

# KUBOTA

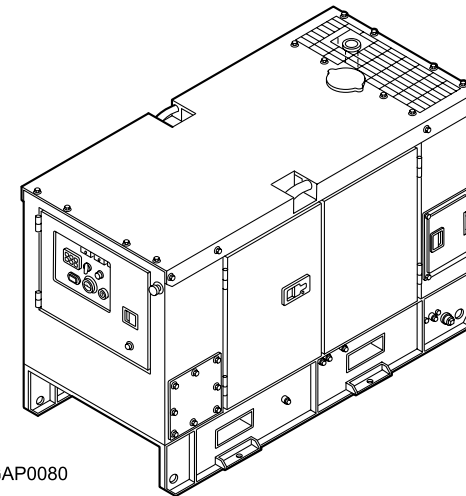
- U.S.A. : **KUBOTA ENGINE AMERICA CORPORATION**  
505 Scheller Road, Lincolnshire, Illinois 60069 U.S.A.  
Telephone : (847)955-2500
- Canada : **KUBOTA CANADA LTD.**  
5900 14th Avenue, Markham, Ontario, L3S 4K4, Canada  
Telephone : (905)294-7477
- France : **KUBOTA EUROPE S.A.S**  
19-25, Rue Jules Verceyusse, Z.I. BP88, 95101 Argenteuil Cedex, France  
Telephone : (33)1-3426-3434
- Germany : **KUBOTA (DEUTSCHLAND) GmbH**  
Senefelder Str. 3-5 63110 Rodgau /Nieder-Roden, Germany  
Telephone : (49)6106-873-0
- U.K. : **KUBOTA (U.K.) LTD.**  
Dormer Road, Thame, Oxfordshire, OX9 3UN, U.K.  
Telephone : (44)1844-214500
- Australia : **KUBOTA TRACTOR AUSTRALIA PTY LTD.**  
25-29 Permas Way, Truganina, VIC 3029, Australia  
Telephone : (61)-3-9394-4400
- Philippines : **KUBOTA PHILIPPINES, INC.**  
155 Panay Avenue, South Triangle Homes, 1103 Quezon City, Philippines  
Telephone : (63)2-9201071
- Indonesia : **P.T. KUBOTA INDONESIA**  
JALAN. Setyabudi 279, Semarang, Indonesia  
Telephone : (62)-24-7472849
- Japan : **KUBOTA Corporation**  
Engine Export Dept.  
2-47, Shikitsuhigashi 1-chome, Naniwa-ku, Osaka, Japan 556-8601  
Telephone : (81)6-6648-2155 Fax : (81)6-6648-3521

AQ, D, 1-1, 1, K Code No. 1G296-8914-1

# OPERATOR'S MANUAL

# KUBOTA DIESEL GENERATOR

**SQ-1120 · SQ-1150 · SQ-3140 · SQ-3200 · SQ-3300**



1AEEAAGAP0080

S  
Q  
1  
1  
2  
0  
0  
S  
Q  
3  
1  
4  
0  
S  
Q  
3  
2  
0  
0  
S  
Q  
3  
3  
0  
0



## 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 .....	4
Control Panel.....	4
Control Box.....	5
PREPARATION TO SUPPLY THE ELECTRIC POWER.....	6
CONNECTING THE LOAD .....	8
Connection Notes.....	8
Connecting the Load .....	8
PRE-OPERATION CHECK.....	10
DAILY CHECK.....	10
How to Open the Door.....	10
Battery .....	10
Engine Oil.....	11
Coolant .....	11
Opening and Closing of the Fuel Tank Cap .....	11
Fuel .....	12
OPERATING THE GENERATOR .....	13
SAFETY DEVICES .....	13
STARTING THE ENGINE .....	14
Warm-up in Cold Ambient Temperatures.....	15
COLD WEATHER STARTING .....	16
STOPPING THE ENGINE .....	17
EMERGENCY STOP SWITCH .....	18
MAINTENANCE .....	19
SERVICE INTERVALS .....	20
PERIODIC SERVICE .....	22
FUEL .....	22
Fuel Level Check and Refueling .....	22
Air Bleeding the Fuel System .....	23
Cleaning the Fuel Filter Element .....	23
Fuel Filter Cartridge Replacement .....	24
Cleaning the Water Separator (Sedimenter) .....	24
Draining Water in the Fuel Tank.....	25
ENGINE OIL .....	25
Checking Oil Level and Adding Engine Oil.....	26
Changing Engine Oil .....	27
Replacing the Oil Filter Cartridge .....	27
RADIATOR .....	28
Checking Coolant Level, Adding Coolant.....	28
Changing Coolant.....	29
Remedies for Rapid Coolant Loss.....	29
Checking Radiator Hoses and Clamps .....	30
Precaution Overheating.....	30

Cleaning Radiator Core (outside).....	30
Cleaning the Radiator (inside).....	30
Anti-freeze.....	30
AIR CLEANER.....	31
Cleaning Primary Air Filter Element.....	32
Evacuator Valve.....	32
For the Air Cleaner with a Dust Cup.....	32
BATTERY.....	32
Battery Charging.....	32
Instructions for Long Term Storage.....	34
Battery Boost Starting.....	34
ELECTRIC WIRING.....	34
FAN BELT.....	35
Adjusting Fan Belt Tension.....	35
FULLY BUNDED.....	35
TRANSPORTING / STORAGE.....	36
Transporting.....	36
Lifting Procedure.....	36
Storage.....	37
OPERATION OF THE EMERGENCY RELAY.....	38
TROUBLESHOOTING.....	40
When it is Difficult to Start the Engine.....	40
When Starter does not Start.....	40
When Output is Insufficient.....	41
When Engine Suddenly Stops.....	41
When Color of Exhaust Smoke is Black and Excessive.....	41
When Engine must be Stopped Immediately.....	42
When Engine Overheats.....	42
Generator Troubleshooting.....	43
WIRING DIAGRAM.....	45



# 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

- 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

- 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

- 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

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 damp or wet conditions. 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

- 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

- 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

- 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

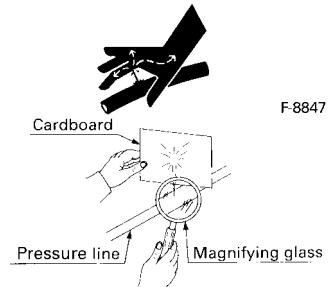
- DO NOT operate the generator with the side covers removed or open. Serious personal injury may result if fingers or clothing are caught in the rotating parts.
- Be sure to stop the engine before checking or adjusting belt tension and cooling fan.
- To avoid personal injury, keep your hands and body 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

- 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

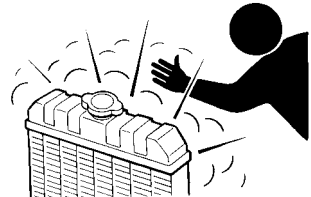
F-2359

## CAUTIONS AGAINST BURNS & BATTERY EXPLOSION

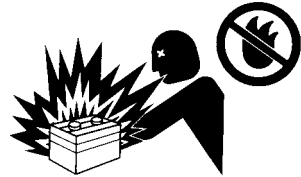
- To avoid burns, be alert for hot components, e.g. muffler, muffler cover, radiator, pipes, hoses, engine body, coolant, engine oil, etc. during operation and just after the engine has been shut off.
- DO NOT remove the radiator cap while the engine is running or immediately after stopping. Otherwise 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



1AEABAAAP0080



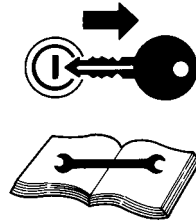
1AAAAABAP0230



1ARAEAAAP0520

## CONDUCTING SAFETY CHECKS & MAINTENANCE

- 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.
- Detach the battery from the generator before conducting service.  
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.
- 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.

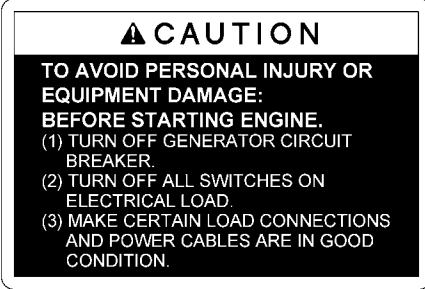


1BJABAAAP0200

## DANGER, WARNING AND CAUTION LABELS

Pay special attention to all labels on the generator. Refer to following representations for labels used on the SQ-Series Generator. Labels are available individually from your KUBOTA Dealer.

(1) Part No. G3341-8851-0



1AEAEAAAP0730

(2) Part No. G3341-8824-0



1AEAEAAAP0670

(3) Part No. 18620-8806-0

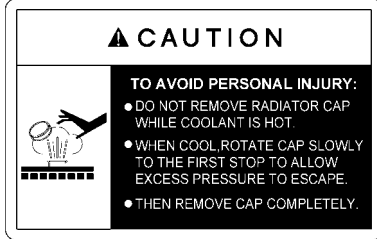


1AEAEAAAP0790

(4) Part No. 18901-5090-0

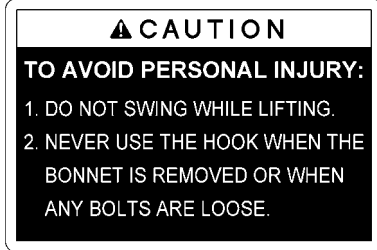


(5) Part No. G3907-8832-0



1AEAEAAAP0800

(6) Part No. G3352-8836-0



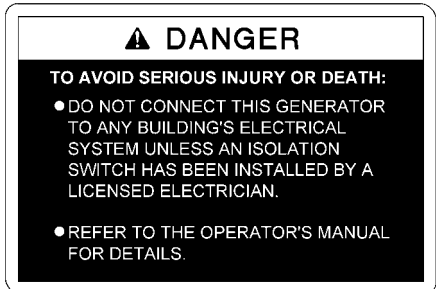
1AEAEAAAP0750

(7) Part No. G3341-8830-0



1AEAEAAAP0690

(8) Part No. G3341-8831-0



1AEAEAAAP0700

(9) Part No. G3102-8806-0



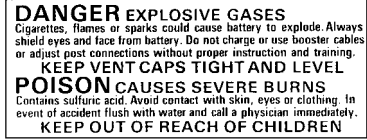
1AEAEAAP0780

(10) Part No. G3341-8822-0



1AEAEAAP0660

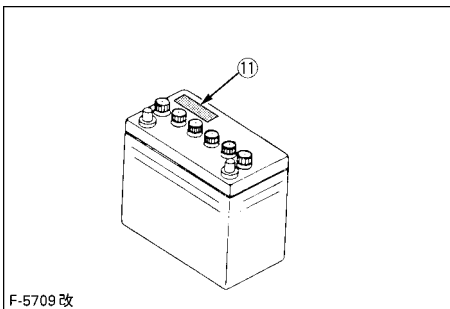
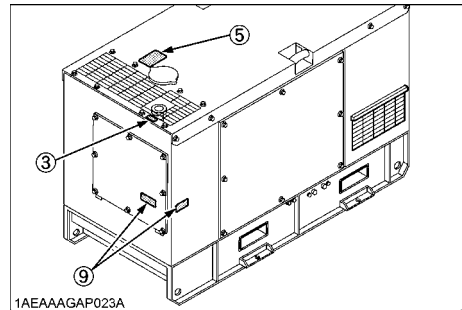
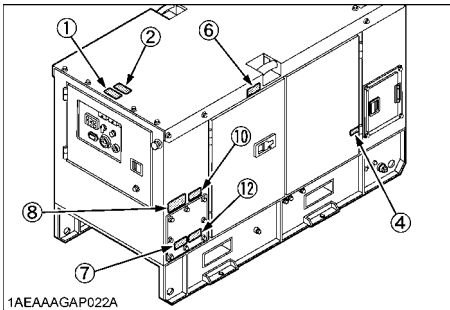
(11) Part No. 6C090-5896-0



