

$$C_3 : S^3 = I \quad R_{16} : \text{Diagram} = \text{Diagram}$$

$$C_7 : (1) \quad \text{Diagram} = \text{Diagram}$$

$$R_{10} : \text{Diagram} = \text{Diagram} \quad R_{11} : \text{Diagram} = \text{Diagram}$$

$$R_{55} : \text{Diagram} = \text{Diagram} \cdot w$$

Lem 22

$$7.4-6.(3) \quad \text{Diagram} = \text{Diagram} \cdot w$$

Proof cont:

$$\text{Diagram} \xrightarrow{\text{WTS}}$$

$$\text{Diagram} \cdot w$$

$C_3 \parallel R_{16}$

$$\text{Diagram} \xrightarrow{\text{WTS}} \text{Diagram} \cdot w$$

$$C_3, C_5, \text{Def 1} \parallel R_{10}, R_{11}$$

$$S^2 Z \xrightarrow{R_{10}} S^2 S'^2 S \frac{C_3}{C_5} S'^2$$

$$S Z^2 \xrightarrow{R_{11}} S S' S^2 \frac{C_3}{C_5} S'$$

$$\text{Diagram} \xrightarrow{\text{WTS}} \text{Diagram} \cdot w$$

By R_{55} , this completes the proof.

□

$B_{01} =$
 $B_{2b} =$
 $R_{17}:$

 $B_{00} =$
 $\text{Def 4: } \oplus :=$
 $\text{Def 2: } \oplus :=$

 $\text{Def 7: } \oplus :=$
 $\text{Def 5: } \oplus :=$
 $C_{15}^1:$

 $R_{31}:$
 $C_{15}^{14}:$

 $\text{Def 3: } \times :=$
 $C_{15}^4:$

 $C_8:$
 $C_7:$
 $R_{19}:$

Lem 23 Def 1-5, Def 7, $C_3, C_5, C_7, C_8, C_{15}, R_{10}, R_{16}, R_{17}, R_{19}, R_{31}$ & R_{56} imply

7.7-9.(1)

