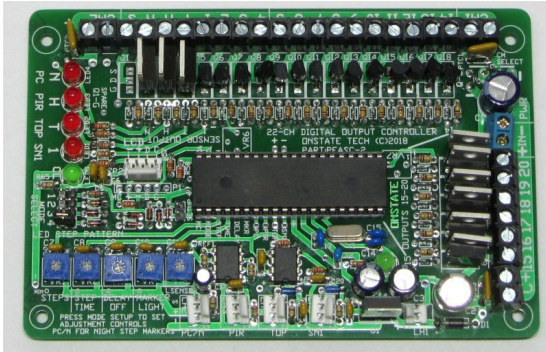




Multi-Purpose Digital Output Controller



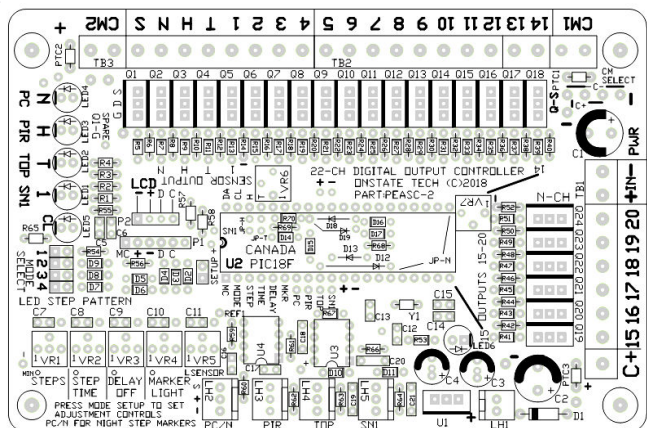
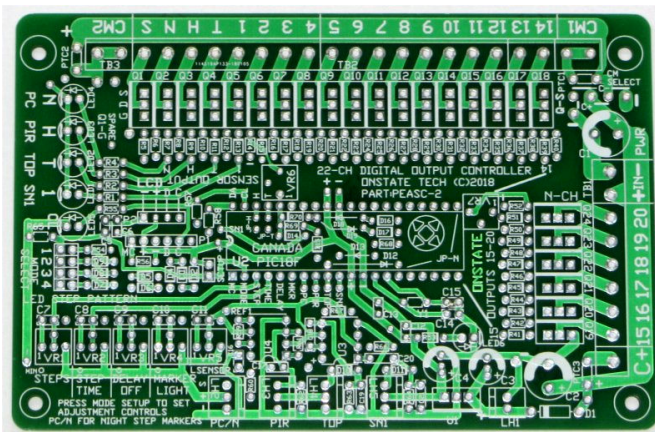
The PEASC is a multi-purpose digital output controller based on the Microchip PIC18F4431 microcontroller for analog inputs and digital outputs. Other microcontrollers can be used to trigger the MOSFET outputs to control LED lights, motors, relays for process control, robotics, LED displays, etc. The module is specifically designed for automatic sequencing of step LED lighting for stairs. It's 9 analog inputs and 22 digital outputs can simplify design and wiring for your DIY or custom professional projects.

Features:

- Linear regulator circuit for power and control.
- PIC18F microcontroller (Microchip) 40-DIP
- Use standard through-hole components
- Large component size/pads for hand soldering
- Easy-to-use robust, integrated design
- Small and economical
- Multi-function for DIY projects
- Easy to read silkscreen labels
- Voltage divider for button control inputs
- 4x trimmer resistor analog input settings
- 1x trimmer resistor for sensor control trigger
- 4x sensor op-amp circuit buffer inputs
- LED status display
- 22x MOSFET output
- 1x spare MOSFET output
- Terminal block output wiring.

PCB Specifications:

- Plating: Through hole plating, all pads
- Finished Copper: 1oz
- Process: SMOBC, HASL, Lead-free, RoHS
- # Layers: 2-layer PCB
- Board Material: 1/16" FR4
- PCB Size: 137mmx90mm (5.39"x3.54")
- Solder Mask: Top and bottom, green
- Silkscreen: Component side, white
- Weight: 40g.
- Mounting holes: 4x 1/8"D holes, 5.0"x3.0"



PCB-PEASC-2: PIC18 digital control board, 22-CH step output, MOSFET switch outputs.

Onstate automatic stairs step LED lighting application.**MODES:**

Mode 1: All ON/OFF mode.

All LEDs will turn on at the same time when triggered by any sensor. The LEDs will dim to marker brightness at remaining ~1/3 delay off time before shutting off. The LEDs timer can be re-triggered to reset when at marker brightness. All LEDs will dim off at the same time.

Mode 2: Sequence up/down with trigger off (modified Mode1).

The LEDs will sequence up (step1->N), down (stepN->1) or all on (PIR) when triggered by the corresponding sensor. It will sequence off in the direction of the second trigger at anytime before the time-out delay. If there is no second trigger within the delay time limit, LED sequence to OFF is from the first trigger location. LEDs must sequence to OFF before retriggering timer.

Mode 3: Sequencing up and/or down (both directions) with delayed off (modified Mode2).

