

- / 📁 Topics (<https://groups.io/g/HP-Agilent-Keysight-equipment/topics?p=,,,0,0,0,0>)
- / 📁 HP3400A Images around Photochopper demodulator (help)



🔊 Mute This Topic (<https://groups.io/g/HP-Agilent-Keysight-equipment/ft/93892915?csrf=5513314409256117711&mute=1&p=Created%2C%2C%2C20%2C2%2C0%2C0>)

HP3400A Images Date ▲ (<https://groups.io/g/HP-Agilent-Keysight-equipment/topic/93892915?p=Created%2C%2C%2C20%2C2%2C0%2C0>) around Photochopper demodulator (help)



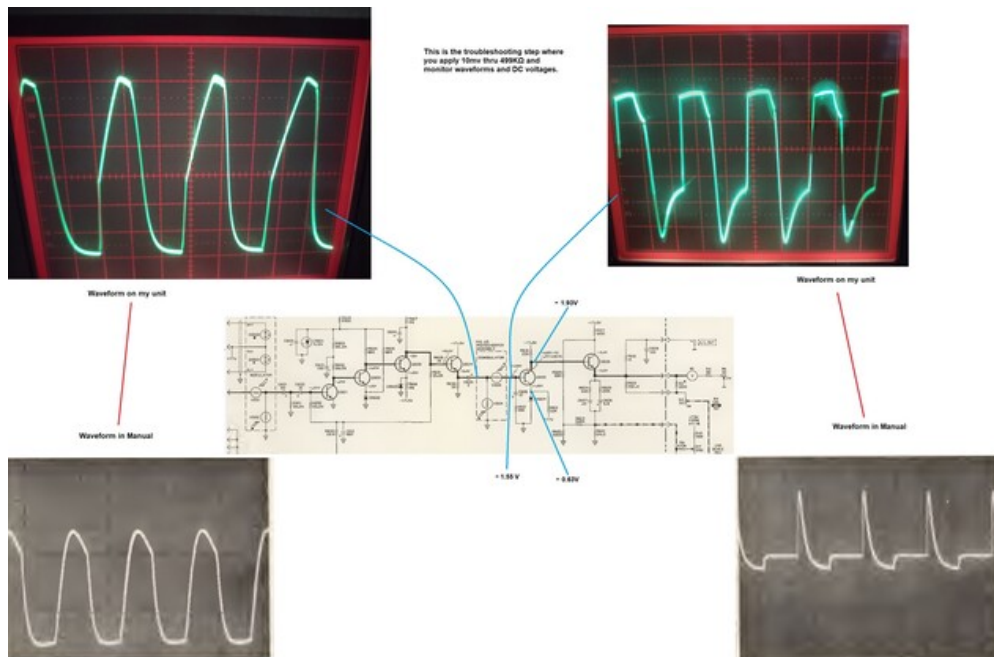
Sep 24 (<https://groups.io/g/HP-Agilent-Keysight-equipment/message/129801>)

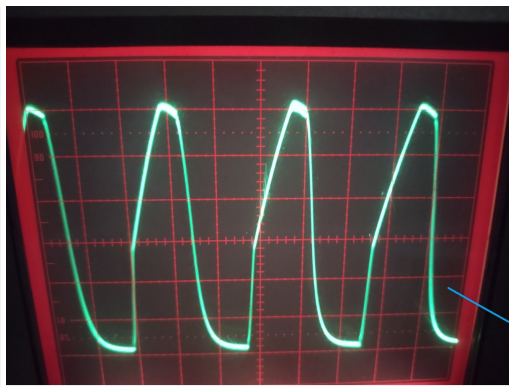
I'm pretty sure I have a photochopper problem, your opinion welcome.
 The the thermocoupler circuit is not involved in this step, as the red wire has been removed, so no feedback input.
 Now, I'm looking for the information to replace the photochopper with either analog switch IC (DG403) or the H11F1M.
 I seem to have read opinions that the other one is better! So what did you do?
 Don't see it in the Files section.
 Does anyone have the info?

BTW, here are the waveforms and voltages from my 3400A vs the manual.

