| | Installation and maintenance | |
|---|---|---|

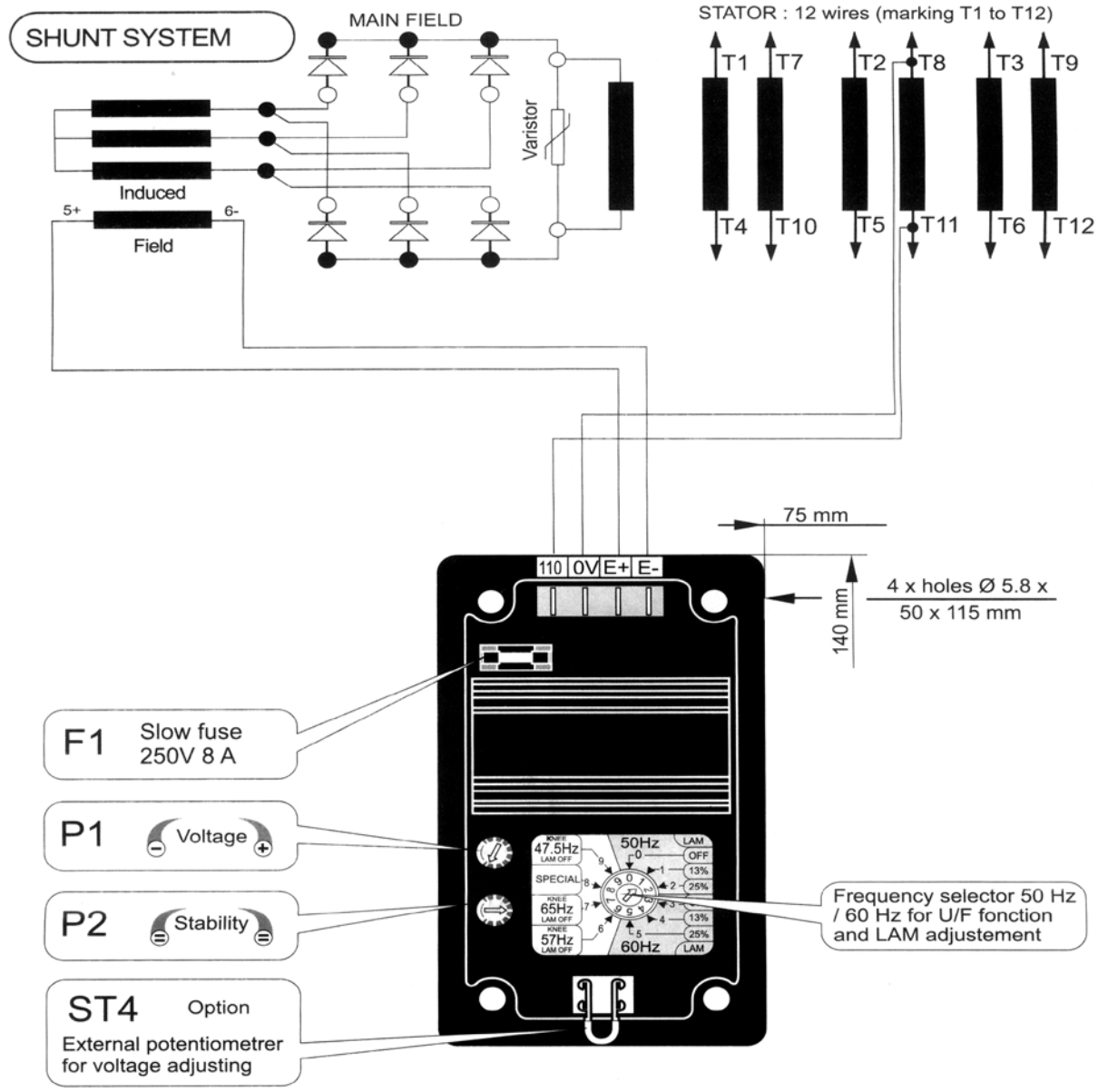
# R250
# A.V.R.

## 1 - SUPPLY

### 1.1 - SHUNT excitation system

The SHUNT excitation alternator is auto-excited with a **R 250** voltage regulator.

The regulator controls the excitation current according to the alternator's output voltage. With a very simple conception, the SHUNT excitation alternator does not have a short circuit capacity.



