

$$R_{15}: \quad \begin{array}{c} \text{---} \\ | \\ \bullet \\ | \\ \text{---} \end{array} \quad S' \quad \begin{array}{c} \text{---} \\ | \\ \bullet \\ | \\ \text{---} \end{array} = \quad \begin{array}{c} \text{---} \\ | \\ \bullet \\ | \\ \text{---} \end{array} \quad S' \quad \begin{array}{c} \text{---} \\ | \\ \bullet \\ | \\ \text{---} \end{array}$$

$$R_{24}^1 : \begin{array}{c} \oplus \\ \parallel \\ |S| \end{array} = \begin{array}{c} \oplus \\ \parallel \\ |S'| \end{array} \quad C_1: w^3=I \quad C_2: H^4=I \quad C_3: S^3=I \quad C_5: SS'=S'S$$

$$C_B^2 : \begin{array}{c} \text{---} \\ | \quad | \\ \bullet \quad \bullet \\ | \quad | \\ \text{---} \end{array} = \begin{array}{c} \bullet \\ | \\ \text{---} \\ | \quad | \\ \bullet \quad \bullet \\ | \quad | \\ \text{---} \end{array} \quad C_B^7 : \begin{array}{c} \text{---} \\ | \quad | \\ \bullet \quad \bullet \\ | \quad | \\ \text{---} \\ | \\ \circ \end{array} = \begin{array}{c} \bullet \\ | \\ \text{---} \\ | \quad | \\ \bullet \quad \bullet \\ | \quad | \\ \text{---} \\ | \\ \circ \end{array} \quad C_6 : \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ | \quad | \quad | \\ \bullet \quad \bullet \quad \bullet \\ | \quad | \quad | \\ \bullet \quad \bullet \quad \bullet \\ | \quad | \quad | \\ \text{---} \end{array} = \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ | \quad | \quad | \\ \bullet \quad \bullet \quad \bullet \\ | \quad | \quad | \\ \bullet \quad \bullet \quad \bullet \\ | \quad | \quad | \\ \text{---} \end{array}$$

$$C_{13}^{||} : \begin{array}{c} \text{---} \\ \textcircled{\text{+}} \\ \text{---} \\ | \\ \textcircled{\text{+}} \\ \text{---} \\ | \\ \textcircled{\text{-}} \\ \text{---} \\ | \\ \textcircled{\text{-}} \\ \text{---} \end{array} = \begin{array}{c} \text{---} \\ \textcircled{\text{+}} \\ \text{---} \\ | \\ \textcircled{\text{+}} \\ \text{---} \\ | \\ \textcircled{\text{-}} \\ \text{---} \\ | \\ \textcircled{\text{-}} \\ \text{---} \end{array}$$

## Lem R

$$R_{50} : \quad \begin{array}{c} \text{Circuit Diagram} \\ \text{Left: } H^2 \text{ and } H \text{ gates; Right: } S^2 \text{ and } S \text{ gates.} \end{array} = \quad \begin{array}{c} \text{Circuit Diagram} \\ \text{Left: } H \text{ gate; Right: } S^2, \oplus, S, H^2, S \text{ gates.} \end{array} \cdot w^2$$

### Proof cont.

$R_{50} \cdot \text{RHS} =$

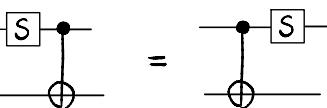
$\underline{C_2, C_3}$

$\underline{C_5}$

$\underline{C_{13}}$

$$\frac{C_{13}^7}{C_6} \quad \frac{C_{13}^{11}}{C_6^*} =: R_{50}.RHS.$$

$$C_1: w^3 = I \quad C_2: H^4 = I \quad C_3: S^3 = I \quad R_{24}^2:$$



$$\text{Def 7: } \begin{array}{c} \oplus \\ \parallel \end{array} := \begin{array}{c} \diagup \quad \diagdown \\ \diagdown \quad \diagup \end{array}$$

$$\text{Def 2: } \begin{array}{c} \oplus \\ \parallel \end{array} := \begin{array}{c} H \quad \cdot \quad H^\dagger \end{array}$$

$$\text{Def 5: } \begin{array}{c} \cdot \\ \parallel \end{array} := \begin{array}{c} \diagup \quad \diagdown \\ \diagdown \quad \diagup \end{array}$$

$$R_{23-25}^1 := \begin{array}{c} \cdot \quad \cdot \quad \cdot \\ S^2 \quad \bigcirc \quad \bigcirc \end{array} = \begin{array}{c} \cdot \quad \cdot \quad \cdot \\ \bigcirc \quad \bigcirc \quad \cdot \end{array} S^2 \cdot w \quad \text{Def 4: } \begin{array}{c} \cdot \\ \parallel \end{array} := \begin{array}{c} H \quad \cdot \quad H^\dagger \end{array}$$

