RSERIES

RECONNECTION GUIDE

KOHLER GENERATORS

R-Series Generator Set Reconnection Guide

These procedures are only to be used when reconnecting 12-lead R-Series generator sets from the factory test voltage to any one of the following voltages:

120/240, 1Ø, 3-Wire
120/240, 3Ø, 4-Wire (Delta)
120/208, 3Ø, 4-Wire (Wye)
240, 3Ø, 3-Wire (Wye)
277/480, 3Ø, 4-Wire (Wye)

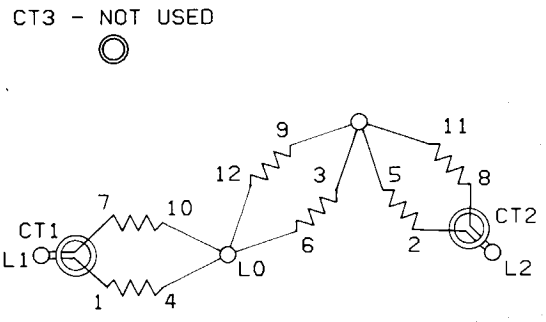
NOTE

600-Volt generators are not reconnectable.

Refer to connection diagrams following:

NOTE

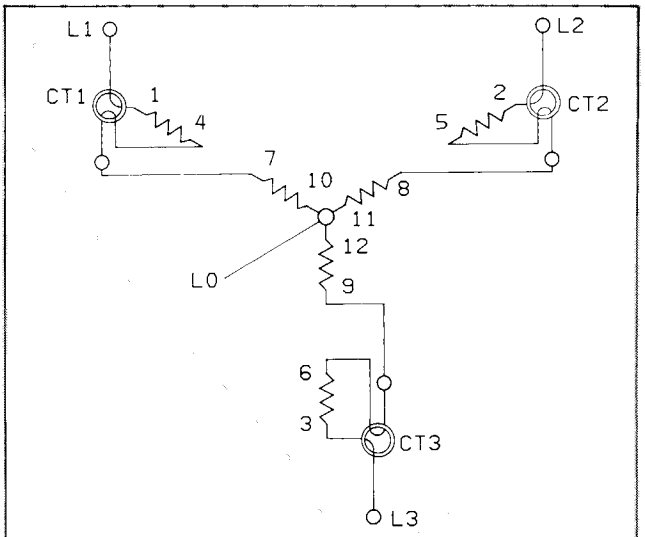
L0 must be grounded to end bracket on ROY/RY models for voltage buildup.



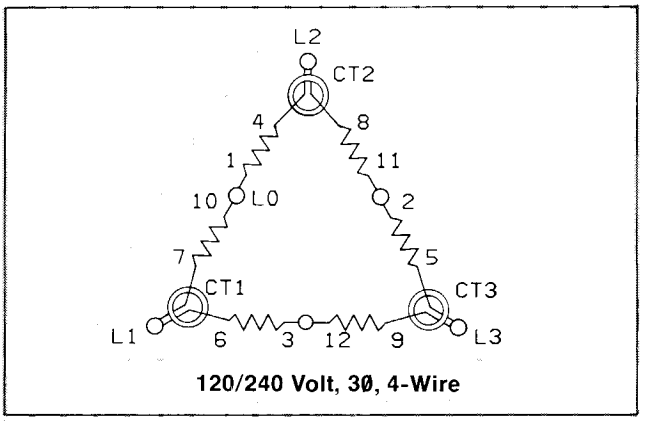
120/240 Volt, 1Ø, 3-Wire

NOTE

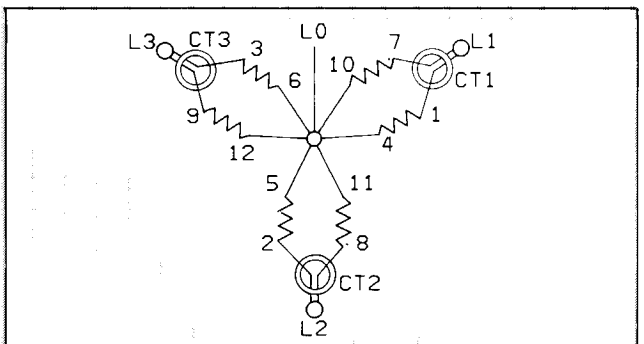
Disconnect wire from selector switch terminal 12 (22.5-47.5 kW) or terminal 14 (15 kW) at CT3. Tape terminal to prevent accidental short circuit or misconnection.



277/480 Volt, 3Ø, 4-Wire



120/240 Volt, 3Ø, 4-Wire



120/208 Volt, 3Ø, 4-Wire
240 Volt, 3Ø, 3-Wire

WARNING

High output voltage may endanger human life or damage equipment! HEAVILY INSULATE OUTPUT LEADS.

The voltage regulator circuit board for R-Series generator sets has been revised. As a result, the load-shedding feature (Pot. 4) has been removed. Determine which type of voltage regulator board is used and follow the appropriate instructions.

WARNING

DANGER OF ELECTROCUTION! High voltage is present at regulator board P1 connector and terminal strip when set is running.

CAUTION

Voltage regulator must be recalibrated using the following procedure if output leads are reconnected to voltage other than factory test voltage. Failure to do so may result in equipment damage.

The following equipment is required to properly adjust regulator board.

1. AC voltmeter, 0-300 V. AC minimum range, ± 0.5% minimum accuracy.
2. Frequency counter, 45 to 75 Hz minimum range, ± 1% minimum accuracy.
3. Potentiometer adjustment tool (or small blade screwdriver).
4. Load bank-capacity must equal output potential of generator set. (Used only on voltage regulator boards with Pot. 4 — Load Shed.)

Before Starting Generator Set:

1. Disconnect generator from load. Place generator main switch in OFF position. Lift enclosure cover to expose voltage regulator board and terminal strip. See Figure 1.
2. Check the wire jumpers on the regulator board and arrange as noted in Table 1.

Table 1. Jumper Condition

Jumper	Models	
	10 kW-17.5 kW	22.5 kW-47.5 kW
J1	Inserted	Removed
J2	Removed	Inserted
J3	Inserted for 60 Hz — Removed for 50 Hz	

3. For generator sets having a single-phase connection, lift lead V9 from the controller circuit board terminal strip and insulate lead end with electrical tape to prevent any electrical connection.

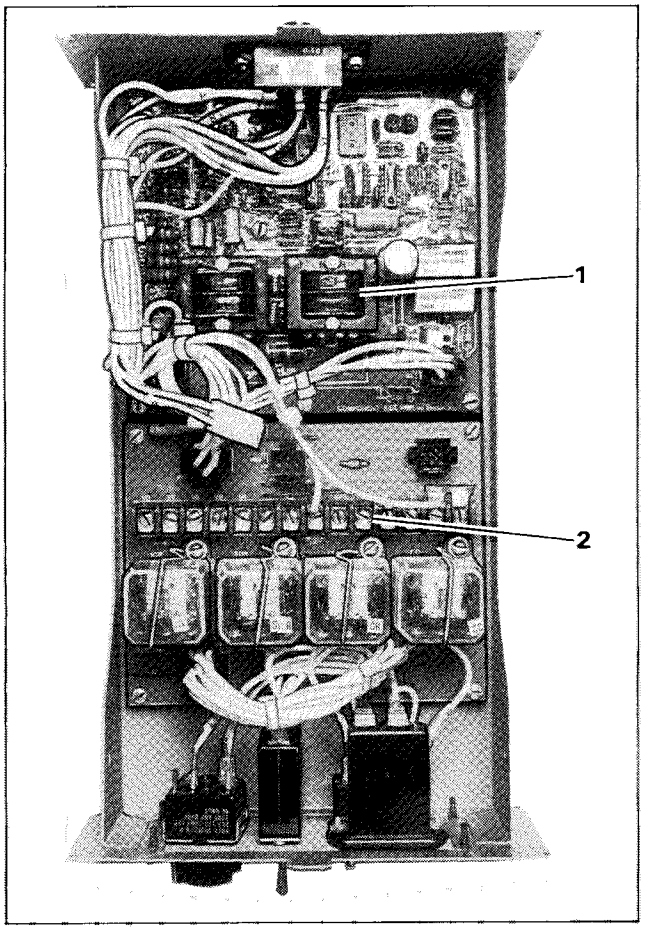


Figure 1. Regulator and Terminal Boards

1. **Voltage Regulator Board**
2. **Terminal Strip**

4. Adjust the external voltage adjustment potentiometer located on the controller assembly front panel (if equipped) to the approximate midpoint of its adjustment range.
5. Connect the AC voltmeter and frequency counter between leads V7 and V8 on the generator set.
6. See Figure 2 for types of voltage regulator boards, in order to determine which adjustment procedure must be used.

VOLTAGE REGULATOR BOARD ADJUSTMENT (New style boards without Pot. 4 — Load Shed)

1. Break adjustment seals on Pots. 1, 2 and 3.

NOTE

Pot. 5 (Ov. Spd.) and Pot. 6 (Ov. Volt) should be sealed and do not require any adjustment at this time.

