NOMNOM2020

FX TYPE: Phaser
Based on the MXR® Phase 90™
Enclosure Size: 1590B, 1590B2, 125B
"Softie" compatibility: Softie1&2
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Overview

The NomNom is based on the script era Phase 90 with added feedback option.

New for 2020: Updated the layout to current 2020 style and fits in multiple enclosures.

Controls

- **SPD:** LFO rate from slow to fast.
- **COLOR:** This switch enables feedback through part of the phase stages (most noticeable when the SPD control is 50% or higher).
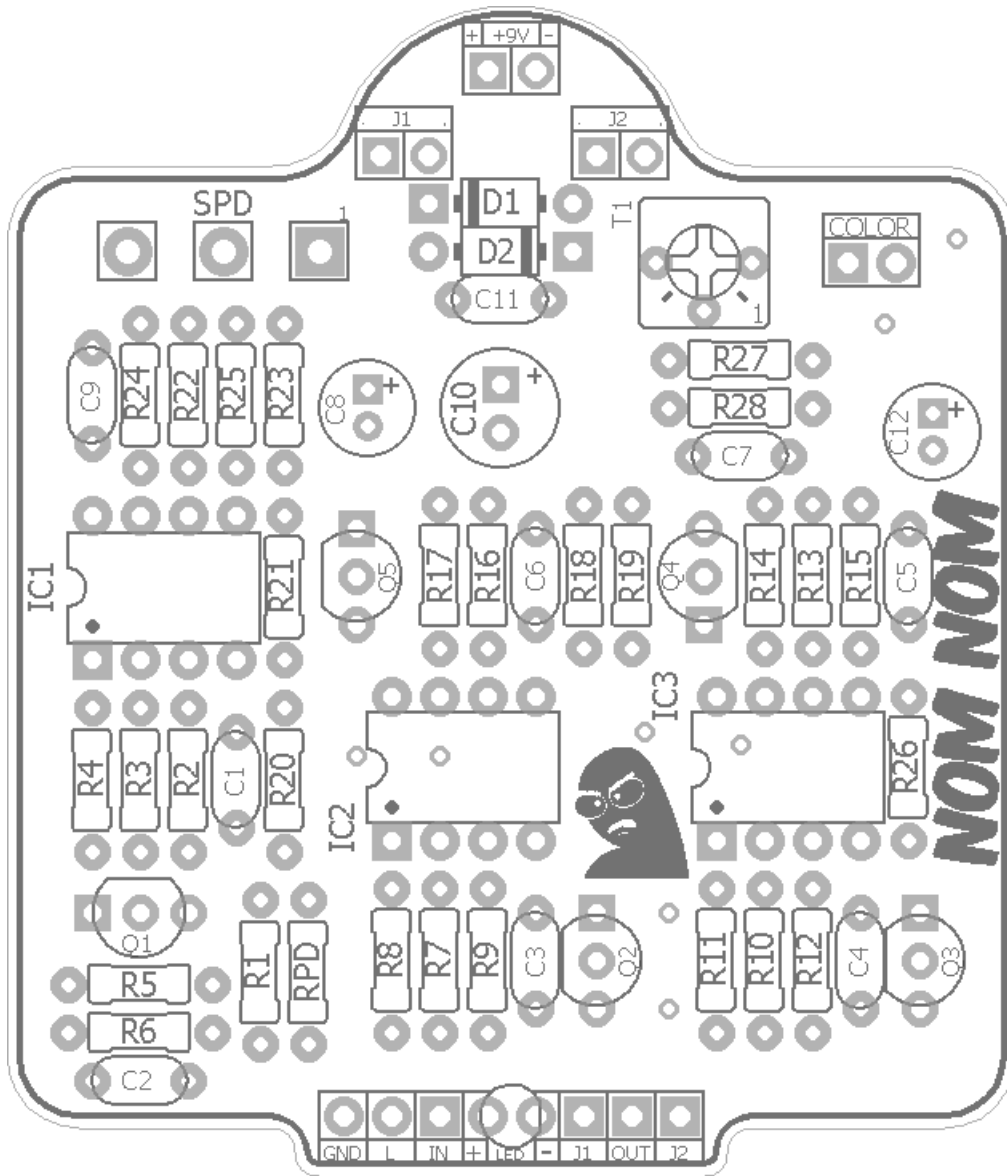- **T1:** This trimmer is used to calibrate the phase sweep.
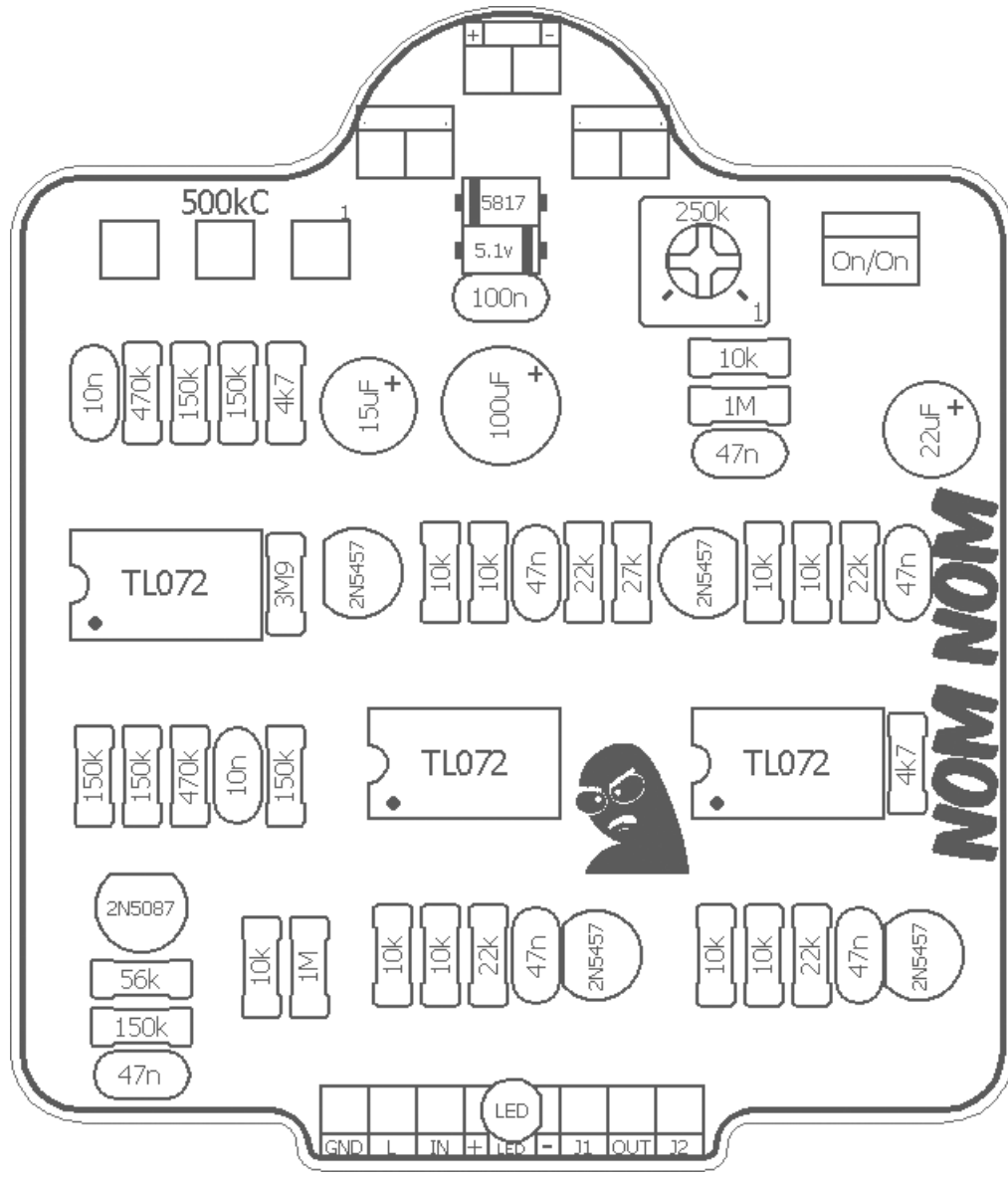
Phase 90 analysis by Electro-Smash: https://www.electrosmash.com/mxr-phase90
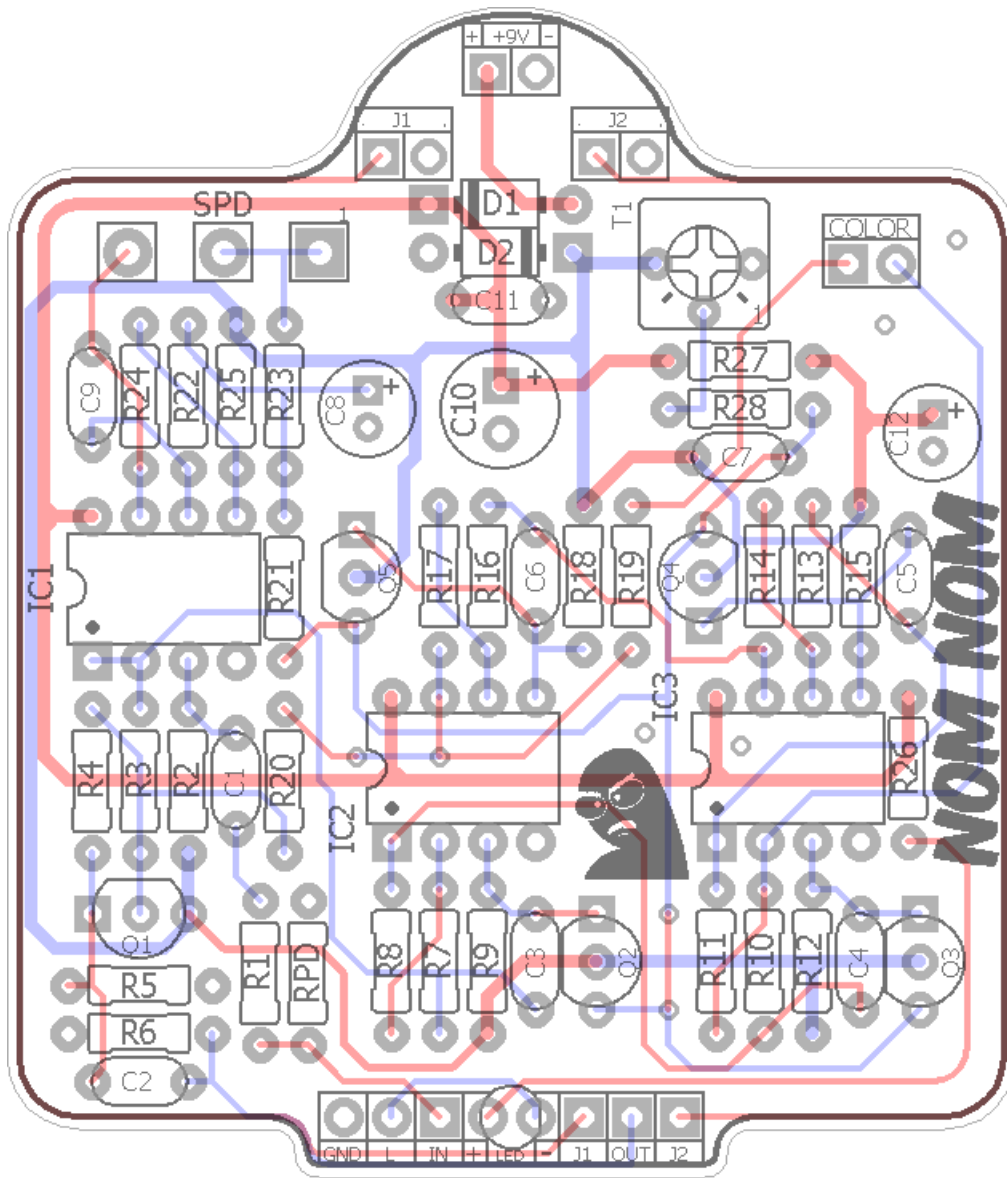GEOFEX Technology of Phase Shifters: http://www.geofex.com/Article_Folders/phasers/phase.html

