IFR 2025 - RF output question -

richardjkelly@... Apr 24 (https://groups.io/g/Marconi-Test-Instruments/message/11292)

Just found a thread on eevBlog which I think you contributed to George (where the OP acquired a 2025 sans PSU), and I see some useful pictures of the 2025 PSU PCB, which appear to show the 100µ caps at the very front RHS of the PSU PCB, looking from the unit front.

Aside being glued down, looks much more straightforward than I would have expected.

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richardjkelly@... Apr 24 (https://groups.io/g/Marconi-Test-Instruments/message/11291)

Gentlemen,

Thanks you for your authoritative responses.

A good point re PSU. I will need to open it up. Mine is an IFR-branded 2025.

If anyone has either a guide or pointer to a guide for doing the cap upgrade, then I'd welcome that. Whilst I have no qualms about opening things up, this is a relatively expensive (and working!) piece of kit to tinker with...!

Thanks.

Richard

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george edmonds Apr 24 (https://groups.io/g/Marconi-Test-Instruments/message/11290)

Hi Dave and Richard

There are at least five different manufacturers of the power supply used in the 2023/2025 series. The Lambda-Contant labelled ones use four high voltage electrolytic capacitors (100uf/205VDC) in a series parallel arrangement, in time these all fail and frequently as a result the 115/230VAC auto switching stage then switches to 115VAC whilst the instrument is on 230VAC and destroys the power supply.

A Racal 9300 has an accuracy of +3dB to -6dB at 20MHz. A better instrument would be a Racal 9301A or the very rare Racal 9105.

A better Marconi equivalent to the Racal 9300 is the Marconi 2600A/B.

George G6HIG Dover UK

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Dave Skone (/g/Marconi-Test-Instruments/profile/@FalconXC)

Apr 24 (https://groups.io/g/Marconi-Test-Instruments/message/11289)

Hi Richard,

What you say makes sense, thanks for clarifying. The method of measurement you are using is not ideal, but is sufficient for what you are trying to do.
I was looking at the Racal 9300 data sheet and could see its accuracy is up to +/-11% at the upper (20MHz) and lower (5Hz) ends of the band, most accurate from 50Hz to 500kHz being +/-1%. As to its calibration status, only you know. So your readings being half of what the 2025 is set for is likely a product of the calibration of the 9300, the 2025 and the actual impedance of your termination.
Actually, I was curious to see that this is what Marconi Instruments must have competed against with this model 2610 with similar top end capability of 25MHz.
As you have said, the readings are seamless with the proper termination impedance, so there doesn't seem to be any fault or issue with the 2025. Hoping you can get many good years of use from it.
As a recommendation, you might do best to replace the two high voltage electro's in the 2025 PSU as when these sag a bit, the supply will destroy itself when it tries very erroneously switching to 110V operation.

Dave
Sydney Australia

Sent from Dave's MarconiPhone

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Apr 22 (https://groups.io/g/Marconi-Test-Instruments/message/11288)

richardjkelly@...

Sorry Dave, to answer your Q re stepping at different frequencies, it behaves the same way.

To be specific, I have only done it from 9kHz to 20MHz as the 9300 starts to lose acuity above that.

But suffice to say over that test range the stepping is seamless with either 50Ω load and/or 10dB attenuator in series.

It is only with 'no load' (i.e. the ca. 1MΩ input impedance of the 9300) that I see the discontinuity.

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Apr 22 (https://groups.io/g/Marconi-Test-Instruments/message/11287)

richardjkelly@...

Thanks for all the responses.

(I only use this really sub-50MHz, so rely on relatively standard BNC terminations.)

Simply put, if I have the 2025 BNC cabled to a T-piece on the Racal 9300, with a 50Ω termination on the other branch of the T, the output measured on the 9300 tracks completely smoothly from nothing to maximum on the 2025.

There is then no discontinuity at the 1V (i.e. +7dBm) point.

Obviously the voltage displayed on the 9300 is then half that displayed on the 2025.

I have also repeated the test with NO 50Ω termination and instead a 10dB inline attenuator. The 9300 reading now shows only an almost imperceptible drop as I go through 1V/+7dBm.

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Dave Skone (/g/Marconi-Test-Instruments/profile/@FalconXC)

Apr 21 (https://groups.io/g/Marconi-Test-Instruments/message/11286)

Hello all,

The 2023/4/5 series Sig gens are quite well designed, the original design by Marconi Instruments. These are 50 ohms from one stage to the next internally. There is no need to go placing mismatch errors into the load to try to prove anything as will only provide measurements with an uncertainty of ludicrous levels.

