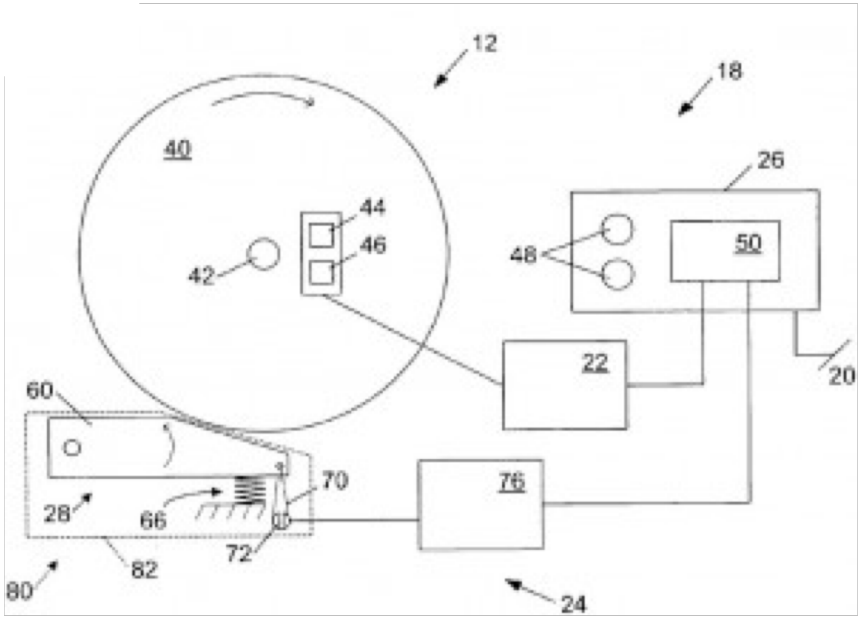
Saw Stop



Switch-controlled Saw (without Saw Stop)

