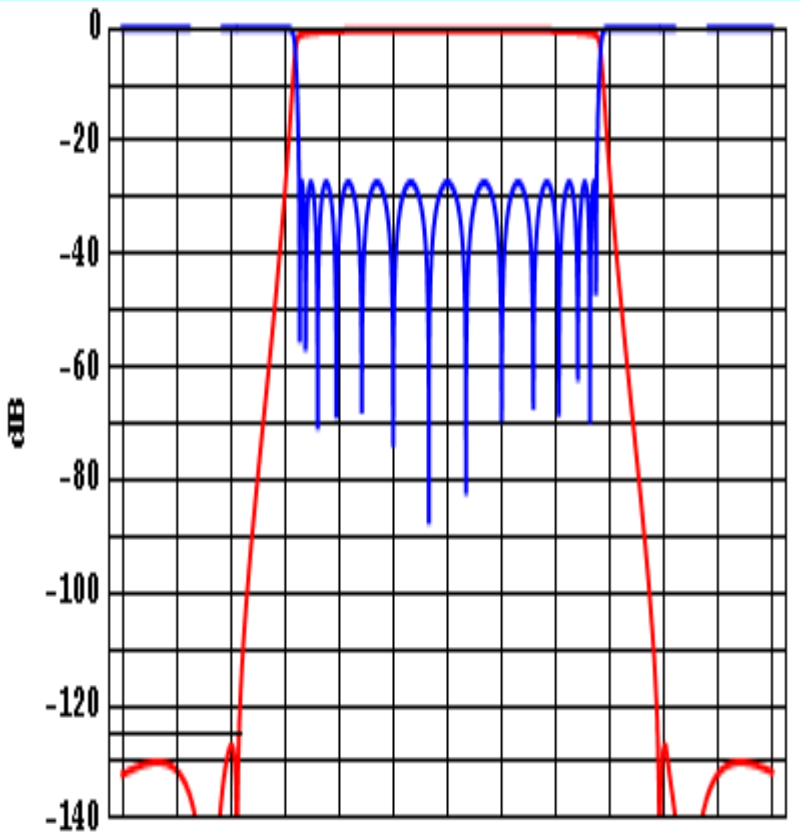
SHARP TUNED FILTERS
"STF"



- TODAYS TOPICS
- MASK FILTERS 101
  - TYPICAL MASK FILTERS
  - PERFORMANCE SUMMARY
  - CASE STUDIES
    - CH 17
    - CH 55
    - CH 14
- Cascaded Filter Experiment

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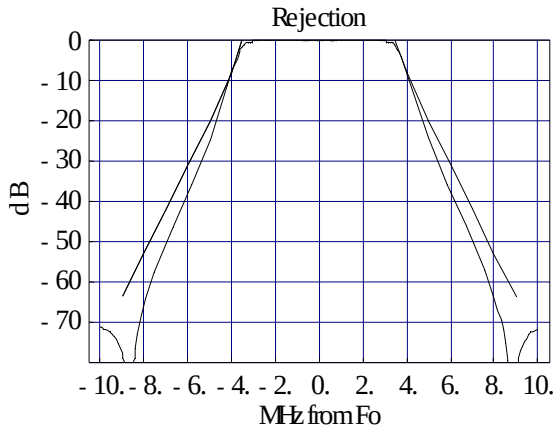
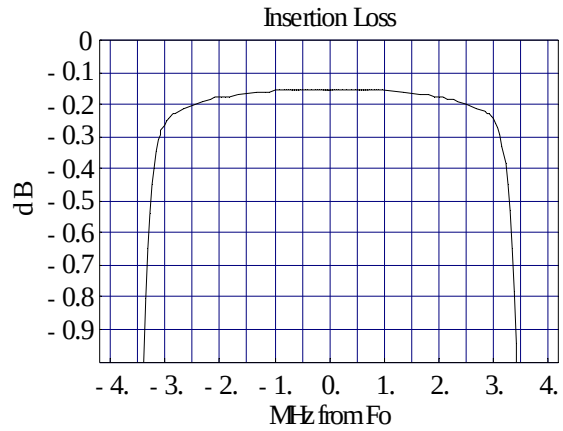
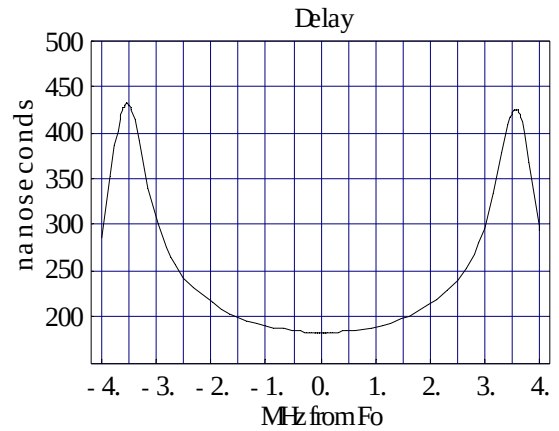
6 SECTION BANDPASS