Richard, please continue your measurements using a good quality 50 ohm termination or through-termination that is capable of operating above the frequency range of your 2025.
You really have to use a proper load - your 2025 is designed only for 50 ohms - you just can't expect to get any sensible readings without the correct loading.
Once you are measuring RF, you cannot and must not use T pieces to couple more than one instrument together, you must use a 50 ohm RF splitter or divider.
The problem you are experiencing may just be a calibration issue - to be able to get an idea of what is really going on, we'd need more information, like what is the RF level 1dB stepping like at 100MHz and 1GHz. Can you borrow a power meter and power sensor to check this?

Dave
Sydney Australia

Sent from Dave's MarconiPhone

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Apr 21 (https://groups.io/g/Marconi-Test-Instruments/message/11284)

jmr (/g/Marconi-Test-Instruments/profile/4056570)

The other way to show the source match problem would be to triple terminate the sig gen so it sees 17 ohms instead of 50 ohms and then repeat the 1dB step test. This time the +7dBm to +8dBm step will go up a lot more than the expected 1dB. It could easily go up by 2dB for this 1dB step. This is because the source impedance deep inside the generator is probably much less than 50 ohms. At a guess the source VSWR of the high power 2024/5 generator is something like 2.5:1 at these low frequencies once above +7dBm. The source impedance might be 20 ohms rather than 50 ohms for example. The step attenuator hides this limitation once the sig gen level is reduced below about +7dBm.

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Apr 21 (https://groups.io/g/Marconi-Test-Instruments/message/11283)

jmr (/g/Marconi-Test-Instruments/profile/4056570)

The series resistor just acts as a potential divider and it should be fine to do this at 20MHz. It will cause the power meter reading to drop by about 8dB but this doesn't matter for this type of test. The whole point of the test is to cause the sig gen to see a mismatch and then look at the relative accuracy of the 1dB steps from the sig gen as the sig gen is stepped through +7dBm. Despite the incorrect power meter reading in an absolute sense you should still hope to see fairly accurate 1dB steps in a relative sense as the sig gen steps through +7dBm as set by the sig gen display. I don't think the high power 2024 can deliver accurate 1dB steps across +7dBm in this test. I'd expect to see the step from +7dBm to +8dBm to hardly do anything, it might even fall slightly instead of trying to go up 1dB. This is a mismatch uncertainty issue.

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jmr (/g/Marconi-Test-Instruments/profile/4056570) Apr 21 (https://groups.io/g/Marconi-Test-Instruments/message/11282)

Running the high power 2024/5 sig gen into a known good 50R impedance (like a power meter) will not reveal the extent of this limitation of the sig gen. I'd expect the power meter reading to track quite well with the high power 2025 sig gen across 0dBm through to 13dBm in 1dB steps. The performance of the sig gen falls apart if you repeat the test into a poor match. If you have a high power 2025 try repeating the test at 20MHz with something like a series 180R resistor feeding into the 50R power head. This lossy mismatch will obviously cause some power loss but ignore the absolute error in the power meter reading and see what happens to the accuracy of the 1dB steps as you cross through +7dBm. I had a look in the manual and I think there is an 11dB attenuator used rather than 10dB. Presumably this is the one that gets switched out as the level is increased above +7dBm.

If you ever need to use this sig gen to to any levelling/calibration checks across (say) -20dBm to +10dBm then I strongly recommend you fit an external 10dB attenuator to the sig gen and boost the sig gen level by 10dB. This will virtually eliminate this limitation of this sig gen model.

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 Clint Chron Apr 21 (https://groups.io/g/Marconi-Test-Instruments/message/11281)

Sorry – you have lost me. If I feed a signal from the 50 ohm output port of a signal generator, into a load that is not 50 ohms, then I would never believe any readings that I see on a RF Voltmeter or Power meter.

73
Clint
W7KEC

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 Clint Chron Apr 21 (https://groups.io/g/Marconi-Test-Instruments/message/11279)

I checked my IFR 2025 on my Boonton 4220A power meter, with a high power probe. The output of 2025 (at 20 Mhz) tracked very close from -30 dbm to +13 dbm. At +13 dbm output, I read 12.95 dbm.