This effect works best with matched JFET transistors. Please see the Notes section before committing to this project.

500kC

5817
5.1v
100n

250k
1

On/On

10n 470k 150k 150k 4k7

15uF +

100uF +

10k
1M
47n

22uF +

TL072

3M9

2N5457

10k 10k 47n 22k 27k

2N5457

10k 10k 22k 47n

NOM NOM

150k 150k 470k 10n 150k

TL072

TL072

4k7

2N5087

56k

150k

47n

10k 1M

10k 10k 22k 47n 2N5457

10k 10k 22k 47n 2N5457

LED

GND | L | IN | + | LED | – | J1 | OUT | J2

Resistors		Caps		Diodes	
R1	10k	C1	10n	D1	1N5817
R2	470k	C2	47n	D2	5.1v
R3	150k	C3	47n	**ICs**	
R4	150k	C4	47n	IC1 - 3	TL072
R5	56k	C5	47n	**Transistors**	
R6	150k	C6	47n	Q1	2N5087
R7	10k	C7	47n	Q2 - Q5	2N5457
R8	10k	C8	15uF	**Switch**	
R9	22k	C9	10n	COLOR	SPDT
R10	10k	C10	100uF	**Trimmer**	
R11	10k	C11	100n	T1	250k
R12	22k	C12	22uF	**Pots**	
R13	10k			SPD	500kC
R14	10k				
R15	22k				
R16	10k				
R17	10k				
R18	22k				
R19	27k				
R20	150k				
R21	3M9				
R22	150k				
R23	4k7				
R24	470k				
R25	150k				
R26	4k7				
R27	10k				
R28	1M				
RPD	1M				

Value	QTY	Type	Rating
4k7	2	Metal / Carbon Film	1/4W
10k	10	Metal / Carbon Film	1/4W
22k	4	Metal / Carbon Film	1/4W
27k	1	Metal / Carbon Film	1/4W
56k	1	Metal / Carbon Film	1/4W
150k	6	Metal / Carbon Film	1/4W
470k	2	Metal / Carbon Film	1/4W
1M	2	Metal / Carbon Film	1/4W
3M9	1	Metal / Carbon Film	1/4W
10n	2	Film	16v min.
47n	6	Film	16v min.
100n	1	Film	16v min.
15uF	1	Electrolytic	16v min.
22uF	1	Electrolytic	16v min.
100uF	1	Electrolytic	16v min.
1N5817	1		
5.1v	1	Zener	
TL072	3		
2N5087	1		
2N5457	4	*see notes	
SPDT	1	On/On, Solder Lug	
250k	1	Bourns 3362p	
500kC	1	PCB Right Angle	16mm

15uF:
https://www.mouser.com/ProductDetail/647-USF1E150MDD
https://www.mouser.com/ProductDetail/667-EEA-GA1C150

5.1v Zener:
http://smallbear-electronics.mybigcommerce.com/diode-zener-1n4733a/

SPDT:
http://smallbear-electronics.mybigcommerce.com/spdt-on-on-short-lever/

Bourns 3362p (250k):
https://www.mouser.com/ProductDetail/652-3362P-1-254LF

16mm Right Angle Pot (500kC):
http://smallbear-electronics.mybigcommerce.com/alpha-single-gang-16mm-right-angle-pc-mount/

Thinline DC Jack:
http://smallbear-electronics.mybigcommerce.com/dc-power-jack-all-plastic-unswitched-2-1-mm/
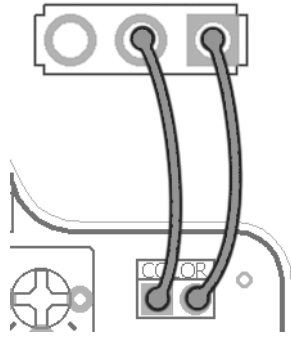
Enclosed Mono:
http://smallbear-electronics.mybigcommerce.com/1-4-in-mono-enclosed-jack/

http://smallbear-electronics.mybigcommerce.com/1-4-in-mono-enclosed-switchcraft-111x/

Lumberg Mono:
http://smallbear-electronics.mybigcommerce.com/lumberg-1-4-compact-shrouded-mono-jack/

The SPDT is wired rather than PCB mounted. When the switch is flipped to the right, feedback is turned on.

2N5087 is indicated for Q1 since it is also very common. You can use the original 2N4125 if you have it or even a 2N3906. All three have the same pin-out.

