P6

PRACTICAL P6 · UNIT E6

Machine safety interlock

UNIT PROGRESS

AIM

Build and test a three-input logic interlock for a press: it runs only when the guard is closed (G), both hands are on the buttons (H) and the stop switch (S) is not pressed.

YOU NEED

- ☐ Logic trainer, or 74HC08 (AND) and 74HC04 (NOT) ICs on a breadboard
- ☐ 3 switches with 10 kΩ pull-down resistors, labelled G, H, S
- ☐ LED + 330 Ω resistor as the motor output (Z)
- ☐ 5 V supply, multimeter
- ☐ Or: CircuitClass logic mode (needs CircuitClass logic mode)

SHORT CIRCUIT

× WHAT EXAMINERS SAW

Logic circuits submitted without labelled input devices could not be tested.

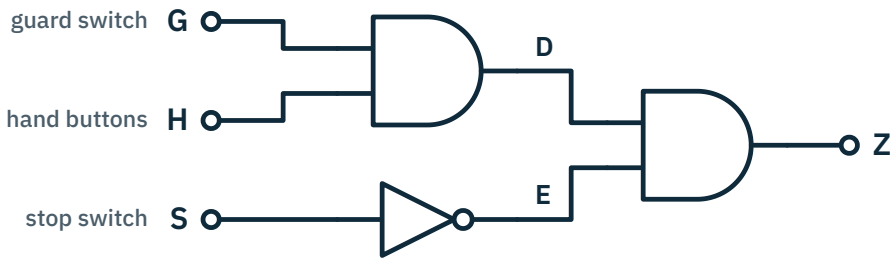
✓ THE FIX

Label each switch G, H or S and the output Z, exactly as in the task.

Course report 2026, Tasks 4a–c.

Design

Z = (G • H) • $\overline{S}$. D is the AND output; E is the NOT output.



Press interlock with labelled input devices

Predict, then test

Predict D, E and Z first. Then test every row. Measure V_{out} at the LED with the multimeter.

Machine safety interlock

G H S	D (predicted)	E (predicted)	Z (predicted)	Z (measured)	V_{out} (V)
0 0 0					
0 0 1					
0 1 0					
0 1 1					
1 0 0					
1 0 1					
1 1 0					
1 1 1					

Expected results

Test results

Modification

Inverbrae Machine Works (fictional) wants a key switch K that a supervisor can turn to lock the press off. Describe and test your modification.

Machine safety interlock

Evaluate

EVALUATION FRAME

Specification point: The circuit should _____.

Result: When I _____, the _____ _____.

Cause and effect: This happened because _____, so _____.

Improvement: To fix the issue named in the task I would _____, so that _____.

Not for use during the assignment