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Installation Instructions
BioFocus Gradient Firmware

A. General

The BioFocus 2000/3000 Main PCB Z180 firmware revision K provides extra commands for gradient voltage and temperature operation, as well as a command to allow the pressure to be turned on during a run.

All commands and features of the previous revision have been retained.

Just as with the previous versions G, H, and J, version K Main Processor firmware only operates with the Motor Controller (68HC11) firmware of revision F or later.

The hardware on the **Motor Controller** PCB must be changed to provide a wider temperature range, and correct operation with the revision K firmware.

B. Procedure

1. It is useful for testing if the machine has been powered off for a while to equilibrate it to room temperature, and the room temperature is known.

2. Remove the **Motor Controller** PCB, being careful to observe the cable positions and orientations.

Notes: The steps 2 to 4 may be done with the Main PCB still installed, or if more convenient, with the Main PCB removed. If the Main PCB is left installed, be careful when installing the EPROM to get the orientation and position right, and be careful not to bend a pin under when doing the EPROM installation. The EPROMs are static sensitive, so use appropriate static precautions such as discharging body voltage to the machine or board ground before handling them.

3. Remove the U18 position EPROM on the Main PCB.

4. **On older version Main PCB's only** if there is an EPROM in position U17, remove it, and change the jumper SP2 to the connected position. (New version boards do not have a position U17.)

5. Install the new EPROM in position U18, observing correct orientation.

Caution: Some EPROMs have been labelled incorrectly. Do not rely on matching label orientations. The notch should be to the left facing the component side of the board when the board is right side up, the same as for all the other IC's. If powered up with reverse orientation, the EPROM will be destroyed.

6. If you removed the Main PCB, reinstall it.

7. Make the resistor changes shown on the next page to the Motor Controller PCB (Not the Main PCB!).

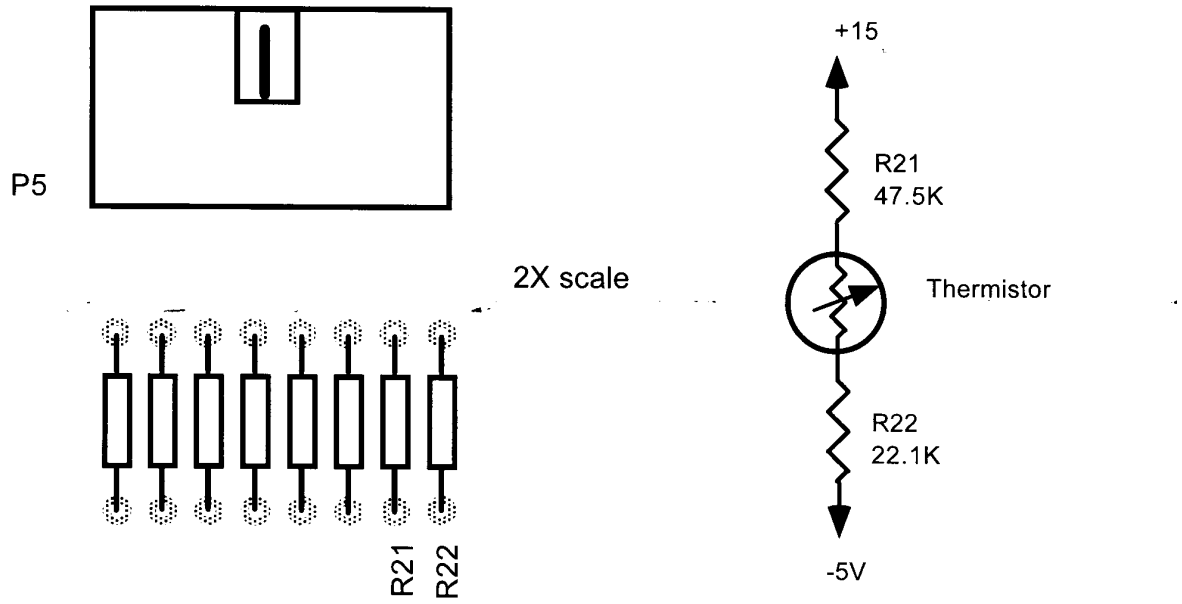
8. Reinstall the Motor Controller PCB.