Proof: 7.7-9.(1). LHS :=

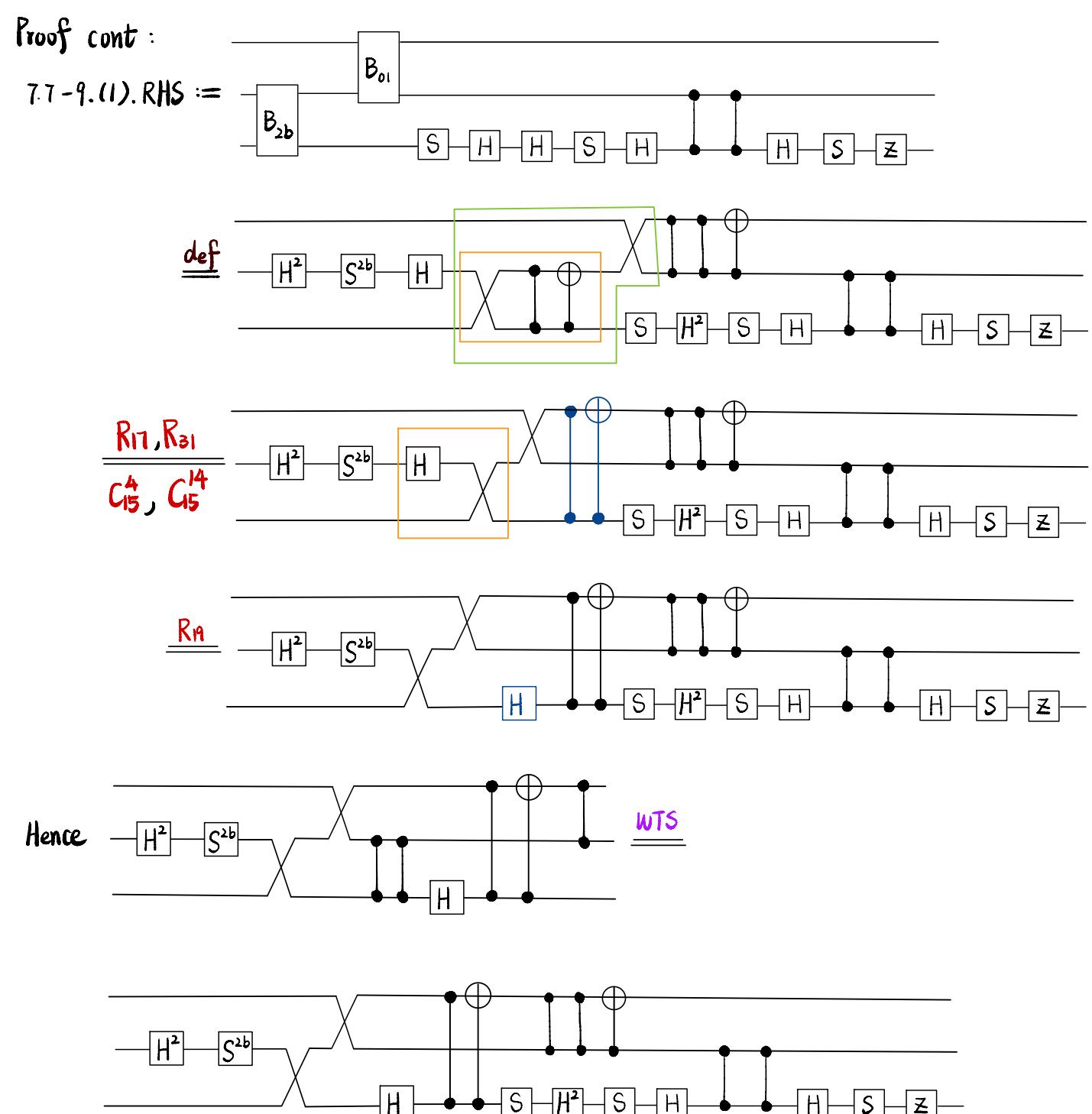
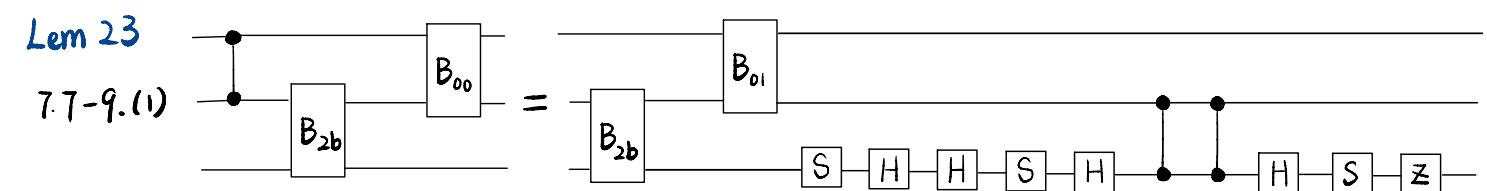
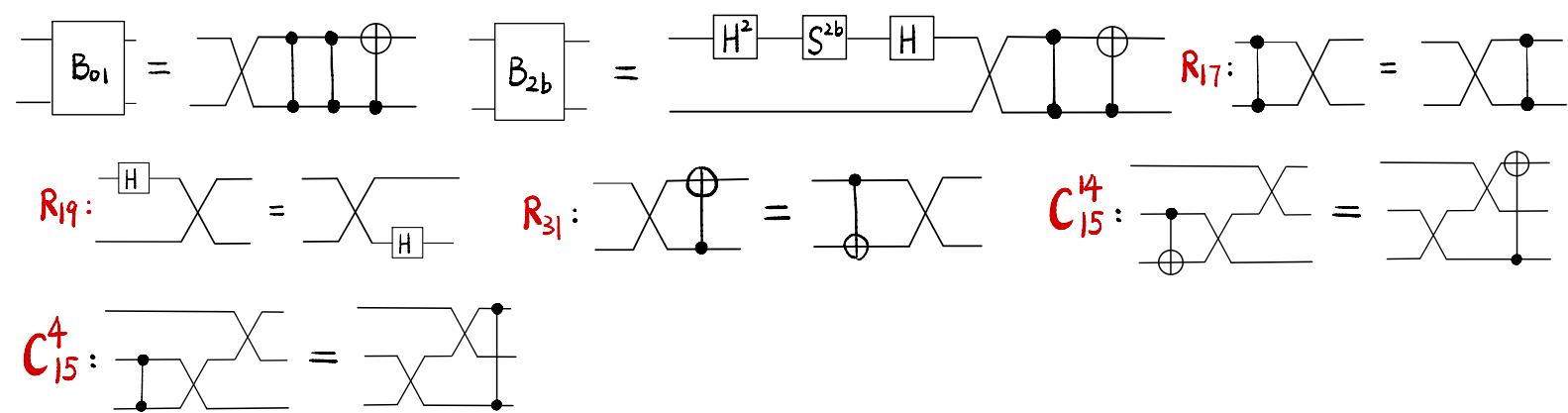
def