Inputs

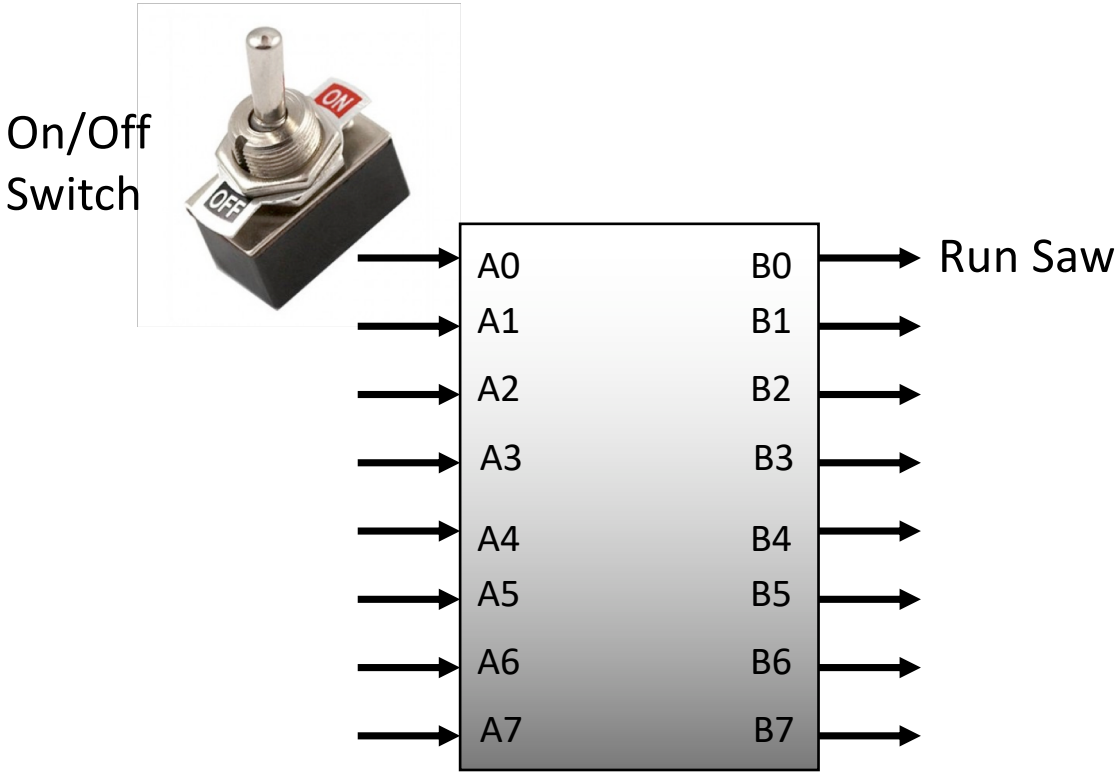
- A0 – On/off switch

Outputs

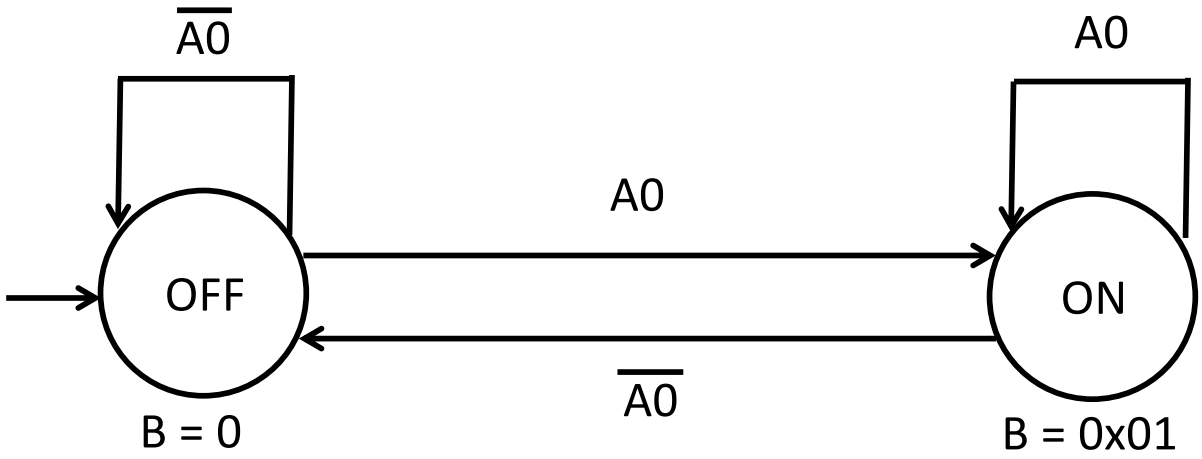
- B0 – Run the saw

Functionality

- The switch (A0) turns the saw on/off

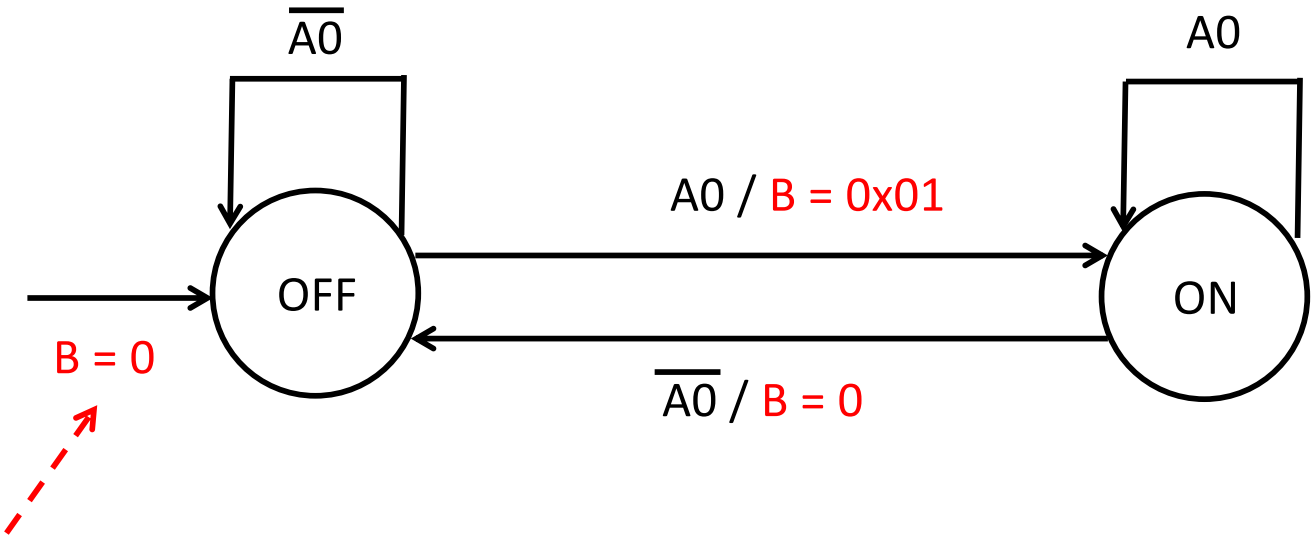


Turn the Saw On/Off with a Switch



Solution with Two States
(Output on States – Moore Machine)

