

## Lesson: Troubleshooting the LTIII

This lesson presents an introduction to the troubleshooting procedures used with the LTIII Automatic Transfer Switch.

### Objectives

After completing this lesson, you should be able to:

- Locate the troubleshooting information in the Service Manual.
- Locate and identify the LEDs on the electronic control board.
- Use the troubleshooting guide and a failed LTIII to determine the most logical testing process for correcting the problem.

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## The LTIII Troubleshooting Guide

1. The troubleshooting guide is located in the LTIII Service Manual 913–0503, Section 4.
2. The LTIII troubleshooting guide includes conditional schematics which highlight the circuitry that is energized during the sequence of events.
3. The troubleshooting guide provides the sequence of operation of transfer, retransfer, test and exercise, with and without load.
4. The troubleshooting guide includes an index of Problem Descriptions and the page number of the corrective action procedure for each problem.
5. "Operator Level" troubleshooting which gives an explanation of what could cause a particular problem (pages 4–7, 4–9, 4–11, 4–13, 4–14, 4–15).
6. "Technician Level" troubleshooting which gives the test points and voltages for the technician to isolate the problem to the electronic control, a specific contactor, a wiring harness, or accessory module (pages 4–6 through 4–15).
7. Understanding the Normal source failure, transfer, normal source return, and retransfer sequences of operation are critical for expedient problem diagnosis.
8. The electronic control schematic and wiring diagrams are also excellent troubleshooting aids.

**Exercise: Normal Source Available Schematic– 240 VAC, Single Phase. Refer to drawing 626–2242, page 2 of 5 for this example.**

1. Normal Source sensing, phases A and C, enter the control from J1/P1 pins 1 and 4 to A1TB1 terminals 1 and 4. Voltage between terminals A1TB1–1 and A1TB1–4 is 240VAC.
2. The voltage between cathodes A1CR15 and A1CR17 is 24VAC.
3. The voltage between anode A1CR15 and cathode A1CR14 is 24Vdc.
4. The voltage between cathode A1CR14 and TB2–1 is 24Vdc (Sense\_A1).
5. The voltage between anode A1CR15 and TB2–1 is 0Vdc (Sense\_A2).
6. The Normal source is connected to the load, so A1K1 retransfer relay is energized and the contacts are closed.
7. The voltage between A1TB1–1 and A1TB1–9 is 0 VAC and the voltage between A1TB1–4 and A1TB1–8 is 0 VAC.
8. The voltage between A1TB1–8 and A1TB1–9 is 240VAC.
9. The voltage between J1–10 and J1–11 is 240VAC.
10. K1 is closed to the load. K1 normally closed contacts 61 to 62 are open.
11. K2 normally closed contacts 51 to 52 are closed.
12. The voltage between K161 and K251 or K252 is 240VAC.
13. The voltage between K161 and K2A1 is 240VAC.
14. The voltage between A1J4–6 and A1J4–8 is 24Vdc.

## Activity: Emergency Source Available – Energize K1–TC.

Given: Normal Power Source is interrupted. The Emergency source is available and time delay for transfer is just complete. Answer the following to determine the sequence for energizing the K1–TC (K1 trip coil).

1. Voltage between P1–3 and P1–6 is \_\_\_\_\_
2. Voltage between A1TB2–1 and A1TB2–4 is \_\_\_\_\_
3. Voltage between A1TB2–5 and A1TB2–6 is \_\_\_\_\_
4. Voltage between the cathode of A1CR33 and anode of A1CR34 is \_\_\_\_\_
5. Voltage between the cathode of A1CR32 and anode of A1CR33 is \_\_\_\_\_
6. Voltage between Sense\_Emer1 and Sense\_Emer2 is \_\_\_\_\_
7. Voltage between J1–9 and J1–12 is \_\_\_\_\_
8. Voltage between A1TB2–5 and K1E1 is \_\_\_\_\_
9. Voltage between A1TB2–6 and K1E1 is \_\_\_\_\_
10. Voltage between A1TB2–5 and K1A2 is \_\_\_\_\_
11. Voltage between K2A1 and K2A2 is \_\_\_\_\_

## Activity:

Using the page 2 of 5 of the 626-xxxx wiring diagrams, determine whether or not the Emergency source contactor has the latching feature—either mechanical or magnetic. Circle the correct answer for each wiring diagram listed below.

1. 626-2242, page 2 of 5

K1 has a mechanical latch, permanent magnet latch, or no latch.

K2 has a mechanical latch, permanent magnet latch, or no latch.

2. 626-2243, page 2 of 5

K1 has a mechanical latch, permanent magnet latch, or no latch.

K2 has a mechanical latch, permanent magnet latch, or no latch.

3. 626-2244, page 2 of 5

K1 has a mechanical latch, permanent magnet latch, or no latch.

K2 has a mechanical latch, permanent magnet latch, or no latch.

4. 626-2245, page 2 of 5

K1 has a mechanical latch, permanent magnet latch, or no latch.

K2 has a mechanical latch, permanent magnet latch, or no latch.

5. 626-2252, page 2 of 5

K1 has a mechanical latch, permanent magnet latch, or no latch.

K2 has a mechanical latch, permanent magnet latch, or no latch.

6. 626-2253, page 2 of 5

K1 has a mechanical latch, permanent magnet latch, or no latch.

K2 has a mechanical latch, permanent magnet latch, or no latch.

## Activity: Troubleshooting the LTIII Transfer Switch

Using the Service Manual (913–0503), solve the problems on as many LTIII transfer switches as possible. The instructor may change the problems on the switches as the activity continues.

### Problem #1

What is the problem on this unit?

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On what page of the Service Manual did you find an explanation of what could cause this problem?

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On what page of the Service Manual did you find a procedure for troubleshooting this problem?

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What did you check to solve the problem?

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What diagrams did you use to help determine how to troubleshoot the problem if there was no procedure in the Service Manual?

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**Problem #2**

What is the problem on this unit?

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On what page of the Service Manual did you find an explanation of what could cause this problem?

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On what page of the Service Manual did you find a procedure for troubleshooting this problem?

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What did you check to solve the problem?

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What diagrams did you use to help determine how to troubleshoot the problem if there was no procedure in the Service Manual?

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**Problem #3**

What is the problem on this unit?

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On what page of the Service Manual did you find an explanation of what could cause this problem?

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On what page of the Service Manual did you find a procedure for troubleshooting this problem?

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What did you check to solve the problem?

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What diagrams did you use to help determine how to troubleshoot the problem if there was no procedure in the Service Manual?

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