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Nautel

TRANSMISSION TALK TUESDAY

Episode #86

Combiners and Filters

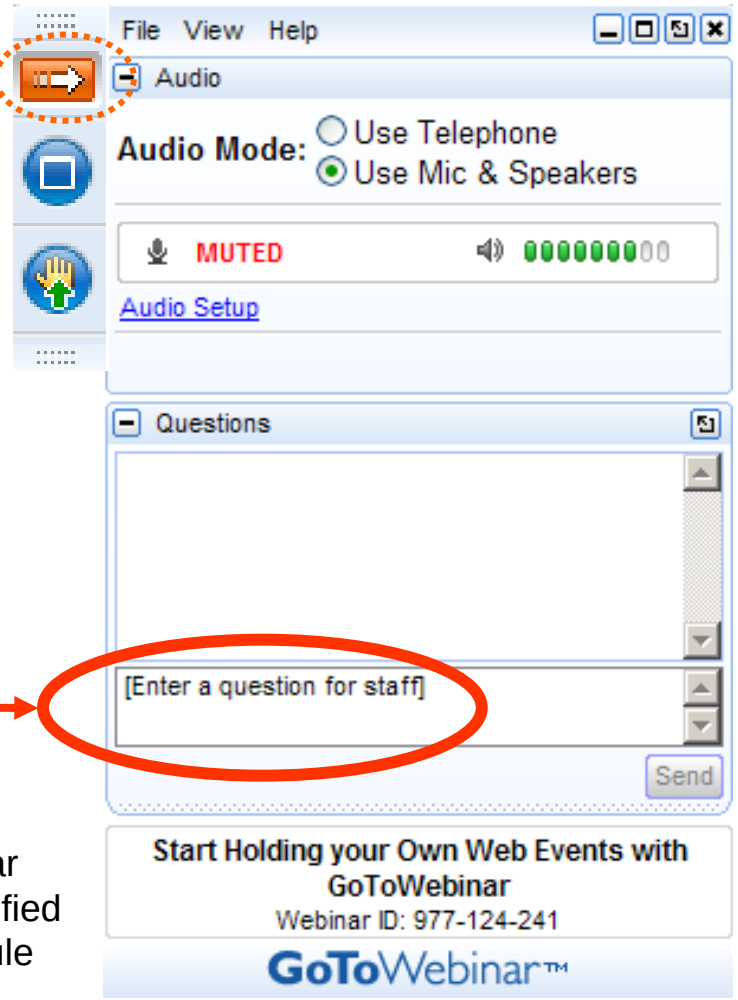
Fun with Math

nautel

Your questions please?

(if you don't see the control panel, click on the orange arrow icon to expand it)

Please enter your questions in the text box of the webinar control panel (remember to press send)



Remember: The completion of a Nautel webinar qualifies for ½ SBE re-certification credit, identified under Category I of the Re-certification Schedule for SBE Certifications.

The idea of education has been so tied to schools, universities, and professors that many assume there is no other way, but education is available to anyone within reach of a library, a post office, or even a newsstand.

“Education of a Wandering Man” Louis L'Amour, 1989

- Insertion Loss
- Return Loss
- Cutoff Frequency
- Pass/Reject
- Poles
- Branch Combiner
- Channel Combiner
- Notch
- Shorting Stub

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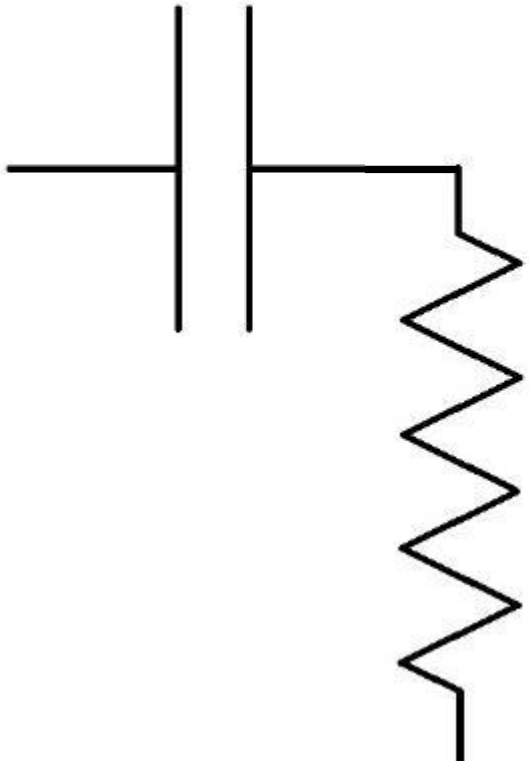
Is there a directory of people who are good at tuning up filters for use in my next translator combiner projects?

