Low Frequency Receiving BP (Band Pass) / LP (Low Pass) Filters

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This design is realized after Nick VK1AA asked me for possible simple BP/LP filters realization for new experimental 500 kHz band and 137 KHz HAM band too. The basic idea is practical filter realization with standard molded chokes but at the end of the article I am proposing BP realization with high Q inductors. Start point specification in design was that IL (insertion loss) has to be under -3 dB.

LP filter for 500 kHz with molded chokes
BP for 100-200 kHz with molded chokes

BP FILTER FOR 100-200kHz DESIGN - YU1LM
BP for 200-300 kHz with molded chokes

BP FILTER FOR 200-300kHz DESIGN - YU1LM
BP for 300-500 kHz with molded chokes

BP FILTER FOR 300-500kHz DESIGN -YU1LM
BP for 300-500 kHz with molded chokes version 2

BP FILTER FOR 300-500kHz DESIGN - YU1LM
Super selective BP filters for 500 KHz realized with high Q coils

This design is little “touchy” for “no tune” realization but it is offering better selectivity. I am giving two proposals with predicted results for real Q factor for all built in components. To repeat good simulation results in praxis it is necessary that all components have tolerance under 5%. Inductor turn number is possible calculate with freeware software [4].

Inductor Q>=200
Inductor Q=100

Inductor Q=40 typical value for molded chokes. I am not recommending this realization reason is too high IL.
Simplified BP for 500 kHz

Inductor Q >= 200

Frequency (MHz)

0.20535 MHz
-42.14 dB

0.40077 MHz
-9.659 dB

0.50038 MHz
-31.36 dB

0.50571 MHz
-1.468 dB

0.60171 MHz
-24.28 dB

1 MHz
-65.81 dB

DB(|S(1,1)|)
BP 500 kHz

DB(|S(2,1)|)
BP 500 kHz

DB(|S(2,2)|)
BP 500 kHz

Inductor Q >= 200
Inductor Q=100

Inductor Q=40 typical value for molded chokes. I am not recommending this realization reason is too high IL >5 dB.
Selective BP filters for 500 KHz minimum components and minimum IL (insertion loss)

This design is little “touchy” for “no tune” realization but it is offering moderate selectivity, minimum IL (insertion loss) with minimum built in components. Realization is possible with high Q inductors but with molded chokes too. To repeat good simulation results in praxis it is necessary that all components have tolerances under 5%. L2 inductor is independent inductor not tap at coils L1 or L2. In practical realization it is necessary prevent unwanted L2 mutual coupling with L1 and L3 to achieve wanted selectivity and IL shape.

![Filter Circuit Diagram]

**SELECTIVE BP FILTER FOR 500kHz DESIGN - YU1LM**

![Graph 1]

| Frequency (MHz) | DB(|S(1,1)|)   | DB(|S(2,1)|)   | DB(|S(2,2)|)   |
|----------------|----------------|----------------|----------------|
| 0.20535 MHz    | 35.13 dB       | -12.6 dB       | -21.44 dB      |
| 0.40077 MHz    | -11.26 dB      | 1.733 dB       |                |
| 0.50571 MHz    | -12.46 dB      | -21.44 dB      |                |
| 0.60171 MHz    | -39.22 dB      | -21.44 dB      |                |
| 1 MHz          | -39.22 dB      | -21.44 dB      |                |
BP 500 kHz response with built in molded chokes

Selective BP filters for 500 KHz minimum components and minimum IL (insertion loss) version 2

SELECTIVE BP FILTER FOR 500kHz DESIGN -YU1LM
BP 500 kHz response with built in inductors Q >=200

BP 500 kHz response with built in molded chokes
Selective BP filters for 500 KHz minimum components and minimum IL (insertion loss) version 3

SELECTIVE BP FILTER FOR 500kHz DESIGN -YU1LM

BP 500 kHz response with built in inductors Q >=200
BP 500 kHz response with built in molded chokes

**Super selective BP filters for 500 KHz**

The super selective BP filter for 500 kHz is very really 'touchy “design in version “no tune” design. But if you have components with precise values 3% or better tolerances you will have very easy realization.
BP 50 kHz response with built in inductors Q >=200

BP 500 kHz response with built in molded chokes
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VY 73/72 and GL in homebrew Tasa YU1LM/QRP

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References:

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4. www.dl5swb.de