The LEDs will sequence up or down when triggered by the corresponding sensor. Retriggering before the delay time will not cause the LED OFF sequence to start. It will sequence off in the corresponding direction depending on the last trigger after ~1/3 delay off time. The LEDs will dim to marker brightness before shutting off. The LEDs can be retriggered to full ON when at LED OFF sequence or at marker brightness.

Mode 4: Mode 3 with marker LEDs on first.

Same as Mode 3 with the added feature that all the LEDs first turn ON to marker brightness before sequencing to full brightness.

Mode 0: Demonstration mode (MODE header not used). Automatic sequencing of each mode after 2 complete cycles at each mode.

Day/Night Mode:

The photocell circuit triggers the Day/Night mode. At night mode, selected LEDs (top/bottom) and handrail will stay at the marker brightness setting. The markers are OFF when in day mode.

Handrail:

Optional handrail output (Step0). First to turn on and last to turn off. Turns on at marker brightness when in night mode. Handrail LED (H) will be flashing when in setup mode.

Tech Specifications:

Steps: 6 to 20, StepN (TOP), Handrail (H, PIR)
Per Step Time: 0.1s to 3.1s (on/off between steps)
Delay Off: 5s to 511s (8.5min, starts after last step LED on)
Marker Brightness: 1/100 to 15/100 duty cycle (1% - 15%),
Marker timing starts at 1/3 delay off total elapse time (in seconds)
Input Voltage: +12VDC (9V to 15V). Match lights with input power
Current (standby): ~30mA, without LCD display
PWM Frequency: 100Hz
Duty Cycle: 1/100 increments (0-100%, brightness selection)

Sensor Inputs:

SN1 Sensor 1. First step (out-1) trigger, bottom step.
PIR Sensor 2. PIR motion for center/middle of stairs (PIR, handrail, out-H).
TOP Sensor 3. Last step (N) trigger, top step (TOP, out-T).
PC/N Sensor 4. Photocell day/night trigger (PC/N, out-N). Night mode markers.

Button Input:

Setup Button

Press button to change between run mode and setup mode.

Status LEDs:

CL	Power (flickering - communicating with LCD display)
SN1, 1	First step (bottom) ON.
PIR, H	PIR motion (handrail, PIR, H) ON.
TOP, T	Last step (N, T, TOP) ON
PC, N	Photocell (PC/N) ON. Output-N is directly connected to PC/N o-amp output.

Mode Selection:

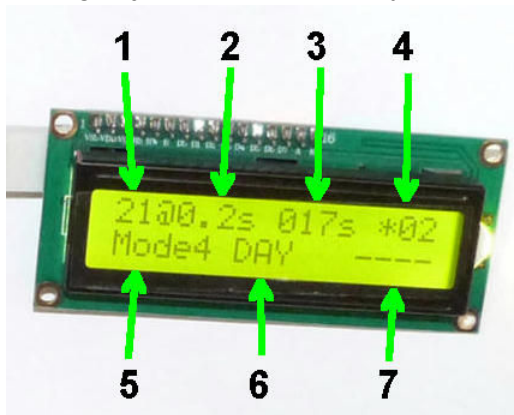
Mode selection can be made anytime. The lower step LEDs turn on to indicate mode selected.

Programming:

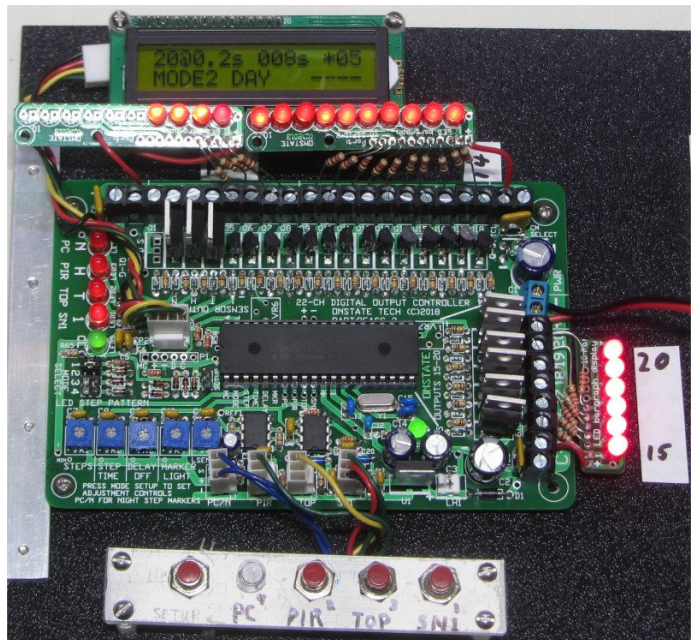
Parameter programming of STEPS, STEP TIME (seconds), DELAY OFF (seconds), and MARKER LIGHT. The marker brightness and marker steps selection use the same control. The marker steps should be set first before the marker brightness. Corresponding LED steps will change to parameter adjusted.

