

shindaiwa®

Original instructions

OWNER'S AND OPERATOR'S MANUAL

Diesel Engine Generator & Welder

DGW200MS/UKV

Vertical, Water-Cooled 4-Cycle Diesel Engine



CAUTION

Do not operate the Generator/Welder, or any other appliance, before you have read and understood the instructions for use and keep near for ready use.



DGW200MS/UKV
X753-008 62 0
X753803-4201

Introduction







Thank you for purchasing a Shindaiwa Sound Proof Diesel Engine Generator & Welder.








- This Operator's manual has been created to ensure the safe operation of this equipment. Therefore, the manufacturer of this equipment strongly recommends that the user follow the instructions herein, to avoid unnecessary accidents and repairs.
- Please operate this equipment after thoroughly reviewing and understanding the contents of this manual.
- Please include this manual, if the equipment is to be on-sold or rented out.
- Please store this manual with the equipment for easy reference.

■ The following conventions will be used throughout the manual to indicate the degree of caution.

 Warning	<i>Can cause serious injuries or death.</i>
 Caution	<i>Can cause minor injuries or damage to the equipment or other properties.</i>
<Note>	<i>Other types of caution and indications.</i>

■ The following explanatory symbols will be used throughout the manual and on the product itself. Please make sure to understand fully what each symbol stands for.

Symbol form / shape	Symbol description / application
	<i>Read and understand instructions</i>
	<i>Safety / Alert</i>
	<i>Beware of exhaust fumes.</i>
	<i>Beware of fire hazard.</i>
	<i>Beware of electric shock.</i>
	<i>Beware of suffocation from welding fumes.</i>

Symbol form / shape	Symbol description / application
	<i>Do not use for Indoor wiring.</i>
	<i>Do not use in the rain.</i>
	<i>Beware of eyes and skin.</i>
	<i>Beware of hot surface.</i>
	<i>Beware of burn.</i>
	<i>Beware of injury. Always lock the doors and never open during operation to avoid injury by moving parts.</i>
	<i>Guaranteed sound power level</i>

- Some of the items noted in 『 ⚠️ **Caution** 』 may also causing serious injuries.
- Please read all items and follow all the safety guidelines.
- This product is for professional use. Please follow international regulations (if any) for the education /training in relation to the engine driven machine/fuel handling qualification, first aid, etc.
- The following statement refers to the noise level data contained in the EC Declaration of conformity contained on the next page of this manual.

“The figures quoted are emission levels and are not necessarily safe working levels. Whilst there is a correlation between the emission and exposure levels, this cannot be used reliably to determine whether or not further precautions are required. Factors that influence the actual level of exposure of work-force include the characteristics of the work place, the other sources of noise, etc. i.e. the number of machines and other adjacent processes, and the length of time for which an operator is exposed to the noise. This information, however, will enable the user of the machine to make a better evaluation of the hazard and risk”.

Declaration of Conformity

The undersigned manufacturer: **YAMABIKO CORPORATION**
1-7-2 Suehirocho
Ohme, Tokyo 198-8760
JAPAN

declares, under the sole responsibility thereof, that the hereunder specified new unit:

SOUND PROOF DIESEL ENGINE GENERATOR/WELDER

Brand: Shindaiwa
Type: DGW200MS/UKV

Serial Number W01001000154 to W01001999999

complies with:

- the requirements of Directive 2006/42/EC (use of harmonized standard EN 60974-1:2012)
- the requirements of Directive 2014/30/EU (use of harmonized standard EN 60974-10:2014
EN 55012:2007/A1:2009
EN 61000-6-2:2005)
- the requirements of Directive 2009/125/EC (use of other technical standard EN 60974-1:2012, Annex M)
and Regulation (EU) 2019/1784 (as its implementing measure)
- the requirements of Directive 2011/65/EU (use of harmonized standard EN IEC 63000:2018)
- the requirements of Directive 2000/14/EC

Noise measurements have been made in accordance with 2000/14/EC
annex 3 part B(57) with supervision by Notified Body No.0036
(TUV SUD Industrie Service GmbH Westendstrasse 199 80686 Munchen)
The declared noise values are as follows:

Measured sound power level	Guaranteed sound power level
87dB LwA	89dB LwA

Tokyo, Jun. 29th, 2021

YAMABIKO CORPORATION



Hisashi Kobayashi

the person in Europe who is authorized to compile the technical file.

Company: Shindaiwa Limited

Address: 6 The Dell, Enterprise Drive, Four Ashes, Wolverhampton WV 10 7DF United Kingdom

General Manager
Quality Assurance Dept.

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1. Safety Precautions

Warning: Suffocation from Exhaust Fume

- Do not operate the equipment in a poorly-ventilated area such as indoors or within a tunnel because the engine exhaust fume includes components that are harmful to humans.

Warning: Suffocation from Welding Fume

- Always be sure to wear a fume-proof mask when welding as the fumes generated during welding include harmful gases and dust. Also be careful that the wind direction is not such that it will cause fumes to be inhaled and always operate the equipment in a well-ventilated area.

Warning: Electric Shock

- Do not operate the equipment with any doors or covers open.
- Do not touch wirings or any electric parts inside the equipment during operation.
- Do not touch the equipment during operation if the equipment or your body is wet.
- Be sure to stop the engine whenever touching Welding output terminals such as when installing or removing welding cables.
- Do not connect welding cables to any part other than Welding output terminals.
- Do not insert any metallic objects, such as pins or wires, into AC output receptacles.
- Always be sure to turn off all circuit breakers before installing or removing devices using AC output receptacles.
- Always be sure to repair the fault when the earth leakage circuit breaker operates.
- Always be sure to stop the engine before performing any equipment check or maintenance.

Warning: Fire

- Always be sure to stop the engine when inspecting fuel or refueling, and absolutely never perform such tasks near fire or other open flames or sparks. Wait until the engine has completely cooled before inspecting fuel or refueling.
- Always be sure to wipe away any spilled fuel or oil.
- Absolutely never use the equipment if there is a fuel, oil or cooling water leak, and be sure to always repair the leak before using.
- Absolutely never inspect or perform maintenance to the equipment near fire or other open flames or sparks.
- Keep any ignitable items (such as fuel, gas and paint) or inflammable items away from the equipment because the muffler, exhaust fume and other parts attain high temperatures.
- Keep any ignitable items (such as fuel, gas and paint) or inflammable items away from the work area due to the scattering of weld spatter that occurs during welding.
- Provide at least 1 meter (3 feet) of distance between the equipment and walls and other obstacles, and operate the equipment on a flat surface.
- Allow the equipment to cool before covering with protective covers and similar items.
- Do not ground wiring of earth leakage circuit breakers of the equipment to piping that contains through flammable material.

 **Warning: Injury**

- Do not operate the equipment with any doors or covers open. There is a danger of hair, body parts and other items being caught up in moving parts such as cooling fans and belts.
- Do not modify the equipment and do not operate with parts removed.
- Always be sure to stop the engine before performing any equipment check or maintenance.
- The lifting lug is designed to be used only for lifting the equipment. Do not lift the equipment with any heavy items (such as a trailer, gas canister and additional fuel tank) added to the equipment.

 **Warning: Injury to Eyes and Skin**

- Use protective gear, such as rubber gloves, when inspecting or replacing the battery due to the dilute sulfuric acid in the battery fluid. Be sure that fluid does not contact eyes, or on skin or clothing.
- If battery fluid gets into the eyes, or on the skin or clothing, immediately wash with a large amount of water, and always be especially sure to seek medical attention if it gets into the eyes.

 **Warning: Explosion**

- Do not operate the equipment or recharge the battery when the battery fluid level is below the lower level.
- Do not generate any sparks near the battery and do not allow any fire or other open flames near the equipment because the battery generates ignitable gas.

 **Warning: Electromagnetic Interference**

- Persons using a heart pacemaker are not allowed near the welder or welding work area while welding is being performed without the permission of a doctor. The welder generates a magnetic field while energized that can negatively affect pacemaker operation.

 **Caution: Suffocation from Exhaust Fume**

- Do not direct the engine exhaust towards passersby, private homes or similar persons/locations because the engine exhaust fume includes components that are harmful to humans.

 **Caution: Electric Shock**

- Do not sprinkle water on the equipment and do not use where exposed to rain and thunder.
- If wearing gloves, be sure to always wear gloves with dry insulation properties. Do not wear gloves that are damaged or wet.

 **Caution: Burn**


- The engine, muffler and similar parts are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.
- Never open the radiator cap during operation or immediately after stopping the equipment. Hot cooling water and steam will spurt out.
- Always be sure to stop the engine and allow it to cool before inspecting or changing the engine oil. Opening the oil gauge or oil plug during operation will result in hot oil spurting out.
- Always be sure to wear leather gloves, apron, shoe covers, arc-proof glasses (face shield), safety shoes, hard hat and long-sleeve clothing to protect against the scattering of weld spatter that occurs during welding.

 **Caution: Injury**

- Use this equipment with it situated on a stable level surface so that it is prevented from moving.
- Do not move the equipment during operation.
- Always be sure to turn off the switches of all devices using the equipment and turn off the equipment circuit breakers before starting the engine.
- Always be sure to turn off the power switches of all devices using the equipment when turning on the equipment circuit breakers. Leaving on the power switch of a device using the equipment when the equipment circuit breakers are turned on could result in the sudden operation of the corresponding device.
- Do not leave on the power switch of a device using the equipment and do not connect a device to an AC output receptacle.
- Always be sure to use the lifting lug when lifting the equipment, and lift slowly and directly straight above.
- Wear a helmet, safety shoes, gloves and similar protective gear when performing lifting work. Do not stand or get under the equipment while it is suspended.
- Securely fix the equipment with rope or similar item so that it cannot move when transporting by truck or other vehicle.

 **Caution: Injury to Eyes and Skin**

- Always be sure to wear arc-proof glasses, clothes that completely cover the skin and other protective gear when welding to protect the eyes and skin from harmful light rays generated during welding.

 **Caution: Physical and Secondary Damage**

- Do not use the equipment for any improper applications. Improper usage can result in an accident or malfunction.
- Do not connect the AC power source to indoor wiring.
- If using the equipment as a power source for medical equipment, you must check with the medical equipment manufacturer, doctor and hospital before using the equipment.

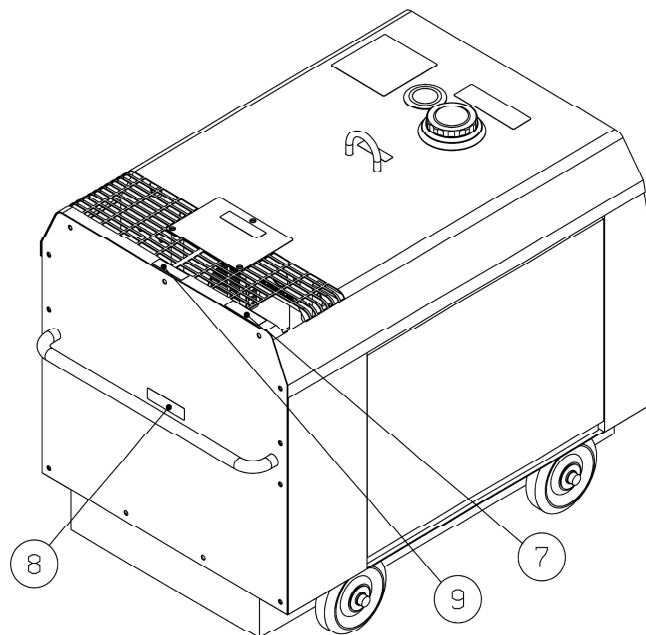
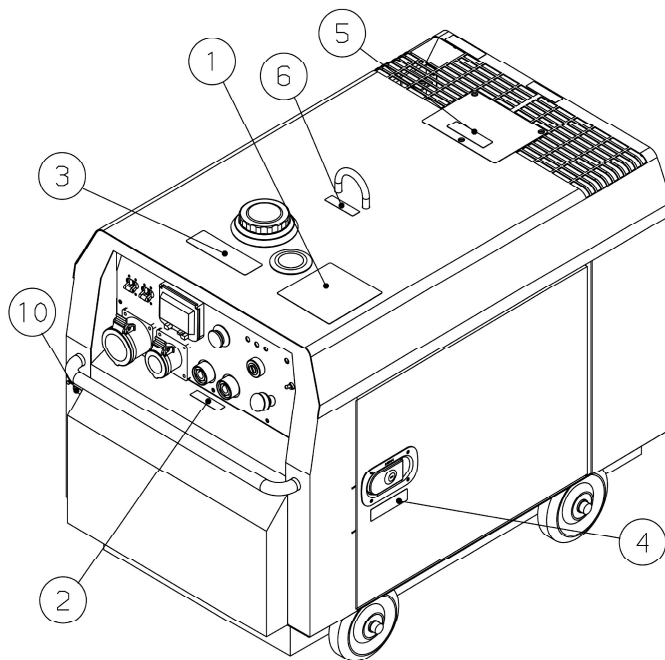
 **Caution: Damage to the equipment or other properties**

- Do not use anything other than the specified optional device because they may cause malfunctions.