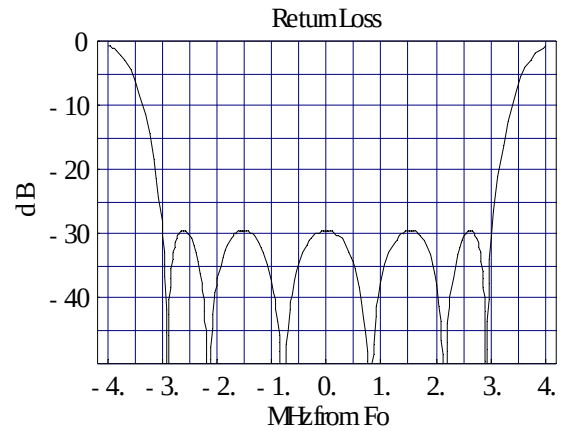
USED BY MOST TRANSMITTERS

PROVIDES EXTRA REJECTION AT Fc +/- 9MHz









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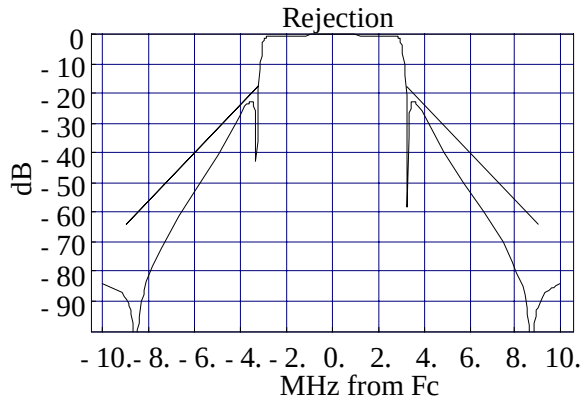
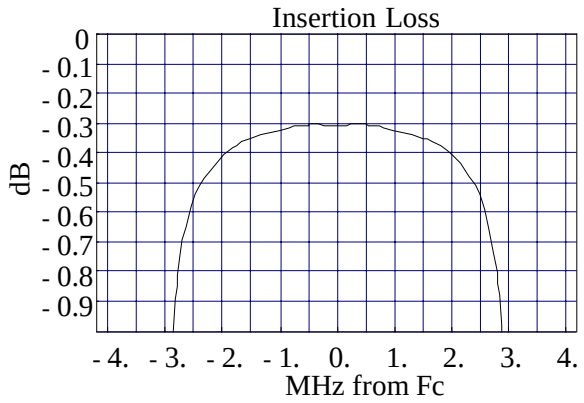
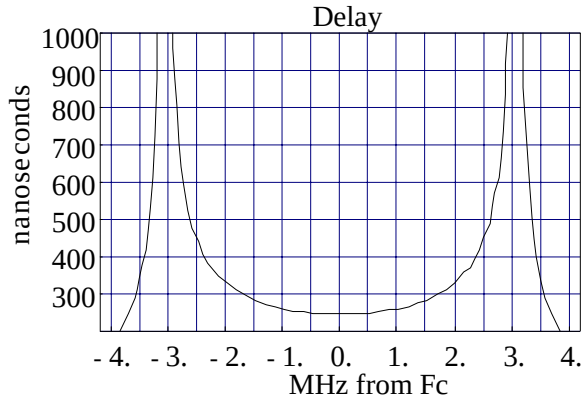
8 SECTION (or “STF”) BANDPASS

