

thm_2Ebinary_ieee_2Eflags_fn_updates (TMWko6qzwcrcyiG1MFUwGTnYKfwL74MTy2Z)

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Definition 1 We define `c_2Emin_2E_3D_3D_3E` to be $\lambda P \in 2.\lambda Q \in 2.inj_o (p P \Rightarrow p Q)$ of type ι .

Definition 2 We define `c_2Emin_2E_3D` to be $\lambda A.\lambda x \in A.\lambda y \in A.inj_o (x = y)$ of type $\iota \Rightarrow \iota$.

Definition 3 We define `c_2Ebool_2E_2T` to be $(ap (ap (c_2Emin_2E_3D (2^2)) (\lambda V0x \in 2.V0x)) (\lambda V1x \in 2.V1x))$

Definition 4 We define `c_2Ebool_2E_21` to be $\lambda A_{27a} : \iota.(\lambda V0P \in (2^{A-27a}).(ap (ap (c_2Emin_2E_3D (2^{A-27a}))$

Definition 5 We define `c_2Ebool_2E_2F_5C` to be $(\lambda V0t1 \in 2.(\lambda V1t2 \in 2.(ap (c_2Ebool_2E_21 2) (\lambda V2t \in 2.V2t)))$

Let `ty_2Ebinary_ieee_2Eflags` : ι be given. Assume the following.

$$nonempty\ ty_2Ebinary_ieee_2Eflags \tag{1}$$

Let `c_2Ebinary_ieee_2Eflags_DivideByZero_fupd` : ι be given. Assume the following.

$$c_2Ebinary_ieee_2Eflags_DivideByZero_fupd \in ((ty_2Ebinary_ieee_2Eflags^{ty_2Ebinary_ieee_2Eflags})^{ty_2Ebinary_ieee_2Eflags}) \tag{2}$$

Let `c_2Ebinary_ieee_2Eflags_InvalidOp_fupd` : ι be given. Assume the following.

$$c_2Ebinary_ieee_2Eflags_InvalidOp_fupd \in ((ty_2Ebinary_ieee_2Eflags^{ty_2Ebinary_ieee_2Eflags})^{(2^2)}) \tag{3}$$

Let `c_2Ebinary_ieee_2Eflags_Overflow_fupd` : ι be given. Assume the following.

$$c_2Ebinary_ieee_2Eflags_Overflow_fupd \in ((ty_2Ebinary_ieee_2Eflags^{ty_2Ebinary_ieee_2Eflags})^{(2^2)}) \tag{4}$$

Let `c_2Ebinary_ieee_2Eflags_Precision_fupd` : ι be given. Assume the following.

$$c_2Ebinary_ieee_2Eflags_Precision_fupd \in ((ty_2Ebinary_ieee_2Eflags^{ty_2Ebinary_ieee_2Eflags})^{(2^2)}) \tag{5}$$

Let $c_2Ebinary_ieee_2Eflags_Underflow_BeforeRounding_fupd : \iota$ be given. Assume the following.

$$c_2Ebinary_ieee_2Eflags_Underflow_BeforeRounding_fupd \in ((ty_2Ebinary_ieee_2Eflags^{ty_2Ebinary_ieee_2Eflags})^{(2^2)}) \quad (6)$$

Let $c_2Ebinary_ieee_2Erecordtype_2Eflags : \iota$ be given. Assume the following.

$$c_2Ebinary_ieee_2Erecordtype_2Eflags \in ((((((ty_2Ebinary_ieee_2Eflags^2)^2)^2)^2)^2)^2) \quad (7)$$

Let $c_2Ebinary_ieee_2Eflags_Underflow_AfterRounding_fupd : \iota$ be given. Assume the following.

$$c_2Ebinary_ieee_2Eflags_Underflow_AfterRounding_fupd \in ((ty_2Ebinary_ieee_2Eflags^{ty_2Ebinary_ieee_2Eflags})^{(2^2)}) \quad (8)$$