Arrgh, they don't look readable, so I added an attachment, also dropbox,
<https://www.dropbox.com/s/5gdlumurq0mwalb/HP3400A%20waveforms%20and%20DC%20Voltages%20on%20A6%20board%20around%20second%20half%20of%20photochopper%20ass%27y.jpg?dl=0>
 (<https://www.dropbox.com/s/5gdlumurq0mwalb/HP3400A%20waveforms%20and%20DC%20Voltages%20on%20A6%20board%20around%20second%20half%20of%20photochopper%20ass%27y.jpg?dl=0>)

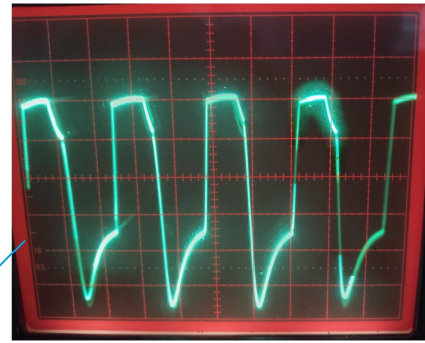
Mikek





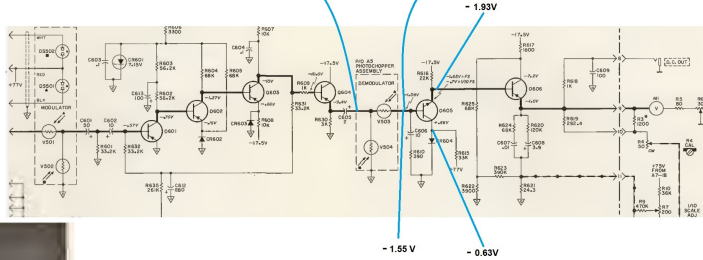
Waveform on my unit

This is the troubleshooting step where you apply 10mv thru 499KΩ and monitor waveforms and DC voltages.

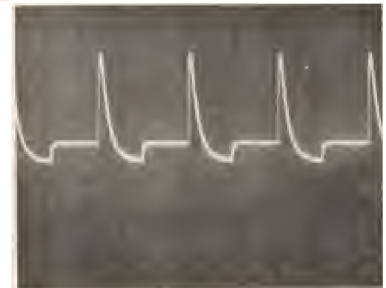
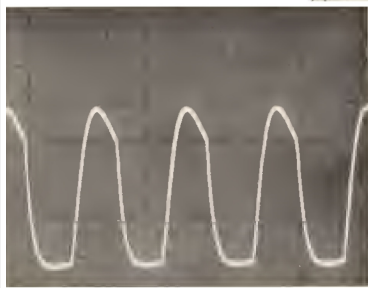


Waveform on my unit

Waveform in Manual



Waveform in Manual



([https://groups.io/g/HP-Agilent-Keysight-equipment/attachment/129801/1/HP3400A waveforms and DC Voltages on A6 board around second half of photochopper ass_y.jpg](https://groups.io/g/HP-Agilent-Keysight-equipment/attachment/129801/1/HP3400A%20waveforms%20and%20DC%20Voltages%20on%20A6%20board%20around%20second%20half%20of%20photochopper%20ass_y.jpg))

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Jeff Furman

Sep 24 (<https://groups.io/g/HP-Agilent-Keysight-equipment/message/129809>)

Mikek,
Later version of the 3400a replaced the photo choppers with a single chip chopper stabilized opamp. I can't recall if the pcb is a direct replacement but you might be traveling along that path. The manual for this version is on the BAMA site.

73, Jeff AD6MX

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John kolb

Sep 24 (<https://groups.io/g/HP-Agilent-Keysight-equipment/message/129810>)

Looks like V504 is not shorting to ground for half the cycle. This could be a failing photocell or the neon light getting dim with age (it is lit, correct?) there have been a number of discussions on what to replace aging neons with but I don't remember any details.

John KK6IL

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Sep 25 (<https://groups.io/g/HP-Agilent-Keysight-equipment/message/129825>)

Here is the drive wave form to the neons, I think this is a pretty good waveform, when compared to the manual, making me think my neons are OK.



Waveform from Manual

There is a slight glitch at the top of the bottom waveform.