■ Location of Warning Labels









Replace warning labels when they become difficult to see or damaged by affixing new labels in the specified locations. Order the necessary labels by numbers in parentheses.

- ① Suffocation from exhaust fumes (No. X505-011481)
- ② Electric shock (No. X505-011470)
- ③ Fire (No. X564-000640)
- ④ Injury (No. X564-000630)
- ⑤ Burn (No. X505-006410)
- ⑥ Lifting Eye (No. M707-000240)
- ⑦ Hot Surface (X505-011490)
- ⑧ Positioning Handle (X505-006430)
- ⑨ Keep 1 meter (No. M707-000260)
- ⑩ Earth Symbol (No. M708-000890)





LABEL REPRODUCTION

① X505-011481

 WARNING	
 <p>SUFFOCATION FROM EXHAUST FUMES</p> <ul style="list-style-type: none"> Do not operate this equipment in poorly ventilated areas. 	<p>ELECTRIC SHOCK</p> <ul style="list-style-type: none"> Do not touch the equipment if you or the equipment are wet. (Welding output terminals, Auxiliary output terminals) Before performing any equipment check or maintenance always stop the engine. Do not touch wiring or any electric parts inside the equipment during operation.
<p>FIRE</p> <ul style="list-style-type: none"> Always operate the equipment on a flat surface and at least 1 metre away from any objects (wall, box, etc.). Keep any flammable items (such as fuel, gas, paint, etc.) away from the place of work. Do not operate the equipment when it is stored in a vehicle. <p>Leaked fuel may cause fire</p> <ul style="list-style-type: none"> Before starting the engine, be sure to check, for leakage in fuel pipes or fuel strainer (Open the fuel valve before checking). When filling with fuel, always stop the engine and keep away from sparks or naked flames. Do not fill the fuel up more than the specified level (The upper surface of the red level mark of the fuel strainer net). Wipe away any fuel spills. Turn the fuel valve to close, when stopping the engine. Be sure to check the following when cleaning the fuel strainer. <ul style="list-style-type: none"> Check for any dirt on the seal when installing the strainer cup. Check for leakage, by turning the fuel valve to OPEN, after the strainer cup is installed (Close the fuel valve after checking). 	 <p>SUFFOCATION FROM WELDING FUMES</p> <ul style="list-style-type: none"> Always operate the equipment in well ventilated areas. Always wear a fume proof mask during operation.
 CAUTION	
 <ul style="list-style-type: none"> Do not connect AC OUTPUT to any indoor wiring. 	 <ul style="list-style-type: none"> Do not operate this equipment in the rain. IP23
 <p>INJURIES TO EYES AND SKIN</p> <ul style="list-style-type: none"> For the protection of eyes from welding arc, always wear the arc proof glass(es). For the protection of skin from welding arc or spatter, always wear leather gloves, apron, shoe covers and shirts with long sleeves. 	 <ul style="list-style-type: none"> Only operate the equipment after thoroughly reviewing and understanding the contents of the operators manual.

X505-011481

② X505-011470

 WARNING X505-011470	
	<p>ELECTRIC SHOCK</p> <p>Whenever touching DC Welding Terminal(s), always stop the engine.</p>

③ X564-000640

	<p> WARNING X564-000640</p> <p>FIRE</p> <ul style="list-style-type: none"> Make sure to stop the engine and avoid flames or sparks when refuelling. Never place flammable material near the machine. 	<p>DIESEL FUEL</p> <p>[EN standard or ASTM standard]</p> <p>(sulfur content <15ppm)</p>
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④ X564-000630

 WARNING X564-000630	
	<p>INJURY</p> <p>Always lock the doors and never open while operation. May cause injury by moving parts.</p>

⑤ X505-006410

		<p>BURN</p> <p>•Never remove the radiator cap while the engine is running or hot. Hot water and steam will cause burns.</p>
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X505-006410(UK)

⑥ M707-000240

Lifting Eye

⑦ X505-011490



⑧ X505-006430



⑨ M707-000260



⑩ M708-000890



2. Specifications

Model		DGW200MS/UKV				
Generating Method		Rotating Field				
Welding DC Generator	Rated Current (A)	180	170	160	120	
	Rated Voltage (V)	27.2	26.8	26.4	24.8	
	Duty Cycle (%)	40	50	60	100	
	ECO	Current Adj. Range (A)	60 – 180			
		Welding Rod (ϕ)	2.0 – 4.0			
	Rated Speed (min^{-1})	3000				
	No Load Voltage (V)	MAX 80				
	Power source efficiency (%)	91				
Idle state power consumption (W)	17					
AC Generator	Rated Frequency (Hz)	50				
	Rated Speed (min^{-1})	3000				
	Phase	1-Phase				
	Rated Voltage (V)	110				
	Rated Current (A)	27.2				
	Rated Output (kVA)	3.0				
	Power Factor	1.0				
	Rating	Continuous				
Engine	Model	Kubota Z482				
	Type	Vertical, Water-Cooled 4-Cycle Diesel Engine				
	Displacement (L)	0.479				
	Rated Output ($\text{kW}/\text{min}^{-1}$)	7.8 / 3000				
	Fuel	EN standard or ASTM standard (sulfur content < 15ppm)				
	Lubricant Oil	API Class CF or better (CJ excluded)				
	Lubrication Oil Volume (L)	2.5 (Effective 0.7)				
	Cooling Water Volume (L)	2.8 (Sub Tank Capacity 0.6 L included)				
	Starting Method	Starter Motor				
	CO ₂ Emission data Non-road steady-state test cycle (g/kWh)	1019.8				
Battery	44B19L (Japanese Industrial Standard)					
Fuel Tank Capacity (L)	15					
Dimension	Length (mm)	998				
	Width (mm)	603				
	Height (mm)	773				
Dry Weight (kg)	222					
Noise (dB(A))	Sound pressure level L_{pA}	73.1 (2006/42/EC, d = 1 m, h = 1.6 m, $I_2 = 180$ A)				
	Measured sound power level L_{WA}	87 (2000/14/EC, r = 4 m)				
	Uncertainty K_{WA}	1				
	Guaranteed sound power level L_{WA}	88 (2000/14/EC, r = 4 m) 89 (declared)(2000/14/EC, r = 4 m)				

WELDING GENERATOR EN 60974-10 EMC classification Group 2 Class A

<Note>

- This CO₂ measurement results from testing over a fixed test cycle under laboratory conditions a parent engine representative of the engine family and shall not imply or express any guarantee of the performance of a particular engine.

SOUND PROOF DIESEL ENGINE GENERATOR/WELDER				YEAR OF MANUFACTURE:2021	
Manufacturer: YAMABIKO CORPORATION 1-7-2 Suehirocho, Ohme, Tokyo 198-8760 Japan		CE	P H A S E 1		n=3000min ⁻¹ n ₀ =3200min ⁻¹ n ₁ =2000min ⁻¹
Type: DGWZOOMS/UKV		EN 60974-1	RATED VOLTAGE	110V	
SER.No. WO1001-000001			FREQUENCY	50Hz	KUBOTA Z482 IP23S
60A/22.4V to 180A/27.2V			RATED CURRENT	27.2A	FUEL TANK CAPACITY
	X	40%	60%	100%	DIESEL FUEL
	I ₂	180A	160A	120A	EN standard or ASTM standard (sulfur content < 15ppm)
U ₀ =67.2V U ₂ 27.2V 26.4V 24.8V			RATED OUTPUT	3.0kVA	DRY WEIGHT
			POWER FACTOR	1.0	NET WEIGHT
			R A T I N G	CONTINUOUS	

