

Rochester, NY 14605
Friday, November 3, 1989

Robert A. Pease
Czar of Band Gaps

National Semiconductor Corp.
Santa Clara, CA 95052

Dear Bob:

Your series was really great! I am also a (gasp!) old-timer. It was good to see confirmation of some of the things they don't put into textbooks. Maybe some fortunate young engineers will read it, heed it, and not have to learn some of it the long hard way.

You're right, most people, even technical people who should know better, tend to treat any numeric display as if it were engraved in stone, ignoring whatever imperfect mechanism generated the digits. Even when scribbled in jello would be more appropriate.

People do get carried away with computer simulation. Back in the sixties there was a story circulating about the Apprentice Engineer who was playing with the plant's new analog computer. He ran up to the Chief Engineer, waving a sheaf of printouts "Look", he said excitedly, "I've come up with a simulation of our power plant heating and air conditioning system which will double the plant's efficiency.!" The Chief Engineer studied the printout for a few moments. "Yes," he said, "but look here", and he pointed to the flow diagram, "this 17°F water is going to be awfully hard on the pumps!"

Your comment on the power supply DPM (last installment) puzzled me. Resolution can often be useful, even when it's not accompanied by accuracy. And it's increasingly the case, that manufacturers find it easy to include the high-resolution chip (which they may use somewhere else and buy in huge volumes), as long as they don't have to do the expensive trimming that also makes it accurate. Even though you don't have the accuracy, you still get the benefit of being able to make a change in your benchtop circuit of very nearly 0.001 instead of 0.01. So I don't think the extra digit is silly, as long as you're not paying a big premium for it. Maybe I missed something there. If so, please let me know.

Your frustration with the menu burden of these wonderful new instruments is right on target. One thing which I detest intensely, and which seems to occur with increasing frequency, is staring blankly at a screen or cursor, knowing full well that the reason it obstinately refuses to do your bidding is almost certainly a consequence of your imperfect understanding of its functioning, and possibly also of your failure to read the manual all the way through... the next time you have a spare week. Also, some of the general principles behind specific points you have raised are discussed with uncommon good sense in a book called "The Psychology of Everyday Things". I can't recommend it too highly..

Again, your series is a treasure. I saved every installment, and intend to circulate it to several of my children who are in electronics.

Keep up the good work,

Reginald W. Neale
Reginald W. Neale
Connoisseur of Solder Globes

cc
cc
I have
comment
I have
comments
RAP

MS-C 2500A
9 Nov 1989

Dear Mr. Neale -

- Thanks for your cheerful letter.
- Yeah, you are right about the "engraved
in Jello" Digital Display. That's my
whole point about the power supplies with
the twin Digital Panel Meters: a 5% error
doesn't sound very bad at the 5-volt level -
4.7 or 4.8 or 4.9 or 5.1 or 5.2 - that's not too weird.
But, if I want to set a voltage to +24 volts,
it would be nice to have less than 1 volt of
uncertainty. Example: to set +24.0 & -24.0,
should I have to trim one supply to +25.1 and the
other -23.1 V, to get the +24.0 & -24.0? or was
that, vice versa? Naw - 5% is just
too crude! I just bought a set of

power supplies, made in Taiwan. Each dual supply has FOUR meters, two for V, two for I ... and each meter has a trim pot.

Now - one thing I did do was to check the settability of the pots - I was able to set the V_{out} to $1.00V \pm 0.030V$ ^{WITHIN} also $2.00 \pm 0.030V$, $3.00 \pm 0.03V$, etc - thus, there were no obvious flatspots or deadspots in the pot, and the resolution was better than 0.1% of full scale - 30mv resolution out of 30 volts. Not bad for a single - turn pot. You'll agree, some pots with coarse and fine aren't any better than that.

(BUT) So far, I have not checked the calibration accuracy of those meters! So in the next few days I'll ask my senior tech to set the meters at 10, 20, 30V, and see what the DVM says; also, 1.0, 2.0, 3.0 amperes....

- 3 -

Now, I like extra digits of resolution as much as anybody does...

But - I just looked over the specs on the new Tektronix 6-digit DVM. The specs aren't bad, but the linearity is ± 10 PPM. - Hell, on a 30-volt scale - that's not necessarily 100 μ v out of 10v, that's 300 μ v out of 30v (so) there could be 300 μ v out of 10v.

I prefer the HP 3456/57 with 1 PPM, or 15 μ v of nonlinearity on a 15-volt scale. Who says a 30v is better than a 15-volt full scale? Maybe it is, maybe it ain't "".

You mention - "The Psychology of Everyday Things" - I shall have to look into that, pronto! Thanks for the tip.

Now, your comment about the 17° F water - I would immediately reply, "oh, the +17° F water goes

through those pumps really smooth,
after I add a little alcohol or
propylene glycol."

and then the crusty old-timer would
say, "Now, son, tell me, where are you
going to get all that cool water on
a hot day when we need it"?? -

- that is a tougher question to answer!

- heck - the heater on my VW works

Real Well in the summer, (especially if I
can't shut it off). It's only in the winter,
that it doesn't work so well. I know
places in Dakota or Minnesota where you can
get all the coolant you want at $\sim +17^{\circ}\text{F}$
in the winter. It's only in the summer that it's
expensive!

I sent your letter in to EDN so they
could enjoy your comments, too!

Best regards

Robert A. Pease, Czar of Floobydust.