Lem S Def1-2, Def4-5, Def7,  $C_1, C_2, C_3, C_5, C_6, C_7, C_8, C_{13}, C_{16}, R_{15}, R_{23}, R_{24}, R_{25}^*$  imply

$$R_{53}: \begin{array}{c} \cdot \quad \cdot \\ \bigcirc \quad H \end{array} = \begin{array}{c} \cdot \quad \cdot \quad \cdot \quad \cdot \\ \bigcirc \quad H \quad \bigcirc \quad \bigcirc \end{array} S \cdot w^2$$

$$\text{Proof: } R_{53} \cdot \text{RHS} := \begin{array}{c} \cdot \quad \cdot \quad \cdot \quad \cdot \\ \bigcirc \quad H \quad \bigcirc \quad \bigcirc \end{array} S \cdot w^2$$

$$\frac{R_{24}^2}{R_{23-25}^1} \begin{array}{c} \cdot \quad \cdot \quad \cdot \quad \cdot \\ \bigcirc \quad H \quad \bigcirc \quad \bigcirc \end{array} S^2 \cdot S \cdot w^2 \cdot w$$

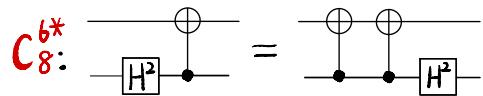
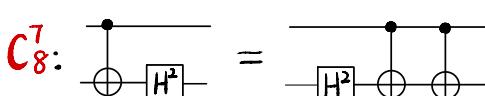
$$\frac{C_1}{C_3} \begin{array}{c} \cdot \quad \cdot \quad \cdot \quad \cdot \\ \bigcirc \quad H \quad \bigcirc \quad \bigcirc \end{array}$$

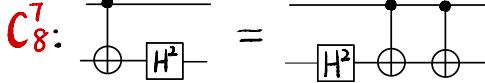
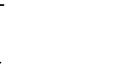
$$\text{Hence } R_{53}: \begin{array}{c} \cdot \quad \cdot \\ \bigcirc \quad H \end{array} \xrightarrow{\text{WTS}} \begin{array}{c} \cdot \quad \cdot \quad \cdot \quad \cdot \\ \bigcirc \quad H \quad \bigcirc \quad \bigcirc \end{array} \quad ||| C_2$$

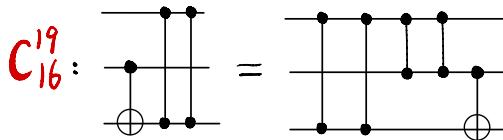
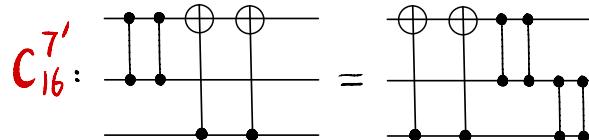
$$R_{53}: \begin{array}{c} \cdot \quad \cdot \quad \cdot \\ H \quad H^3 \quad H^2 \end{array} \xrightarrow{\text{WTS}} \begin{array}{c} \cdot \quad \cdot \quad \cdot \quad \cdot \\ H^2 \quad \bigcirc \quad \bigcirc \end{array} \quad ||| \text{Def 4}$$

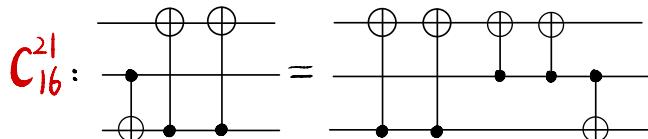
$$R_{53}: \begin{array}{c} \cdot \\ \bigcirc \quad H^2 \end{array} \xrightarrow{\text{WTS}} \begin{array}{c} \cdot \quad \cdot \quad \cdot \quad \cdot \\ \bigcirc \quad H^2 \quad \bigcirc \quad \bigcirc \end{array}$$

$$C_1: w^3 = I \quad C_2: H^4 = I \quad C_3: S^3 = I \quad C_8^{1*}:$$

$$C_8^{6*}:$$
   $=$  

$$C_8^7:$$
   $=$  

$$C_{16}^{19}:$$
   $=$  

$$C_{16}^{21}:$$
   $=$  

LemS

$$R_{53}: \quad \text{Diagram: } \begin{array}{c} \dots \\ \bullet \quad | \\ \text{H} \quad | \\ \dots \end{array} \quad = \quad \begin{array}{c} \dots \\ \bullet \quad | \\ \text{H} \quad | \quad S \quad | \quad S^2 \quad | \quad S \quad | \\ \dots \end{array} \cdot w^2$$

Proof cont.

