

nonlinearcircuits

Mobius PiLL build & BOM

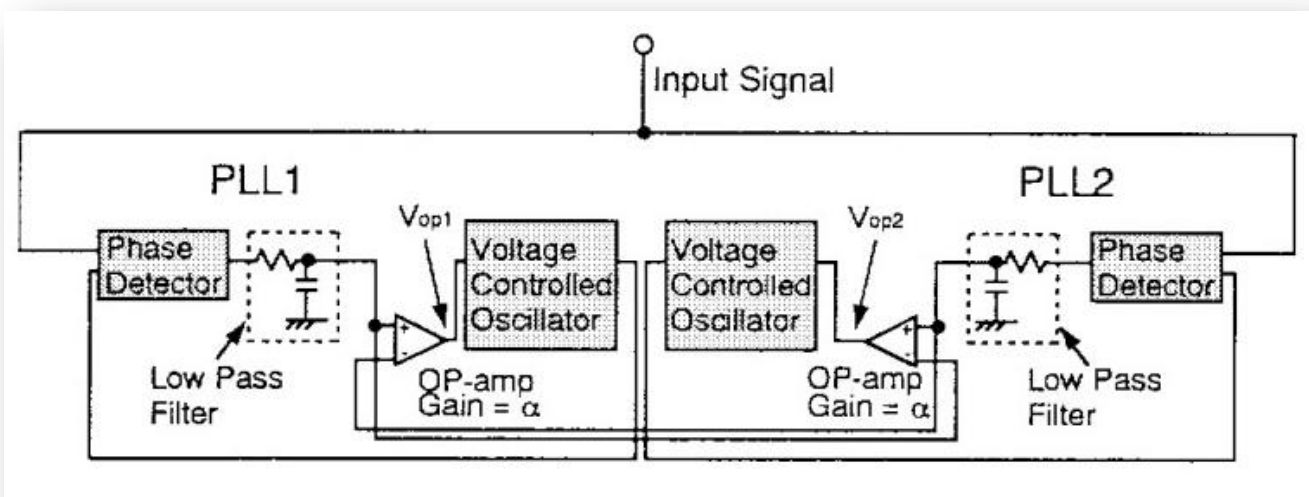
This is a chaotic noise module, it is generally not very nice unless you are into noise. In which case, hello!! Actually thanks to the vactrol based filters, it has a lot of character.

There are several papers describing ways to couple PLL (phase locked loop) ICs to create chaos. I have been sitting on a stack of them for years but found the actual circuits quite limited in a synth.

Eventually it clicked that the low-pass filter needed to be a bit fancier than a pot and a capacitor which nearly all PLL circuits get, so this version gets two Buchla style low pass gate/filters.

The circuit contains two PLL chips and two low pass filters. The PLLs are voltage controlled together, the filters are controlled individually.

Normally in a PLL circuit, the output of the phase detector goes thru a low pass stage and then the output of this is used to control the VCO. In this version, the low pass filter outputs are fed to the non-inverting input of an op amp for its own VCO and the inverting input of an op amp for the other VCO. Maybe the pic describes it best; this is from Intermittent Chaos in a Mutually Coupled PLL's System (Shirahama et al), tho I have seen similar circuits in other papers. Use



Use:

The module is self-running, feel free to tweak the pots and add CV until you get some nice sounds. Adding an input signal will force the module to try and track the incoming signal try. The VCO1 and 2 outs are pulses from the PLL VCOs, these are good for sending to filters or other processing. The LPG outs are from the filters and already have quite a lot of character.

BOM – The Tayda & Mouser part numbers are given as examples

VALUE	QUANTITY	DETAILS
220pF	2	0805 Tayda: A-3504
1nF	2	0805 Tayda: A-3524
4n7 = 4.7nF	2	0805 Tayda: A-3527
100nF or 104	7	0805 Tayda: A-3511
1uF	2	0805 25V or higher voltage rating Mouser Part No: 80-C0805C105K3R
10uF	2	0805 25V or higher voltage rating Mouser Part No: 963-TMK212BBJ106MG-T
470R	3	0805
1k	4	0805
10k	6	0805
15k	2	0805
39k	3	0805
47k	2	0805
100k	19	0805
150k	3	0805
1M	2	0805
4046	2	Soic Mouser Part No:595-CD4046BNSRE4 or similar
LDR	6	See notes
TL072 or TL082	6	Soic Tayda: A-1139
3mm LED	3	See notes
3.9V Zener diodes	3	SOD-80 Mouser Part No: 78-BZT55C3V9 or similar
Eurorack 10 pin power connector	1	Tayda: A-198 cut to size
Schottky, power rectifier or 10R, optional - for reverse voltage protection...or not	2	SMD SEE NOTES #1. dot on PCB indicates CATHODE (stripe on component). My current fave is BAT54GWX, Mouser: 841-BAT54GWX
3.5MM SOCKET Kobiconn style	8	Tayda: A-865 or Thonkiconn Jacks (PJ301M-12) from Thonk, Synthcube or Modular Addict
10 Pin 2.54mm Single Row Pin Header Strip	7	Tayda: A-197 (cut to size)
10 Pin 2.54mm Single Row Female Pin Header	7	Tayda: A-1306
100k pot	6	Tayda: A-1848

