We prove:

$((A \vee B) \Rightarrow C) \Leftrightarrow ((A \Rightarrow C) \wedge (B \Rightarrow C))$ (abc1)

with no assumptions.

Proof by sequent calculus with unit propagation:

$\{\{((A \vee B) \Rightarrow C) \Leftrightarrow ((A \Rightarrow C) \wedge (B \Rightarrow C)), \text{"abc1"}\}\}.$ (G#0)

Equivalence goal (abc1) is proven in both directions.

☑ {1} Direction from left to right: Assume:

$(A \vee B) \Rightarrow C,$ (A#1)

and prove:

$(A \Rightarrow C) \wedge (B \Rightarrow C),$ (G#2)

$\{\{(A \Rightarrow C) \wedge (B \Rightarrow C), \text{"G\#2"}\}\}.$ (G#3)

Conjunctive goal (G#2) is decomposed on different proof branches.

☑ {1, 1} Proof of (G#2.1):

$A \Rightarrow C.$ (G#2.1)

$\{\{A \Rightarrow C, \text{"G\#2.1"}\}\}.$ (G#9)

Implicative goal (G#2.1) is split. Assume:

$A,$ (A#15)

and prove:

$C,$ (G#16)

$\{\{C, \text{"G\#16"}\}\}.$ (G#17)

Implicative assumption (A#1) is used for Modus Ponens.

☑ {1, 1, 1} First the premise of (A#1) is proven:

$A \vee B.$ (G#25)

$\{\{A \vee B, \text{"G\#25"}\}, \{C, \text{"G\#16"}\}\}.$ (G#26)

Disjunctive goal (G#25) is split:

$A,$ (G#25.1)

$B.$ (G#25.2)

$\{\{A, \text{"G\#25.1"}\}, \{B, \text{"G\#25.2"}\}, \{C, \text{"G\#16"}\}\}.$ (G#27)

Assumed (A#15) goal (G#25.1): success.

☑ {1, 1, 2} Now the conclusion of (A#1) is assumed:

$C.$ (A#24)

Assumed (A#24) goal (G#16): success.

☑ {1, 2} Proof of (G#2.2):

$B \Rightarrow C.$ (G#2.2)

```
{{B ⇒ C, "G#2.2"}}.
```
(G#10)

Implicative goal (G#2.2) is split. Assume:

```
B,
```
(A#28)

and prove:

```
C,
```
(G#29)

```
{{C, "G#29"}}.
```
(G#30)

Implicative assumption (A#1) is used for Modus Ponens.

☑ {1, 2, 1} First the premise of (A#1) is proven:

```
A ∨ B.
```
(G#38)

```
{{A ∨ B, "G#38"}, {C, "G#29"}}.
```
(G#39)

Disjunctive goal (G#38) is split:

```
A,
```
(G#38.1)

```
B.
```
(G#38.2)

```
{{A, "G#38.1"}, {B, "G#38.2"}, {C, "G#29"}}.
```
(G#40)

Assumed (A#28) goal (G#38.2): success.

☑ {1, 2, 2} Now the conclusion of (A#1) is assumed:

```
C.
```
(A#37)

Assumed (A#37) goal (G#29): success.

☑ {2} Direction from right to left: Assume:

```
(A ⇒ C) ∧ (B ⇒ C),
```
(A#4)

and prove:

```
(A ∨ B) ⇒ C,
```
(G#5)

```
{{(A ∨ B) ⇒ C, "G#5"}}.
```
(G#6)

Assumed conjunction (A#4) is split into:

```
A ⇒ C,
```
(A#4.1)

```
B ⇒ C.
```
(A#4.2)

Implicative goal (G#5) is split. Assume:

```
A ∨ B,
```
(A#49)

and prove:

```
C,
```
(G#50)

```
{{C, "G#50"}}.
```
(G#51)

Disjunctive assumption (A#49) is used for proof by cases.

☑ {2, 1} Case (A#49.1):

```
A.
```
(A#49.1)

Implicative assumption (A#4.1) is used for Modus Ponens.

☑ {2, 1, 1} First the premise of (A#4.1) is proven:

```
A.                                                    (G#70)
{{A, "G#70"}, {C, "G#50"}}.                           (G#71)
```

Assumed (A#49.1) goal (G#70): success.

☑ {2, 1, 2} Now the conclusion of (A#4.1) is assumed:

```
C.                                                    (A#69)
```

Assumed (A#69) goal (G#50): success.

☑ {2, 2} Case (A#49.2):

```
B.                                                    (A#49.2)
```

Implicative assumption (A#4.1) is used for Modus Ponens.

☑ {2, 2, 1} First the premise of (A#4.1) is proven:

```
A.                                                    (G#73)
{{A, "G#73"}, {C, "G#50"}}.                           (G#74)
```

Implicative assumption (A#4.2) is used for Modus Ponens.

☑ {2, 2, 1, 1} First the premise of (A#4.2) is proven:

```
B.                                                    (G#76)
{{B, "G#76"}, {A, "G#73"}, {C, "G#50"}}.              (G#77)
```

Assumed (A#49.2) goal (G#76): success.

☑ {2, 2, 1, 2} Now the conclusion of (A#4.2) is assumed:

```
C.                                                    (A#75)
```

Assumed (A#75) goal (G#50): success.

☑ {2, 2, 2} Now the conclusion of (A#4.1) is assumed:

```
C.                                                    (A#72)
```

Assumed (A#72) goal (G#50): success.