Turn the Saw On/Off with a Switch

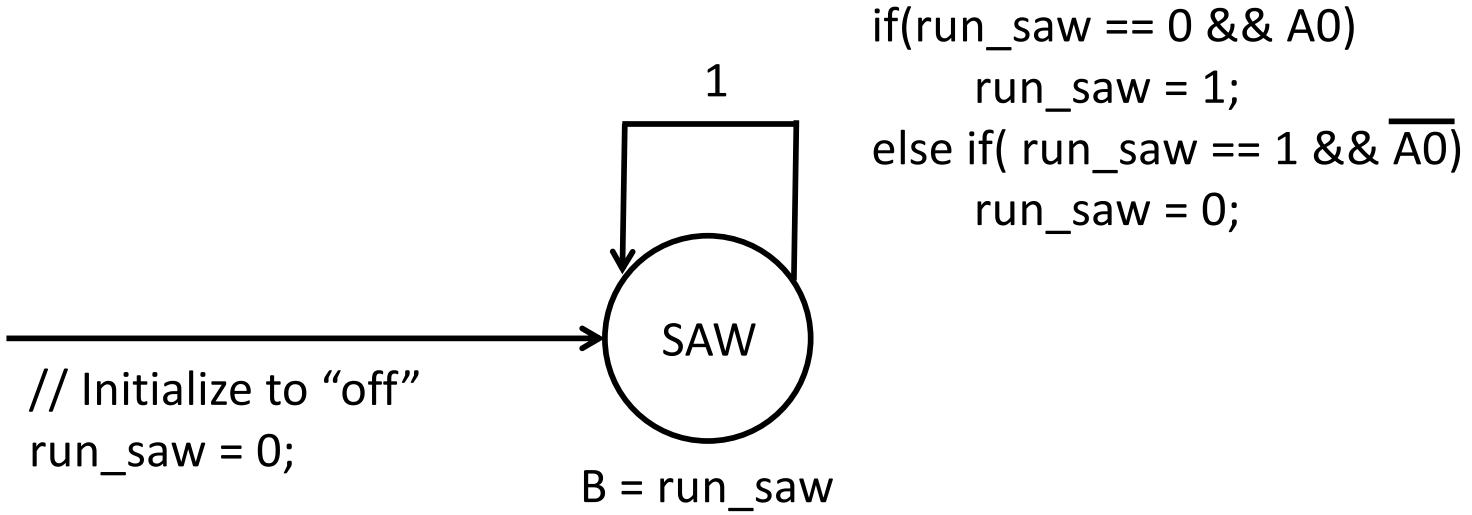


Don’t forget to initialize the output

Solution with Two States
(Output on Transitions – Mealy Machine)

Turn the Saw On/Off with a Switch

```
// 0 = Off; 1 = On
unsigned char run_saw;
```

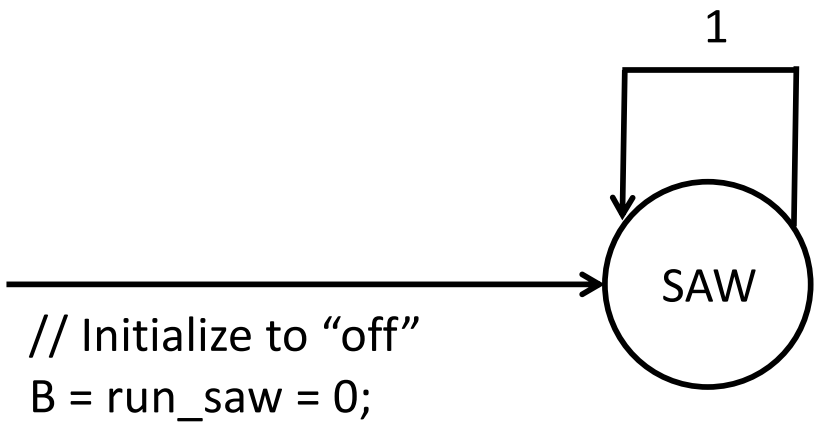



```
if(run_saw == 0 && A0)
        run_saw = 1;
else if( run_saw == 1 && A0)
        run_saw = 0;
```