The NomNom is laid out for 2N5457 transistors since they are common and work equally well in the phase circuit. If you want to use the original 2N5952, you will need to flip the transistors 180° on the PCB since the 2N5952 have the opposite pin-out of the 2N5457.

An important consideration: Are you able/willing to match JFETs?

This is a good question to ask before you start. Finding four matched JFETs for the NomNom is going to require a healthy supply of transistors. You should have at least 25 transistors on hand before even considering doing it yourself and it would be much better to have 50 or more. The Vgs characteristic (the thing we are comparing) varies widely from device to device and it is entirely possible to go through a few handfuls to find the right ones.

The good news is that if you have a sufficient amount of transistors, you will likely find several pairs or quads that will work for phaser builds. However, if the NomNom is the only phaser you are ever going to build, it might be better to purchase pre-matched transistors. If this is the route you chose, guitarpcb.com sometimes offers sets of matched 2N5952 transistors. They are pricey, though.

It is possible to achieve an acceptable result by simply plugging in four unmatched transistors but this is a matter of luck. And, without a matched set you will not be able to compare the results of un-matched vs. matched.

Matching Transistors

Read about how JFET matching is done here (courtesy of RG Keen): http://www.geofex.com/Article_Folders/fetmatch/fetmatch.htm

This is not the only method used to find matched sets but it's the one I've always utilized and with good results.
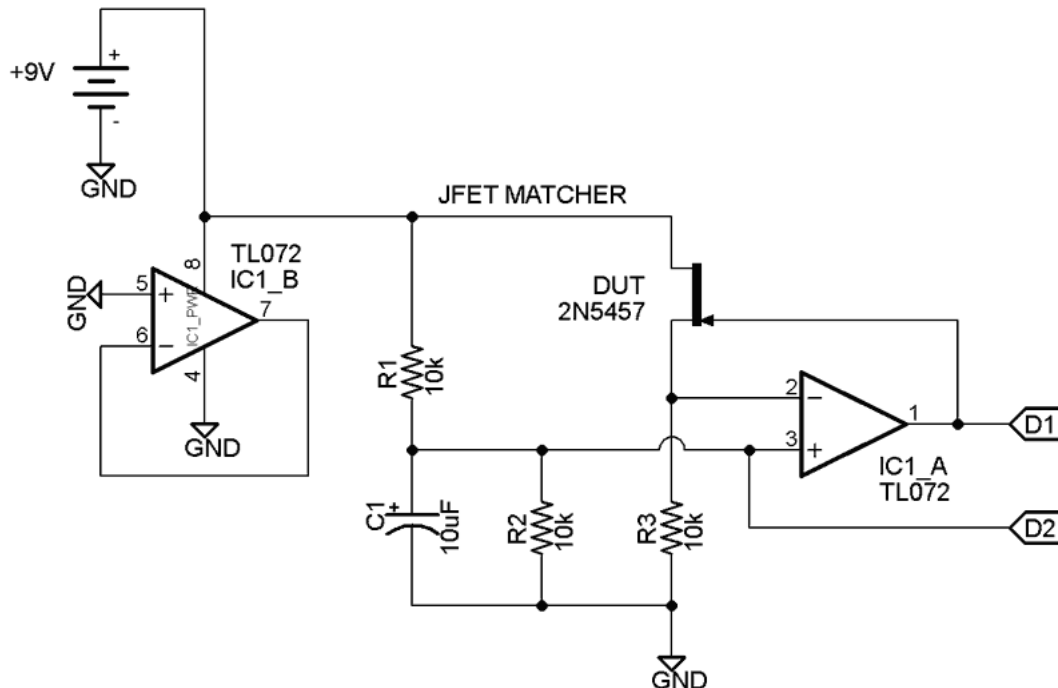
You can put this testing circuit on a breadboard in about 5 minutes. Use the probes on your multimeter (set for DC voltage) to test the Vgs of each JFET at D1 and D2 testing point. Vgs values between 1v and 4v are typical. Try to match all four transistors to two decimal places. Ex. -1.55v, etc).

Calibrating the NomNom

This is easy to do. Set the SPD control about halfway up and leave the Color switch to the OFF position. Begin playing through the circuit and adjust the T1 trimmer so the rise and fall of the phase sweep are symmetrical. IOW, the result will sound like an even triangle wave.

MODS

If you want a different flavor of phase, you can substitute the phase caps for the values used in the Univibe. It won't magically turn your NomNom into a Univibe, but it will get you in the ballpark. Obviously you will want to socket these caps so you can revert to the traditional values if you want.

Make the following changes: C3: 15n, C4: 220n, C5: 470pF, C6: 4n7

Double Extra Bonus #2: try the same values in a different order. Ex: 470pF, 4n7, 15n, 220n and so on.

Triple Dog Dare You #3: If you do the Univibe mod, try making minuscule adjustments to the T1 trimmer so the triangle wave is slightly asymmetrical. This will emulate a bit of the Univibe "throb".

