MODULE *Blinker*

EXTENDS *Integers*, *Sequences*

BC is a sequence of blinker configurations - in this case just a natural number signifying the blink period in some time unit

CONSTANT BC
VARIABLES $bState$

ASSUME $\land BC \in Seq(Nat)$

$vars \triangleq bState$

$States \triangleq \{\text{“Active\_Off”}, \text{“Active\_On”}\}$
$Blinker \triangleq [timer : Nat, state : States]$

$TypeOK \triangleq \land bState \in [\text{DOMAIN } BC \to Blinker]$

$$
\begin{array}{l}
Init \triangleq \\
\quad \land bState = [n \in \text{DOMAIN } BC \mapsto [timer \mapsto BC[n], \\
\qquad\qquad\qquad\qquad\qquad\qquad state \mapsto \text{“Active\_Off”}] \\
\qquad\qquad]
\end{array}
$$

$$
\begin{array}{lll}
Transition(n) \triangleq & \land bState[n].timer = 0 & \\
& \land bState[n].state = \text{“Active\_Off”} & \\
& \land bState' = [bState \text{ EXCEPT } ![n].timer = BC[n], & \\
& \qquad\qquad\qquad\qquad\qquad\qquad ![n].state = \text{“Active\_On”}] & \\
\qquad\qquad \lor & & \\
\qquad\quad \land bState[n].timer = 0 & & \\
\qquad\quad \land bState[n].state = \text{“Active\_On”} & & \\
\qquad\quad \land bState' = [bState \text{ EXCEPT } ![n].timer = BC[n], & & \\
\qquad\qquad\qquad\qquad\qquad\qquad ![n].state = \text{“Active\_Off”}] & &
\end{array}
$$

$$
\begin{array}{lll}
Tick \triangleq & \land \forall\, n \in \text{DOMAIN } BC : bState[n].timer > 0 & \\
& \land bState' = [n \in \text{DOMAIN } BC \mapsto [timer \mapsto bState[n].timer - 1, & \\
& \qquad\qquad\qquad\qquad\qquad\qquad state \mapsto bState[n].state]] &
\end{array}
$$

$Next \triangleq Tick \lor \exists\, n \in \text{DOMAIN } BC : Transition(n)$

$Spec \triangleq Init \land \Box[Next]_{vars}$
$FairSpec \triangleq Spec \land \text{WF}_{vars}(Next)$

$LEDsWillTurnOn \triangleq \forall\, n \in \text{DOMAIN } BC : (bState[n].state = \text{“Active\_Off”}) \leadsto (bState[n].state = \text{“Active\_On”}$
$LEDsWillTurnOff \triangleq \forall\, n \in \text{DOMAIN } BC : (bState[n].state = \text{“Active\_On”}) \leadsto (bState[n].state = \text{“Active\_Off”}$