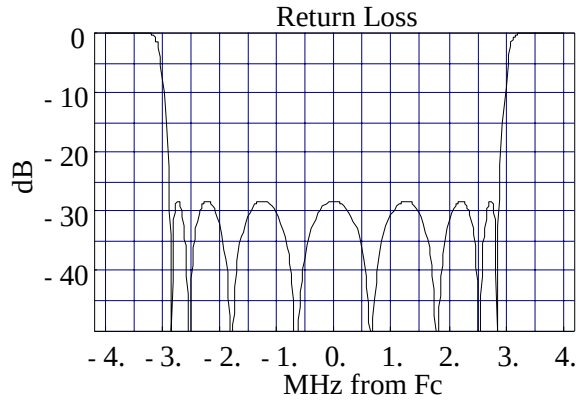
USED FOR ADJACENT CHANNEL SITUATIONS

PROVIDES EXTRA REJECTION AT BAND EDGES
AND ACROSS THE UPPER & LOWER ADJACENT CHANNELS









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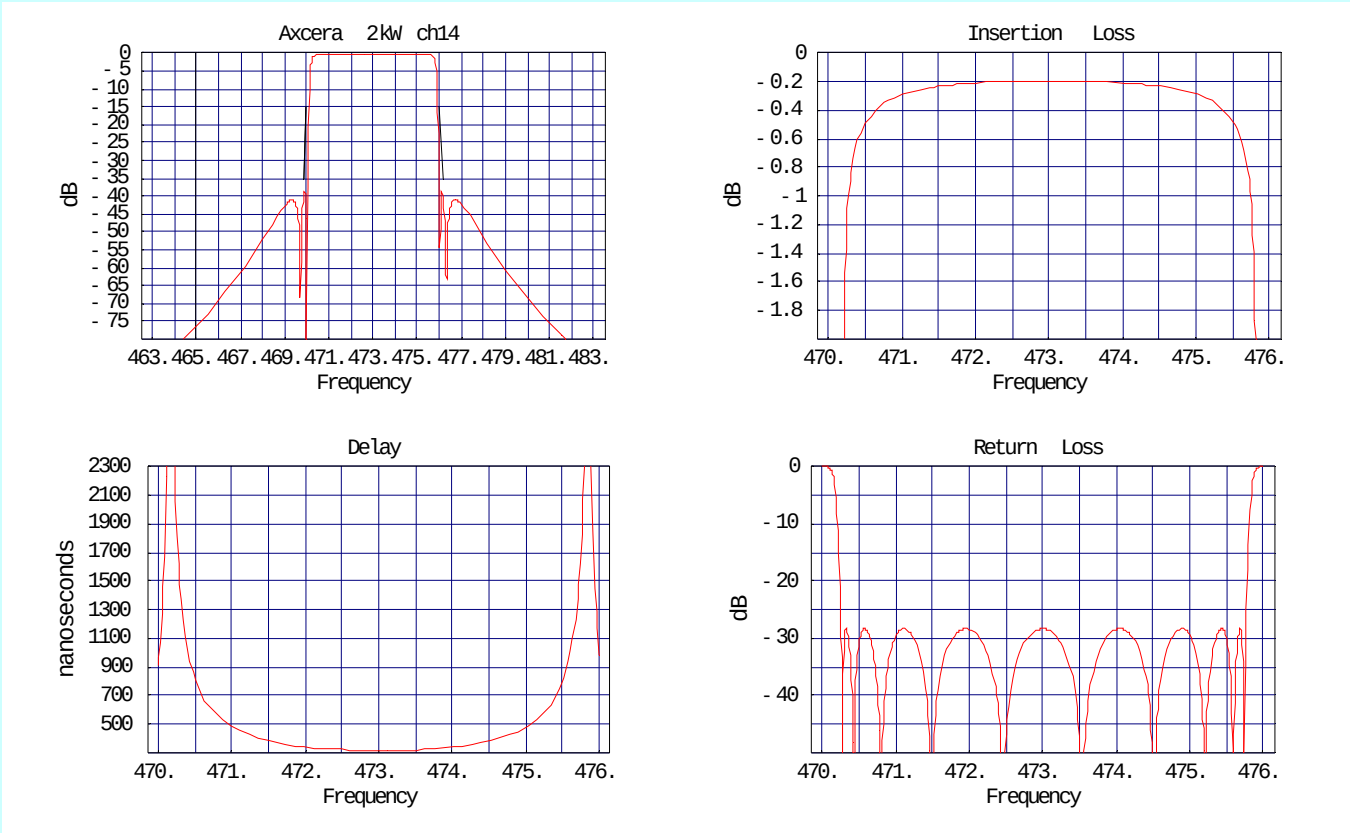
10 SECTION “STF” BANDPASS

PROVIDES EXTRA REJECTION AT BAND EDGES Fc+/- 3MHz
TO PROTECT ADJACENT CHANNEL SPECTRUM USERS



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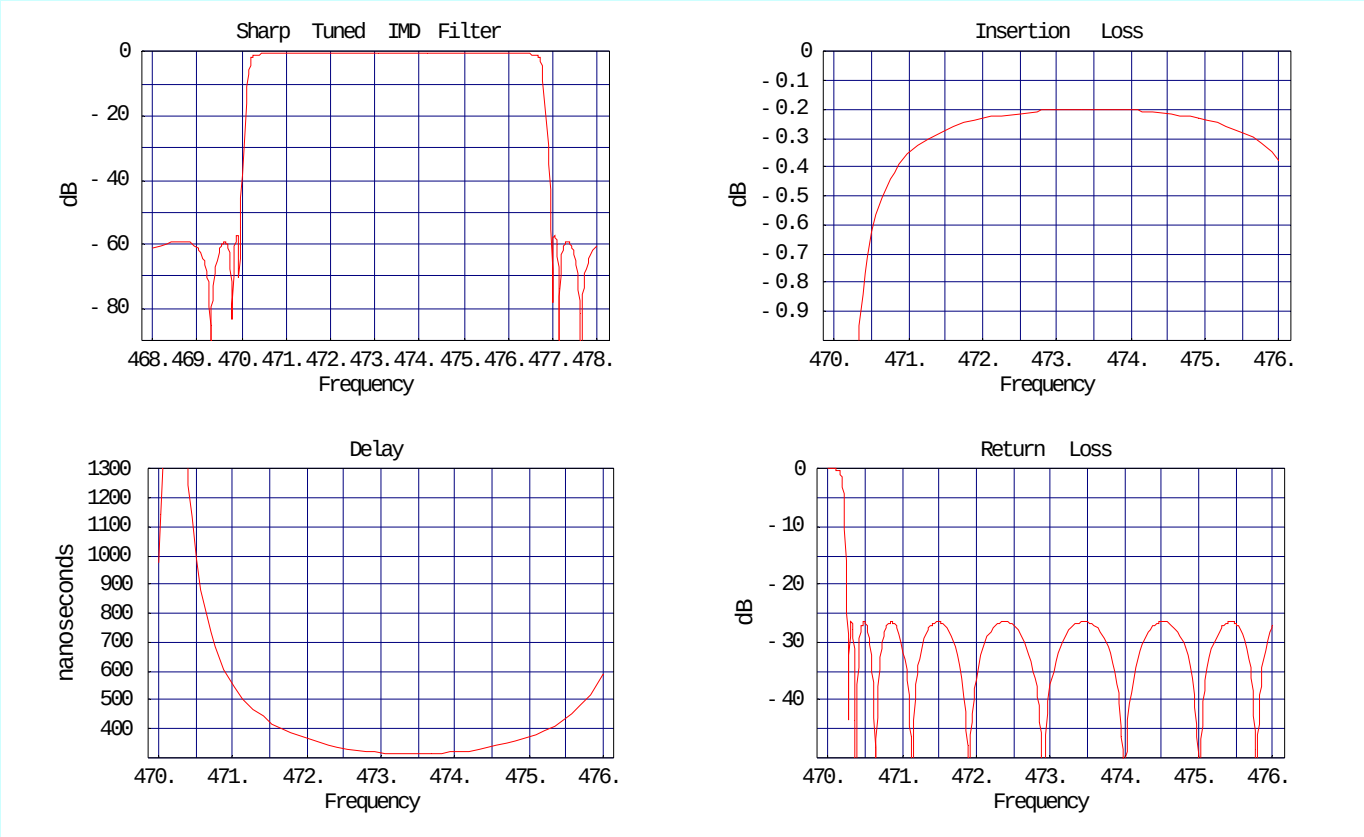
12 SECTION “STF” BANDPASS