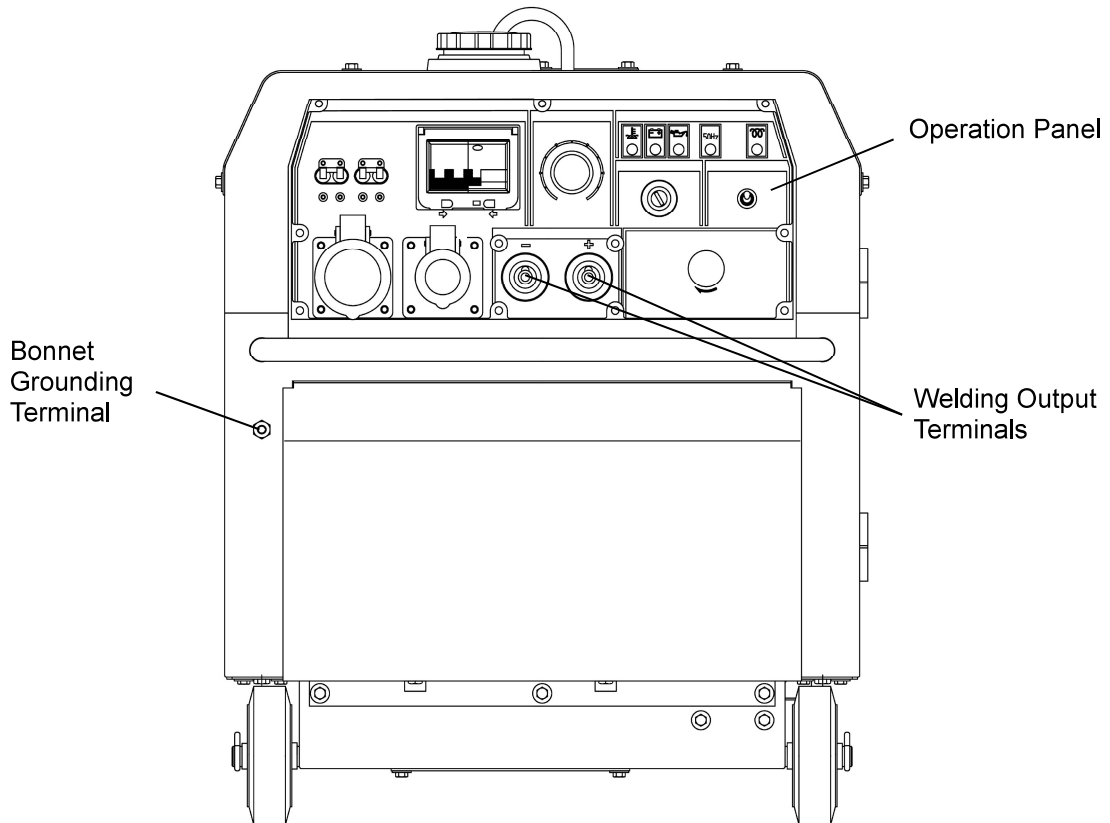
3. Applications

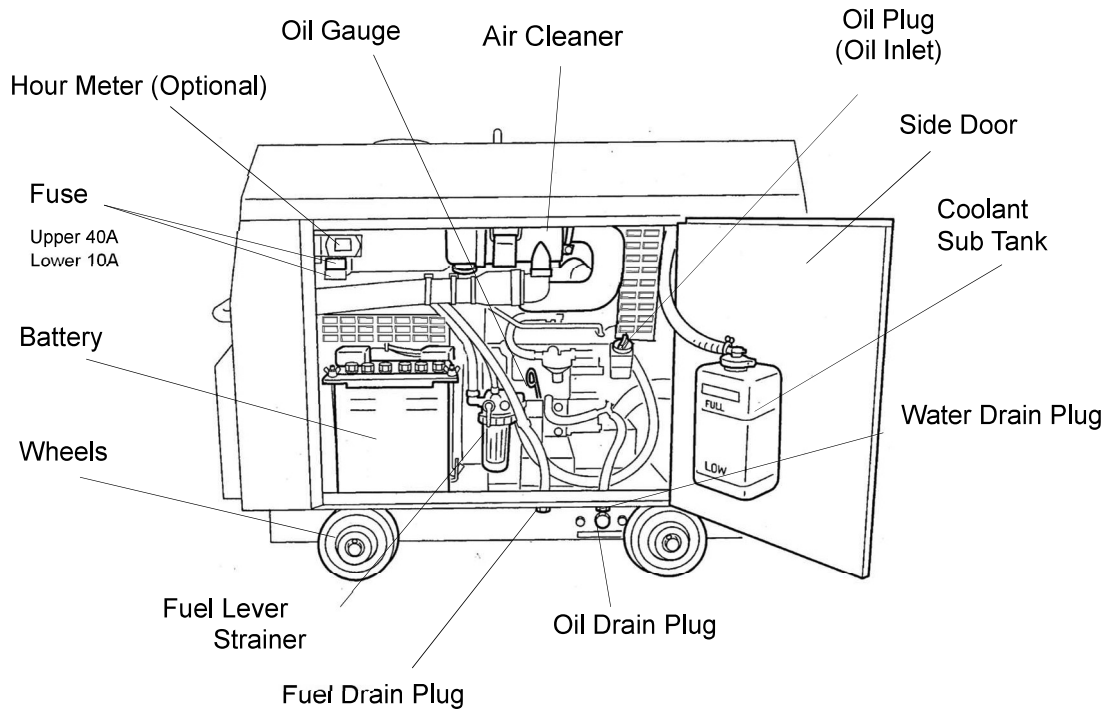
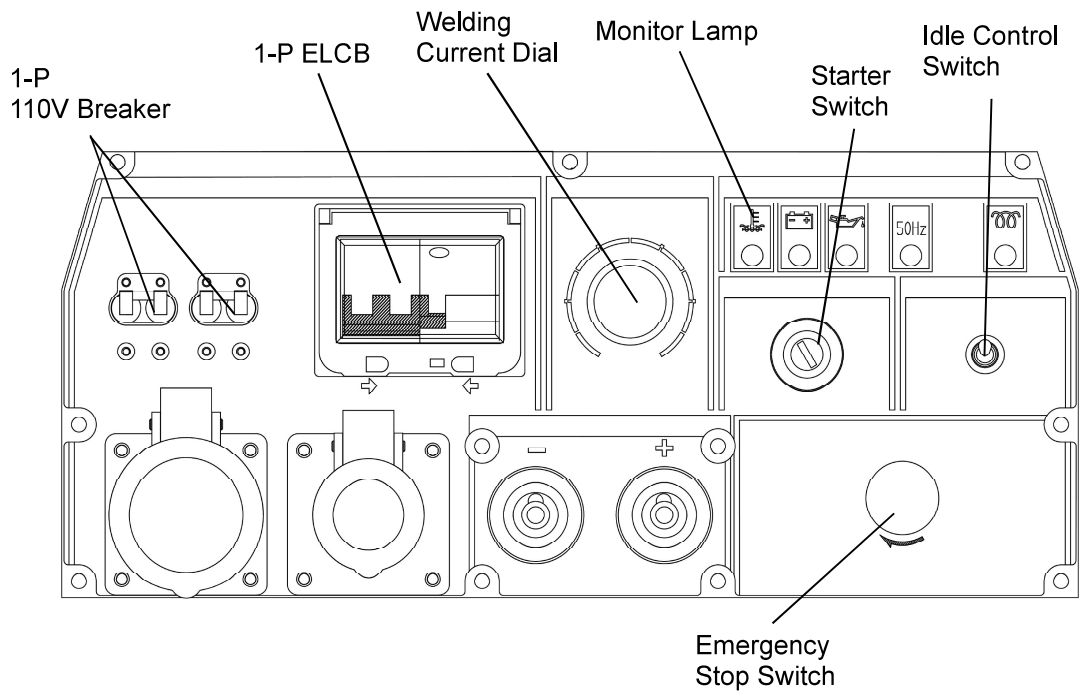
- Shielded Metal Arc Welding
- Power Source for Light, Electric Tools and Appliances

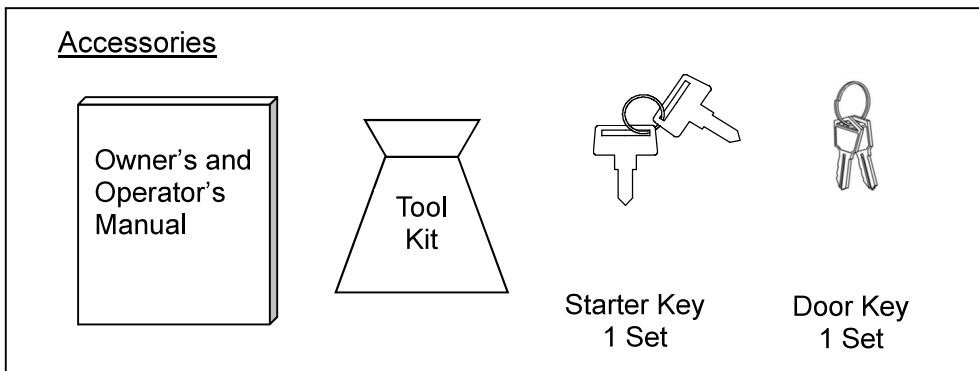
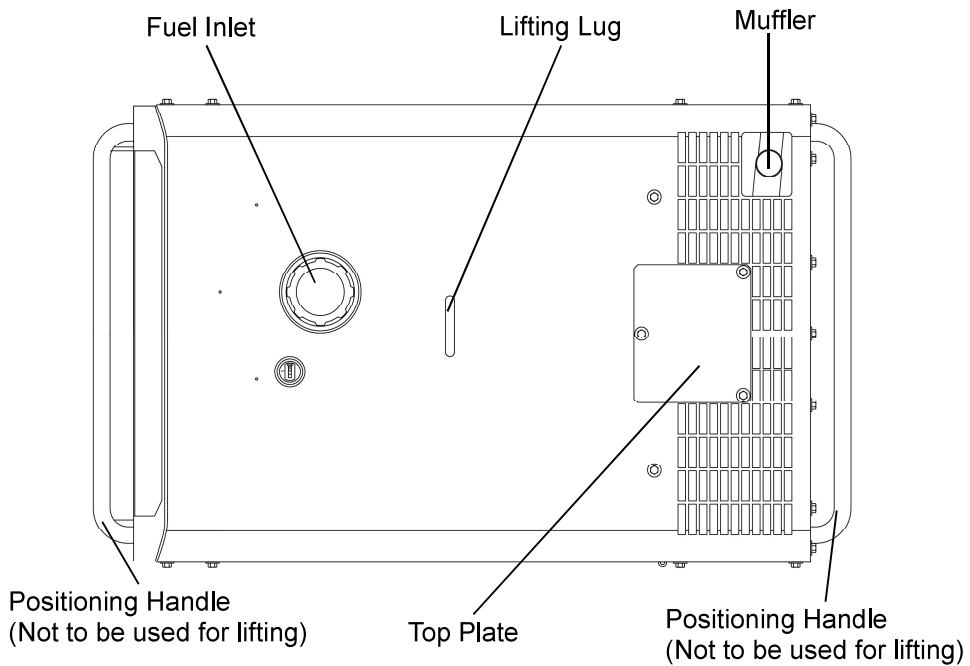
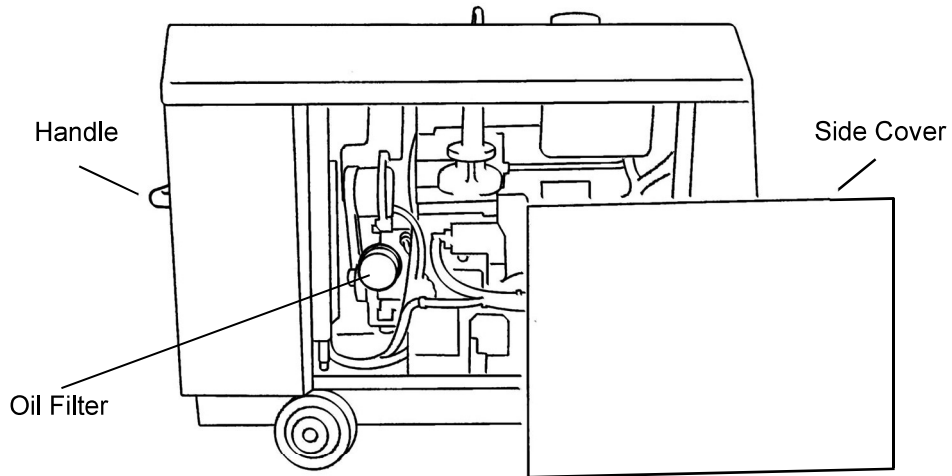
⚠ Caution: Physical and Secondary Damage

- Do not use the equipment for any applications not listed above. Improper usage can result in an accident or malfunction.
- If using the equipment as a power source for medical equipment, you must check with the medical equipment manufacturer, doctor and hospital before using the equipment.

4. Parts Names



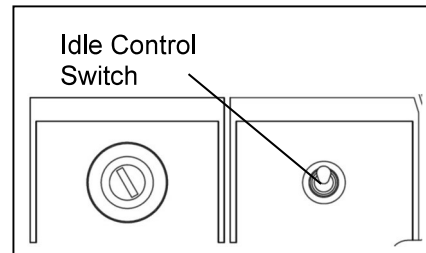




5. Equipment

5-1. Idle Control

The equipment includes an idle control function. You can use the idle control switch to select an engine speed setting of "AUTO" or "HIGH".



(1) Auto Idle

The equipment includes an auto idle function in order to reduce noise, save fuel, and reduce exhaust gas emission.

You can set the idle control switch to "AUTO" so that the engine operates at low speed when not welding or using the equipment as a power source.

When you start to weld or use as an AC power source, the engine automatically increases to high speed. When in a no-load condition, the engine automatically returns to low speed after approximately 8 seconds of high-speed operation.

<Note>

- Set the idle control switch to "HIGH" if using a high capacity motor, precision instruments or AC load with an attached magnetic switch.
- Set the idle control switch to "HIGH" if using as an AC power source of a device of 0.5A or less because the engine might not reach a high speed as speed control does not operate at that level.

(2) High Idle

You can set the idle control switch to "HIGH" to maintain the engine constantly at high speed.

5-2. Monitor Lamp

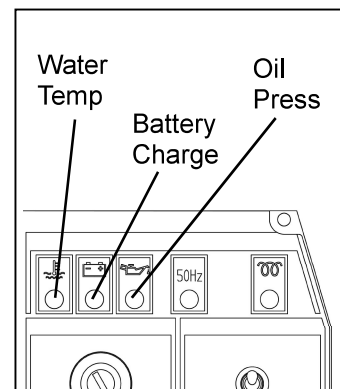
⚠ Warning: Injury/Electric Shock

- Do not operate the equipment with any doors or covers open. There is a danger of hair, body parts and other items being caught up in moving parts such as cooling fans and belts.

⚠ Caution: Burn

- The engine, muffler and similar parts are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.
- Never open the radiator cap during operation or immediately after stopping the equipment. Hot cooling water and steam will spurt out.
- Always be sure to stop the engine and allow it to cool before inspecting or changing the engine oil. Opening the oil gauge or oil plug during operation will result in hot oil spurting out.

The equipment includes monitor lamps for water temperature, battery charge, oil pressure. If the equipment is normal, the "CHARGE", "OIL PRESS" monitor lamps illuminate when the starter switch is switched to "STOP" to "RUN", and all monitor lamps turn off when the engine is started. If any error occurs during operation, the corresponding monitor lamp illuminates and the engine is automatically stopped. If the engine is automatically stopped, return the starter switch to "STOP" and restart the engine. Watch the lit/unlit status of the monitor lamps the next time an automatic stop occurs and check the error contents.



