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Hands-On Technical Workshops
by Ron Beaufort

Email PLC Quiz #210 – Questions

Greetings ...

This edition of our "Email PLC Quiz" contains questions which are somewhat "Beyond Beginner" and could prove challenging even for some technicians who have considerable PLC experience. As always, the primary objective of the quiz is to cover useful skills for technicians who troubleshoot systems controlled by Allen-Bradley PLCs.

PLEASE NOTE: If you would rather not receive more "Email PLC Quizzes" like this one, just reply to this email with the word "remove" in the subject line. On the other hand, if you know someone who might find this type of information useful, please feel free to forward this email to them.

IMPORTANT: Due to size and bandwidth considerations, this edition of the "PLC Quiz" is being sent as an email attachment. If you have trouble opening the attachment, you may download the entire file (in an easy to print PDF format) from our website at www.ronbeaufort.com - look in the "Sample Lessons" section. Answers to the quiz are also available as a separate file. Absolutely no registration or visitor information is ever required for access to our website.

Also, if you'd like to discuss the information contained in any of our quizzes, please feel free to contact us. We'll be glad to answer any questions you might have.

Please keep in mind that this material is intended only for use with the PLC-5, the SLC-500, and the ControlLogix families of Allen-Bradley PLC processors. You should also keep in mind that there may be certain important differences in operation between these three processor families. For example, information pertaining to a PLC-5 system might not be directly applicable to the SLC-500 or the ControlLogix platforms. In simple terms, all Allen-Bradley processors do NOT function in exactly the same way.

LEGAL DISCLAIMER: This material is provided "as is" with no warranty of any kind. Specifically, we do not assume responsibility or liability for any actual use of this material in an industrial setting and shall be held harmless with respect to any information presented herein. In all cases, consult all applicable codes, regulations, and standards – and your local plant engineering staff - before applying any control strategy.

We'd also like to say "thank you" to all of you who have contacted us and asked for future editions of our PLC Quizzes – and who have recommended your friends and associates to be added to our email list. Based on all of the comments we've received so far, it seems that we're meeting our goal of making our quizzes: (1) entertaining, (2) thought provoking, and (3) educational. We've also been pleased to hear about the "spirited" debates over our previous editions that have taken place around the maintenance shops. We'd like to say a special "thank you" for all of your excellent suggestions for topics to be covered in our future editions. We'll definitely try to get around to those in the months ahead.

Good luck on the quiz ...

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Beyond Beginner Quiz – Number 210

