──────────────────── MODULE *DieHard* ────────────────────

EXTENDS *Integers*

VARIABLES *bigJug*, *smallJug*

$TypeOk \triangleq \land smallJug \in 0 .. 3$
$\qquad\qquad\; \land bigJug \in 0 .. 5$

$Init \triangleq \land bigJug = 0$
$\qquad\quad \land smallJug = 0$

$Min(m, n) \triangleq$ IF $m < n$ THEN m ELSE n

$FillSmallJug \triangleq \land smallJug' = 3$
$\qquad\qquad\qquad \land\;\; bigJug' = bigJug$

$FillBigJug \triangleq \land bigJug' = 5$
$\qquad\qquad\qquad \land smallJug' = smallJug$

$EmptySmallJug \triangleq \land smallJug' = 0$
$\qquad\qquad\qquad\quad \land bigJug' = bigJug$

$EmptyBigJug \triangleq \land smallJug' = smallJug$
$\qquad\qquad\qquad\quad \land bigJug'\; = 0$

$SmallToBig \triangleq$
LET
$\quad pouredAmount \triangleq Min(bigJug + smallJug, 5) - bigJug$
IN
$\quad \land bigJug' = bigJug + pouredAmount$
$\quad \land smallJug' = smallJug - pouredAmount$

$BigToSmall \triangleq$
LET
$\quad pouredAmount \triangleq Min(bigJug + smallJug, 3) - smallJug$
IN
$\quad \land bigJug' = bigJug - pouredAmount$
$\quad \land smallJug' = smallJug + pouredAmount$

$Next \triangleq \lor FillSmallJug$
$\qquad\quad\; \lor FillBigJug$
$\qquad\quad\; \lor EmptySmallJug$
$\qquad\quad\; \lor EmptyBigJug$
$\qquad\quad\; \lor SmallToBig$

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$$\lor \; BigToSmall$$

$DefuseBomb \;\triangleq\; bigJug \neq 4$ Look for a violation which is the solution....