I suggest sticking with 27k for R19. You might be tempted to lower this value for more pronounced feedback but 27k seems to consistently be the lower threshold before distortion and/or oscillation. On my build of the 2020 NomNom I actually used 30k to lower a very small bit of distortion I heard.
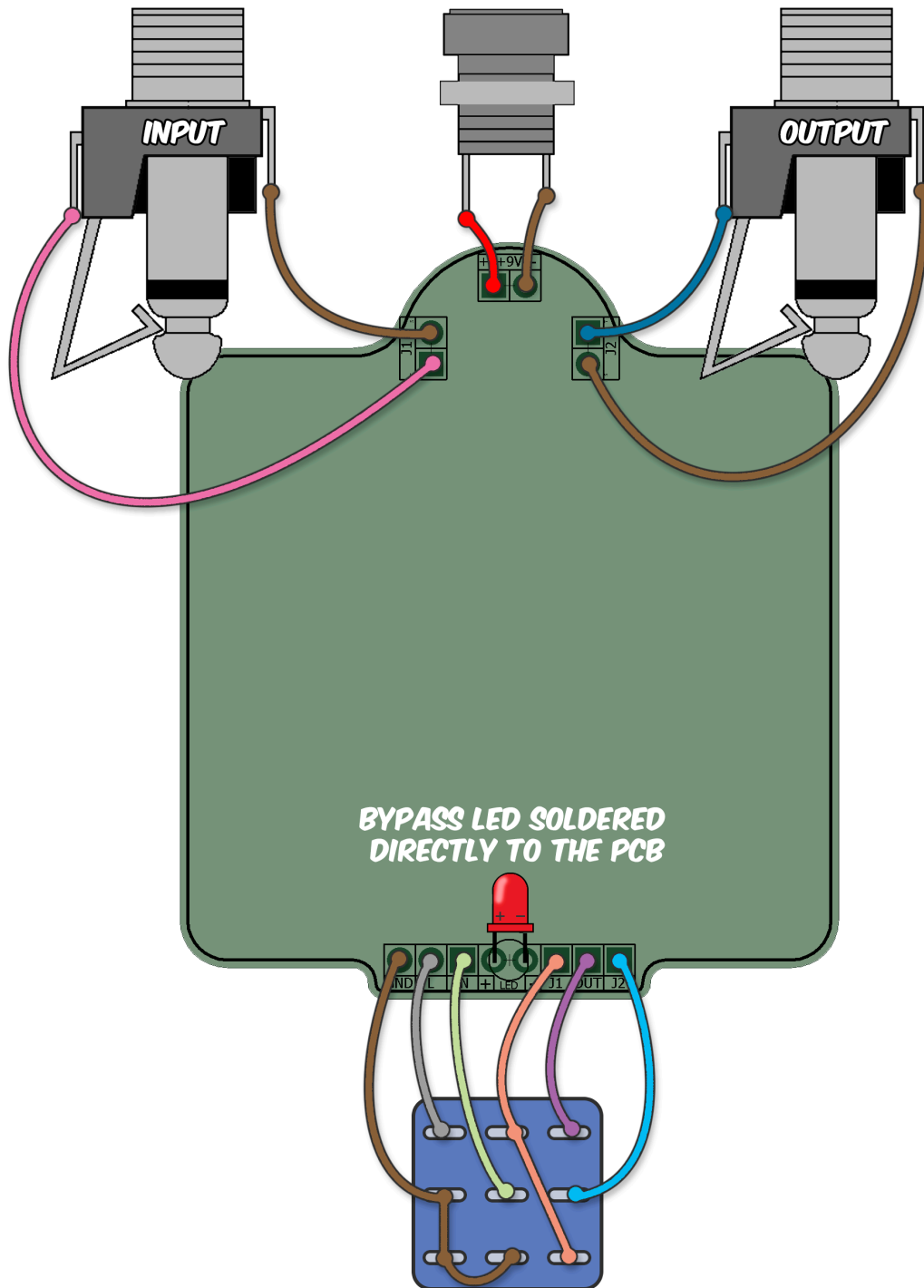
INPUT

