Instruction Manual & Parts List

Multi-Voltage Generator

Model: PowerMaker 15MVK



Caution: Do not attempt to operate this machine until you have read and understood completely ALL instructions and guidelines contained. Keep this manual available at all times for operators and service engineers.

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Please use the machine with the following instructions

- This "INSTRUCTION MANUAL" gives a detailed description of operation, routine, inspection, maintenance and troubleshooting of the generator, and other items required for correct operation.
- Please read this manual carefully, especially the contents and caution symbols.
- While the generator is in its required place of operation, please keep the instruction manual in a place readily available to operators and service engineers
- For detailed operation and maintenance of the ENGINE, please refer to the "Engine Operation Manual", supplied by the engine manufacturer.

Your machine: Model No: Powermaker 15MVK

There may be a difference between the specification detailed in this manual and the actual performance of the machine due to modifications to the machine.

Symbol Mark in this Manual

- DANGER: Indicates an imminently 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 or property-damage.
 - (Notice): Notice is used to notify people of installation operation, maintenance information which is important but not hazard-related.



Safety Precautions

DANGER: ENSURE GOOD VENTILATION

Exhaust from the engine contains substances harmful to the human body. Sufficient change of air is necessary when the machine is used in places with poor ventilation, such as in a tunnel or indoors. Do not direct exhaust to passers by or houses.

DANGER: FIRE PREVENTION

Fuel and oil are inflammable. Keep inflammable material away from the machine, never smoke while refuelling and never refuel during its operation.

DANGER:

AVOID ELECTRIC SHOCKS

Do not touch the output terminals during operation. This is extremely dangerous when your hands are wet. Stop the machine when you touch the terminals for connection and other purposes.

DANGER:

NO CONNECTION TO DOMESTIC WIRING

Connecting to domestic wiring is illegal and very dangerous because it may cause electric shocks and damage to the generator.

DANGER:

CONFIRM CONNECTION

Damaged cables and insufficient tightening of connections may cause damage to the machines and electric shocks. Repair damaged cables and ensure connections are tight.











Safety Precautions - Continued

CAUTION: DURING OPERATION

Do not open any of the following items while the generator is running and immediately after the generator has stopped.

1. Radiator Cap

Only perform these checks when the engine is cold to avoid injury. Do not at anytime, when the engine is still hot, remove the radiator cap. Opening the radiator cap when the engine is hot will result in boiling water gushing out of the radiator which will scald people nearby.



2. Cooling Water Drain Plug

Opening the cooling water drain plug when the engine is hot will result in boiling water gushing out of the engine which will scald nearby people.

3. Engine Oil Drain Plug

Opening the engine oil drain plug when the engine is still hot will result in burning oil gushing out of the engine which will scald nearby people.

4. Do not touch while operating the generating set, the engine cooling fan or any other places of high temperatures like, the exhaust pipe, engine and radiator. Even when the machine is stopped, take care that the machine has cooled down enough before touching the engine and other components.

CAUTION:

Battery

As the battery contains combustible gas, take extreme care in handling the battery. If you are careless, like dropping the battery, there is a risk that the battery might explode. In carrying out maintenance or inspection check, recharging and using booster cables, extreme care should be taken to ensure safety.

CAUTION:

Strictly prohibited

Do not expose the battery to naked flames, sparks, cigarettes, and anything else flammable, as the battery contains flammable liquid and gas.

CAUTION:

There is a risk of explosion if you do not charge the battery as there will be a build up of combustible gas. The recharging process and handling of the battery should be done in an area that is exposed to an air current, to avoid the risk of a dangerous concentration combustible gas.

CAUTION:

In case the battery liquid is (dilute sulphuric acid) happens to come into contact with clothing or skin, you must immediately rinse it out by using a lot of water. If the battery liquid comes into contact with your eyes, wash it out with lots of water and seek medical attention immediately.

1. Preparations

This machine has undergone stringent factory tests and inspections to ensure the machine performs in accordance with its specifications, before being shipped to the end user.

As with any piece of motorised machinery, excessive use of brand new machinery may shorten the life of the machine. Therefore, it is recommended for the initial 50 hours of machine usage, special care is required for this running in period.

Upon receipt of this machine, please perform a maintenance check of the machine BEFORE USE, so as to further insure there are no major malfunctions or damage to the machine that occurred during transit.

We recommend that the machine be placed upon a level surface, where there is not excessive dust or moisture.

1.1 When using the machine where there is inadequate ventilation, make sure the following care is taken:

DANGER:

Ensure good ventilation, exhaust from the engine contains substances harmful to the human body. Sufficient changes of air is necessary when the machine is used in places with poor ventilation, such as in a tunnel or indoors. Do not direct exhaust onto passers by or houses.

1.2 Caution in machine transporting.

CAUTION:

In cases where wheels are fixed to the generator, for better mobility, make sure blocks are used to stop the generator from moving when in operation and transporting the generator.

CAUTION:

When transporting, loading or unloading the machine you must use the balanced centre point lifting hook which is situated on the top panel of the machine.

lifting

CAUTION:

Caution should be taken in transporting the machine to and from sites. It is advisable when using the machine to use the balance centre point lifting hook. Trucks and the like should be used as a means of transportation. When loaded on a truck be sure to use the bar on the front and back of the machine, as means to affix the machine during transportation.

1. Preparations - Continued

1.3 Notice for Installation

(Notice)

Make sure the generator is placed on a secure and level surface. When using the generator on an inclined surface, the allowable inclination angle is up to 20 degrees.

(Notice)

Avoid using the generator in places of high humidity.

(Notice)

Avoid using the generator in places where surrounding temperature is likely to rise over 40 degrees Celsius.

(Notice)

Avoid using the generator in places where there is excessive dust, noxious gases and explosive gases.

(Notice)

Provide adequate space for machine inspection and maintenance.

(Notice)

Do not have obstacles within 1 metre from the machine otherwise the machine could overheat.

1.4 Caution During Operation

While operating the generator set, you should check the instruments on the control panel (e.g. frequency meter, voltmeter, ammeter, etc, to make sure the machine is working correctly), on a regular basis.

1.5 Battery

Correct maintenance of the battery is important to ensure smooth starting and long service life. Check the specific gravity, level of electrolyte and output voltage every 50 hours or once every month.

(Notice)

If the specific gravity is 1.28 (at 20°C) the battery is adequately charged. If the specific gravity is 1.245 or less, recharging is necessary.

(Notice)

The electrolyte must always cover the plates. If the plates are exposed to air for a long time, damage will result. Apply a thin coat of grease on the terminals, to ensure a good connection.



Place the machine horizontally



2. Instrument Names

2.1 Outline Drawing and name of instruments.

- 01. Control Panel.
- 02. Fuel level gauge.
- 03. Fuel tank inlet.
- 04. Lifting hook / lug
- 05. Door latch

06. Bar

- 07. Air intake
- 08. Exhaust
- 09. Ventilation
- 10. Fuel drain
- 11. AC Power output

Terminal (110V single phase)

- 11 AC Power output
 - (415/240V)
- 13. Radiator inlet.
- 14. Water Drain.
- 15. Oil drain.