Special requirements for HD stations?

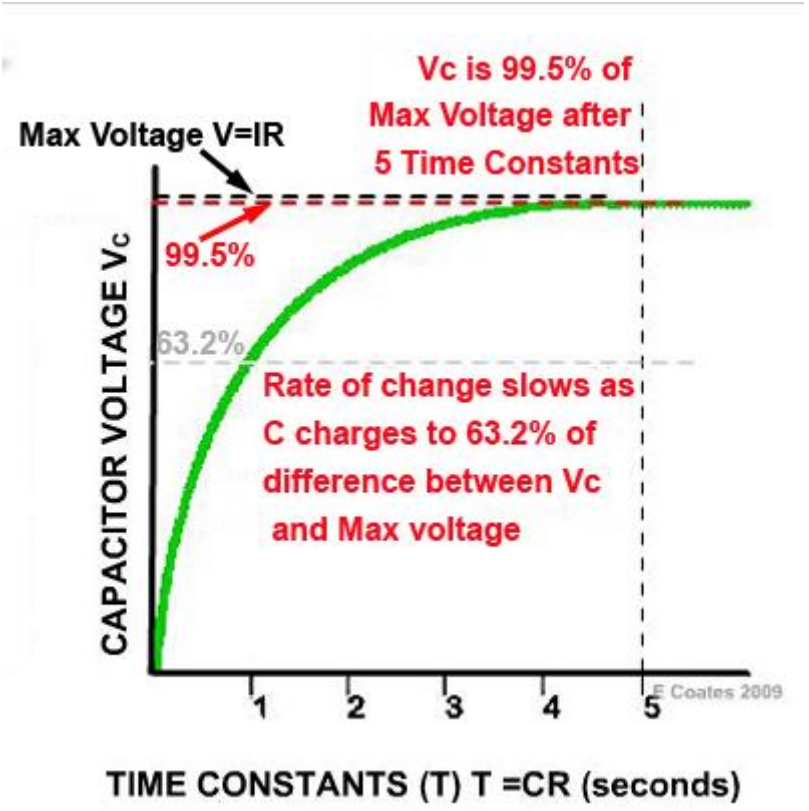
Please discuss benefits / drawbacks of CIF vs manifold combiners. Also ways to feed one antenna from multiple inputs.

I would like to delve into the filters for RF in AM signals, this is related to places where there are several AM Radio station

Don't forget the most important filter...The Coffee Filter.



