



Tales of Radio Horror

*By Myk Dormer - Senior RF design engineer, Radiometrix
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Previously I've written what I hope have been informative articles, offering application tips and precautionary advice. Now I wish to indulge in a little reminiscence, and list for you a few of the more amusing "incidents" that I've witnessed over the years. (Circumstances and names have been obscured to protect the guilty)

Short range ? A customer reported an extremely short operating range from a wireless module pair theoretically capable of well over 1km. He insisted that every recommendation of the data sheet had been followed, right down to the specified quarter wavelength wire aerials.

On the eventual site visit I inspected the units: the aerials were indeed correct 16cm quarter wavelengths, and the transmitter aerial projected stiffly from the hand-held unit. The receiver aerial unfortunately was 'in the way' and so had been neatly coiled up and stuffed underneath the pcb, into a 2mm gap between it and the (steel) chassis

Low power ? A customer phones up complaining that the supplied 100mW transmitter could output no more than 40mW. The unit was re-checked (perfect) and the customer's power meter examined (in calibration). Finally, the cable coupling the two was seen: Two meters of the best quality *audio* coax.

Sold short ? Another customer complains of lower-than-spec power output. The 500mW transmitter is only outputting 475mW. Which is less than -0.3dB low, so I politely enquire "Is your power meter in calibration?". "What power meter?" is the answer. "I'm measuring it by eye, off the screen of my (old) spectrum analyser"

Best of three ? A (by now) familiar complaint. The 100mW transmitter is "barely capable of 10mW". No fault can be found on the returned module and the customer's test equipment is functioning normally. Several days of confusion ensue, until a red-faced chief engineer reports the discovery of an inverse pair of diodes added across the RF feed at the last moment "to protect the radio from large signals" by an over zealous junior

Less is more ? We've supplied small numbers of a 25mW transmitter to a customer for the early stages of a project. The goal posts move (as they are prone to) and he needs significantly more range in the production units.

"No problem" I crow. "We make a 500mW transmitter, and it's got the same pin out". A few days later the confused fellow reports that the new, higher power units have less range than their lower power predecessors. Now I'm confused too, until I re-check the data sheets. The 25mW unit can operate from 3.3 - 15v, but the 500mW module needs a 5v regulated rail.

What is his power supply? A high current lithium 'D' cell. Supplying 3.7v.

Not to spec ? An indignant customer complains that a transmitter/receiver pair sold as "capable of 75-150 meters range" is barely able to function over 20m, and even then the link reliability varies randomly.

We find the receiver is inside a (metal bodied) lift car, running in a (steel lined) shaft, with the transmitter located in the (steel framed) building lobby.

And the random factor is "lift doors opening"

Speed kills ? A customer evaluates a simple remote control coder chip with a particular transmitter. All goes well until he decides that a faster response time is needed.

He increases the clock speed of the coder until the datastream is as fast as the transmitter's baseband filter will pass, while ignoring our repeated warnings that, as he increases the clock, the time allowed by the simple coder for preamble, start-up and settling times falls proportionally, until it is less than the guaranteed 'on' time of his chosen transmitter.

Guess what happens when he goes to production ?

And a few little 'gems':

Lengths of RF coax spliced with mains-type terminal block

Long, winding, unmatched pcb track between the radio and an "rf" connector

A customer designed add-on power amplifier with no supply decoupling

A customer designed (class C) non-linear power amplifier with no lowpass filter
Modules 'potted' with corrosive RTV silicone compound
Modules washed in aggressive solvents.
"I need a range of 100m underwater"
A UHF aerial on a VHF transmitter
No aerial ("What ... I need an *aerial*)
"The pins fell out when we de soldered it, so we pushed them back in"

And lastly, a classic. A security firm in the 1980s is using the then-popular Motorola MPT700 hand held transceiver, and they are getting an unexpectedly high rate of in service failures on one particular site.

Diagnosis of the failed units shows RF power amplifier faults consistent with low frequency oscillation and resulting thermal overload. Nothing similar has been seen with this unit before, so engineers are sent to the customer site to investigate.

None of the expected problems (charger defects, missing or damaged aerials, high power interferers) are found, and no solution is in sight, until a technician observes some of the security staff going on-shift:

They take their radios off the charger rack, and *tie the 50cm long flexible whip aerial around the case of the radio* before putting the unit in their pocket "because the aerial gets in the way".

As a result, there is far more coupling from the output back into the transmitter than the design ever allowed for, and the circuitry would sometimes go unstable.

The cure: a more rigid aerial.

Of course, all these examples are purely hypothetical: no real customer could ever have actually made any such errors. If you recognise something familiar, I assure you that I could not possibly be referring to you.

Radiometrix Ltd
Hartcran House
231 Kenton Lane
Harrow, Middlesex
HA3 8RP, ENGLAND
Tel: +44 (0) 20 8909 9595
Fax: +44 (0) 20 8909 2233
sales@radiometrix.com
www.radiometrix.com

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