Reference

Powermaker 15MVK

2.2 Name of Components

- 01. Alternator
- 02. Diesel Engine
- 03. Air Cleaner
- 04. Fuel Tank
- 05. Fuel Filter 06. Oil filler
- 07. Oil Filter 08. Oil dipstick
- 09. Radiator
- 10. Radiator Reserve Tank
- 11. Battery
- 12. Junction Terminal
- 13. Fuse



Reference Powermaker 15MVK

2. Instrument Names - Continued

2.3 Control panel and name of instrument

- 1. Circuit breaker (for 415V)
- 2. Circuit breaker (for 110V)
- 3. Frequency meter
- 4. A.C Ammeter
- 5. A.C Voltmeter
- 6. Indicator lamp unit (oil pressure water,battery charging and 240V)
- 7. Starter switch
- 8. Hour meter
- 9. Earth terminal for earth leakage relay.
- 10. AC Power output receptacle

(3-phase 415V 16A)

- 11. AC Power output receptacle (1-phase 110V 32A)
- 12. AC Power output receptacle (1-phase 240V 16A)

- 13. AC Power output receptacle (1-phase 240V 16A)
- 14. AC Power output receptacle (1-phase 110V 16A)
- 15. AC Power output receptacle
- 16. Circuit breaker (Miniature circuit 110V or breakers



3. Operating Procedures

The following checks before start up must be undertaken.

1. Oil Check

Be sure to check the oil before start up everyday. The oil level must be maintained between the two notches on the dipstick. Of the oil level is lower than the lower notch,

immediately replenish the oil, so that the oil level lies between the two notches on the dipstick. Do not overfill so that the oil level is greater than the upper notch as this may cause the oil seals to fail, causing an oil leak. When checking the oil level, be sure to check if the oil is clean and viscous. If the oil is not clean, drain the oil by removing the oil drain plug and then re-fit the oil plug and replenish the oil.

After a specified amount of the engine oil is supplied, run the engine for several minutes and then stop it to re-check the oil level again.

Standard

	15MVK
Engine oil Capacity	5.1L

(Notice): Use only high quality lubricating oil with classification CC and DC.

(Notice): Grades of lubricating oil (service classification) CA, CB, CC, CD - Diesel Engine classification.

(Notice): Selection of engine oil viscosity. Use oil viscosity most suitable to the temperature under which the machine is used. For example, SAE30 (oil for summertime use). SAE20 (oil for wintertime use) and SAE10W-30 (oil for all season use).

2. Check the cooling water

In the checking and replenishing of the cooling water, make sure that the engine is cold. Check that the reserve water tank (sub tank), water level is between the high (H) and low (L) lines of the level gauge. When the cooling water in the reserve tank is at a low level, immediately refill it. If the radiator level is low, it will automatically draw on the water from the reserve tank.

(Notice): When refilling the engines cooling water, be sure to use tap water. Do not use river or rain water as it may cause trouble for the engine cooling system.

3. Check the fan belt

Check the belt for tension, and elongation and adjust them as required. Concurrently, check that the belt has not been damaged and immediately replace it if any abnormality is noted on the belt. Perform the adjustment and replace as directed in the "Instruction Manual" provided by the engine manufacturer.

15MVK



Δ	Check	the	fuel
4.	CHECK	\ uie	IUEI

Fan belt Part No.

Check the fuel level by looking at the fuel gauge. If the level is low, refill the fuel tank.

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(Notice): Only use ASTM No 2 diesel fuel or heavy oil, which the engine manufacturer recommends. Do not use substitute oils and kerosene as the quality is unknown and the octane (cetane), number is low. Use JIS special No 3 diesel fuel for temperatures below -15°C.

From time to time, it is important to drain the fuel tank, as contaminants will build up at the bottom of the fuel tank. Unplug the fuel tank drain plug at the side of the generator base and re-plug the drain to refill with a fresh supply of diesel fuel. (Notice): The fuel inlet area has a drain hole for overflow of fuel and rain. When refuelling, be sure to remove dust, mud, etc. that will build up around the fuel inlet. If it is not done, the fuel will choke up and there is a greater chance of contaminants entering the fuel tank.



DANGER: FIRE PREVENTION

Fuel and oil are inflammable. Keep inflammable material away from the machine, never smoke while refuelling and never refuel during operation.

5. Battery Check

Always ensure the level of battery fluid is maintained above the low level mark. If the battery fluid is low, distilled water should be immediately supplied to the battery. **(Notice):** Do not refill the battery over the upper level mark. Always remember to tighten the battery cap correctly after refilling the battery.

6. Battery Cable Connection

Make sure the battery cables are properly connected to battery terminal (+) and (-).

(Notice): If the cable is connected incorrectly, damage to the electrical parts will result in a short period.

• Always check or connect the battery cable connection when the starter key switch is in the off position.



(Notice): Do not connect the cables to the battery when the starter switch is "ON", because, electric sparks will be produced. They may injure the operator and cause damage to the machines electrical components.

(Notice) It is recommended that a thin film of grease be applied to the battery terminals to ensure a good connection and the prevention of corrosion of the battery terminals. An insufficient or poor connection may cause poor starting of the machine and other malfunctions to occur.

7. Fuel Filter Cock

Turn the fuel filter cock lever from the close position to the open position.

8. Check the Wiring

Inspect the wiring to ensure that all wire connections are not loose and that no wires are worn out. If any worn out or damaged wires or connections are noticed, either repair it or replace it immediately.

9. Check the Piping and Hose Connections

Check that all piping and hose connections are not loose. If these connections are loose and not rectified, oil leakages and cooling water leakages may occur during operation. Make sure all connections are rectified.

Check that all hoses are not worn out. If a hose is found to be worn out or damaged, repair or replace it immediately.



3.1 Starting and Operating

Before starting the machine, the pre-starting safety checks must be completed. In addition, do a general survey of the area surrounding the machine making sure the area is safe, air vents of the machine are not blocked and the exhaust can be freely discharged.

The machine can be started, once the people around the machine have been notified that it is going to be used.

(Notice): In cold operating conditions, use suitable cooling water and lubricating oil for improved starting conditions and prevention of any troubles. The battery must always be maintained at full charging level.

- 1) Insert the key into the "starter switch" and turn it to the "Run" position. When the key is on the "Run" position, the indicator lamp will come on.
- 2) Once the indicator lamp goes off, turn the key to the "Start" position to start the engine. As soon as the engine starts, release the key whereby the key will automatically return to the "Run" position.
- 3) After the engine starts, let the machine idle for 5~10 minutes to warm-up

(Notice): After the engine started check to see if the oil pressure lamp and battery charging lamp are off. If one of these lamps are on, check the machine after the engine is turned off. (Refer to the Operation Manual for details.) (Notice): While the engine is operating, do not switch the starter switch on. Note, if the engine does not start within 10 seconds after the key is turned to the "Start" position wait for at least 30 seconds and repeat the starting procedure again.