Solution with One State
(Moore Machine)
(List and initialize variables)

Turn the Saw On/Off with a Switch

```
// 0 = Off; 1 = On
unsigned char run_saw;
```




```
if(run_saw == 0 && A0)
        B = run_saw = 1;
else if( run_saw == 1 && A0)
        B = run_saw = 0;
```

Solution with One State
(Mealy Machine)
(List and initialize variables)

Button vs. Switch

- Switch
  - Turn On - Actuate
  - Turn Off - Deactuate

- Button
  - Press – Actuate/Deactuate
  - Release – Signifies end of press

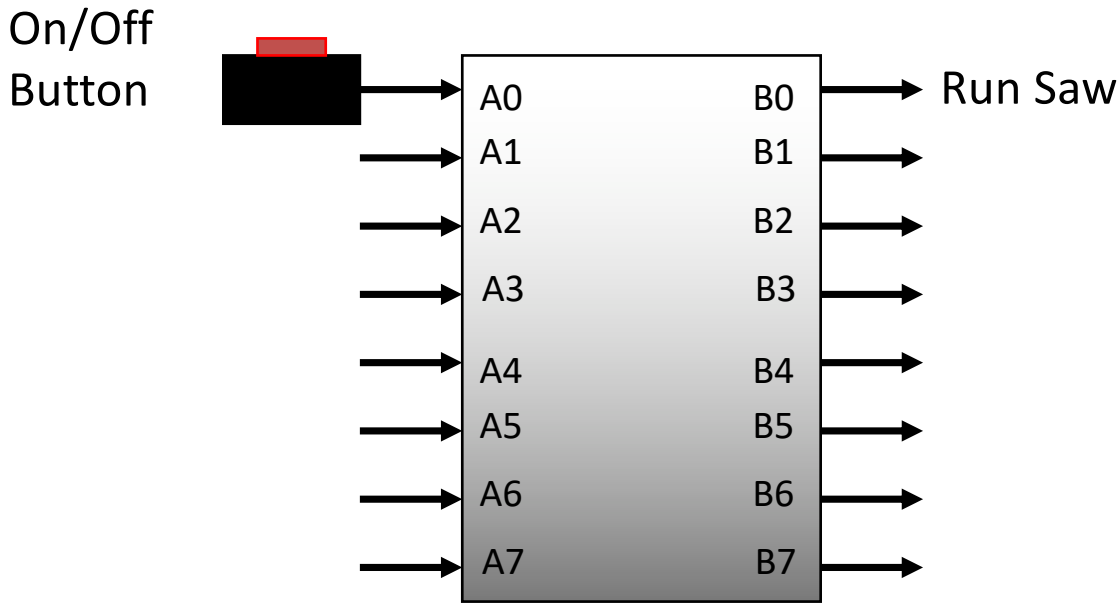
Button-controlled Saw (without Saw Stop)

