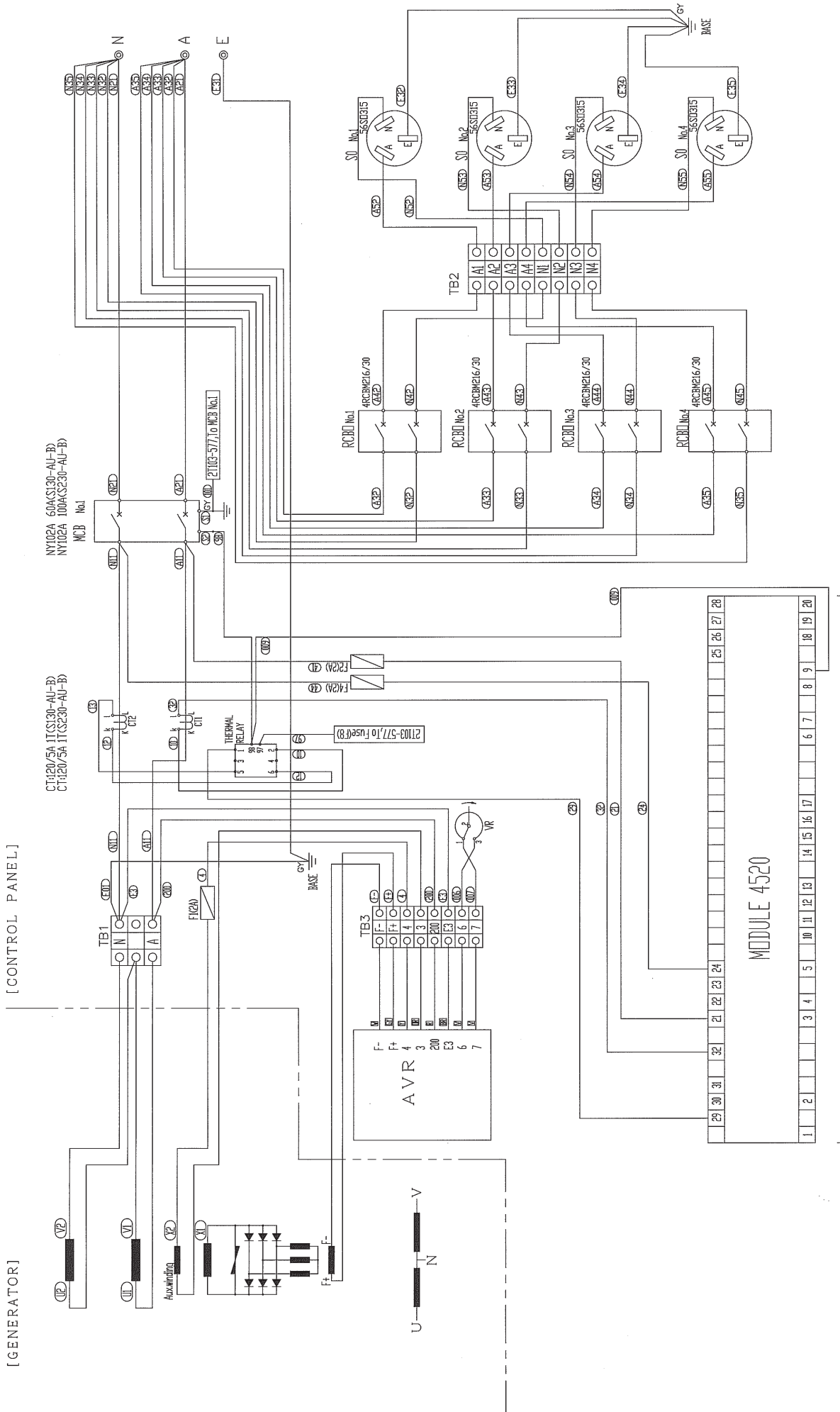
| Cause | Countermeasures |
|---|---|
| Engine oil insufficient | *Check oil level. Replenish oil as required. |
| Fan belt broken or elongated | *Check all moving parts carefully. |
| Coolant insufficient | *Replenish coolant. |
| Excessive concentration of antifreeze | *Flush Coolant and replace with 50/50 mix. |
| Radiator net or radiator fin clogged with dust | *Clean net or fin carefully. |
| Inside of radiator or coolant flow route corroded | *Clean or replace radiator and parts. |
| Fan or radiator or radiator cap defective | *Replace defective parts. |
| Thermostat defective | *Check thermostat and replace if necessary. |
| Temperature gauge or sensor defective | *Check temperature with thermometer and replace if necessary. |
| Overload running | *Reduce load. |
| Head gasket defective or water leakage | *Replace parts. |
| Incorrect injection timing | *Adjust to proper timing. |
| Unsuitable fuel used | *Use the specified fuel. |

