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Author Topic: Metcal RF soldering base unit playing up (Read 821 times)

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Chris Wilson
Frequent Contributor
Posts: 993
Country:
Race car engineer, dog lover, hoarder.

Metcal RF soldering base unit playing up
« **on:** September 16, 2018, 06:33:47 pm » Say Thanks Reply Quote

After singing this RF soldering station's praises here and elsewhere it has decided after many years good service to play up. Whilst tips et hot, probably to full temp, they do not retain heat when touched to joints. I have tried several tips, one brand new and my RF tweezers on their own RF co-ax seem to do the same. I suspect whatever part of the circuitry is supposed to maintain heat when a junction is taking it from the tip is not working properly, but that's merely a guess. It's an earlier version than some I have seen mentioned in here, a
STSS-P2V-O2 but I would imagine the schematic of the later ones will be similar unless anyone has the correct diagram / service manual

http://www.chriswilson.tv/MX-500P-11.pdf

Any ideas where to look and has anyone had this issue themselves and fixed it? Thanks
« *Last Edit: September 16, 2018, 10:14:23 pm by Chris Wilson* » Report to moderator Logged

Best regards,

Chris Wilson.

JFJ
Regular Contributor
Posts: 204
Country:

Re: Metcal RF soldering base unit playing up
« **Reply #1 on:** September 16, 2018, 09:49:51 pm » Say Thanks Reply Quote

Quote from: Chris Wilson on September 16, 2018, 06:33:47 pm

> ... I suspect whatever part of the circuitry is supposed to maintain heat when a junction is taking it from the tip is not working properly, but that's merely a guess...

The tip regulates its own temperature:

A Metcal System is comprised of a power supply with handle/cord assembly and a tip cartridge. Each cartridge is equipped with a self-regulating heater, which senses its own temperature and tightly maintains its pre-set idle temperature for the life of the cartridge. The heater temperature is set by the atomic structure of the heater material. It cannot be adjusted, and does not require any adjustment.

The power supply with handle/cord assembly does not contain the heater or any tip temperature sensors, but simply provides the current to the heater. Any expected variability or drift in the power supply over its life does not adversely affect its ability to maintain the necessary current to the heater. There are no adjustments to be made.

(Taken from an old copy of the MX-500 User Guide).

The tip's power uptake can be reduced when it's in the vicinity of a strong magnetic field (magnets are used in Metcal's "TipSaver" workstands to reduce the tip's absorption of RF energy). If a magnetic field is not the cause of the problem, then failing/aging power supply components may have significantly reduced the RF output.

Are you able to measure the output frequency and amplitude of your power unit - during the tip's initial heat-up? If so, then perhaps someone here will be willing provide comparative readings from a fully functioning unit.

A Metcal System is comprised of a power supply with handle/cord assembly and a tip cartridge. Each cartridge is equipped with a self-regulating heater, which senses its own temperature and tightly maintains its pre-set idle temperature for the life of the cartridge. The heater temperature is set by the atomic structure of the heater material. It cannot be adjusted, and does not require any adjustment.

The power supply with handle/cord assembly does not contain the heater or any tip temperature sensors, but simply provides the current to the heater. Any expected variability or drift in the power supply over its life does not adversely affect its ability to maintain the necessary current to the heater. There are no adjustments to be made.

SmartHeatControl.jpg (45.27 kB, 622x205 - viewed 770 times.)

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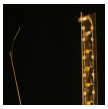
The following users thanked this post: Chris Wilson

mikeselectricstuff
Super Contributor



Posts: 11971
Country:

Re: Metcal RF soldering base unit playing up
Say Thanks Reply Quote
« **Reply #2 on:** September 16, 2018, 10:04:14 pm »

From memory I think it regulates RF power by adjusting the DC supply to the RF PA, so looking at this supply would be the first step. I think it goes up to about 48V.

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Youtube channel:Taking wierd stuff apart. Very apart.
Mike's Electric Stuff: High voltage, vintage electronics etc.
Day Job: Mostly LEDs

mmagin
Frequent Contributor

Posts: 613
Country:

Re: Metcal RF soldering base unit playing up
Say Thanks Reply Quote
« **Reply #3 on:** September 16, 2018, 10:25:54 pm »

After falling in love with Metcal stuff (though I use Thermaltronics tips now), I've bought a couple used STSS-001 models and preemptively replaced the electrolytic capacitors, but aside from the dead incandescent pilot lights, they've been no trouble. Assuming you've tried different tips, it does sound like it's having trouble with the DC power supply.

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Chris Wilson
Frequent Contributor

Posts: 993
Country:

Re: Metcal RF soldering base unit playing up
Say Thanks Reply Quote
« **Reply #4 on:** September 17, 2018, 10:38:02 am »

Quote from: mikeselectricstuff on September 16, 2018, 10:04:14 pm

Race car engineer, dog lover, hoarder.

> From memory I think it regulates RF power by adjusting the DC supply to the RF PA, so looking at this supply would be the first step. I think it goes up to about 48V.

Thanks Mike, I am but a raw beginner but I thought the circuit had the means to control voltage to the output FET, yet all the Googling i have done seems to suggest it operates on full power all the time and the Curie effect of the tips controls the operating temperature. I will find my thermocouples later but I get the impression the tips initially heat up to full operating temps, but if touched to a hefty solder joint just conduct the heat stored away and for whatever reason the power to them is insufficient to bring them back up. Certainly failure to regulate the voltage on the output FET high enough would cause this! Thanks again for your input.

Report to moderator Logged

Best regards,

Chris Wilson.

