EEVblog Electronics Community Forum

A Free & Open Forum For Electronics Enthusiasts & Professionals

Hello volvo_nut_v70
Show unread posts since last visit.
Show new replies to your posts.
August 23, 2019, 08:09:58 pm

« previous next »

Pages: [1] Go Down REPLY NOTIFY MARK UNREAD SEND THIS TOPIC PRINT SEARCH

Author Topic: Hp 8903 restoration (Read 2827 times)

volvo_nut_v70 and 0 Guests are viewing this topic.

reddish75
Contributor
Posts: 12
Country:

Hp 8903 restoration
« **on:** January 25, 2017, 10:26:58 am »
Say Thanks Reply Quote

I'm going to try and restore my 8903a and could use some help/tips on what to replace or modify?

Going to start on the oscillator board A5, going to replace the capacitors on there, is there a consensus to replacing the axial tantalum caps (Sprague 150d) should I replace them like for like or could I use an electrolytic like the Nichicon UKL series? Alsoare there any opamp upgrades that could be done to this board whilst its out?

Thanks

Chris

HP 8903A A5 Schematic.pdf (208.29 kB - downloaded 101 times.)

Report to moderator Logged

reddish75
Contributor
Posts: 12
Country:

Re: Hp 8903 restoration
« **Reply #1 on:** January 25, 2017, 04:17:13 pm »
Say Thanks Reply Quote

OK, first hurdle, capacitors c9/20 are 0.18uf 200vdc +/- 1% and c10/21 are 0.0223uf +/- 1% they look like poly caps, looking at the schematic are these tolerances strictly necessary?

Why replace them I hear you say? Well, the limited info on people repairing these mostly have had problems with these type of capacitors, and if I'm going through it these are getting replaced as well.

Report to moderator Logged

Re: Hp 8903 restoration

dacman
Frequent Contributor
Posts: 391
Country:

« **Reply #2 on:** January 25, 2017, 10:32:35 pm » Say Thanks Reply Quote

I've never seen a 150D fail.

There are 2 capacitors on the A3 card (on the +/- 15 Vdc rails) that are not 150D capacitors, C2 and C3 (these are sometimes 30D or TE series). These two capacitors can fail.

There are a couple of fuses on the A2 card.

I wouldn't concern myself with the A5 capacitors unless there is a problem with the ranges.

Report to moderator Logged

rastro
Frequent Contributor
Posts: 350
Country:

Re: Hp 8903 restoration
« **Reply #3 on:** January 25, 2017, 11:51:44 pm » Say Thanks Reply Quote

When you say restore what do you mean? Is there a problem with the instrument?

If you are just doing some proactive capacitor replacement I would suggest you get a good baseline of the system like running and recording the performance tests. Also record ripple on the power supplies. Isn't the 8903's linear power supplies; so probably less issues with high ESR capacitors.

My experience is that most high end test equipment manufactures use very good quality components in these older systems. I have certainly replace a few after failure but I would hesitate preemptively replacing capacitors unless a particular model or board has a history of problems. An example would be the Tektronix 49X series Spectrum analyzers SMPS. There's about 12 electrolytics in these that are likely marginal if it's original. There is also some Tek o-scopes boards that have tantalum caps that are notoriously destructive. So there are some good cases for preemptive maintenance but you can also put problems into as system by fixing things that aren't broke.

Have you seen reports of high capacitor failure on the HP 8903 series?

-rastro

Report to moderator Logged

reddish75
Contributor
Posts: 12
Country:

Re: Hp 8903 restoration
« **Reply #4 on:** January 26, 2017, 01:15:09 am » Say Thanks Reply Quote

I'm doing it as I don't know the history of the unit, the serial number suggests it was manufactured in 1983 for all I know its been on nearly everyday since new, when reading distortion of its inbuilt oscillator it measures 0.0108 which I'm assuming is on the high side.

When looking for information on the 8903a I've come across a few instances where some of the poly caps on the oscillator board are not performing as they should, if I'm replacing those I want to pre-emptively replace components that might be coming to the end of their life, in essence I don't want to have to pull the board again, just set and forget if you know what I mean, I will also be going through each board in turn doing the same thing, if whilst I'm doing it if anyone knows of any improvements to be made to any part of the circuit then I would be open to it.