■ Generator Troubleshooting

| Trouble | Possible causes | Correction |
|------------------------------------|---|--|
| Unusual noise or vibration | Single-phase load applied beyond allowable level (on three phase models). | *Lower the load to acceptable level. |
| | Bearing deteriorated. | *Replace the bearing. |
| | Coupling damaged. | *Replace the coupling. |
| Frame overheated. | Cooling fan inlet or outlet blocked. | *Unblock the inlet or outlet. |
| | Voltage too high. | *Readjust the voltage. |
| | Overloaded. | *Reduce the load. |
| Voltage failure to rise. | Voltage maladjusted. | *Readjust using the voltage control. |
| | AVR excitation output cable broken. | *Repair the cable. |
| | AVR itself in trouble. | *Replace the AVR. |
| | Exciter's winding short-circuited or broken. | *Replace the generator. |
| | AVR excitation input cable broken. | *Repair the cable. |
| | Generator's winding broken. | *Replace the generator. |
| | AVR excitation output fuse blown out. | *Replace the fuse. |
| Voltage too high. | Voltage maladjusted. | *Readjust using the voltage control. |
| | AVR voltage detection cable broken. | *Repair the cable. |
| | AVR itself in trouble. | *Replace the AVR. |
| | Mercury arc lamp or such conductive load connected. | *Disconnect such load. |
| Voltage hunting | Inverter or such switching load connected. | *Disconnect such load. |
| | AVR itself in trouble. | *Replace the AVR. |
| Circuit breaker turned OFF. | Connected cable or load short-circuited. | *Contact a qualified electrical engineer for inspection. |
| | Overloaded. | *Reduce the load. |
| | Shutdown Alarm | *See "Digital Control Panel Warning And Shutdown Alarms" |