Chris Wilson

Frequent Contributor

Posts: 993
Country:

Race car engineer, dog lover, hoarder.

Re: Metcal RF soldering base unit playing up

Say Thanks Reply Quote

« **Reply #5 on:** September 17, 2018, 10:40:31 am »

> **Quote from: JFJ on September 16, 2018, 09:49:51 pm**
>
> > **Quote from: Chris Wilson on September 16, 2018, 06:33:47 pm**
> >
> > ... I suspect whatever part of the circuitry is supposed to maintain heat when a junction is taking it from the tip is not working properly, but that's merely a guess...
>
> The tip regulates its own temperature:
>
> The tip's power uptake can be reduced when it's in the vicinity of a strong magnetic field (magnets are used in Metcal's "TipSaver" workstands to reduce the tip's absorption of RF energy). If a magnetic field is not the cause of the problem, then failing/aging power supply components may have significantly reduced the RF output.
>
> Are you able to measure the output frequency and amplitude of your power unit - during the tip's initial heat-up? If so, then perhaps someone here will be willing provide comparative readings from a fully functioning unit.

Hi, thanks for the reply, this is what I have always thought to be the case, yet Mike and the schematic seem to suggest that there is a circuit controlling voltage to the output FET which WOULD control the power produced... Hmmm

Report to moderator Logged

Best regards,

Chris Wilson.

Chris Wilson

Frequent Contributor

Posts: 993
Country:

Race car engineer, dog lover, hoarder.

Re: Metcal RF soldering base unit playing up

Say Thanks Reply Quote

« **Reply #6 on:** September 17, 2018, 10:42:37 am »

> **Quote from: mmagin on September 16, 2018, 10:25:54 pm**
>
> After falling in love with Metcal stuff (though I use Thermaltronics tips now), I've bought a couple used STSS-001 models and preemptively replaced the electrolytic capacitors, but aside from the dead incandescent pilot lights, they've been no trouble. Assuming you've tried different tips, it does sound like it's having trouble with the DC power supply.

Thanks for the reply! Ahh! Someone that has had a similar modelt to mine apart Can you recall please if it would be possible to power the thing up out of its case? The thing that comes to mind first is heat sinking any semiconductors that rely on the case itself for that function. Cheers.

Report to moderator Logged

Best regards,

Chris Wilson.

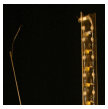
mikeselectricstuff

Super Contributor

Re: Metcal RF soldering base unit playing up

Say Thanks Reply Quote

« **Reply #7 on:** September 17, 2018, 12:19:25 pm »



Posts: 11971
Country:

If you look at that schematic you'll see there is feedback from an RF detector to the LM2576 regulator, so it's regulating for constant RF power, and as the tip absorbs more, it needs to increase the drive to maintain the same output.

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Youtube channel:Taking wierd stuff apart. Very apart.
Mike's Electric Stuff: High voltage, vintage electronics etc.
Day Job: Mostly LEDs

JFJ
Regular Contributor
Posts: 204
Country:

Re: Metcal RF soldering base unit playing up
Say Thanks Reply Quote
« **Reply #8 on:** September 17, 2018, 01:11:49 pm »

Quote from: Chris Wilson on September 17, 2018, 10:40:31 am

> ... Mike and the schematic seem to suggest that there is a circuit controlling voltage to the output FET which WOULD control the power produced...

Metcal's 1986 US patent describes the voltages that are applied to the FET's drain, as follows: 16V is applied when the system is not loaded (the controller is not used), and a variable voltage of 16 to 32V (set by the controller) is applied when the system is loaded.

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macboy
Super Contributor
Posts: 1952
Country:

Re: Metcal RF soldering base unit playing up
Say Thanks Reply Quote
« **Reply #9 on:** September 17, 2018, 01:35:23 pm »

The heater power is "controlled" by the tip. The base station provides high power RF to the tip (at 13.56 MHz). This is absorbed by the tip, until it goes above the Curie temperature when its physical magnetic properties change, and it reflects most of the power back to the base.

I can see several possible causes of this issue:
- **Faulty passives in the handpiece (see below)**.
- Bad connection at the RF F-connector.
- Break or near-break of the conductor within the cable.
- Faulty power supply not able to maintain the >40 W RF power output.

Note that the handpiece is more than just a coax cable with a handle at the end, there is an inductor and capacitor near the tip connector. See this thread and especially this thread .

If possible, borrow another handpiece and/or power supply to test with. This will help narrow down the issue to the power brick or the handpiece.

Report to moderator Logged

The following users thanked this post: mmagin

Chris Wilson
Frequent Contributor
Posts: 993
Country:
Race car engineer, dog lover, hoarder.

Re: Metcal RF soldering base unit playing up
Say Thanks Reply Quote
« **Reply #10 on:** September 17, 2018, 03:13:23 pm »

Getting somewhere now, there's definitely one faulty tip, but the new one and the tweezers fire up to temp and maintain it if I wiggle the F type connector at the main unit about. I suspect something is up with the socket, so I will get inside and have a look see Many thanks for the help! It's great unit and i would miss it as it allows me to do heavy work and SMC quite easily.

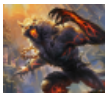
Report to moderator Logged

Best regards,

Chris Wilson.

The following users thanked this post: mmagin

GreyWoolfe
Super Contributor



Re: Metcal RF soldering base unit playing up
Say Thanks Reply Quote
« **Reply #11 on:** September 18, 2018, 01:28:42 pm »

Hopefully, it's nothing more than reflowing solder joints.

Report to moderator Logged

Posts: 3211
Country:
NW0LF

That which doesn't kill you still requires a co-pay.

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