3SOS-C

Differential Ternary Model with Neutral Equilibrium State

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The Logic of Equilibrium

English edition

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This booklet presents 3SOS-C as a differential ternary model. The aim is clarity: to explain the idea in accessible language while preserving its technical core.

The model is not presented as a finished product or a physically validated device. It is a structured conceptual and numerical framework that may support later analysis, simulation, and technical discussion.

1. The basic idea

We are used to binary thinking: yes or no, 0 or 1, on or off. Yet many real situations do not immediately belong to one of the two extremes. Sometimes there is an intermediate state that is neither emptiness nor absence, but balance.

This is where 3SOS-C begins: a ternary logic in which the central state is treated as a distinct functional state.

$$Y \in \{-1, 0, +1\}$$

In this model, the value 0 means differential equilibrium.

2. How it works

The model uses two complementary reading branches, denoted I_N and I_P. What matters is not only each branch separately, but the difference between them.

$$D = I_N - I_P$$

From that difference, the system produces the ternary output Y.

$$G \to C \to (I_N, I_P) \to D \to Y$$

If the negative branch clearly dominates, the output is -1. If the positive branch clearly dominates, the output is +1. If the two branches remain almost equal, the output is 0.

3. The neutral window

To avoid false switching near equilibrium, the model introduces a threshold T and a central zone of neutrality.

$$-T \le D \le +T \Rightarrow Y = 0$$

This window means that the system is not forced to choose an extreme when the difference is small. In this way, equilibrium becomes a legitimate computational state.

4. A simple numerical example

The normalized model uses three conductance levels:

$$G_H = 1.0,\ G_M = 0.5,\ G_L = 0.1$$

With these values, the three ideal states can be summarized as follows:

Center C	Difference D	Output Y
-1	+0.9	-1
0	0.0	0
+1	-0.9	+1

The example shows that the central state appears when the two branches balance each other, not when the system “does nothing.”

5. Why the central state matters

In ordinary binary systems, the middle region is often treated as indecision, tolerance, or simple transition. In 3SOS-C, however, the middle region is elevated to the status of a formal state.

This changes the interpretation of 0. Here, 0 is not a passive void; it is the expression of an active balance between two opposite tendencies.

That is why the key sentence of the model is short but meaningful:

$$0 = \text{equilibrium}$$

Between two extremes, equilibrium can be a real state of computation.

6. Possible applications

In its current form, 3SOS-C can be understood as:

- a differential comparator with a neutral zone;
- an analog-to-ternary interface for continuous signals;
- a decision block with negative, neutral, and positive outcomes;
- a conceptual teaching model for the distinction between absence and balance.

An intuitive example is a sensor that does not have to decide immediately “too low” or “too high,” but can also indicate a region of stability or tolerance.

7. The main limitation

The most sensitive state is 0. If noise, offset, or drift become too strong, equilibrium may be pushed falsely toward one of the extremes. That is why the critical point of the model is the stability of the neutral state.

$$D_{meas} = D + \text{noise} + D_0 + \text{drift}$$

In its present form, 3SOS-C remains conceptually and numerically coherent, but not physically validated.

8. A compact glossary

C — the controllable center that determines the ternary state.

I_N — the negative reading branch.

I_P — the positive reading branch.

D — the decision difference between the two branches.

T — the threshold that defines the neutral zone.

Y — the final ternary output.

9. A practical reading of the model

If read in the simplest way, 3SOS-C says the following: whenever two opposed influences are measured, the result does not have to be forced into a binary yes/no answer. A balanced middle can be preserved as a meaningful output.

This makes the model interesting not because it promises to replace all binary logic, but because it opens a compact and well-defined space for a third state.

10. Development roadmap

The natural next steps are straightforward:

- numerical simulations under noise, offset, and drift;
- comparison with window comparators and ternary logic blocks;
- definition of a possible physical implementation;
- evaluation of robustness, energy, and switching behavior.

Until these steps are completed, the value of 3SOS-C remains that of a clean technical proposal rather than a verified hardware solution.

11. Conclusion

3SOS-C proposes a differential ternary logic in which the central state 0 is defined as equilibrium between two complementary branches. This idea is simple, clear, and useful for representing a neutral zone between two extremes.

It is not yet an experimentally validated technology. It is a working architecture: accessible enough to be explained publicly and structured enough to be discussed technically.

The formula worth remembering is the simplest one:

$$0 = \text{equilibrium}$$