OPERATION MANUAL

AIR COOLED
DIESEL GENERATOR
TYPE YDG 2700E
Dantherm No. 323290
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1. INTRODUCTION

1.1 Purpose

The purpose of this operation manual is to give the user a detailed knowledge of operation and preventive maintenance of the diesel generator Yanmar Type 2700E with Dantherm cabinet etc. for Dantherm heater type VA-M.

In case of more demanding corrective maintenance, we refer to the original Yanmar manual, which can be delivered on request.

![Diesel generator type YDG 2700E, complete with Dantherm cabinet](image)

**WARNING!**
The generator is designed to give safe and dependable service provided that it is operated according to instructions. Read and understand the Operation Manual before operating the generator. Failure to do so could result in personal injury or equipment damage.
<table>
<thead>
<tr>
<th>MODEL</th>
<th>ITEM</th>
<th>UNIT</th>
<th>YANMAR YDG 2700E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RE VOLVING FIELD TYPE SINGLE-PHASE ALTERNATING CURRENT GENERATOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td>Hz</td>
<td>50</td>
</tr>
<tr>
<td>G E N E R A T O R</td>
<td>Rated Output</td>
<td>KVA</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>kW</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Voltage       (AC)</td>
<td>V</td>
<td>220 230 240 110/220 115/230</td>
</tr>
<tr>
<td></td>
<td>Current        (AC)</td>
<td>A</td>
<td>9.1 8.7 8.3 8.2/9.1 17.4/8.7</td>
</tr>
<tr>
<td></td>
<td>Revolution Speed</td>
<td>RPM</td>
<td>3000</td>
</tr>
<tr>
<td></td>
<td>Power Factor</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Phase</td>
<td></td>
<td>Single-phase</td>
</tr>
<tr>
<td></td>
<td>Number of Poles</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Excitation</td>
<td></td>
<td>Self-excitation type</td>
</tr>
<tr>
<td></td>
<td>Insulation</td>
<td></td>
<td>Type E</td>
</tr>
<tr>
<td></td>
<td>Ball Bearing</td>
<td></td>
<td>Grease-enclosed</td>
</tr>
<tr>
<td></td>
<td>MODEL</td>
<td></td>
<td>L48AE-D(E)GY5/6</td>
</tr>
<tr>
<td>M O T O R</td>
<td>Type</td>
<td></td>
<td>4-CYCLE SINGLE CYLINDER AIR COOLED DIESEL ENGINE</td>
</tr>
<tr>
<td></td>
<td>Continuous Rated Output Power</td>
<td>kW/rpm</td>
<td>2.8/3000 (3.8/3000)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HP/rpm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Max. Output Power</td>
<td>kW/rpm</td>
<td>3.1/3000 (4.2/3000)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HP/rpm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cylinder Stroke x Stroke</td>
<td>mm (in)</td>
<td>Ø 70 x 55 (2.76 x 2.17)</td>
</tr>
<tr>
<td></td>
<td>Displacement</td>
<td>cc(in³)</td>
<td>211(12.9)</td>
</tr>
<tr>
<td></td>
<td>Cooling System</td>
<td></td>
<td>Forced air-cooled system</td>
</tr>
<tr>
<td></td>
<td>Lubrication System</td>
<td></td>
<td>Forced lubrication</td>
</tr>
<tr>
<td></td>
<td>Lube Oil Capacity</td>
<td>ltr. (US qts)</td>
<td>0.8 (0.84)</td>
</tr>
<tr>
<td></td>
<td>Starting</td>
<td></td>
<td>Recoil or Electric</td>
</tr>
<tr>
<td></td>
<td>Fuel</td>
<td></td>
<td>Diesel fuel</td>
</tr>
<tr>
<td></td>
<td>Fuel tank capacity</td>
<td>ltr. (USgal)</td>
<td>7.2 (1.9)</td>
</tr>
</tbody>
</table>
3.7 Battery

The generator is from the factory delivered with a hermetically sealed, dry-charged battery for instant activation just by filling the electrolyte. The battery has to be delivered without the electrolyte in accordance with international transport safety rules and to keep the battery fresh during storage. The battery is hermetically sealed by aluminum foil tape on vent holes. Never remove this until filling electrolyte.