Input

- A0 – On/off button

Output

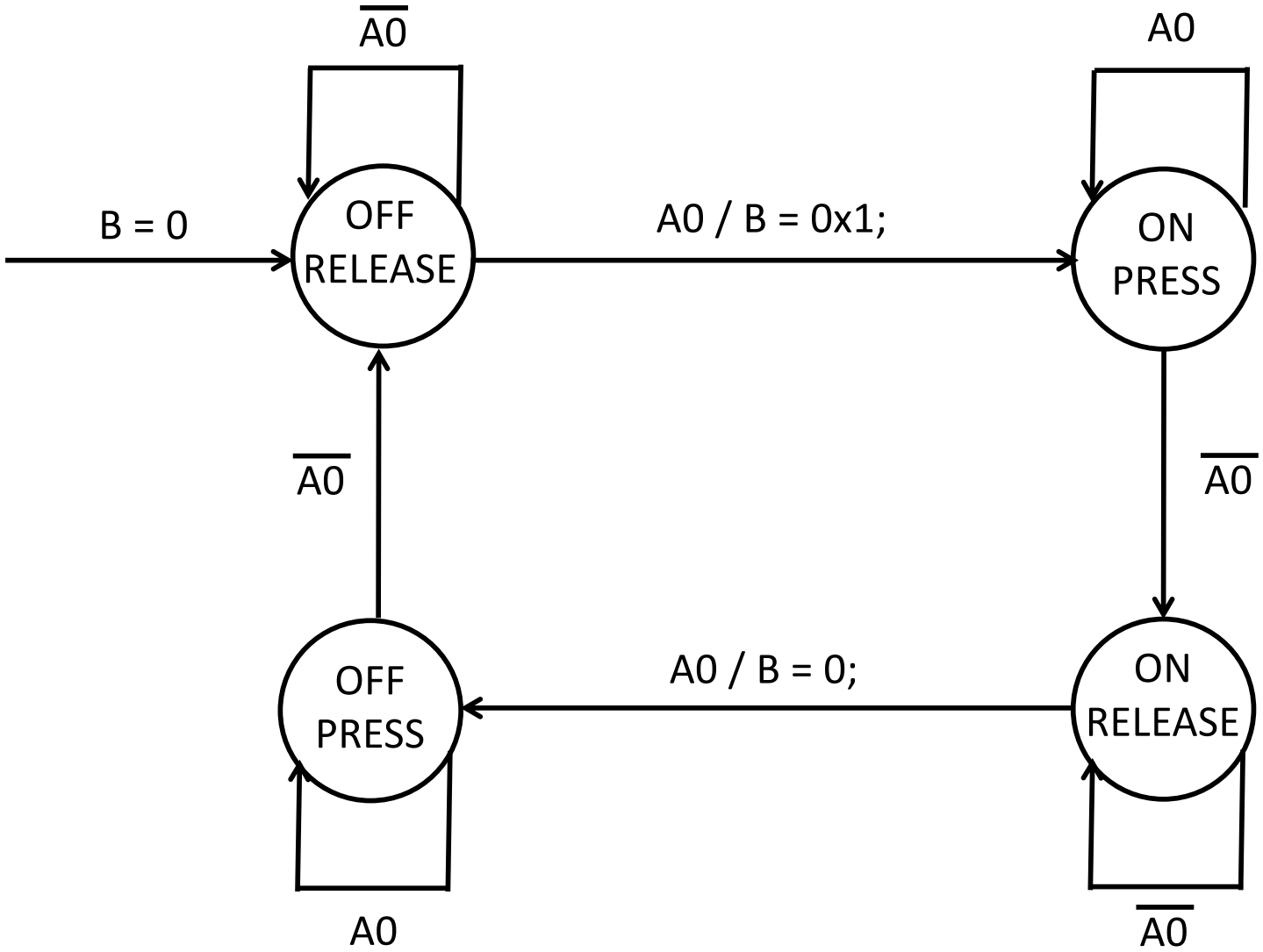
- B0 – Run the saw



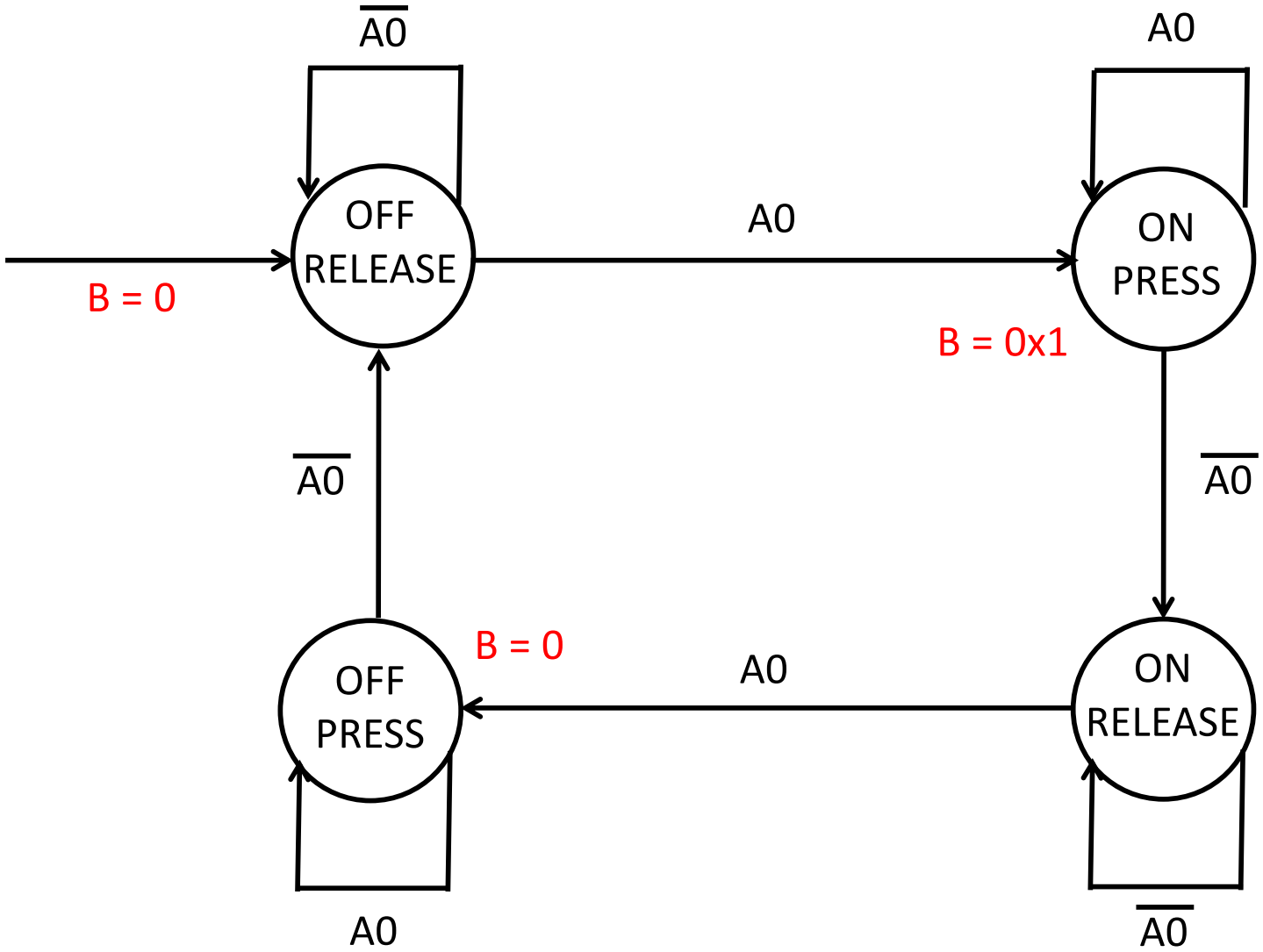
Functionality