(12) Part No. G3341-8895-0



1AEAEAAP0740



## **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.

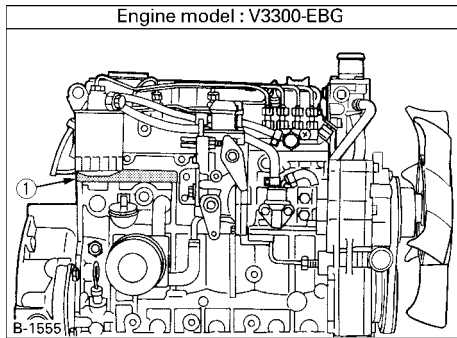
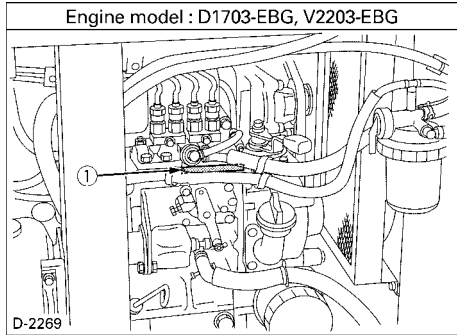
# SERVICING OF GENERATOR

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

<b>Kubota DIESEL GENERATOR</b>	
Model	SQ-3200-AUS
Capacity	20.0 kVA 16.0 kW at 0.8 PF
Voltage	415V
Frequency	50Hz
Current	27.8A
Rated Speed	1500rpm
Phase	3
No. of Poles	4
MFG. No.	-
<b>KUBOTA Corporation</b> MADE IN JAPAN	

1AEAAAGAP014A

(1) Generator model

(2) Generator serial number

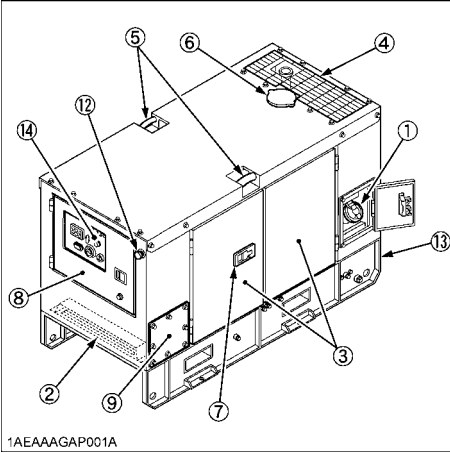


# SPECIFICATIONS

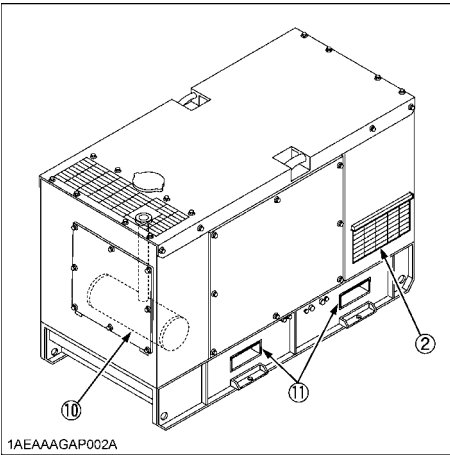
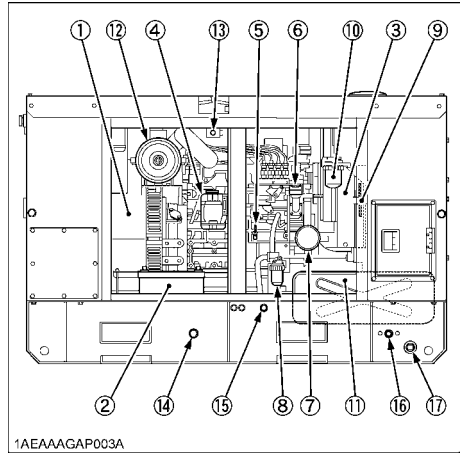
MODEL	Unit	SQ-1120	SQ-1150	SQ-3140	SQ-3200	SQ-3300
<b>GENERATOR</b>						
Model		PX-312KE1	PX-319KE1	PX-312KE3	PX-319KE3	PX-322KE3
Design		Revolving field, self-excited brushless AC generator				
Frequency	Hz	50				
Standby Output	kVA (kW)	11.8 (11.8)	16 (16)	15.4 (12.3)	22 (17.6)	33 (26.4)
Continuous Output	kVA (kW)	11.2 (11.2)	15 (15)	14 (11.2)	20 (16)	30 (24)
Voltage-single phase	V	240			240	
Voltage-3 phase	V	---				
Armature connection		Series			Star with neutral	
Phase & Wire		1 Phase & 4 Wires			3 Phase & 12 Wires	
Power Factory		1.0			0.8	
No. of Poles		4-pole				
Insulation		Class H				
Voltage Regulation	%	$\pm 1.5$ (No load to full load)				
Type of Coupling		Direct coupled				
<b>DIESEL ENGINE</b>						
Model		D1703-EBG	V2203-EBG	D1703-EBG	V2203-EBG	V3300-EBG
Type		Vertical, water-cooled, 4-cycle diesel engine				
No. of cylinders		3	4	3	4	4
Bore x Stroke	mm	87 x 92.4				98 x 110
Displacement	L	1.647	2.197	1.647	2.197	3.318
Engine Speed	rpm	1500				
Continuous rated output	kW (HP)	13.6 (18.2)	18.4 (24.7)	13.6 (18.2)	18.4 (24.7)	26.8 (35.9)
Lubricating oil		API service class CF or higher				
Oil capacity	L	5.6	7.6	5.6	7.6	13.2
Coolant capacity *	L	6.6	7.4	6.6	7.4	9.3
<b>SET</b>						
Fuel		Diesel fuel No.2 (ASTM D975)				
Fuel Consumption At full load	L/h	3.9	5.5	3.8	5.3	7.7
Fuel tank capacity	L	62				68
Continuous operating hours (at 3/4 load)	hrs	20.7	15.1	21.4	15.5	11.5
Battery (Ah/5Hr)		80D26R (55Ah)				130E41R (92Ah)
Starting system		Electric				
L x W x H	mm	1675 x 780 x 1070				1935 x 860 x 1095
Approx. Net Wt.	kg	699	762	699	762	935
Emergency stop system		In case of abnormal : Oil pressure, water temperature, fan belt broken When the side cover and door open with running				
<b>AMPS</b>						
Single phase 240V	A	46.7	62.5	12.5 (3 set)	18.1 (3 set)	27.1 (3 set)
Three Phase 415V	A	---	---	19.5	27.8	41.7

\*Including the recovery tank

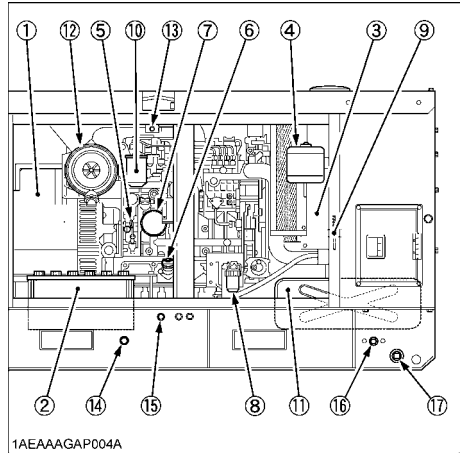
**Part Names**



**[SQ-1120, SQ-3140, SQ-1150, SQ-3200]**



**[SQ-3300]**



- (1) Fuel tank cap-with lockable key
- (2) Cooling air inlet
- (3) Door
- (4) Cooling air outlet
- (5) Handling hook
- (6) Radiator top cover
- (7) Door handle-with lockable key
- (8) Panel cover
- (9) Load center cover
- (10) Muffler
- (11) Fork pockets
- (12) Emergency stop switch
- (13) Fully Bunded (Base bunded to 110% capacity)
- (14) Control panel

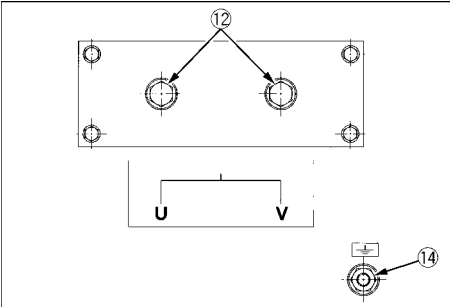
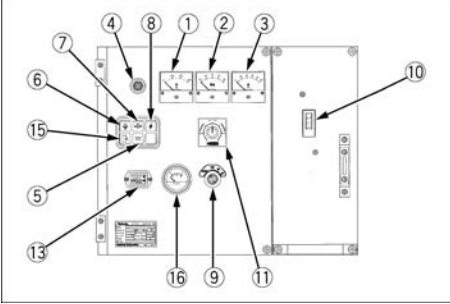
- (1) Generator
- (2) Battery
- (3) Radiator
- (4) Recovery tank
- (5) Oil dipstick
- (6) Engine oil port
- (7) Oil filter cartridge
- (8) Fuel sedimenter cartridge (water separator)
- (9) Electric fuel feed pump
- (10) Fuel filter cartridge
- (11) Fuel tank
- (12) Air cleaner
- (13) Safety switch
- (14) Engine oil drain plug
- (15) Coolant drain plug
- (16) Fuel tank drain plug
- (17) Containment drain point (Plug size: 3/4)

# INSTRUMENT PANEL AND PART NAMES

**■ Control Panel**

**◆ 1 Phase Type**

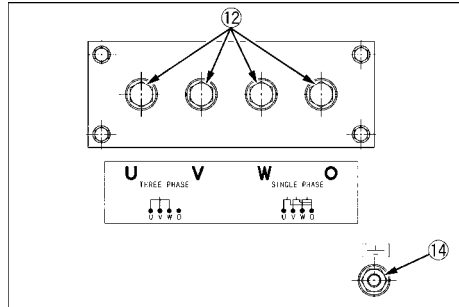
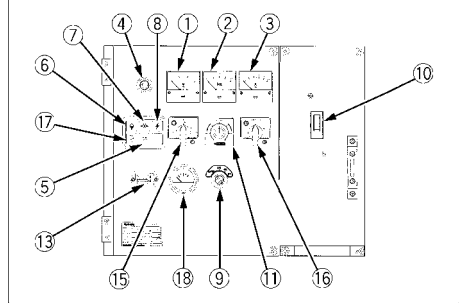
[SQ-1120, SQ-1150]



- (1) A.C. Voltmeter
- (2) Frequency meter
- (3) A.C. Ammeter
- (4) Pilot lamp (Green lamp)
- (5) Glow plug lamp
- (6) Water temperature lamp
- (7) Oil pressure lamp
- (8) Battery charge lamp
- (9) Main switch (key)
- (10) Circuit breaker
- (11) Voltage adjuster
- (12) Terminals (output)
- (13) Hour meter
- (14) Ground terminal
- (15) Door open lamp
- (16) Fuel gauge

**◆ 3 Phase Type**

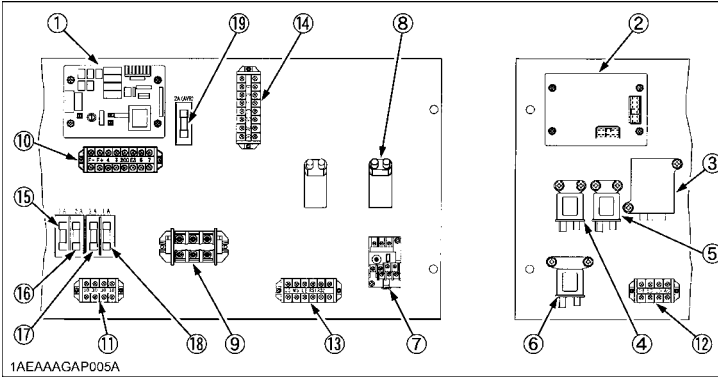
[SQ-3140, SQ-3200, SQ-3300]