Fill with electrolyte (standard dilute sulphuric acid with specific gravity of 1.260) slowly and carefully, and then adjust level in each cell to "upper level".

A fast charge is recommended for a short time to warm the electrolyte and battery before placing in service during cold weather.

If the electrolyte level after some use falls to "lower level" always replenish with distilled water (see preventing service caped. 5.8 and 5.9).
7. TROUBLE SHOOTING

A. When the engine will not start:
   1. Is there enough fuel in the jerry can or drum?
   2. Is the oil line bled out and full of fuel?
   3. Does the external fuel pump operate?
   4. Is the engine speed lever in the "RUN" position?
   5. Is the lube oil level correct?
   6. Is the fuel injection nozzle working properly?
   7. Is the recoil starter pulled sufficiently quickly and firmly?
   8. Is the battery discharging?

B. When no electricity is generated:
   1. Is the main switch turned on?
   2. Are the generator brushes worn?
   3. Are the plugs correctly connected?

If electricity is still not generated, please contact a Yanmar Dealer or Dantherm.
2.2 Standard Execution

The standard execution includes:

- Diesel engine YDG 2700E built together with generator L48AE-D(E)GY5/6
- Cabinet with thermostatic controlled forced air-cooling
- Fuel supply line (pump, filter, air bleed)
- Start battery (12V - 18A)
- Grounding lance with cable
- Tool kit
- Operation Manual
- Exhaust pipe with attenuator
- Oil lance for jerry can

The generator can be delivered for 230V/50Hz.

2.3 Cabinet Finish

Top finish painting is STANDARD NATO GREEN RAL 6014 with infrared anti reflecting ability. The sheet metal plates are galvanized and protected against corrosion.

2.4 Cabinet Dimensions

1. Control panel
2. retractable oil supply lance and suction line
3. Removable cover
4. Attenuator flange
5. Lifting rail

Outside Dimensions
3. CONSTRUCTION AND FUNCTION

3.1 Scope

The Dantherm diesel engine generator unit (GENSET) has been developed to power supply the Dantherm military heaters in the field, where no electricity is available and in this way create self-contained heaters.

The GENSET has been designed on basis of a Yanmar (Japanese) diesel generator and a Dantherm cabinet, which can be placed directly into the accessory compartment of the VA-M 40 heater.

The output power of the generator is sufficient for one VA-M 40 as well as for supplementary 600 W Power for light etc. in the shelter.

The GENSET can also be used in a remote position from the heater - if necessary in a hollow in the soil - to reduce the noise level.

The cabinet has been built in anti corrosive material and protects the engine against the weather.

The construction is very compact but is service- and user-friendly with easy access to all vital parts. Two men can carry the unit.

The fuel type is diesel fuel taken from a jerry can or drums via a supply line with own pump, filter, air bleed etc.

The main components are:

1. Generator
2. Diesel engine
3. Fuel supply line
4. Cooling fan
5. Control panel
6. Battery
3.2 Generator

The generator is a single-phase, revolving field type AC generator with automatic speed regulation, which always ensures an output of constant AC-Voltage as well as an available output of 12V DC for charging the battery or for somewhat else auxiliary equipment. In case of service the end cover of the generator is dismounted. This gives free access to brushes, terminals, stator and rotor, which are connected directly to the engine.

3.3 Motor

The diesel motor is a single-cylinder, 4-stroke cycle diesel engine with direct fuel injection and forced air-cooling by flywheel fan. The construction is very compact but still service-friendly, and the fuel consumption is very low. Thanks to a Low Oil Pressure warning system the motor is protected against damage when lube oil is running short by automatic engine stop and lightning alert lamp.