Additional notes:

1. , Schottky (best option) or standard power rectifier diode 50-600V 1A or more, or use a resettable fuse or just a 10R. Examples: BAT54GWX, PMEG2005EGWX, AEC-Q101, 20V, SOD-123, PMEG2005EH DIODE, SCHOTTKY, 0.5A, 20V, 1N400x or S1JL or similar.

2. The chips, resistors, caps are cheapest from Tayda. Schottky diodes, CMOS & 1uF, 10uF 25V 0805 caps from Mouser/E14/Farnell/etc.

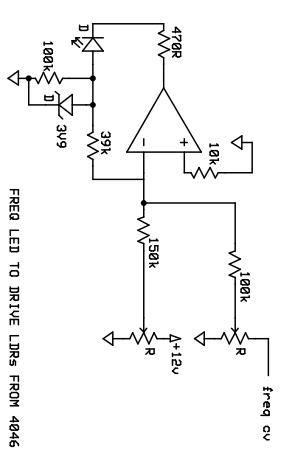
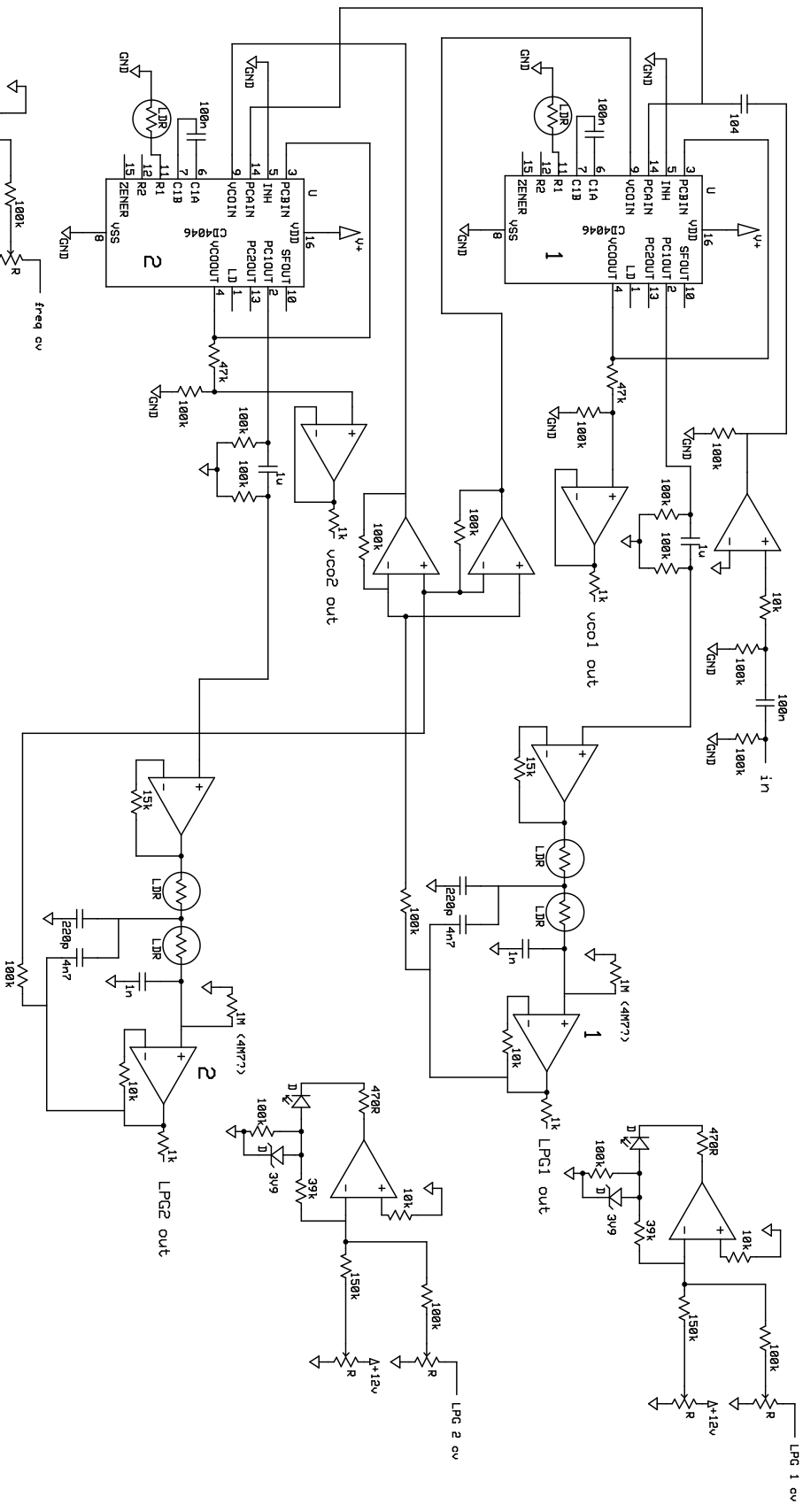
3. Join the Nonlinearcircuits Builders Guild on FB: <https://www.facebook.com/groups/174583056349286/> and ask questions there if you have any. If you prefer not to FB then email is fine.