2. Turn Pot. 1 to full clockwise (CW) position.
3. Turn Pot. 2 to full counterclockwise (CCW) position.

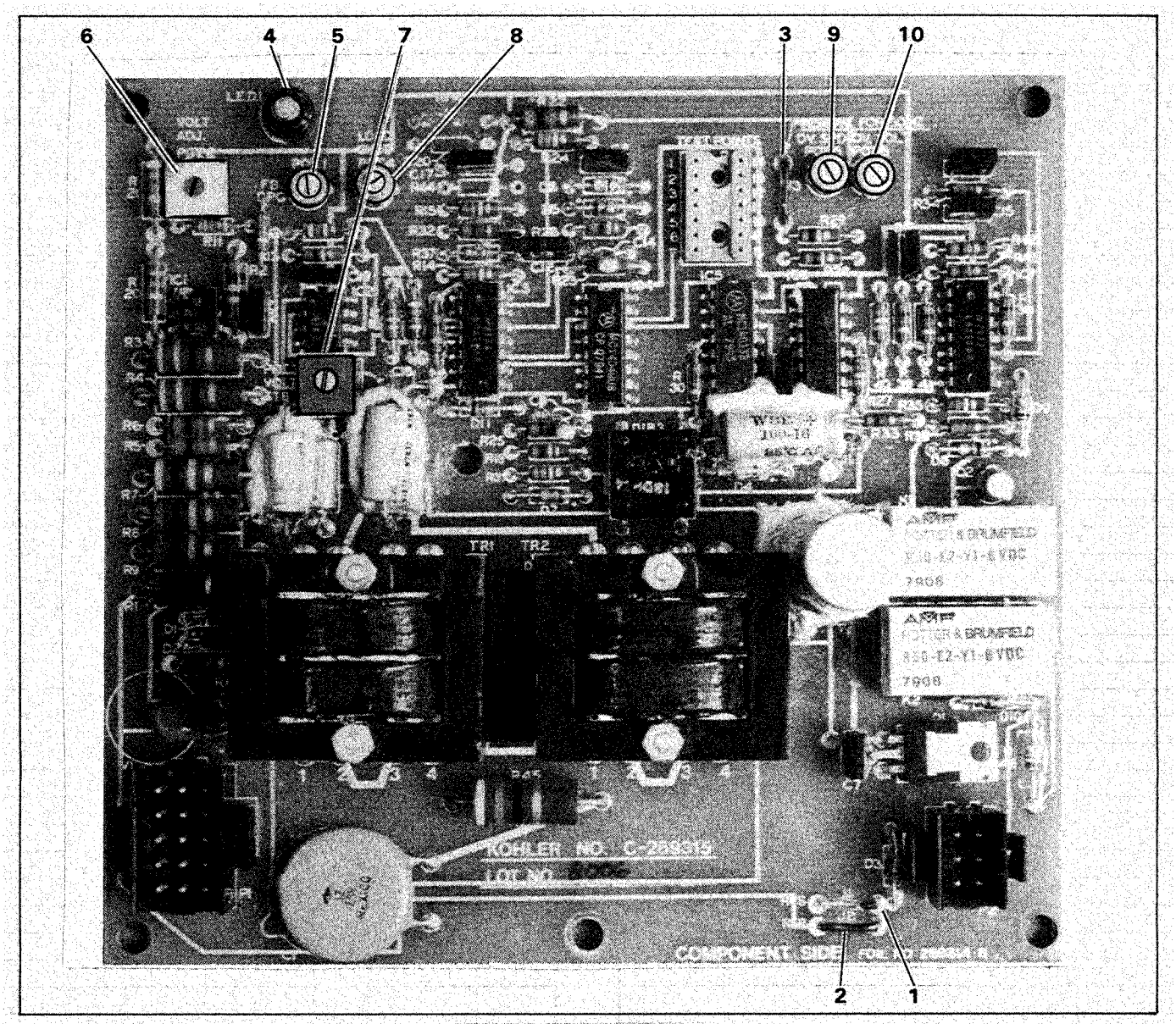


Figure 2. Regulator Board

1. **J-1**
2. **J-2**
3. **J-3**
4. **LED**
5. **Pot. 1 — FR Damp**
6. **Pot. 2 — Volt Adj.**
7. **Pot. 3 — Volt Stb.**
8. **Pot. 4 — Load Shed (Found only on old style board)**
9. **Pot. 5 — Ov. Spd.**
10. **Pot. 6 — Ov. Volt**

4. Start the generator set with no load applied.

WARNING

DANGER OF ELECTROCUTION! High voltage is present at regulator board P1 connector and terminal strip when unit is running.

5. Adjust Pot. 2 (Volt Adj.) while observing the AC voltmeter. Adjust for a meter reading as specified for this set.

6. Observe LED on the regulator board. If it is glowing a steady red, proceed to the next step. If it is "flickering" alternately, first adjust Pot. 3 (Volt Stb.) and then Pot. 1 (FR Damp) until a steady glow is attained. It may be necessary to repeat the alternate adjustment several times.

NOTE

For single-phase units do *not* adjust Pot. 1. Leave it in the fully clockwise limit.

7. Overvoltage Shutdown Check (Pot. 6)

   a. While observing the AC voltmeter reading, slowly adjust Pot. 2 just to the point where the generator set shuts down. Note carefully the AC voltmeter reading just prior to shutdown. This reading shall be within the following limits:

      50 Hz Sets: 257 ± 5 Volts AC
      60 Hz Sets: 280 ± 5 Volts AC

CAUTION

Do not exceed 285 Volts when adjusting Pot. 2. Regulator board damage may result.

   b. Readjust Pot. 2 about 1/8 turn in the CCW direction to prevent an immediate shutdown upon restart.

   c. Turn the controller main switch to the OFF position and reset the overvoltage fault.

   d. Restart the generator set.

   e. Adjust Pot. 2 while observing the AC voltmeter. Adjust for a meter reading as specified for this set.

NOTE

If the set fails to pass this test, go to Step 8. Otherwise, omit Step 8 and go to Step 9.

8. Overvoltage Shutdown Adjustment (Pot. 6)

   a. Break adjustment seal and turn Pot. 6 to full CW position.

   b. While observing AC voltmeter reading, adjust Pot. 2 as follows:

      50 Hz Sets: 257 ± 3 Volts AC
      60 Hz Sets: 280 ± 3 Volts AC

   c. Slowly turn Pot. 6 in a CCW direction just to the point where the generator set shuts down. Do *not* turn pot. beyond this point.

   d. Readjust Pot. 2 about 1/8 turn CCW to prevent immediate shutdown upon restart.