The diesel engine can be started either via the electrical starting motor or by manual recoil starting.

3.4 Fuel Supply Line

The fuel type is diesel fuel, which is lead to the engine from a separate jerry can via rubber hoses with oil lance, filters, and pump. The oil lance has non-return valve and quick-coupling and is stored locked in a tubular sleeve.

In the oil line there is also an air canister glass with a screw for manual air bleed.

3.5 Cooling Fan

As the diesel generator is enclosed by the cabinet, it is necessary with forced ventilation for cooling. To secure this a fan with an air flow of 390 m³/h is mounted in the cabinet. Intake of ambient air to the engine as well as the generator takes place on both sides through the grill openings and discharge through the grills on the back.

The fan is thermostatically controlled, thus performing delayed start/stop.

3.6 Control Panel

When the door on the front has been opened there is free access to operate the engine and in this compartment the control panel is also located.

On the front of the panel there are two EEC connectors for output of 230V AC (total 8.7 A / 2.07 kW), current limiter, voltmeter, indicator lamp for switch-on, and oil alert lamp. The start/stop switch is a detachable key. On the left side of the panel (remove the upper housing) there is one receptacle for output of 12V/8.3A DC and a current limiter for this DC application.
3.7 Battery

The generator is from the factory delivered with a hermetically sealed, dry-charged battery for instant activation just by filling the electrolyte. The battery has to be delivered without the electrolyte in accordance with international transport safety rules and to keep the battery fresh during storage. The battery is hermetically sealed by aluminum foil tape on vent holes. Never remove this until filling electrolyte.

Fill with electrolyte (standard dilute sulphuric acid with specific gravity of 1.260) slowly and carefully, and then adjust level in each cell to "upper level".

A fast charge is recommended for a short time to warm the electrolyte and battery before placing in service during cold weather.

If the electrolyte level after some use falls to "lower level" always replenish with distilled water (see preventing service caped. 5.8 and 5.9).
4. OPERATION

4.1 Introduction

The diesel generator and the jerry can should be placed in a close to horizontal position and without too big difference in level.

4.2 Preplanning Before Start

- Install the flue pipe in the exhaust flange.
- Place the oil lance in the jerry can join in the quick coupling connector on the oil hose line with the receptacle on the lance.
- Put the grounding lance in the earth to prevent electric shocks.
- Check liquid level in the battery. Replenish with distilled water, if it is on "lower level".
- Connect mains lead from the heater to the diesel generator, if the generator should be used as power source. Let the main switch on the heater be in "OFF" position, until the generator has started and runs even.

Diesel generator, operating compartment
4.3 Electric Starting

1. Set the engine speed lever on "RUN"

2. Turn the starting key clockwise to "START" position.

3. Remove your hand from the key as soon as the engine starts.

4. If the starting motor doesn't start after 10 seconds, wait a while (for about 15 seconds) before attempting to start again.

5. When the motor starts it may run uneven in the beginning. If so, check the fuel supply and/or ventilate the fuel system. Allow the motor to get warm and to run smoothly before connecting any load.

4.4 Manual Start (Recoil Starting)

1. Loosen the rubber straps and remove the top housing.

2. Put the engine speed lever in the "RUN" position.

3. Pull the recoil starting handle slowly to the point where you feel strong resistance, and then return it to the initial position.

4. Push down the decompression lever. It will return automatically when the recoil starter is pulled.
5. Pull out the recoil starting handle briskly with both hands. Do not allow the handle grip to snap back against the engine. Return it gently to prevent damage to the starter.

6. If the motor does not start, repeat from point 3.

7. When the generator is running, remount the top housing and the warm air heater can be started.

**Cold Start**

In cold weather, when your engine is hard to start, remove the rubber plug from the rocker arm cover and add 2 cc of engine oil. Replace the rubber plug before starting.