(1) Water Temperature Monitor Lamp

The water temperature monitor lamp ("WATER TEMP") illuminates and the engine is automatically stopped if the cooling water temperature becomes irregularly high during operation. If this occurs, inspect the water level of the sub tank and add cooling water if the water level is insufficient. (Refer to section "7-2 Cooling Water Inspection".)

If the cooling water in the sub tank is at the specified level, it is probable that overloading is the cause. Use within the rated output.

(2) Battery Charge Monitor Lamp

The battery charge monitor lamp ("CHARGE") illuminates and the engine is automatically stopped if battery charge fails during operation. If this occurs, it is probable that there is fan belt damage or a wiring fault. Request repair at the retail outlet where the equipment was purchased.

(3) Oil Pressure Monitor Lamp

The oil pressure monitor lamp ("OIL PRESS") illuminates and the engine is automatically stopped if the engine oil pressure drops during operation. If this occurs, inspect the engine oil level and fill with engine oil until it reaches the maximum level.

<Note>

- The oil pressure monitor cannot detect oil deterioration. Change the engine oil periodically. (Refer to section "12. Inspection/Maintenance".)
- The charge monitor cannot detect battery deterioration or insufficient battery fluid. Inspect the battery fluid level periodically. (Refer to section "7-5 Battery Inspection".)
- Inspect the fuses if the engine is automatically stopped and none of the monitor lamps ("WATER TEMP", "CHARGE" and "OIL PRESS") illuminate. (Refer to section "4. Part Names" for fuse location.)
If a fuse has blown, it is probable that there is a fault in an electric part or the wiring. Request repair at the retail outlet where the equipment was purchased.

5-3. Earth Leakage Circuit Breaker and Grounding

⚠ Warning: Electric Shock

- Always be sure to repair the fault when the earth leakage circuit breaker operates.

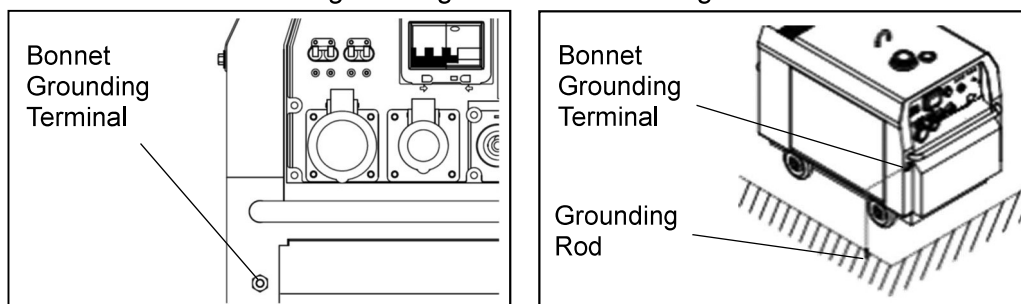
⚠ Warning: Fire

- Do not ground wiring of earth leakage circuit breakers of the equipment to piping that contains through flammable material.

The equipment includes earth leakage circuit breakers (solidly grounded type) in order to prevent electric shock. Immediately isolate the electrical circuit if earth leakage occurs due to insulation failure in devices using the equipment or similar reason.

(1) Bonnet Grounding Terminal

The equipment includes a bonnet grounding terminal in order to connect the grounding rod. This machine bonnet grounding terminal should be grounded to the earth.



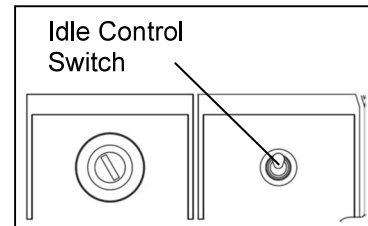
<Note>

- Connect using a plug with a grounding pole.
- If using a plug without a grounding pole, perform grounding work and check that used devices are connected to ground.
- Securely ground the bonnet grounding terminal to the metal frame of the vehicle if transporting the equipment by truck or trailer.
- In the event you cannot ground the generator to the earth, consult with the authorized distributor or our dealer.

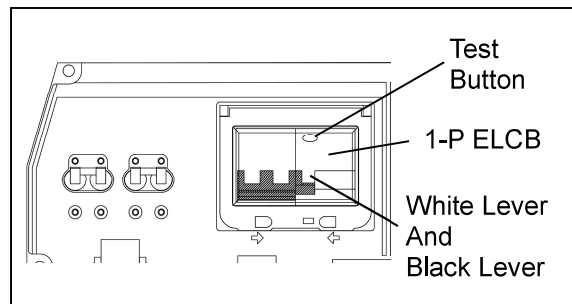
(2) Operation Check of Earth Leakage Circuit Breaker

Be sure to always check the earth leakage circuit breakers before starting operation according to the following procedures.

- 1) Start the engine.
(Refer to section "8-1. Starting the Engine".)
- 2) Set the idle control switch to "HIGH".
- 3) Set the 1-P ELCB lever to "ON".
- 4) Press the 1-P ELCB test button.
Operation is normal if the White lever and Black lever of the 1-P ELCB lowers and turns off at this time.



There is a fault in the earth leakage circuit breakers if operation cannot be checked according to the above procedures. Request repair at the retail outlet where the equipment was purchased.



(3) If an Earth Leakage Circuit Breaker Operates

⚠ Caution: Electric Shock/Injury

- Always be sure to turn off the power switches of all devices using the equipment when turning on the equipment circuit breakers after an earth leakage circuit breaker operates. Leaving on the power switch of a device using the equipment when the equipment circuit breakers are turned on could result in the sudden operation of the corresponding device.

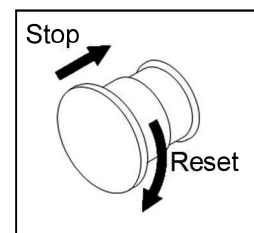
The White lever and Black lever of 1-P ELCB moves to "OFF" when 1-P ELCB operates.
When this occurs, immediately stop the engine and repair the earth leakage location.
After repairing all faults, push up the 1-P ELCB lever to the "ON" side to reset the system.

<Note>

- If the 1-P ELCB (only Black lever) turns to OFF, it means AC Output over load.

5-4. Emergency Stop Switch

Press the emergency stop switch to stop the engine immediately.
After pressing the emergency stop switch, securely return the starter switch to the "STOP" position and turn the emergency stop switch clockwise to reset the switch.



6. Transporting

⚠ Warning: Injury

- The lifting lug is designed to be used only for lifting the equipment. Do not lift the equipment with any heavy items (such as a trailer, gas canister and additional fuel tank) added to the equipment.

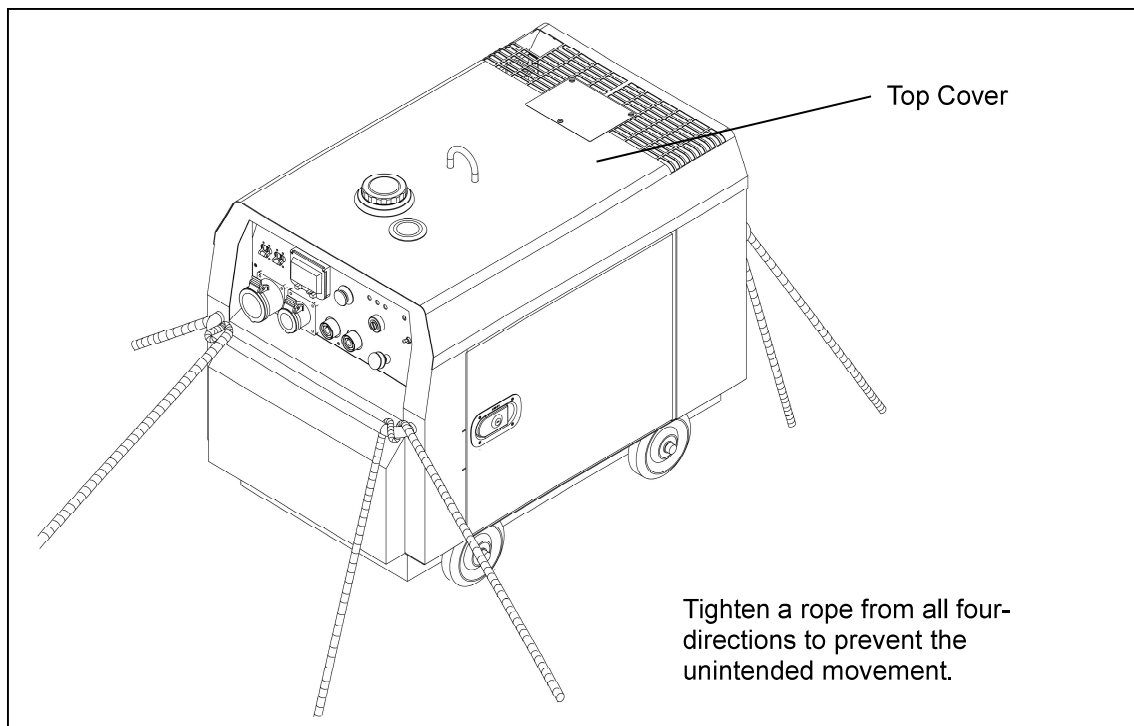
⚠ Caution: Injury

- Do not move the equipment during operation.
- Always be sure to use the lifting lug when lifting the equipment, and lift slowly and directly straight above.
- Wear a helmet, safety shoes, gloves and similar protective gear when performing lifting work. Do not stand or get under the equipment while it is suspended.

Always be sure to fix the equipment securely when transporting the equipment.

<Note>

- Tighten a rope from all four-directions to protect against unintended movement when this equipment intends to transport.
- Handle the equipment with great care when raising, lowering and transporting. Rough handling of the equipment can result in damage or malfunction.



7. Pre-Operation Inspection

⚠ Warning: Injury/Electric Shock

- Do not operate the equipment with any doors or covers open. There is a danger of hair, body parts and other items being caught up in moving parts such as cooling fans and belts.
- Always be sure to stop the engine before performing any equipment check or maintenance.

⚠ Warning: Fire

- Always be sure to wipe away any spilled fuel or oil.
- Absolutely never use the equipment if there is a fuel, oil or cooling water leak, and be sure to always repair the leak before using.
- Absolutely never inspect or perform maintenance to the equipment near fire or other open flames or sparks.

⚠ Caution: Burn

- The engine, muffler and similar parts are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.

⚠ Caution: Damage to the equipment or other properties

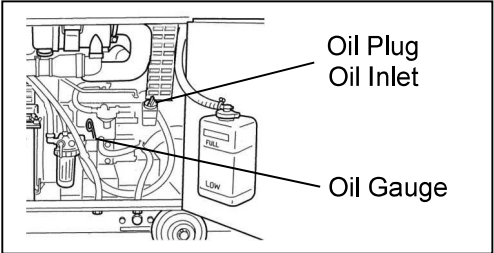
- Do not use anything other than the specified optional device because they may cause malfunctions.

7-1. Engine Oil Inspection

⚠ Caution: Burn

- Always be sure to stop the engine and allow it to cool before inspecting or changing the engine oil. Opening the oil gauge or oil plug during operation will result in hot oil spurting out.

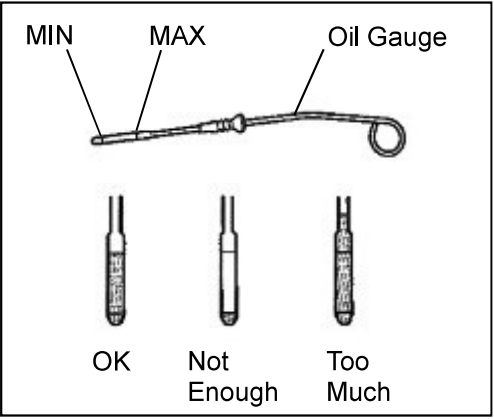
Situate the equipment on a level surface and completely insert the oil gauge to inspect the oil level. Inspect the oil level before starting operation and, if it has decreased, fill with oil until it reaches the maximum level.