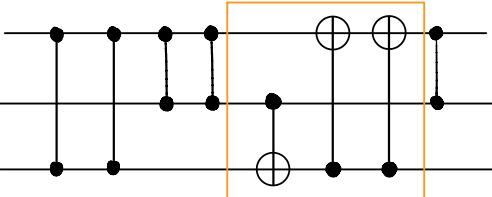
$$R_{53}: \quad \text{Diagram: } \begin{array}{c} \dots \\ \bullet \quad | \\ \text{H}^2 \quad | \\ \dots \end{array} \quad \xrightarrow{\text{WTS}} \quad \begin{array}{c} \dots \\ \bullet \quad | \\ \text{H}^2 \quad | \quad \dots \end{array}$$

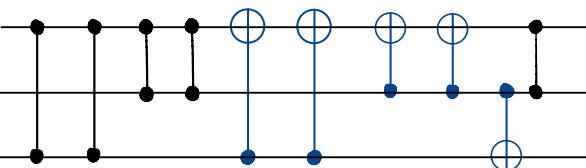
$\equiv C_8^{1*}, C_8^{6*}, C_8^7$

$$R_{53}: \quad \text{Diagram: } \begin{array}{c} \dots \\ \bullet \quad | \\ \text{H}^2 \quad | \\ \dots \end{array} \quad \xrightarrow{\text{WTS}} \quad \begin{array}{c} \dots \\ \bullet \quad | \\ \text{H}^2 \quad | \\ \dots \end{array}$$

$C_2 \equiv C_{16}^{19}$

$$R_{53}: \quad \text{Diagram: } \begin{array}{c} \dots \\ \bullet \quad | \\ \text{H}^2 \quad | \\ \dots \end{array} \quad \xrightarrow{\text{WTS}} \quad \begin{array}{c} \dots \\ \bullet \quad | \\ \text{H}^2 \quad | \\ \dots \end{array}$$

Then  $R_{53} \cdot \text{LHS} :=$  

$$\equiv C_{16}^{21}$$
 

$$C_1: w^3 = I \quad C_2: H^4 = I \quad C_3: S^3 = I$$

$$R_{25}^7: \quad \begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines.} \end{array} = \begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines, followed by } S' \text{ and } S \text{ boxes.} \end{array} \cdot w$$

$$C_7: \quad \begin{array}{c} \text{Diagram showing a vertical line with an } S \text{ box.} \end{array} = \begin{array}{c} \text{Diagram showing a vertical line with an } S \text{ box.} \end{array}$$

$$R_{24}^2: \quad \begin{array}{c} \text{Diagram showing a vertical line with an } S \text{ box, followed by a } \oplus \text{ symbol.} \end{array} = \begin{array}{c} \text{Diagram showing a vertical line with an } S \text{ box, followed by a } \oplus \text{ symbol.} \end{array}$$

$$R_{24}^3: \quad \begin{array}{c} \text{Diagram showing a vertical line with an } S \text{ box, followed by a } \oplus \text{ symbol.} \end{array} = \begin{array}{c} \text{Diagram showing a vertical line with an } S' \text{ box, followed by a } \oplus \text{ symbol.} \end{array}$$

$$C_{16}^{7'}: \quad \begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines.} \end{array} = \begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines.} \end{array}$$

$$C_{13}^3: \quad \begin{array}{c} \text{Diagram showing a vertical line with an } \oplus \text{ symbol.} \end{array} = \begin{array}{c} \text{Diagram showing a vertical line with an } \oplus \text{ symbol.} \end{array}$$

$$C_{13}: \quad \begin{array}{c} \text{Diagram showing a vertical line with an } \oplus \text{ symbol.} \end{array} = \begin{array}{c} \text{Diagram showing a vertical line with an } \oplus \text{ symbol.} \end{array}$$

LemS

$$R_{53}: \quad \begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines, followed by an } H \text{ box.} \end{array} = \begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines, followed by an } H \text{ box, an } S^2 \text{ box, and an } S \text{ box.} \end{array} \cdot w^2$$

Proof cont.

$$R_{53}: \quad \begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines, followed by an } H \text{ box.} \end{array} \stackrel{\text{WTS}}{=} \begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines, followed by an } H \text{ box, an } S^2 \text{ box, and an } S \text{ box.} \end{array}$$