$\underline{\underline{R_{17}, R_{31}}}$ $\underline{\underline{C_{15}^4, C_{15}^{14}}}$

$\underline{\underline{C_8}}$

$\underline{\underline{C_7}}$

$\underline{\underline{C_{15}^1}}$



$$C_2: H^4 = I \quad C_3: S^3 = I \quad R_{16}: \text{Diagram} = \text{Diagram}$$

$$R_{10}: \text{Diagram} = \text{Diagram}$$

$$R_{56}: \text{Diagram} = \text{Diagram}$$

Lem 23

$$7.7-9.(1) \quad \text{Diagram} = \text{Diagram}$$

Proof cont:

$$\text{WTS} \quad \text{Diagram} = \text{Diagram}$$

$C_2, C_3 \parallel R_{16}$

$$\text{WTS} \quad \text{Diagram} = \text{Diagram}$$

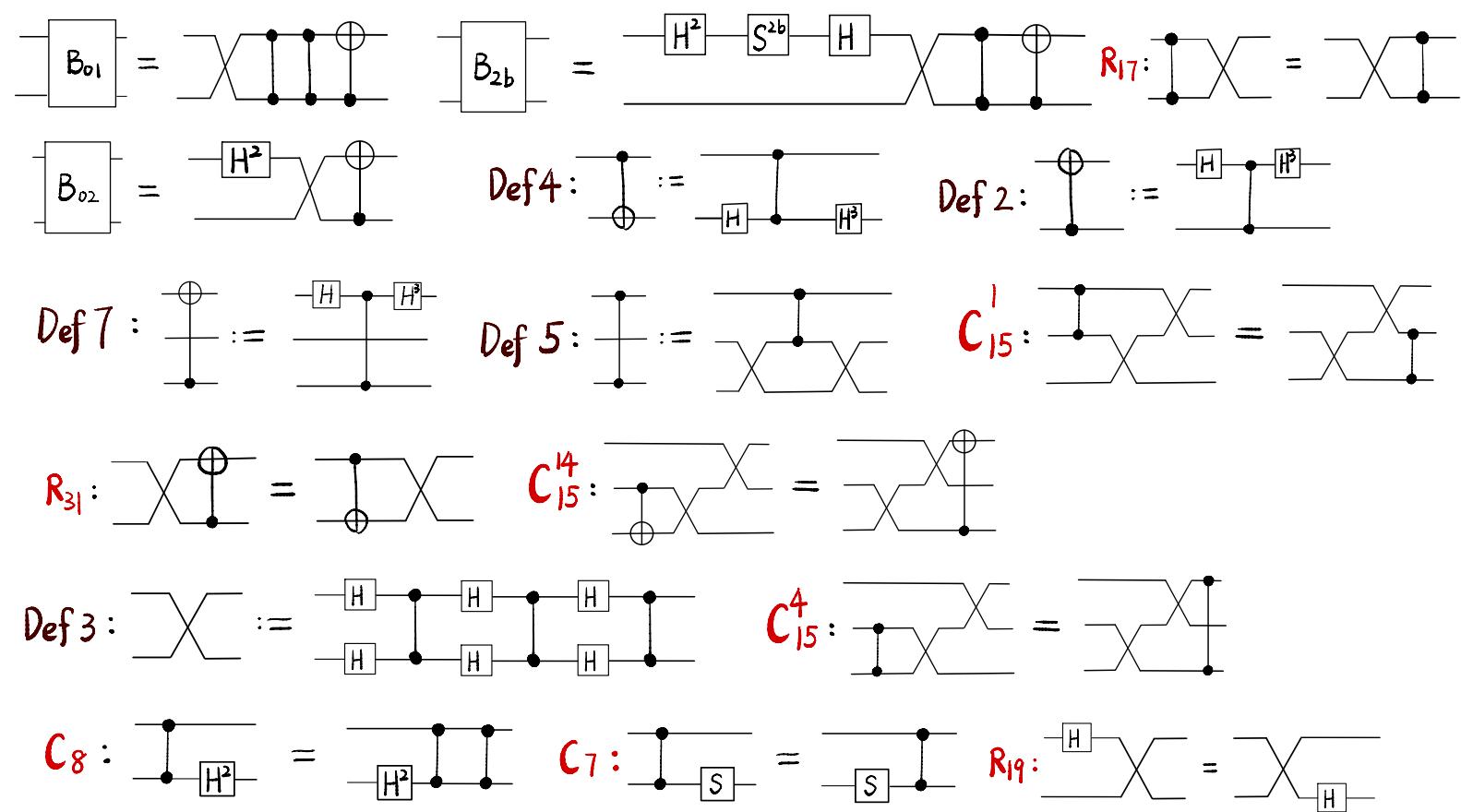
$C_5, \text{Def 1} \parallel R_{10}$

