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# Hydraulics Technology 3: Advanced Hydraulics and Electro-Hydraulics

## SKILL 11A: A FULLY AUTOMATIC SYSTEM

Name	Class/Period	Date

### 1. Overview

In Hydraulics Technology 2, you built and operated a semi-automatic system. Recall that in a semi-automatic system, the system executes a single complete working cycle and then stops, waiting for manual input.

In this Skill Drill, you will use both magnetic switches to build a fully automatic electro-hydraulic system, where the system is started manually and then continuously completes full working cycles until it is manually stopped.

### 2. Performance Objectives

- Connect and operate an automatic electro-hydraulic system.
- Connect and operate a circuit based on sequential operation.

### 3. Required Materials

- JMTS panel
- Oil tray
- Hydraulic power pack
- Hoses of different lengths
- 4/3 sol-sol tandem valve
- Double-acting cylinder with attached magnetic sensors
- Power supply module
- Operational module
- Relay module
- Electrical cables of different lengths
- Rags or paper towels
- Hex driver

- Safety glasses

#### 4. Panel Setup

Secure the components to the panel as shown:



#### 5. Inventory and Safety

Before beginning the Skill Drill, review this checklist and mark off each item as you complete it.

- ☐ All hardware components required for this Skill Drill are mounted on the panel.
- ☐ The hardware is mounted securely to the panel.
- ☐ The power pack is off, and the pressure gauge reads zero.
- ☐ The power supply module is off.
- ☐ You are wearing safety glasses.
- ☐ Hands, hair, and clothing are securely away from the work area of any moving parts.
- ☐ You are standing an arm's length away from the panel.
- ☐ The work area is clean and devoid of food or drink.
- ☒ *Warning: Oil may leak from components and hoses. Be aware of oil leaking after disconnecting hoses from components. Do not get oil on your clothing!*

## 6. Skill Drill

### Procedure

Perform these steps:

1. Build and operate the following electro-hydraulic system:
  - The system is fully automatic.
  - In a single working cycle, the cylinder fully extends and then fully retracts.
  - When the system is commanded (manually) to stop, it completes its current working cycle and then stops.

Scan the code below to watch the system action.



2. Show your electro-hydraulic system to your instructor.

### Hints and Tips

- You will need to use one of the operational module's toggle switches or the upper switch-button to build this system. The push buttons that you have used previously may be inadequate.
- If you have the simulator available, you may want to simulate your circuit before trying it out in the lab. (Recall that the magnetic sensors in your lab only have normally open connections.)
- Connect the hydraulic components before you connect the electric components.
- You can test whether or not you have made some of your electric connections correctly before turning on the power pack. Solenoid valves have indicators that are illuminated when a solenoid is energized, even if no oil is present.
- Your circuit will have to latch and unlatch relays. Remember that you need NC contacts to unlatch a relay, and the magnetic sensor/switches are NO.

## 7. Authentic Skill Assessment

Have your instructor verify that your work meets the requirements in the Performance Objectives and sign below. Place this Skill Drill Sheet in your Skills binder.

Instructor Signature	Date

## 8. Shutdown

Unless instructed otherwise by your teacher, review and complete each of the items of the checklist below.

- ☐ Switch off the power pump.
- ☐ Switch off the power supply module.
- ☐ Clean any oil spills using rags or paper towels.
- ☐ Disconnect all hoses and put them away.
- ☐ Remove the components mounted on the JMTS panel and store them securely unless instructed otherwise by your teacher.
- ☐ Check whether all materials required for this activity have been returned to their proper place at your lab station.