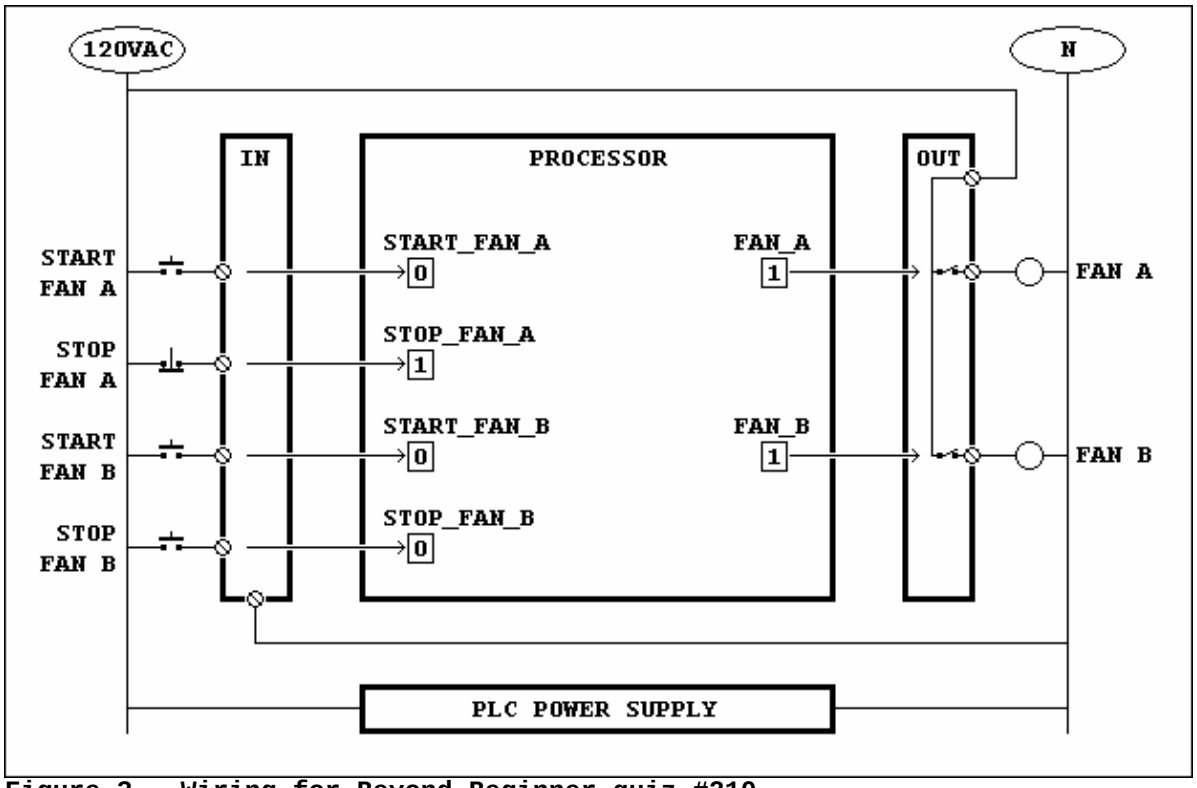

Figure 3 – Wiring for Beyond Beginner quiz #210

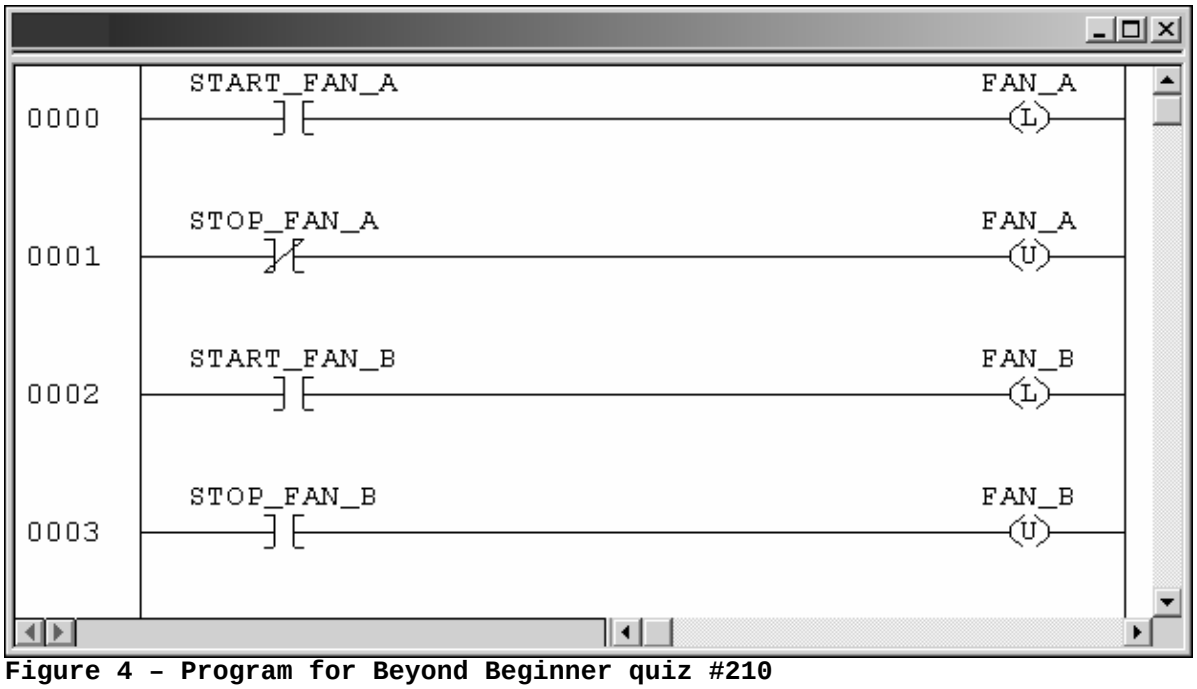

Figure 4 – Program for Beyond Beginner quiz #210

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Figure 3 shows the wiring for a simple control system. The two output field devices are ventilation fans which are required to automatically "resume operation" after a plant-wide power failure.

Figure 4 shows the entire ladder logic program. These rungs are being properly scanned as in a normal simple program. This is not an STI or any other type of subroutine file. Notice that "retentive" Latch and Unlatch instructions are being used in order to satisfy the "resume operation" requirements specified above. The processor's key will be left in the Run position throughout the entire exercise.

Our objective is to test the system's operation by initiating a plant-wide power failure while both of the fans are running – and then confirm that both fans properly "resume operation" and come back ON again once the power is eventually restored.

Before the test begins, both FAN_A and FAN_B are running – under the conditions shown in Figure 3. To initiate the test, the 120VAC power line which supplies both the PLC's power supply and the system's I/O wiring is suddenly turned OFF to simulate a plant-wide power failure.

Several minutes later, the 120VAC line power is restored. According to the programming specifications, FAN_A and FAN_B are both required to "resume operation" without a press of either of the "start buttons". But will the fans actually come back ON as planned?

Beyond Beginner Quiz – Number 210

For an SLC-500 system – after a plant-wide power cycle ...
Question 1: Will FAN_A come back ON or will it stay OFF?
Question 2: Will FAN_B come back ON or will it stay OFF?

For a PLC-5 system – after a plant-wide power cycle ...
Question 3: Will FAN_A come back ON or will it stay OFF?
Question 4: Will FAN_B come back ON or will it stay OFF?

For a ControlLogix system – after a plant-wide power cycle ...
Question 5: Will FAN_A come back ON or will it stay OFF?
Question 6: Will FAN_B come back ON or will it stay OFF?

There are many experienced technicians and professional programmers who cannot confidently answer these apparently simple questions without doing a considerable amount of research – or else performing several hands-on experiments with actual equipment.

The answers are available for downloading from our company website at www.ronbeaufort.com – look in the "Sample Lessons" section. Absolutely no registration or visitor information is ever required for access to our website.

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