   e. Turn the controller's main switch to the OFF position and reset the overvoltage fault.

   f. Restart the generator set and turn Pot. 2 CW until unit shuts down while observing AC voltmeter. Note carefully the AC voltmeter reading just prior to shutdown. This reading shall be within the following limits:

      50 Hz Sets: 257 ± 3 Volts AC
      60 Hz Sets: 280 ± 3 Volts AC

      If voltage is not within specifications, readjust Pot. 6 1° CW and go back to Step d.

   g. Readjust Pot. 2 about 1/8 turn CCW to prevent immediate shutdown upon restart.

   h. Turn the controller's main switch to the OFF position and reset the overvoltage fault.

   i. Restart the generator set and readjust Pot. 2 for the specified output voltage for this set as indicated on the AC voltmeter.

   j. Seal Pot. 6 with insulating varnish or equivalent.

9-1.1. Overspeed Shutdown Check (Pot. 5) — Models Without NFPA Controllers Only

   a. While observing the frequency counter reading, slowly increase the engine speed (by adjusting the engine governor) just to the point where the set shuts down. Note carefully the frequency counter reading just prior to shutdown. This reading shall be within the following limits:

      50 Hz Sets: 60 ± 2 Hz
      60 Hz Sets: 70 ± 2 Hz

   b. Readjust the governor slightly to reduce engine speed, thereby preventing an immediate shutdown upon restart.

   c. Turn the controller main switch to the OFF position and reset the overspeed fault.

   d. After restarting the set, readjust the engine speed governor for the set's specified output frequency.

NOTE

If the set fails to pass this test, go to Step 9-1.2. Otherwise, omit Step 9-1.2 and go to Step 10.

9-1.2. Overspeed Shutdown Adjustment (Pot. 5) — Models Without NFPA Controllers Only

   a. Break adjustment seal and turn Pot. 5 to its full CW position.

   b. Adjust the engine speed governor for a frequency counter reading as follows:

      50 Hz Sets: 61 ± 1 Hz
      60 Hz Sets: 71 ± 1 Hz

   c. Slowly turn Pot. 5 in a CCW direction, just to the point where the generator set shuts down. Do *not* turn the pot. beyond this point.

   d. Readjust the governor slightly to reduce engine speed, thereby preventing an immediate shutdown upon restart.

   e. Turn the controller's main switch to the OFF position and reset the overspeed fault.

   f. Restart the set and increase engine speed until shutdown while observing frequency meter. Note carefully the frequency reading just prior to shutdown. This reading shall be within the following limits:

      50 Hz Sets: 61 ± 1 Hz
      60 Hz Sets: 71 ± 1 Hz

NOTE

If frequency is not within specifications, readjust Pot. 5 1° CW and go back to Step d.

g. Readjust the governor slightly to reduce engine speed, thereby preventing an immediate shutdown upon restart.

h. Turn the controller's main switch to the OFF position and reset the overspeed fault.

i. Restart the set and readjust the engine speed governor for the set's specified output frequency as indicated by the frequency counter.

j. Seal Pot. 5 with insulating varnish or equivalent.

9-2.1. Overspeed Shutdown Adjustment (Pot. 5) — Models with NFPA Controllers Only

a. Break adjustment seal and turn Pot. 5 to its full CW position.

b. Adjust the engine speed governor for:

50 Hz Sets: 61 ± 1 Hz
60 Hz Sets: 71 ± 1 Hz

c. Break adjustment seal and slowly adjust the overspeed pot. on the NFPA controller board just to the point where the generator set shuts down. See Figure 3.

d. Readjust the governor slightly to reduce engine speed, thereby preventing an immediate shutdown upon restart.

e. Turn the controller's main switch to the OFF position and reset the overspeed fault.

f. Restart the set and increase engine speed until shutdown while observing frequency meter. Note carefully the frequency reading just prior to shutdown. This reading shall be within the following limits:

50 Hz Sets: 61 ± 1 Hz
60 Hz Sets: 71 ± 1 Hz

g. Readjust the governor slightly to reduce engine speed, thereby preventing an immediate shutdown upon restart.

h. Turn the controller's main switch to the OFF position and reset the overspeed fault.

i. Restart the set and readjust the engine speed governor for the set's specified output frequency as indicated by the frequency counter.

j. Seal Pot. 5 with insulating varnish or equivalent.

k. Seal the overspeed pot. on the NFPA controller board with insulating varnish or equivalent. Be careful not to move the adjustment wheel.