9. Power up the BioFocus and run the operating software. Go to the temperature screen, and observe before setting sample temperature that the temperature is near room temperature. Put in a test cartridge, and program the cartridge temperature to 15 degrees. The temperature should go down within 1 minute to 18 degrees, and come to temperature within a few minutes, and not oscillate. Set the cartridge temperature to 60 degrees, and see that the temperature is reached within 5 minutes. Oscillation or failure to reach high temperature is an indication that the resistors have been installed incorrectly, provided there is adequate pump flow.

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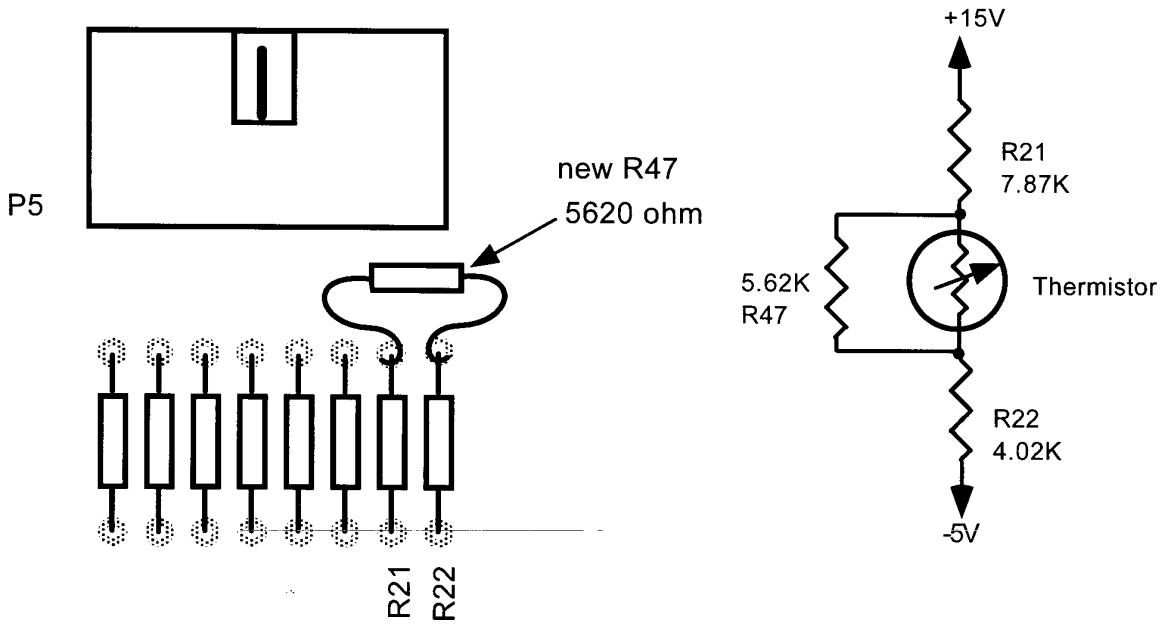
Instructions for modifying the Motor Controller PCB for Gradient Firmware

See the figure below representing the center of 800-5564, Motor Controller PCB:



Note that P5 may be either a closed or an open header. The closed type is shown above.

1. Using desoldering equipment, remove R21 and R22, 47.5K and 22.1K, resp.
2. Install a 7870 ohm resistor in the R21 position (do not solder yet).
3. Install a 4020 ohm resistor in the R22 position (do not solder yet).
4. Wrap the leads of a 5620 ohm resistor around the upper leads of R21 and R22 as shown below. Trim leads closely to avoid shorting. Solder all connections.



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