Assume the following.

$$\begin{aligned} & (\forall V0f \in (2^2)).(\forall V1b \in 2.(\forall V2b0 \in 2.(\forall V3b1 \in \\ & \quad 2.(\forall V4b2 \in 2.(\forall V5b3 \in 2.(\forall V6b4 \in 2.((ap \\ & \quad (ap\ c_2Ebinary_ieee_2Eflags_DivideByZero_fupd\ V0f)\ (ap\ (\\ & \quad ap\ (ap\ (ap\ (ap\ c_2Ebinary_ieee_2Erecordtype_2Eflags\ V1b) \\ & \quad V2b0)\ V3b1)\ V4b2)\ V5b3)\ V6b4)) = (ap\ (ap\ (ap\ (ap\ (ap\ (ap\ c_2Ebinary_ieee_2Erecordtype_2Eflags \\ & \quad (ap\ V0f\ V1b))\ V2b0)\ V3b1)\ V4b2)\ V5b3)\ V6b4))))))))) \end{aligned} \quad (9)$$

Assume the following.

$$\begin{aligned} & (\forall V0f \in (2^2)).(\forall V1b \in 2.(\forall V2b0 \in 2.(\forall V3b1 \in \\ & \quad 2.(\forall V4b2 \in 2.(\forall V5b3 \in 2.(\forall V6b4 \in 2.((ap \\ & \quad (ap\ c_2Ebinary_ieee_2Eflags_InvalidOp_fupd\ V0f)\ (ap\ (ap\ (\\ & \quad ap\ (ap\ (ap\ (ap\ c_2Ebinary_ieee_2Erecordtype_2Eflags\ V1b)\ V2b0) \\ & \quad V3b1)\ V4b2)\ V5b3)\ V6b4)) = (ap\ (ap\ (ap\ (ap\ (ap\ (ap\ c_2Ebinary_ieee_2Erecordtype_2Eflags \\ & \quad V1b)\ (ap\ V0f\ V2b0))\ V3b1)\ V4b2)\ V5b3)\ V6b4))))))))) \end{aligned} \quad (10)$$

Assume the following.

$$\begin{aligned} & (\forall V0f \in (2^2)).(\forall V1b \in 2.(\forall V2b0 \in 2.(\forall V3b1 \in \\ & \quad 2.(\forall V4b2 \in 2.(\forall V5b3 \in 2.(\forall V6b4 \in 2.((ap \\ & \quad (ap\ c_2Ebinary_ieee_2Eflags_Overflow_fupd\ V0f)\ (ap\ (ap\ (ap \\ & \quad (ap\ (ap\ (ap\ c_2Ebinary_ieee_2Erecordtype_2Eflags\ V1b)\ V2b0) \\ & \quad V3b1)\ V4b2)\ V5b3)\ V6b4)) = (ap\ (ap\ (ap\ (ap\ (ap\ (ap\ c_2Ebinary_ieee_2Erecordtype_2Eflags \\ & \quad V1b)\ V2b0)\ (ap\ V0f\ V3b1))\ V4b2)\ V5b3)\ V6b4))))))))) \end{aligned} \quad (11)$$

Assume the following.

