# CANACE3C Firmware

This firmware is a rewrite of CANACE3_v2f code, providing enhanced facilities for 'next generation' control panels. To avoid confusion, this code uses a different module ID from the standard CANACE3 firmware.

Existing CANACE3_v2f modules **should not** be upgraded to this firmware unless the new features are required, as this will involve reconfiguring the firmware and re-entering all the configuration and events. However, with suitable reconfiguration, this firmware can be used with any existing control panel hardware or setup.

With this firmware, the 128 potential switches are divided into 8 blocks of 16 switches, each of which can be independently configured for different types of switches and operating modes:

- **Toggle Switch**
  This mode uses a normal 'toggle' switch or similar, with a distinct ON and OFF setting. An ON event is generated when its turned ON; an OFF event is generated when its turned OFF.

- **Toggle Switch, ON Only**
  This is identical to *Toggle Switch* mode, but only sends ON events.

- **Toggle Switch, OFF Only**
  This is identical to *Toggle Switch* mode, but only sends OFF events.

- **Toggle Switch with Start of Day**
  This is identical to *Toggle Switch* mode, however when a Start of Day (SOD) ON event is received (or automatically generated by the node), an ON or OFF event is sent as appropriate for each switch in the block.
  SOD events will **not** be sent if a block is currently locked out.

- **Pushbutton Pairs**
  This mode uses pairs of push buttons to generate ON or OFF events. The odd number switches generate an ON event, the even numbered switches an OFF event.
  Note that in this mode, only 8 different events are generated by each block of switches.

- **Push Button Toggle**
  This mode uses a single push button to alternately generate an ON or OFF event on each push. The first push after powerup will generate an ON event, the next OFF and so on. When a Start of Day (SOD) ON event is received (or automatically generated by the node), the internal state will be reset so the next push will generate an ON event.

- **Push Button Toggle with Monitor**
  This is identical to *Pushbutton Toggle* mode, however, if some other device generates the same event, the internal state of the switch will be set such that the next push of the button will generate the opposite event. This allows multiple control panels to be used, each automatically generating the next state when a button is pushed.
  Note that monitor mode will only work for long or short events numbered below 256.

## Lockout

Lockout can optionally be enabled for any block. If a lockout event is configured, then if an ON

event is received, it will lockout (or disable) ALL the switches in the blocks which have lockout set.
If an OFF event is received, it will re-enable all switches.
Note that the lockout setting is stored in non-volatile memory, so the lockout state will be "permanent" until changed again.
Note that lockout cannot be enabled/disabled by a switch on the same CANACE3C.

## Automatic Start of Day Generation

As well as responding to Start of Day (SOD) events generated by other nodes, the firmware can automatically generate ON or OFF SOD events after powerup.
This uses the same event that is configured for the SOD option for the switches.
A delay of to 2-31 seconds can be configured.
An OFF event can also be configured; this will generate an OFF SOD event after another delay of the same time.
If any switch blocks are set to *Push Button Toggle with Monitor* mode, they will automatically send their status when the SOD ON event is automatically generated.
Note that an automatic Start of Day will also be generated after the Node Variables have been updated.

## Event Processing

Even though it is possible to assign the same event to Lockout, SOD or a *Push Button Toggle with Monitor*, the event will only be processed by the first match of these.

## Updating from CANACE3 V2f Firmware

To update from the CANACE3 firmware with the same functionality, set each block as follows:

| | **Blocks 1..4** | **Blocks 5..8** |
|---|---|---|
| **Mode 0** | Toggle Switch | Toggle Switch |
| **Mode 1** | Pushbutton Pairs | Pushbutton Pairs |
| **Mode 2** | Toggle Switch | Pushbutton Pairs |
| **Mode 3** | Toggle Switch | Toggle Switch, On Only |
| **Mode 4** | Pushbutton Pairs | Toggle Switch, On Only |
| **Mode 5** | Toggle Switch, On Only | Toggle Switch, On Only |

## Internal Switch Numbering

| **Row** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
|---|---|---|---|---|---|---|---|---|
| **Col** | | **Block 1** | | | | **Block 5** | | |
| **1** | 1 | 2 | 3 | 4 | 65 | 66 | 67 | 68 |
| **2** | 5 | 6 | 7 | 8 | 69 | 70 | 71 | 72 |
| **3** | 9 | 10 | 11 | 12 | 73 | 74 | 75 | 76 |
| **4** | 13 | 14 | 15 | 16 | 77 | 78 | 79 | 80 |
| | | **Block 2** | | | | **Block 6** | | |
| **5** | 17 | 18 | 19 | 20 | 81 | 82 | 83 | 84 |
| **6** | 21 | 22 | 23 | 24 | 85 | 86 | 87 | 88 |
| **7** | 25 | 26 | 27 | 28 | 89 | 90 | 91 | 92 |
| **8** | 29 | 30 | 31 | 32 | 93 | 94 | 95 | 96 |
| | | **Block 3** | | | | **Block 7** | | |
| **9** | 33 | 34 | 35 | 36 | 97 | 98 | 99 | 100 |
| **10** | 37 | 38 | 39 | 40 | 101 | 102 | 103 | 104 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **11** | 41 | 42 | 43 | 44 | 105 | 106 | 107 | 108 |
| **12** | 45 | 46 | 47 | 48 | 109 | 110 | 111 | 112 |
| | | **Block 4** | | | | **Block 8** | | |
| **13** | 49 | 50 | 51 | 52 | 113 | 114 | 115 | 116 |
| **14** | 53 | 54 | 55 | 56 | 117 | 118 | 119 | 120 |
| **15** | 57 | 58 | 59 | 60 | 121 | 122 | 123 | 124 |
| **16** | 61 | 62 | 63 | 64 | 125 | 126 | 127 | 128 |

## Node Variables

The mode for switch blocks 1..8 is controlled by NV1..NV8 as follows:

| Value | Mode |
|---|---|
| **0x00** | Toggle Switch |
| **0x01** | Toggle Switch, Send On Event Only |
| **0x02** | Toggle Switch, Send Off Event Only |
| **0x04** | Pushbutton Pairs (8 switch pairs per block) |
| **0x08** | Push Button Toggle with Event Monitor |
| **0x10** | Push Button Toggle without Event Monitor |
| **0x20** | Toggle Switch, Send states when SOD processed |
| **0x40** | Enable Lockout for this block |
| **0x80** | Current unused, leave set to 0 |

The final value of NV1..8 is the bitwise 'OR' of these values.

The optional Automatic Start of Day Generation is controlled by NV9 as follows:

| Value | Mode |
|---|---|
| **2...63** | Time (in seconds) before Automatic Start of Day Generation |
| **0x40** | Generation ON Event |
| **0x80** | Generation OFF Event |

The final value of NV9 is the bitwise 'OR' of these values. Set NV9 to 0 if Auto SOD is not used.

## Event Table

The first 128 entries in the event table are used for the 128 switches. Entry 129 is used for the Lockout event, entry 130 for the Start of Day event.

## SLiM Mode

Operation in SLiM Mode is identical to using CANACE3 v2f firmware.

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