PROVIDES EXTRA REJECTION AT BAND EDGES
TO PROTECT ADJACENT CHANNEL SPECTRUM USERS



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CASE STUDY #1:

CH 17 DTV LPTV
NYC

- NEEDED TO BE TRANSPARENT TO LOWER CHANNEL (482-488 MHz)
- CH 16 USED BY PUBLIC SAFETY SERVICES
  - FDNY
  - NYPD
  - NYCTA
  - Other NYC Agencies
- DESIGN REQUIREMENTS
  - -70dB @ Fc +/- 3.4 MHz
  - Minimize loss @ Fc +/- 2.69 MHz
- SOLUTION
  - 12 Section cross-coupled
  - Temperature Compensated

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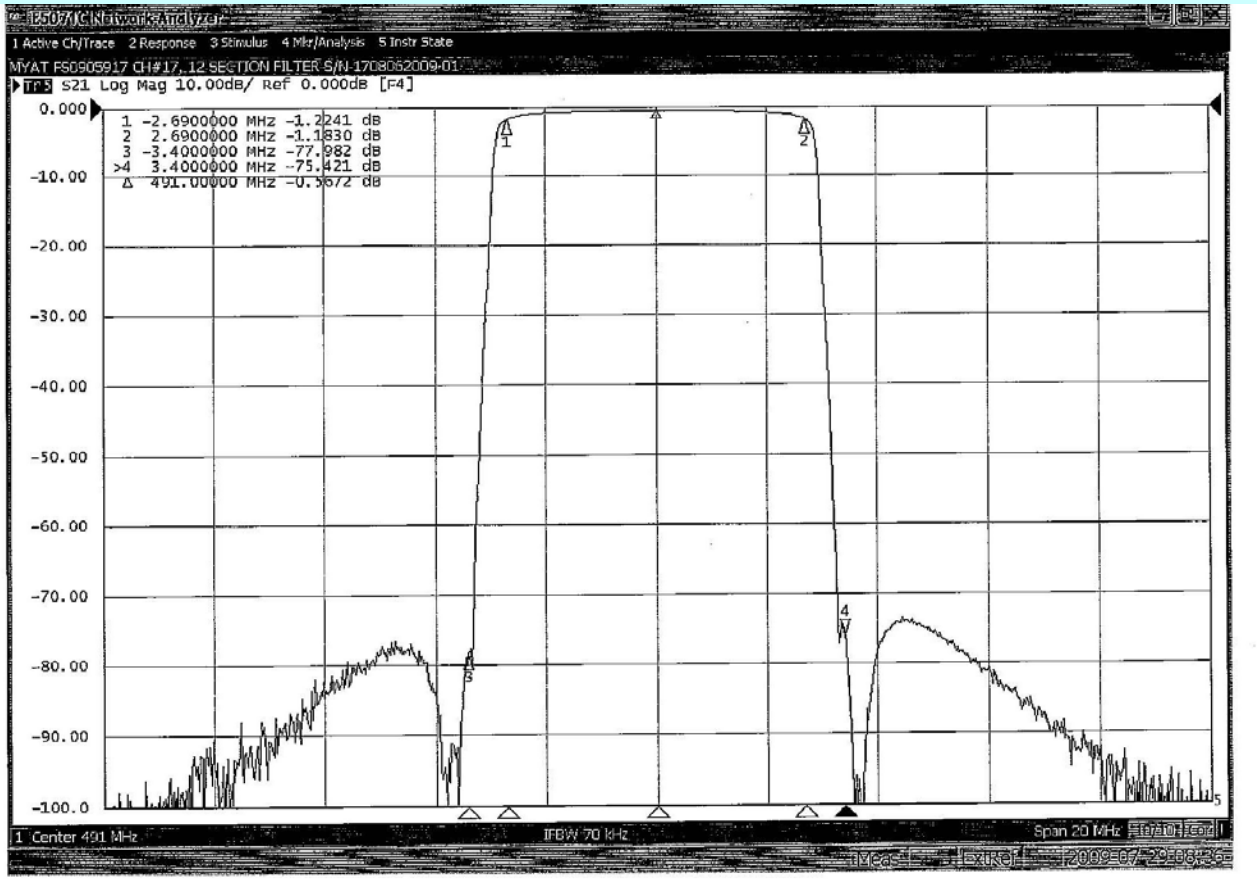
CASE STUDY #1:

MEASURED RESPONSE
12 SECTION “STF” BANDPASS
CH 17 DTV



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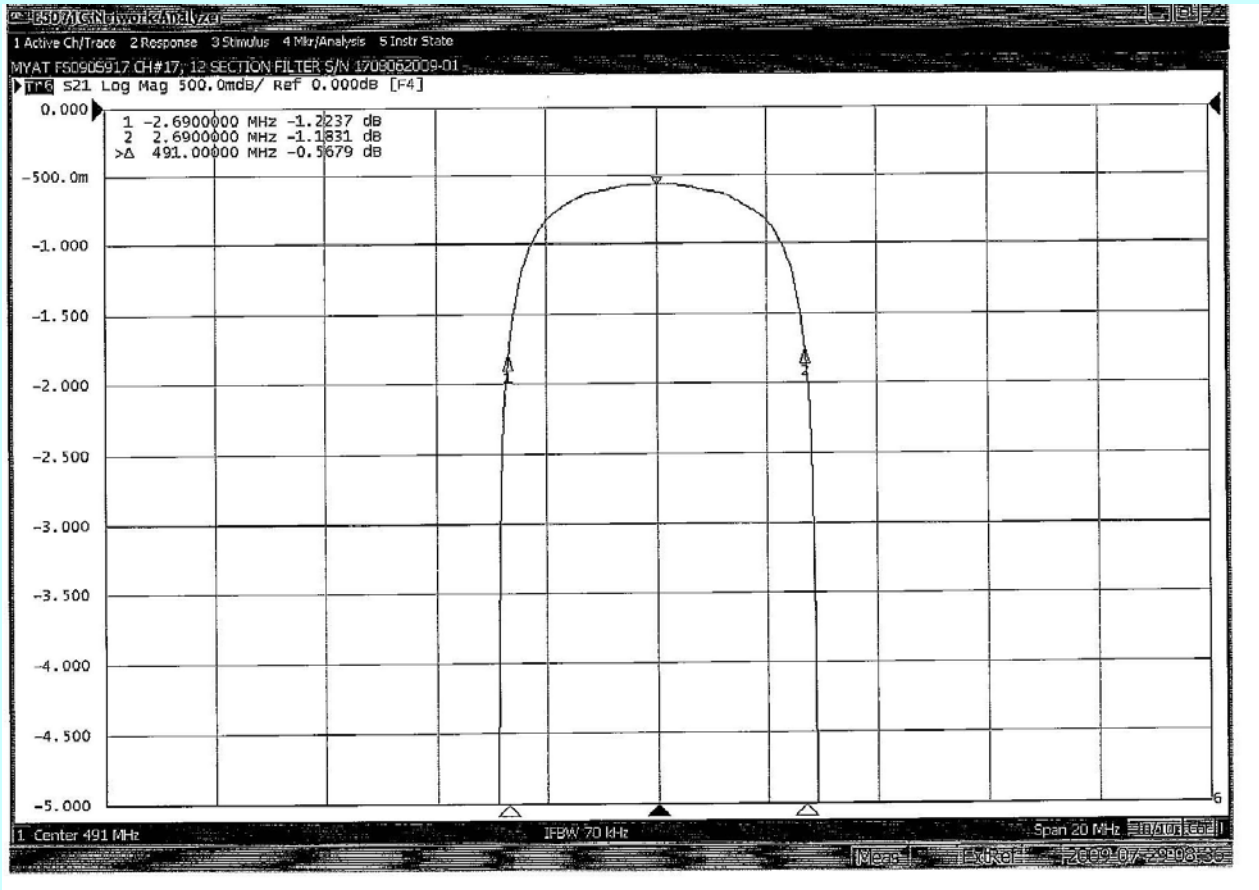
CASE STUDY #1:

MEASURED INSERTION LOSS
12 SECTION “STF” BANDPASS
CH 17 DTV



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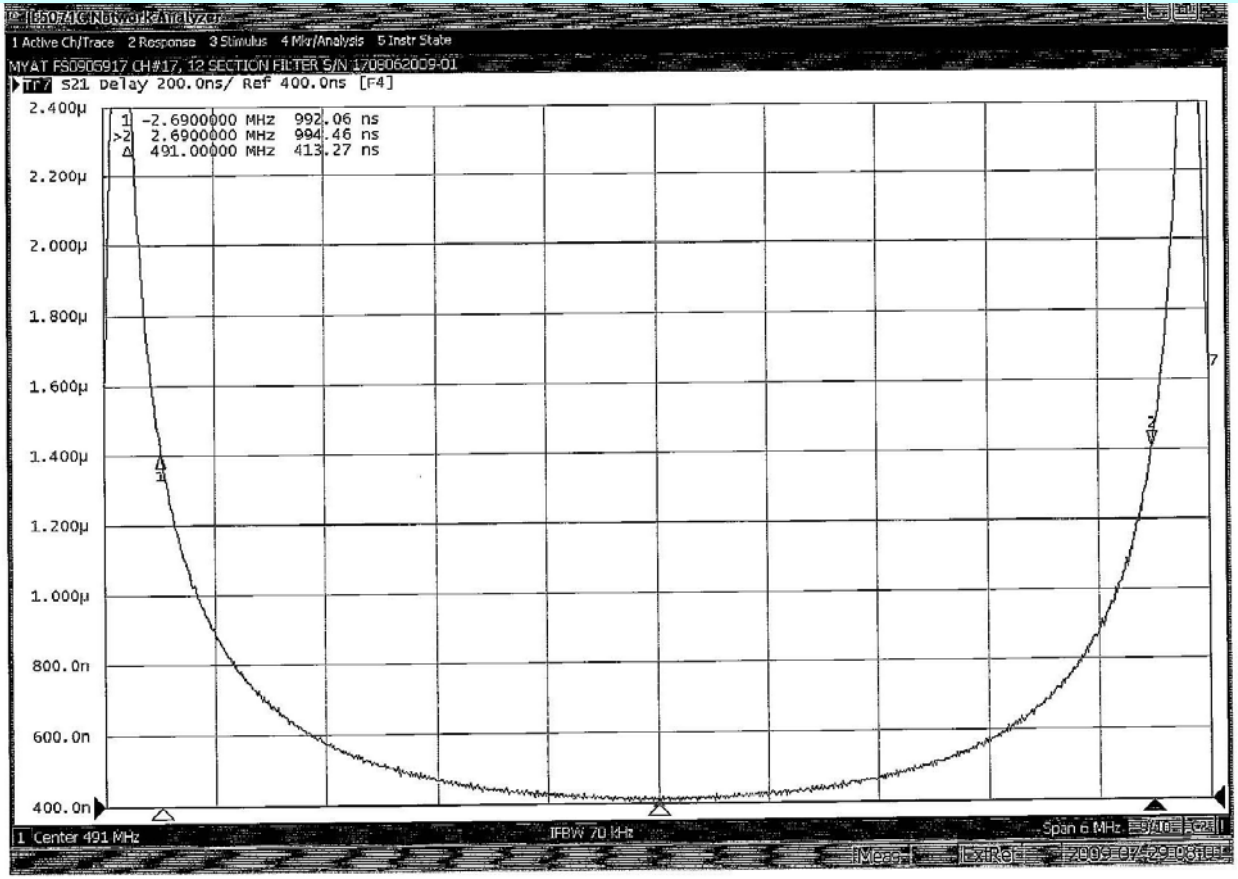
CASE STUDY #1:

MEASURED GROUP DELAY
12 SECTION “STF” BANDPASS
CH 17 DTV



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CASE STUDY #2:

CH 55
NATIONWIDE ROLL-OUT

- NEEDED TO BE TRANSPARENT TO UPPER AND LOWER CHANNELS
- DESIGN REQUIREMENTS
  - 50dB @ Fc +/- 3.0 MHz
  - Used a wider band Fc +/- 2.71 MHz
    - 5.42 MHz vs. 5.38 MHz
  - Low Loss due to higher TPO
    - Increased efficiency
    - Lower operating costs
- SOLUTION
  - DUAL MODE 12 SECTION
  - INVAR FOR TEMPERATURE STABILITY

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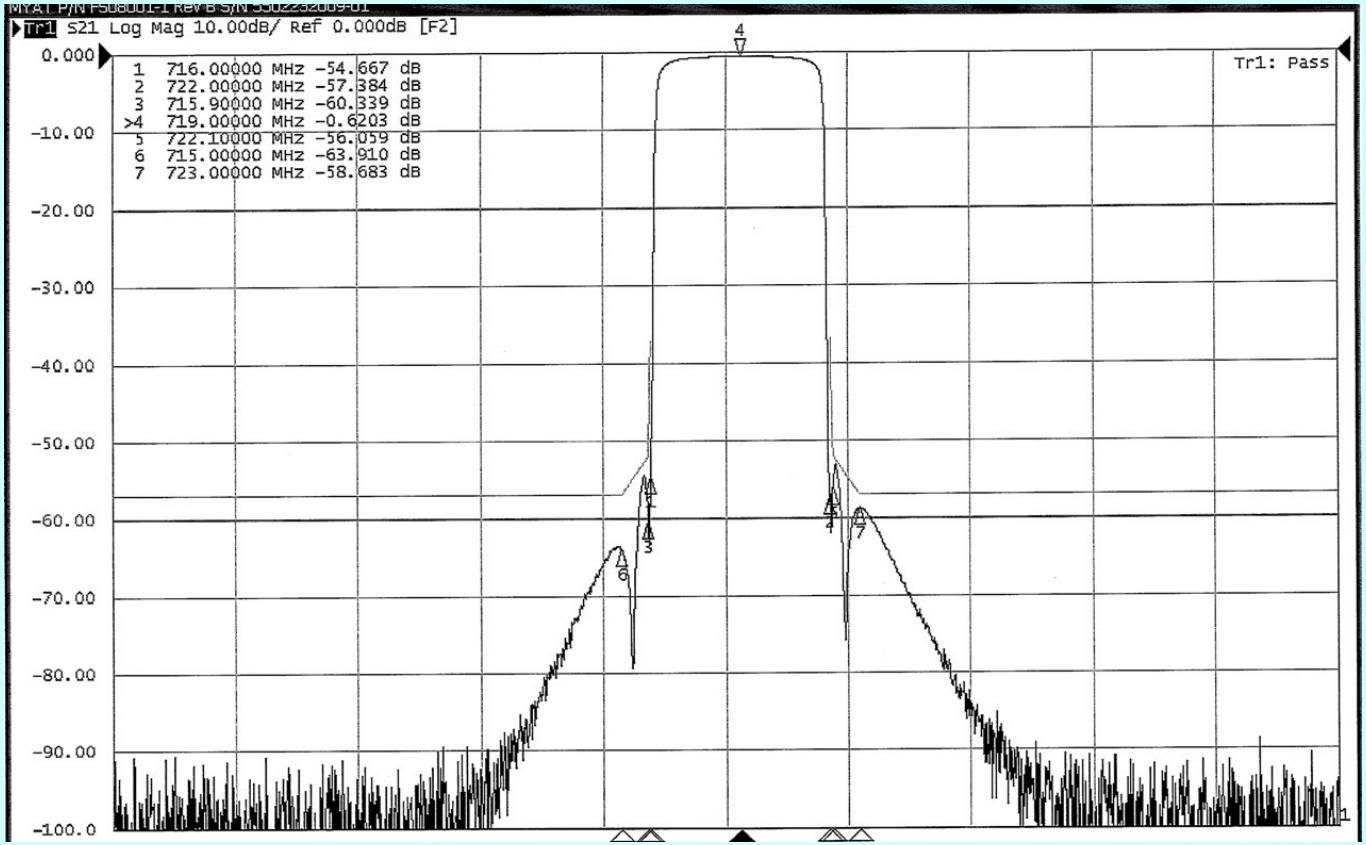
CASE STUDY #2:

