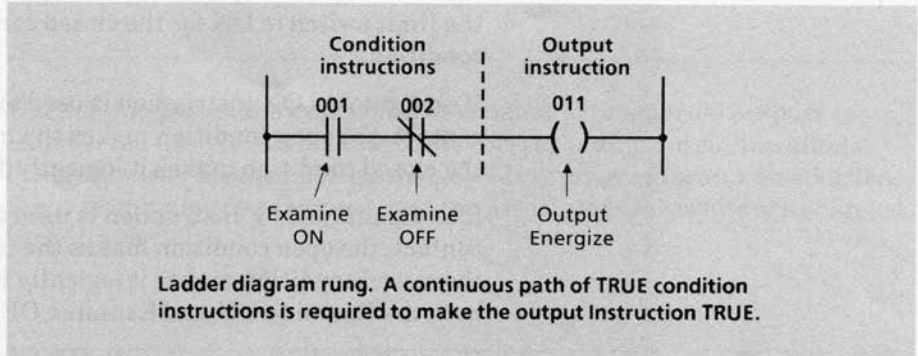


Logical Continuity

An example of how condition and output instructions are used is shown in the ladder diagram of Figure 3.7. The *Examine ON* and *Examine OFF* instructions (conditional) are analogous to relay contacts, while the *Output Energize* instruction is analogous to a relay coil. However, this diagram must be evaluated in terms of *logical* continuity rather than *electrical* continuity.

Figure 3.7



As stated earlier, each instruction is linked to a status bit in the data table. The bit will be either ON or OFF to indicate the status of the instruction. Thus, with the *Examine ON* instruction we are asking the controller to “examine the status bit for an ON condition”. If the status bit is ON, then the instruction is TRUE; if the bit is OFF, then the instruction is FALSE.

Similarly, the *Examine OFF* instruction means “examine the status bit for an OFF condition”. If the status bit is OFF, the instruction is TRUE; if the bit is ON, the instruction is FALSE.

The *Output Energize* instruction asks the controller to “set the status bit of the addressed *Output Energize* instruction to ON when rung conditions are TRUE”. Thus, in Figure 3.7, when both the *Examine ON* instruction and the *Examine OFF* instruction are TRUE, the status bit of the *Output Energize* instruction will be set to ON.

In terms of continuity: When there is a continuous path of TRUE *conditional* instructions in a rung, logical continuity exists; accordingly, the output instruction is TRUE and its status bit will be set ON. If any conditional instruction in the continuity path goes FALSE, logical continuity is lost; the output instruction is then FALSE and its status bit will be set to OFF.

External I/O Devices

The user program always includes instructions to represent external devices connected to the processor and expansion units. The processor examines the status of these external devices indirectly.

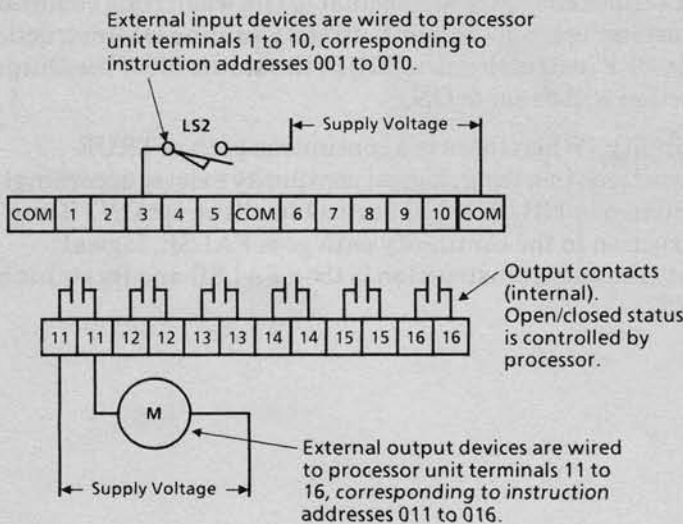
Thus, in Figure 3.8a, the limit switch contact connected to input terminal 3 causes a voltage to be present at the terminal when the switch is closed, and removes this voltage when the switch is opened. The processor senses these voltage levels, and sets the status bit of the instruction representing the limit switch to ON for the closed condition and OFF for the open condition.

If an Examine ON instruction is used to represent the limit switch contact, the open condition makes the instruction logically FALSE, and the closed condition makes it logically TRUE.

If an Examine OFF instruction is used to represent the limit switch contact, the open condition makes the instruction logically TRUE, and the closed condition makes it logically FALSE. Figure 3.8b summarizes both the Examine ON and Examine OFF cases.

Figure 3.8b also summarizes the Output Energize instruction as it applies to an external I/O address. In this case, if the status bit of the instruction is ON, the corresponding output contact (Figure 3.8a) closes, energizing the external device. If logical continuity of the rung is lost, the status bit is changed to OFF; the output contact opens, de-energizing the external device.

Figure 3.8



3.8a – External input and output device connections. Input wiring terminals 1-10 correspond to addresses 001-010. Output wiring terminals 11-16 correspond to addresses 011-016.

External Input Device	Input Terminal	Examine ON Instruction	Examine OFF Instruction
OPEN	OFF	FALSE Status Bit OFF	TRUE Status Bit OFF
CLOSED	ON	TRUE Status Bit ON	FALSE Status Bit ON

Output Energize Instruction	Output Contacts	External Output Device
Status Bit ON TRUE Rung Conditions	CLOSED	ENERGIZED
Status Bit OFF FALSE Rung Conditions	OPEN	NOT ENERGIZED

3.8b – Examine ON, Examine OFF, and Output Energize instructions, as they relate to external input and output devices.