

<p>ARCS PROCEDURE:</p> <p>Author: F. Hesel</p>	<p>GENSET – TRANSFER SWITCH COMPARTMENT PRINTED CIRCUIT BOARD REPLACEMENT</p>	<p>PRO(GEN)-008.001</p> <p>February 16, 2001</p> <p>Page 1 of 8</p>
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GENSET – Transfer Switch Compartment Printed Circuit Board Replacement

I. Purpose:

To describe the steps to be taken for replacing the printed circuit board in the transfer switch compartment of GENSET.

II. Cautions and Hazards:

- This procedure is to be performed **ONLY** by a technician qualified to work on Caterpillar generators and transfer switch equipment.

III. Requirements:

None.

IV. Procedure:

A. Steps:

1. The ARCS instruments and computer systems must be turned off prior to beginning this procedure. Once this equipment is powered down and you have received authority to proceed with the repair, check that the two UPS supplies (I-Van and D-Van) are shut down (red switch on the front of these supplies is switched to “Emergency Off” position). Switch the main service disconnect switches at the entrance to each ARCS van to the “O” or OFF position.
2. Enter Utility Van generator compartment and go to the “generator’s electronic control panel” and rotate the rotary switch to the OFF position.
3. Go to the “service entrance circuit breaker,” which is located at the lower right hand side of the generator room as you enter the utility generator room. Place this circuit breaker to the O position (off or down). This will open the breaker and disconnect utility grid power to the entire system. **Note:** make sure all vans are power down before doing this.
4. Place lockout/tagout device over the circuit breaker switch and padlock. This lockout device and padlock is included with repair kit provided.
5. Open the transfer switch compartment door and measure voltages at E1, E2, E3, E4, N1, N2, N3, N4, T1, T2, T3, T4 terminal lugs. No

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voltage should be present at these terminal lugs. Work in transfer switch compartment can now be performed safely.

6. Remove the clear Lexan cover from the switch control electronic box which is mounted on the inside door of the transfer switch compartment. This box is white and contains the printed circuit boards that are to be replaced.
7. Identify three PC boards to be replaced. The top board is to be replaced first, this is the system control board. Do not concern yourself with potentiometer settings. These settings will be repositioned to given values after replacement of all boards has been done and are stated at the end of this procedure.
8. Disconnect the Molex 15 pin connector from the mating connector using a flat, thin but wide screwdriver. Carefully remove the connector as not to damage any pins or wiring.
9. Remove the black cover labeled "System Control" by using a ¼" nut driver which is supplied along with the kit. It may be necessary to rotate the potentiometer knobs to slide the cover over them. It is not necessary to remove these knobs. The new boards have their own knobs.
10. Now that the cover has been removed, the PC board can be removed with a ¼" nut driver and replaced with the new board supplied in the kit. (Note: This board is labeled 63904 System control board on outside of box.)
11. Reverse the procedure to install the new board.
12. Make sure to reinstall the 15 pin connector to the mating connector and that it is seated and locked firmly into place.
13. Place the potentiometer knobs according to these positions:
 - Engine minimum run – 6 min. (fully counterclockwise)
 - Engine warm-up – 6 sec. (fully counterclockwise)
 - Return to utility – 10 min. (fully counterclockwise)
 - Engine cooldown – 5 min. (fully counterclockwise)
 - Standby voltage – 85% (approx. 12 o'clock position)
 - Standby frequency 80% (fully counterclockwise)
 - Time delay – 5 sec. (approx. 12 o'clock position)
 - Transfer when exercising (to **OFF** position)
 - Engine warm-up timer bypass (to **OFF** position)

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14. This completes the installation for the system control board.
15. The middle board, labeled the “Programmable Exerciser” can now be replaced using the same procedures performed with the system control board, with the exception of removing the 9 volt battery prior to the removal of this board.
16. After replacement of this board replace the 9 volt battery with the new battery which is supplied in the kit. Insure that this connector is firmly seated in place. Check to insure that the Molex connectors are properly connected.
17. Do not concern yourself with programming the exerciser board at this time. This will be done later on in this procedure.
18. Repeat procedure for the third board, labeled “Utility Voltage Sensor.”
19. After installation of this board place the potentiometers to the following positions:
 - Voltage Pickup – 95%
 - Voltage Dropout – 95% of Pickup
 - Line Interrupt Delay – 5 seconds
20. Review installation of all three boards and verify that all connections have been done properly, that the connectors are firmly in place and that mounting the hardware is tight (careful not to strip or overtighten plastic screws).
21. Do not replace Lexan cover over control electronic boards at this time, due to the fact that the exerciser board has not been programmed at this time.
22. Close the transfer switch compartment door.
23. Execute the “Functional Tests” describes in section 9.5, Part 9, of the “WN type Automatic Transfer Switch” manual. You will need to remove the Lock/out padlock and lockout device from service entrance circuit breaker to perform this test. Place lever to the position 1 (on or up). Power from grid to the transfer switch is now present.
24. The following steps repeat parts of the “Functional Tests” of section 9.5. These steps will verify transfer switch operation.
25. Observe lights on the Transfer Switch compartment door. The Normal light should be lit.
26. Go to the Electronic panel at the generator and rotate the switch to the AUTO position.

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27. The generator may start but will cycle through and should shut itself off in approx. 15 minutes.
28. Allow the generator to shut down and then simulate a grid failure by opening the service entrance breaker (place breaker to the “O” position) (off or down).
29. The generator should start and after a short period (approx. 10 minutes), the system will be powered by the generator.
30. Successful transfer can be verified by viewing the indicator lights on the Transfer switch door. The red light should be lit and that normal light off when the GENSET is providing power to the site.
31. Voltage measurements can be made at the terminal boxes at each respective van. These terminal boxes are located next to each van near the right front of each van.
32. Voltage levels should be nominally 416 volts phase to phase, 220-240 phase to neutral.
33. Reapply grid power, by placing service entrance circuit breaker to the 1 position (on or up) and verify transfer to grid by observing door panel lights in generator room. Normal light should come on and standby light should go off after approximately 10 minutes.
34. Generator will shut down automatically after approximately 15 minutes.
35. Repeat simulated grid failures until satisfied that the transfers to and from standby, return to grid, and automatic shutdown of generator is working as designed.
36. Once the normal grid power light is on and the generator has shutdown, open the transfer switch compartment door and program the exerciser board according to instruction to the exerciser board.
37. Program to the following:
 - Set of time of day – time of programming
 - Set time of day engine to exercise – 12:00 a.m.
 - Set day – Friday
38. Place Lexan cover through slots over PC board compartment.
39. This concludes the board replacement procedure.
40. Review all your work. At the electronic control panel on the generator make sure that the rotary switch is in the AUTO position.

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41. Return to the twp UPS front panel switches (red) to “ON” position.
Return main service disconnect switches at the entrance to each van to “1” or ON position.
42. Notify TWP that the repair is completed.

V. References:

1. WN type Automatic Transfer Switch Manual.

V. Attachments:

None.