- <Note>**
- The oil level cannot be accurately checked if the equipment is at an angle.
 - Operating the equipment when the oil has been filled above the maximum level can result in engine cylinder internal damage.

■ Engine Oil Selection
Use a diesel-type engine oil with a viscosity that is appropriate for the outdoor air temperature (refer to the table).

- <Note>**
- Use oil with a quality of CF class or better (API classification / CJ excluded).



Temperature/Engine Oil Relationship

Temperature	+20°C or more	+10°C to +20°C	-10°C to +40°C
Oil Viscosity	SAE 30	SAE 20	SAE 10W/30

7-2. Coolant Inspection

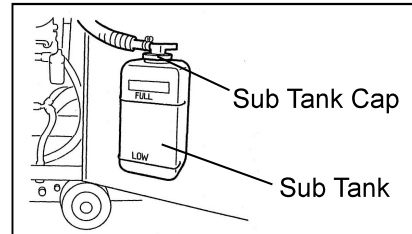
⚠ Caution: Burn

- Never open the radiator cap during operation or immediately after stopping the equipment. Hot cooling water and steam will spurt out.

Check that the sub tank cooling water level is within the range of "FULL" and "LOW". If the cooling water level is lower than "LOW", add water to both the sub tank and radiator.

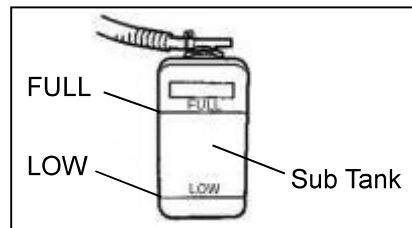
(1) Adding Water to the Sub Tank

- 1) Remove the sub tank cap.
- 2) Pour cooling water into the sub tank until it reaches the "FULL" level.
- 3) Install the sub tank cap.



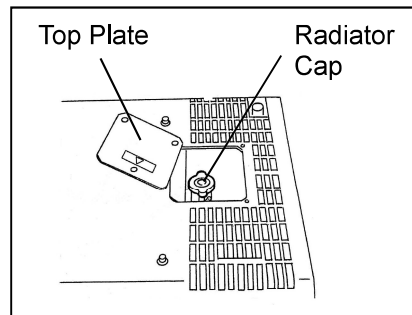
(2) Adding Water to the Radiator

- 1) Remove the top plate.
- 2) Remove the radiator cap.
- 3) Pour cooling water into the radiator through the inlet port until it reaches the mouth of the port.
- 4) Tighten the radiator cap.
- 5) Re-install the top plate.



<Note>

- Use a long-life coolant (LLC) in order to prevent freezing and rust. (An LLC with a 30% mixing ratio is used when shipped from the factory.)
- Use an LLC mixing ratio in the range 30% to 45% in accordance with the outdoor air temperature.
- Change the LLC every 2,000 hours or 1 year.



Mixing Ratio Guide

Min. Temp.	-15°C	-20°C	-30°C
Mixing Ratio	30%	35%	45%

7-3. Fuel Inspection

⚠ Warning: Fire

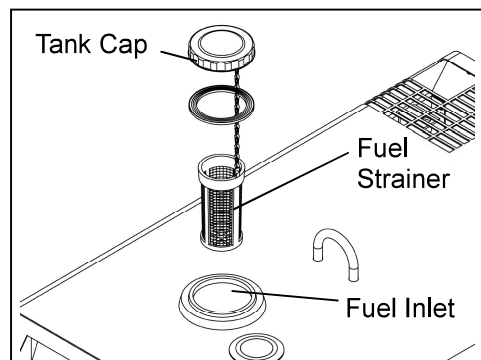
- Always be sure to stop the engine when inspecting fuel or refueling, and absolutely never perform such tasks near fire or other open flames or sparks. Wait until the engine has completely cooled before inspecting fuel or refueling.

Check that there is sufficient fuel and add fuel if insufficient.

After refueling, securely tighten the tank cap and close the fuel inlet cover.

<Note>

- Use Diesel fuel, EN Standard or ASTM standard (sulfur content < 15ppm). Engine is designed to operate on Ultra Low Sulfur Diesel Fuel only. Use of any other fuel may cause the engine not to operate in compliance with emissions requirements.



- The fuel supply pump, injectors and other parts of the fuel system and engine can be damaged if any fuel or fuel additives are used other than those specifically recommended by the engine manufacturer.
- Carefully add fuel until tank is full.
- Always be sure to wipe away any spilled fuel.

<Note>

Do not use any fuel other than the specified light oil type. Doing so may lead to the problems described below.

- This machine complies with the exhaust gas regulations. If you use any type of fuel other than the specified light oil type, the machine will be a product not conforming to the exhaust gas regulations.
- Using fuel mixed with heavy oil, kerosene or alcohol, or degraded fuel may have negative effect on the machine functions (a decrease in output, start-up performance deterioration) or cause the engine to malfunction (component wear and corrosion, early deterioration of the engine oil, fuel filters or fuel hoses).

7-4. Inspection for Fuel/Oil/Cooling Water Leakage

⚠ Warning: Fire

- Absolutely never use the equipment if there is a fuel, oil or cooling water leak, and be sure to always repair the leak before using.

Open the side door and check for fuel leakage from fuel line joints and similar components, and check for oil and cooling water leakage. Open the fuel tap to perform inspection and close it after inspection has been completed.

7-5. Battery Inspection

⚠ Warning: Injury to Eyes and Skin

- Use protective gear, such as rubber gloves, when inspecting or replacing the battery due to the dilute sulfuric acid in the battery fluid. Be sure that fluid does not contact eyes, or on skin or clothing.
- If battery fluid gets into the eyes, or on the skin or clothing, immediately wash with a large amount of water, and always be especially sure to seek medical attention if it gets into the eyes.

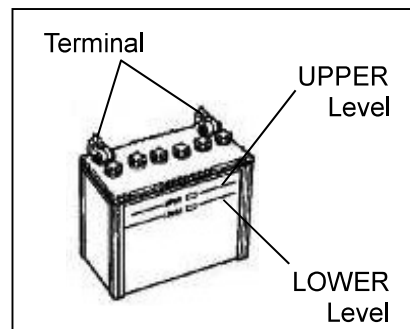
⚠ Warning: Explosion

- Do not operate the equipment or recharge the battery when the battery fluid level is below the lower level.
- Do not generate any sparks near the battery and do not allow any fire or other open flames or sparks near the equipment because the battery generates ignitable gas.

- 1) Inspect the battery fluid level. If it is near the lower level, add distilled water until it reaches the upper level.
- 2) Inspect for loose terminals and retighten if loose.

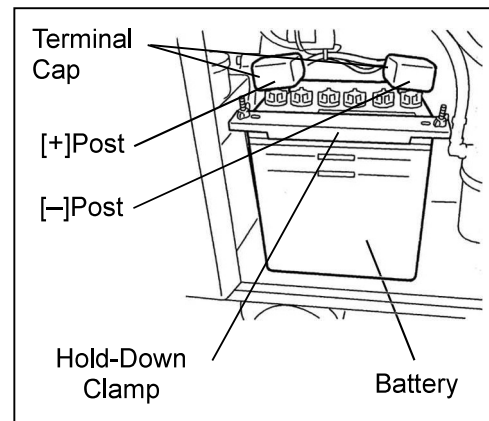
<Note>

- It is necessary to recharge the battery when the specific gravity of the battery fluid is 1.23 or less. Contact the retail outlet where the equipment was purchased if this occurs.



- **Battery Replacement Procedures**
- 1) Removed the front panel and under plate.
(M6 bolt x 2)
- 2) Remove the " - " (negative) cable.
(Always be sure to first remove the " - " (negative) side.)
- 3) Remove the battery hold-down clamp.
- 4) Remove the "+" (positive) cable.
- 5) Remove the battery.

* Install the battery by performing the above procedures in reverse order.
(Always be sure to first attach the "+" (positive) side.)



<Note>

- Use the specified battery.< 44B19L > (Japanese Industrial Standard)

8. Operating Procedures

- ⚠ **Warning: Suffocation from Exhaust Fume**
 - Do not operate the equipment in a poorly-ventilated area such as indoors or within a tunnel because the engine exhaust fume includes components that are harmful to humans.
- ⚠ **Warning: Fire**
 - Keep any ignitable items (such as fuel, gas and paint) or inflammable items away from the equipment because the muffler, exhaust fume and other parts attain high temperatures.
 - Provide at least 1 meter (3 feet) of distance between the equipment and walls and other obstacles, and operate the equipment on a flat surface.

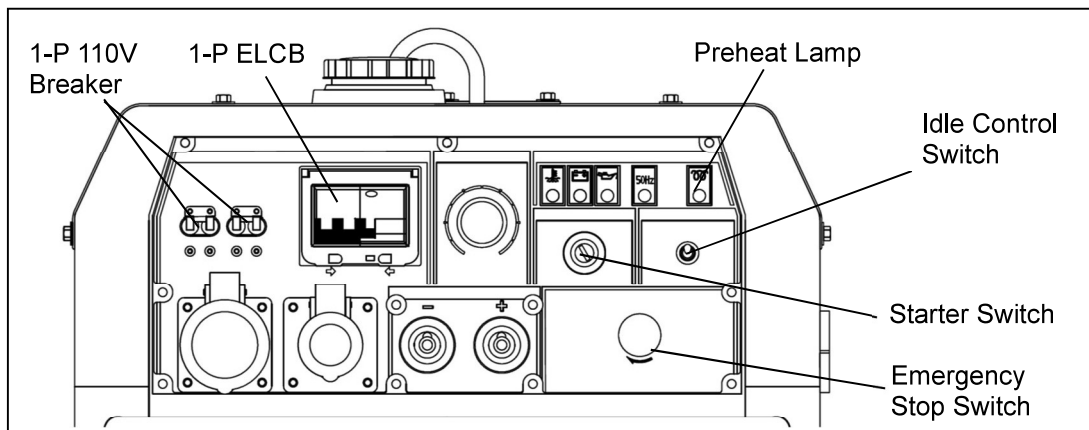
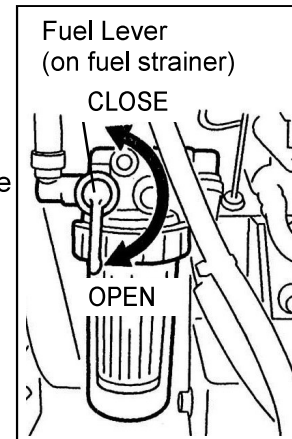
- ⚠ **Caution: Suffocation from Exhaust Fume**
 - Do not direct the engine exhaust towards passersby, private homes or similar persons/locations because the engine exhaust fume includes components that are harmful to humans.
- ⚠ **Caution: Burn**
 - The engine, muffler and similar parts are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.
- ⚠ **Caution: Injury**
 - Use this equipment with it situated on a stable level surface so that it is prevented from moving.
 - Do not move the equipment during operation.
 - Always be sure to turn off the switches of all devices using the equipment and turn off the equipment circuit breakers before starting the engine.
- ⚠ **Caution: Damage to the equipment or other properties**
 - Do not use anything other than the specified optional device because they may cause malfunctions.

<Note>

- Check that the surrounding area is safe before starting the engine.
- When there are multiple workers who are working together, they must mutually signal each other before starting the engine.
- Do not use in an area with high temperature or humidity, or an area with a large amount of dust.
- Do not open any doors during operation. Operating with a door open can negatively affect cooling effect, resulting in an equipment malfunction.
- Use ear protection if the level of noise is high. Failure to do so could result in hearing damage.

8-1. Starting the Engine

- 1) Turn all connected equipment's switches to "OFF".
- 2) Turn all breakers (1-P 110V) to "OFF".
- 3) Turn the fuel lever (on the fuel strainer) to "OPEN".
- 4) Set the idle control switch to "AUTO".
- 5) Check that the emergency stop switch has been released.
- 6) If the temperature is 5°C or less, turn the starter switch to the "PREHEAT" position and wait until the preheat lamp turns off. (approx. 5 seconds)
- 7) Turn the starter switch to the "START" position to start the starter motor, which then starts the engine.
- 8) After the engine starts, remove your hand from the starter switch.
- 9) Allow the engine to warm up for approximately 5 minutes.