- Each **distinct** button press turns the saw on/off

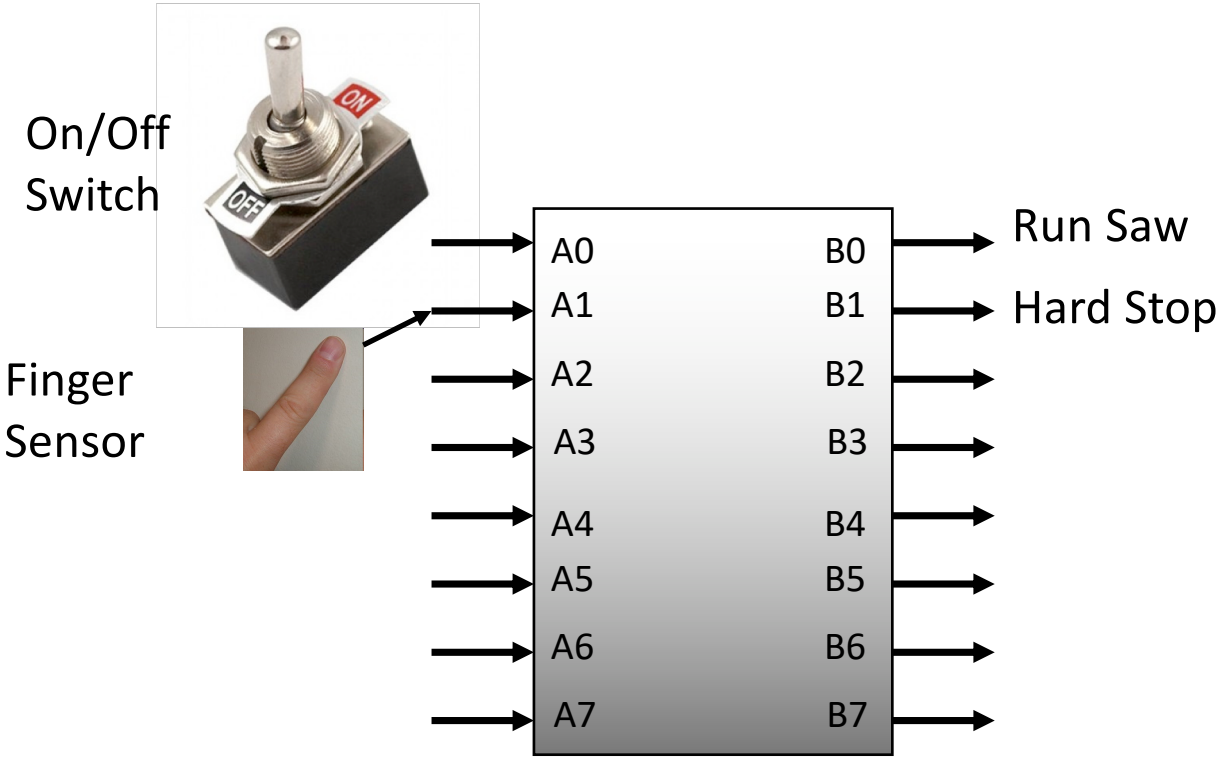
Turn the Saw On/Off with a Button



Turn the Saw On/Off with a Button



Now, Add the Saw Stop



Problem Statement