$$\tau = RC = \frac{1}{2\pi f c}$$



https://learnabout-electronics.org/ac_theory/dc_ccts43.php

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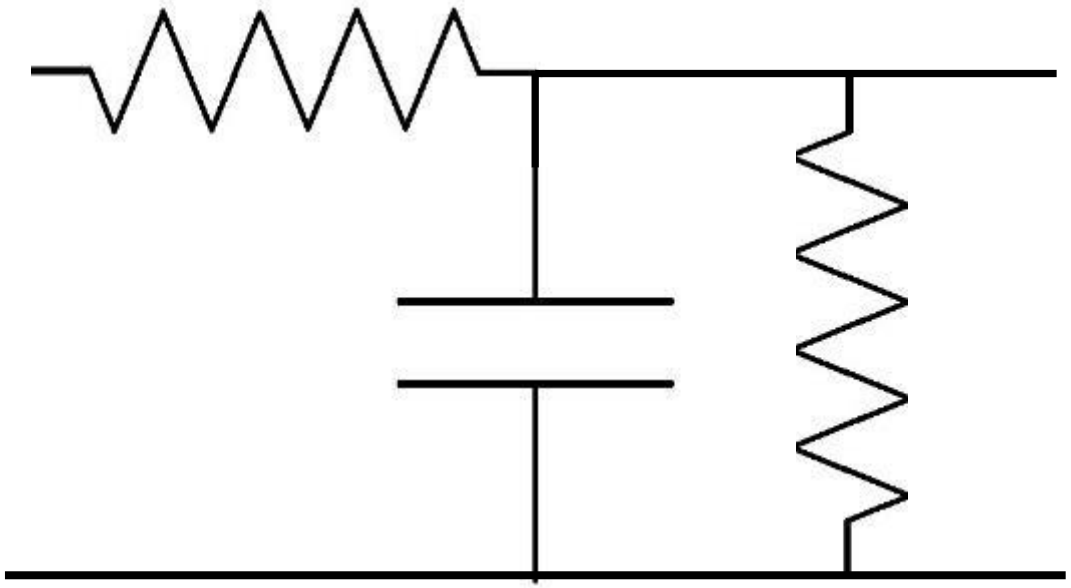
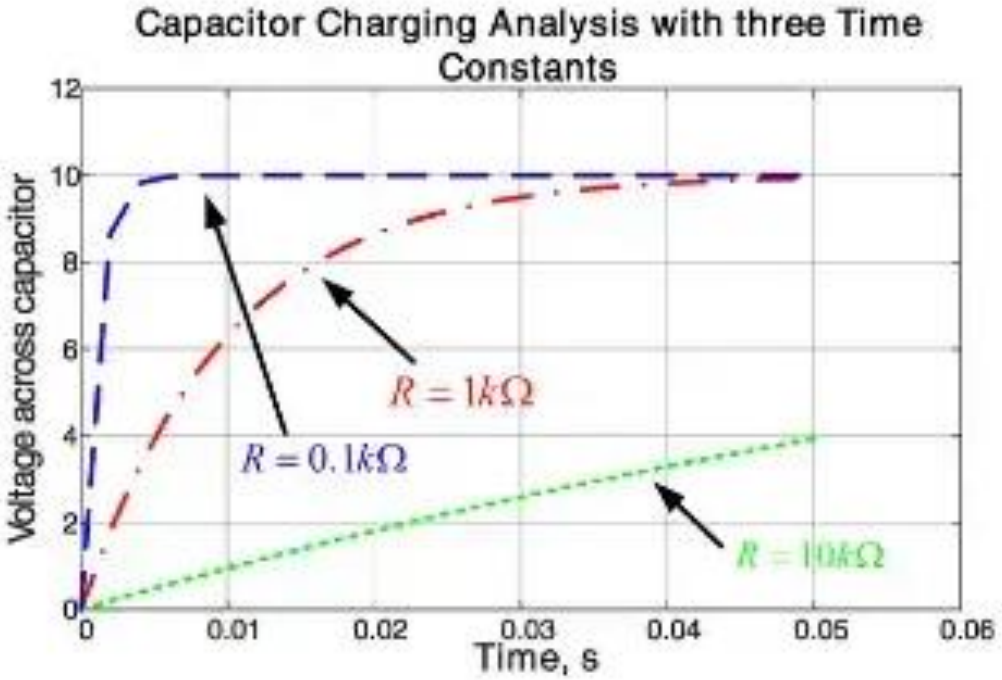
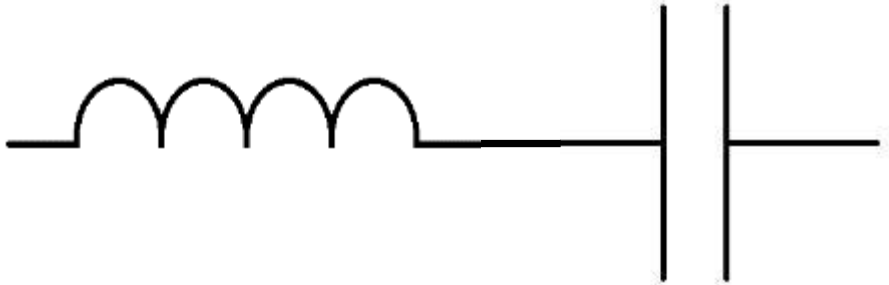
https://www.electrical4u.com/time-constant/