- (1) A.C. Voltmeter
- (2) Frequency meter
- (3) A.C. Ammeter
- (4) Pilot lamp (Green lamp)
- (5) Glow plug lamp
- (6) Water temperature lamp
- (7) Oil pressure lamp
- (8) Battery charge lamp
- (9) Main switch (key)
- (10) Circuit breaker
- (11) Voltage adjuster
- (12) Terminals (output)
- (13) Hour meter
- (14) Ground terminal
- (15) Voltmeter change-over switch
- (16) Ammeter change-over switch
- (17) Door open lamp
- (18) Fuel gauge

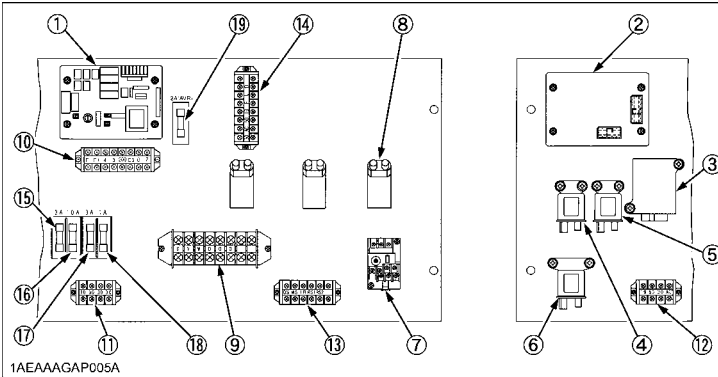
■ Control Box

◆ 1 Phase Type



- (1) AVR  
(Automatic voltage regulator)
- (2) Relay unit
- (3) Emergency relay
- (4) Starter relay
- (5) Solenoid relay
- (6) Glow relay
- (7) Thermal relay  
(Over current relay)
- (8) CT  
(Current transformer)
- (9) Terminal (Generator)
- (10) Terminal (AVR)
- (11) Terminal (Battery) TB3
- (12) Terminal  
(Main switch) TB2
- (13) Terminal  
(Auxiliary output) TB1
- (14) Terminal  
(Auto-start unit) TB4

◆ 3 Phase Type



- (1) AVR  
(Automatic voltage regulator)
- (2) Relay unit
- (3) Emergency relay
- (4) Starter relay
- (5) Solenoid relay
- (6) Glow relay
- (7) Thermal relay  
(Over current relay)
- (8) CT  
(Current transformer)
- (9) Terminal (Generator)
- (10) Terminal (AVR)
- (11) Terminal (Battery) TB3
- (12) Terminal  
(Main switch) TB2
- (13) Terminal  
(Auxiliary output) TB1
- (14) Terminal  
(Auto-start unit) TB4
- (15) Fuse (3A, F1)
- (16) Fuse (10A, F2)
- (17) Fuse (3A, F3)
- (18) Fuse (1A, F4)
- (19) Fuse (2A, AVR)

# PREPARATION TO SUPPLY THE ELECTRIC POWER

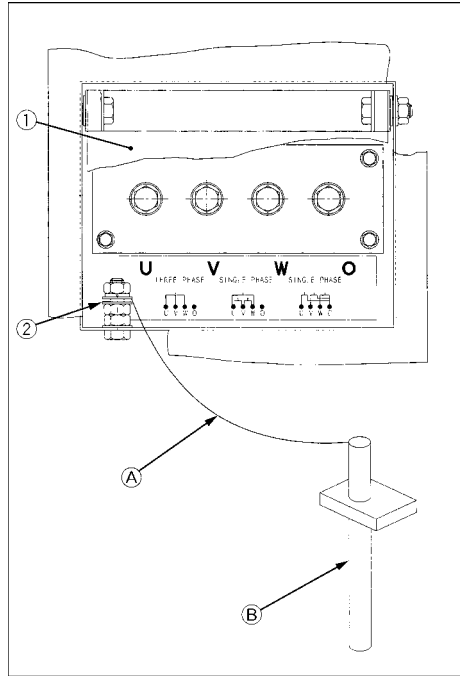
## 1. Generator grounding

The end user, equipment owner or operator must contact his local, state, county or municipal electric code department to determine the approved generator grounding method to be used in his application or location.

Recommendations in the NEC (National Electrical Code), NFPA (National Fire Protection Association), AUSTRALIAN STANDARDS and OSHA (Occupational Safety and Health Administration) regulations must be followed to assure compliance and safe operation.

Always be sure to ground (earth) the generator terminals to comply with the local, state, national or OSHA requirements.

One possible connection method for construction site use is as follows:






- (1) Load center cover
- (2) Generator ground terminal
- (A) #6AWG Flexible copper ground connection
- (B) Metal ground rod or building cold water pipe system per N.E.C. code

## 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
SQ-1120	11.2 kVA (11.2 kW)	7.0 kVA (5.6 kW)	---
SQ-1150	15.0 kVA (15.0 kW)	9.5 kVA (7.6 kW)	---
SQ-3140	11.2 kVA (11.2 kW)	8.5 kVA (6.8 kW)	5.5 kW (7.5 HP) 3 Phase
SQ-3200	16 kVA (16 kW)	12.5 kVA (10.0 kW)	7.5 kW (10 HP) 3 Phase
SQ-3300	24 kVA (24 kW)	19.0 kVA (15.2 kW)	11 kW (15 HP) 3 Phase

### NOTE :

- Keep an inverter 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

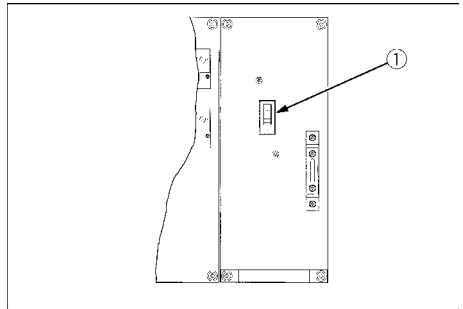


### WARNING

To avoid personal injury:

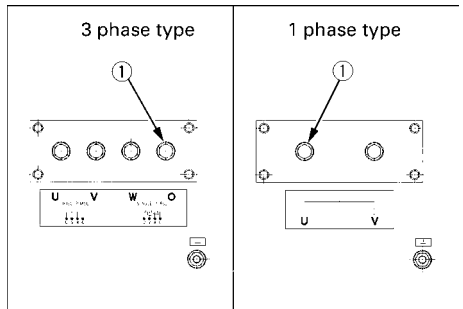
- Connect or disconnect the load to the AC receptacle only when the engine is stopped.

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



(1) Circuit breaker

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



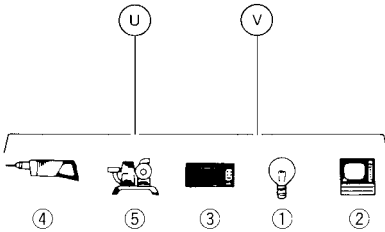
(1) Terminals (output)

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

◆ **Single phase 2 terminals type**

Use (U)-(V)

Single Phase



D-1918改

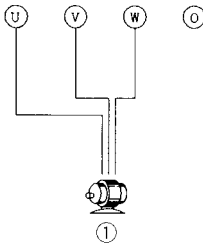
- (1) Light
- (2) Television
- (3) Air conditioner
- (4) Electric Drill
- (5) Motor Pump

◆ **3 phase and single phase 4 terminals type**

● **For 3 phase power source**

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

Three phase



D-2044

- (1) Motor

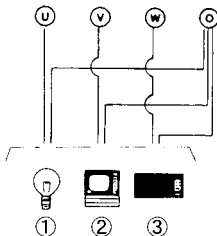
● **For single phase power source**

Use (O)-(U)

(O)-(V)

(O)-(W)

Single phase



1AEAAAAGAP027A

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



# 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 bunded 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.)



### CAUTION

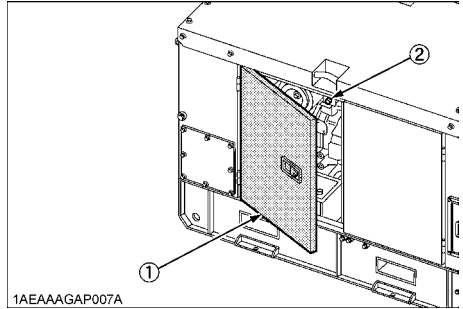
To avoid personal injury from contact with moving parts;

- 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

Insert the door key and turn clockwise and open the machine doors. The doors open together on hinges.

The door of the generator is equipped with a safety switch. Safety switch automatically shuts off the engine when door is opened.



1AEAAAGAP007A

(1) Door

(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.

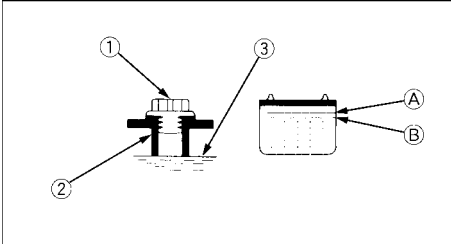
- DO NOT use or charge the battery if the fluid level is below the LOWER (lower limit level) mark.

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.



D-2064

- (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.

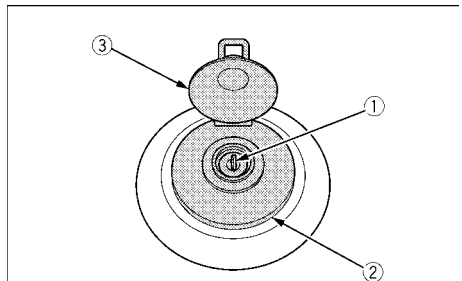
1. Remove the radiator cap and fill with specified coolant until the coolant level is just below the port.
2. Fill with coolant to the "FULL" mark on the recovery tank.
3. Securely tighten radiator cap and recovery tank cap.

**NOTE :**

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

**■ Opening and Closing of the Fuel Tank Cap**

1. Open the tank cap cover, insert the tank cap cover key and turn clockwise. Then turn the tank cap counterclockwise to open.



D-2284

There are three types of key. Select the key as necessary.

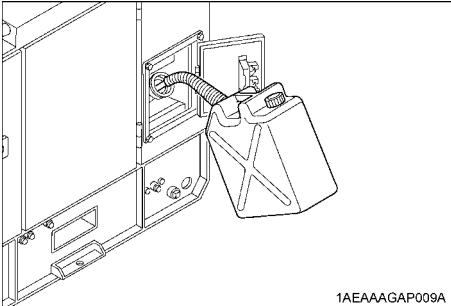
- (1) Key
  - (2) Fuel tank cap
  - (3) Tank cap cover
2. To close the tank cap, turn clockwise and the tank cap cover key in the opposite direction. Then close the tank cap cover.

## ■ 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".



1AEEAAGAP009A

**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.)

# 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 circuit breaker before starting the generator.
- Turn OFF all switches on the electrical devices.
- Check the wiring and connections of the electrical devices before starting the machine.
- DO NOT touch the live parts during operation.

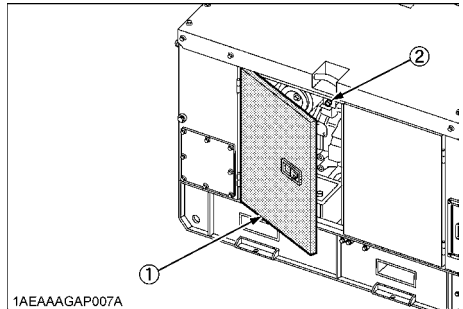
## SAFETY DEVICES



## 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 access door are equipped with safety devices to detect the opening and/or closing condition of door.
  2. The door safety switch (2) is located on the access door.  
If you turn the key switch to "ON" with the access door open, the starter of engine will not activate. (While the fuel pump solenoid can be activated.)
  3. Turn the key switch to "OFF" to close the access door and then restart the engine.