Report to moderator Logged

dacman
Frequent Contributor
Posts: 391
Country:

Re: Hp 8903 restoration
« **Reply #5 on:** January 26, 2017, 02:34:54 am » Say Thanks Reply Quote

There is an adjustment for the notch filter (with the TI measuring its own distortion). It's supposed to be adjusted to -86 dB or less, which would be about 0.005%. If the reading is high, it is usually due to the analyzer, not the oscillator. 0.01%, or about -80 dB, would not be an unusual reading if it hasn't been adjusted.

The only high failure parts that I know of are the two I've already mentioned, C2 and C3 on A3, although the switches can sometimes need attention.

The 1% capacitors are related to the oscillator frequency accuracy.

Edit:
The 1% capacitors mentioned are in Integrators 1 and 2.
If you are wondering how a 0.3% oscillator can use 1% range capacitors, here is an excerpt from the manual (service sheet BD3):
"The frequency is coarse tuned by adjusting (wo) in the simplified diagram (Rs and Cs in Integrators 1 and 2). Fine tuning is accomplished by adjustment of (*B*). Tuning is accomplished by the controller which uses the counter to check frequency. ..."

« Last Edit: January 27, 2017, 02:31:47 pm by dacman »

Report to moderator Logged

rastro
Frequent Contributor
Posts: 350
Country: 00

Re: Hp 8903 restoration
« **Reply #6 on:** January 26, 2017, 02:51:08 am »
Say Thanks Reply Quote

I would think it is still worthwhile to do the performance checks of section 4 in the manual (http://www.ko4bb.com/manuals/97.99.195.170/HP_8903A_Audio_Analyzer-Service.pdf) before replacing parts or doing any modifications. You would then have a baseline before starting any work. Just a suggestion.

I just went through this procedure on my 8903B. You can get by without an AC calibrator by using a signal generator and a decent DMM that goes to 100KHz rms readings. You will also probably need some kind of step/adjustable attenuator. You may not be able to check all the higher signal levels 60Vrms but you can cover most of it.

Anyway good luck on your progress.

-rastro

Report to moderator Logged

dacman
Frequent Contributor
Posts: 391
Country:

Re: Hp 8903 restoration
« **Reply #7 on:** January 27, 2017, 01:49:52 am »
Say Thanks Reply Quote

If the poly caps are not performing as expected, I would assume it would be because they have drifted too far from nominal, and not because of dissipation. 1% is a very tight tolerance.

Report to moderator Logged

rastro
Frequent Contributor
Posts: 350
Country: 00

Re: Hp 8903 restoration
« **Reply #8 on:** January 27, 2017, 01:38:05 pm »
Say Thanks Reply Quote

There is some 8903A modification/upgrade discussion on diyaudio.

http://www.diyaudio.com/forums/equipment-tools/295895-hp-8903a-audio-analyzer-mods-upgrades.html

-rastro

Report to moderator Logged

Cubdriver
Supporter

Posts: 2295
Country:
Nixie addict

Re: Hp 8903 restoration
« **Reply #9 on:** January 29, 2017, 08:01:17 am »
Say Thanks Reply Quote

I'm disinclined to replace things simply for the sake of replacing them, especially if the things being replaced are expensive, reliable and well regarded parts. 150Ds are hermetically sealed solid tantalum caps and pretty bulletproof. (And also, based on a quick search, seem to start at about $5/pop for small ones, and quickly head up to $15-25 or more/ea for larger ones. These aren't el cheapo floor sweeping electrolytics.)

I'll second what others have said - baseline the instrument before doing anything to it. After testing, if it's out, try the factory alignment procedure and see if that improves the performance. If you just dive in and start shotgunning parts, you won't know if you've improved it or buggered it up worse. HP gear from that era was built to last, and unlike consumer products they typically used high quality parts, rather than whatever was cheapest that week.

FWIW

-Pat

Report to moderator Logged

If it jams, force it. If it breaks, you needed a new one anyway...

The following users thanked this post: rastro

halej1
Newbie
Posts: 4
Country:

Re: Hp 8903 restoration
« **Reply #10 on:** December 31, 2017, 11:38:28 pm »
Say Thanks Reply Quote

Well - I know the thread is a little dated but then again so is the equipment (and then again so am I) So I just got my 8903A and was checking it out--- it seemed to need some attention in the output channel. But I also live in Germany and was running it off a Transformer @ 120 VAC. I decided to try it at the 220V line voltage in Germany and (and I am kicking myself over it) did not switch the voltage selector card around. Blew the input fuse and also bricked the unit. After some "next morning " analysis. The F! fuse on the motherboard did not blow. but whenever I put in voltage (120 this time)

it will blow the input fuse. I unplugged f1, f2, f3 input fuse still bows. I unplugged tranformer connector on the board -- input fuse OK and get VAC out of connector ports. SO between the input connector ant the f1,f2,f3 fuses is only a couple componemts -- checked diodes - OK, checked the one 100 ohm resistor--- OK. not much left except the Thyristor (Q3)-- it is a transistor looking case (T-66) -- can't seem to find this part anywhere. when tested with a tester it come up as two resistors-- i think it should be two diodes. anybody know a replacement or sub for this part?