1. Press the mode setup button to enter the SETUP mode.
2. Enable the PC/N to night mode (cover LDR sensor) to access the marker setup.
3. Adjust the marker adjustment to turn on the night-time marker steps required. Select how many steps are required (symmetrical top and bottom LEDs) to turn on at night mode.
4. Enable day mode (light on LDR sensor) to exit marker setup. This will return to normal setup mode.
5. Adjust the marker brightness. Step LEDs brightness will change to marker brightness setting.
6. All other parameters can be adjusted in normal setup mode.
6. Press the mode setup button again to exit and save parameters to EEPROM memory.

Note: Adjustments are active only in SETUP mode. Recycling power will cause it to read the current setting adjustments in memory.

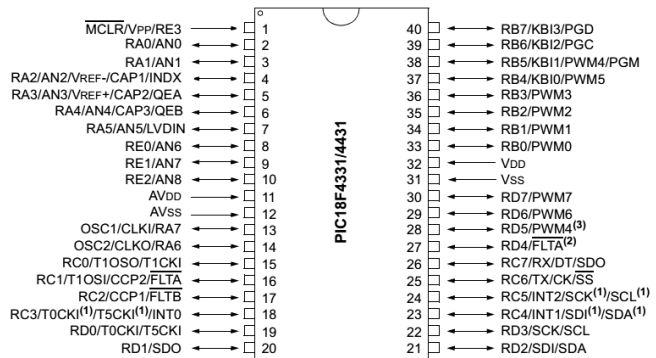

LCD Display (optional):

1. Steps.
 2. Step Time (seconds).
 3. Delay Off (seconds).
 4. Marker Brightness.
 5. Mode, Setup Mode, Setup Marker
 6. Day (DAY) or Night (NGTxx) mode. NGTxx, xx for for night-time marker steps active.
 7. Sensor inputs (1,2,3,4). 1=first (SN1), 2=PIR (H), 3=last (N/T), 4=day/night (PC/N).
- The 16x2 LCD display (add. 0x27) will need to be powered up (5V) at the same time as the PEASC module for it to display correctly.



PIC18F4431-I/P Microcontroller IC 8-Bit 40MHz 16kB (8kx16) FLASH 40-PDIP 8-Bit, use with PICKIT3.

Speed: 40MHz
 Connectivity: I²C, SPI, UART/USART
 Number of I/O: 36
 Memory Size: 16kB (8k x 16)
 Memory Type: FLASH
 EEPROM Size: 256 x 8
 RAM Size: 768 x 8
 Voltage Supply: 4.2V ~ 5.5V
 Data Converters: A/D 9x10b
 Oscillator Type: Internal/External



PIC18F4431 DIP40 pinout and functions.

PIN	NAME	USE	PIN	NAME	USE
1	MCLR	Programming, M CLR	21	RD2	Digital output, STEP14
2	RA0	Analog input, MODE/SETUP	22	RD3	Digital output, STEP13
3	RA1	Analog input, STEPS	23	RC4	Digital output, STEP12
4	RA2	Analog input, STEP TIME	24	RC5	Digital output, STEP11
5	RA3	Analog input, DELAY OFF	25	RC6	Digital output, STEP10
6	RA4	Analog input, MARKERS	26	RC7	Digital output, STEP9
7	RA5	Analog input, PC/N	27	RD4	Digital output, STEP8
8	RE0	Analog input, PIR	28	RD5	Digital output, STEP7
9	RE1	Analog input, TOP	29	RD6	Digital output, STEP6
10	RE2	Analog input, SN1	30	RD7	Digital output, STEP5
11	AVDD	Power +5V	31	VSS	Power ground
12	AVSS	Power ground	32	VDD	Power +5V
13	RA7	Oscillator, freq. set	33	RB0	Digital output, STEP4
14	RA6	Oscillator, freq. set	34	RB1	Digital output, STEP3
15	RC0	Digital output, STEP20	35	RB2	Digital output, STEP2
16	RC1	Digital output, STEP19	36	RB3	Digital output, STEP1 bottom
17	RC2	Digital output, STEP18	37	RB4	Digital output, STEP N top
18	RC3	Digital output, STEP17	38	RB5	Digital output, STEP0 handrail
19	RD0	Digital output, STEP16	39	RB6/PGC	Programming, LCD, clock
20	RD1	Digital output, STEP15	40	RB7/PGD	Programming, LCD, data

NOTE: LCD display should have on-board display driver and I²C receiver/converter to display correctly.

NOTE:

PEASC-2 PCB for use with PIC18F4431 for 22-CH outputs.
 PEASC-3 PCB for use with PIC18F4431 for 24-CH outputs or
 PIC18F46K22 (higher speed/memory, pin6/7 swap required).
 PEASC-2 -> PEASC-3 changes.
 Outputs Pin13(RA7)->StepH. Pin14(RA6)->StepT. No ext. osc.
 Re-sequence digital outputs:
 STEP0 handrail->STEP1, STEP N top->STEP2, STEP1 bottom->
 STEP3, STEP2->STEP4, STEP20->STEP22

If using PIC18F46K22, program and pin swap RA4 (MARKER, pin6)
 and RA5 (PC/N, pin7). RA5 is now MARKER input. Bend IC pins.