$$S Z \xrightarrow{R_{10}} S S'^2 S \xrightarrow{C_5} S^2 S'^2$$

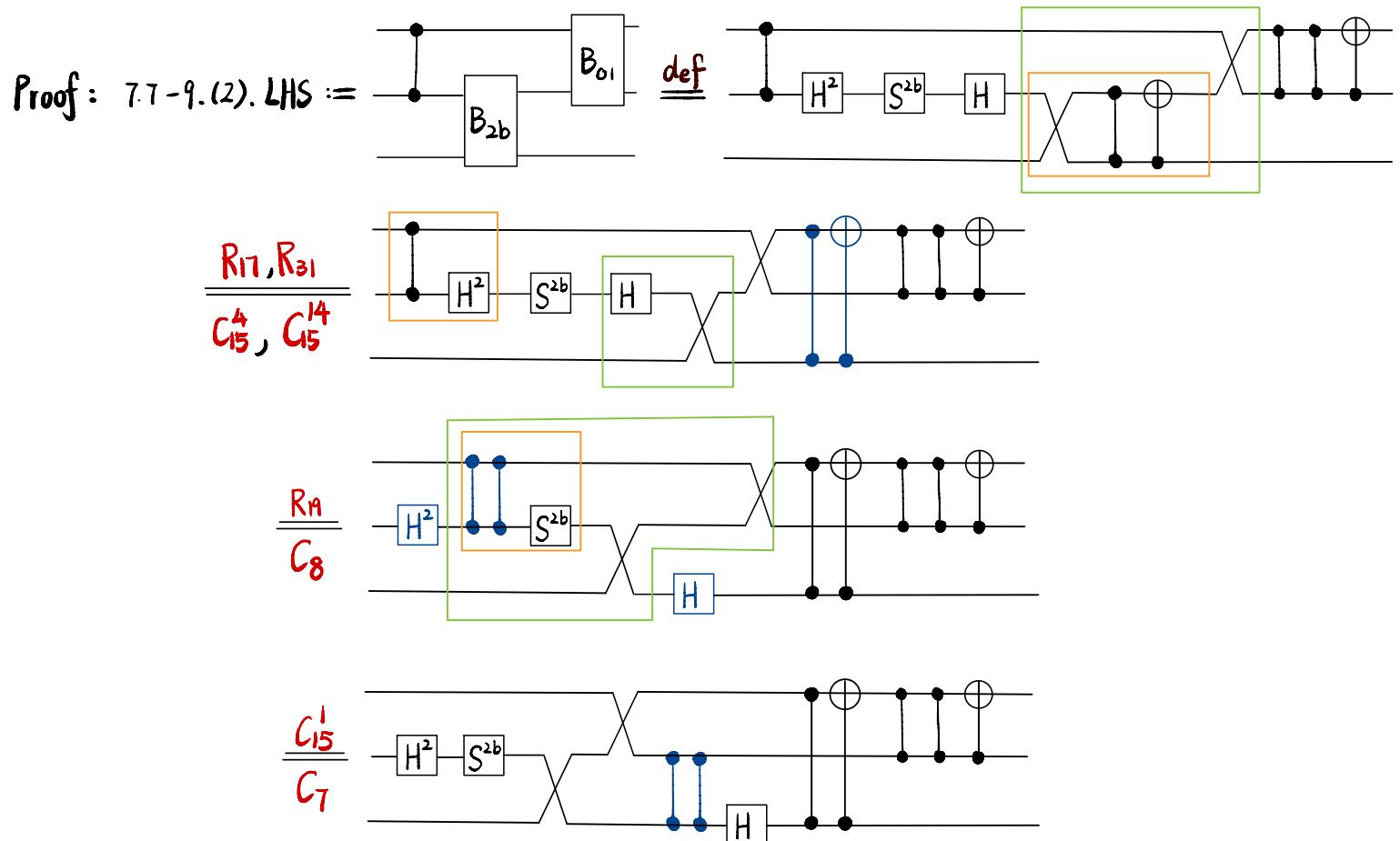
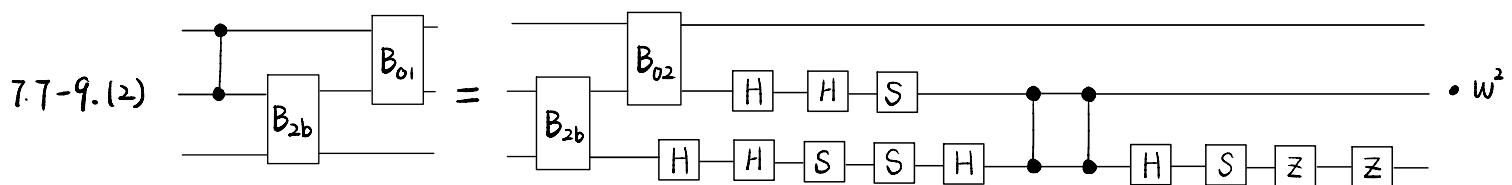
$$\text{WTS} \quad \text{Diagram} = \text{Diagram}$$

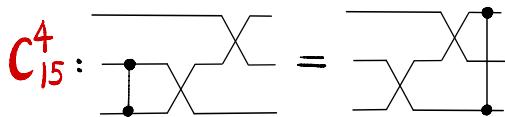
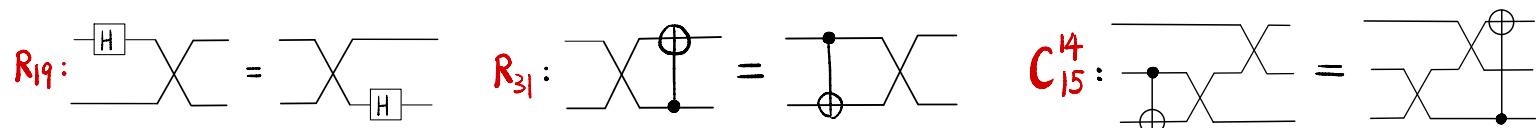
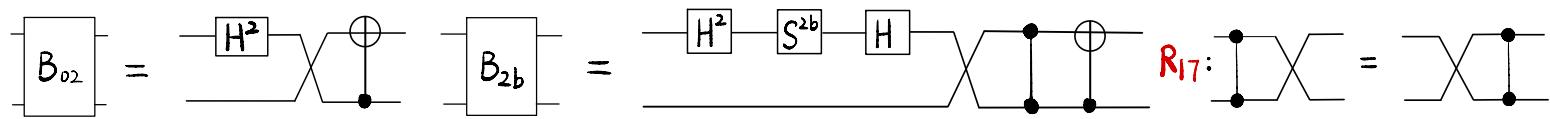
By R_{56} , this completes the proof.