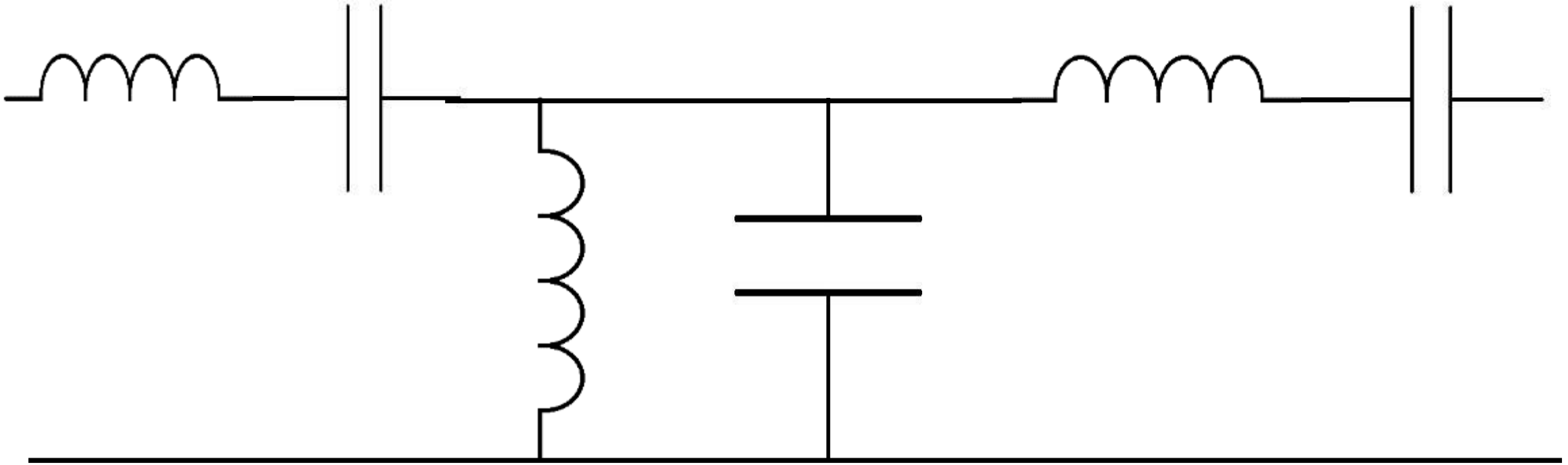


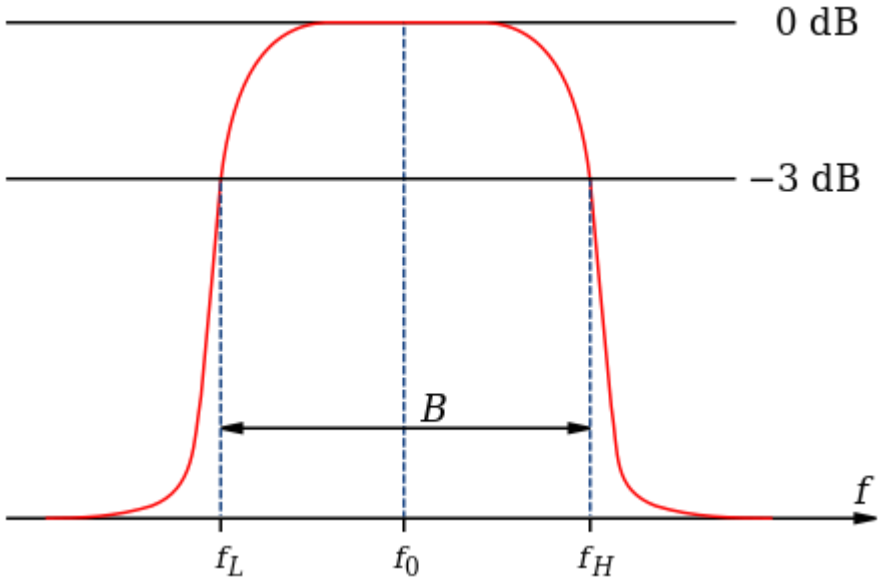


$$\tau = \frac{R}{L} = 2\pi FL$$

τ is the time required to charge the capacitor, through the resistor, from an initial charge voltage of zero to approximately 63.2% of the value of an applied DC voltage, or to discharge the capacitor through the same resistor to approximately 36.8% of its initial charge voltage.

https://en.wikipedia.org/wiki/RC_time_constant




0 dB
−3 dB
B
f
f_L
f_0
f_H

Q is short for the ‘quality-factor’ of a filter, which defines its bandwidth in relation to its centre frequency and indicates a filter’s resonant properties. The higher the Q the more resonant the filter, and the narrower the range of frequencies that are allowed to pass.

https://www.soundonsound.com/glossary/q

- Insertion Loss
- Return Loss
- Cutoff Frequency
- Pass/Reject
- Poles
- Branch Combiner
- CIF Combiner
- Notch
- Shorting Stub
- Bandwidth
- Q

Return loss is a quantity often used within RF circuits where impedance matching is important. The return loss is the proportion of a signal that is reflected as a result of an impedance mismatch.

$$R = 10 \log_{10} \left(\frac{P_i}{P_r} \right)$$

https://www.electronics-notes.com/articles/antennas-propagation/vswr-return-loss/what-is-return-loss.php

Whenever a signal travels through a component or a system, there is always some loss of power due to a number of reasons. This loss that occurs while a signal is traveling through a component or system is called as **Insertion Loss**. It is measured in decibels (dB).

$$\boldsymbol{Insertion\ Loss\ (dB) = 10\ \log \left(\frac{P_{in}}{P_{out}} \right) = -10\ \log \left(\frac{P_{out}}{P_{in}} \right)}$$