4) When the idling period has finished, make sure the engine speed is under NO LOAD OPERATION mentioned below.

50 Hz approx. 52.0 (3120 rpm)	FREQUENCY	NO-LOAD OPERATION
	50 Hz	approx. 52.0 (3120 rpm)

During the winter or when the surrounding air temperature is cold, in situations where a load start is required, turn the key to the "Run-pre-heat position", you must wait until the engine indicator lamp goes off.

(Notice): After the engine has started, if you continue to hold the key in the start position damage will be caused to the starter. The key switch must be turned to the "Run" position within 10 seconds of starting the engine. In situations where the sound of the engine turning over cannot be heard to start the machine, repeat the starting procedure from the beginning in accordance with the Operational Manual, after about 30 seconds.

If the machine fails to start despite repeating the starting procedure, there is obviously a problem with the machine. Therefore a thorough check is required (e.g. fuel has run out, forgetting to turn the fuel cock to the open position, excessive air in the fuel system and battery leakage.)

- 5) Carefully check the engine for abnormal vibration (noise), oil leakage, fuel leakage, cooling water leakage and air leakage. If the machine is operating normally, set the "circuit breaker" to the ON position in order to supply electricity to the load.
- (Notice): While the machine is operating do not have any obstacles within one meter radius from the machine. Obstacles within this area, may cause the machine to overheat.



(Notice): Do not have any of the doors of the machine open while

operating. The main problem with leaving the doors of the machine open during operating, are the effect on the internal air flow of the machine and alien sub stances (e.g. dust and dirt) will be drawn into the machine.

- (Note): How to use the automatic air vent device. When the engine stops due to running out of fuel, changing the fuel filter or fuel piping and restart the machine in accordance with the following instructions.
 - (A) Refuel the fuel tank and open the fuel filter cock.
 - (B) Turn the starter switch to the start position whereby when the engine starter turns over, the automatic air vent device will expel the air inside the fuel system.
 - (C) After 10 to 20 seconds of turning the engine over, the automatic air vent devices would have expelled all the air out of the fuel system. At this point, the engine will be able to start.

3.2 Stopping the engine

- (1) Ensure Circuit breaker are in the OFF position.
- (2) Turn the key to the "Off" position.
- (3) Remove the key out of the starter switch. Make sure when the machine is not being used, that the key is kept safe.
- (4) Turn the fuel filter cock to the "Close" position.
- (5) Disconnect the wiring and plug(s) from the AC power connections.
- (6) Make sure the generator is not exposed to moisture. It is important the generator is kept dry when not in use.
- (7) To keep the generator in good working order, do not leave the generator exposed to the elements. When the generator is not being used, cover it using a sheet .



(Notice): In the unlikely occurrence of the engine not stopping when the key is turned to the "Off" position, there is a way of stopping the generator. Please refer to the following diagram and explanation.
In order to stop the machine in this situation, you must turn the fuel filter cock to the "closed" position. Closing the fuel filter cock cuts the supply of fuel to the engine and the engine will take a few minutes to stop. This should only be done in case of an emergency.

3.3 Operating Precautions

(1) Always read the meters and lamps on the control panel

 While the generating set is still running, periodically check the readings of the meters on the control panel. Specifically, check that these meters show the machine is running correctly or not and the alarm lamps are on or not.



• When the machine is running correctly the alarm lamps will show the following.

Generator load	Rated load	No load
Alarm lamp Reading	All Off	All Off

(Notice): If any of the alarm lamps are illuminated or the meters show abnormal readings while operating the machine, immediately stop the engine. Proceed to check and inspect the source of the problem.

(2) Hour meter

- Hour meter will always be working as soon as the engine is turned on.
- Use the "Hour Meter" to plan maintenance for the generator.

(3) Others

While the generator is running check the following:

(Notice): Make a periodic check of the exhaust discharge, which will make the operator aware of any abnormalities in the exhaust discharge.

(Notice): Check for leakage's of lubricant oil, fuel, cooling water and exhaust gases.

- (Notice): Be aware of the noise produced by the machine. If any strange noises/sounds are noticed there may be a problem.
- (Notice): If any abnormalities are noted, immediately stop the machine and investigate the cause of the abnormality.

3.4 Emergency stop devices.

The generating set is equipped with the following "Emergency Stop" devices.

• When one of the emergency stop devices is activated, the engine will stop automatically and the control panel will indicate where the problem is. The operator must turn the starter switch to "stop" position and then proceed to check and repair the problem area of the machine.

	ACTIVATED DEVICE	REASONS FOR ENGINE STOPPING
	Charging Alarm Lamp	Battery uncharged, loose battery connections, fan belt loose or broken.
EMERGENCY STOP DEVICE	Engine oil pressure switch.	If the engine oil pressure is abnormally low, engine is stopped (below 0.5kg/cm2) This indicates there is a shortage of oil.
	Engine water temperature switch	Engine is stopped, when the cooling water temperature is abnormally high over (110 °C). This indicates the radiator is overheating or there is a blockage.
	Door Switches	Side door open or front bottom end panel removed or badly fitted .

FUSE

The engine wiring system has its own fuse. If this fuse has blown, check the wiring to determine if there are any problems.

If there are no apparent problems with the wiring, check to see if there are any alien substances in the wiring system.

Repair any problems found in accordance with the engine Manufacturer's Operation Manual. After the problem is fixed, replace the blown fuse.

(Notice): If the engine does not stop despite a blown fuse or another malfunction (with the starter switch in the "OFF" position), turn the fuel filter cock to the close position and the engine will stop.

3.5 Engine stop switch

- **1.** The engine will not start when the side door is open or the front bottom cover has been removed.
- **2.** The engine will stop if the side door is opened during operation or the front bottom end cover is removed.

(Notice): The above actuation is cancelled if the connector (4P) of accessories is inserted in to the connector located above the battery and beside the centre frame inside the side door.

If the side door is opened and the engine has stopped, close the door.

Then re-start the engine after returning the starter key to the "stop" position.

4. Operation of the Generator

4.1 AC Power

This machine is equipped with single phase and three phases output generating capabilities.

(Notice): In connecting a load, make sure the correct size of cable and plugs are used on the appropriate output terminal. When connecting cables direct to the terminal board you must tighten the terminal bolts correctly.



DANGER: Confirm connection

Damaged cables and insufficient tightening of connection screws may cause damage to the machine and electric shocks. Repair damaged cables and ensure connections are tight.

- 1. Take extreme care when connecting induction motor powered machines that are susceptible to frequency.
- **2.** Do not connect and disconnect the terminal connections of a load as a means of turning the supplied AC power on and off for a particular load.
- 3. When connecting a load to the generator, the circuit breaker must be turned "OFF". Never connect a load with the circuit breaker ON, as it will cause the operator a serious electric shock and also cause possible damage to the generator set.