• Connection Diagram – Single Phase

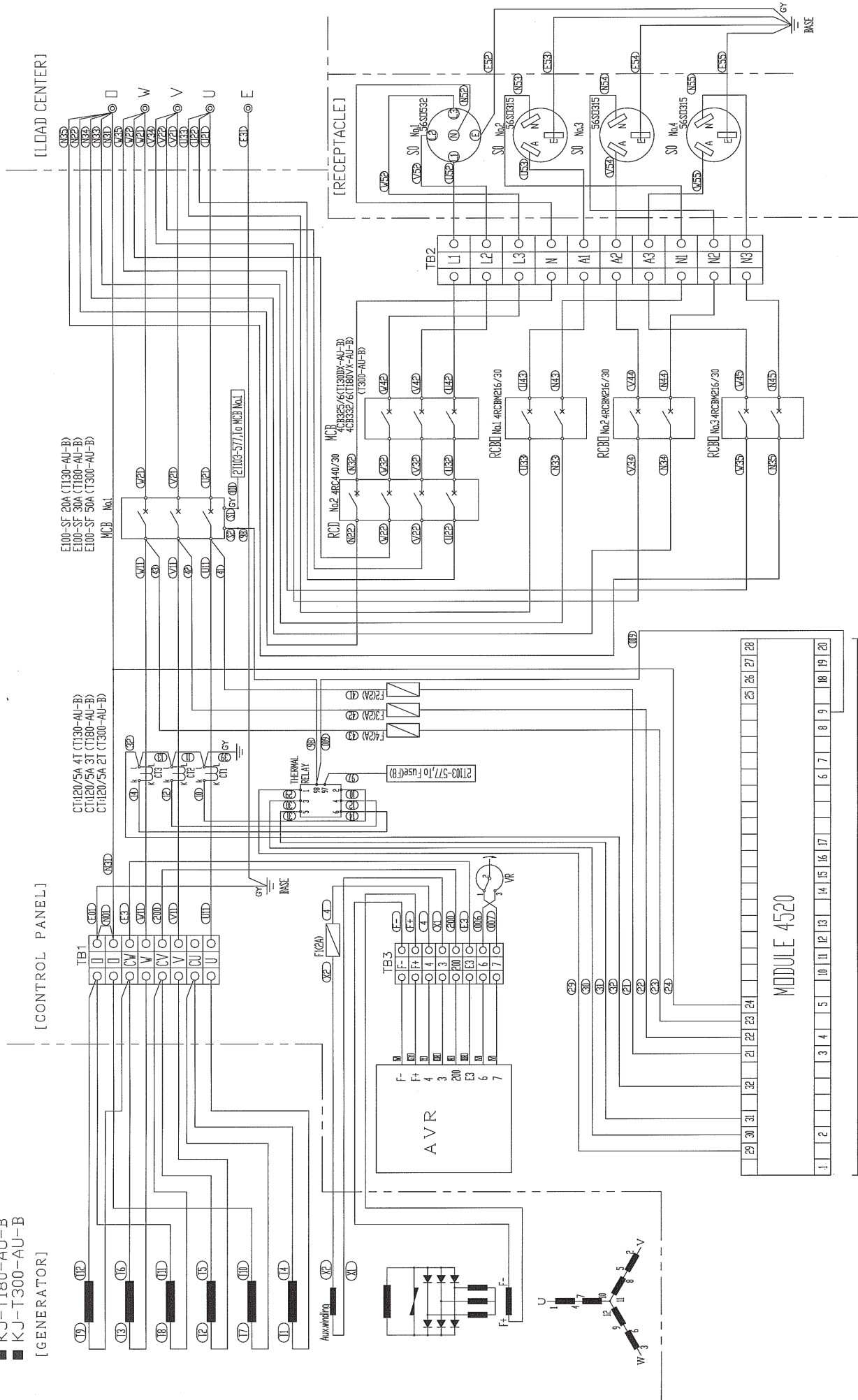
- KJ-S130-AU-B
- KJ-S230-AU-B



Reference for Engine Circuit 2T103-577

• Connection Diagram – Three Phase

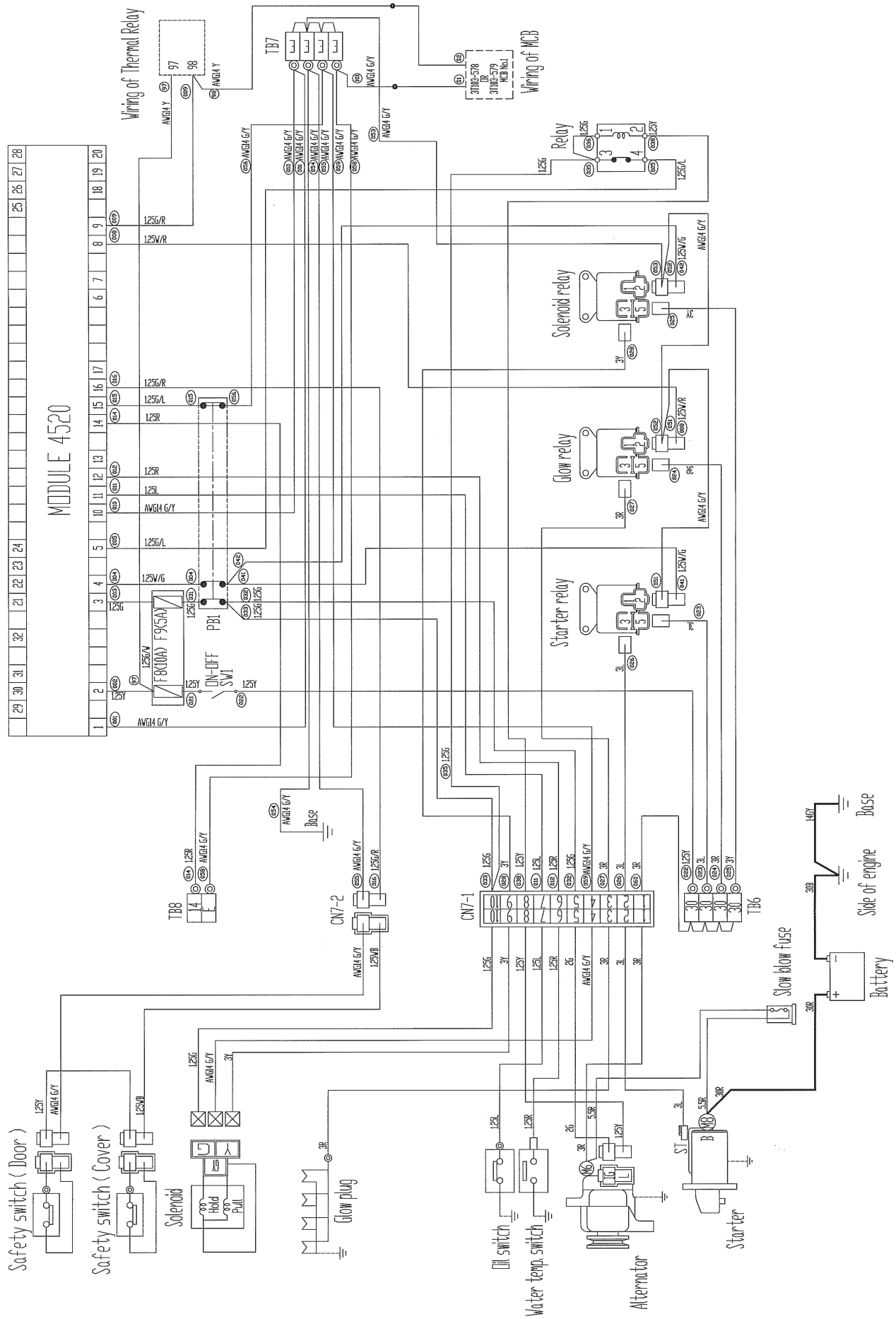
- KJ-T130-AU-B
- KJ-T180-AU-B
- KJ-T300-AU-B



Reference for Engine Circuit 2T103-577

• Engine Circuit – D1703 / V2203

KJ-S130-AU-B/KJ-T130-AU-B/KJ-T180-AU-B



• Engine Circuit – V3300

KJ-S230-AU-B/KJ-T300-AU-B