thank you
John

Report to moderator Logged

Bashstreet
Frequent Contributor
Posts: 298
Country:

Re: Hp 8903 restoration
« **Reply #11 on:** January 01, 2018, 02:59:01 am »
Say Thanks Reply Quote

Quote from: halej1 on December 31, 2017, 11:38:28 pm

> Well - I know the thread is a little dated but then again so is the equipment (and then again so am I) So I just got my 8903A and was checking it out--- it seemed to need some attention in the output channel. But I also live in Germany and was running it off a Transformer @ 120 VAC. I decided to try it at the 220V line voltage in Germany and (and I am kicking myself over it) did not switch the voltage selector card around. Blew the input fuse and also bricked the unit. After some "next morning " analysis. The F! fuse on the motherboard did not blow. but whenever I put in voltage (120 this time) it will blow the input fuse. I unplugged f1, f2, f3 input fuse still bows. I unplugged tranformer connector on the board -- input fuse OK and get VAC out of connector ports. SO between the input connector ant the f1,f2,f3 fuses is only a couple componemts -- checked diodes - OK, checked the one 100 ohm resistor--- OK. not much left except the Thyristor (Q3)-- it is a transistor looking case (T-66) -- can't seem to find this part anywhere. when tested with a tester it come up as two resistors-- i think it should be two diodes. anybody know a replacement or sub for this part?
>
> thank you
> John

Impossible to say without schematic.
It is best practice to provide the schematic when asking such questions

Report to moderator Logged

Cubdriver
Supporter

Posts: 2295
Country:
Nixie addict

Re: Hp 8903 restoration
« **Reply #12 on:** January 01, 2018, 05:09:03 am »
Say Thanks Reply Quote

I'm unsure how different it is from the 'A' model, but the service manuals for the 8903B are available as PDFs from Keysight (go to keysight.com, click on 'services and support' then 'manuals' under document library and enter 8903B in the search box.)

It's a two volume set, and the power supply is the A13 board, which is in volume 2. Its schematic and layout are around page 165 of the PDF. Again, this is for the 'B' model, and may not be an exact match, but it should get you at least into the ballpark. It's not a perfect scan, but as freebies go it's excellent quality.

Good luck with your repair efforts!

-Pat

« *Last Edit: January 01, 2018, 05:29:44 am by Cubdriver* »
Report to moderator Logged

If it jams, force it. If it breaks, you needed a new one anyway...

Cubdriver
Supporter

Posts: 2295
Country:
Nixie addict

Re: Hp 8903 restoration
« **Reply #13 on:** January 01, 2018, 05:29:24 am »
Say Thanks Reply Quote

The triac used in the 'B' unit is part number 1884-0276. This is an in-house HP part number, and some cursory searching has not readily revealed a replacement with a common part number. If you dig a bit more perhaps you can find specs to determine a sub, or find a recommended sub.

The following link will get you to a PDF that describes a quick test for SCRs/triacs using an ohmmeter:

https://www.ab.com/support/abdrives/documentation/fb/1012.pdf

When untriggered, it should be a high resistance, so the fact that yours looks like resistors probably doesn't bode well.

-Pat

Report to moderator Logged

If it jams, force it. If it breaks, you needed a new one anyway...

rastro
Frequent Contributor
Posts: 350
Country: 00

Re: Hp 8903 restoration
« **Reply #14 on:** January 22, 2018, 05:05:48 pm »

Say Thanks Reply Quote

Quote from: halej1 on December 31, 2017, 11:38:28 pm

> ... But I also live in Germany and was running it off a Transformer @ 120 VAC. I decided to try it at the 220V line voltage in Germany and (and I am kicking myself over it) did not switch the voltage selector card around. Blew the input fuse and also bricked the unit. After some "next morning " analysis. The F! fuse on the motherboard did not blow. ...

Changing the mains configuration from 120VAC to 220VAC also requires changing the mains fuse from 1.5A to 1.0A. The 1.5A fuse used for running at 120VAC is overrated when running at 220VAC.
Are you sure that you didn't damage the mains transformer?

Report to moderator Logged

Quick Reply