DANGER: AVOID ELECTRIC SHOCKS

Do not touch output terminals during operation. This is extremely dangerous when your hands are wet. Stop the machine before you touch the terminals for connection and other purposes.



(Notice): Be careful not to overload the generator. As soon as the machine is

overloaded the circuit breaker will trip and the machines output will be immediately cut off. If you want to use the machine for simultaneous 3-phase and single phase output, make sure that the sum total of the load does not exceed the rated load.



4. Do not connect the AC Power output of the generator with commercially available power supplies. Therefore, you must ensure that the generator's output will not come into contact with commercially available power supplies.

DANGER: NO CONNECTION TO DOMESTIC WIRING

Connection to domestic wiring is illegal and very dangerous because it may cause electric shocks and damage to the generator.

5. The following diagrams illustrate how to connect 1-phase and Single-phase loads to the generators output terminal.



1-Phase 3-Wire Output Terminal 50Hz



V 1- Phase Load Use U-V for 110V

6. The following diagrams illustrate how to connect 3-phase and single-phase loads to the generators output terminal.

U	V	W	0
0	0	0	0

3-Phase 4-Wire Output Terminal 50Hz

U	V	W	0
0	0	0	0

3- Phase Load Use U-V-W for 415V

U	V	W	0
0	0	0	0

Single Phase Load Use O-U, O-V, O-W for 240V

U	V	W	0
0	0	0	ο

Single Phase Load U-V, V-W, W-U for 415V

4.2 Earth Leakage Relay

(1) General Description

- The machine is equipped with an earth leakage relay which has a current adjustable sensitivity from 30mA to 1000mA and adjustable time setting from 00.04 sec to 2 sec. The purpose of the relay is to detect any current leakage due to insulation failure. When the earth leakage relay detects a current leakage, it will automatically trip the circuit breaker, thereby shutting down the output to the terminal, in order to guard against the possibility of electric shock.
- It is more important to ensure that the load is properly connected to the generator rather than being careless and risk the possibility of current leakage and other problems. We urge the users of this generator to read this Operation Manual thoroughly.

- When the earth leakage relay is activated, the operator should immediately locate the leakage and repair it. Once the repairs have been completed, you should press the reset button on the earth leakage relay or stop the engine and then turn the circuit breaker on again. It is recommended that the correct current values and tripping times are selected for the appropriate load prior to starting the machine
- (2) The generator is provided with the earth leakage relay to prevent operators from any electrical shocks by detecting an earth leakage cause by insufficient insulation or broken cable etc.

The earth leakage relay detects any earth leakage that may occur on the 3-phase output. If any leakage is detected this would automatically cause the relay to activate.

The current values and the tripping times are adjustable as shown on tables 1 and 2.

(Notice): The 110V adjustable single phase output is covered with its own earth leakage relay which is not adjustable

If the current values and tripping settings are made incorrectly, it can be more dangerous than not having an earth leakage relay at all.

IMPORTANT NOTICE :

IT IS VERY IMPORTANT THAT ANY ADJUSTMENT TO THE CURRENT OR TIME SETTING FROM THE FACTORY SETTINGS IS ONLY CARRIED OUT BY A FULLY QUALIFIED ELECTRICAL ENGINEER.

The earth leakage relay has adjustable current and tripping times which are illustrated in the following charts 1 & 2 by changing switch modes, the correct current and tripping times can be selected.

Table 1 setting of the related current

1 (Notice): This mode (switch 1 at "ON") is given precedence to other switches 2 ~ 8.

Set	Slide switch mode				
current	switch	1	2	3	4
30mA 0.04 sec. Or less	O N OFF		*	1	
100mA	O N OFF				
200mA	O N OFF				
500mA	O N OFF				
1000mA	O N OFF				

Table 2: Setting of the tripping time

Set time		Slide s			
	Switch	5	6	7	8
0.04 sec. Or less	O N OFF				
0.3 sec. (0.2~ 0.36)	O N OFF				
0.5 sec. (0.4 ~ 0.6)	O N OFF				
1 sec. (0.8 ~ 1.2)	O N OFF				
2 sec. (1.3 ~ 2)	O N OFF				

How to change the settings:

the

1. Remove the transparent cover. The cover can be removed by putting the tip of a screwdriver in a cover notch and slightly pushing up the cover until the hook is released.

2. Referring to tables 1& 2, set the slide switch positions according to desired rated sensitivity current/operating time.

Using a small screwdriver will facilitate you to move

switch knobs to the ON or OFF position.

! CAUTION: Halfway position or improper setting of the switches will disable the relay to operate satisfactory. Be sure to set the switches according to the tables 1 & 2.



(3) How to Use and Test the Earth Leakage Relay

The following descriptions allow you to make sure the earth leakage relay is functioning correctly.

- (1) Perform a periodic check on the earth leakage relay to ensure it is operating correctly, in accordance with the following instructions
 - Start the engine. Note that the indicator lamp (green colour) on the leakage is on.
 - Turn the circuit breaker on
 - Press the "Test" button (red colour) on the earth leakage relay. If this causes the leakage lamp to turn red, which activates the leakage relay and trips the circuit breaker, the leakage relay is operating correctly
 - Press the reset button on the earth leakage relay and return the circuit breaker to the off position temporarily. This allows the circuit breaker to be turned on again.
- (Notice): The leakage relay once activated will hold its activation state until the reset button is pressed or the starter switch is turned to the off position.
- (2) Grounding the Generator
 - To ground the generator, the grounding rod supplied with the generator should be connected to the grounding terminal on the control panel. The grounding rod should be placed into the ground as per illustration.
- **! CAUTION:** If the generator set is not grounded, the earth leakage relay will not operate. The grounding resistance should be less that 500 ohms and the current sensitivity of the earth leakage relay is 30mA. The grounding of the generator should be done in accordance with the applicable electrical standards that are in force. In addition, ground the generator case by connecting a grounding conductor to the case grounding terminal provided on the control panel.
 - (3) Grounding the Load Equipment
 - As with the generator, the load equipment should be grounded.

5. Lubricating Oil, Cooling Water and Fuel

5.1 Engine Oil



- The lubricating oil used influences engine performance, starting characteristics and ultimately the life of the engine. We recommend that an appropriate, good quality lubricating oil be used.
 - 1. We recommend that "CC class" lubricating oil be used (API service grade)
 - 2. We recommend the use of SAE 10W-30 all season type of engine oil viscosity. The viscosity of the oil to be used is dependant on the external temperatures. Refer to the above mentioned list

(Notice):

Do not pour in different kinds of oil as it will change the oil quality, which will have a detrimental effect on engine performance. If you want to add a different type of oil, you must first drain the oil already in the engine completely. **3.** The total oil change capacity is 5.1L (15MVK).