Then  $R_{53} \cdot \text{LHS} =$

$$\begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines, followed by an } H \text{ box.} \end{array}$$

$$\underline{\underline{C_{16}^{7'}}} \quad \begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines, followed by an } H \text{ box, an } S^2 \text{ box, and an } S \text{ box.} \end{array}$$

$$\underline{\underline{C_{13}}} \quad \begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines, followed by an } H \text{ box, an } S^2 \text{ box, and an } S \text{ box.} \end{array}$$

$$\underline{\underline{R_{25}^7}} \quad \begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines, followed by an } H \text{ box, an } S' \text{ box, an } S \text{ box, and a } \oplus \text{ symbol.} \end{array} \cdot w$$

$$\underline{\underline{C_{13}^3, R_{24}^2, R_{24}^3}} \quad \begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines, followed by an } H \text{ box, an } S' \text{ box, an } S \text{ box, and a } \oplus \text{ symbol.} \end{array} \cdot w$$

$$\underline{\underline{C_{13}, C_7, R_{15}}} \quad \begin{array}{c} \text{Diagram showing two vertical lines with } \oplus \text{ symbols, connected by horizontal lines, followed by an } H \text{ box, an } S' \text{ box, an } S \text{ box, and a } \oplus \text{ symbol.} \end{array} \cdot w$$

$$C_1: w^3 = I \quad C_2: H^4 = I \quad C_3: S^3 = I \quad C_{13}: \dots = \dots$$

$$C_{13}^3: \dots = \dots$$

$$R_{15}: \dots = \dots$$

$$C_7: \dots = \dots$$

$$C_4: \dots = \dots$$

$$C_6: \dots = \dots$$

$$R_{25}' = \dots = \dots \cdot w^2$$

LemS

$$R_{53}: \dots = \dots \cdot w^2$$

Proof cont.

$$R_{53}: \dots \stackrel{WTS}{=} \dots$$

$$R_{53}.LHS = \dots \cdot w$$

$$\underline{R_{25}'} = \dots \cdot w \cdot w^2$$

$$\underline{\underline{C_5, C_7, R_{15}}} \quad \dots$$

$$\underline{\underline{C_{13}, C_4}} = \dots$$

$$\underline{\underline{C_6}} = R_{53}.RHS$$

$$C_1: w^3 = I \quad C_2: H^4 = I \quad C_3: S^3 = I \quad R_{24}^2: \quad \begin{array}{c} S \\ \oplus \\ \otimes \end{array} \quad = \quad \begin{array}{c} \bullet \\ \otimes \\ \oplus \end{array} \quad R_{24}^3: \quad \begin{array}{c} S \\ \otimes \\ \oplus \end{array} \quad = \quad \begin{array}{c} \bullet \\ \oplus \\ \otimes \end{array}$$

$$\text{Def 7: } \begin{array}{c} \oplus \\ \otimes \end{array} := \begin{array}{c} \diagup \quad \diagdown \\ \diagdown \quad \diagup \end{array}$$

$$\text{Def 2: } \begin{array}{c} \oplus \\ \otimes \end{array} := \begin{array}{c} H \\ \bullet \\ H^\dagger \end{array}$$

$$\text{Def 5: } \begin{array}{c} \bullet \\ \otimes \\ \oplus \end{array} := \begin{array}{c} \diagup \quad \diagdown \\ \diagdown \quad \diagup \end{array}$$

$$R_{23-25}^1: \quad \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ S^2 \quad \otimes \quad \otimes \end{array} = \quad \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ \otimes \quad \otimes \quad S^2 \end{array} \cdot w \quad \text{Def 4: } \begin{array}{c} \bullet \\ \otimes \\ H \end{array} := \begin{array}{c} H \\ \bullet \\ H^\dagger \end{array}$$

Lem T Def 1-2, Def 4-5, Def 7, C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub>, C<sub>5</sub>, C<sub>6</sub>, C<sub>7</sub>, C<sub>8</sub>, C<sub>13</sub>, C<sub>16</sub>, R<sub>15</sub>, R<sub>23</sub>, R<sub>24</sub>, R<sub>25</sub>\* imply

$$R_{54}: \quad \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ \oplus \quad \otimes \quad \oplus \\ H \end{array} = \quad \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ \oplus \quad \otimes \quad \oplus \\ S' \quad S^2 \quad S \end{array}$$

$$\text{Proof: } R_{54} \cdot \text{RHS} := \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ \oplus \quad \otimes \quad \oplus \\ H \quad S' \quad S^2 \quad S^2 \quad S \end{array}$$

$$\frac{R_{24}^2, R_{24}^3}{R_{23-25}^1} \quad \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ \oplus \quad \otimes \quad \oplus \\ H \quad S^2 \quad S^2 \quad S^2 \quad S \end{array} \cdot w$$

$$\frac{C_3}{C_5} \quad \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ \oplus \quad \otimes \quad \oplus \\ H \quad S' \quad S \end{array} \cdot w$$

$$\text{Hence } R_{54}: \quad \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ \oplus \quad \otimes \quad \oplus \\ H \end{array} \quad \stackrel{\text{WTS}}{=} \quad \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ \oplus \quad \otimes \quad \oplus \\ H \quad S' \quad S \end{array} \cdot w$$