9-2.2. Voltage Adjustment Range Check — Models with NFPA Controllers Only

a. Turn the external voltage adjustment potentiometer on the controller assembly front panel (if equipped) while observing the AC voltmeter reading. Note the readings when the potentiometer is in the CW and CCW limit positions. These readings should be at least 10 Volts above and below the set's specified output voltage. Adjust to the specified voltage.

10. Regulator calibration is now complete. Turn controller main switch to OFF position and wait until set shuts down. Disconnect AC voltmeter and frequency counter. Seal Pot. 1, Pot. 2 and Pot. 3 on the regulator board with insulating varnish or equivalent. Check to make sure all five pots. on the regulator board are sealed. On units with NFPA controllers, check to make sure overspeed adjustment pot. on NFPA controller is sealed.

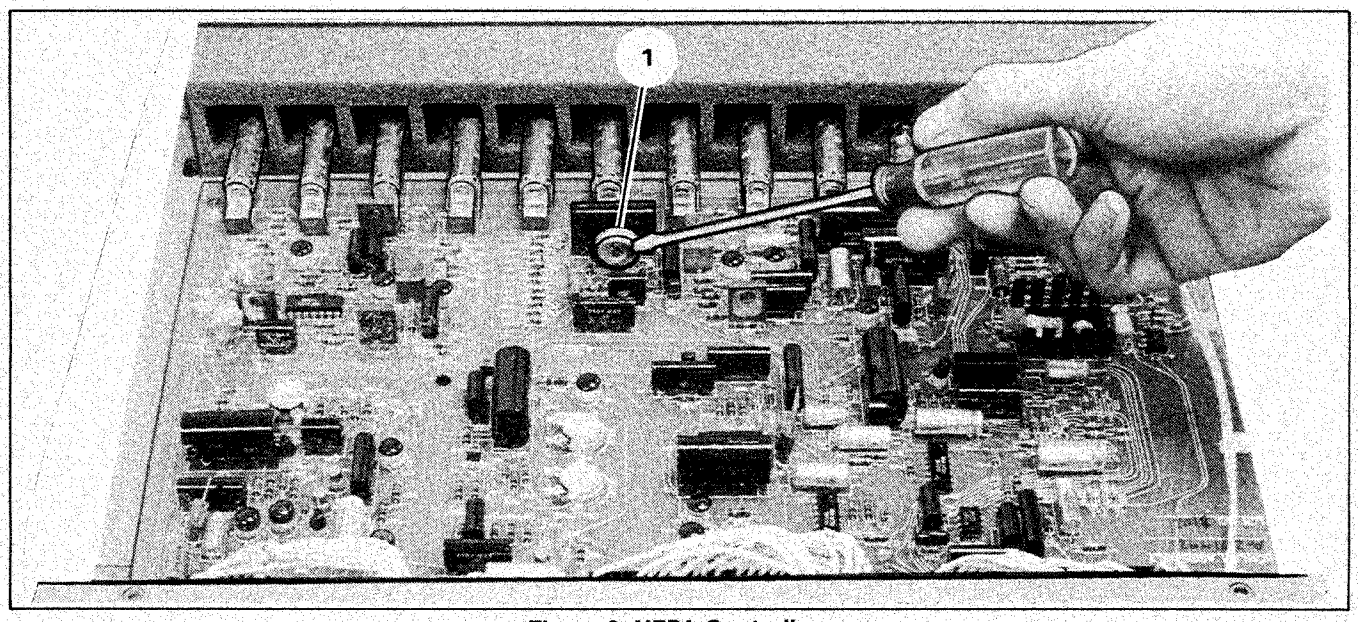


Figure 3. NFPA Controller

1. Overspeed Pot.

VOLTAGE REGULATOR BOARD ADJUSTMENT (Old style boards with Pot. 4 — Load Shed)

1. Break adjustment seals on Pots. 1, 2, 3, 4, 5 and 6.
2. Adjust Pot. 2 and Pot. 4 to their fully counterclockwise position.
3. Adjust Pot. 1, Pot 5 and Pot. 6 to their fully clockwise position.
4. Start the generator set with no load applied.