4.5 **Stopping the Generator**

**CAUTION:**
If the generator is supplying power to the VA-M 40 heater, then turn the main switch to OFF and wait until the fan in the heater has stopped before switching off the generator.

1. Turn the starting key anticlockwise to the "OFF" position. Now the generator stops producing power.

2. Let the engine run in approx. 3 minutes without power with the engine speed lever in the "RUN" position. This allows cooling of the generator.

3. Press the stop lever downward to "STOP" position.

1. Stop lever
With eng. speed lever at "STOP" position

**CAUTION:**
- Do not stop the engine with the decompression lever.
- Do not stop the engine without allowing the generator to cool down because this may cause the temperature to rise abnormally.
5. PERIODIC CHECK AND MAINTENANCE

5.1 Scope

Periodic check and maintenance are very important for keeping the engine in good condition and durable. The chart on next page indicates which checks to make and when to make them. The mark * indicates that special tools and skills are required, and in this case it is recommended to follow all instructions in the original Yanmar service manual of which copies can be ordered from the manufacturer or Dantherm.

WARNING!
Shut off the engine before performing any maintenance. If the engine must be run, make sure the area is well ventilated. The exhaust contains poisonous carbon monoxide gas.

CAUTION:
- After the engine has been used, clean it immediately with a cloth to prevent corrosion and to remove sediment.

- Use only genuine Yanmar parts. The use of replacement parts, which are not of equivalent quality, may damage the engine.
### 5.2 Maintenance Schedule

<table>
<thead>
<tr>
<th>Item</th>
<th>Daily check</th>
<th>Every month or every 50 hrs.</th>
<th>Every 3 months or every 200 hrs.</th>
<th>Every 6 months or every 400 hrs.</th>
<th>Every year or every 1000 hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the fuel level and refill if necessary</td>
<td>☒ before operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drain the fuel tank</td>
<td>☐</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean the fuel filter</td>
<td>☐</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace the fuel filter element</td>
<td>☐</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check for fuel leakage</td>
<td>☒ after operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel injection nozzle. Check the injection condition</td>
<td>☐</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check the fuel injection timing</td>
<td>☐</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check the fuel injection pump</td>
<td>☐</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check the lube oil level in the oil pan and refill if necessary</td>
<td>☒ before operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace the lube oil</td>
<td>☒ 1st time</td>
<td>☒ 2nd time and thereafter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean lube oil filter</td>
<td>☒ 1st time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check for lube oil leakage</td>
<td>☒ after operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check the air cleaner element</td>
<td>☐</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace the air cleaner element</td>
<td>☐</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check spark arrester clogging and clean if necessary</td>
<td>☒ before operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check the battery liquid level and refill if necessary</td>
<td>☒ before operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjust the intake and exhaust valve clearance</td>
<td>☐</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check commutator brush and slip ring</td>
<td>☐</td>
<td></td>
<td>*</td>
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</tr>
</tbody>
</table>

Note: Items marked * should be serviced by an authorized YANMAR dealer, unless the owner has proficient mechanical ability and the proper tools.
5.3 Change of Motor Oil

1. Remove the oil filler cap. Remove the drain plug and drain the old oil while the oil is still warm. The plug is located on the front of the cabinet below the inspection door.

2. Tighten the drain plug and refill with the recommended oil to the "upper level".

5.4 Cleaning of Filter

1. Loosen the fixing bolt and then pull out the filter.

2. Cleaning: Every 6 months or 500 hours.
   Replace if necessary.
5.5 Changing the Air Filter Element

Loosen the rubber straps and remove the upper housing. The air cleaner will now be accessible on the right hand side.

Unscrew the wing nut, re-move the cover and draw out the air cleaner element.

Do not wash the element with detergent because this is a wet type element.

Change: Every 6 months or 500 hours (or earlier, if dirty)

1. Element

CAUTION:
Never run the engine without the element or with a defective element.