1AEAAAGAP007A

- (1) Access door  
(2) Safety switch

4. If you open the access door 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.  
(For detail on the emergency unit, see "OPERATION OF THE EMERGENCY RELAY" on page 38.)

## STARTING THE ENGINE

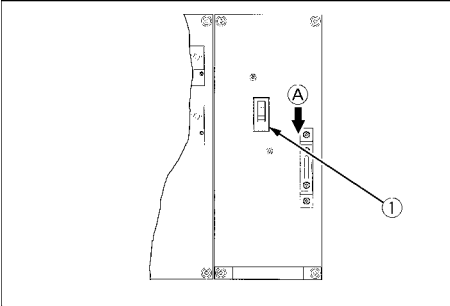


### CAUTION

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 access 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 circuit breakers on the control panel.



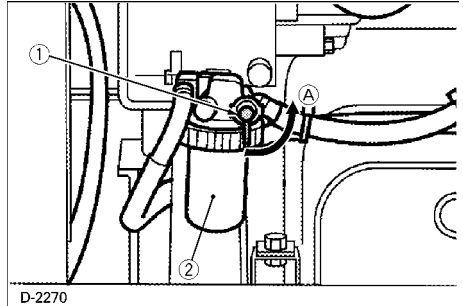
(1) Circuit breaker

(A) "OFF"

#### NOTE :

- For the AUS specified models, also turn OFF the load center circuit breaker.

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

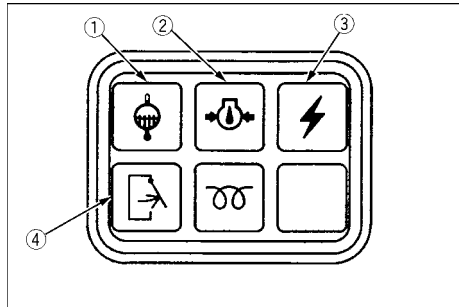


(1) Fuel lever

(A) "OPEN"

(2) Water separator

4. Insert the key into the main switch and turn it "ON".
5. Check the battery charge lamp and oil pressure lamp are "ON".



(1) Water temperature lamp

(2) Oil pressure lamp

(3) Battery charge lamp

(4) Door open lamp

#### IMPORTANT :

- Do not use ether or any starting fluid for starting the engine, or severe engine damage will occur.
- To protect the battery and the starter, make sure that the starter is not continuously turned for more than 10 seconds.
- 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 :

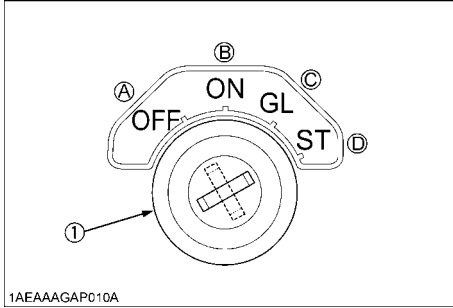
- The thermal relay does not work if the battery voltage falls below the prescribed level, which will detect overload on the meter. Therefore, be aware of the battery condition.

**6. Turn the key to "GLOW" position.**

**NOTE :**

- See "COLD WEATHER STARTING" section as to the preheating times.

**7. Turn the key to the "START" position and release when the engine starts.**



1AEAAAGAP010A

- (1) Main switch (Key)
- (A) "OFF"  
 (B) "ON"  
 (C) "GLOW"  
 (D) "START"

**IMPORTANT :**

- Do not run the starter motor continuously for more than 10 seconds at a time, or it may damage the starter. If the engine fails to start, wait for about 30 seconds and try again. When the engine starts to generate electric power, the green lamp will light up.

**8. Check to see that the battery charge lamp, oil pressure lamp and door open lamp are "OFF".**

**9. Check the warning lamps.**

Whenever the engine stops automatically during operation, correct the problem before restarting the engine.

**IMPORTANT :**

- Be sure to warm up the engine, not only in winter, but also in warmer seasons. An insufficiently warmed-up engine can shorten its service life.

**■ 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:

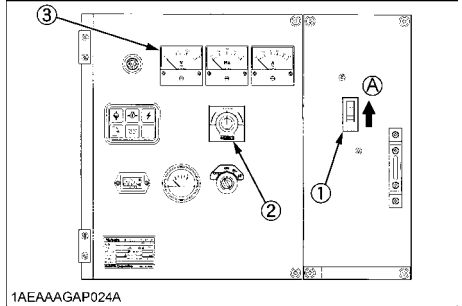
Warm up the engine at rated revolution with no load.

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

**10. Check the voltage on the meters.**

- Voltage regulation can be achieved by turning the voltage adjuster in clockwise or counterclockwise direction.
- Set voltage to the same as the devices being used.

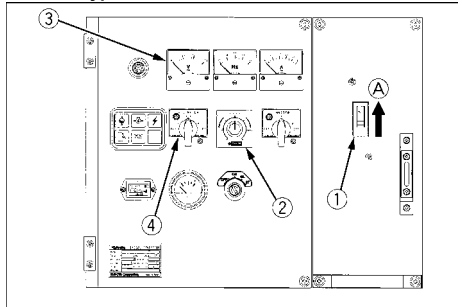
**Single Phase Type**



1AEAAAGAP024A

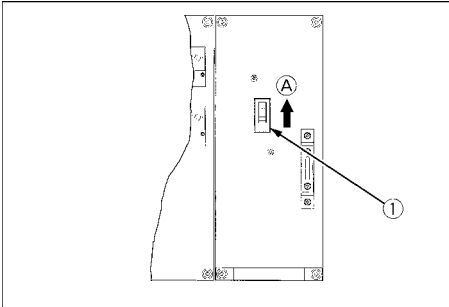
- (1) Circuit breaker (A) "ON"  
 (2) Voltage adjuster (Potentiometer)  
 (3) AC Volt meter

**3 Phase Type**



- (1) Circuit breaker (A) "ON"  
 (2) Voltage adjuster (Potentiometer)  
 (3) AC Volt meter  
 (4) Voltmeter Change-Over switch

**11. Turn ON the circuit breaker on the control panel.**



(1) Circuit breaker (A) "ON"

**NOTE :**

- For the AUS specified models, turn ON the load center circuit breaker that corresponds to the receptacle being used.

**12. Turn ON the electrical device switches for the connections.**

**COLD WEATHER STARTING**

If the ambient temperature is below \* -5°C (23°F) and the engine is very cold, start it in the following manner: Take steps (1) through (5) in "STARTING THE ENGINE" section.

**6. Turn the main switch (key) to the "GLOW" position until the glow plug indicator goes off.**

**NOTE :**

- If the ambient temperature is low, the preheating time will take longer.

**IMPORTANT :**

- Shown below are the standard preheating times for various temperatures. This operation, however, is not required, when the engine is warmed up.

Ambient temperature	Preheating time
Above 10°C (50°F)	NO NEED
10°C (50°F) to -5°C (23°F)	Approx. 5 seconds
*Below -5°C (23°F)	Approx. 10 seconds
Limit of continuous use	20 seconds

**7. Turn the key to "ST" ("START") position and the engine should start.**

(If the engine fails to start after 10 seconds, turn off the key for 30 seconds. Then repeat steps (6) and (7) above.)

**IMPORTANT :**

- Do not allow the starter motor to run continuously for more than 10 seconds.
- Be sure to warm up the engine, not only in winter, but also in warmer seasons. An insufficiently warmed-up 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.

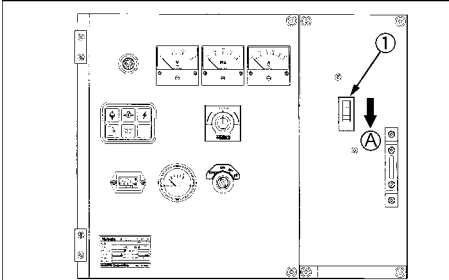
## STOPPING THE ENGINE

1. Turn OFF all electrical device switches for connected loads.

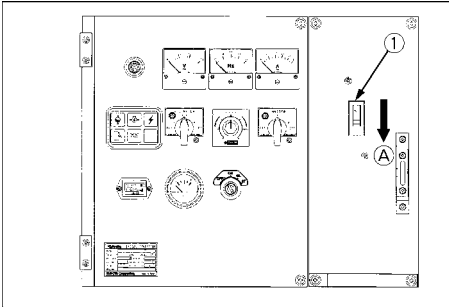
**NOTE :**

- For the AUS models, also turn OFF the load center circuit breaker.

2. Turn OFF the circuit breakers.



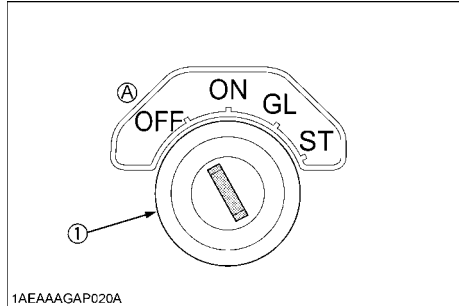
1AEAAAAGAP024B



(1) Circuit breaker (A) "OFF"

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

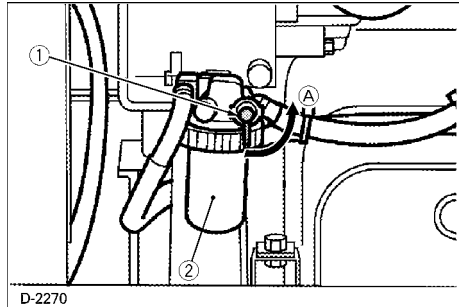
4. Turn the main switch (key) to the "OFF" position.



1AEAAAAGAP020A

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

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



D-2270

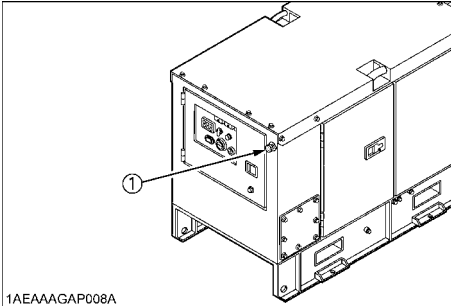
(1) Fuel lever (2) Filter bowl (A) "CLOSE"



## EMERGENCY STOP SWITCH

**NOTE :**

- If the emergency stop switch is pressed, the battery power is turned off and the engine is interrupted. Do not press this switch except for an emergency.



1AEAAAGAP008A

(1) Emergency stop switch

1. If anything unusual occurs, press the switch (1) and the engine must be stopped immediately.
2. In this case, be sure to turn off the main switch.
3. Rotate the button to reset emergency stop.