https://www.everythingrf.com/community/what-is-insertion-loss

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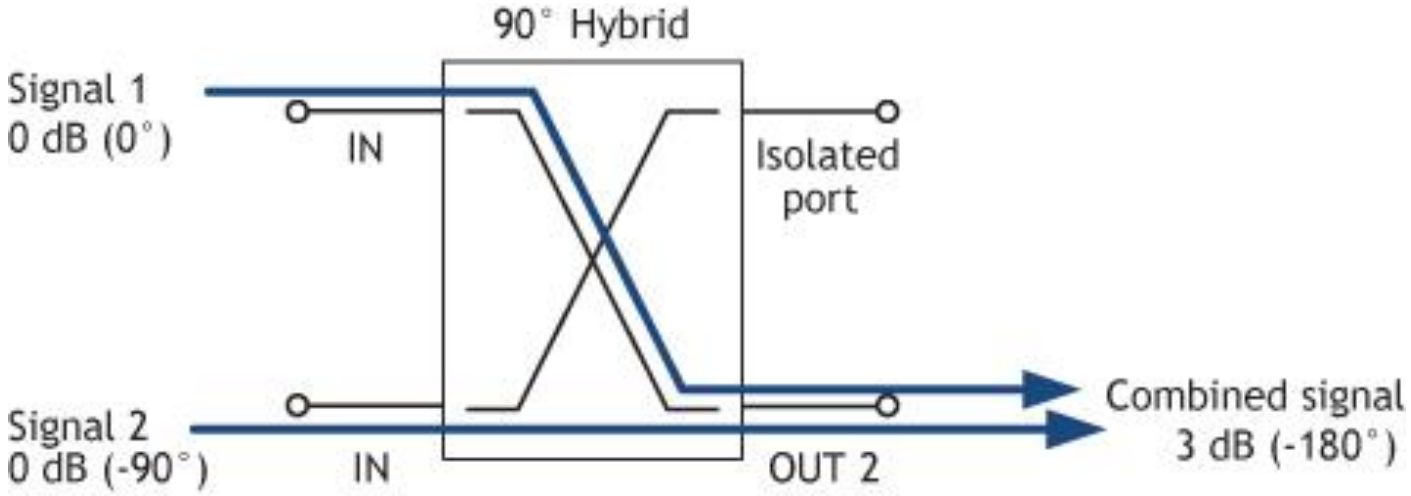
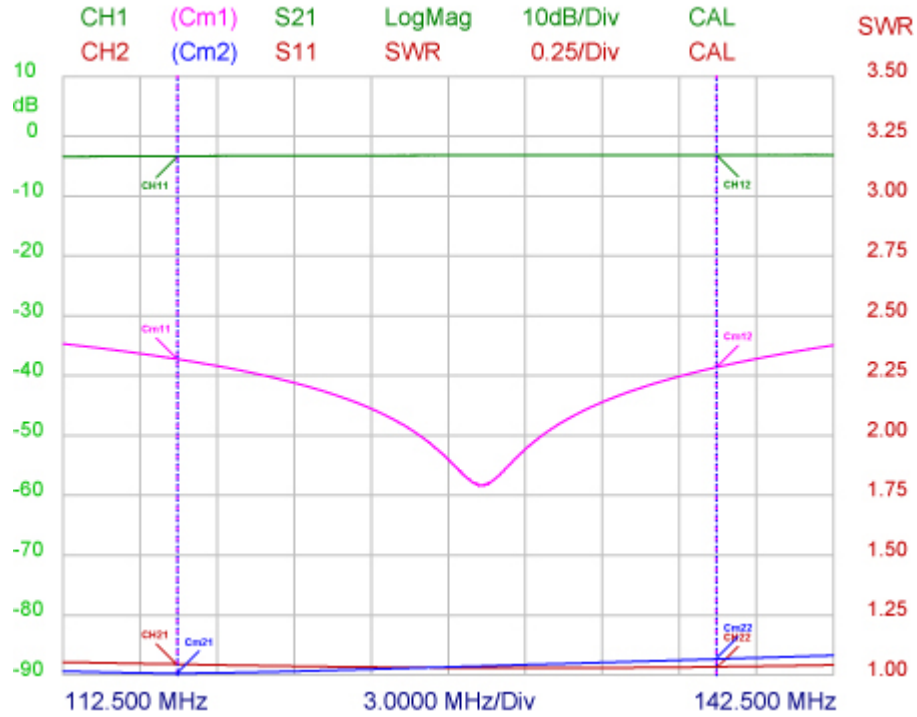