The initial problem I have is at the very beginning of the calibration 5-22 d. adjustment of the DC output voltage. I can't get it up to 1V (0.844V max) even after adjusting the value of R3 to it's suggested maximum value.

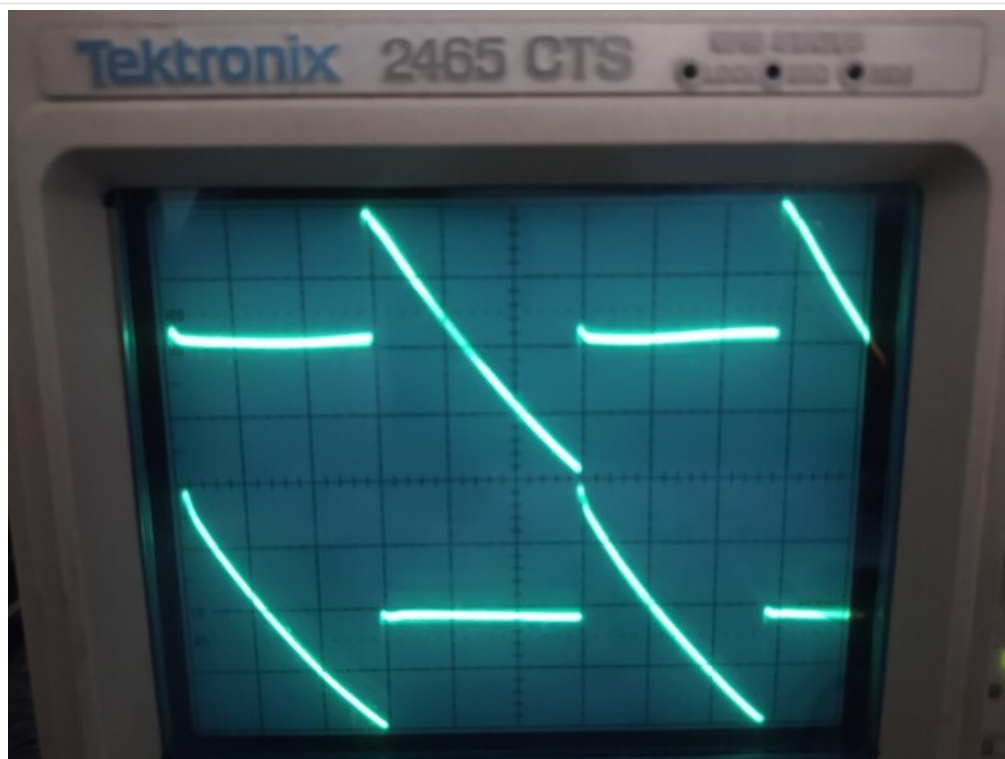
Someone sent me a photochopper modification using a DG403 made by br4av01 (Parker). I tried an email, but it bounced. The last post I see of his is 2013.

After I verify my thermocouples are good, I'll probably go the route of making the modification.

There was also a mod using H11F1 which is no longer available, replaced with the H11F1M.

If anyone has info on that mod, please let me know.

Thanks, Mikek



([https://groups.io/g/HP-Agilent-Keysight-equipment/attachment/129825/0/HP3400A Neons measured at the back of the PS board.jpg](https://groups.io/g/HP-Agilent-Keysight-equipment/attachment/129825/0/HP3400A%20Neons%20measured%20at%20the%20back%20of%20the%20PS%20board.jpg))

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Mikek

Sep 25 [🔗 \(https://groups.io/g/HP-Agilent-Keysight-equipment/message/129827\)](https://groups.io/g/HP-Agilent-Keysight-equipment/message/129827)

On Sat, Sep 24, 2022 at 07:44 PM, Jeff Furman wrote:

Later version of the 3400a replaced the photo choppers with a single chip chopper stabilized opamp. I can't recall if the pcb is a direct replacement but you might be traveling along that path. The manual for this version is on the BAMA site.

After calculating the price of the mod and the work involved, if I can get an upgraded board for around \$60, I'd probably go that route. But, if there is a much modification to install the new board, the mod may be preferable.

