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/  21.4 Mhz I.F. Assembly Failure of H.P./Agilent ESA E44xx series Spectrum Analyzer

 Mute This Topic (<https://groups.io/g/HP-Agilent-Keysight-equipment/ft/69851436?csrf=5513314409256117711&mute=1&p=Created%2C%2C%2C20%2C2%2C0%2C0>)

21.4 Mhz I.F. Date ▼ (<https://groups.io/g/HP-Agilent-Keysight-equipment/topic/69851436?p=Created%2C%2C%2C20%2C1%2C0%2C0>)  
Assembly Failure  
of H.P./Agilent ESA E44xx series Spectrum Analyzer



John Annison (/g/HP-Agilent-Keysight-equipment/profile/1777617)

2020-01-19  (<https://groups.io/g/HP-Agilent-Keysight-equipment/message/102017>)

Thanks to all for your response.

Amirb: With the HP ESA units; within the Service menu, the "Alignment Now" can be made visible. This allows one to see what the unit is doing. This includes Alignment, Measurement, and so on.

It appears that calculations are being completed, and adjustment made.

An example of the list would be:

Aligning ADC

Aligning CF DAC for 100KHz.

Pole 1,2,3,4 step gain

And so forth.

To all: These are Surface Mount 50 ohm Coax, 12 volt Reed Relays. I did actuate the relays and verified that contacts closed (near 0.1 ohm) and were also Open when deactivated. I also tested that relay contact closure happens at about 6-7 volts, so at 12 volts it should be closed.

Mark: As with most all HP equipment, a good testability design was thought of. There are many test points that are brought to the relative edge of the board, outside of the shield covers. I have verified that the Drive Voltages are present during the "Alignment Now" process.

I will verify that each of the Steering Diodes is doing their job; I didn't do that.

The Alignment seems to go through three repeat cycles of tests with a good A3 assy. The failing unit stops at the near completion of the first cycle. There then appears to be some calculation going on. The test stops.

The next step that should happen is: Measure ENBWR of (and three frequencies). This never happens and my assumption is that the calculations are out of the correct range, because perhaps some of the previously calculated or measured values were incorrect because of a component value change, etc.

I did verify that the 21.4 MHz Gain and the Log output is very close to the same (within 1 dB) with the good and bad unit, before any corrections are applied with the "Align Now". This requires a Clear Memory start-up.

If I had an in-process simulator (not even Keysight would have that now) to test the card on, I could find the failing area.

I will still keep looking, but so far my options are just to have Luck.

Thanks to all. Any further ideas are still welcome.

John A.

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Mark Bielman (/g/HP-Agilent-Keysight-equipment/profile/502679)

2020-01-18 <https://groups.io/g/HP-Agilent-Keysight-equipment/message/101992>

Looking at the CLIP. The relay control is interesting. Looks like the op-amp relay drivers swing between +/- 15 or so volts. You should check those. This might be tedious but you're gonna have to get your hands dirty on this one. But I would start there.

Mark

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Kuba Ober

2020-01-18 <https://groups.io/g/HP-Agilent-Keysight-equipment/message/101988>

I was going to suggest the same thing: just because the relays click doesn't mean that they work. Those are really aggravating failures, but the only way to make sure the unit will keep on working is to measure all relays in the assembly, and look at any outliers within the relays of the same type/construction. If more than two have outlying closed resistance on any contacts, they should all be replaced, if they are signal switching (very low power, unlikely to weld/arc contacts). For relays that switch power, consider their load: the ones with more load may be more likely to fail, and then if two or more in the same "load group" are outliers: best to replace them all.

Cheers, Kuba

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amirb

2020-01-18 <https://groups.io/g/HP-Agilent-Keysight-equipment/message/101974>

interesting, may I ask how did you find out about the number of measurements? how could you monitor what is going on during the alignment? sorry I cannot give you any advice as i have never had an ESA (except one for a short while with a failing LO which i quickly fixed and returned to the owner)

you said the relays actuate but is the contact resistance acceptable?

is it possible that it stops alignment because of a fault somewhere else other than IF?  
I once had an Anritsu SA that was failing auto cal and the message was cal signal not found, however I could see the cal signal is perfect up until the end of 3rd converter, so it turned out there was a fault in the log amp (after RBW filters) but the error was very misleading...

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John Annison (/g/HP-Agilent-Keysight-equipment/profile/1777617)

2020-01-18 <https://groups.io/g/HP-Agilent-Keysight-equipment/message/101962>

John.....Thanks for the idea.  
I did check all the relays and they all do actuate as one would expect.

I found that the "Align Now" makes about 113 measurements/calculations and adjustments for a normal working system. With the failed A3 assy., it stops at about 33 measurements. Apparently some of the measurements are out of range and the system can't continue.  
A test procedure for the A3 would help characterize it.

John A.

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John Gord

2020-01-17 <https://groups.io/g/HP-Agilent-Keysight-equipment/message/101948>

John,

I had a similar problem on an E4411B. In the end, it was a bad relay in one of the RBW stages. No smoke or obvious damage, the relay just did not work. I don't remember how I found it; probably by attaching temporary probe connections to the various RBW stages until one didn't behave like the others. I replaced the relay with a similar (but not identical) unit from Digkey.

--John Gord

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John Annison ([/g/HP-Agilent-Keysight-equipment/profile/1777617](https://groups.io/g/HP-Agilent-Keysight-equipment/profile/1777617))

2020-01-17 <https://groups.io/g/HP-Agilent-Keysight-equipment/message/101947>

Hi everyone.....

I have a perplexing problem I am trying solve, so this may be long and I hope someone has run into this problem or perhaps one of the H.P./Agilent people may lead me in the right direction.

This would apply to one of the ESA-E4402B thru E4407B series spectrum analyzers.

I do have all the Service, Cal, and CLIPS documentations so that is not the issue. I have a correctly working E4405B and E4407B with ONLY one correctly working 21.4 Mhz I.F. (A3) assembly.

The other 21.4 Mhz. I.F. assembly initially had a relay coil shorted to Return in the 3<sup>rd</sup>. Filter Pole, which caused the series resistor to burn open. This was repaired and all involved circuits were found to be not damaged. This circuit now functions correctly.

The problem is the E4405B or 07B will not complete the "align now" function with the still defective I.F. assembly. The good I.F. assembly always completes the test with both E4405B and 07B units.

What I have noticed is that:

The good I.F. unit goes through three iterations of calibrating (Align Now) of I.F./R.F. sequences and completes correctly.

The bad I.F. unit goes through one iteration of calibration and stops. The display goes back to "System, Alignments, Align Now, All required now"

The overall 21.4 Mhz. I.F. gain for both (A3) units are within one DB of each other, so gain is not the issue.

If there is anyone that knows the answer to this issue, I sure would appreciate the help. A procedure to test the A3 unit would be of help.

Thanks.

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