OUTPUT

+9V

J1

J2

BYPASS LED SOLDERED
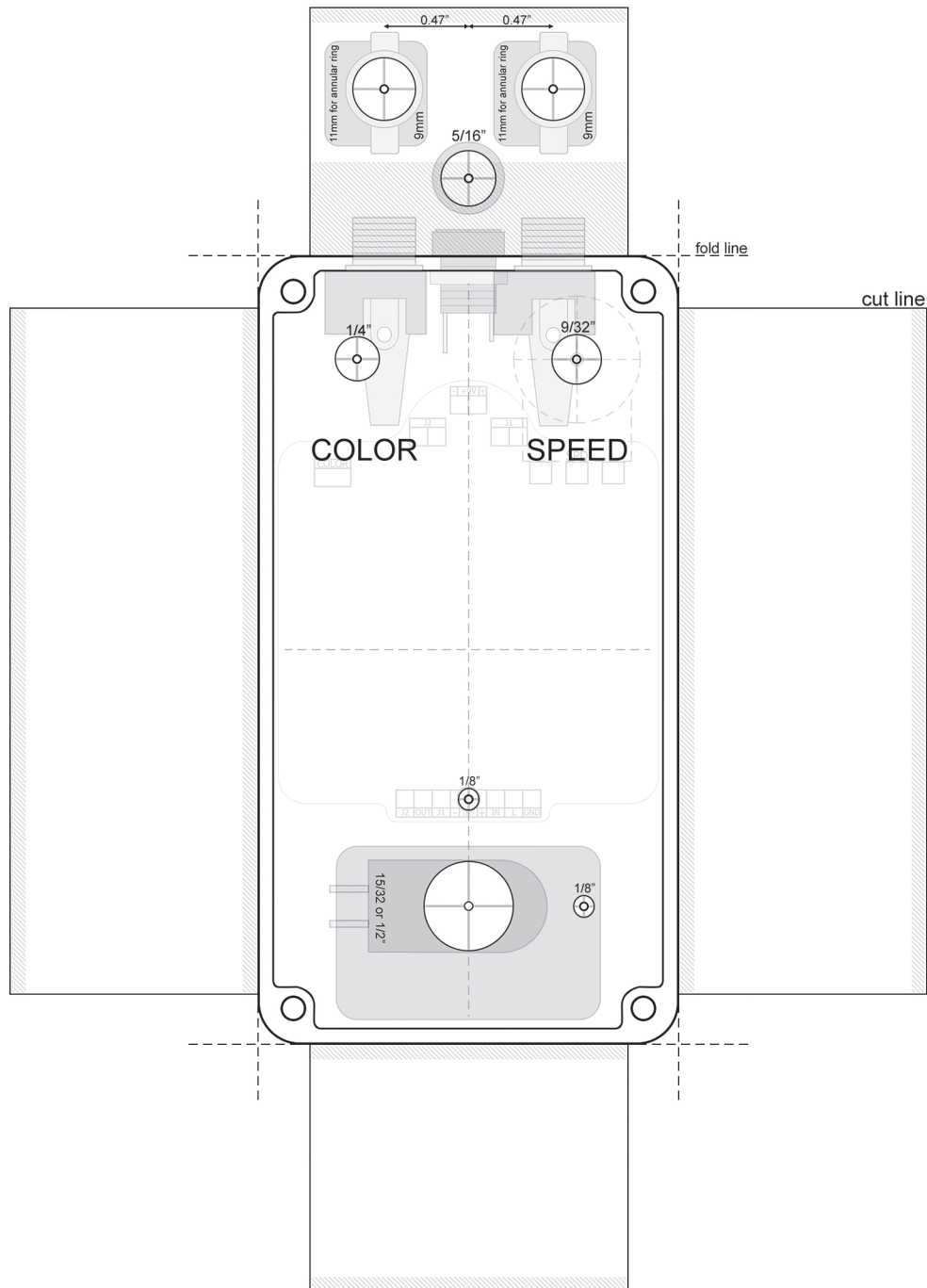DIRECTLY TO THE PCB

GND L IN + LED J1 OUT J2

Note: *Drill Guides are approximate and may require tweaking depending on the types of jacks, switches and pots you use.*
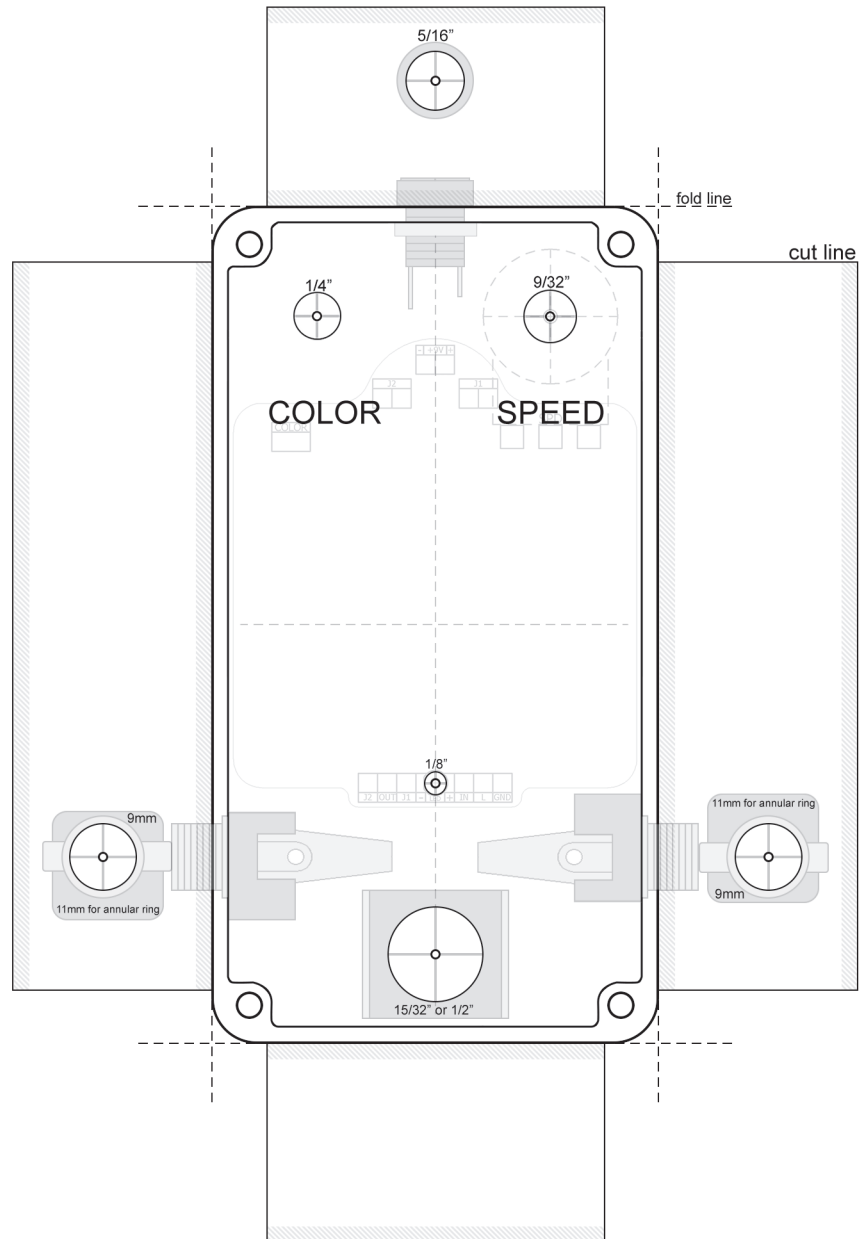
- This is a tight fit, but should work if you use the Lumberg or metal frame style 1/4" jacks.
- I don't recommend using any of the mbp 3pdt boards for this enclosure.

