

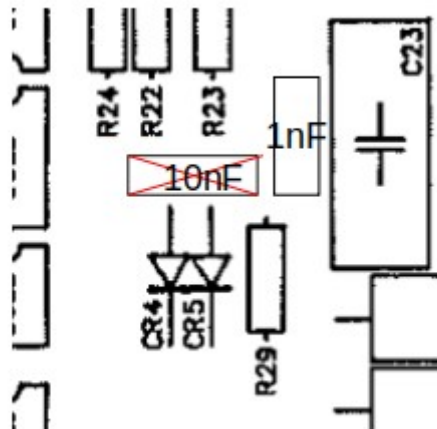
Prema 6048 mods

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This is a preliminary writeup about the mods i applied to our Prema 6048. Applying mods carries a certain risk of damaging the instrument. The instrument has difficult to replace microcircuits. CMOS circuits require proper ESD handling. Don't drop solder where it doesn't belong. Clean solder points using alcohol and Q-Tips. Film caps are preferred over ceramic/MLCC caps. I cannot take responsibility if something goes wrong.

Measures on integrator board: The hilited ones may be relevant for the nonlinearity issue.

1. Recap electrolytics, i used 22uF 35V polymer caps, need about 40 for whole instrument.
2. Add diode 1N4002 in voltage doubler
3. Solder heatsinks to seven voltage regulators. These are about 3 x 4 cm cut from thin copper sheet.
4. Remove 10 nF capacitor. It is between U9 pins 2 and 6 and missing in the schematics.
5. Replace it by 680 pF capacitor between BK7 pins 11 and 13
6. Add 1 nF capacitor. Similar to C17 100nF in temperature ADC on processor board.



7. Replace U9 OP77 by OPA140 or similar

8. Add pull-up resistor 12K from output of U9 to +12 V, between pins 6 and 7 of U9

9. Insert filter 120R and 10 nF between PWM reference and integrator. The filter was originally meant for measuring the PWM reference output with another meter, but it also helps for the integrator. In the image there is another resistor 1K5 and a 3.3nF cap. Nonlinearity compensation attempt, to be removed.

10. Replace R29 68R resistor by 1K resistor.

11. Ground the can of precision resistor R31 5K

12. Insert 10uF in series with 56R in the location of the missing C49 (buffer/damping for LTZ1000 reference output) These should become 0805 SMD parts, with a MLCC cap.

13. Add 100nF parallel to CR14 (improve feedback of U20)

14. Replace U10 by OPA140 or another opamp without protection diodes between two inputs.

15. Add 100nF parallel to R35 10K. In the image there is a styroflex cap 220pF from the negative input of U10 to Gnd. To be removed.

16. Replace 1M resistors R63 and R64 by a switched pull-down. Two diodes 1N4148 and a 10K resistor from the PWM signal on pin 1 of U16 DG308

17. Exchange pins 14 and 15 of U16 DG308 in order to reduce capacitive coupling from PWM control signal on pin 16 to input of integrator.

18. There are more mods in the 3.6864 MHz PLL section, likely not relevant.

Images with red labels indicating the locations of mods:

