MODULE *appex*1_4

modules de base importables

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

CONSTANTS $x1,\ x2,\ U,\ MIN,\ MAX$

VARIABLES $y1,\ y2,\ y3,\ z1,\ z2,\ pc$

$locs \triangleq \{\text{“START”},\ \text{“HALT”},\ \text{“g”}\}$

$BF(X) \triangleq X \neq U \Rightarrow X \in MIN\ ..\ MAX$

ASSUME $BF(x1) \land BF(x2)$

$Init \triangleq pc = \text{“START”} \land y1 = U \land y2 = U \land y3 = U \land z1 = U \land z2 = U$

$$
\begin{aligned}
actionSTART\_g \triangleq\ & \land pc = \text{“START”} \\
& \land pc' = \text{“g”} \\
& \land y1' = 0 \\
& \land y2' = 0 \\
& \land y3' = x1 \\
& \land z1' = z1 \\
& \land z2' = z2
\end{aligned}
$$

$$
\begin{aligned}
actiong\_HALT \triangleq\ & \land pc = \text{“g”} \\
& \land y3 = 0 \\
& \land pc' = \text{“HALT”} \\
& \land y1' = y1 \\
& \land y2' = y2 \\
& \land y3' = y3 \\
& \land z1' = y1 \\
& \land z2' = y2
\end{aligned}
$$

$$
\begin{aligned}
actiong\_g \triangleq\ & \land pc = \text{“g”} \\
& \land y3 \neq 0 \\
& \land pc' = pc \\
& \land y1' = \text{IF } y2 + 1 = x2 \text{ THEN } y1 + 1 \text{ ELSE } y1 \\
& \land y2' = \text{IF } y2 + 1 = x2 \text{ THEN } 0 \text{ ELSE } y2 + 1 \\
& \land y3' = y3 - 1 \\
& \land z1' = z1
\end{aligned}
$$

$\wedge\ z2' = z2$

$skip \triangleq$ UNCHANGED $\langle y1,\ y2,\ y3,\ z1,\ z2,\ pc\rangle$

$Next \triangleq\ actionSTART\_g \vee\ \ actiong\_HALT \vee actiong\_g \vee skip$

---

vrification du contrle

$safety1 \triangleq\ pc \in locs$

correction partuielle

$safety2 \triangleq\ pc = \text{“HALT”} \Rightarrow z1 = x1 \div x2 \wedge z2 = x1\%x2 \wedge PrintT(z1) \wedge PrintT(z2)$

$safety2bis \triangleq\ pc = \text{“HALT”} \Rightarrow \quad x1 = z1 * x2 + z2\ \ \wedge 0 \leq z2 \wedge z2 < x2$

$safety3 \triangleq\ BF(z1) \wedge BF(z2) \wedge BF(y1) \wedge BF(y2) \wedge BF(y3)$

$test \triangleq\ safety1 \wedge safety2 \qquad \wedge safety3 \wedge safety2bis$