Thanks, Mikek

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Dave Wise

Sep 25 [🔗 \(https://groups.io/g/HP-Agilent-Keysight-equipment/message/129830\)](https://groups.io/g/HP-Agilent-Keysight-equipment/message/129830)

While restoring my 740B DC Voltage Standard/Differential Voltmeters, I've found that about half of my photocells have slowed down to the point it's not possible to maintain the specified gain or input resistance. Not only that, their sensitivity varies by orders of magnitude from cell to cell, which means even good cells are overdriven or underdriven. I'm perfecting an approach of selecting photocells for the modulator, with customized illumination for each cell, and using H11F1's in the demodulator. This hybrid system enables a timing trick that can raise the efficiency quite a bit.

It may be possible to repurpose my board for the 3400A. See EEVBlog thread [\(https://www.eevblog.com/forum/testgear/hewlett-packard-740b-dc-standard-digital-voltmeter-\(and-740a\)\)](https://www.eevblog.com/forum/testgear/hewlett-packard-740b-dc-standard-digital-voltmeter-(and-740a)) and OSHPark project "HP-Chopper-Photocell-Driver.kicad_pcb".

Dave Wise

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Mikek

Sep 25 [🔗 \(https://groups.io/g/HP-Agilent-Keysight-equipment/message/129832\)](https://groups.io/g/HP-Agilent-Keysight-equipment/message/129832)

On Sun, Sep 25, 2022 at 11:04 AM, Dave Wise wrote:

See EEVBlog thread [\(https://www.eevblog.com/forum/testgear/hewlett-packard-740b-dc-standard-digital-voltmeter-\(and-740a\)\)](https://www.eevblog.com/forum/testgear/hewlett-packard-740b-dc-standard-digital-voltmeter-(and-740a))

I couldn't get that link to work, but I found it.

[https://www.eevblog.com/forum/testgear/hewlett-packard-740b-dc-standard-digital-voltmeter-\(and-740a\)/50/](https://www.eevblog.com/forum/testgear/hewlett-packard-740b-dc-standard-digital-voltmeter-(and-740a)/50/)
([https://www.eevblog.com/forum/testgear/hewlett-packard-740b-dc-standard-digital-voltmeter-\(and-740a\)/50/](https://www.eevblog.com/forum/testgear/hewlett-packard-740b-dc-standard-digital-voltmeter-(and-740a)/50/))

Mikek

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Sep 25 (https://groups.io/g/HP-Agilent-Keysight-equipment/message/129834)

On Sat, Sep 24, 2022 at 07:47 PM, John kolb wrote:

Looks like V504 is not shorting to ground for half the cycle. This could be a failing photocell or the neon light getting dim with age (it is lit, correct?) there have been a number of discussions on what to replace aging neons with but I don't remember any details.

John KK6IL

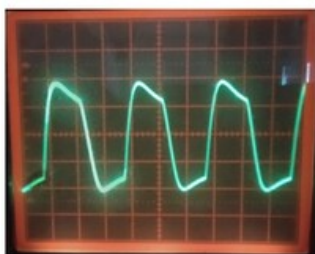
Here is a comparison between an HP 3400A that calibrates and a my non calibrating HP 3400A.

Mikek

These are the Waveforms from my working HP3400A

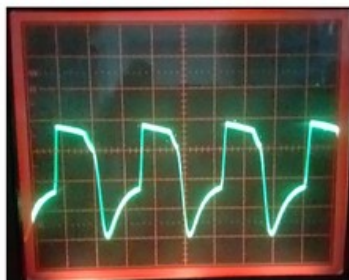
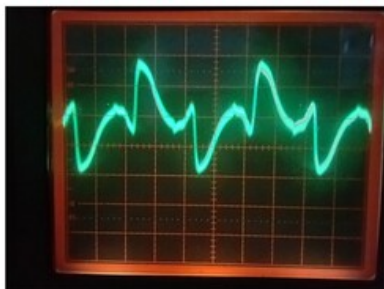


Waveform at the junction of V501 and V502
With red wire removed and 10mv applied to pin 13 of A6 board. 2ms/Div and 20mv/Div



Waveform at the junction of V503 and 504
With red wire removed and 10mv applied to pin 13 of A6 board. 2ms/Div and 1V/Div

These are the waveforms from the HP3400A that will not pass the initial calibration for the DC OUT Calibration.




