

**MACHINE** m2

**REFINES** m1

**SEES** cd, COLOR

**VARIABLES**

a as in previous abstraction  
b as in previous abstraction  
c as in previous abstraction  
ml\_tl mainland traffic light  
il\_tl island traffic light  
il\_pass technical boolean  
ml\_pass technical boolean

**INVARIANTS**

inv1 :  $ml\_tl \in \{red, green\}$   
inv2 :  $il\_tl \in \{red, green\}$   
inv3 :  $ml\_tl = green \Rightarrow c = 0$   
When mainland traffic light is green there is no car on bridge going to mainland  
inv12 :  $ml\_tl = green \Rightarrow a + b < d$   
When mainland traffic light is green the maximum has not been reached  
inv4 :  $il\_tl = green \Rightarrow a = 0$   
When island traffic light is green there is no car on bridge going to island  
inv11 :  $il\_tl = green \Rightarrow b > 0$   
when island traffic light is green there are cars in island  
inv6 :  $il\_pass \in \{0, 1\}$   
inv7 :  $ml\_pass \in \{0, 1\}$   
inv8 :  $ml\_tl = red \Rightarrow ml\_pass = 1$   
inv9 :  $il\_tl = red \Rightarrow il\_pass = 1$   
inv5 :  $il\_tl = red \vee ml\_tl = red$

**EVENTS**

**Initialisation**

**begin**  
act2 :  $a := 0$   
act3 :  $b := 0$   
act4 :  $c := 0$   
act1 :  $ml\_tl := red$   
act5 :  $il\_tl := red$   
act6 :  $ml\_pass := 1$   
act7 :  $il\_pass := 1$   
**end**

**Event**  $ML\_out1 \hat{=}$   
leaving mainland

**refines**  $ML\_out$

**when**  
grd1 :  $ml\_tl = green$   
traffic light is green  
grd2 :  $a + b + 1 < d$   
more cars can enter  
**then**  
act1 :  $a := a + 1$   
act2 :  $ml\_pass := 1$

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    end
Event ML_out2  $\hat{=}$ 
    leaving mainland
refines ML_out
    when
        grd1 : ml_tl = green
            traffic light is green
        grd2 :  $a + b + 1 = d$ 
            maximum is reached
    then
        act1 :  $a := a + 1$ 
        act2 : ml_tl := red
            traffic light becomes red
        act3 : ml_pass := 1
    end
Event IL_out1  $\hat{=}$ 
    leaving island
refines IL_out
    when
        grd1 : il_tl = green
            traffic light is green
        grd2 :  $b > 1$ 
            more cars in island
    then
        act1 :  $b := b - 1$ 
        act2 :  $c := c + 1$ 
        act3 : il_pass := 1
    end
Event IL_out2  $\hat{=}$ 
    leaving island
refines IL_out
    when
        grd1 : il_tl = green
            traffic light is green
        grd2 :  $b = 1$ 
            island will be empty
    then
        act1 :  $b := b - 1$ 
        act2 : il_tl := red
            traffic light becomes red
        act3 :  $c := c + 1$ 
        act4 : il_pass := 1
    end
Event ML_tl_green  $\hat{=}$ 
    turning mainland traffic light to green
Status convergent
    when
        grd1 : ml_tl = red
        grd2 :  $a + b < d$ 
        grd3 :  $c = 0$ 
        grd4 : il_pass = 1
    then
        act1 : ml_tl := green
        act2 : il_tl := red
        act3 : ml_pass := 0

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    end
Event IL_tl_green  $\hat{=}$ 
    turning island traffic light to green
Status convergent
    when
        grd1 : il_tl = red
        grd2 :  $0 < b$ 
        grd3 :  $a = 0$ 
        grd4 : ml_pass = 1
    then
        act1 : il_tl := green
        act2 : ml_tl := red
        act3 : il_pass := 0
    end
Event IL_in  $\hat{=}$ 
    entering island
refines IL_in
    when
        grd11 :  $0 < a$ 
    then
        act11 :  $a := a - 1$ 
        act12 :  $b := b + 1$ 
    end
Event ML_in  $\hat{=}$ 
    entering mainland
refines ML_in
    when
        grd1 :  $0 < c$ 
    then
        act1 :  $c := c - 1$ 
    end
VARIANT
    ml_pass + il_pass
END

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