5.2 Engine Cooling Water

- 1) Use soft water for cooling water. For example, tap water that is of good quality can be used.
- 2) If the generator is to be used in cold areas, especially where there is risk of freezing, long-life anti-freeze coolant (LLC) should be used.

(When delivered ex-factory, the radiator coolant water consists of 30% long life coolant)

(Notice):

The recommended ratio of LLC to be used is between 30%-40% range. (Notice):

The following is recommended of LLC to be used for below mentioned temperatures:

- 30%: down to -15°C
- 35%: down to -20°C
- 45%: down to -30°C

5. Lubricating Oil, Cooling Water and Fuel - Continued

(Notice):

The LLC should be changed at least every 2 years.

- 3) The total cooling water capacity is 2.2L
- (This does not include the cooling water reserve tank)
- A) For the proper use of LLC, carefully follow the instructions given by the LLC manufacturer.
- **B)** During cold periods and LLC is not used, the cooling water should be drained, including the reserve tank cooling water before adding in the LLC at the appropriate ratio in relation to the prevailing temperatures.

5.3 Fuel

(1) Use ASTM No.2 diesel fuel only.

(Notice):

If fuel, other than the fuel that is recommended is used, it will cause poor engine performance, reduce engine life and could cause possible engine problems.

(2) Use only JIS No.3 diesel fuel or JIS special No.3 diesel fuel.

-JIS No.2 Diesel fuel	: down to –5°C
-JIS No.3 Diesel fuel	: down to –15°C
-JIS Special No.3 Diesel Fuel	: down to –25°C

6. Maintenance

6.1 Maintenance for the Initial 50 hours

1) Oil Change

An oil change must be done after the initial 50 hours of operation. Thereafter, an oil change is required for each 200 hours of operation.

- (a) To change the engine oil take out the engine oil drain plug and wait until all the old oil has been drained.
 Note: the easiest time to drain the oil is when the engine is warm (not hot) because the oil will be in its most fluid state.
- (b) Once the old oil has been completely drained refit the oil drain plug. Now you can pour in the new oil through the oil filter and continue to pour in the oil until the correct level is reached. (Refer to section 3-1 (1) for the appropriate instructions).
- 2) After the oil change has been completed, start the engine and run it for a while. While the engine is running check to see if there are any oil leaks. Stop the engine after this check has been carried out. About 10-20 minutes after the engine has been stopped, re-check the oil level. If the oil level is below the two notches on the dipstick, refill until the correct level is indicated on the dipstick. (Note: do NOT overfill the oil tank.)
- 3) Changing the oil engine filter
 - a) Remove the cartridge (oil filter) using the filter wrench.
 - b) Insert the new cartridge.
 - c) Screw in the new cartridge by hand. Once the gasket comes into contact the face of the seal, tighten the cartridge 1 1/4 turns using the filter wrench.
 - d) Run the engine for a while and check to see if there are any oil leakages.

Change the oil filter Cartridge : Part No 06020 41174

6.2 Maintenance Check every 100 hours of Operation

Clean the fuel filter element

- (a) Turn the fuel filter cock to the closed position. Remove the ring screw and take out the filter cup and element.
- (b) Rinse the element using diesel fuel and also, clean the inside of the filter cup using diesel fuel.
- (c) After cleaning , fit the fuel filter back in to its original position. Make sure when the fuel filter is being refitted that it is not dirty.
- (1) Cleaning the air cleaner element

< The air filter needs to be cleaned particularly if it has trapped a lot of dust and dirt >

- 1. Take the air element out. Clean the air element by passing an air current through the air element.
- 2. Make sure when refitting the air cleaner element to its proper position that you do so in a way that does not allow dust to enter into the cleaner.









6. Maintenance - Continued

(Notice):

After cleaning the air element, check to see whether there is any damage to the element. If there is any damage replace the damaged element with a new element.

6.3 Maintenance check every 200 hours of operation

(1)	Change the engine oil Lubricant capacity	5.1 L		
(2)	Change the oil filter Cartridge : Part No.	06020 41174		

6.4 Maintenance every 300 hours of operation

(1) Check the Battery Gravity

 Measure the battery gravity if there is a suspicion that battery leakage has occurred especially where there have been instances when the machine would not start. The relationship between battery gravity and battery charging at 20°C.

Battery Gravity	Battery Charging
Over 1.28	Over charged (Need Adjustment)
1.25 - 1.28	Optimal Charging
1.24 - 1.25	Average
below 1.24	Low Charged (Need Adjustment)

Note: In determining the specific gravity at a temperature other than 20°C use the following formula :

$$S20 = St + 0.0007(t - 20)$$

Where S20 : is the calculated specific gravity at 20° C. S t : is the measured specific gravity

t : is the battery solution temperature reading



6.5 Maintenance Check Every 400 Hours of Operation

- (1) Change the fuel filter element and the O-Ring
- (Notice): Change the fuel filter element as per the description contained in 6.2 (1). Including 'O' Ring.

Change the fuel filter Element Part No:	06020 42174

6.6 Maintenance Check Every 500 Hours of Operation.

 (1) Change the air element every 500 Hours or 2 years whichever comes first .
 (Follow the instructions in section 6.2 (2)) In situations where the generator has not been operated for 500 hours or more, as a

general rule, the air cleaner will need cleaning or replacing.



6. Maintenance - Continued

6.7 Maintenance Check Every 1000 Hours of Operation.

(1) Clean the inside of the fuel tank.

6.8 Other Checks and Maintenance

- (1) Change the nylon or rubber pipes. In cases where the nylon or rubber pipes have become hard, deterioration of the rubber has taken place, replace it. Normally, this needs to be done every 2000 hours or 3 years. Which ever comes first.
- (2) In cases where the acoustic material is extremely dirty (with oil for example) or is starting to look in poor condition, this material will need to be replaced

	Daily Check	50 hrs	100 hrs	200 brs	300 hrs	400 hrs	500 brs	1,000 brs	2,000 brs
1. Check for leakage of oil, water and fuel.	#	me	1110	1110	1110	1110	1110	1110	1110
2. Check for looseness of pipe connection and signs of wear.	#								
3. Check for looseness of wiring connections and signs of wear.	#								
4. Check the working order of each control panel instruments and alarm lamps.	#								
5. Check the Air cleaner is stuck or not.	#								
6. Clean the air cleaner element.			#						
7. Change the air cleaner element							+		
8. Check the engine oil level and the quality of engine oil	#								
9. Check the Radiator water level and quality of the water	#								
10. Check the fuel level	#								
11. Check the battery liquid level.									
12. Drain the water from the fuel tank (undo drain plug)	#								
13. Check the Tension of the fan belt	#								
14. Change the engine oil.		*		+					
15. Change the oil filter		*		+					
16. Clean the fuel element			#						
17. Change the fuel element							+		
18. Check the specific gravity of the battery						#			
19. Check the engine injection nozzle						#			
20. Measure engine compression pressure									+
21. Check the Valve clearance									+
22. Change the radiator water (If LLC is used)									+
23. Clean the radiator tank							#		
24. Clean the inside of the fuel tank.								#	

KEY : * - replace for 50 hour only. # -

check and / or clean.