<Note>

- Do not crank the starter motor for 15 seconds or more continuously.
- If repeating starter switch operation, wait 30 seconds or more between operations.
- After the engine starts, do not turn the starter switch to "START" during operation.

■ Restarting after Stopping due to Running Out of Fuel

The equipment includes an automatic air-bleeding device. You can easily restart the engine according to the following procedures even if the engine stops due to running out of fuel.

- Turn all breakers (1-P 110V) to "OFF".
- Turn the starter switch to the "STOP" position.
- Add fuel to the fuel tank.
- Set the idle control switch to "AUTO".
- Turn the starter switch to the "START" position and crank the starter motor for approximately 10 seconds.
- After the engine starts, remove your hand from the starter switch.
- Wait for air to be completely bled from the fuel pipes and engine speed to stabilize (approx. 1 minute).

*Engine speed is not stable until all air is bled from the fuel pipes.

<Note>

- Do not switch the engine to high speed or apply any loads to it until all the air has been bled from the fuel pipes (until speed is stable). Doing so can cause a malfunction.

8-2. Stopping the Engine

- 1) Turn all breakers (1-P 110V) to "OFF".
- 2) Set the idle control switch to "AUTO".
- 3) Allow the engine to cool down for approximately 5 minutes.
- 4) Set the starter switch to "STOP".
- 5) After the engine stops, turn the fuel lever to "CLOSE".

<Note>

- Do not stop the engine while welding or using as an AC power source. Doing so can cause a malfunction.
- If the engine does not stop when the starter switch is set to "STOP", turn the fuel lever to "CLOSE". The engine will stop a few minutes afterwards. If the engine does not stop by starter switch operation, stop using the equipment and request repair at the retail outlet where the equipment was purchased.

8-3. Emergency Stop

The equipment includes an emergency stop device.

Press the emergency stop switch if you want to immediately stop the engine when an emergency occurs in the work area, the equipment suffers an operating fault, and similar circumstances.

<Note>

- After stopping the engine using the emergency stop device, turn the starter switch to "STOP".
- Do not strike the emergency stop switch with a hammer or similar tool.
- Only use the emergency stop switch for emergency stop purposes.
- If the engine does not stop when the emergency stop switch is pressed, turn the fuel lever to "CLOSE". The engine will stop a few minutes afterwards.

9. Using as a Welder

9-1. Welding Cable Selection

Use welding cables with a cross-sectional area that is larger than the proper cross-sectional areas indicated in the table below.

Using cable that is less than the proper cross-sectional area reduces the weld output.

<Note>

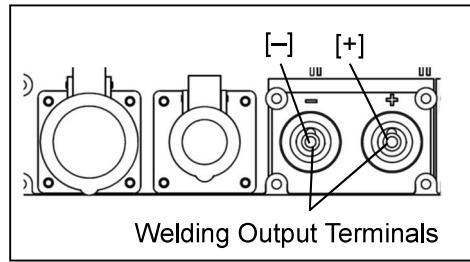
- Use welding cables when they are completely extended (not coiled). Using a cable that is coiled reduces the weld output.

Proper Cable Cross-Sectional Area (Units: mm²)

Return Length \ Weld Current	20m	30m	40m	60m	80m	100m
180A	22	22	30	50	60	80
150A	22	22	22	38	50	60
100A	22	22	22	30	30	38

9-2. Welding Polarity

There are "+" (positive) and "-" (negative) welding output terminals. Refer to the table below to select a polarity corresponding to the work you are performing.



<Note>

- Use the polarity indicated for the welding rods being used if so indicated.
- When welding with 2 persons using different polarities for the same base material, a single worker must not hold 2 holders because the voltage between the 2 holders could become high and there may be a danger.

Polarity	Application	Connection
Straight Polarity	Generals Welding, such as Construction	[+] Plus to the Earth (Material) [-] Minus to holder (Rod)
Reverse Polarity	Thin Plate, Build-Up Welding, Stainless Steel	[+] Plus to holder (Rod) [-] Minus to the Earth (Material)

9-3. Welding Cable Connection

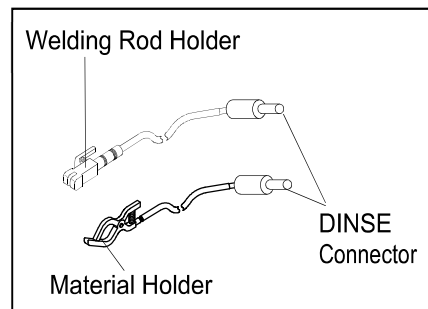
⚠ Warning: Electric Shock

- Always examine welding cables, power cables and plugs etc., to ensure there are no defects present, prior to operation.
- Before connecting or disconnecting a welding cable from welding output terminals, stop the engine, and remove the engine key. The person performing this task must always keep the key.

- 1) Stop the engine.
- 2) Connect the welding cables to the DINSE connectors, a welding rod holder and a material holder.

<Note>

- Always fit the correct size DINSE connectors. (Recommended parts : DIX SK70)
- Ensure the welding cable connections are made correctly.
- Be sure to connect the cables tightly to welding output terminals. Otherwise, welding output terminals may burn due to the heat caused by poor connections.
- Do not use a cable without the DINSE connectors. Personal injury or damage to the machine may result as a consequence.



9-4. Duty Cycle

The duty cycle is the percentage of time the load is being applied in a 10-minute period. For example a 50% duty cycle, represents 5 minutes of load and 5 minutes of no-load in a 10-minute period.

<Note>

- Continuing to weld beyond the rated duty cycle with the rated output can result in equipment overheating and corresponding malfunctions.

9-5. Welding Work

⚠ Warning: Suffocation from Welding Fume

- Always be sure to wear a fume-proof mask when welding as the fumes generated during welding include harmful gases and dust. Also be careful that the wind direction is not such that it will cause fumes to be inhaled and always operate the equipment in a well-ventilated area.

⚠ Warning: Fire

- Keep any ignitable items (such as fuel, gas and paint) or inflammable items away from the work area due to the scattering of weld spatter that occurs during welding.

⚠ Warning: Electromagnetic Interference

- Persons using a heart pacemaker are not allowed near the welder or welding work area while welding is being performed without the permission of a doctor. The welder generates a magnetic field while energized that can negatively affect pacemaker operation.

⚠ Caution: Burn

- Always be sure to wear leather gloves, apron, shoe covers, arc-proof glasses (face shield), safety shoes, hard hat and long-sleeve clothing to protect against the scattering of weld spatter that occurs during welding.

⚠ Caution: Injury to Eyes and Skin

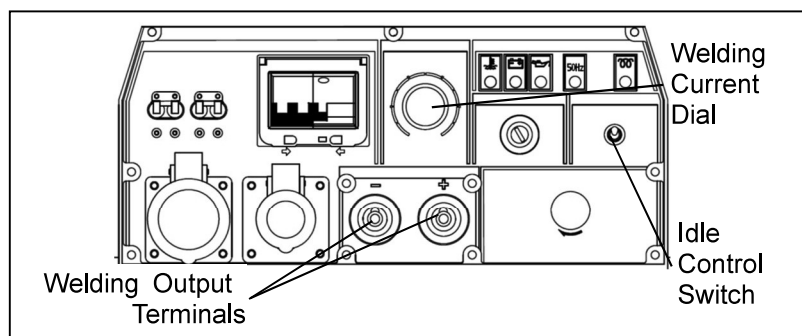
- Always be sure to wear arc-proof glasses (refer to the table below), clothes that completely cover the skin and other protective gear when welding to protect the eyes and skin from harmful light rays generated during welding.

Standards for Arc-Proof Glasses (Japanese Industrial Standard)

Filter No.	7	8	9	10	11	12	13
Welding Current (A)	30-75		76-200			201-400	

⚠ Caution: Electric Shock

- If wearing gloves, be sure to always wear gloves with dry insulation properties. Do not wear gloves that are damaged or wet.



- 1) Set the Idle control switch to "AUTO" or "HIGH", according to the operation.
- 2) Set the current amperage by the welding current dial.
 - ※ The values are for reference only. The Cable length or the ambient temperature will affect each value.

10. Using as a Generator

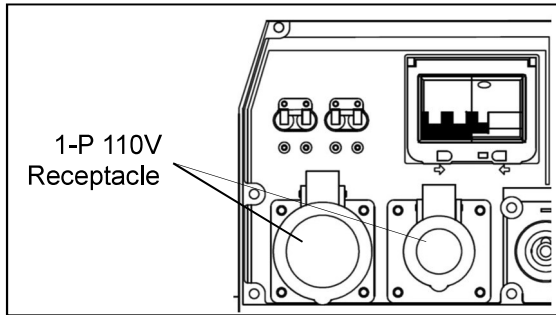
10-1. Output Types and Ranges

The equipment includes two 1-P 110V receptacles.

The maximum output available from the receptacle of left side is 3.0kVA.

The maximum output available from the receptacle of right side is 1.6kVA.

The total maximum output available from the two receptacle is 3.0kVA.



10-2. Usable Device Capacities

Usable capacity varies depending on the type and performance of the electrical tool or household appliance being used.

Overview of Usable Device Capacities

Device Used	Standard Capacities (Units: kW)		
	1-Phase 110V		
	Receptacle (Left side)	Receptacle (Right side)	Total capacity of Two receptacles
Incandescent bulbs, electrical heaters and similar devices	3.0	1.6	3.0
Electrical tools (commutator motor) and similar devices	1.5	0.8	1.5
Mercury lamps (high power factor types)	1.2	0.6	1.2
Submerged pump, compressor and similar devices (Induction motors)	1.2	0.6	1.2

* Commutator motors: Motors with brushes

* Induction motors: Motors without brushes

* Capacity values are displayed under "OUTPUT" for induction motors and under "POWER CONSUMPTION" for all other devices.

<Note>

- This equipment is a 50Hz dedicated unit. Use 50Hz devices with this equipment.
- Devices using a motor might require power that is larger than the device rating. In such cases, consult with the retail outlet where the equipment was purchased.
- Do not start up multiple devices simultaneously if using two or more units of devices such as submerged pumps. Start each unit separately.
- Do not illuminate a mercury lamp again immediately after turning it off. Wait for the lamp to cool down (approximately 15 minutes) after a lamp has been turned off before turning it on again.

10-3. Operation

⚠ Warning: Electric Shock

- Always be sure to turn off all circuit breakers before installing or removing devices using AC output receptacles.
- Always be sure to repair the fault when the earth leakage circuit breaker operates.

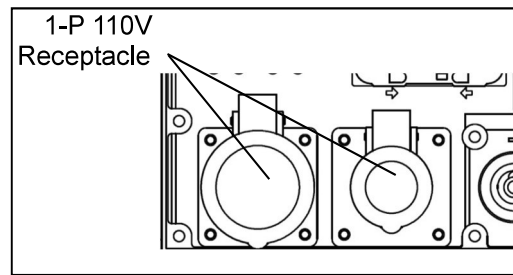
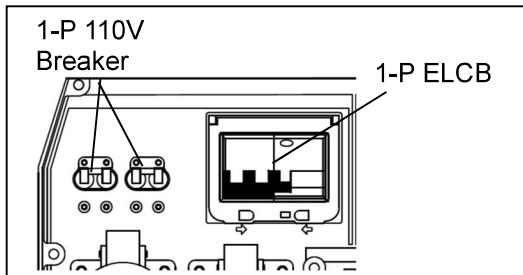
⚠ Caution: Injury

- Always be sure to turn off the power switches of all devices using the equipment when turning on the equipment circuit breakers. Leaving on the power switch of a device using the equipment when the equipment circuit breakers are turned on could result in the sudden operation of the corresponding device.
- Do not leave on the power switch of a device using the equipment and do not connect a device to an AC output receptacle.

⚠ Caution: Physical and Secondary Damage

- If using the equipment as a power source for medical equipment, you must check with the medical equipment manufacturer, doctor and hospital before using the equipment.