4. Use 3mm LEDs, avoid blue or white. Best are red or green

5. LDRs (light dependent resistors) – different types will give different results. I used GL5516, get 100 pieces for \$4 with shipping off ebay. Feel free to try whatever types you like ☺ One builder reported that for the NLC black box LPGs it is best to install the LDRs flat, do not bend them towards the LEDs. This way you get a better range over the control pots. See pics following as an example.

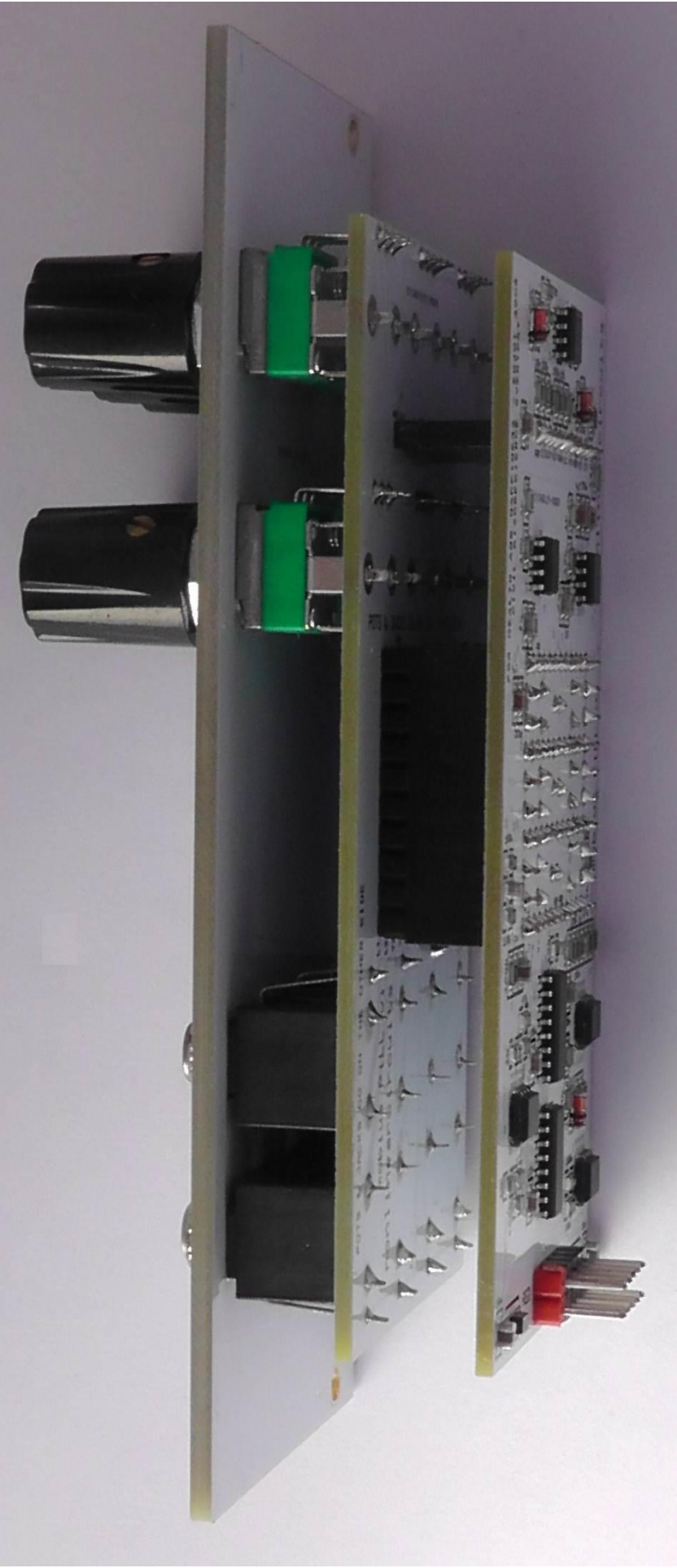
6. Mods – the 100nF between pins 6 & 7 of the 4046 PLLs set the core VCO frequency, feel free to try other values – 10nF to pep it up some, 1uF to slow it right down (may not work so well, will depend on your LDRs as well)

