

Experiment: phase shift by Firefly

<https://www.youtube.com/watch?v=4rtTlnBv8go>

Summary

0:00 So we have ferrite trafo, primary is split in two halves
secondary connected thru 200nF capacitor to the primary, and there is capacitor in the secondary
primary can move

1:00 First, let's tune resonance in primary circuit
here is first harmonic, now we need find maximum
ok, it is 57-58khz

Now we know frequency, I need to measure secondary's inductance and calculate capacitor for it

1:34 measured inductance 53uH, let's calculate capacitor
capacitor for this coil for 57khz is 147nF

2:00 connected capacitor approx. 140nF, let's see
signals in phase

3:00 now let's add capacitor to secondary approx. 10nF and see what happen
we see blue trace move to the right

let's add 20nF
with 20nF it moved even more to the right
now let's add 10nF in addition to 20nF

4:00 we see that blue trace moved even further
now I have added 32nF and got this phase shift
blue trace almost 90 degree shifted

not exactly, so I fine tune it with frequency
now increasing frequency and blue trace moving to the right
this way I can fine tune 90 degree shift

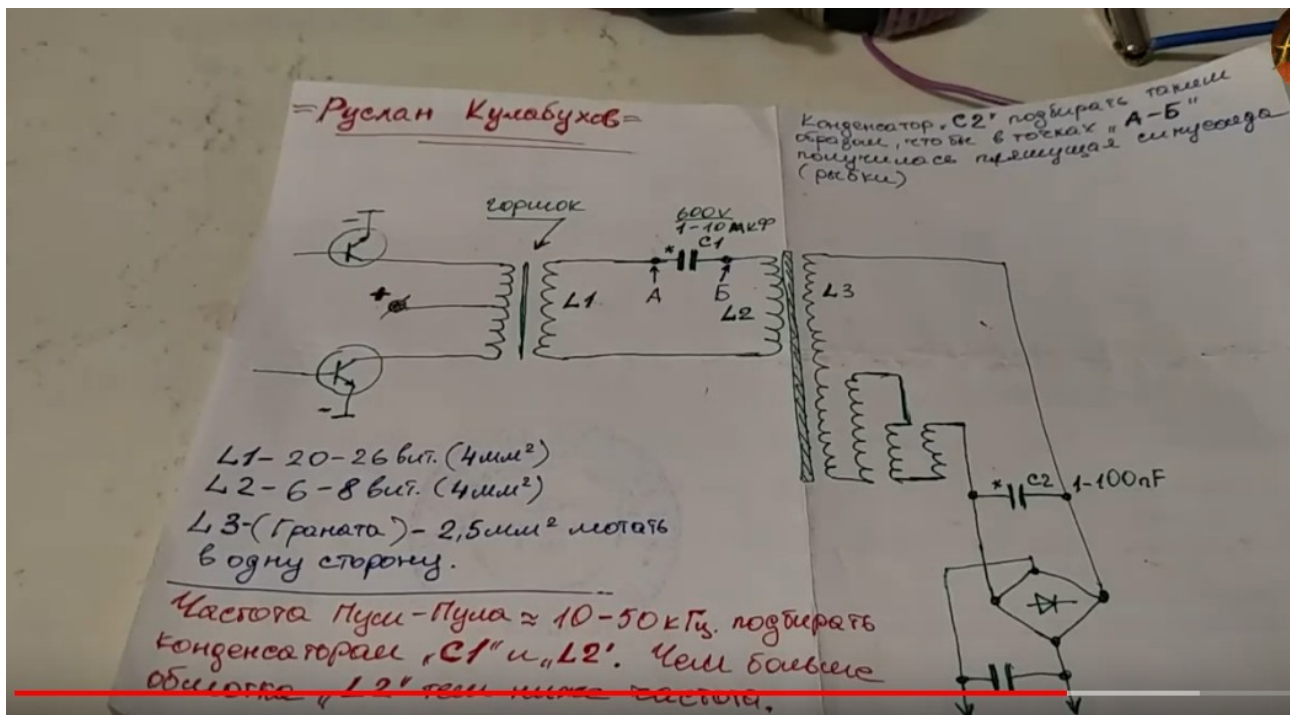
6:00 If I add even bigger capacitor, phase will became 180 degere

7:10 let's remove all additional capacitors
so now frequency is 57 khz, signals in phase

now instead of adding capacitors I will increase frequency

8:40 we see phase also shifted 90 degeres
but moved away from resonance and amplitude decreased a lot

9:45 let's adjust time scale on the scope, see continuous signal
clean sine, no "dancing waves", coils in resonance



Text on the schematic:

Ruslan Kulabukhov

Capacitor C2 adjust so that in points A and B appear dancing sine ("fishes")

Yoke core

L1 20-26 turns 4sq.mm

L2 6-8 turns 4sq.mm

L3 (grenade) 2.5sq.mm wind in one direction

Push pull frequency 10-50khz, adjust with C1 and L2

The longer L2 the lower frequency

10:16 ok, now the question

we have such schematic, I will not mention who is author of the schematic

but author says about tuning

with this capacitor (C1) we tune resonance to push pull frequency

I drive my push pull with signal generator I can tune here any frequency

and with capacitor C2 author says we need tune so that we get "dancing sine" on C1 (points A and B) or so called "fish" signal

11:20 these "fishes" should be visible when we increase time scale on the scope like this

here I supposed to get "fishes"

but ok, there is no "fishes" here

also I made experiments with this push pull driver

I can move phase 90 degree, 180 degree, can tune resonance in primary, secondary

can adjust phase with capacitor

but I can't get "fishes"

somebody can think that schematic is wrong

but schematic is authentic

here is a stamp (translator note: Firefly being sarcastic I guess)
but there is no “fishes”
and so if somebody knows where to find “fishes” write in comments

Experiment: phase shift (power consumption) by Firefly
<https://www.youtube.com/watch?v=v72ocGCdIFo>

Summary

0:00 Let's make an experiment
Here we have signal generator
Driver with two switches, ferrite trafo and primary coil tuned in resonance
We have current meter, will see power supply current
and we have secondary coil with capacitor connected
we will adjust phase shift between primary and secondary and will check power consumption
1:00 Exp. 1
switch on PSU, current 5 amp, primary on the left
moving primary coil to the middle of secondary, see amplitude grow and PSU current also
1:27 Exp. 2
Adjusted capacitor in the secondary coil so that phase shift is 90 degree
see, signals have 90 deg phase shift and slowly becoming anti-phase
capacitors in the secondary get hot momentarily and so frequency changing, this is reason
why phase changes
2:00 Exp. 3
Adjusted capacitor in the secondary coil so that phase shift 180 degree (anti-phase)
let's see, PSU current almost 7 amp, primary coil on the left side
moving primary coil to the center, notice PSU current decreased to 1.7 amp
text on the bottom: capacitors in the secondary do not get even warm
moving primary back to the left side, current grows to almost 7 amp
ok, these are experiments
write your opinion in comments
thanks everyone