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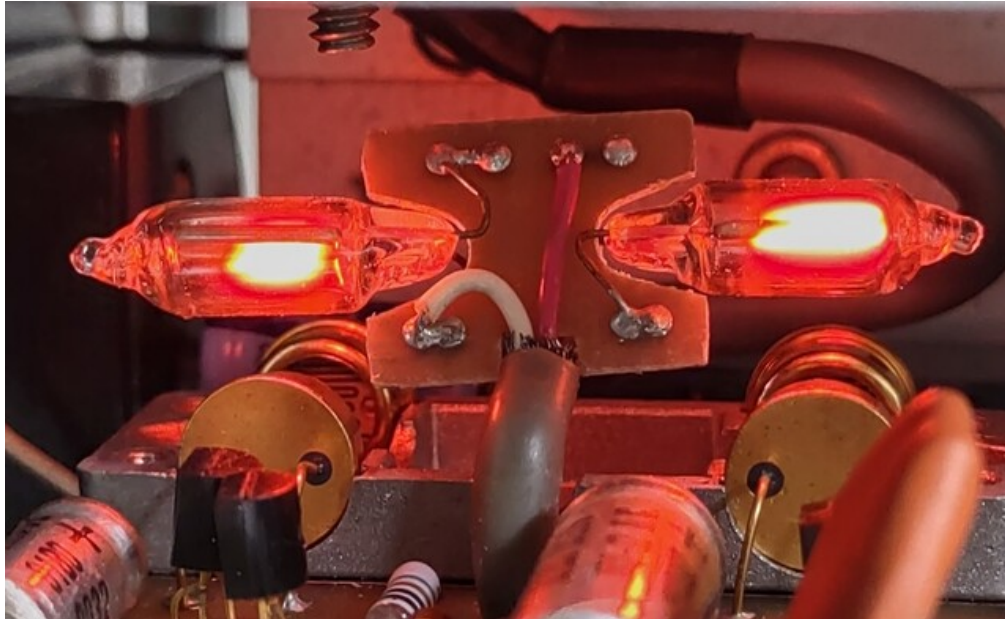


Mikek


Sep 25  (<https://groups.io/g/HP-Agilent-Keysight-equipment/message/129835>)

I was suspecting the LDR, but now after viewing the difference in intensity of the Neon bulbs, I'm not as sure. Here is a Dropbox link to a video showing the neon's alternating in brightness (camera modulated). <https://www.dropbox.com/s/ktrk8p3ikdt69yr/HP3400A%20Neon%20Bulb%20intensity%20video.mp4?dl=0> Any opinions about LDR vs Neon? I guess I could swap their relative positions to see if that changes the problem from demod side to modulation side.

Thanks, Mikek

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Glenn Little

Sep 25  (<https://groups.io/g/HP-Agilent-Keysight-equipment/message/129836>)

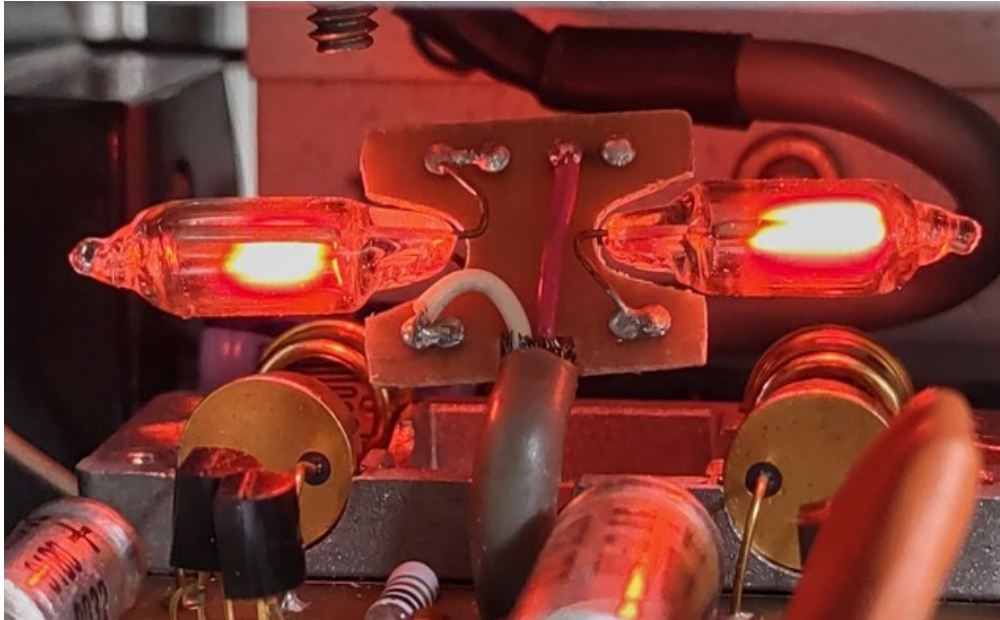
Gas discharge tubes age and begin to strike at a higher voltage.
I would suspect that the Neon bulbs have aged and are striking at a higher voltage.
This would give the appearance of the LDR failing.
With new neon bulbs, you may fix the problem, until they age, but, that would probably be past the time that you would care to use the instrument.