- 1) Turn off the switches of devices being used.
- 2) Turn all breakers (1-P 110V) to "OFF".
- 3) Start the engine. (Refer to section "8-1. Starting the Engine".)
- 4) Connect the power plug(s) of device(s) being used to the AC output receptacle(s).
- 5) Turn all breakers (1-P 110V) to "ON".
(Check that the ELCB lever is set to "ON".)



■ Recovery from Overcurrent Breaker Operation

⚠ Caution: Injury

- Always be sure to turn off the power switches of all devices using the equipment when turning on the equipment circuit breakers. Leaving on the power switch of a device using the equipment when the equipment circuit breakers are turned on could result in the sudden operation of the corresponding device.

Breakers operate when there is excessive current to isolate the corresponding circuit. Inspect the breakers if a device being used stops during equipment operation.

Follow the following procedures to recover operation when breakers operate due to overcurrent.

- 1) Turn off all switches of devices using the equipment as an AC power source.
- 2) Restart the engine.
- 3) Push up the breaker lever that has operated to the "ON" position.

<Note>

- Refer to section "10-2. Usable Device Capacities" and be careful of overloading.

11. Simultaneously Welding and Using as AC Power Source

Due to the fact that breakers only function for AC power output, the engine can become overloaded if simultaneously welding and using the equipment as an AC power source. Refer to the table on the next page and limit the use of AC power accordingly.

Overview of Capacities Usable Simultaneously

Weld Output		AC Power Output
Welding Rod / Current		1-phase Output (Power factor: 1.0)
ϕ 2.0 / 60A	PLUS	3.0 kW
ϕ 2.6 / 120A		2.5 kW
ϕ 3.2 / 140A		1.0 kW
ϕ 4.0 / 170A		0.5 kW

*1-Phase output is the total output of two receptacles.

<Note>

- Do not use as an AC power source simultaneously with welding if it is necessary to perform high-quality welding.

12. Inspection/Maintenance

Warning: Electric Shock/Injury

- Always be sure to stop the engine before performing any equipment check or maintenance.
- Do not operate the equipment with any doors or covers open. There is a danger of hair, body parts and other items being caught up in moving parts such as cooling fans and belts.
- Do not modify the equipment and do not operate with parts removed.

Warning: Fire

- Always be sure to stop the engine when inspecting fuel or refueling, and absolutely never perform such tasks near fire or other open flame. Wait until the engine has completely cooled before inspecting fuel or refueling.
- Always be sure to wipe away any spilled fuel or oil.
- Absolutely never use the equipment if there is a fuel, oil or cooling water leak, and be sure to always repair the leak before using.
- Absolutely never inspect or perform maintenance to the equipment near fire or other open flames or sparks.

Warning: Injury to Eyes and Skin

- Use protective gear, such as rubber gloves, when inspecting or replacing the battery due to the dilute sulfuric acid in the battery fluid. Be sure that fluid does not contact eyes, or on skin or clothing.
- If battery fluid gets into the eyes, or on the skin or clothing, immediately wash with a large amount of water, and always be especially sure to seek medical attention if it gets into the eyes.

Warning: Explosion

- Do not operate the equipment or recharge the battery when the battery fluid level is below the lower level.
- Do not generate any sparks near the battery and do not allow any fire or other open flames near the equipment because the battery generates ignitable gas.

Caution: Burn

- The engine, muffler and similar parts are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.
- Never open the radiator cap during operation or immediately after stopping the equipment. Hot cooling water and steam will spurt out.
- Always be sure to stop the engine and allow it to cool before inspecting or changing the engine oil. Opening the oil gauge or oil plug during operation will result in hot oil spurting out.

<Note>

- Procedures except for pre-operation inspection must be performed by specialized technicians.
- Items indicated by ■: Contact the retail outlet where the equipment was purchased.
- Always be sure to use genuine parts when replacing parts.
- When removing waste liquid from the equipment, place some container to collect the liquid and prevent it from spilling on the ground. Dispose of such oil, fuel, cooling water (LLC), filters, batteries and other harmful substances as industrial waste in accordance with applicable laws and regulations. Consult with the retail outlet where the equipment was purchased if you have any inquiries regarding proper disposal.
- When disposing of parts containing liquids (capacitors and batteries), handle the waste parts thereof carefully so that they do not leak due to cracking.
- When performing maintenance with doors or covers open, be sure that no other persons can accidentally come close to the equipment. Close all doors and covers if momentarily leaving the equipment unattended.

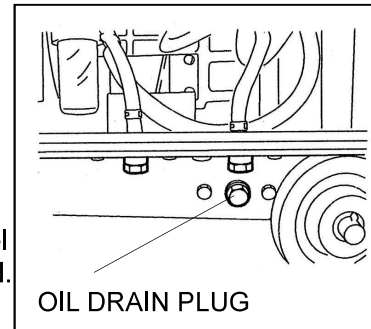
Perform periodic inspection and maintenance as indicated by the table below in order to ensure that this equipment can be operated in optimal condition.
Use the hour meter as a general indicator for the operating time.

Inspection Item	Pre-Operation Inspection	Inspection Period					
		50th hour	Every 100 hours	Every 200 hours	Every 400 hours	Every 1,000 hours	Every 2,000 hours
1 Inspect/Add Fuel	○						
2 Inspect/Add Engine Oil	○						
3 Change Engine Oil		1st time ■	2nd time and after ■				
4 Change Oil Filter		1st time ■		2nd time and after ■			
5 Inspect/Add Cooling Water	○						
6 Change Cooling Water							■ or 1 year
7 Clean Fuel Strainer		1st time ■	2nd time and after ■				
8 Replace Fuel Element					■		
9 Drain Water from/Clean Fuel Tank				■			
10 Inspect for Fuel/Oil/Cooling Water Leakage	○						
11 Inspect/Add Battery Fluid	○						
12 Clean Air Element		1st time ■	2nd time and after ■				
13 Replace Air Element					■		
14 Adjust V-belt Tension		1st time ■	2nd time and after ■				
15 Replace V-belt					■ or 2 years		
16 Clean Radiator Fin (External)					■		
17 Clean Radiator (Internal)					■		
18 Inspect/Replace Fuel/Cooling Water/Oil Hoses, Anti-Vibration Rubber					■ or 1 years (Inspect)		■ or 2 years
19 Adjust/Lap Clearance of Air Intake/Release Valves						■ Adjust- ment	■ Lapping
20 Inspect/Adjust Clearance of Fuel Injection Valves					■		
21 Inspect/Adjust Fuel Injection Pump							■

(1) Changing the Engine Oil

1st time	50th hour
2nd time and after	Every 100 hours

- 1) Remove the oil plug.
- 2) Remove the oil drain plug and drain the engine oil.
- 3) Tighten the oil drain plug.
- 4) Add oil through the oil inlet, while checking the oil level using the oil gauge, until it reaches the maximum level. (Fill with approx. 2.5 L)
- 5) Tighten the oil plug.



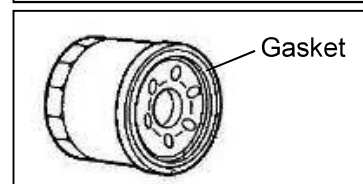
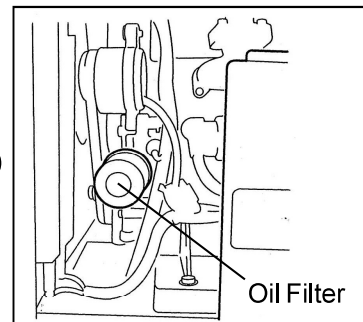
<Note>

- Refer to section "7-1. Engine Oil Inspection" for the types of engine oil.
- Replace the packing of the oil drain plug with a new part each time the oil is changed.
- Packing part no. : 6C090-58961(Kubota part no.)
- After tightening the oil drain plug, operate the engine for a short period and check that there is no oil leakage. Stop the engine when completed.

(2) Changing the Oil Filter

1st time	50th hour
2nd time and after	Every 200 hours

- 1) Drain the engine oil according to the procedures of "(1) Changing the Engine Oil".
- 2) Remove the oil filter using a filter wrench.
- 3) Apply a thin layer of oil to the gasket of a new oil filter.
- 4) Screw in the oil filter by hand and securely tighten by hand (do not use a filter wrench) after the gasket contacts the seal surface.
- 5) Add engine oil.



<Note>

- Contact the retail outlet where the equipment was purchased if you do not have a filter wrench.
- Oil filter part no. : 15853-32433 (Kubota part no.)
- After adding engine oil, operate the engine for a short period and check that there is no oil leakage. Stop the engine when completed.

(3) Cleaning/Replacing the Air Element

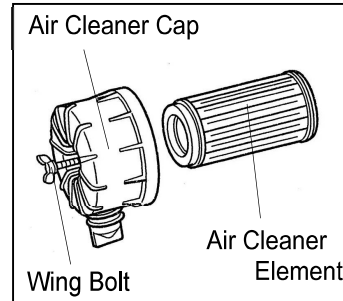
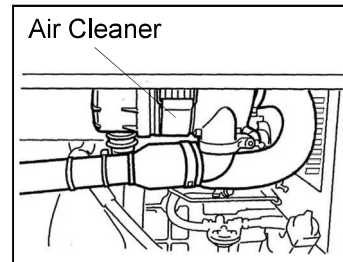
Cleaning	1st time: 50th hour / 2nd time and after: Every 100 hours
Replacement	Every 400 hours

- 1) Loosen the wing bolt to remove the cleaner cap.
- 2) Clean or replace the air element.
 <If dry dust is adhering>
 Spray compressed air from within the element.
 <If carbon or oily substance is adhering>
 Replace with a new part.

- 3) Install in the reverse order of removal.

<Note>

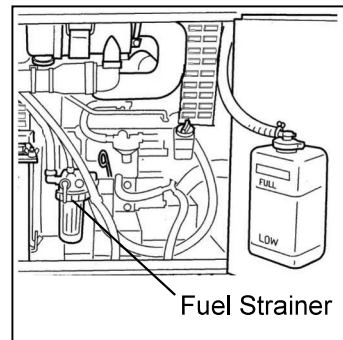
- Clean sooner than scheduled if using the equipment in a dusty location.
- Element part no. : 67980-82632 (Kubota part no.)



(4) Cleaning/Replacing the Fuel Strainer

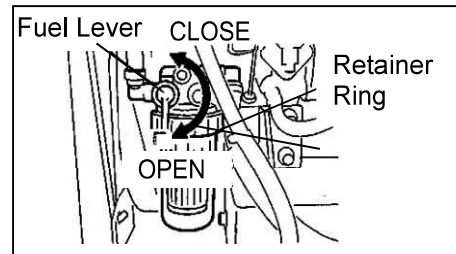
Cleaning	1st time: 50th hour / 2nd time and after: Every 100 hours
Replacement	Every 400 hours

- 1) Turn the fuel lever to "CLOSE".
- 2) Turn the retainer ring counter clockwise and remove the cup and element.
- 3) Remove any water or foreign material from the cup and clean the element using compressed air. (Or replace the element.)
- 4) Install in the reverse order of removal.



<Note>

- Check that no foreign material is adhering to the packing then install the cup.
- After installation, turn the fuel lever to "OPEN" and check that there is no fuel leakage. After checking, turn the fuel lever to "CLOSE".
- Element part no. : 16271-43561 (Kubota part no.)



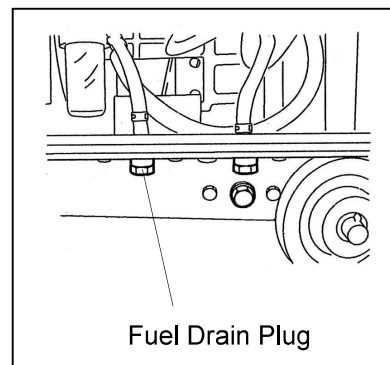
(5) Draining Water from the Fuel Tank

Draining Water	Every 200 hours
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- 1) Remove the fuel drain plug.
- 2) Drain the water and tighten the fuel drain plug.

<Note>

- Replace the packing with a new part each time you drain the water.
- Packing part no. : 6C090-58961(Kubota part no.)
- Always be sure to check that there is no fuel leakage after tightening the fuel drain plug.



