MODULE *pluscal5*

EXTENDS *TLC*, *Integers*, *Naturals*

CONSTANTS $n0$, *min*, *max*

```
--algorithm compte{
variables n = n0, reverse = 0, rem, temp, r ;
{
  l1: temp := n ;
  w: while ( temp ≠ 0 )
  {
     l2: rem := temp%10 ;
     l3: reverse := reverse * 10 + rem ;
     l4: temp := temp ÷ 10 ;
   } ;
  l5:   print ⟨"finde  boucle"⟩ ;
  if ( reverse = n )   {
    print ⟨"palin", n⟩ ;
    r := TRUE ;
     }
    else
    {
    print ⟨"not palin", n⟩ ;
    r := FALSE ;
     }

 }
 }
```

BEGIN TRANSLATION

CONSTANT *defaultInitValue*

VARIABLES n, *reverse*, *rem*, *temp*, r, *pc*

$vars \triangleq \langle n, reverse, rem, temp, r, pc \rangle$

$Init \triangleq$ Global variables
$\land\ n = n0$
$\land\ reverse = 0$
$\land\ rem = defaultInitValue$
$\land\ temp = defaultInitValue$
$\land\ r = defaultInitValue$
$\land\ pc = \text{"l1"}$

$l1 \triangleq \land\ pc = \text{"l1"}$
$\land\ temp' = n$
$\land\ pc' = \text{"w"}$
$\land$ UNCHANGED $\langle n, reverse, rem, r \rangle$

$w \triangleq \land\ pc = \text{"w"}$

$\land$ IF $temp \neq 0$
THEN $\land\ pc' =$ "l2"
ELSE $\land\ pc' =$ "l5"
$\land$ UNCHANGED $\langle n,\ reverse,\ rem,\ temp,\ r\rangle$

$l2 \triangleq$ $\land\ pc =$ "l2"
$\land\ rem' = temp\%10$
$\land\ pc' =$ "l3"
$\land$ UNCHANGED $\langle n,\ reverse,\ temp,\ r\rangle$

$l3 \triangleq$ $\land\ pc =$ "l3"
$\land\ reverse' = reverse * 10 + rem$
$\land\ pc' =$ "l4"
$\land$ UNCHANGED $\langle n,\ rem,\ temp,\ r\rangle$

$l4 \triangleq$ $\land\ pc =$ "l4"
$\land\ temp' = (temp \div 10)$
$\land\ pc' =$ "w"
$\land$ UNCHANGED $\langle n,\ reverse,\ rem,\ r\rangle$

$l5 \triangleq$ $\land\ pc =$ "l5"
$\land\ PrintT(\langle$"finde boucle"$\rangle)$
$\land$ IF $reverse = n$
THEN $\land\ PrintT(\langle$"palin", $n\rangle)$
$\land\ r' =$ TRUE
ELSE $\land\ PrintT(\langle$"not palin", $n\rangle)$
$\land\ r' =$ FALSE
$\land\ pc' =$ "Done"
$\land$ UNCHANGED $\langle n,\ reverse,\ rem,\ temp\rangle$

$Next \triangleq\ l1 \lor w \lor l2 \lor l3 \lor l4 \lor l5$
$\lor$ Disjunct to prevent deadlock on termination
$(pc =$ "Done" $\land$ UNCHANGED $vars)$

$Spec \triangleq\ Init \land \Box[Next]_{vars}$

$Termination \triangleq\ \Diamond(pc =$ "Done"$)$

END TRANSLATION

$D \triangleq\ min\ ..\ max$
$DD(X) \triangleq\ (X = defaultInitValue) \lor (X \in D)$

$question1 \triangleq\ pc =$ "Done" $\Rightarrow (r =$ TRUE $\Rightarrow reverse = n)$
$question2 \triangleq\ DD(reverse) \land DD(temp)$

$$P1 \triangleq n \in D \land reverse \in D \land (rem = \quad \lor rem \in D) \land (temp = defaultInitValue \lor temp \in D)$$