Note:
A clogged element hinders the flow of air to the combustion chamber. This reduces the engine output, increases lube oil and fuel oil consumption and makes starting difficult.

Make sure you replace the element regularly.

5.6 Cleaning or Change of Filter in Oil Supply Line

The oil filter before the pump is a throw-away filter, which has to be changed when it looks dirty - every 6 months or 500 hours.

The air bleed with the glass canister and the bleed screw on the top also have a filter element that has to be checked and perhaps removed for cleaning.

NOTE:
A blocked filter causes uneven operation or stop of engine.
5.7 Corrective maintenance

- Adjusting the valve head clearance for the intake and exhaust valves.
- Lapping of intake and exhaust valves
- Replacing piston ring
- Change of commutator brush and slip ring.
- Replacing nozzle, pump, etc.
- Tightening the cylinder head bolts.

Maintenance like above require special tools and skills, so contact a Yanmar dealer or get the original service and maintenance manual at Dantherm.

WARNING: Do not perform the injection nozzle test near an open fire or any other kind of fire. The fuel spray may ignite. Do not expose bare skin to the fuel spray. The fuel may penetrate the skin and cause injury to the body. Always keep your body away from the nozzle.

5.8 Checking and Replenishing Battery Fluid

The start motor uses a 12V battery. Battery fluid will be lost through continuous charging and discharging.

Before starting, check for physical damage to the battery and also the electrolyte levels, and replenish with distilled water up to the upper mark. If necessary, when actual damage is discovered, change the battery.

Check the battery fluid monthly.

![Battery Label]

1. Upper level
2. Lower level

WARNING: The battery electrolyte contains sulphuric acid. Protect your eyes, skin and clothing. In case of contact, flush thoroughly with water and get prompt medical attention, especially if your eyes are affected.

NOTE: Much more fluid is lost during summer than in winter.
5.9 Charging the Battery

Before charging, remove the cap from each cell of the battery.

Charge the battery in a place where there is plenty of ventilation.

Discontinue charging if the electrolyte temperature exceeds 45°C (117°F).

Do not charge the battery with the battery cable still connected. The diodes will be damaged by the high voltage.

Connect the (+) lead of the charger to the (+) terminal of the battery, and the (-) lead to the (-) terminal. Reversed polarity will damage the charger rectifier or the battery.

After charging is completed, connect the battery cables correctly to the battery. Reversed polarity wiring will damage the diodes.

Quick-charging should only be done in an emergency; slow-charging is recommended.

WARNING:
Batteries generate hydrogen gas, which can be highly explosive. Do not smoke or allow flames or sparks near the battery, especially during charging.
6. PREPARATIONS FOR TRANSPORT AND STORAGE

6.1 Transport

During transport the upper housing, the flue pipe and the oil lance have to be located in their correct position with the flue pipe hanging on the brackets on left and side of the unit.

6.2 Long-term Storage

If the generator has to be stored for a long period, make the following preparations:

- Operate the engine for about 3 minutes and then stop.
- Drain the engine lube oil while the engine is still warm and fill with new oil.
- Remove the rubber plug on the rocker arm at the engine top and add 3 cc of lube oil. Put the plug in place.
- Recoil starting: Push the decompression lever down (non-compression position) and hold it while you pull the recoil starter 2 or 3 times (do not start engine).
  
  Electric starting:
  Turn the engine for 2 - 3 seconds with the decompression lever set at the non-compression position, and the starter key at the "START" position (do not start the engine).
- Pull the decompression lever up. Pull the recoil starter slowly. Stop when it feels tight. (This closes the intake and exhaust valves (in compression position) and helps prevent rust from forming.)
- Wipe oil and dirt from engine and cabinet, grease the oil lance, drain oil line and put on covers. Store in a dry place, perhaps under plastic.

6.3 Disabling

In a war situation the unit is most easily disabled by destroying the generator housing.