

Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

WINDOW LIFTER'S

[STATE MACHINE IMPLEMENTATION WHIT INFINITE LOOP] TEST LOG

- Debounce Testing
- Automatic work validation Testing
- Semiautomatic work validation Testing
- Semiautomatic work validation (Considering the time transition) Testing



Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

- DEBOUNCE TESTING: (TEST PASSED)
 - Signal Generator's Testing Time Constraints [> 9ms]:
 - 7ms → PASS: No action is performed provided the time length of input signal.
 - 8ms → PASS: No action is performed provided the time length of input signal.
 - 9ms → PASS: No action is performed provided the time length of input signal.
 - 10ms → PASS: Enters in automatic mode (either up or down).
 - 11ms → PASS: Enters in automatic mode (either up or down).
 - o Signal Generator's code snippets:
 - 7ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(7);
  digitalWrite(13,LOW);
  delay(50);
}
```

THR

U1

U2

T1

T2

Y

X

T0

AUT: +7.00mS Ubt +4.69V Save Image

o 8ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(8);
  digitalWrite(13,LOW);
  delay(50);
}
```

```
RUN DC -- AUTO Squ 10 KHz DUT 502

50 10 -- 10mS 12

THR

U1

U2

Y

X

T0

4K

EXT
```



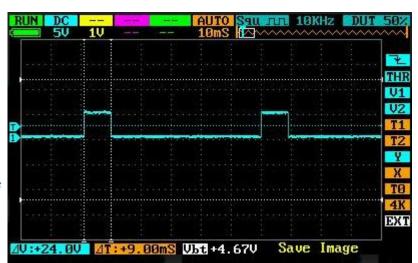
Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

o 9ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

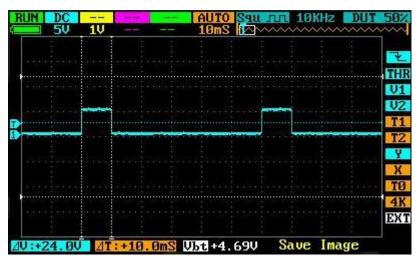
void loop() {
  digitalWrite(13,HIGH);
  delay(9);
  digitalWrite(13,LOW);
  delay(50);
}
```



o 10ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(10);
  digitalWrite(13,LOW);
  delay(50);
}
```





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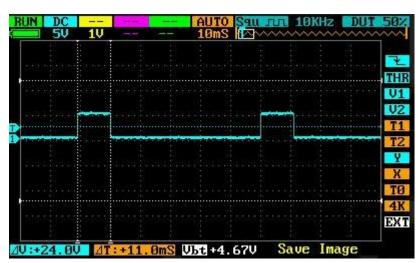
Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

o 11ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(11);
  digitalWrite(13,LOW);
  delay(50);
}
```





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Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

Automotive Entry Program

- AUTOMATIC ACTIVATION TESTING: (TEST PASSED)
 - Signal Generator's Testing Time Constraints [< 500ms]:
 - 498ms → PASS: Enters in automatic mode (either up or down).
 - 499ms → PASS: Enters in automatic mode (either up or down).
 - 500ms → PASS: No action is performed provided the time length of input signal.
 - 501ms → PASS: No action is performed provided the time length of input signal.
 - 502ms → PASS: No action is performed provided the time length of input signal.
 - Signal Generator's Code Snippet:
 - o 498ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(498);
  digitalWrite(13,LOW);
  delay(498);
}
```

```
## AUTO Squ | 10KHz DUT 582

50 10 -- - 58mS | 10KHz DUT 582

THR

U1

U2

T1

T2

Y

X

WU:+24, 8U MT:+498 mS Ubt +4.50V Save Image
```

o 499ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(499);
  digitalWrite(13,LOW);
  delay(499);
}
```

```
#UNDC -- AUTO SQUIN 10KH2 DUT 50%

5V 1V -- 50mS

THR

U1

V2

T11

T2

Y

X

T8

4K

EXT
```



Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

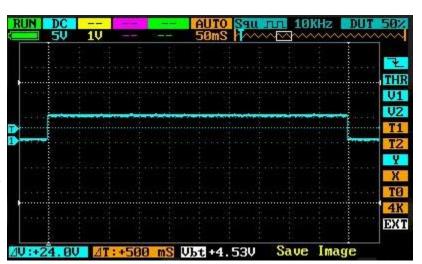
o 500ms Test:

```
THR
void setup() {
                                                                               V1
  pinMode (13, OUTPUT);
                                                                               V2
                                                                               T1
}
                                                                               TZ
                                                                                Y
void loop() {
                                                                                X
  digitalWrite(13, HIGH);
                                                                               TØ
  delay(500);
                                                                               4K
  digitalWrite(13,LOW);
                                                                               EXT
  delay(500);
                                                               Save Image
                                     4T: +500 mS Vbt +4.53V
                         ∆V:+24.0V
```

o 501ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(501);
  digitalWrite(13,LOW);
  delay(501);
}
```





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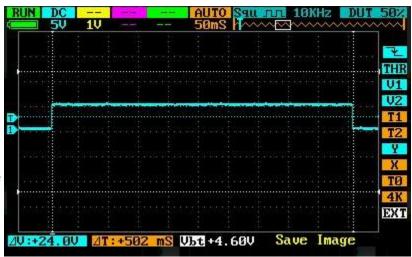
Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

Automotive Entry Program

o 502ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(502);
  digitalWrite(13,LOW);
  delay(502);
}
```





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Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

Automotive Entry Program

- SEMI-AUTOMATIC ACTIVATION TESTING [>= 500MS]: (TEST PASSED)
 - Signal Generator's Testing Time Constraints:
 - 498ms → PASS: Enters in automatic mode (either up or down).
 - 499ms → PASS: Enters in automatic mode (either up or down).
 - 500ms → PASS: No action is performed provided the time length of input signal.
 - 501ms → PASS: No action is performed provided the time length of input signal.
 - 502ms → PASS: No action is performed provided the time length of input signal.
 - Signal Generator's Code Snippets:
 - o 498ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(498);
  digitalWrite(13,LOW);
  delay(498);
}
```

o 499ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(499);
  digitalWrite(13,LOW);
  delay(499);
}
```

```
THR
U1
T2
Y
X

TU:+24.00 MS Ubt+4.530 Save Image
```



Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

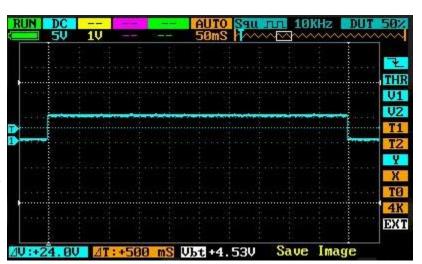
o 500ms Test:

```
THR
void setup() {
                                                                               V1
  pinMode (13, OUTPUT);
                                                                               V2
                                                                               T1
}
                                                                               TZ
                                                                                Y
void loop() {
                                                                                X
  digitalWrite(13, HIGH);
                                                                               TØ
  delay(500);
                                                                               4K
  digitalWrite(13,LOW);
                                                                               EXT
  delay(500);
                                                               Save Image
                                     4T: +500 mS Vbt +4.53V
                         ∆V:+24.0V
```

o 501ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(501);
  digitalWrite(13,LOW);
  delay(501);
}
```





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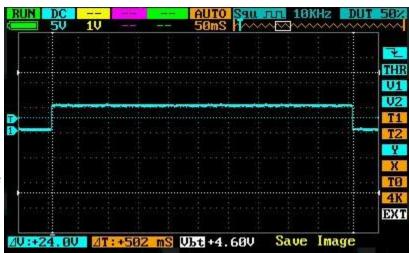
Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

Automotive Entry Program

o 502ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(502);
  digitalWrite(13,LOW);
  delay(502);
}
```





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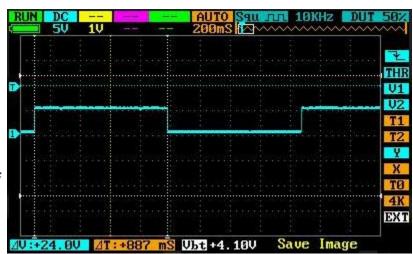
Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

Automotive Entry Program

- SEMI-AUTOMATIC ACTIVATION TESTING [CONSIDERING LED TRANSITION TIMES: 500MS + 400MS = 900MS]: (TEST PASSED)
 - Signal Generator's Testing Time Constraints:
 - 887ms → PASS: No action is performed provided the time length of input signal.
 - 900ms → PASS: No action is performed provided the time length of input signal
 - 901ms → PASS: Enters in semi-automatic mode (either up or down).
 - 903ms → PASS: Enters in semi-automatic mode (either up or down).
 - Signal Generator's Code Snippet:
 - o 887ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(887);
  digitalWrite(13,LOW);
  delay(887);
}
```



