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# Hydraulics Technology 3: Advanced Hydraulics and Electro-Hydraulics

## SKILL 3A: CONTROLLING PISTON SPEED

Name	Class/Period	Date

### 1. Overview

In this Skill Drill, you will build a dowel insertion type hydraulic circuit. In the circuit, you will be able to control the extension and retraction speed of the piston using two unidirectional valves.

### 2. Performance Objective

- Adjust hydraulic cylinder speed.

### 3. Required Materials

- JMTS panel
- Oil tray
- Hydraulic power pack
- Hoses of different lengths
- 4/3 closed-center valve
- Two unidirectional valves
- Two pressure gauges
- Double-acting cylinder
- Rags or paper towels
- Hex driver
- Safety glasses

#### 4. Panel Setup

Secure the components to the panel as shown. Ensure that you have left at least 9 inches / 20 cm between the piston head and the tabletop or benchtop.



#### 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.
- ☐ 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 the following steps:

1. Build a hydraulic circuit that performs the following actions:
  - For one of the 4/3 valve positions, the cylinder extends. The speed of extension can be adjusted by one of the unidirectional valves.
  - For a different 4/3 valve position, the cylinder retracts. Retraction speed can be adjusted by the other unidirectional valve.

Scan the code below to watch the system action.



2. Show the hydraulic system to your instructor.
3. If you have not already done so, implement the two pressure gauges into the circuit by connecting them to either port of the cylinder. Observe the changes in pressure as you adjust the unidirectional valves and extend and retract the cylinder. Note your observations.

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### Hints and Tips

- Port letters indicate what type of hoses the ports should be connected to. For example:
  - T should be connected to the tank return valve.
  - A and B indicate output to actuators.
  - P is typically the input port for the valve.
- Unidirectional valves only control oil flow in one direction. Make sure that you have connected them to your circuit properly.

## 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.
- ☐ 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.