□

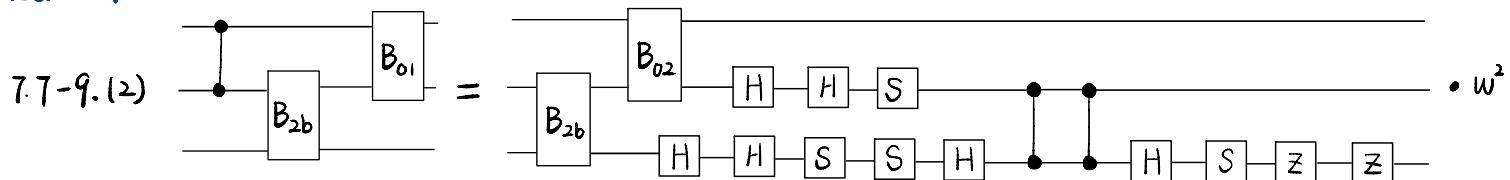


Lem 24 Def 2-5, Def 7, C_3 , C_7 , C_8 , C_{15} , R_{16} , R_{17} , R_{19} , R_{31} & R_{57} imply

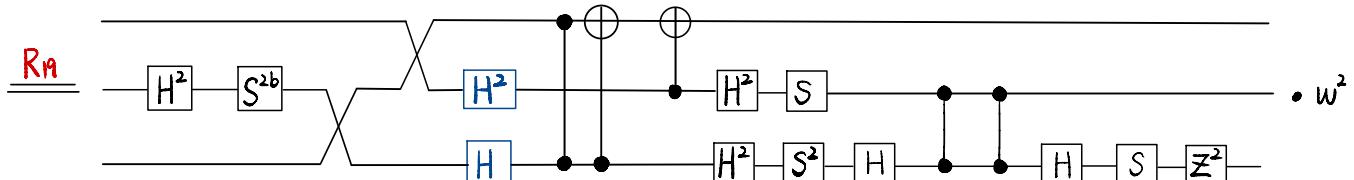
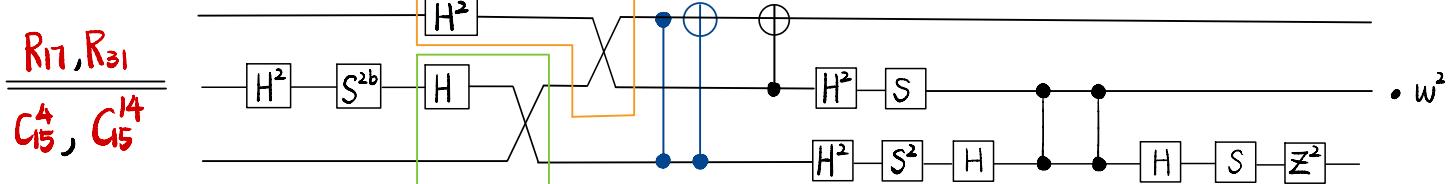
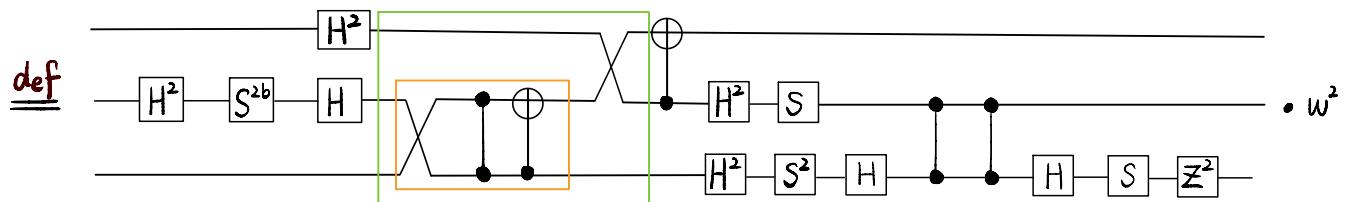
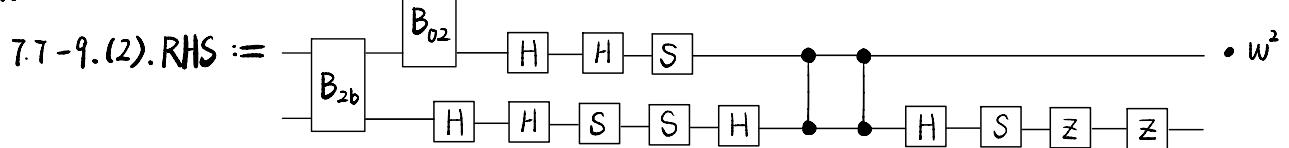