o 900ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(900);
  digitalWrite(13,LOW);
  delay(900);
}
```



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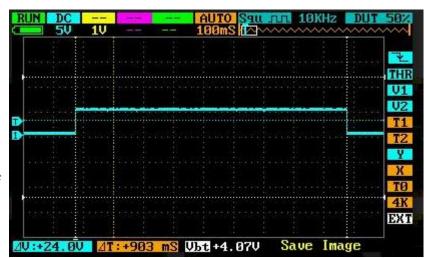
Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

Automotive Entry Program

o 903ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(903);
  digitalWrite(13,LOW);
  delay(903);
}
```





Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

WINDOW LIFTER'S

[STATE MACHINE IMPLEMENTATION WHIT SCHEDULER BPS] TEST LOG

- Period of the tasks Testing
- Transition time of the Led Bar Testing
- Debounce Testing
- Automatic work validation Testing
- Semiautomatic work validation Testing
- Semiautomatic work validation (Considering the time transition) Testing



}

△V:+24.0V △T:+2.00mS Vbt +4.44**V**

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Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

```
PERIOD OF THE TASKS: (TEST PASSED)
      void SchM_1MS_Task ( ){
          ruw_CounterTime1ms++;
                                                       Added code in function SchM_1MS_Task ()
         Dio_PortTooglePin(PORTCH_D, TASK_1MS);
                                                      //file SchM_Tasks.c
          windowlifter_void_MefWindowLifter(&ruw_CounterTime1ms);
                                                              V2
                                                               T0
                                                               4K
                                                              EXT
      void SchM 2MS Task ()
                                                Added code in function SchM_2MS_Task ()
   Dio_PortTooglePin(PORTCH_D, TASK_2MS);
                                                 //file SchM_Tasks.c
                                                       V2
                                                       TØ
                                                       4K
                                                       EXT
```



Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

TRANSITION TIME OF THE WINDOWS'LEDS TESTING: (TEST PASSED)

We modified the code to test the transition time of the window's leds. The system works in automatic down mode and automatic up mode for this test.

We added the following code to the system (Always Automatic work)

```
void SchM_1MS_Task ( ){
    Dio_PortTooglePin(PORTCH_D, TASK_1MS);

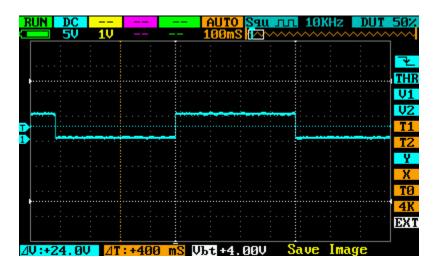
static unsigned char state = 0;
    ruw_lpit0_ch0_counter1ms++;

if(rub_Percentwindow==0){
    rs_Fg.bi1_flagUp=1;
    rs_Fg.bi1_flagAutomaticUp=1;
    state=4;
    }

if(rub_Percentwindow==10){
    rs_Fg.bi1_flagDown=1;
    rs_Fg.bi1_flagDown=1;
    rs_Fg.bi1_flagAutomaticDown=1;
    state=4;
}
```

```
if((*lpub_Time)>=400){
Dio_PortTooglePin(PORTCH_D,TRANSITION_400MS);
```

Added code in function wc_WindowUp () and wc_WindowDown () //file app_windowcontrol.c





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Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

- DEBOUNCE TESTING: (TEST PASSED)
 - Signal Generator's Testing Time Constraints [> 9ms]:
 - 7ms → PASS: No action is performed provided the time length of input signal.
 - lacktriangle 8ms ightarrow PASS: No action is performed provided the time length of input signal.
 - 9ms → PASS: No action is performed provided the time length of input signal.
 - 10ms → PASS: No action is performed provided the time length of input signal.
 - 11ms → PASS: Enters in automatic mode (either up or down).
 - Signal Generator's code snippets:
 - o 7ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(7);
  digitalWrite(13,LOW);
  delay(50);
}
```

RUN DC -- AUTO Squ 10KHz DUT 582

5V 1V -- 10mS 12

THR

V1

V2

T1

T2

Y

X

T0

4K

EXT

o 8ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(8);
  digitalWrite(13,LOW);
  delay(50);
}
```

```
RUN DC -- AUTO Squ TT 10KHz DUF 582

THR

U1

U2

T1

T2

Y

AUT: +8.08mS U5t +4.69V Save Image
```



