────────── MODULE *TPaxosWithVotes* ──────────

EXTENDS *TPaxos*
VARIABLE *votes* $votes[q]$: the set of votes cast by $q \in Participant$
$varsV \triangleq \langle vars, votes \rangle$

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$InitV \triangleq$
    $\wedge Init$
    $\wedge votes = [q \in Participant \mapsto \{\}]$

$TypeOKV \triangleq$
    $\wedge votes \in [Participant \rightarrow$ SUBSET $(Ballot \times Value)]$
    $\wedge TypeOK$

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$PrepareV(p, b) \triangleq$
    $\wedge Prepare(p, b)$
    $\wedge votes' = votes$

$AcceptV(p, b, v) \triangleq$
    $\wedge \quad Accept(p, b, v)$
    $\wedge \quad votes' = [votes$ EXCEPT $![p] = @ \cup \{\langle b, v \rangle\}]$ collecting proposal $\langle b, v \rangle$

$OnMessageV(q) \triangleq$
    $\wedge OnMessage(q)$
    $\wedge$ IF $state'[q][q].maxVBal \neq state[q][q].maxVBal$ accept
        THEN $votes' = [votes$ EXCEPT $![q] = @ \cup$ collecting proposal
                          $\{\langle state'[q][q].maxVBal, state'[q][q].maxVVal \rangle\}]$
        ELSE UNCHANGED $votes$

$NextV \triangleq \exists p \in Participant :$
           $\vee OnMessageV(p)$
           $\vee \exists b \in Ballot : \vee PrepareV(p, b)$
                       $\vee \exists v \in Value : AcceptV(p, b, v)$
$SpecV \triangleq InitV \wedge \square[NextV]_{varsV}$

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$maxBal \triangleq [p \in Participant \mapsto state[p][p].maxBal]$
$V \triangleq$ INSTANCE *Voting* WITH $Acceptor \leftarrow Participant$
                          $votes \leftarrow votes, maxBal \leftarrow maxBal$

THEOREM $SpecR \Rightarrow V!Spec$

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1