73
Clint
W7KEC

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jmr (/g/Marconi-Test-Instruments/profile/4056570) Apr 21 (https://groups.io/g/Marconi-Test-Instruments/message/11278)

I think it happens on this particular step because above 7dBm (1V emf) the sig gen clicks out the last 10dB attenuator and the source impedance is then degraded to that defined by the components associated with the levelling system. Unless you terminate the sig gen in a fairly accurate 50R load then there will be a discontinuity here if you step through in (say) 1dB steps. Your various high Z meters will provide very little termination and the AVO 8 might provide a lower impedance than the other meters.

I suspect the ALC and calibration includes a fudge factor at 7dBm (1V emf) because this is where the source impedance degrades once the last attenuator is switched out. The fudge factor should be transparent (in terms of achieving accurate 1dB steps) if the sig gen is well terminated but the limitations of the design become apparent if the test is repeated at ever increasing amounts of mismatch here. The sig gen can also complain with an error message if it sees an impedance that upsets it and this usually happens at levels above 7dBm. Connecting/disconnecting unterminated RF cables is one way to upset it and get the error message. The on-screen message could be worded better as it is quite alarming. I think it says the output amplifier has failed or is unterminated when this happens. All the high power 2024 sig gens I had did this sometimes but the output amplifier was fine once the sig gen was reset.

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jmr (/g/Marconi-Test-Instruments/profile/4056570) Apr 21 (https://groups.io/g/Marconi-Test-Instruments/message/11277)

My usual workaround for these limitations is to fit a 10dB to 15dB attenuator at the output and turn up the level on the sig gen by the same amount. This improves the source impedance and also the ultimate noise floor. Of course, this means the sig gen output is attenuated but you can still get about +10dBm from the sig gen with it set to 23dBm.

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jmr (/g/Marconi-Test-Instruments/profile/4056570) Apr 21 (https://groups.io/g/Marconi-Test-Instruments/message/11276)

Sadly, I think you are exploring the limitations of the output amplifier and levelling system of this model. The source impedance isn't well defined on these sig gens once you go above about 7dBm.

I once owned three of the high power Marconi 2024 sig gens but quickly sold two of them. Only buy this sig gen model if you need the high power capability and even then, you can't treat this sig gen as having a good 50R source impedance once above 7dBm. In my opinion this isn't a professional instrument (in terms of levelling accuracy and source impedance) once used above +7dBm. The other horrible aspect of the high power (+25dBm) model is the ultimate noise floor is much worse than the standard 2024 when used at (say) +10dBm.

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richardjkelly@... Apr 21 (https://groups.io/g/Marconi-Test-Instruments/message/11275)

Well, only to prove the issue George!

The issue occurs at any frequency - I only tested up to 20MHz as that is the practical limit of the Racal 9300 RF mVM I am using.

When I tried same with Fluke and AVO I set the 2025 to 10kHz.

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george edmonds

Apr 21 (https://groups.io/g/Marconi-Test-Instruments/message/11274)

Oh what a tangled web you weave when trying to make RF measurements.

I have NEVER heard of using an AVO 8 to make RF measurements..

What frequency are you setting the 2305 to?

George G6HIG Dover UK

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richardjkelly@...

Apr 21 (https://groups.io/g/Marconi-Test-Instruments/message/11273)

New joiner, having just found this board after acquiring an IFR 2025.

My question is as follows:

When I connect the 2025 direct to an RF RMS millivoltmeter (via BNC) and gradually wind up the RF level, the mVM display tracks that RF level, with various relays clicking in the 2025 as various RF levels are passed. 2025 and mVM match exactly.

Until I get to exactly 1V on the 2025. At this point there is a further click of a reed relay, the display of the 2025 says e.g. 1.01V but the displayed voltage on the mVM drops by about 20%. Winding up the RF level on the 2025 produces a continued smooth trajectory but with this 'offset'.

I'm on the 3V range on the mVM - so it's nothing to do with changing ranges. Spot on up to 1V, then ca. 0.8V as I scroll through 1V on the 2025..

The mVM is a Racal 9300 which has 1MΩ input impedance. Same thing happens if I use my Fluke 87.

If I add a 50Ω through load there is then no such discontinuity as I wind through the 1V level, although the measured voltage is now about half what the 2025 is displaying (which would seem to figure). Similarly, using an AVO 8 shows almost no discontinuity WITHOUT the 50Ω load.

Why is this effect occurring at this one level step?

(In case it matters, this 2025 has the high power option).

It's a steep learning curve on the 2025 so apologies if I have missed something obvious, or got a setting wrong somewhere.

Thanks,

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(https://groups.io/g/Marconi-Test-Instruments/topic/90417701?p=,,,20,0,0,0::,,,0,0,0,90417701)

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