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Automotive Entry Program

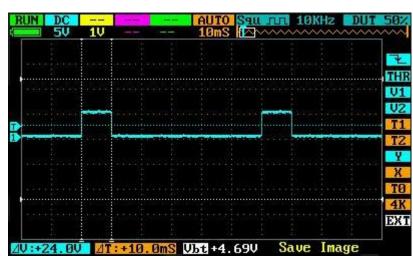
Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

```
San ur 10kHz Dui
                                                                               THR
void setup() {
                                                                               V1
  pinMode (13, OUTPUT);
                                                                               V2
                                                                               T1
}
                                                                               T2
void loop() {
                                                                                X
  digitalWrite(13, HIGH);
                                                                               TØ
  delay(9);
                                                                               4K
 digitalWrite (13, LOW);
                                                                               EXT
  delay(50);
                                                               Save Image
                                     △T:+9.00mS Vbt +4.67V
}
```

o 10ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(10);
  digitalWrite(13,LOW);
  delay(50);
}
```





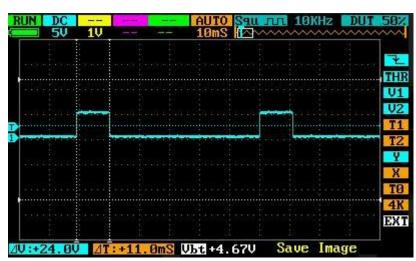
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Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

Automotive Entry Program

11ms Test:

```
void setup() {
  pinMode (13, OUTPUT);
}
void loop() {
  digitalWrite (13, HIGH);
  delay(11);
  digitalWrite(13,LOW);
  delay(50);
}
```





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Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

Automotive Entry Program

- AUTOMATIC ACTIVATION TESTING: (TEST PASSED)
 - Signal Generator's Testing Time Constraints [< 500ms]:
 - 498ms → PASS: Enters in automatic mode (either up or down).
 - 499ms → PASS: Enters in automatic mode (either up or down).
 - 500ms → UNDIFINED:
 - 501ms → PASS: No action is performed provided the time length of input signal.
 - 502ms → PASS: No action is performed provided the time length of input signal.
 - Signal Generator's Code Snippet:
 - o 498ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(498);
  digitalWrite(13,LOW);
  delay(498);
}
```

```
### AUTO Squ | 10KHz | DUT 50% | THE | THE
```

o 499ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(499);
  digitalWrite(13,LOW);
  delay(499);
}
```

```
### 10KHz DUT 50%

5V 1V -- - 50mS

THR

U1

U2

T11

T2

Y

X

T0

4K

EXT
```



Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

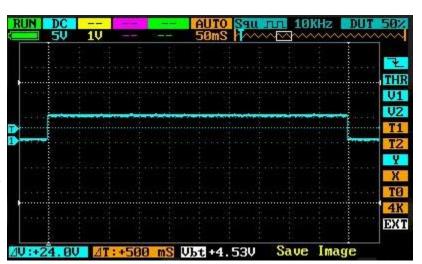
o 500ms Test:

```
THR
void setup() {
                                                                               V1
  pinMode (13, OUTPUT);
                                                                               V2
                                                                               T1
}
                                                                               TZ
                                                                                Y
void loop() {
                                                                                X
  digitalWrite(13, HIGH);
                                                                               TØ
  delay(500);
                                                                               4K
  digitalWrite(13,LOW);
                                                                               EXT
  delay(500);
                                                               Save Image
                                     4T: +500 mS Vbt +4.53V
                         ∆V:+24.0V
```

o 501ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(501);
  digitalWrite(13,LOW);
  delay(501);
}
```





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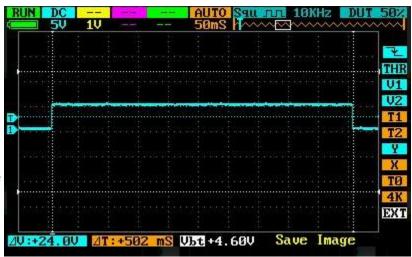
Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