- Shown with Softie 2 relay bypass. If you are using one of the mbp 3pdt bypass boards, or just a 3pdt switch on its own, move the drill spot for the switch a bit lower so you can fit everything properly. Drill only one LED spot!
- Lumberg style jacks are used here but other styles may fit using the same drill locations.

Note: *Drill Guides are approximate and may require tweaking depending on the types of jacks, switches and pots you use.*

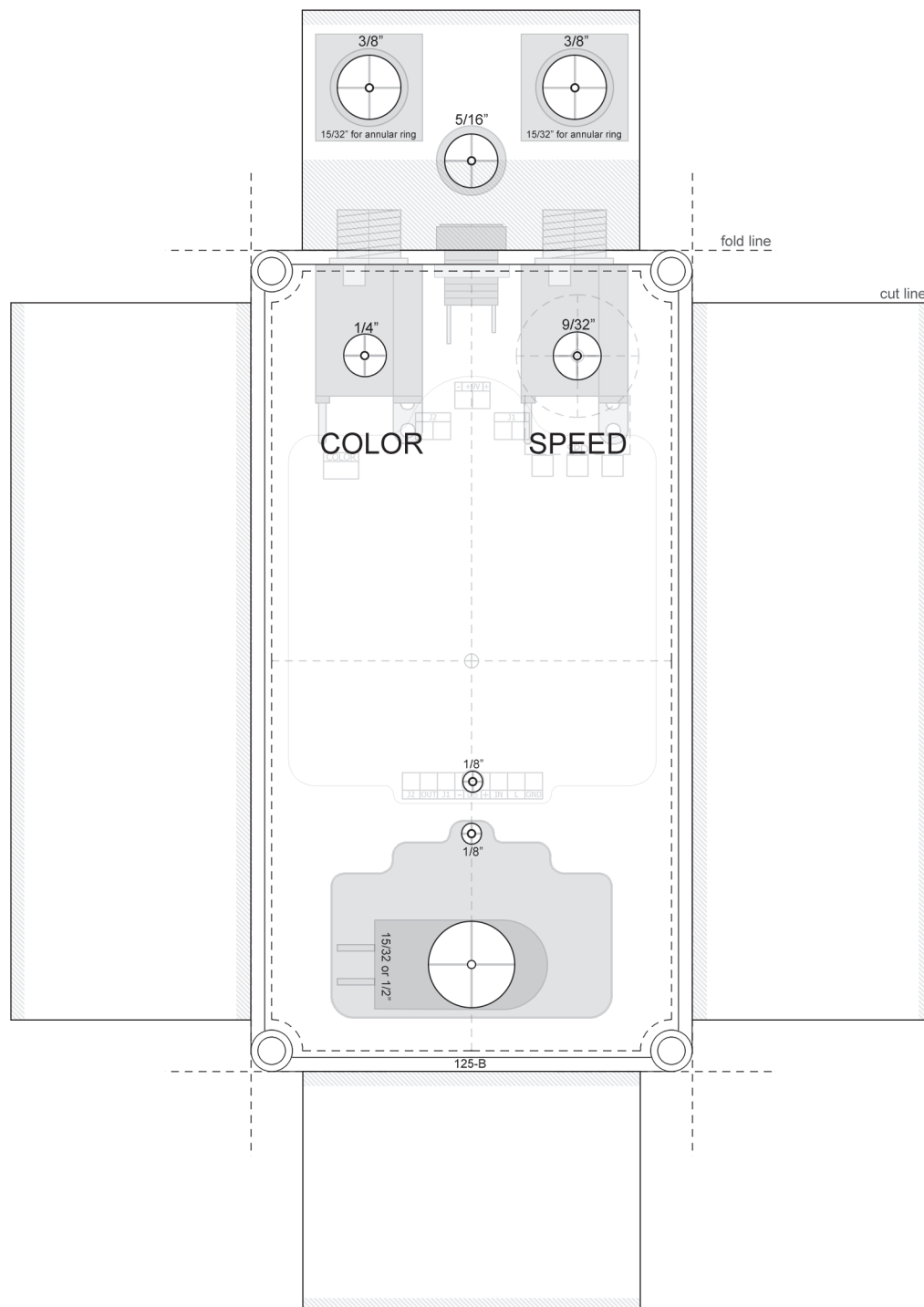- Shown with Softie 1 relay bypass. Use the same drill spot for 3PDT switch or move to your desired location. Drill only one LED spot!
- Enclosed top jacks are used here, but you should also be able to fit open-frame metal jacks or the Lumberg style.
- You could also use side jacks but you'll need to move the Softie1 drill spot down. If you use side jacks with a regular 3pdt instead of the Softie simply pick your drill spots for the jacks.

IC1	TL072	IC3	TL072	Q3	2n5952
1	4.25	1	4.24	D	4.24
2	4.25	2	4.24	S	4.24
3	4.05	3	4.24	G	varies
4	0	4	0	**Q4**	**2n5952**
5	varies	5	4.23	D	4.24
6	varies	6	4.25	S	4.24
7	varies	7	4.25	G	varies
8	9.16	8	9.16	**Q5**	**2n5952**
IC2	**TL072**	**Q1**	**2n5087**	D	4.24
1	4.24	C	2.6	S	4.24
2	4.24	B	3.71	G	varies
3	4.24	E	4.24		
4	0	**Q2**	**2n5952**		
5	4.24	D	4.24		
6	5.01	S	4.24		
7	4.24	G	varies		
8	9.16				

