



# Memorandum

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**To:** Geoff Ediss  
**From:** John Effland  
**Date:** 2003-11-19  
**Subject:** Optimum Mixer Heater Resistance Value

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Mixer heaters allow raising the physical temperature of the mixer junction above its critical temperature to remove trapped flux that can cause anomalous mixer performance. The mixer heaters are comprised of Mini-Systems MSR thick-film resistors on alumina substrates with case size 2412 rated at 2W dissipation. The mixer heater is epoxied to its mount, which is also used for mounting the cartridge temperature sensors. These heater mounts are then screwed onto the mixer body.

The monitor and control system will provide 24V at a maximum current of 200 mA to this resistor. Figure 1 was used to determine the optimum resistance. The curve marked "Power when  $V = 24\text{ V}$ " shows the power dissipated as a function of heater resistance when the resistor voltage is a constant 24V. The resistor's power dissipation was limited to the 2W rated value of the resistor, even though it should be able to withstand more power because its mounting acts like a heat sink. The large diamond in the figure entitled "Resistance required (290 ohms) for 2 watts" shows the resistance for the 2W limit on that curve. Current requirements are shown on the upper curve entitled "Current when  $V = 24\text{ V}$ " and the ordinate for that curve is the right axis. The triangle on that curve, entitled "Current required (83 mA) for 2 watts," shows that for 2W dissipation, 290 ohms requires a current of 83 mA, which is well within the maximum 200 mA available from the monitor and control system.

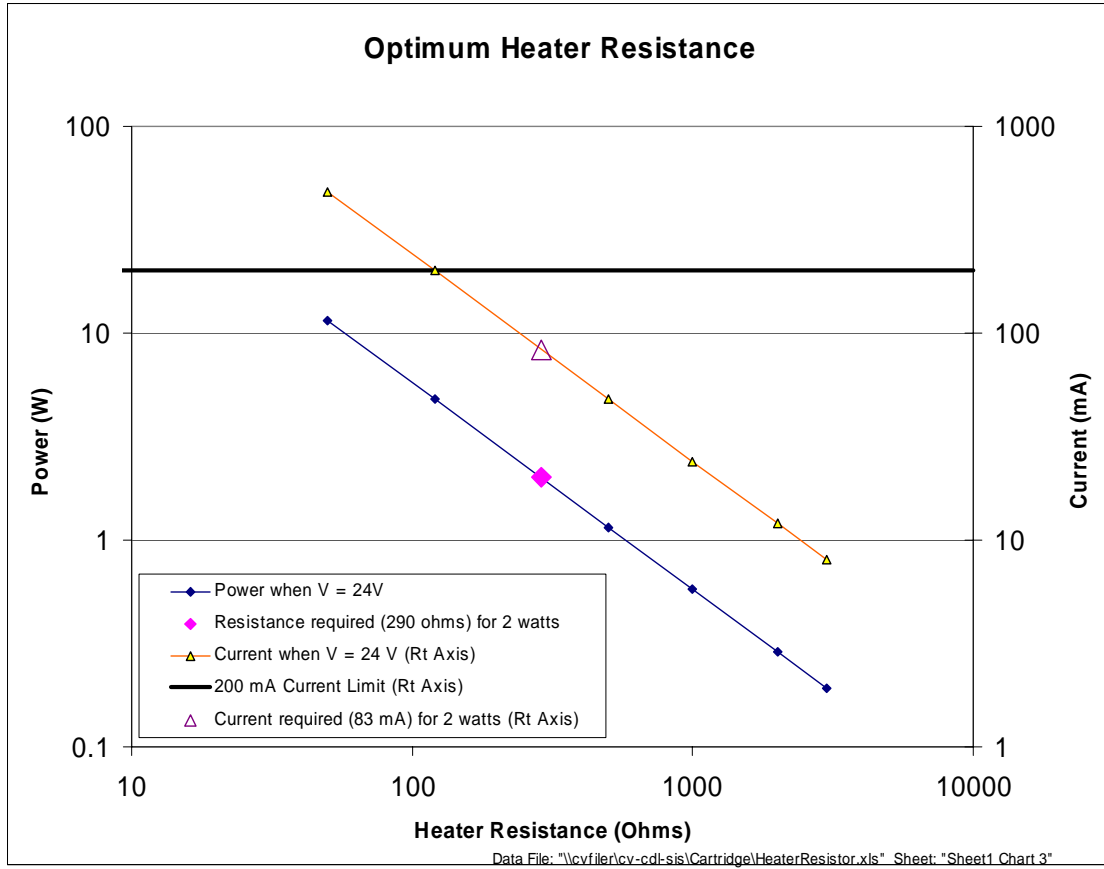


Figure 1: Curves used to determine optimum heater resistance