Automotive Entry Program

o 502ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(502);
  digitalWrite(13,LOW);
  delay(502);
}
```





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Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

- SEMI-AUTOMATIC ACTIVATION TESTING [>= 500MS]: (TEST PASSED)
 - Signal Generator's Testing Time Constraints:
 - 498ms → PASS: Enters in automatic mode (either up or down).
 - 499ms → PASS: Enters in automatic mode (either up or down).
 - 500ms → UNDIFINED.
 - 501ms → PASS: No action is performed provided the time length of input signal.
 - 502ms → PASS: No action is performed provided the time length of input signal.
 - Signal Generator's Code Snippets:
 - o 498ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(498);
  digitalWrite(13,LOW);
  delay(498);
}
```

```
RUN DC -- AUTO Squ  10KHz DUT 582
50 10 -- 50mS  10 10KHz DUT 582
THR
U1
U2
T11
T2
Y
X
T0
4K
EXT
```

o 499ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(499);
  digitalWrite(13,LOW);
  delay(499);
}
```

```
RUN DC -- -- AUTO SSU -- 10KH2 DUT 50Z
5V 1V -- - 50mS
THR
U1
U2
T1
T2
Y
X
T8
4K
EXT
```



Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

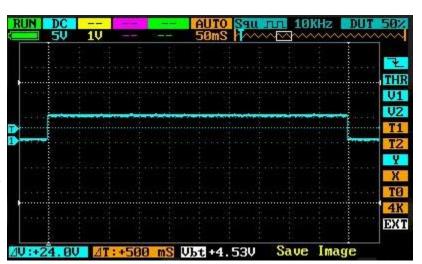
o 500ms Test:

```
THR
void setup() {
                                                                               V1
  pinMode (13, OUTPUT);
                                                                               V2
                                                                               T1
}
                                                                               TZ
                                                                                Y
void loop() {
                                                                                X
  digitalWrite(13, HIGH);
                                                                               TØ
  delay(500);
                                                                               4K
  digitalWrite(13,LOW);
                                                                               EXT
  delay(500);
                                                               Save Image
                                     4T: +500 mS Vbt +4.53V
                         ∆V:+24.0V
```

o 501ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(501);
  digitalWrite(13,LOW);
  delay(501);
}
```





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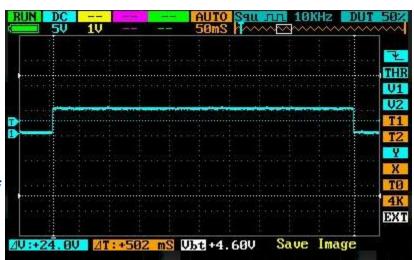
Automotive Entry Program

Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

o 502ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(502);
  digitalWrite(13,LOW);
  delay(502);
}
```



scheduler)

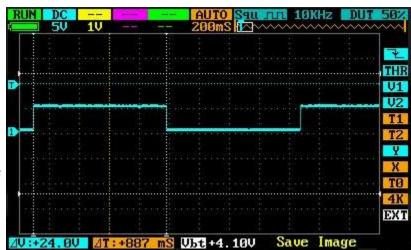


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Automotive Entry Program Window Lifter Test Log (State Machine implementation with infinite loop and

- SEMI-AUTOMATIC ACTIVATION TESTING [CONSIDERING LED TRANSITION TIMES: 500MS + 400MS = 900MS]: (TEST PASSED)
 - Signal Generator's Testing Time Constraints:
 - 887ms -> PASS: No action is performed provided the time length of input signal.
 - 900ms → PASS: No action is performed provided the time length of input signal
 - 901ms → PASS: Enters in semi-automatic mode (either up or down).
 - 903ms → PASS: Enters in semi-automatic mode (either up or down).
 - Signal Generator's Code Snippet:
 - 887ms Test:

```
void setup() {
  pinMode (13, OUTPUT);
}
void loop() {
  digitalWrite (13, HIGH);
  delay(887);
  digitalWrite (13, LOW);
  delay(887);
}
```



900ms Test:

```
void setup() {
  pinMode (13, OUTPUT);
}
void loop() {
  digitalWrite (13, HIGH);
  delay(900);
  digitalWrite (13, LOW);
  delay(900);
}
```

```
THR
                                                   V1
                                                   V2
                                                   T1
                                                   T2
                                                    Y
                                                   TØ
                                                   4K
                                                   EXT
4V:+24.0V 2T:+900 mS Vbt +4.09V
                                    Save Image
```



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Window Lifter Test Log (State Machine implementation with infinite loop and scheduler)

Automotive Entry Program

o 903ms Test:

```
void setup() {
  pinMode(13,OUTPUT);
}

void loop() {
  digitalWrite(13,HIGH);
  delay(903);
  digitalWrite(13,LOW);
  delay(903);
}
```