(6) Changing the Cooling Water

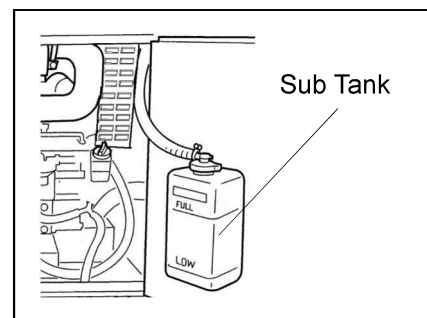
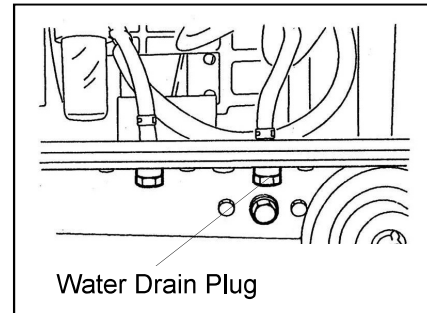
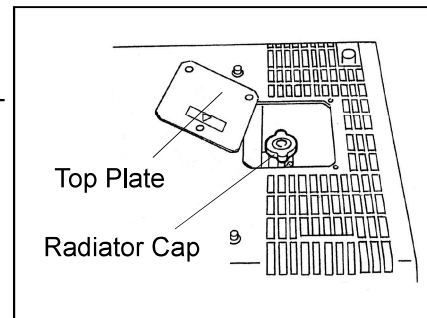
Change	Every 2,000 hours or 1 year
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Cooling Water Total Capacity: Approximately 2.8 L
(Including the sub tank capacity of approx. 0.6 L)

- 1) Remove the top plate.
- 2) Remove the radiator cap.
- 3) Remove the water drain plug.
- 4) Drain the cooling water and tighten the water drain plug.
- 5) Change the cooling water in the sub tank.
- 6) Pour cooling water into the water inlet until it reaches the mouth of the port.
- 7) Tighten the radiator cap.
- 8) Re-install the top plate.

<Note>

- Replace the packing with a new part each time you change the cooling water.
- Packing part no. : 6C090-58961(Kubota part no.)
- Operate the engine for a short period and check that there is no cooling water leakage. Stop the engine when completed.



13. Long-Term Storage

Warning: Electric Shock/Injury

- Always be sure to stop the engine before performing any equipment check or maintenance.
- Do not operate the equipment with any doors or covers open. There is a danger of hair, body parts and other items being caught up in moving parts such as cooling fans and belts.

Warning: Fire

- Always be sure to stop the engine when inspecting fuel or refueling, and absolutely never perform such tasks near fire or other open flames or sparks. Wait until the engine has completely cooled before inspecting fuel or refueling.
- Always be sure to wipe away any spilled fuel or oil.

Caution: Burn

- The engine, muffler and similar parts are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.
- Always be sure to stop the engine and allow it to cool before inspecting or changing the engine oil. Opening the oil gauge or oil plug during operation will result in hot oil spurting out.

Perform the following maintenance procedures if not using the equipment for two months or more.

- 1) Remove the battery. (Refer to section "7-5. Battery Inspection".)
- 2) Change the engine oil. (Refer to section "12.(1) Changing the Engine Oil".)
- 3) Drain the fuel from the fuel tank and strainer.
(Refer to section "12.(4) Cleaning/Replacing the Fuel Strainer".)
- 4) Clean all parts and store the equipment in an area with low humidity and little dust with a cover or similar protection covering it.

<Note>

- Recharge a removed battery approximately once every month.

14. Troubleshooting

Warning: Electric Shock/Injury

- Always be sure to stop the engine before performing any equipment check or maintenance.
- Do not touch the equipment during operation if the equipment or your body is wet.
- Do not operate the equipment with any doors or covers open. There is a danger of hair, body parts and other items being caught up in moving parts such as cooling fans and belts.

Warning: Fire

- This equipment uses diesel fuel. Always be sure to stop the engine when inspecting fuel or refueling, and absolutely never perform such tasks near fire or other open flames or sparks. Wait until the engine has completely cooled before inspecting fuel or refueling.
- Always be sure to wipe away any spilled fuel or oil.
- Absolutely never use the equipment if there is a fuel, oil or cooling water leak, and be sure to always repair the leak before using.
- Absolutely never inspect or perform maintenance to the equipment near fire or other open flames or sparks.

Warning: Injury to Eyes and Skin

- Use protective gear, such as rubber gloves, when inspecting or replacing the battery due to the dilute sulfuric acid in the battery fluid. Be sure that fluid does not contact eyes, or on skin or clothing.
- If battery fluid gets into the eyes, or on the skin or clothing, immediately wash with a large amount of water, and always be especially sure to seek medical attention if it gets into the eyes.

Warning: Explosion

- Do not operate the equipment or recharge the battery when the battery fluid level is below the lower level.
- Do not generate any sparks near the battery and do not allow any fire or other open flames near the equipment because the battery generates ignitable gas.

Caution: Burn

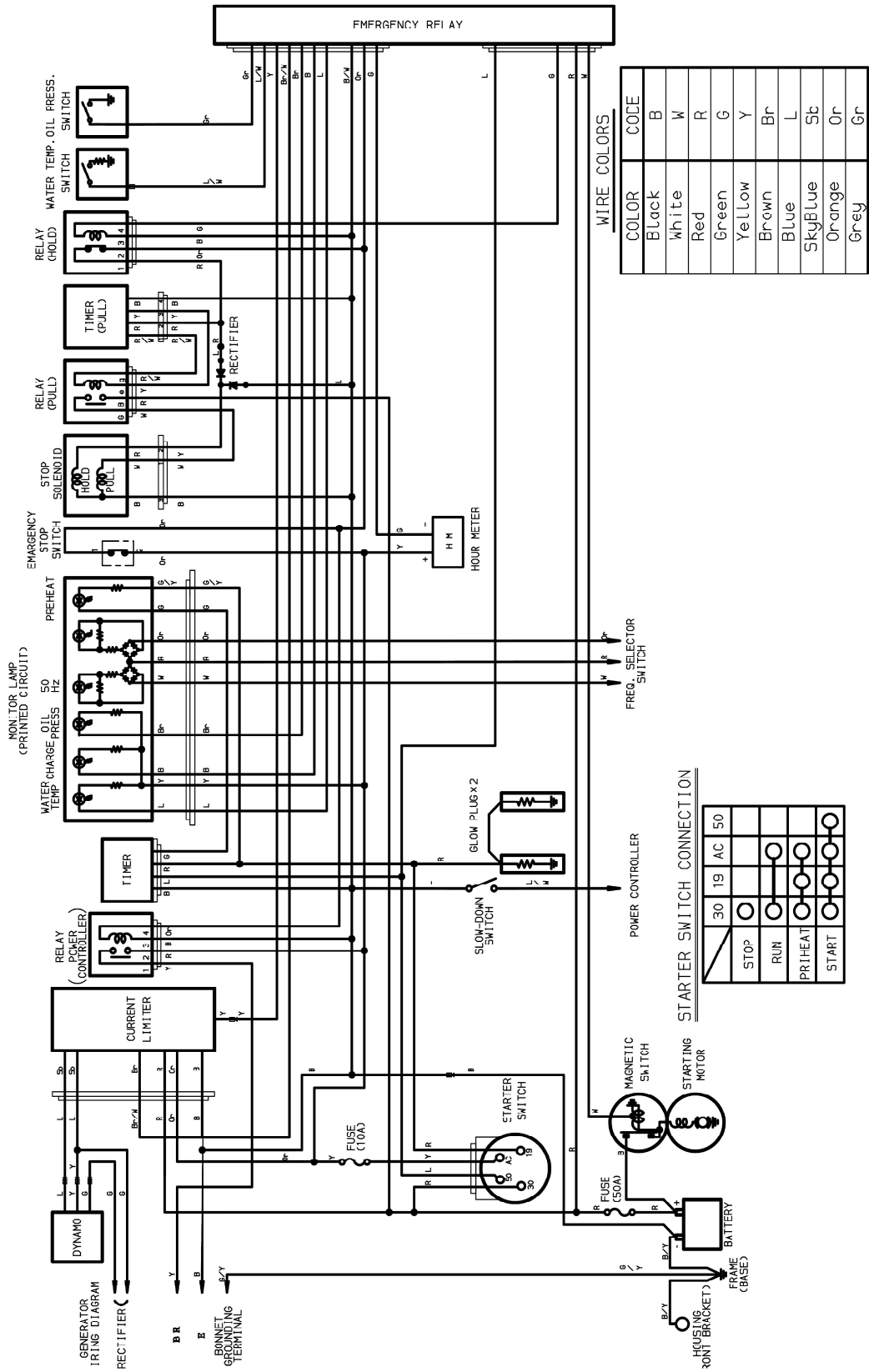
- The engine, muffler and similar parts are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.
- Never open the radiator cap during operation or immediately after stopping the equipment. Hot cooling water and steam will spurt out. Always be sure to stop the engine before performing any equipment check or maintenance.
- Always be sure to stop the engine and allow it to cool before inspecting or changing the engine oil. Opening the oil gauge or oil plug during operation will result in hot oil spurting out.

Refer to the table below to perform inspection when the equipment is operating poorly. If you cannot resolve a problem after inspecting the equipment, request repair at the retail outlet where the equipment was purchased.

Symptoms	Possible Cause	Corrective Actions
Starter motor does not turn	<ol style="list-style-type: none"> 1. Battery has a low charge. 2. Battery is deteriorated. 	<ol style="list-style-type: none"> 1. Recharge the battery. 2. Replace the battery.
Engine does not start	<ol style="list-style-type: none"> 1. Fuel lever is "CLOSE". 2. Emergency stop switch is "ON". 3. No fuel. 4. Water or foreign material is mixed in with the fuel. 5. Blown fuse. 	<ol style="list-style-type: none"> 1. Turn the fuel lever to "OPEN". 2. Release the emergency stop switch. 3. Add fuel. 4. Drain water from and clean the fuel tank and fuel strainer. 5. Replace the fuse.
Engine starts but quickly stops.	<ol style="list-style-type: none"> 1. Insufficient oil. 2. Overheating of water temperature. 3. Battery recharging fault. 	<ol style="list-style-type: none"> 1. Add oil. 2. Comply with rated outputs/Add cooling water. 3. Repair.
Black or white smoke is continuously exhausted from the muffler.	<ol style="list-style-type: none"> 1. Overloaded. 	<ol style="list-style-type: none"> 1. Comply with the rated outputs.
Engine does not stop.	<ol style="list-style-type: none"> 1. Stop solenoid fault. 	<ol style="list-style-type: none"> 1. Turn the fuel lever to "CLOSE" to stop the engine.
Weak welding arc	<ol style="list-style-type: none"> 1. Wrong welding current dial position. 2. Faulty cable connection. 3. Improper cable. (excessively thin) 4. Faulty connection with base material. 5. Using simultaneously as AC power source. 6. Welding cable short circuit. 	<ol style="list-style-type: none"> 1. Turn the dial clockwise. 2. Faulty cable connection. 3. Improper cable. (excessively thin) 4. Faulty connection with base material. 5. Using simultaneously as AC power source. 6. Welding cable short circuit.
Strong welding arc	<ol style="list-style-type: none"> 1. Wrong welding current dial position. 	<ol style="list-style-type: none"> 1. Turn the dial counterclockwise.
No AC power output	<ol style="list-style-type: none"> 1. Breaker is "OFF". 	<ol style="list-style-type: none"> 1. Turn the breaker to "ON".
AC power output is weak.	<ol style="list-style-type: none"> 1. The current of devices using the equipment exceed the rated current. 2. Using simultaneously for welding. 	<ol style="list-style-type: none"> 1. Refer to "Usable Device Capacities". 2. Stop welding.
Engine cannot obtain high speed.	<ol style="list-style-type: none"> 1. Current of device using the equipment as AC power source is 0.5A or less. 	<ol style="list-style-type: none"> 1. Set the idle control switch to "HIGH".

15. Engine Wiring Diagram

ENGINE WIRING DIAGRAM



MEMO

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