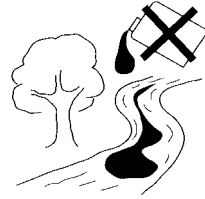
# MAINTENANCE

## 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



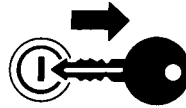
B-1507



## 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.

No.	Check point	Interval					Ref. page	
		First 50 hours	Every day	Every 100 hours	Every 250 hours	Every 500 hours		
1	Check of fuel pipes and clamp bands		⊙				-	
2	Check and drain banded base as required		⊙				35	
3	Change of engine oil	⊙	*5		⊙		11	⊙
4	Cleaning of air cleaner element				⊙		31	*1
5	Check of battery electrolyte level			⊙			32	
6	Check of fan belt tightness	⊙			⊙		35	⊙
7	Check of radiator hoses and clamp bands				⊙		30	
8	Check of intake air hose				⊙		31	
9	Replacement of oil filter cartridge	⊙				⊙	27	⊙
10	Replacement of fuel filter cartridge or element					⊙	23, 24	
11	Cleaning of sedimenter (water separator)				⊙		24	
12	Cleaning of water jacket (radiator interior)						30	
13	Replacement of fan belt						35	
14	Check of valve clearance						-	
15	Replacement of air cleaner element						31	*2
16	Check of damage in electric wiring and loose connections				⊙		34	
17	Check of fuel injection nozzle injection pressure						-	*3
18	Check of injection pump						-	*3
19	Replacement of fuel pipes and clamp bands						-	*3
20	Replacement of radiator hoses and clamp bands						30	
21	Replacement of battery						32	
22	Change of radiator coolant (L.L.C.)		*5				29	
23	Replacement of intake air hose						31	*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.
- \*5 Level check.
- When the battery is used for less than 100 hours in a year, check its electrolyte yearly. (for refillable battery's only)

No.	Check point	Interval					Ref. page	
		Every 1000 hours	Every 1500 hours	Every 3000 hours	Every 1 year	Every 2 years		
1	Check of fuel pipes and clamp bands						-	
2	Check and drain banded base as required						35	
3	Change of engine oil						11	⊙
4	Cleaning of air cleaner element						31	*1
5	Check of battery electrolyte level						32	
6	Check of fan belt tightness						35	⊙
7	Check of radiator hoses and clamp bands						30	
8	Check of intake air hose						31	
9	Replacement of oil filter cartridge						27	⊙
10	Replacement of fuel filter cartridge or element						23, 24	
11	Cleaning of sedimenter (water separator)						24	
12	Cleaning of water jacket (radiator interior)	⊙					30	
13	Replacement of fan belt	⊙					35	
14	Check of valve clearance						-	
15	Replacement of air cleaner element						31	*2
16	Check of damage in electric wiring and loose connections						34	
17	Check of fuel injection nozzle injection pressure		⊙				-	*3
18	Check of injection pump			⊙			-	*3
19	Replacement of fuel pipes and clamp bands					⊙	-	*3
20	Replacement of radiator hoses and clamp bands					⊙	30	
21	Replacement of battery					⊙	32	
22	Change of radiator coolant (L.L.C.)					⊙	29	
23	Replacement of intake air hose					⊙	31	*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.
- \*5 Level check.
- When the battery is used for less than 100 hours in a year, check its electrolyte yearly. (for refillable battery's only)

# 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.**

- **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 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 overflow.
- 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.

Fuel tank capacity

L

Model	Capacity
SQ-1120, SQ-3140, [Engine model : D1703-EBG] SQ-1150, SQ-3200 [Engine model : V2203-EBG]	62
SQ-3300 [Engine model : V3300-EBG]	68

Flash Point, °C (°F)	Water and Sediment, volume %	Carbon Residue on, 10 percent Residuuum, %	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 <sup>2</sup> /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

■ Air Bleeding the Fuel System



**CAUTION**

To avoid personal injury;

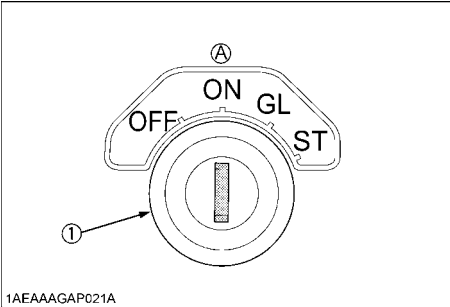
- **DO NOT bleed a hot engine as this could cause fuel to spill onto a hot exhaust manifold creating a danger of fire.**

Air bleeding of the fuel system is required if;

- after the fuel filter and pipes have been detached and refitted;
- after the fuel tank has become empty; or
- before the engine is to be used after long storage.

**[PROCEDURE]**

1. Fill the fuel tank with fuel.
2. Set the fuel lever to "OPEN" position.
3. Turn the key to "ON" for 30 to 40 seconds.



1AEAAAAGAP021A

(1) Main switch (Key)

(A) "ON"

**NOTE :**

- With the key switch at "ON", the fuel electro-mechanical pump can be activated automatically to vent the air in the fuel pipes, hoses and filter.

**IMPORTANT :**

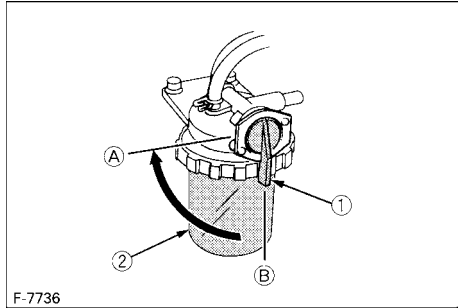
- Always turn the key to "OFF" when air is vented and the engine is not used, or it will cause the battery to discharge.

■ 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.



F-7736

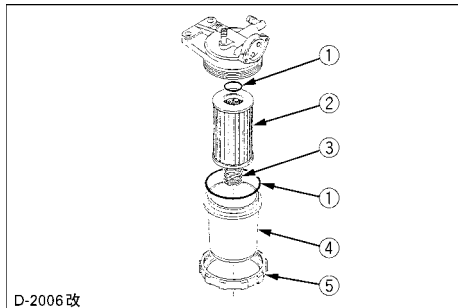
- (1) Fuel filter lever
- (2) Fuel filter pot

- (A) "CLOSE"
- (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

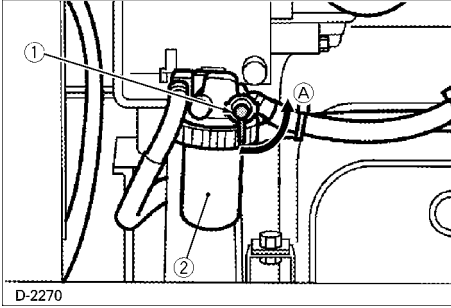
- (1) O ring
- (2) Filter element
- (3) Spring
- (4) Filter bowl
- (5) Screw ring

### Fuel Filter Cartridge Replacement

[Engine model : V3300-EBG]

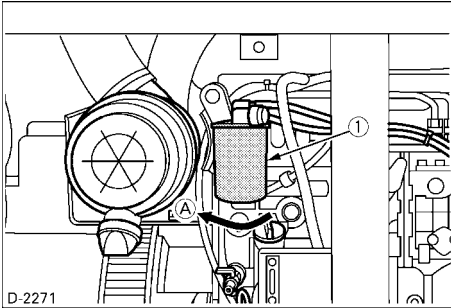
Replace the fuel filter cartridge every 500 hours of use, using the following procedure.

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.

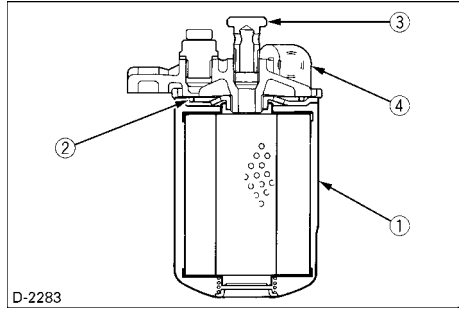


(1) Fuel filter cartridge (A) "REMOVE"

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.



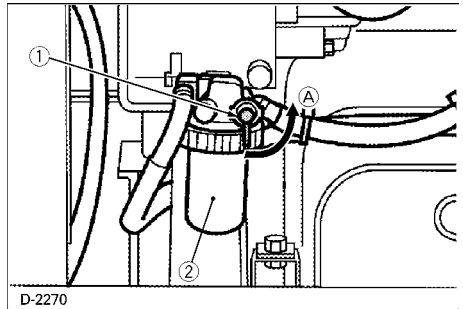
D-2283

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

### 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.

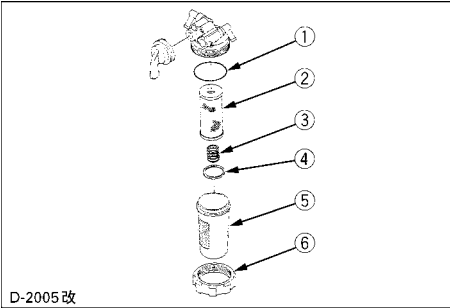


(1) Fuel lever (A) "CLOSE"  
(2) Water separator

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.

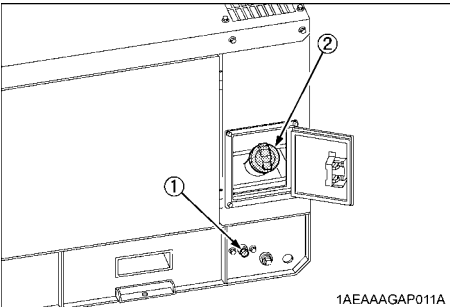


- (1) O ring
- (2) Filter element
- (3) Spring
- (4) Marker
- (5) Filter bowl
- (6) Screw ring

**Draining Water in the Fuel Tank**

If the water separator gets filled too often, let water out of the fuel tank.

The water in the tank can be drained by opening the plug, as shown below illustration.



- (1) Fuel tank drain plug
- (2) Fuel tank cap

**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 :**

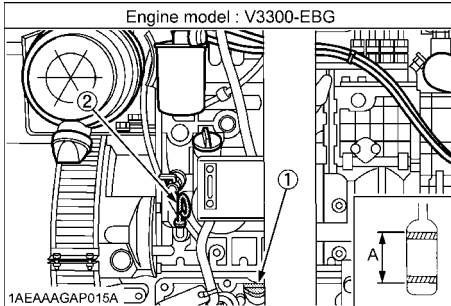
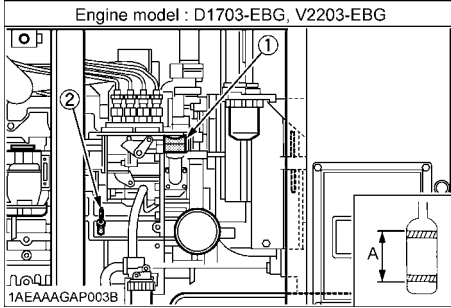
- Do not operate a diesel engine when engine oil is overfilled. This can effect the air intake system which could result in engine damage or malfunction.



### ■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.

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.



(1) Oil port  
 (2) Oil level gauge

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

Engine oil capacity L

Model	Capacity
SQ-1120, SQ-3140 [Engine model : D1703-EBG]	5.6
SQ-1150, SQ-3200 [Engine model : V2203-EBG]	7.6
SQ-3300 [Engine model : V3300-EBG]	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-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.

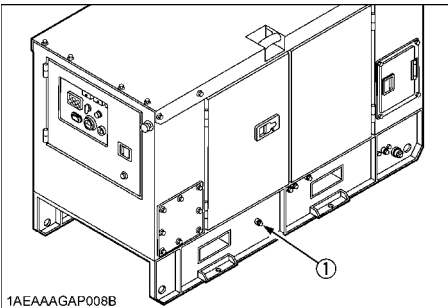
## ■ Changing Engine Oil



### 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

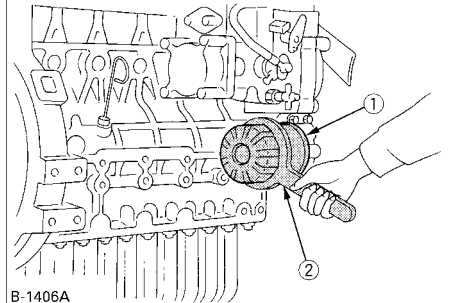


### CAUTION

To avoid personal injury:

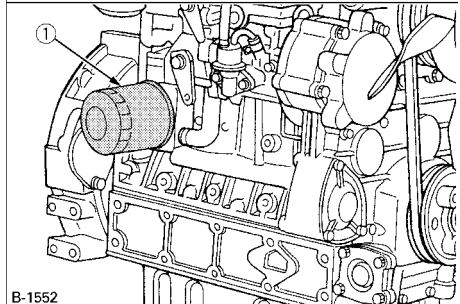
- Be sure to stop the engine before changing the oil filter cartridge.
  - Allow engine to cool down sufficiently. Oil can be hot and cause burns.
1. Replace the oil filter cartridge every 500 hours of operation.
  2. Remove the old oil filter cartridge with a filter wrench. Dispose of filter properly.
  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.

