

Re: Trying to understand how to design circuits

Source: <http://sci.tech-archive.net/Archive/sci.electronics.design/2005-12/msg04570.html>

- *From:* "Tim Williams" <tmoranwms@xxxxxxxxxxx>
 - *Date:* Mon, 26 Dec 2005 20:41:19 -0600
-

The difference is the entire philosophy on constructing a work. Electronics is highly scientific, and as such comes from a methodic progression of ideas and constructions, connected together. The real art is connecting the proper building blocks together to accomplish a given function.

Given that, there are many circuits that apply both linear and interconnected topologies (arrangements, whatever).

http://webpages.charter.net/dawill/tmoranwms/Circuits/6N7_Guitar_Amp.gif

Here's a good example of a series of stages. On the left it begins with a common-cathode preamplifier stage, a summing paragraph as it were. (It does in fact accomplish summation, if you add a signal to the RCA jack as well.) The next triode (circle) splits this signal into two identical but opposite signals for the next stages to build on. The next stage, in the middle, amplifies the signal further, preserving balance between the opposite signals. The second last stage increases the current capacity of the signal, allowing it to drive the last tube, which finally turns wiggling guitar strings into wiggling speaker cones, after the output transformer.

It's like I asked you to do this on a calculator:

Enter 7.

Multiply by 4.

Add 6.

Divide by 3.4.

Press equal button and read answer.

Every operation performs some modification of the signal as it passes each stage. It flows through every one and is processed in full.

Now on the other hand, you might have something like this:

<http://webpages.charter.net/dawill/Images/Frequency%20Divider.gif>

I'll help you out. Each pair of transistors (in the circles) facing each other works together: when one or the other is turned on (positive voltage on the straight line), the collector (diagonal line) is pulled down near emitter (diagonal arrow). Say you pull down the upper-left collector node: the voltage is transferred through the resistors, removing voltage from the inside upper-right transistor. If the outside upper-right transistor is off too, then the collector node will rise near +V, which puts voltage on the inside upper-left transistor -- which you'll recall is already on, holding its collector near zero (ground). Thus, it holds itself in one state or the other depending on which input was last triggered, otherwise known as a

Re: Trying to understand how to design circuits

register. But there's those other resistors that connect to the diodes, which then connect to the bottom half register, which behaves in the same way, and also to the two transistors at the bottom. The two bottom transistors handle the only input.

What ends up happening is, by way of everything storing, interacting and switching, the P1 and P2 signals alternate every other clock pulse, which is to say the clock frequency has been divided by two.

But creating these. It's different from writing, you just jump in. (This is my first, and last, draft of this post! ;) Jumping into say, designing an 8-bit computer from scratch, now that's a little more troublesome. I mentioned you always start from simpler things. In electronics, the first thing you learn about is the circuit, a switch and lightbulb. Then you might add a resistor, or two, and determine what happens to the voltages depending on the resistances. (Hint: I hope you know some algebra.) Then you can get into nonlinear (nonohmic) components like diodes and transistors. You determine how the diode, transistor, etc. behave, then apply it to other things, like your resistors. If you consider how the transistor works, you can pretty quickly come up with a very high gain amplifier. If you're clever, you can come up with a voltage regulator too, and all other sorts of stiff, constant-voltage circuits. If you combine both, you get an audio power amplifier!

The real genius in electronics is coming up with original connections. One fellow back in the 1920s had the marvellous idea of sending an amplifier's output back to its input. Applied properly, you get negative feedback which reduces distortion. If you apply it backwards (positive feedback), you can get an oscillator, making radio possible.

Taken to an extreme, all of today's linear amplifiers use astounding amounts of NFB — a factor on the order of thousands — to reduce distortion and improve bandwidth, with wonderful results.

Tim

—

Deep Fryer: a very philosophical monk.

Website: <http://webpages.charter.net/dawill/tmoranwms>

"chriswilliams" <chriswilliams65@xxxxxxxx> wrote in message
news:1135647451.248671.202630@xx
<For some reason it won't add the carat indents>

Hi all:

I am trying to understand the process by which the design of circuits is carried out.

How from the white paper begins the design of a certain circuit?

In many other areas one understands that there is a certain structure, a certain order, a process. For example:

Re: Trying to understand how to design circuits

Re: Trying to understand how to design circuits

In the case of a writing one understands that there is a thesis, main ideas, ideas of support, a conclusion. All this must be articulated to achieve a certain objective. This is understandable.

In the case of a car is understood that exists the motor, the electric system, the chassis, the panel, all they complying a certain function and thus in many other areas as the software, Civil Engineering, etc.

But in the case of the circuits all seems very confused (at least for the novice). One doesn't know how someone decided to put a resistor here, there a diode, or a capacitor over there. At times seems that certain circuits were discovered by accident. Which is the center and which the periphery.

So the question is:

Once one has certain know-how of electronics as the function of the components, the basic theory, etc

¿How to proceed from the white paper to go building a certain circuit?

How to decide where to put a resistor, a diode, a capacitor, etc?

Thanks in advance by any comment.

- **Follow-Ups:**

- ◆ **[Re: Trying to understand how to design circuits](#)**

◇ *From:* Paul Burridge

- ◆ **[Re: Trying to understand how to design circuits](#)**

◇ *From:* Fred Bloggs

- **References:**

- ◆ **[Trying to understand how to design circuits](#)**

◇ *From:* chriswilliams

- Prev by Date: **[Re: why does this newsgroup have beasts](#)**
- Next by Date: **[Re: seriously dumb question 'bout Tek scopes...](#)**
- Previous by thread: **[Re: Trying to understand how to design circuits](#)**
- Next by thread: **[Re: Trying to understand how to design circuits](#)**
- Index(es):
 - ◆ **[Date](#)**
 - ◆ **[Thread](#)**