+ - routine placement.

7. Troubleshooting

Check point No.

Eng	gine fails to start	
\rightarrow Sta	arter rotates	1, 2, 3, 4, 8
→ Sta	rter fails to rotate	5, 6, 8
Something wrong with engine		2, 3, 4, 8, 9
Insufficient output of engine		8, 10, 11
Engine suddenly stops during operation		1, 2, 3, 4, 7, 9, 11, 12, 13, 14

CHECK POINT

1.	No fuel. Fuel strainer is closed.
2.	Fuel pipe clogged or sucks in air.
3.	Water in fuel tank and in fuel system.
4.	Clogged fuel strainer.
5.	Battery cable disconnected.
6.	Inspect the battery electrolyte level and voltage.
7.	Check oil level.
8.	Use an oil with appropriate viscosity, especially in cold ambient temperatures.
9.	Clogged air cleaner.
10	Circuit breaker is turned OFF
11	Generating set is overloaded.
12	No water in the radiator or the water level is too low.
13	Fan belt is loosened or broken.
14	Generating set operates in enclosed or confined area where the free flow of cooling air is restricted.

8. Storage Of Machine

It is very important to carry out the prescribed maintenance and inspection in order to maximise the machine's useful life and performances.

- (1) Long term storage.
 For long term storage of the machine, the battery cable terminal () must be disconnected from the battery.
- (2) Inspection of the battery Solution Level. In situations where the battery solution level is low and it is below the required level, supply distilled water to the battery until the required level is reached.
- (3) Miscellaneous Checks
 Do routine checks for loose bolts, nuts and other fasteners. Always check for fuel, oil
 and cooling water leakage's. For the complete routine check refer to the engine
 manufacturers operation manual.







	Spec \ Model	15MVK
Ac Generator	Туре	Rotating - field, protection type synchronous gene.
3 - Phase	Frequency (Hz)	50
	Rated output (kVA)	15
	Rated Voltage (V)	415/240
	Rated Current (A)	20.9
	Number of Phases	3-phase 4-phase
	Power Factor	0.8
	Excitation	Brushless type (with AVR)
	Number of poles	2
	Speed (min -1 (rpm))	3000
	Insulation	Class F
1 - phase	Frequency (Hz)	50
	Rated output (kVA)	12.0
	Rated Voltage (V)	110
	Rated Current (A)	109.1
	Number of Phases	1 – phase 3 wires
	Power Factor	1.0
	Speed (min -1 (rpm))	3000
Engine	Model	KUBOTA D1005
	Туре	Vertical, water cooled, 4 cycle diesel
	No. Of Cylinders	3
	Bore x Stroke (mm)	76 x 73.5
	Total displacement (L)	1.001
	Rated output (KW(ps) /Min -1(rpm))	17.0 3000
	Battery	12V - 45Ah x 1 (55B24L)
	Fuel	DIESEL FUEL ASTM NO. or equivalent
	Fuel tank capacity (L)	Approx. 42
	Lubricant capacity (L)	5.1
	Coolant Capacity (L)	4.7
SET	Length (mm)	1520mm
	Width (mm)	720
	Height (mm)	770
	Dry Weight (kg)	Approx. 437

9. Major Specifications



10. Generator Wiring Diagram 15MVK



12. Outline Drawing 15MVK



No. NAUE

NAVE

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CENTER OF GLAVITY

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SPARE PARTS CATALOGUE 15MVK

How to use the parts list

- 1. This part list covers the parts for AC Generator model, Powermaker 15MVK.
- 2. When placing orders specify the following details:
 - a) Model number and serial number
 - b) Parts number and part name
 - c) Quantity required
- 3. The parts listed with serial numbers are new parts. Please place an order with us after confirmation of serial number for the machine at your site
- 4. The sequence of this parts list is by machine structure. Each group of parts has an illustration or the first page of the parts list. Parts can be identified on the parts list, using the item number on the illustration, item numbers are also shown on the left hand column in the parts list.
- 5. The parts number are shown as 10 digits.
- 6. The parts marked with an asterisk and the parts are not listed are not available as a single part, and orders must be placed for them as an assembly
- 7. Please check the specification of each unit such as frequency voltage, model No, etc before placing orders.
- 8. Left (L.H) and Right (R.H) used in this parts list, show the direction when you look at the engine from the generator side.
- 9. For engine parts not listed in this parts list, refer to KUBOTA DIESEL D1005 Engine Catalogue.
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Generator Set

Item No:	Part Names, Remarks
1	Generator Assembly Reference :P 40-43
2	Control Panel Assembly Reference :P 44-47
3	Engine Radiator Assembly Reference: P 50-53
4	Battery Assembly Reference :P 54-55
5	Muffler Reference :P 56-57
6	Fuel Tank Assembly Reference: P 58-61
7	Bonnet Assembly Reference: P 62-69
	Name plate Assembly Reference: P 70

Generator Assembly



Generator Assembly

Item No:	Part No:	Part Name:	Quantity
1	41100 00403	Rotor Assembly	1
1-1	06018 20037	Rectifier	1
1-2	06018 22638	Surge Absorber	1
1-3	00712 06307	Bearing	1
1-4	00800 00035	Snap ring	1
2	00124 10030	Hex. Head Bolt	4
3	41111 00103	Fan	1
4	00171 08025	Hex. Head Bolt	6
5	78113 15102	End Bracket	1
6	85113 41003	Armature Assembly	1
7	41530 00202	End Bracket	1
8	01370 00003	Field Assembly , exciter	1
9	00171 05035	Hex. Head Bolt	4
10	41534 00403	Grommet	2
11	41315 00004	Set Bolt	4
12	00400 12000	Spring Washer	4
13	00412 12000	Plain Washer	4
14	00300 12000	Hex.Nut	4
15	01313 00104	Cover	1
16	02269 00200	Rubber Seal	1
17	41853 00104	Bracket	1
18	00171 08035	Hex. Head Bolt	4
19	00123 10025	Hex. Head Bolt	8
20	41554 00104	Cover, fan	1

Generator Assembly - Continued



Generator Assembly - Continued

Item No.	Part No.	Part Name .	Quantity
21	00171 06040	Hex. Head Bolt	1
	00379 06000	Hex. Nut	1
22	41331 00703	Generator Foot	1
23	41331 00603	Generator Foot	1
24	00123 10025	Hex. Head Bolt	8
25	08050 83904	Rubber Suspension	2
26	02070 10000	Hex. Nut	2