C<sub>2</sub> |||

$$R_{54}: \quad \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ \oplus \quad \otimes \quad \oplus \\ H \quad H^3 \quad H^2 \end{array} \quad \stackrel{\text{WTS}}{=} \quad \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ \oplus \quad \otimes \quad \oplus \\ H^2 \quad S' \quad S \end{array} \cdot w$$

||| Def 4

$$R_{54}: \quad \begin{array}{c} \bullet \\ \oplus \\ H^2 \end{array} \quad \stackrel{\text{WTS}}{=} \quad \begin{array}{c} \bullet \quad \bullet \quad \bullet \\ \oplus \quad \otimes \quad \oplus \\ H^2 \quad S' \quad S \end{array} \cdot w$$

$$C_1: w^3 = I \quad C_2: H^4 = I \quad C_3: S^3 = I \quad C_6: \text{Diagram} = \text{Diagram}$$

$$C_8^{1*}: \text{Diagram} = \text{Diagram}$$

$$C_8^{6*}: \text{Diagram} = \text{Diagram}$$

$$C_8^7: \text{Diagram} = \text{Diagram}$$

$$C_{16}^{19}: \text{Diagram} = \text{Diagram}$$

$$C_{16}^{21}: \text{Diagram} = \text{Diagram}$$

$$R_{25}^{5'}: \text{Diagram} = \text{Diagram} \cdot w^2$$

LemT

$$R_{54}: \text{Diagram} = \text{Diagram}$$

Proof cont.

$$R_{54}: \text{Diagram} \xrightarrow{\text{WTS}} \text{Diagram} \cdot w$$

$\equiv C_8^{1*}, C_8^{6*}, C_8^7$

$$R_{54}: \text{Diagram} \xrightarrow{\text{WTS}} \text{Diagram} \cdot w$$

$\equiv C_2 \equiv C_{16}^{19}$

$$R_{54}: \text{Diagram} \xrightarrow{\text{WTS}} \text{Diagram} \cdot w$$

$\equiv C_6 \equiv$

$$R_{54}: \text{Diagram} \xrightarrow{\text{WTS}} \text{Diagram} \cdot w$$

$\equiv C_{16}^{21} \equiv R_{25}^{5'}, C_1, C_2, C_3, \text{Def1}$

$$R_{54}: \text{Diagram} \xrightarrow{\text{WTS}} \text{Diagram} \cdot w \cdot w$$

$$C_1: w^3 = I \quad C_2: H^4 = I$$

$$C_3: S^3 = I$$

$$R_{25}^6: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} = \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array} \cdot w^2$$

$$C_{16}^{7'}: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} = \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array}$$

$$C_6: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} = \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array} \quad C_6^{2*}: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} = \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array}$$

$$C_{13}: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} = \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array}$$

$$C_{13}^4: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} = \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array}$$

$$R_{25}^{5'}: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} = \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array} \cdot w^2$$

Lem T

$$R_{54}: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} = \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array} \quad \begin{array}{c} \text{Diagram 5} \\ \text{Diagram 6} \end{array} \cdot S' \cdot S^2 \cdot S$$

Proof cont.

$$R_{54}: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} \xrightarrow{\text{WTS}} \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array} \quad R_{54} \cdot w \cdot w$$

$$C_5 \parallel C_{16}^{7'}$$

$$R_{54}: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} \xrightarrow{\text{WTS}} \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array} \cdot w^2$$

$$C_6 \parallel C_6^{2*}$$

$$R_{54}: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} \xrightarrow{\text{WTS}} \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array} \cdot w^2$$

$$C_{13} \parallel C_{13}^4$$

$$R_{54}: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} \xrightarrow{\text{WTS}} \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array} \cdot w^2$$

$$R_{25}^6 \parallel$$

$$R_{54}: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} \xrightarrow{\text{WTS}} \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array} \cdot w^2$$

$$C_2 \parallel C_6$$

$$R_{54}: \quad \begin{array}{c} \text{Diagram 1} \\ \text{Diagram 2} \end{array} \xrightarrow{\text{WTS}} \quad \begin{array}{c} \text{Diagram 3} \\ \text{Diagram 4} \end{array}$$