# R250
# A.V.R.

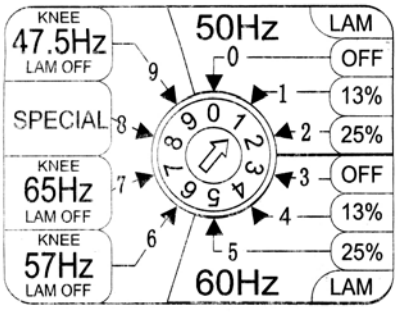
## 2 - R250 A.V.R.

### 2.1 - Characteristics

- Voltage regulation: around ± 0,5 %.
- Supply range/voltage detection 85 to 139 V (50/60Hz).
- Rapid response time (500 ms) for a transient voltage variation amplitude of ± 20 %.
- Voltage setting **P1**.
- Stability setting **P2**.
- Supply protected with an 8 A fuse, slow action (supports 10 A for 10 s).

### 2.2 - U/F Fonction and LAM

The threshold position (50 Hz - 60 Hz) to action the U/F fonction as well as the LAM setting type is selected using the potentionmeter.




**WARNING: The jumper settings must correspond to the rated operating frequency (see the nameplate on the alternator).**
**Risk of destruction for the alternator.**

The threshhold position and LAM fonction settings are done with the jumper.

**Operating at 50 Hz: (U/F gradient)**

**0**: threshold at 48 Hz without LAM for impacts between 30 and 40% of the rated load.

**1**: threshold at 48 Hz with LAM 13% for impacts between 40 and 70% of the rated load.

**2**: threshold at 48 Hz with LAM 25% for impacts > 70% of the rated load.

**Operating at 60 Hz: (U/F gradient)**

**3**: threshold at 58 Hz without LAM for impacts between 30 and 40% of the rated load.

**4**: threshold at 58Hz with LAM 13% for impacts 40 and 70% of the rated load.

**5**: threshold at 58Hz with LAM 25% for impacts > 70% of the rated load.

**Specific operating**

**6**: threshold at 57Hz without LAM for speed variations at a steady state > 2 Hz

**7**: threshold at 65Hz without LAM for variable speed and tractelec / gearlec (U/F gradient).

**8**: special: the factory setting 48Hz 2U/F gradient ; a special programme is possible on request. This programme must be specified before ordering, during the project study.

**9**: threshold at 47.5 Hz without LAM for speed variations at a steady state > 2 Hz

### 2.3 - R250 A.V.R. option

Potentiometer for voltage setting, 1000 Ω / 0,5 W min: setting range ± 5 %.
- Remove the **ST4** jumper.

## 2.4 - LAM characteristics (Load Acceptance Module)

### 2.4.1 - Voltage drop

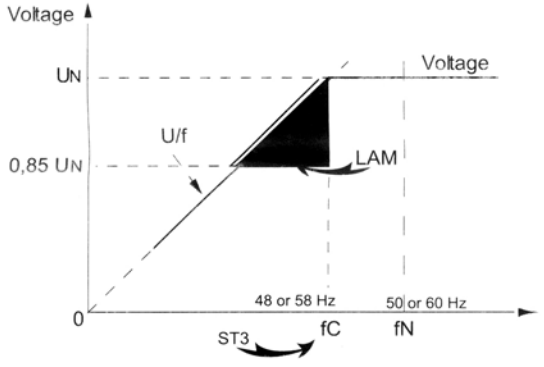
The LAM system is integrated in the A.V.R. It is active as standard. It can be adjusted to 13% or 25%.

- Role of the «LAM» (Load Adjustment Module):

On application of a load, the rotation speed of the generator set decreases. When it passes below the preset frequency threshold, the LAM causes the voltage to drop by approximately 13% or 25% and consequently the amount of active load applied is reduced by approximately 25% to 50%, until the speed reaches its rated value again.

Hence the "LAM" can be used either to reduce the speed variation (frequency) and its duration for a given applied load, or to increase the applied load possible for one speed variation (turbo-charged engines).
To avoid voltage oscillations, the trip threshold for the "LAM" function should be set approximately 2 Hz below the lowest frequency in steady state.

It is advised to use the "LAM" at 25% for load impacts > at 70% of the genset rated power.