Engine model : D1703-EBG, V2203-EBG



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

Engine model : V3300-EBG



- (1) Oil filter cartridge

- 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**

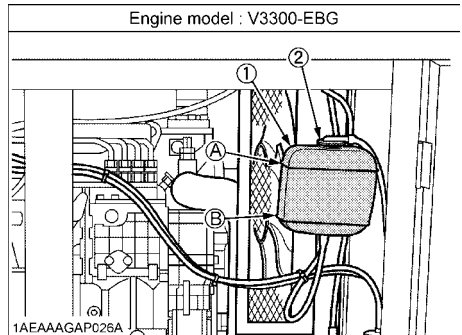
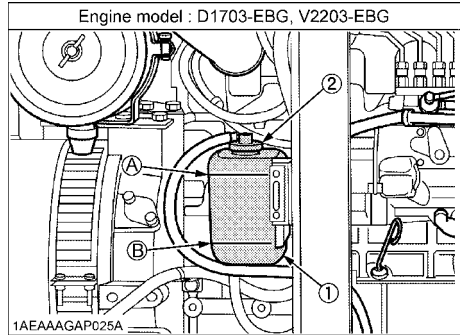
To avoid personal injury:

- 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**

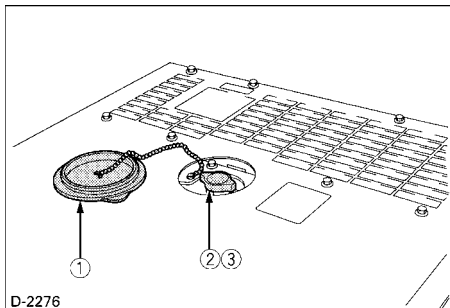
- Remove the radiator cap after the engine has completely cooled, and check to see that coolant reaches the supply port.

- 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
- (2) Cap
- (A) "FULL" Upper line 1.1 L
- (B) "LOW"

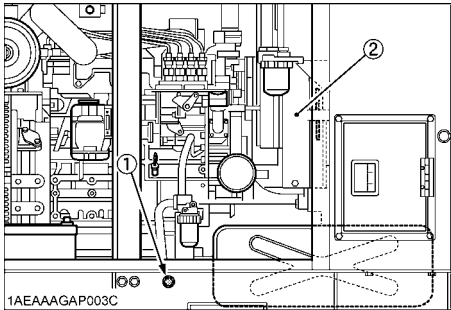
- When the coolant level drops due to evaporation, add only coolant up to the full level.



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

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

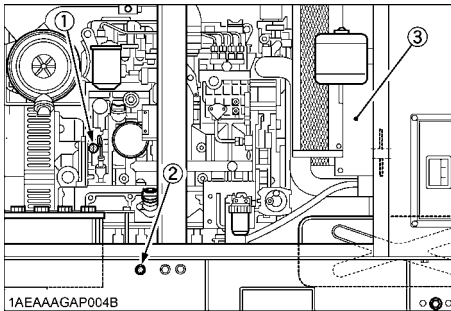
4. Check to see by a drain plug; it is at the fully banded as shown below.



- (1) Coolant drain plug
- (2) Radiator

**[Engine model : V3300-EBG]**

4. Check to see the two drain points; one is at the crankcase side and the other is at the fully banded as shown below.



- (1) Coolant drain cock
- (2) Coolant drain plug
- (3) 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

Engine model	Coolant capacity
D1703-EBG	5.5
V2203-EBG	6.3
V3300-EBG	8.2

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

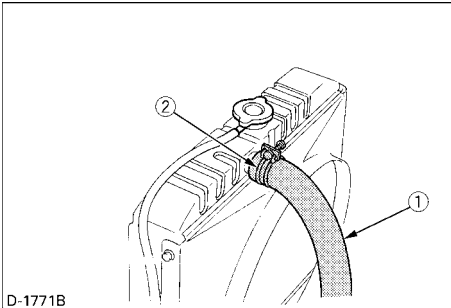
To avoid personal injury:

- 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  $1.013 \times 10^5$  Pa (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.

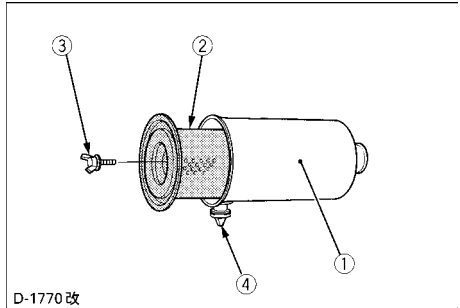
**AIR CLEANER**

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/cm<sup>2</sup>, 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

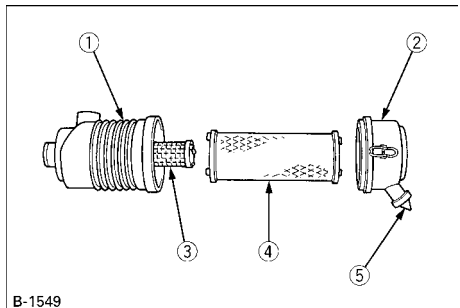
**IMPORTANT :**

- 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/cm<sup>2</sup>, 30 psi).

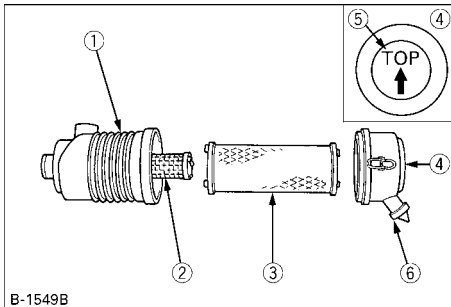
Maintain reasonable distance between the nozzle and filter.

**■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.

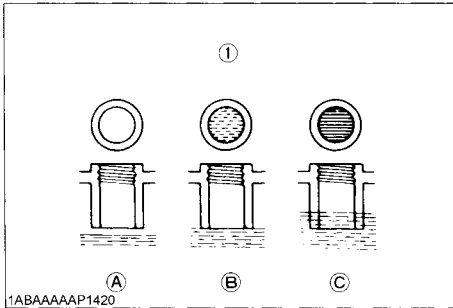
- DO NOT use or charge the battery if the fluid level is below the LOWER (lower limit level) mark. Otherwise, the battery component parts may deteriorate prematurely, which will shorten the battery's service life or may cause an explosion.

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.

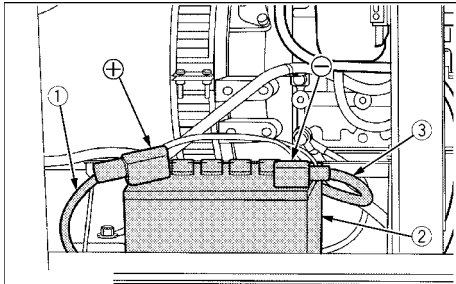
1. Make sure that each electrolyte level is to the bottom of vent wells, if necessary, add only distilled water in a well-ventilated place.



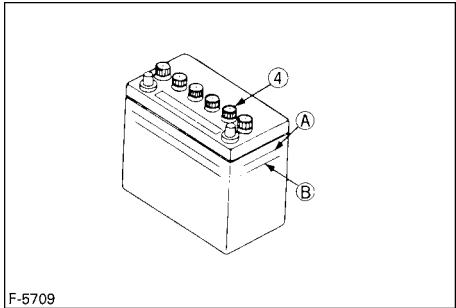
1ABAAAAAP1420

- (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.



D-2270



F-5709

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

**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.

**■ Battery Boost 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.

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**

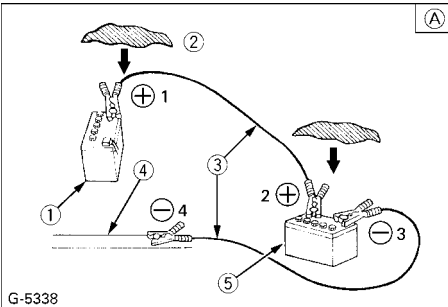


**CAUTION**

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.



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

## 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.
-------------------------	---

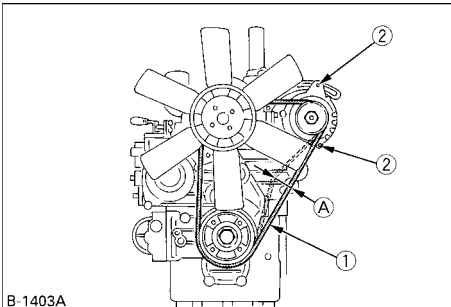
#### [Engine model : V3300-EBG]

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)

## FULLY BUNDED

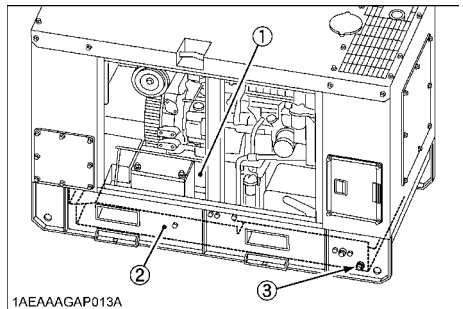
#### IMPORTANT :

- Before installing the unit all environmental factors must be considered.

Generator installation must comply with local building codes, fire regulations and environmental requirements.

Use these instructions as a general guide only, the complete installation must comply with all local, state, and federal building codes, fire ordinances, and any other applicable regulations.

1. Open the access door and check for anything unusual every workday.
2. Look at the point (1) to make sure anything accumulated will not spill out.
3. If an accumulation may come out, loosen the plug (3) to drain the unit.
4. Finally, retighten up the plug.



1AEAAGAP013A

- (1) Check point  
(2) Fully banded (Base banded to 110% capacity)  
(3) Containment drain point (Plug size: 3/4)

L

Engine model	Fully banded capacity
D1703-EBG, V2203-EBG	84
V3300-EBG	104

# TRANSPORTING / STORAGE

## ■Transporting



### CAUTION

To avoid personal injury:

- Secure the generator to prevent movement during operation.
- DO NOT stand near or under the generator while it is suspended.
- The generator is heavy. Utilize suitable equipment to lift and transport. Keep hands and feet away from under the suspended generator.
- When transporting the generator, remove the (-) battery cable, close the fuel cock lever, and keep the generator level to prevent fuel spillage.

1. When transporting the generator, use only suitable transporting equipment, such as crane, fork lift or etc.
2. The generator is equipped with the 2 inlets in the machine bed for forklift forks. Transportability is increased by 2 ways; special forklift openings and 1-point lifting hook. Use lifting equipment of sufficient capacity.

Model	Approx. gross wt. kg
SQ-1120, SQ-3140	759
SQ-1150, SQ-3200	854
SQ-3300	1015

## ■Lifting Procedure

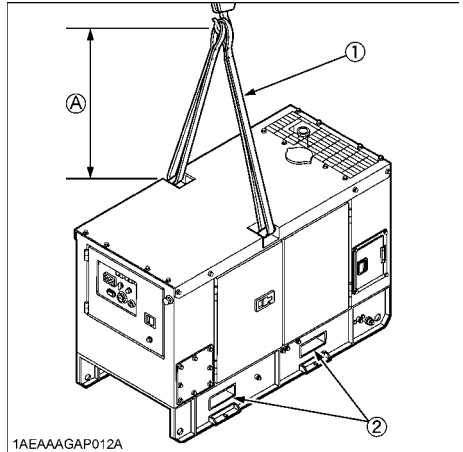


### CAUTION

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.
- DO NOT swing while lifting.
- DO NOT use the hook when the bonnet is removed or when any bolts are loose.

