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This applies to all similar type models 2445 , 2445A , 2445B , 2465 , 2465A , 2465B , 2467 , 2467A , 2467B and others which share common circuit boards.

The 2465 series is regarded as one of the most-reliable Analog oscilloscopes ever made, and proper maintenance can be expected to last for at least another 30 years. Unfortunately ignorance (and sometimes greed) is consigning these fine instruments to the trash-heap well before their time.

Symptoms: This is my lab unit, which suddenly started blowing its main AC fuse.

My first action was to contact Tektronix in Israel, who informed me that this unit is no longer supported since 2003, and gave me the name of an ex-Tektronix technician in Tel Aviv, now working at Exx Telecom. I called him, and he told me that a new PSU board would cost $2500 (ha, ha) , and he could not repair the existing PSU circuit board "as no parts were available". I chose not to embarrass him by telling him that he was either an insult to the guild of professional technicians, or spaced out on coke, and hung up.

I decided that even though I had never opened any type of oscilloscope before, my extensive experience in electronics repair just had to put me in a positive position to be able to tackle this project successfully.

I downloaded the Service Manual from the Yahoo TekScopes forum and opened up the scope. Most of the postings on the TekScopes forum pointed to bad capacitors, but on mine, other problems were also evident. Here, I'd like to thank 2 real Tektronix technicians in the USA from the Yahoo group who helped me successfully through some really difficult diagnoses – Dave Baxter and Dan Shores.

Here is the A2 PCB before restoration, with the AC High-voltage section on the left.

The 2465B is actually quite a pleasure to work on, with the circuits being well laid-out, and relatively easy to access.

I started with the Power -Supply subsection, basically a normal switching power-supply. It is made up of 2 circuit boards mounted together back-to-back.

I disconnected the High-voltage section from the Low-voltage section. There are 2 test points in the high-voltage section, and both should read the same. Mine read 160V, and 195V respectively.

So, I went right back to basics, and started checking individual components.
On the left, are 4 components circled in red. These were the faulty components.

1. R1010 and R1019 – 15 ohm resistors, which were relaced by Ohmite blue ceramic 5W units.
2. C1016 and C1018 – 68nF type X2, which were replaced by Vishay MKP339 AC type X2 units.
3. In addition, I replaced C1021 and C1022 - the large Sprague 290uF power capacitors with Panasonic TSHA 330uF 250V units.

After these changes, the high-voltage section was stable with equal voltage at the 2 test points.

Even though the ESR's of the electrolytic capacitors (in the low-voltage section) were within limits, I elected to change all of them as well, using Panasonic EB and Nichicon PW units. This was because of all the postings in the Tek forum relating to the certainty of capacitor degradation in the PSU.

Here is the A2 PCB after restoration, with all the new components clearly visible

I now reassembled the PSU, and reinstalled it in the 'scope. I switched on AC power, and the AC fuse did not blow. But the front panel lights started pulsing on and off, and the scope never got any further in starting up.

Here is the A3 PCB before restoration.

I shut down, and disassembled the PSU. Again I started with basics, concentrating in the Low-voltage section of the A3 PCB.

Troubleshooting led me first to 4 Schottky rectifiers CR1113-16, circled in red to the left of the transformer. 2 of them were defective, and I replaced all 4 with new 1N5822 units.

Tantalum capacitors are one of my favorite causes of problems, and sure-enough C1034 (to the left of the blue Sprague capacitors) had high ESR. I replaced it with a Panasonic EB 4.7uF unit.

I checked all the semiconductors – all checked OK, except for CR1110, a dual common-cathode Schottky rectifier (circled in red above the transformer). This Tek part is NLA, and I had to have a good look at the circuit to determine an acceptable substitute. This is a 1/2 bridge switching circuit, with output for 5V, with 2 fuse protections of 5A. I selected a Vishay MBR40H45CT-E3/45.

For good measure, I checked the 4 film capacitors, having had experience on the A2 PCB already. They were all more than 10% off-spec.
I replaced them as follows:
1. C1020 and C1051 with Vishay 2200pF MKP3386 AC type Y2 units,
2. C1052 with a Vishay 10nF MKP3366 AC type Y2 unit,
3. C1065 with a Vishay 56nF MKT372 DC unit.

At this point, before reassembling the PSU, I posted my progress on the TekScopes forum, and the 2 gentlemen mentioned above, responded instructing me what to look for, as to further diagnosis.

C1101 (to the left of the transformer) must be exactly 100uF, as it is a coupling capacitor responsible for providing exactly -8V. It cannot be substituted with any other value. Needless to say it was nowhere near 100uF. I now replaced all the electrolytic capacitors on the A3 PCB with Panasonic EB and Nichicon PW units. All the 180uF and 250uF capacitors can be easily replaced with 330uF 50V units.

R1020 at the bottom right-hand corner operates under high stress. I replaced it with a Vishay 270Kohm PR03 3W unit.

Here is the A3 PCB after restoration.

I now reassembled the PSU, and reinstalled it. At power switch-on, my trusty 'scope started normally. Hallelujah!

And the "tech" wanted $2500 for a new PSU – haha! But this was not all…..

After having spent many hours browsing through the TekScopes forum, I came across other areas of concern regarding these ageing 'scopes.

1. On the A5 Control PCB, there are 4 SMD electrolytic capacitors known to leak and destroy the copper traces.

I removed the old units - no damage had been caused (yet), and installed the 4 replacements from Panasonic's FK SMD series:
C2010 and C2070 – 33uF 10V
C2011 and C2113 – 10uF 35V

2. U800 Hybrid Horizontal Amplifier failure. I installed an aluminum heat sink on the original Tek (not Maxim) chip.

3. I replaced all the original 85°C Nichicon electrolytics on the A1 Main PCB with Panasonic EB units. This provided me with an immediate and markedly visible improvement of the clarity and sharpness of the signal trace on the CRT display. Not a quick and easy job, but very well worth it.

Here is the A1 Main PCB after restoration. The new heat-sink is evident to the right of the kink in the black plastic stem for the On-Off switch. All the new electrolytic capacitors are also clearly visible.

So that was my project – a top-quality restoration, with no attempt to cut corners, or save time or money on cheap components – My trusty 2465B should be good for many more decades at work in my lab.

Parts for this restoration

Parts and advice are available for owners who wish to tackle this project by themselves.

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