WARNING

DANGER OF ELECTROCUTION! High voltage is present at regulator board P1 connector and terminal strip when unit is running.

5. Adjust Pot. 2 for the specified output voltage as indicated by the AC voltmeter.

CAUTION

Do not exceed 285 volts when adjusting Pot. 2. Regulator board damage may result.

6. Observe LED on the regulator board. If it is glowing a steady red, proceed to the next step. If it is "flickering" alternately adjust Pot. 3 and Pot. 1 until a steady glow is obtained. It may be necessary to repeat the alternate adjustment several times.

NOTE

For Single Phase units do NOT adjust Pot. 1. Leave it in the fully clockwise limit.

7. For 60 Hz Frequency Specifications:

   Readjust Pot. 2 for an output of 280 Volts ± 4 Volts as indicated by the AC voltmeter.

8. Slowly adjust Pot. 6 in the counterclockwise direction to the point where the generator set shuts down. The overvoltage shut-down function is now set.
9. Readjust Pot. 2 approximately 1/8 turn counterclockwise before restarting the generator set.
10. Turn the controller main switch to OFF. Activate the overvoltage reset switch and restart the generator set.
11. Adjust Pot. 2 for the specified output voltage as indicated by the AC voltmeter.
12. For 60 Hz Frequency Specifications:

    Adjust the engine speed governor for an output frequency of 71 Hz (2130 RPM) ± 1 Hz as indicated by the frequency meter.

    For 50 Hz Frequency Specifications:

    Adjust the engine speed governor for an output frequency of 61 Hz (1830 RPM) ± 1 Hz as indicated by the frequency meter.

13. For Basic and Meter Box Models:

    Slowly adjust Pot. 5 in the counterclockwise direction to the point where the generator set shuts down. The overspeed shut-down function is now set.

    For NFPA (Hospital Code) Models:

    Leaving Pot. 5 in its fully clockwise position, slowly adjust the overspeed Pot. on controller board clockwise until set shuts down (Figure 3). The overspeed shut-down function is now set.

14. Adjust engine governor as necessary to reduce engine speed before restarting set.
15. Turn main switch to OFF. Activate overspeed reset switch, and turn main switch to test to restart generator set.

Complete the following steps with rated full load applied to the generator set:

16. For 60 Hz Frequency Specifications:

    Adjust the governor for an output frequency of 57 Hz (1710 RPM) ± 1 Hz as indicated by the frequency meter.

    For 50 Hz Frequency Specifications:

    Adjust the governor for an output frequency of 47 Hz (1410 RPM) ± 1 Hz as indicated by the frequency meter.

17. Observe the AC voltmeter reading and adjust Pot. 4 clockwise to where the output voltage begins to decrease. Slowly readjust counterclockwise to the point where the output voltage stops increasing. The load shedding function is now calibrated to become operational at a frequency slightly below the specified value.
18. Adjust the governor to the specified frequency.
19. Adjust the external voltage adjustment on the controller assembly front plate (if equipped) throughout its range. The output voltage indicated by the AC voltmeter should change ± 10 Volts minimum from the specified value. Adjust to the specified voltage.
20. Regulator calibration is now complete. Turn main switch to OFF and wait until set shuts down. Disconnect meters and reseal pots. with "insulating varnish".

KOHLER
GENERATORS

TP-5075 3-84
Printed in U.S.A.

KOHLER CO. KOHLER, WISCONSIN 53044