Glenn

On 9/25/2022 3:39 PM, Mikek wrote:

I was suspecting the LDR, but now after viewing the difference in intensity of the Neon bulbs, I'm not as sure. Here is a Dropbox link to a video showing the neon's alternating in brightness (camera modulated).
<https://www.dropbox.com/s/ktrk8p3ikdt69yr/HP3400A%20Neon%20Bulb%20intensity%20video.mp4?dl=0>
 (https://www.dropbox.com/s/ktrk8p3ikdt69yr/HP3400A%20Neon%20Bulb%20intensity%20video.mp4?dl=0)
 Any opinions about LDR vs Neon? I guess I could swap their relative positions to see if that changes the problem from demod side to modulation side.

Thanks, Mikek



--

 Glenn Little ARRL Technical Specialist QCWA LM 28417
 Amateur Callsign: WB4UIV wb4uiv@arrl.net (mailto:wb4uiv@arrl.net) AMSAT LM 2178
 QTH: Goose Creek, SC USA (EM92xx) USSVI, FRA, NRA-LM ARRL TAPR
 "It is not the class of license that the Amateur holds but the class
 of the Amateur that holds the license"

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Jeremy B

Sep 25 <https://groups.io/g/HP-Agilent-Keysight-equipment/message/129839>

The replacement photochopper board is built around an the Maxim ICL7650. Last I checked it was still available from Mouser in DIP and SMT packages. It's about 9 USD for one item. Depending on your level of skill a clone board can easily be made as the rest of the components are all off shelf.

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Sep 25 (<https://groups.io/g/HP-Agilent-Keysight-equipment/message/129842>)

On Sun, Sep 25, 2022 at 03:14 PM, Jeremy B wrote:

Depending on your level of skill a clone board can easily be made as the rest of the components are all off shelf.

I'm a good builder, but I would need a schematic to copy from.
Mikek

btw, Jim Williams, built a whole 3400 on a pcb 3.5" x 2.25".

<https://www.analog.com/media/en/technical-documentation/application-notes/an61fa.pdf> (<https://www.analog.com/media/en/technical-documentation/application-notes/an61fa.pdf>) Very near the end.