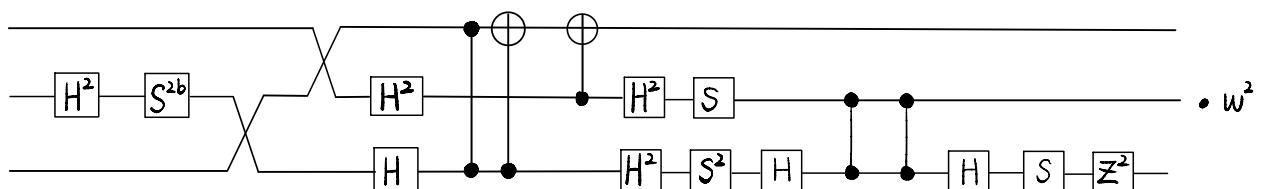
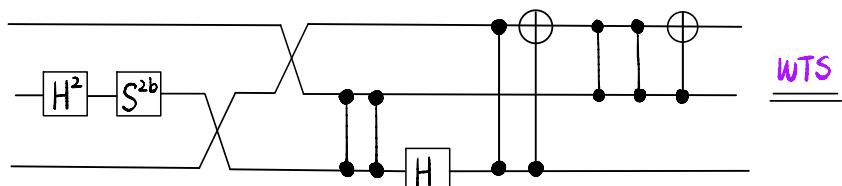
Lem 24



Proof cont:



Hence,



$$C_2 : H^4 = I \quad C_3 : S^3 = I \quad R_{16} : \text{Diagram} = \text{Diagram}$$

$$R_{11} : \boxed{z^2} = \boxed{s'} \boxed{s} \boxed{s}$$

$$R_{57} : \text{Diagram} = \text{Diagram} \cdot w^2$$

Lem 24

$$7.7-9.(2) \quad \text{Diagram} = \text{Diagram} \cdot w^2$$

$$\text{Proof cont: } \text{Diagram} \xrightarrow{\text{WTS}} \text{Diagram}$$

$$\text{Diagram} \xrightarrow{\text{WTS}} \text{Diagram} \cdot w^2$$

$C_2, C_3 \parallel R_{16}$

$$\text{Diagram} \xrightarrow{\text{WTS}} \text{Diagram} \cdot w^2$$

$$C_3, C_5, \text{Def 1} \parallel R_{11} \quad S z^2 \xrightarrow{R_{11}} S S' S^2 \xrightarrow[C_5]{C_3} S'$$

$$\text{Diagram} \xrightarrow{\text{WTS}} \text{Diagram} \cdot w^2$$

By R_{57} , this completes the proof.

□