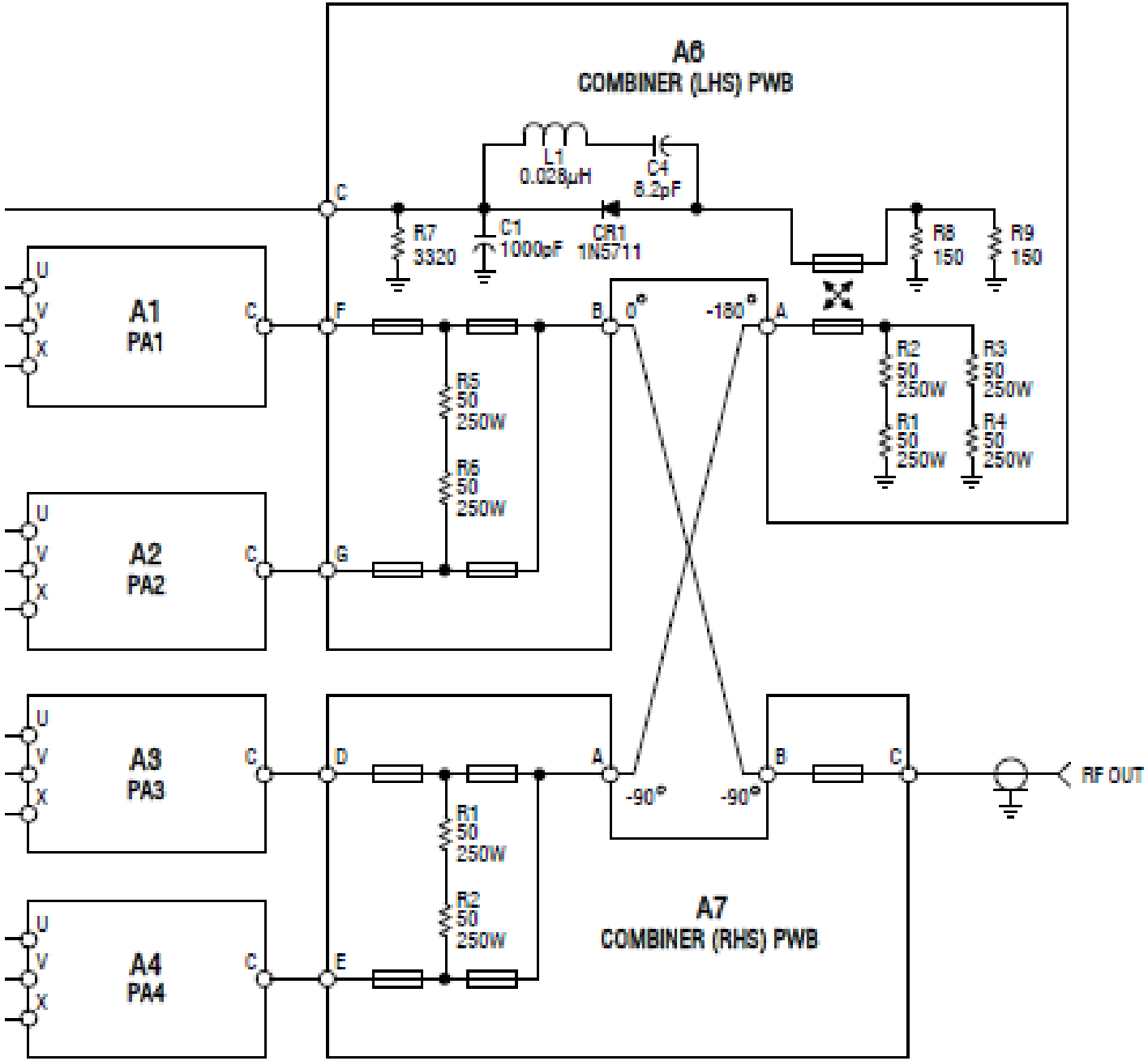
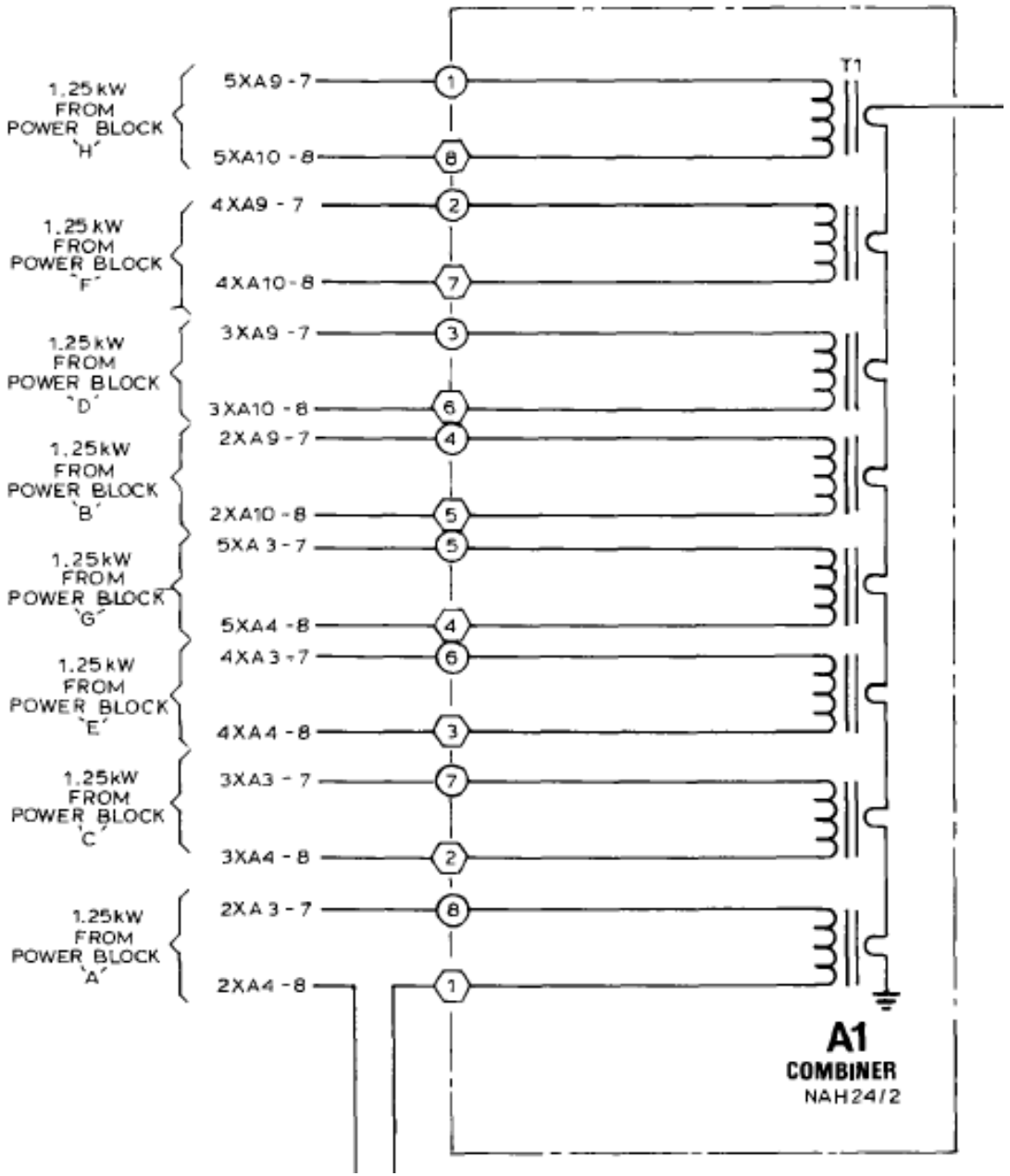