- 9.42vDC One Spot
- Current Draw ~ 14mA
- Some readings may differ depending on where your T1 trimmer is set.
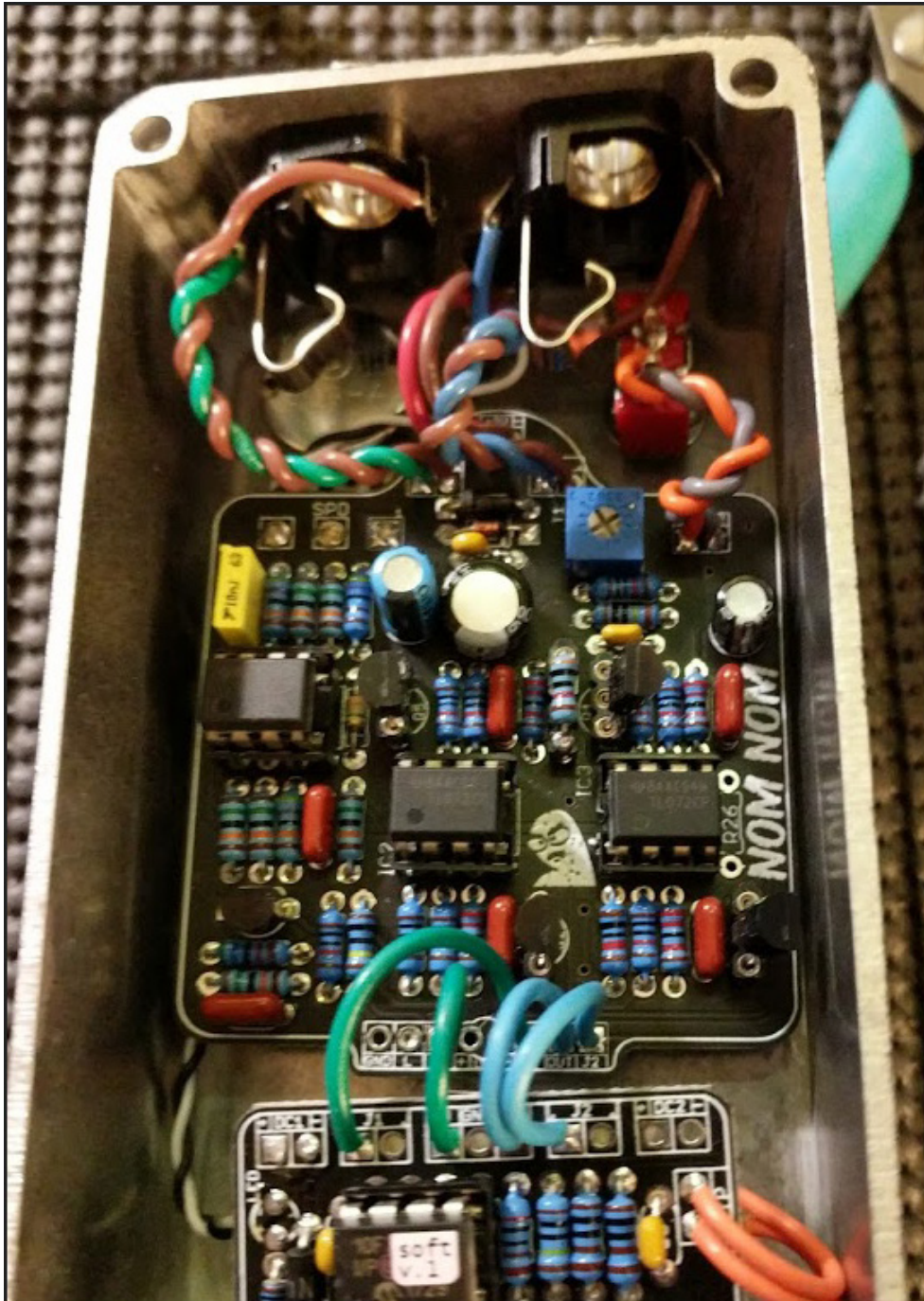
I had enough 2n5952 to find a good matched set so that's what I used in this (5th?) Phase 90 build o' mine. I decided to socket them just in case I ever want to try out another set. I also tried a matched set of BF256 and while they worked the phase depth was not nearly as good as the 2n5952.

NOM NOM
based on the MXR Phase 90 (tm)
v.2020 (c) madbeanpedals

500kC
SPD

R23
4k7

R27
10k

VB

D1
5817

+9V

GND

R26
4k7

C10
100uF

C11
100n

IC1_PWR +8
IC2_PWR +8
IC3_PWR +8

D2
5.1v

C12
22uF

250K
T1

R28
1M

VR

R25
150k

R24
470k

IC1_B
TL072

C9
10n

R22
150k

R21
3M9

C8
15uF

GND

BYP.1_LED

GND

BYP.1_GND

GND

J1

GND

J2

GND

BYP.1_J1

BYP.1_J2

BYP.1_L

R2
470k

VB

Q1
2N5087

BYP.1_IN

IN

R1
10k

C1
10n

TL072
IC1_A

R3
150k

R4
150k

C2
47n

BYP.1_OUT

OUT

RPD
1M

R20
150k

R5
56k

R6
150k

GND

GND

GND

COLOR

R19
27k

R8
10k

R7
10k

IC2_A
TL072

C3
47n

R9
22k

Q2
2N5457

R11
10k

R10
10k

IC3_A
TL072

C4
47n

R12
22k

Q3
2N5457

R14
10k

R13
10k

IC3_B
TL072

C5
47n

R15
22k

Q4
2N5457

R17
10k

R16
10k

IC2_B
TL072

C6
47n

R18
22k

Q5
2N5457

VB

C7
47n

VR

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