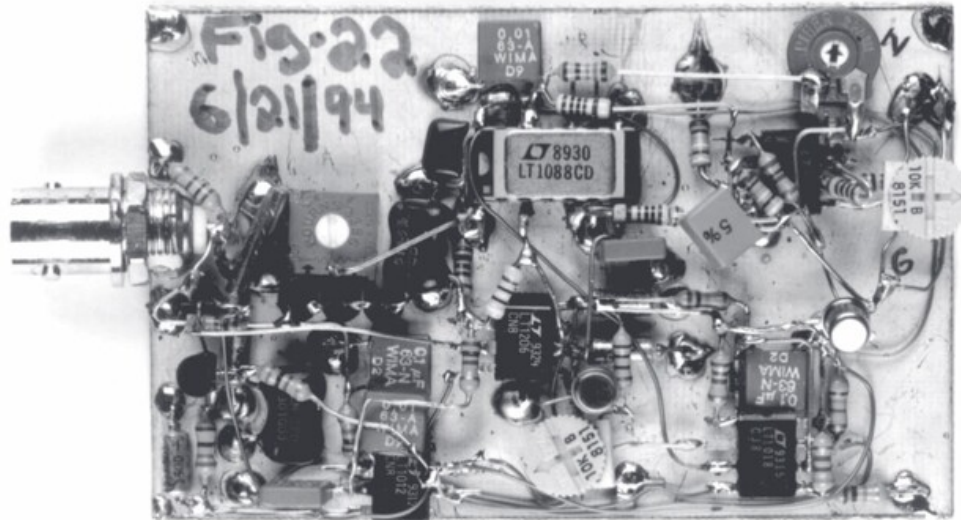


Figure A7. Figure 22's Circuit Puts Entire HP3400 Electronics on One Small Board. FET Buffer-LT1206 Amplifier Appear Left Center Behind BNC Shield. LT1088 IC (Upper Center) Replaces Thermal Converter. LT1013 (Upper Right) Based Circuitry Replaces Photo-Chopper Board. LT1018 and Components (Lower Right) Provide Overload Protection. Ain't Modern ICs Wonderful?

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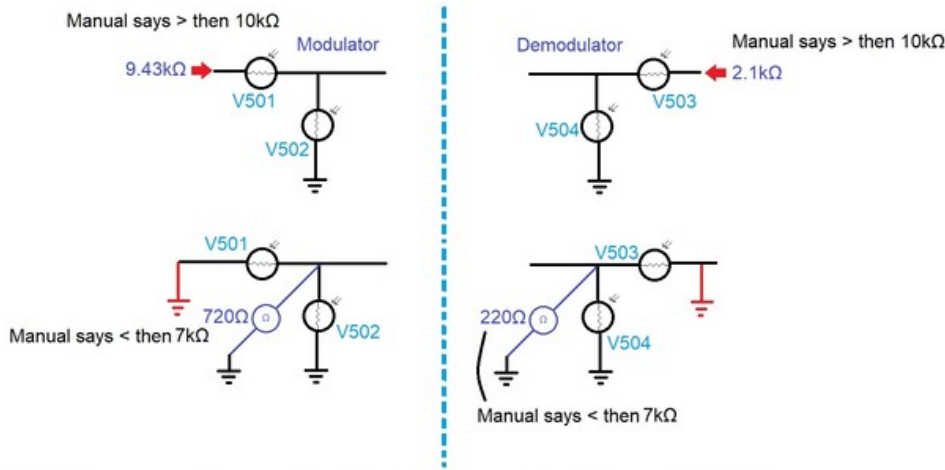
Sep 25 <https://groups.io/g/HP-Agilent-Keysight-equipment/message/129846>

On Sun, Sep 25, 2022 at 01:39 PM, Glenn Little wrote:

Gas discharge tubes age and begin to strike at a higher voltage.
I would suspect that the Neon bulbs have aged and are striking at a higher voltage.

Just when you think you have it figured out and then you follow the manual!!
I took the resistance measurements following the procedure in the manual. Then I did some outside the procedure to get individual LDR measurements.
It looks to me like all of the LDRs are getting to the end of life. with V503 being the worst case.
Mikek

All measurements Made following the Procedure in Manual



Additional measurements were made with meter on, but not grounding, so I measured individual LDR resistances.

V501 3KΩ
V502 1.7kΩ
V503 400Ω
V504 1.5kΩ

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1:39am <https://groups.io/g/HP-Agilent-Keysight-equipment/message/129848>

The glitch on the bottom trace is matched by a corresponding glitch on the top trace at the start of the flat portion - when the neon bub is lit. The neon is operating on the voltage difference between that shown on the scope and +77V, so the neon starts with a lower lit voltage which then increases a little. Probably not meaningful.

John KK6IL

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<https://groups.io/g/HP-Agilent-Keysight-equipment/topic/93914925?p=%2C%2C%2C0%2C0%2C0%3A%3A%2C%2C%2C0%2C0%2C0%2C93914925>

<https://groups.io/g/HP-Agilent-Keysight-equipment/topic/93907789?p=%2C%2C%2C0%2C0%2C0%3A%3A%2C%2C%2C0%2C0%2C0%2C93907789>