Inputs

- A0 – On/off **switch**
- A1 – Finger sensor (capacitive touch)

Outputs

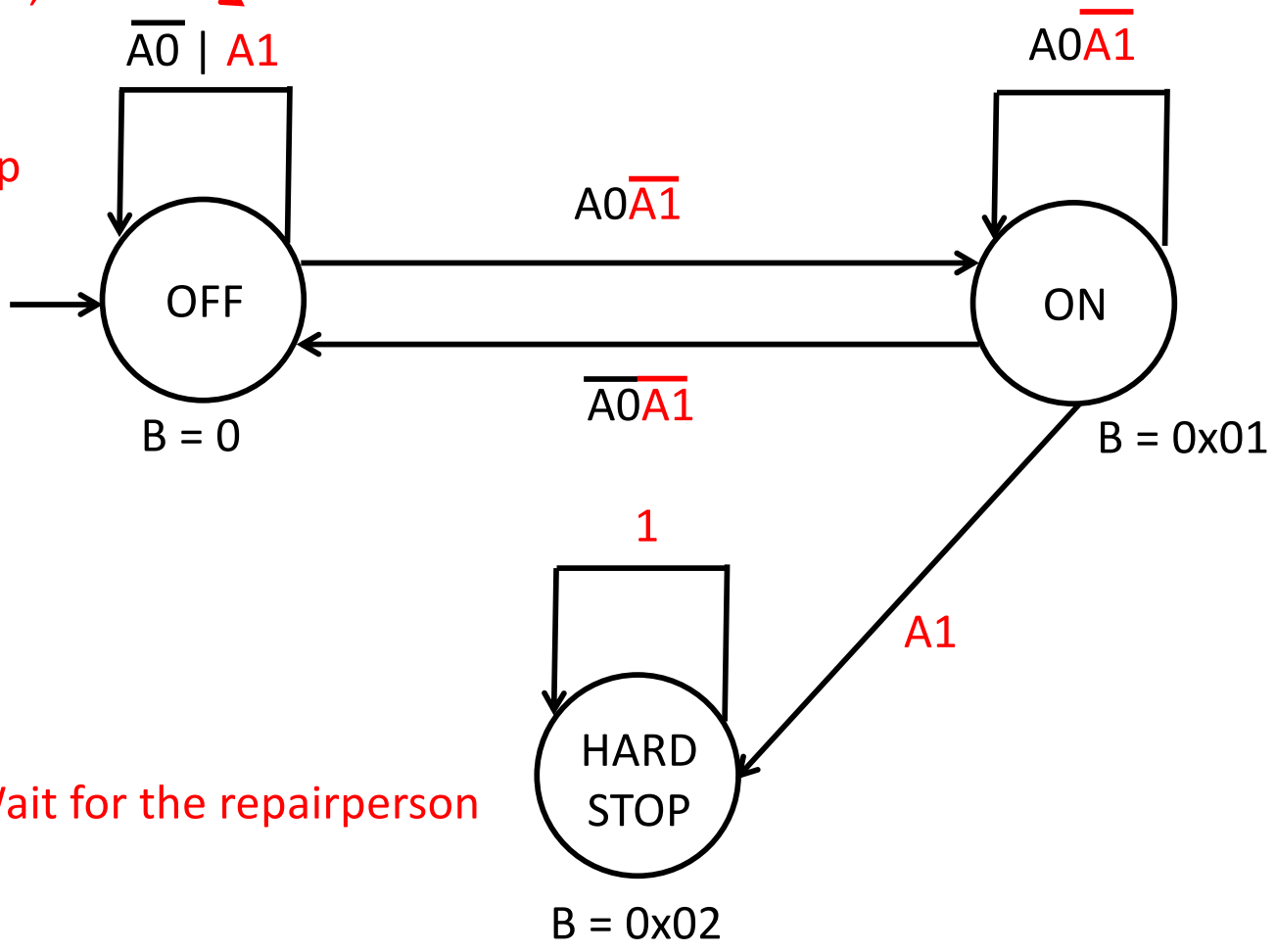
- B0 – Run the saw
- B1 – Initiate a hard stop