Control Panel Assembly

Item No:	Part No:	Part Name:	Quantity
1	02250 02703	Control Panel	1
2	00218 06030	Machine Screw	4
3	06018 00455	Frequency Meter	1
4	06018 05749	AC Ammeter	1
5	06018 00285	AC Voltmeter	1
6	06018 09070	Circuit Breaker 22A	1
7	00210 04035	Machine Screw	4
	00400 04000	Spring Washer	4
	00421 04000	Plain Washer	4
8	06018 09217	Circuit Breaker 125A	1
9	00210 04060	Machine Screw	4
	00400 04000	Spring Washer	4
	00421 04000	Plain Washer	4
10	06018 10794	Cover	2
11	00290 05012	Machine Screw	8
12	06018 22446	Earth Leakage Relay 30mA	1
12-1	06018 02810	Zero-phase-sequence Current Transformer	1
13	76151 88504	Set Stay	2
14	00210 04110	Machine screw	2
	02070 04000	Hex. Nut	2
	00400 04000	Spring Washer	2
	00412 04000	Plain Washer	2
15	06018 10793	Cover	1
16	00290 04010	Machine Screw	4
17	00271 04010	Machine Screw	4
18	06018 06072	Circuit Breaker 30A	4
19	06018 06071	Circuit Breaker 15A	2
20	00271 03008	Machine Screw	12
21	06021 00077	Starter Switch	1



Control Panel Assembly - Continued

Item No.	Part No.	Part Name .	Quantity
22	06018 10523	Indicator Assembly	1
	06018 10830	Bulb	4
23	06021 25055	Fuel Gauge	1
24	06018 00682	Hour Meter	1
25	06018 15759	Terminal Board	1
26	00271 05025	Machine Screw	2
27	02686 00004	Resistor	1
28	00271 04012	Machine Screw	2
29	06018 23204	Rectifier	1
30	00271 03016	Machine Screw	1
31	06018 24525	Relay	4
32	00271 05016	Machine Screw	4
33	06022 02564	Controller	1
34	00271 05020	Machine Screw	1
35	06022 00475	Emergency Unit	1
36	00271 05025	Machine Screw	4
37	06018 12588	Receptacle 415V 32A	1
38	06018 12581	Receptacle 240V 32A	2
39	06018 12583	Receptacle 110V 32A	2
40	06018 12584	Receptacle 240V 16A	1
41	06018 12582	Receptacle 110V 16A	1
42	00271 05016	Machine Screw	28
43	06018 15109	Ground Terminal	1



Item No:	Part No:	Part Name:	Quantity
1	06018 15426	Terminal Board	1
2	00271 04025	Machine Screw	2
3	87018 60004	Set Board, output terminal	1
4	85018 67304	Set Board, output terminal	1
5	78118 61004	Output Terminal	7
6	08018 30604	Hex. Head Bolt	7
7	00400 08000	Spring Washer	21
8	00414 08000	Plain Washer	14
9	00412 08000	Plain Washer	7
10	00395 08000	Hex. Nut	7
11	00300 08000	Hex. Nut	7
12	00169 06025	Hex. Head Bolt	8
13	02626 00903	Bracket, electric parts	1
14	00169 06016	Hex. Head Bolt	3
15	06018 40085	Rheostat	1
16	06018 20660	Automatic Voltage Regulator	1
17	00271 05016	Machine Screw	4
18	87018 99004	Fuse Box	1
	87006 25004	Decal : Fuse Box	1
	06018 06642	Fuse 5A	4
	06018 06643	Fuse 15A	2
	06018 06644	Fuse 30A	2
19	00169 05016	Hex. Head Bolt	2
20	06018 31591	Switch	1
21	06018 50090	Stopper	1
22	00271 03016	Machine Screw	1
23	06018 06640	Fuse	1
24	02269 00165	Rubber Seal	1

Output Terminal Assembly

Engine and Radiator Assembly



Key No	Part No	Part Name	Quantity
1	09252 00254	Engine	1
	06020 11479	Fan Belt	1
1 - 1	06020 41174	Cartridge, oil filter	1
2	43052 00504	Engine Foot	2
3	00124 10025	Hex. Head Bolt	8
4	76054 19004	Rubber Suspension	2
5	02070 10000	Hex. Nut	2
6	06020 12730	Radiator	1
6 - 1	06020 11064	Radiator Cap	1
7	43121 00303	Bracket, Radiator	1
8	00169 06016	Hex. Head Bolt	3
9	63126 00304	Rubber Mount	2
10	00169 08020	Hex. Head Bolt	2
11	02203 00350	Rubber Seal	2
12	43125 00403	Radiator Hose	1
13	43125 01003	Radiator Hose	1
14	06055 15112	Hose Band	2
15	06055 15134	Hose Band	2
16	06020 46531	Air Cleaner	1
	06020 46611	Element, air cleaner	1
17	43752 00503	Band, air cleaner	1
18	00169 08030	Hex. Head Bolt	1
19	00169 06016	Hex. Head Bolt	2
20	43751 01303	Hose, air cleaner	1
21	43751 00703	Hose, air cleaner	1

Engine And Radiator Assembly

Engine and Radiator Assembly – Continued



Key No	Part No	Part Name	Quantity
22	06055 15139	Hose Band	1
23	06055 15027	Hose Band	2
24	15020 25103	Drain Joint, oil	1
25	16220 14103	Drain Joint, water	1
26	08020 11104	Plug	2
27	01500 00018	O Ring	2
28	00169 06016	Hex. Head Bolt	4
29	43221 00404	Drain Hose	1
30	06055 15073	Hose Band	1
31	06055 15158	Hose Band	1
32	01999 00850	Drain Hose	1
33	01999 00440	Drain Hose	1
34	06055 15094	Hose Band	4
35	08020 81403	Reserve Tank	1
36	08020 81104	Cap, reserve tank	1
37	01991 00215	Hose	1
38	87020 82004	Bracket, reserve tank	1
39	00169 06025	Hex. Head Bolt	1
40	00169 06016	Hex. Head Bolt	2
41	01999 00470	Hose	1
42	06055 15094	Hose Band	2

Engine and Radiator Assembly - Continued

Battery Assembly



Battery Assembly

Item No.	Part No	Part name.	Quantity
1	01691 05524	Battery	1
2	87222 51004	Battery Sheet	1
3	75522 53004	Battery Band	1
4	78722 51004	Battery Bolt	2
5	00378 06000	Wing Nut	2
6	00400 06000	Spring Washer	2
7	00416 06000	Plain Washer	2
8	06022 20312	Terminal Assy + VE	1
9	06022 20313	Terminal Assy - VE	1
10	06022 20600	Terminal Cap – Red	1
11	06022 20601	Terminal Cap - Black	1
12	06022 20643	Terminal Cap	1

Muffler Assembly



Muffler Assembly

Key No	Part No	Part Name	Quantity
1	43321 01103	Muffler	1
2	00169 08020	Hex Head Bolt	4
3	43350 01403	Exhaust Pipe	1
4	06023 20153	Gasket	1
5	15023 36004	Gasket	1
6	02070 08000	Hex. Nut	4
7	00169 08035	Hex head Bolt	2
8	43351 00304	Outlet Pipe	1
9	91022 00004	Pipe Band	1
10	91022 00304	Pipe Band	1
11	00169 08035	Hex. Head Bolt	2
12	00169 08020	Hex. Head Bolt	1