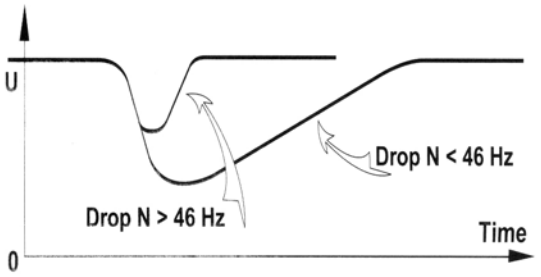



### 2.4.2 - Gradual voltage return function

During load impacts, the function helps the genset to return to its rated speed faster thanks to a gradual increase in voltage according to the following principles:

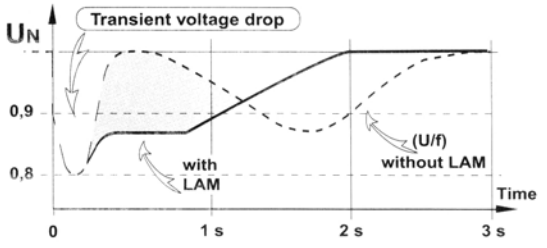
- if the speed drops between 46 Hz and 50 Hz, the rated voltage follows a fast gradient as it is restored.

- if the speed drops below 46 Hz, since the engine needs more help, the voltage follows a slow gradient as it returns to the reference value.

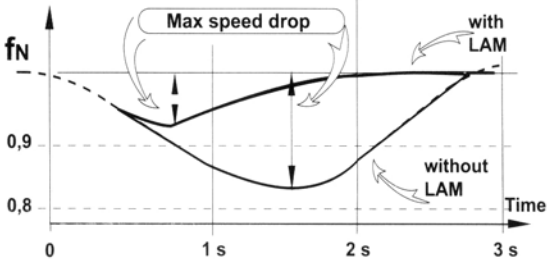



## 2.5 - Typical effects of the LAM with a diesel engine or without a LAM (U/F only)

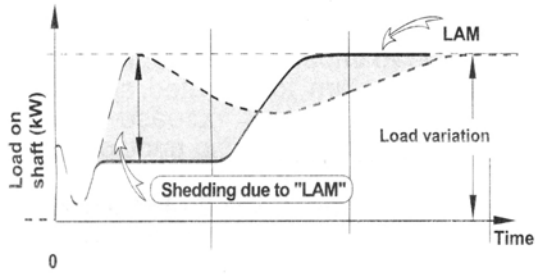
### 2.5.1 - Voltage




### 2.5.2 - Frequency



### 2.5.3 - Power




## 3 - Electrical faults

| Fault | Action | Effect | Check/cause |
|---|---|---|---|
| No voltage at no load on start-up | Connect a new battery of 4 to 12 volts to terminals E- and E+ respecting the polarity for 2 to 3 seconds | The alternator starts up and its voltage is still correct when the battery is removed. | - Lack of residual magnetism |
| | | The alternator starts up but its voltage does not reach the rated value when the battery is removed. | - Check the connection of the voltage reference to the A.V.R.<br>- Faulty diodes<br>- Induced short circuit |
| | | The alternator starts up but its voltage disappears when the battery is removed | - Faulty A.V.R.<br>- Exciter field short-circuited<br>- Short-circuit in the main field. Check the resistance |
| Voltage too low | Check the drive speed | Correct speed | Check the A.V.R. connections (A.V.R. may be faulty)<br>- Field windings short-circuited<br>- Rotating diodes burnt out<br>- Main field winding short-circuited<br>- Check the resistance |
| | | Speed too low | Increase the drive speed<br>(Do not touch the A.V.R. pot (P1) before returning to the correct speed.) |
| Voltage too high | Adjust A.V.R. potentiometer | Adjustment ineffective | - Faulty A.V.R.<br>- 1 faulty diode |
| Voltage oscillations | Adjust A.V.R. stability potentiometer | | - Check the speed: possibility of cyclic irregularity<br>- Loose terminals<br>- Faulty A.V.R.<br>- Speed too low on load (or U/F gradient set too high) |
| Voltage correct at no load and too low when on load (*) | Run at no load and check the voltage between E+ and E- on the A.V.R. | | - Check the speed (or U/F gradient set too high) |
| | | | - Faulty rotating diodes<br>- Short-circuit in the main field. Check the resistance<br>- Faulty induced excitaion |
| **(*) Warning:** For single-phase operation, check that the sensing wires coming from the A.V.R. are correctly connected to the operating terminals (see the alternator manual). | | | |
| Voltage disappears during operation | Check the A.V.R., the surge suppressor, the rotating diodes and replace any defective components | The voltage does not return to the rated value. | - Exciter winding open circuit<br>- Faulty induced excitation<br>- Faulty A.V.R.<br>- Main field open circuit or short-circuited |