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



1AEAAAGAP012A

(1) Wire Rope  
(2) Fork pockets

(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.

# OPERATION OF THE EMERGENCY RELAY

The SQ series generator is equipped with an emergency unit (EG-20) that is designed to detect trouble and stop the engine automatically.

## 1. What to detect

Trouble	Detection	Method
<b>Oil pressure fall</b>	Oil pressure switch (ON at below 49 kpa (7 psi))	*The oil pressure switch stays ON after the start delay period.
<b>Water temperature rise</b>	Water temperature switch (ON at above $115 \pm 3^{\circ}\text{C}$ ( $239 \pm 5^{\circ}\text{F}$ ))	*The water temperature switch stays ON after the start delay period.
<b>Belt broken</b>	Voltage of alternator terminal L (Charge lamp ON: Stop or trouble) (Charge lamp OFF : Normal)	*The alternator terminal L stays at "L" after the start delay period.
<b>Load center cover or door open</b>	Safety switch (ON : Open) (OFF : Closed)	*The door limit switch comes ON when the key switch is set from "START" to "ON" position at starting. (*The door limit switch is located on the load center cover and on the access door. *The door limit switch is activated when the load center cover or the access door is opened.)

### NOTE :

#### Start-up delay time

- All the alarms but the door-related one are kept inactive for a certain period of time (7 to 14 seconds) after the key switch is set from "START" to "ON" position.

#### Start delay period.

This interval is necessary to prevent the engine from shutting down while oil pressure is still low after engine start-up.

## 2. Method at start-up

1. Set the key switch to "ON" position, and the electric fuel feed pump turns ON.
2. Set the key switch to "GLOW" position, and the solenoid turns ON.
3. Set the key switch to "START" position, and the starter is activated. Turn it back to "ON" position, and the emergency unit starts automatic detecting.

### NOTE :

- If the starter is activated but the engine fails to start, the oil pressure switch stays ON. If the key switch is turned and left at "ON" position in this state, the solenoid and fuel electric feed pump will turn OFF after the start delay period. To have the engine restarted, turn the key switch back to "OFF" position again.

## 3. Method with an alarm

1. If any of the warning lamps is ON, turn OFF the solenoid and electric fuel feed pump and the engine stops.
2. To restart the engine, turn the key switch back to "OFF" position then start again.

### IMPORTANT :

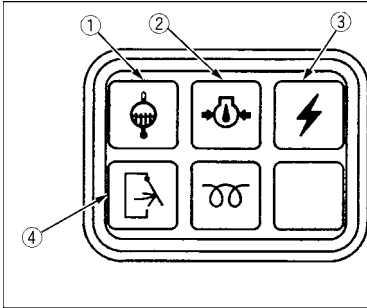
- When this device stops the engine, it may be that a malfunction and some minor damage to the engine has occurred. To limit engine damage as much as possible, please do not make the assumption that shut down was a false alarm. Check unit thoroughly prior to restarting.

### NOTE :

- Be sure to turn the key switch back to "OFF" position, or the battery will be dead.

#### 4. Alarms and Corrective Measures

If a trouble occurs during operation, a corresponding indicator lamp lights up and the engine stops. Determine at which lamp is ON, and pinpoint and correct the cause of trouble.



- (1) Water temperature lamp  
Lights up if the engine is overheating.
- (2) Oil pressure lamp  
Lights up if engine oil pressure is too low.
- (3) Battery charge lamp  
Lights up if there is a battery problem or if the belt is broken.
- (4) Access door open lamp  
Lights up if the load center cover or the access door is opened.

Light-up	Possible Causes	Countermeasures
Lamp (1)	Engine overheating.	*See "Precaution Overheating" in "PERIODIC SERVICE" section. (See page 30.)
	Water temperature sensor faulty.	*Replace the water temperature sensor.
	Water temperature sensor wiring faulty.	*Repair the wiring.
Lamp (2)	Insufficient engine oil.	*Add engine oil.
	Lubricating system in trouble.	*Check the system.
	Oil pressure sensor faulty.	*Replace the sensor.
	Oil pressure sensor wiring faulty.	*Repair the wiring.
Lamp (3)	Fan belt loose or damaged.	*Readjust belt tension or replace the belt.
	Alternator terminal in poor contact.	*Connect tightly.
	Alternator problem.	*Check the alternator.
Lamp (4)	Access door opened.	*Close the door.
	Limit switch faulty.	*Replace the limit switch.
	Limit switch wiring faulty.	*Repair the wiring.

# TROUBLESHOOTING

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

## ■ 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.	* <b>[Engine model : D1703-EBG, V2203-EBG]</b> Adjust valve clearance to 0.18 to 0.22 mm when the engine is cold. * <b>[Engine model : V3300-EBG]</b> 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 * <b>[Engine model : D1703-EBG]</b> The injection timing 15.5° before top dead center. * <b>[Engine model : V2203-EBG]</b> The injection timing 17.0° before top dead center. * <b>[Engine model : V3300-EBG]</b> 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).

Cause	Countermeasures
Low compression	*Bad valve or excessive wear of rings, pistons and liners cause insufficient compression. Replace with new parts.
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 switch "ON"	*Rotate button to reset emergency stop.
Battery discharges too much	*Recharge battery.
Access door is opened.	*Close the door.
Defect of contact point or shortage of alternator L-shaped coupler	*Check wiring and repair.
Alternator defect	*Replace.
Fuse blows.	*Replace.

### ■ 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.	<b>[Engine model : D1703-EBG, V2203-EBG]</b> *Adjust valve clearance to 0.18 to 0.22 mm with the engine is cold. <b>[Engine model : V3300-EBG]</b> *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 <sup>2</sup> , 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

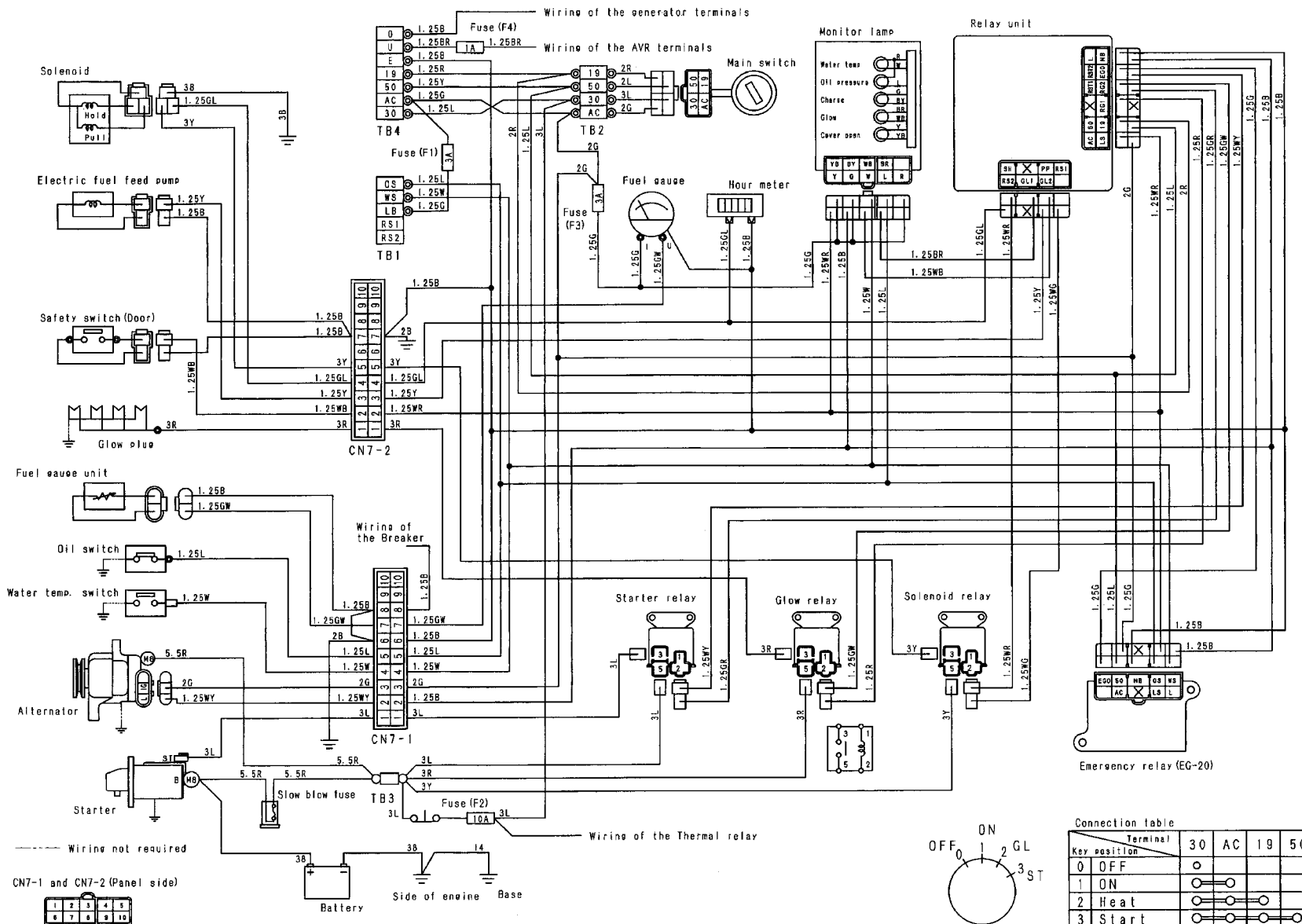
Cause	Countermeasures
Engine oil insufficient	*Check oil level. Replenish oil as required.
Fan belt broken or elongated	*Check all moving parts carefully.
Coolant insufficient	*Replenish coolant.
Excessive concentration of antifreeze	*Add water only or change to coolant with the specified mixing ratio.
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

