

## Servo Turnouts and Control Panel

One way to control servos is to use an Arduino Mega and PCA9685 module (or shield), along with the accessory controller functionality of DCC++EX. The Buttons and LEDs can connect to unused pins on the Arduino Mega and/or MCP23017 modules.

This example shows the setup of 3 servos attached to the first PCA9685 module.

```
// myAutomation.h

// SERVO_TURNOUT(id,pin,activeAngle,inactiveAngle,profile,"description")
// SERVO_TURNOUT(100,100,400,200,Slow,"test") // reserve 100 until needed; simple numbering
SERVO_TURNOUT(1,101,400,200,Slow,"East_1")
SERVO_TURNOUT(2,102,400,200,Slow,"East_2")
SERVO_TURNOUT(3,103,400,200,Slow,"East_3")

// Set up Signals on vpins 182-187 (second MCP23017)
// Momentary contact buttons wired from 167, 168, 169 to GND – no setup required for use by EXTRAIL
SIGNAL(182, 0, 183) // Red, Amber, Green
SIGNAL(184, 0, 185)
SIGNAL(186, 0, 187)

// Upon initial starting of the Command Station set the Turnouts as follows
CLOSE(1) // servo ID 1
CLOSE(2)
CLOSE(3)
DONE // This ends the startup thread,

/* === START->===== */

// Clever way to run All three together
#define CLEVER(turnout,button,signal) \
AUTOSTART SEQUENCE(turnout) \
AT(button) THROW(turnout) DELAY(1000) \
AT(button) CLOSE(turnout) DELAY(1000) FOLLOW(turnout) \
ONTHROW(turnout) RED(signal) DONE \
ONCLOSE(turnout) GREEN(signal) DONE

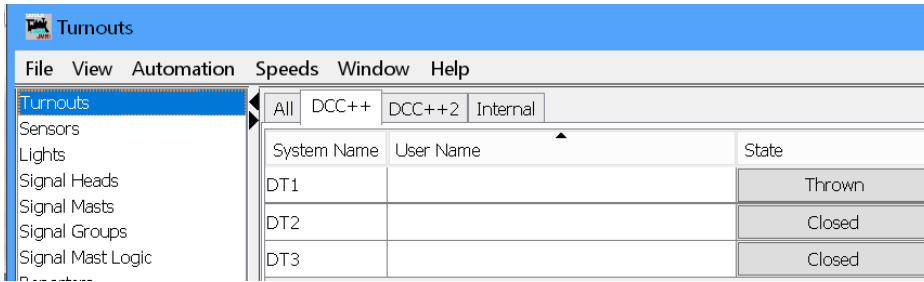
CLEVER(1,167,182) // Turnout 1, Button 167, {182 Red & Green}
CLEVER(2,168,184) // Turnout 2, Button 168, {184 Red & Green}
CLEVER(3,169,186) // Turnout 3, Button 169, {186 Red & Green}
```

-- What if you use SPST toggle switch instead of a momentary push button?

For SPST toggle switch – ON/OFF – **invert the second AT command**:

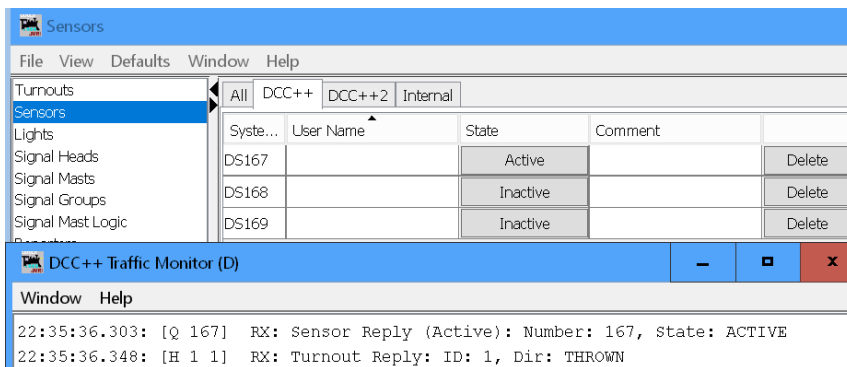
```
#define CLEVER(turnout,button,signal) \
AUTOSTART SEQUENCE(turnout) \
AT(button) THROW(turnout) DELAY(1000) \
AT(-button) CLOSE(turnout) DELAY(1000) FOLLOW(turnout) \
ONTHROW(turnout) RED(signal) DONE \
ONCLOSE(turnout) GREEN(signal) DONE
```

And the turnouts defined in DCC++EX automatically appear in JMRI Turnouts Table.



If you want the buttons/sensors to appear in JMRI sensors table, add lines in mySetup.h:

```
SETUP("S 167 167 1");
SETUP("S 168 168 1");
SETUP("S 169 169 1");
```



Why would you want these buttons/sensors to show in JMRI ? No need for these as JMRI will see the turnout state, but it illustrates how you could define an occupancy sensor so that it would appear in JMRI.

It is good to understand that EXRAIL doesn't require pins for sensors or digital output pins to be defined prior to their use in an EXRAIL sequence.

If you use Engine Driver connected directly to DCC++EX, the descriptions on the turnouts will be included on the Turnouts page.