$$\begin{aligned}
& (\forall V0f \in (2^2).(\forall V1b \in 2.(\forall V2b0 \in 2.(\forall V3b1 \in \\
& \quad 2.(\forall V4b2 \in 2.(\forall V5b3 \in 2.(\forall V6b4 \in 2.((ap \\
& \quad (ap \ c_2Ebinary_ieee_2Eflags_Precision_fupd \ V0f) \ (ap \ (ap \ (\\
& \quad ap \ (ap \ (ap \ (ap \ c_2Ebinary_ieee_2Erecordtype_2Eflags \ V1b) \ V2b0) \\
& \quad V3b1) \ V4b2) \ V5b3) \ V6b4)) = (ap \ (ap \ (ap \ (ap \ (ap \ (ap \ c_2Ebinary_ieee_2Erecordtype_2Eflags \\
& \quad V1b) \ V2b0) \ V3b1) \ (ap \ V0f \ V4b2)) \ V5b3) \ V6b4))))))))) \\
& \hspace{15em} (12)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0f \in (2^2).(\forall V1b \in 2.(\forall V2b0 \in 2.(\forall V3b1 \in \\
& \quad 2.(\forall V4b2 \in 2.(\forall V5b3 \in 2.(\forall V6b4 \in 2.((ap \\
& \quad (ap \ c_2Ebinary_ieee_2Eflags_Underflow_BeforeRounding_fupd \\
& \quad V0f) \ (ap \ (ap \ (ap \ (ap \ (ap \ (ap \ c_2Ebinary_ieee_2Erecordtype_2Eflags \\
& \quad V1b) \ V2b0) \ V3b1) \ V4b2) \ V5b3) \ V6b4)) = (ap \ (ap \ (ap \ (ap \ (ap \ (ap \ c_2Ebinary_ieee_2Erecordtype_2Eflags \\
& \quad V1b) \ V2b0) \ V3b1) \ V4b2) \ (ap \ V0f \ V5b3)) \ V6b4))))))))) \\
& \hspace{15em} (13)
\end{aligned}$$

Assume the following.

$$\begin{aligned}
& (\forall V0f \in (2^2).(\forall V1b \in 2.(\forall V2b0 \in 2.(\forall V3b1 \in \\
& \quad 2.(\forall V4b2 \in 2.(\forall V5b3 \in 2.(\forall V6b4 \in 2.((ap \\
& \quad (ap \ c_2Ebinary_ieee_2Eflags_Underflow_AfterRounding_fupd \\
& \quad V0f) \ (ap \ (ap \ (ap \ (ap \ (ap \ (ap \ c_2Ebinary_ieee_2Erecordtype_2Eflags \\
& \quad V1b) \ V2b0) \ V3b1) \ V4b2) \ V5b3) \ V6b4)) = (ap \ (ap \ (ap \ (ap \ (ap \ (ap \ c_2Ebinary_ieee_2Erecordtype_2Eflags \\
& \quad V1b) \ V2b0) \ V3b1) \ V4b2) \ V5b3) \ (ap \ V0f \ V6b4))))))))) \\
& \hspace{15em} (14)
\end{aligned}$$

