```
list_all_iff_assert_list_all_2  THM

⊢  ∀L:T List, P:(T→𝔹). ∀x∈L.P(x) ⟺ ∀x∈₂L.P(x)  by Auto
|
|\
| 1. T : Type
| 2. L : T List
| 3. P : T→𝔹
| 4. ∀x∈L.P(x)
| ⊢  ∀x∈₂L.P(x)  by MoveToConcl 4 THEN ListInd 2
| |
| |\
| | 3. P : T→𝔹
| | ⊢  ∀x∈nil.P(x) ⇒ ∀x∈₂nil.P(x)
| | | by Rewrite
| | |    (HigherC list_all_2_unrollC THENC HigherC list_all_unrollC
| | |     THENC
| | |     HigherC assert_evalC)
| | |    0
| | |
| | ⊢  True ⇒ True  by Auto
| |
| .\
| . 4. u : T
| . 5. v : T List
| . 6. ∀x∈v.P(x) ⇒ ∀x∈₂v.P(x)
| . ⊢  ∀x∈(u.v).P(x) ⇒ ∀x∈₂(u.v).P(x)
| . | by Rewrite
| . |    (HigherC list_all_2_unrollC THENC HigherC list_all_unrollC)
| . |    0
| . |
| . 7. P(u)
| . 8. ∀x∈v.P(x)
| . ⊢  P(u)∧₂∀x∈₂v.P(x)  by FwdThru 6 [8]
| . |
| . 9. ∀x∈₂v.P(x)
| . ⊢  P(u)∧₂∀x∈₂v.P(x)
| .   by BackThru Thm* ∀p,q:𝔹. (p∧₂q) ⟺ p & q    {assert_of_band}
|
.\
. 1. T : Type
. 2. L : T List
. 3. P : T→𝔹
. 4. ∀x∈₂L.P(x)
. ⊢  ∀x∈L.P(x)  by MoveToConcl 4 THEN ListInd 2
. |
. |\
. | 3. P : T→𝔹
. | ⊢  ∀x∈₂nil.P(x) ⇒ ∀x∈nil.P(x)
. | | by Rewrite
. | |    (HigherC list_all_2_unrollC THENC HigherC list_all_unrollC
. | |     THENC
. | |     HigherC assert_evalC)
. | |    0
. | |
```

```
. | ⊢  True ⇒ True  by Auto
. |
. .\
. . 4. u : T
. . 5. v : T List
. . 6. ∀x∈₂v.P(x) ⇒ ∀x∈v.P(x)
. . ⊢  ∀x∈₂(u.v).P(x) ⇒ ∀x∈(u.v).P(x)
. . | by Rewrite
. . |    (HigherC list_all_2_unrollC THENC HigherC list_all_unrollC)
. . |    0
. . |
. . |\
. . | 7. P(u)∧₂∀x∈₂v.P(x)
. . | ⊢  P(u)
. . |   by FwdThru Thm* ∀p,q:𝔹. (p∧₂q) ⟺ p & q    {assert_of_band}
. . |      [7]
. . |
. . .\
. . . 7. P(u)∧₂∀x∈₂v.P(x)
. . . ⊢  ∀x∈v.P(x)
. . . | by Inst Thm* ∀p,q:𝔹. (p∧₂q) ⟺ p & q    {assert_of_band}
. . . |    [P(u);∀x∈₂v.P(x)]
. . . |
. . . 8. (P(u)∧₂∀x∈₂v.P(x)) ⟺ P(u) & ∀x∈₂v.P(x)
. . . ⊢  ∀x∈v.P(x)  by Analyze 8 THEN Thin -1
. . . |
. . . 8. (P(u)∧₂∀x∈₂v.P(x)) ⇒ P(u) & ∀x∈₂v.P(x)
. . . ⊢  ∀x∈v.P(x)  by RenameVar ‘xx’ -2
. . . |
. . . 7. P(u)∧₂∀x∈₂v.P(x)
. . . 8. (P(u)∧₂∀x∈₂v.P(x)) ⇒ P(u) & ∀x∈₂v.P(x)
. . . ⊢  ∀x∈v.P(x)  by With xx (Analyze -1)
. . . |
. . . 8. P(u) & ∀x∈₂v.P(x)
. . . ⊢  ∀x∈v.P(x)  by Analyze 8
. . . |
. . . 8. P(u)
. . . 9. ∀x∈₂v.P(x)
. . . ⊢  ∀x∈v.P(x)  by FwdThru 6 [-1] THEN Trivial
END
```