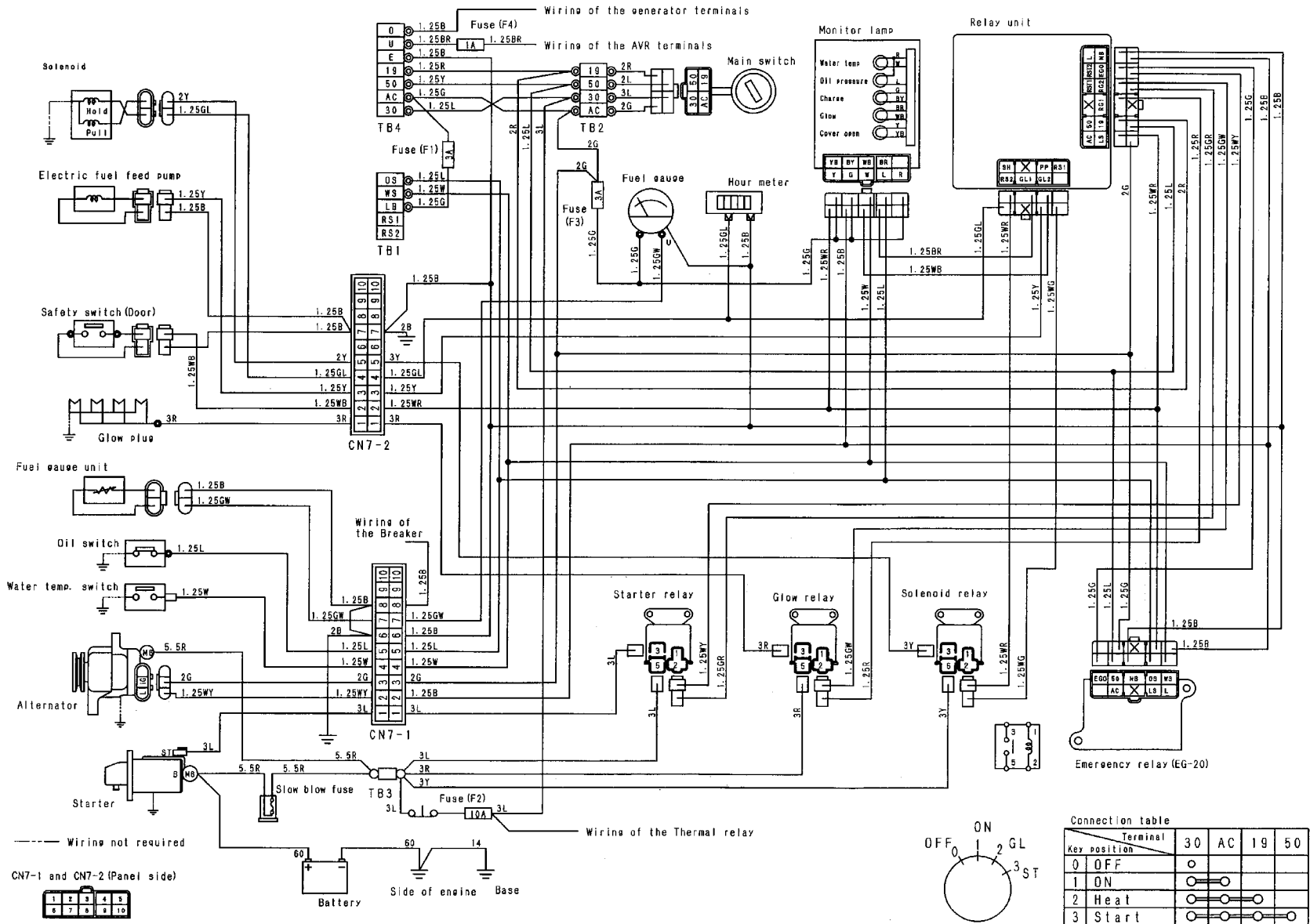
Trouble	Possible causes	Correction
<b>Unusual noise or vibration</b>	Single-phase load applied beyond allowable level (on three phase models).	*Lower the load to acceptable level.
	Bearing deteriorated.	*Replace the bearing.
	Coupling damaged.	*Replace the coupling.
<b>Frame overheated.</b>	Cooling fan inlet or outlet blocked.	*Unblock the inlet or outlet.
	Voltage too high.	*Readjust the voltage.
	Overloaded.	*Reduce the load.
<b>Voltage failure to rise.</b>	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.
<b>Voltage too high.</b>	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.
<b>Voltage hunting</b>	Inverter or such switching load connected.	*Disconnect such load.
	AVR itself in trouble.	*Replace the AVR.
<b>Circuit breaker turned OFF.</b>	Connected cable or load short-circuited.	*Contact a qualified electrical engineer for inspection.
	Overloaded.	*Reduce the load.
<b>Pilot lamp failure to light up</b>	Lamp bulb broken.	*Replace the bulb.
	Generator voltage too low.	*See "Voltage failure to rise" above.



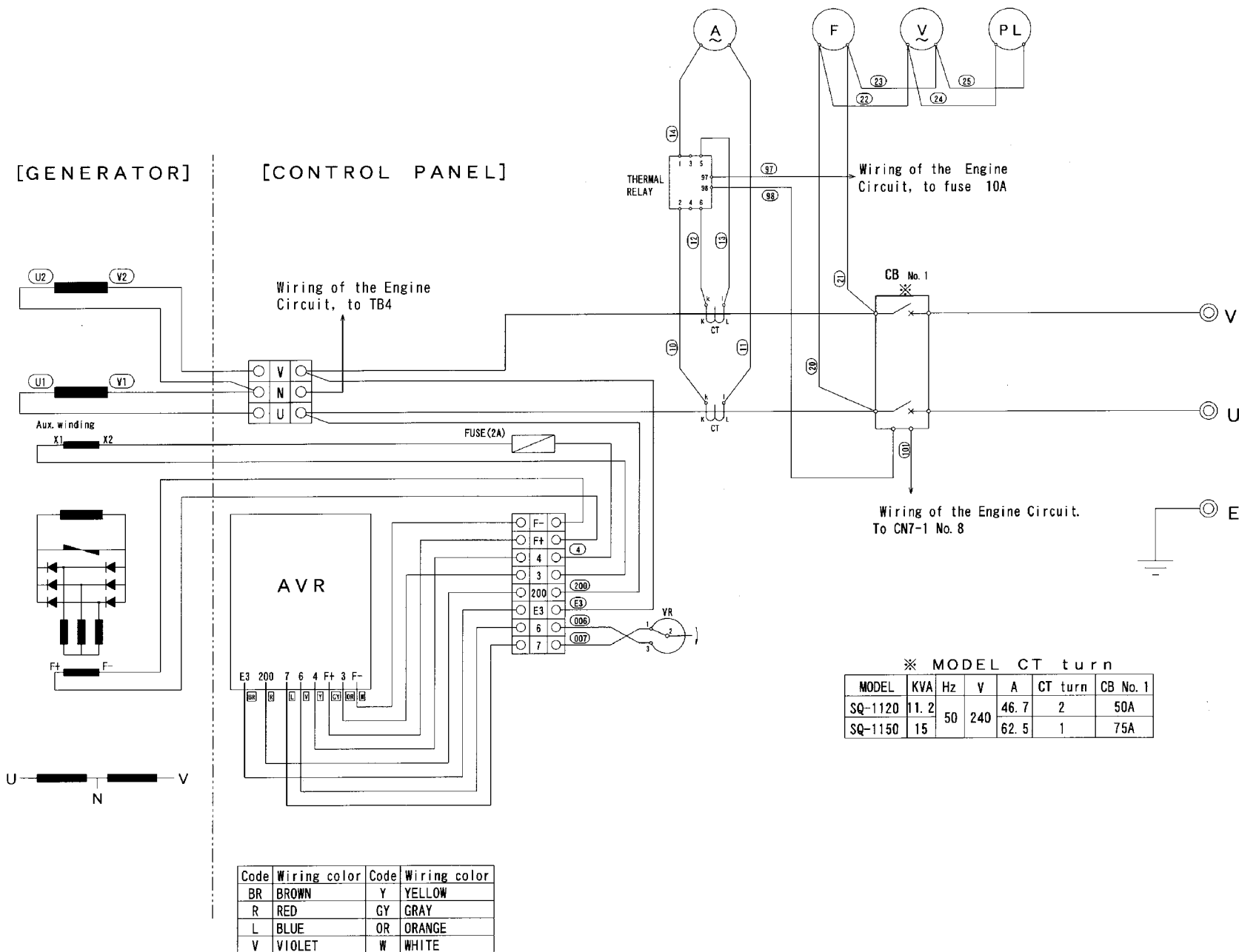
■ Engine Circuit Diagram SQ-3140, SQ-3200, SQ-1120, SQ-1150



■ Engine Circuit Diagram SQ-3300

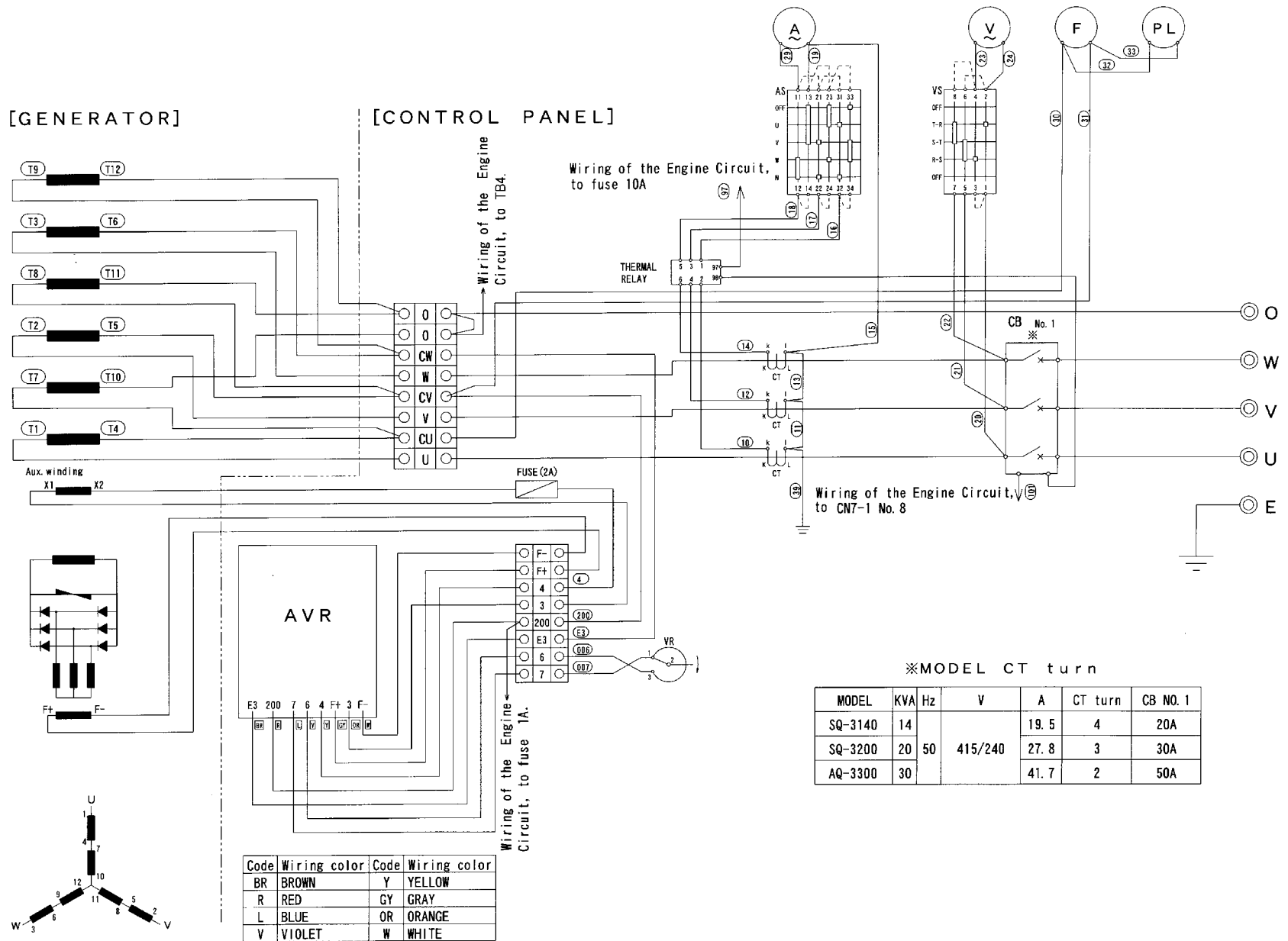


■ Generator Circuit Diagram SQ-1120 (240V) 50Hz, SQ-1150 (240V) 50Hz



Code	Wiring color	Code	Wiring color
BR	BROWN	Y	YELLOW
R	RED	CY	GRAY
L	BLUE	OR	ORANGE
V	VIOLET	W	WHITE

■ Generator Circuit Diagram SQ-3140 (415/240V) 50 Hz, SQ-3200 (415/240V) 50 Hz, SQ-3300 (415/240V) 50 Hz



※MODEL CT turn

MODEL	KVA	Hz	V	A	CT turn	CB NO. 1
SQ-3140	14	50	415/240	19.5	4	20A
SQ-3200	20			27.8	3	30A
AQ-3300	30			41.7	2	50A

Code	Wiring color	Code	Wiring color
BR	BROWN	Y	YELLOW
R	RED	GY	GRAY
L	BLUE	OR	ORANGE
V	VIOLET	W	WHITE