Functionality

- The switch (A0) turns the saw on/off
- The finger sensor (A1) triggers a hard stop
- If a hard stop occurs, wait and do nothing
  - The repairperson turns the saw off to replace the saw blade and crumpled metal
  - The state machine re-initializes when the repairperson turns the system back on

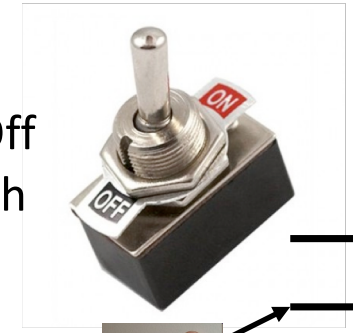
Design an SM to Implement the Saw Stop Functionality

If the system is not engaged while someone touches the saw, keep it off; rather than immediately initiating Saw Stop and wasting $60.

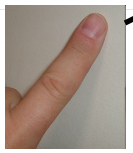


Wait for the repairperson

Saw Stop with Persistent Microcontroller

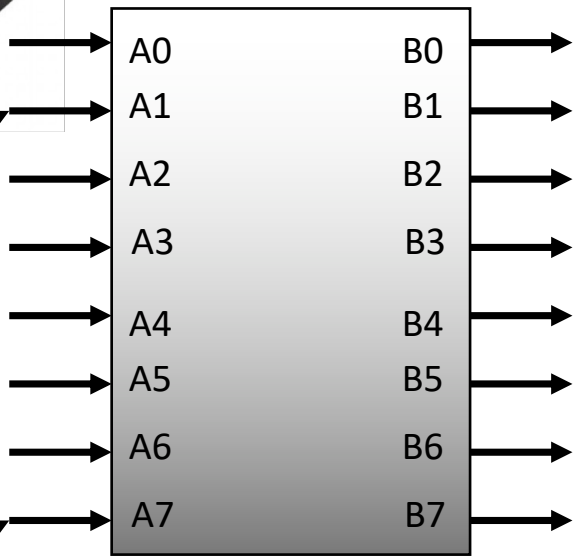


On/Off Switch



Finger Sensor

Failsafe sensor



Goal:

Return from the HARD STOP to the OFF state without resetting the microcontroller

Problem Statement

Inputs

- A0 – On/off **switch**
- A1 – Finger sensor (capacitive touch)
- A7 – Failsafe sensor

Outputs

- B0 – Run the saw
- B1 – Initiate a hard stop

Functionality

- The switch (A0) turns the saw on/off
- The finger sensor (A1) triggers a hard stop
- The failsafe sensor (A7) detects the hard stop
  - It is triggered by physical phenomena, not the hard stop (B1) signal
  - It turns off when the repairperson successfully replaces the saw blade and crumpled metal and closes the door to the machine
- The failsafe sensor (A7) never misfires
  - It can be ignored in the ON/OFF states

Design an SM to Implement the Saw Stop Functionality