```
switch_normal_safety  THM

⊢  ∀E:TaggedEventStruct. safetyR(E) preserves AD-normal(E)
| by Unfolds ``preserved_by R_safety`` 0 THEN Reduce 0
THEN Auto

|    THEN Try (Fold `trace_property` 0 THEN Auto)

|    THEN InstLemma `iseg_select` [|E|;y;x] THENA Auto

|    THEN SimpHyp (-1) THEN ExRepD
THEN MoveToHyp 0 (-4)
|
|
1. E : TaggedEventStruct
2. x : |E| List
3. y : |E| List
4. y ≤ x
5. ||y||≤||x||
6. ∀i:ℕ. i<||y|| ⇒ y[i] = x[i]
7. AD-normal(E)(x)
⊢  AD-normal(E)(y)
| by All (\h. Unfold `switch_normal` h THEN Reduce h)

|    THEN ParallelOp (-1) THEN Thin (-3)
THEN Subst y[i] = x[i]
|     0 THENA Auto THEN EasyHyp
THEN Subst y[(i+1)] = x[(i+1)]
|     0 THENA Auto THEN EasyHyp
|
1. E : TaggedEventStruct
2. x : |E| List
3. y : |E| List
4. y ≤ x
5. ||y||≤||x||
6. ∀i:ℕ. i<||y|| ⇒ y[i] = x[i]
7. i : ℕ(||y||-1)
8. (is-send(E)(x[i]) ⇒
    ¬is-send(E)(x[(i+1)]) ⇒ (x[i] =msg=(E) x[(i+1)]))
   & ((∃x@0,y:ℕ||x||.
       x@0<y
       & is-send(E)(x[x@0])
       & is-send(E)(x[y])
       & x[x@0] delivered at time i+1
       & x[y] delivered at time i)
      ⇒
      loc(E)(x[i]) = loc(E)(x[(i+1)]))
⊢  (is-send(E)(x[i]) ⇒
    ¬is-send(E)(x[(i+1)]) ⇒ (x[i] =msg=(E) x[(i+1)]))
   & ((∃x,y@0:ℕ||y||.
       x<y@0
       & is-send(E)(y[x])
       & is-send(E)(y[y@0])
       & y[x] delivered at time i+1
       & y[y@0] delivered at time i)
```

```
      ⇒
      loc(E)(x[i]) = loc(E)(x[(i+1)]))
  by RepeatFor 5 (ParallelOp (-1))
THEN All (Unfold `delivered_at`)

     THEN Subst y[i] = x[i] (-1) THENA Auto THEN EasyHyp
THEN Subst
     y[(i+1)] = x[(i+1)] (-1) THENA Auto THEN EasyHyp
THEN Subst
     y[x1] = x[x1] (-1) THENA Auto THEN EasyHyp
THEN Subst y[y@0]
                                                            =
                                                            x[y@0]
      (-1) THENA Auto THEN EasyHyp
END
```