https://amphenolprocom.com/products/filters/1033-pro-phy-117-137-3-db




A6
COMBINER (LHS) PWB
L1
0.028µH
C4
8.2pF
C
R7
3320
C1
1000pF
CR1
1N5711
R8
150
R9
150
U
V
X
A1
PA1
C
F
B
0°
-180°
A
R2
50
250W
R3
50
250W
R5
50
250W
R1
50
250W
R4
50
250W
R6
50
250W
A2
PA2
G
A3
PA3
D
A
B
C
-90°
-90°
RF OUT
R1
50
250W
R2
50
250W
A4
PA4
E
A7
COMBINER (RHS) PWB


1.25 kW FROM POWER BLOCK 'H'
5XA9 - 7
5XA10 - 8
1.25 kW FROM POWER BLOCK 'F'
4XA9 - 7
4XA10 - 8
1.25 kW FROM POWER BLOCK 'D'
3XA9 - 7
3XA10 - 8
1.25 kW FROM POWER BLOCK 'B'
2XA9 - 7
2XA10 - 8
1.25 kW FROM POWER BLOCK 'G'
5XA 3 - 7
5XA4 - 8
1.25 kW FROM POWER BLOCK 'E'
4XA 3 - 7
4XA4 - 8
1.25 kW FROM POWER BLOCK 'C'
3XA3 - 7
3XA4 - 8
1.25 kW FROM POWER BLOCK 'A'
2XA 3 - 7
2XA4 - 8
T1
A1
COMBINER
NAH24/2

Online Information

Webinars
https://www.nautel.com/resources/webinars/

Nautel Waves Newsletter
https://www.nautel.com/newsletters/

YouTube
http://www.youtube.com/user/NautelLtd

Online Info, such as the Broadcasters' Desktop Resource
https://www.thebdr.net/

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THANK YOU!

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