Theorem 1

$$\begin{aligned}
& ((\forall V0f \in (2^2).(\forall V1b \in 2.(\forall V2b0 \in 2.(\forall V3b1 \in \\
& \quad 2.(\forall V4b2 \in 2.(\forall V5b3 \in 2.(\forall V6b4 \in 2.((ap \\
& \quad (ap\ c_2Ebinary_ieee_2Eflags_DivideByZero_fupd\ V0f)\ (ap\ (\\
& \quad ap\ (ap\ (ap\ (ap\ (ap\ (ap\ c_2Ebinary_ieee_2Erecordtype_2Eflags\ V1b) \\
V2b0) V3b1) V4b2) V5b3) V6b4)) = (ap\ (ap\ (ap\ (ap\ (ap\ (ap\ c_2Ebinary_ieee_2Erecordtype_2Eflags \\
& \quad (ap\ V0f\ V1b))\ V2b0)\ V3b1)\ V4b2)\ V5b3)\ V6b4))))))\ \wedge\ ((\forall V7f \in \\
& \quad (2^2).(\forall V8b \in 2.(\forall V9b0 \in 2.(\forall V10b1 \in 2.(\\
& \quad \forall V11b2 \in 2.(\forall V12b3 \in 2.(\forall V13b4 \in 2.((ap\ (\\
& \quad ap\ c_2Ebinary_ieee_2Eflags_InvalidOp_fupd\ V7f)\ (ap\ (ap\ (ap \\
V10b1) V11b2) V12b3) V13b4)) = (ap\ (ap\ (ap\ (ap\ (ap\ (ap\ c_2Ebinary_ieee_2Erecordtype_2Eflags \\
& \quad V8b)\ (ap\ V7f\ V9b0))\ V10b1)\ V11b2)\ V12b3)\ V13b4))))))\ \wedge\ ((\forall V14f \in \\
& \quad (2^2).(\forall V15b \in 2.(\forall V16b0 \in 2.(\forall V17b1 \in 2. \\
& \quad (\forall V18b2 \in 2.(\forall V19b3 \in 2.(\forall V20b4 \in 2.((ap \\
& \quad (ap\ c_2Ebinary_ieee_2Eflags_Overflow_fupd\ V14f)\ (ap\ (ap\ (\\
V17b1) V18b2) V19b3) V20b4)) = (ap\ (ap\ (ap\ (ap\ (ap\ (ap\ c_2Ebinary_ieee_2Erecordtype_2Eflags \\
& \quad V15b)\ V16b0)\ (ap\ V14f\ V17b1))\ V18b2)\ V19b3)\ V20b4))))))\ \wedge\ ((\forall V21f \in \\
& \quad (2^2).(\forall V22b \in 2.(\forall V23b0 \in 2.(\forall V24b1 \in 2. \\
& \quad (\forall V25b2 \in 2.(\forall V26b3 \in 2.(\forall V27b4 \in 2.((ap \\
& \quad (ap\ c_2Ebinary_ieee_2Eflags_Precision_fupd\ V21f)\ (ap\ (ap \\
V24b1) V25b2) V26b3) V27b4)) = (ap\ (ap\ (ap\ (ap\ (ap\ (ap\ c_2Ebinary_ieee_2Erecordtype_2Eflags \\
& \quad V22b)\ V23b0)\ V24b1)\ (ap\ V21f\ V25b2))\ V26b3)\ V27b4))))))\ \wedge\ ((\forall V28f \in \\
& \quad (2^2).(\forall V29b \in 2.(\forall V30b0 \in 2.(\forall V31b1 \in 2. \\
& \quad (\forall V32b2 \in 2.(\forall V33b3 \in 2.(\forall V34b4 \in 2.((ap \\
& \quad (ap\ c_2Ebinary_ieee_2Eflags_Underflow_BeforeRounding_fupd \\
V28f)\ (ap\ (ap\ (ap\ (ap\ (ap\ (ap\ c_2Ebinary_ieee_2Erecordtype_2Eflags \\
& \quad V29b)\ V30b0)\ V31b1)\ V32b2)\ V33b3)\ V34b4)) = (ap\ (ap\ (ap\ (ap\ (ap\ (ap \\
& \quad c_2Ebinary_ieee_2Erecordtype_2Eflags\ V29b)\ V30b0)\ V31b1)\ V32b2) \\
& \quad (ap\ V28f\ V33b3))\ V34b4))))))\ \wedge\ ((\forall V35f \in (2^2).(\forall V36b \in \\
& \quad 2.(\forall V37b0 \in 2.(\forall V38b1 \in 2.(\forall V39b2 \in 2.(\\
V40b3 \in 2.(\forall V41b4 \in 2.((ap\ (ap\ c_2Ebinary_ieee_2Eflags_Underflow_AfterRounding_fupd \\
& \quad V35f)\ (ap\ (ap\ (ap\ (ap\ (ap\ (ap\ c_2Ebinary_ieee_2Erecordtype_2Eflags \\
& \quad V36b)\ V37b0)\ V38b1)\ V39b2)\ V40b3)\ V41b4)) = (ap\ (ap\ (ap\ (ap\ (ap\ (ap \\
& \quad c_2Ebinary_ieee_2Erecordtype_2Eflags\ V36b)\ V37b0)\ V38b1)\ V39b2) \\
& \quad V40b3)\ (ap\ V35f\ V41b4))))))))))
\end{aligned}$$