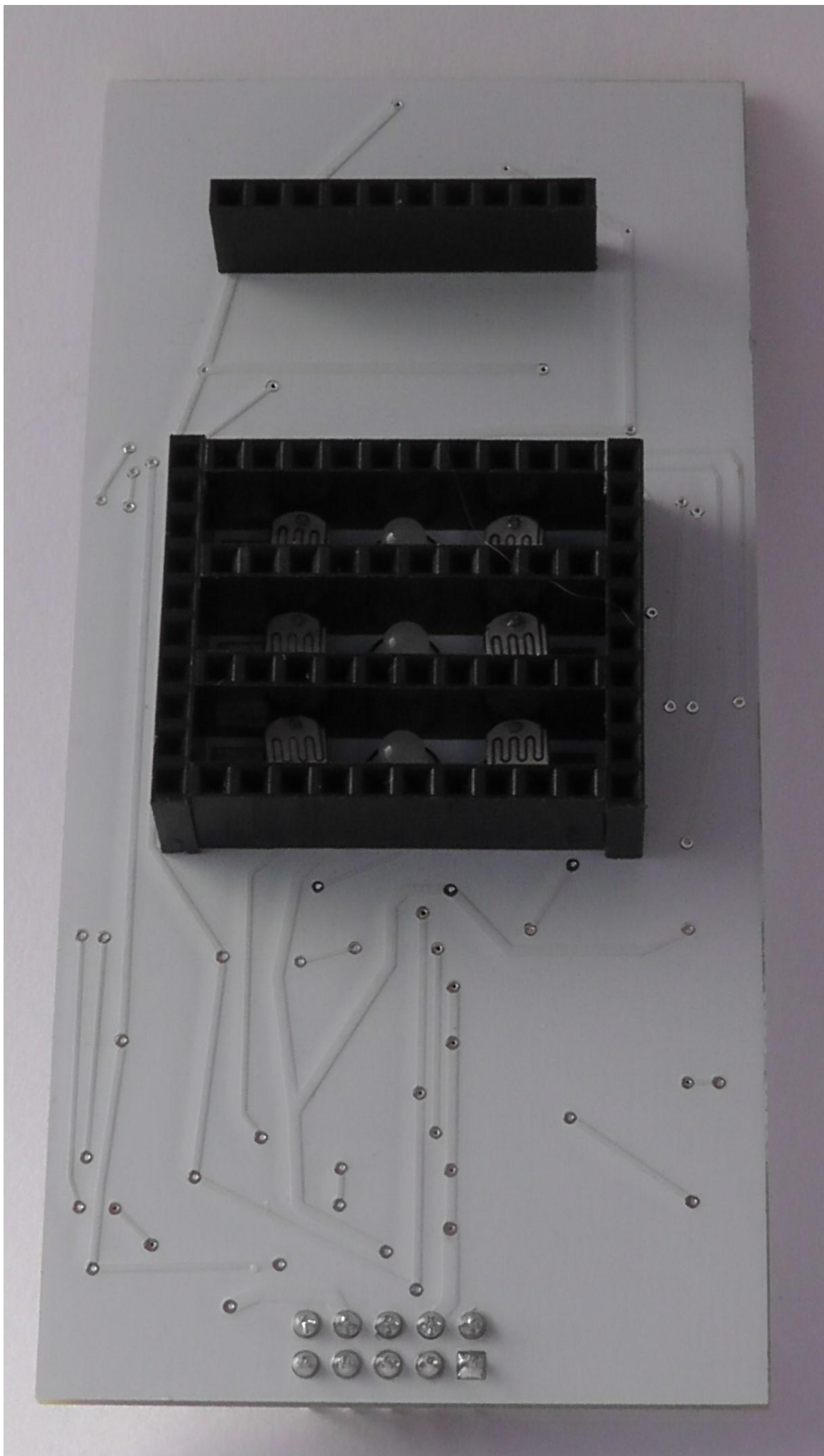




FREQ LED TO DRIVE LDRs FROM 4046 PIN 11s

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Rev 2	Page # or name
andrewf	22/4/2019





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100V 100V 100V

POTS & JACKS GO ON THE OTHER SIDE

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mobius Pill v1
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L1 L2 V2 V1 GND GND

2011