Fuel Tank Assembly



Fuel Tank Assembly

Key No:	Part No:	Part Name:	Quantity
1	43650 00903	Fuel Tank	1
1-1	08101 05800	Cap Fuel Tank	1
1-2	08101 05900	Fuel Filter	1
2	06055 01082	Sender, fuel gauge	1
	19243 00184	Gasket	1
3	00229 05015	Machine Screw	5
4	03653 00903	Bracket, fuel tank	1
5	00169 08020	Hex. Head Bolt	4
6	02233 00300	Tank Sheet	2
7	43652 00104	Tank Band	2
8	63653 00504	Pad, tank band	4
9	00169 08020	Hex. Head Bolt	2
10	02073 08000	Hex. Nut	2
11			
12	93124 00004	Rubber Seal	1
13	06055 11357	Valve	1
14	78120 14003	Drain Joint	1
15	08020 11104	Plug	1
16	01500 00018	O Ring	1
17	00173 06016	Hex. Head Bolt	2
18	01999 00550	Drain Hose	1
19	06055 15094	Hose Band	2
20	06020 42077	Fuel Filter	1
	06020 42174	Element, fuel filter	1
21	43687 00604	Bracket, fuel filter	1
22	00169 08020	Hex, Head Bolt	2
23	00169 08030	Hex. Head Bolt	2





Key No	Part No	Part Name	Quantity
24	06055 13134	Suction Hose	1
25	06055 13116	Suction Hose	1
26	06055 14027	Return Hose	1
27	06055 14064	Return Hose	1
28	06055 15070	Hose Band	4
29	06055 15072	Hose Band	4



Bonnet Assembly - Part 1

Key No	Part No	Part Name	Quantity
1	04150 02502	Base	1
	04950 00103	Lining	1
2	44151 00404	Floor Panel	1
3	00169 06016	Hex Head Bolt	8
4	04552 00303	Splasher Panel	1
5	04552 00203	Splasher Panel	1
6	00169 06016	Hex Head Bolt	16
7	04250 01102	Front Frame	1
	04951 01103	Lining	1
8	06018 50239	Grommet	1
9	00169 06016	Hex. Head Bolt	3
10	00169 08020	Hex. Head Bolt	2
11	43121 00613	Cover, Radiator	1
12	00169 06016	Hex Head Bolt	5
13	43122 00203	Fan Guard	1
14	00169 06016	Hex Head Bolt	2
15	04252 01003	Cover, front frame	1
	04951 01004	Lining	1
16	00169 06016	Hex. Head Bolt	8
17	44353 01303	Hanger	1
18	04353 00803	Hanger	1
19	00171 12030	Hex. Head Bolt	2
20	00171 12030	Hex. Head Bolt	2
	91192 00304	Plain Washer	2
21	04420 00704	Rear Frame	1
	04953 00904	Lining	1
22	00169 06016	Hex. Head Bolt	4
23	00169 08020	Hex. Head Bolt	3



Key No	Part No	Part Name	Quantity
24	04453 02804	Cover, rear frame	1
	04953 01004	Lining	1
25	00169 06016	Hex. Head Bolt	6
26	04650 00902	Roof Panel	1
	04955 00304	Lining	1
27	00169 06016	Hex. Head Bolt	18
28	78151 65004	Cover	1
	78151 65504	Rubber Sheet	1
29	00169 05016	Hex. Head Bolt	4
30	08050 82304	Set Screw	1
	00412 08000	Plain Washer	1
	00805 06000	Snap Ring	1
31	04452 00703	Door, rear frame	1
	02269 00585	Edge Strip	1
32	85051 46304	Window Plate	1
33	02070 06000	Hex. Nut	6
34	06018 51613	Stopper	2
35	04551 00703	Side Panel	1
	04954 01104	Lining	1
36	00169 06035	Hex. Head Bolt	6
37	04550 00703	Side Door	1
	04954 01204	Lining	1
38	08250 07362	Door Handle	1
38-1	93125 00004	Rubber Seal	1
39	00218 06015	Machine Screw	4
40	08100 14704	Pin	2
41	00802 00004	Snap Ring	2
42	78351 86014	Door Stay	1

Bonnet Assembly - Part 1 Continued



Key No	Part No	Part Name	Quantity
43	78350 88004	Collar	1
44	00171 08020	Hex. Head Bolt	1
45	08450 41904	Grommet	1
46	85118 64604	Plate	1
47	00169 06016	Hex. Head Bolt	5
48	44458 00104	Ring Pin	1

Bonnet Assembly - Part 1 Continued

Bonnet Assembly - Part 2







Key No	Part No	Part Name	Quantity
1	02283 00820	Rubber Seal	2
2	02283 00465	Rubber Seal	2
3	02219 00106	Rubber Seal	2
4	02219 00410	Rubber Seal	1
5	02203 02450	Rubber Seal	1
6	03180 00810	Rubber Seal	1
7	03180 00760	Rubber Seal	1
8	02292 00240	Rubber Seal	2
9	02292 00600	Rubber Seal	2
10	02292 00200	Rubber Seal	2

Bonnet Assembly - Part 2

Name Plate Assembly

Key No	Part No	Part Name	Quantity
	08006 60204	Plate : AC110v	3
	16306 45004	Decal ; Oil Drain	1
	16306 47004	Decal ; Coolant Drain	1
	16306 80004	Decal ; Use #2 Diesel fuel only	1
	08006 66504	Decal ; AC240v	1
	08006 89404	Decal ; +	1
	08006 89504	Decal ; -	1
	08006 54704	Decal ; 3 Phase output terminals	1
	08406 23704	Decal ; Ground for bonnet	1
	78106 80104	Decal ; Fuel drain	1
	78106 80204	Decal ; Cooling Water	1
	78106 32504	Decal ; Address	1
	85006 13104	Decal ; Ground for leakage relay	1
	85006 13204	Decal ; Caution, instruction	1
	85006 13004	Decal ; Important 'Check Daily'	1
	79606 65504	Decal ; AC415v	1
	87006 11804	Decal ; Warning Dangerous Gas	1
	87006 11904	Decal ; Danger electrical shock hazard	1
	85006 13604	Decal ; Caution for earth leakage	1
	85006 13704	Decal ; Caution 415 volts	2
	85006 13804	Decal; Caution, electrical shock	2
	85006 12004	Decal; AC Output terminal	1
	05123 02703	Decal; Specification	1
	87006 11524	Decal; Caution Oil Refueling	1
	05321 01004	Decal : LWA95dB	1
	05621 01303	Decal; Multi-voltage (Short)	1
	05621 01603	Decal; Multi-voltage (Long)	1
	05621 01403	Decal; Generator (Long)	1
	05621 01503	Decal; Generator (Short)	1
	95054 00004	Decal; Important Starting Procedure	2



CE Warning Decals