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 $\land BC \in Seq(Nat)$

$vars \triangleq bState$

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

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

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

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

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

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

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

$$
\begin{aligned}
LEDsWillTurnOn \triangleq\ & \forall\, n \in \text{DOMAIN } BC : \\
& (bState[n].state = \text{“Active\_Off”}) \rightsquigarrow (bState[n].state = \text{“Active\_On”})
\end{aligned}
$$

$$
\begin{aligned}
LEDsWillTurnOff \triangleq\ & \forall\, n \in \text{DOMAIN } BC : \\
& (bState[n].state = \text{“Active\_On”}) \rightsquigarrow (bState[n].state = \text{“Active\_Off”})
\end{aligned}
$$