MEASURED REJECTION
12 SECTION “STF” BANDPASS
CH 55

Fc+/- 3MHz

-55dB !



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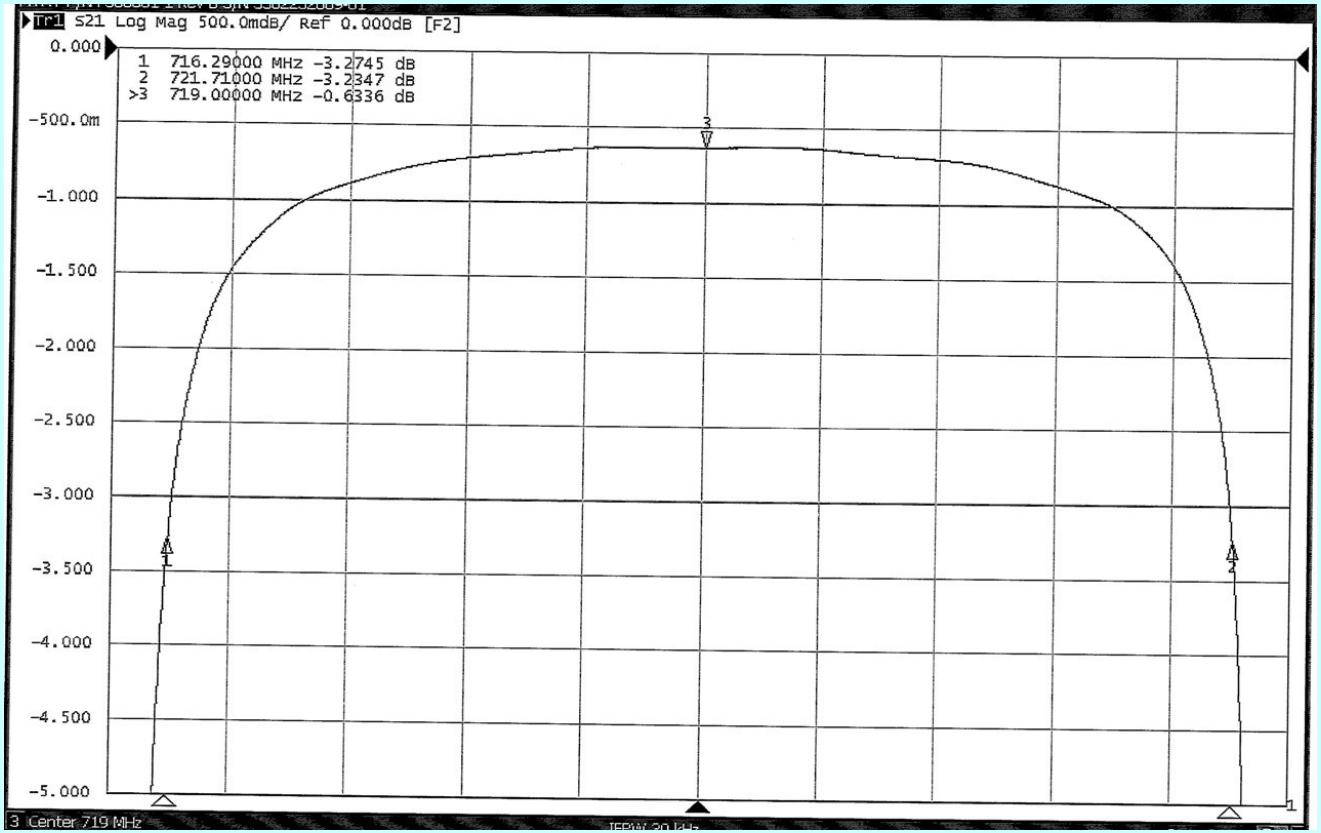
CASE STUDY #2:

MEASURED INSERTION LOSS
12 SECTION “STF” BANDPASS
CH 55



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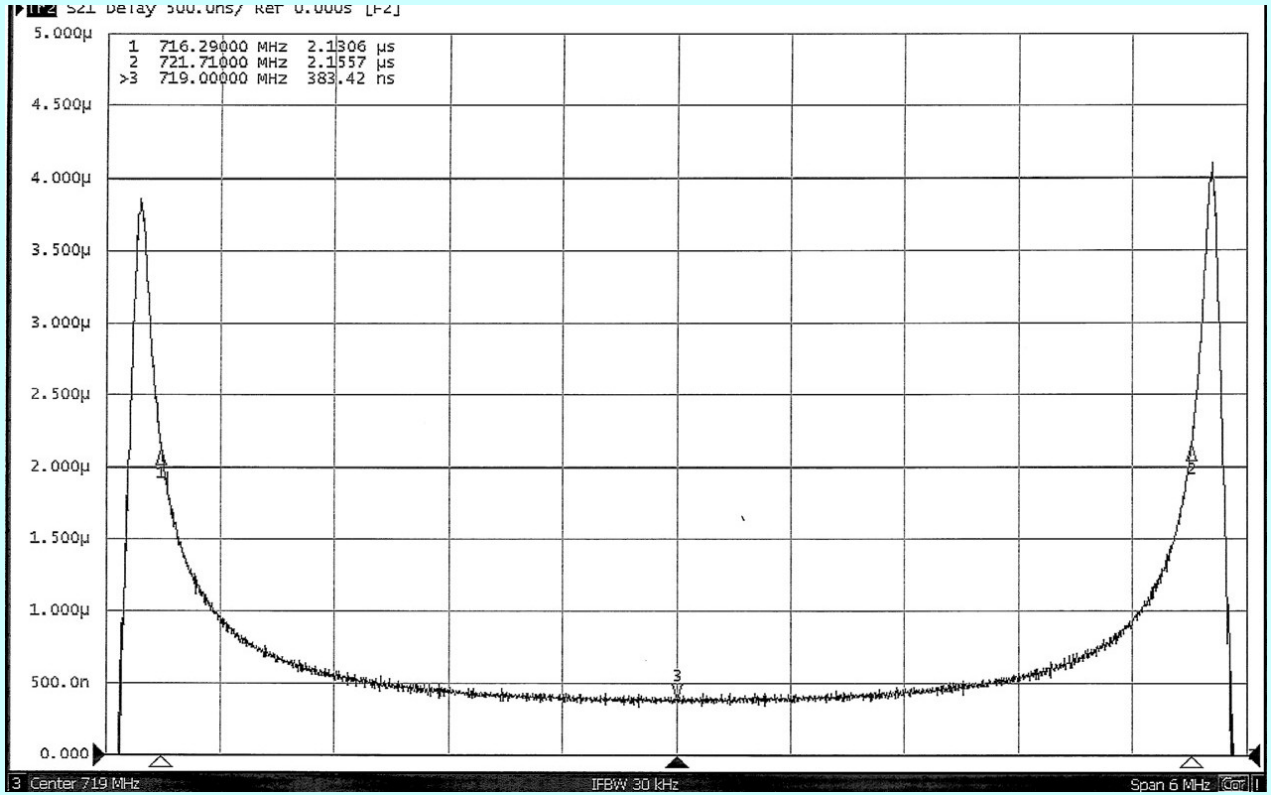
CASE STUDY #2:

MEASURED GROUP DELAY
12 SECTION “STF” BANDPASS
CH 55



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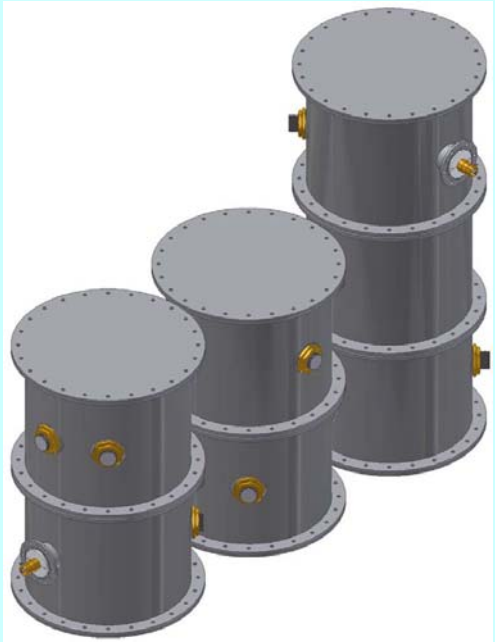
CASE STUDY #3

CH 14 DTV
470.31-475.69 MHz

- PROTECT LAND MOBILES
  - Operating from 465 to 469.2 MHz
  - Only 1.1 MHz from lower band edge
- DESIGN REQUIREMENTS
  - Minimal effects on CH 14 DTV
  - Minimum of -125 dB rejection required from 469.2 MHz to 465 MHz
  - -110 db below 465 MHz
  - Size restriction
- SOLUTION
  - Dual Mode 14 Section
  - INVAR for temperature stability
  - Constant Impedance design for low VSWR



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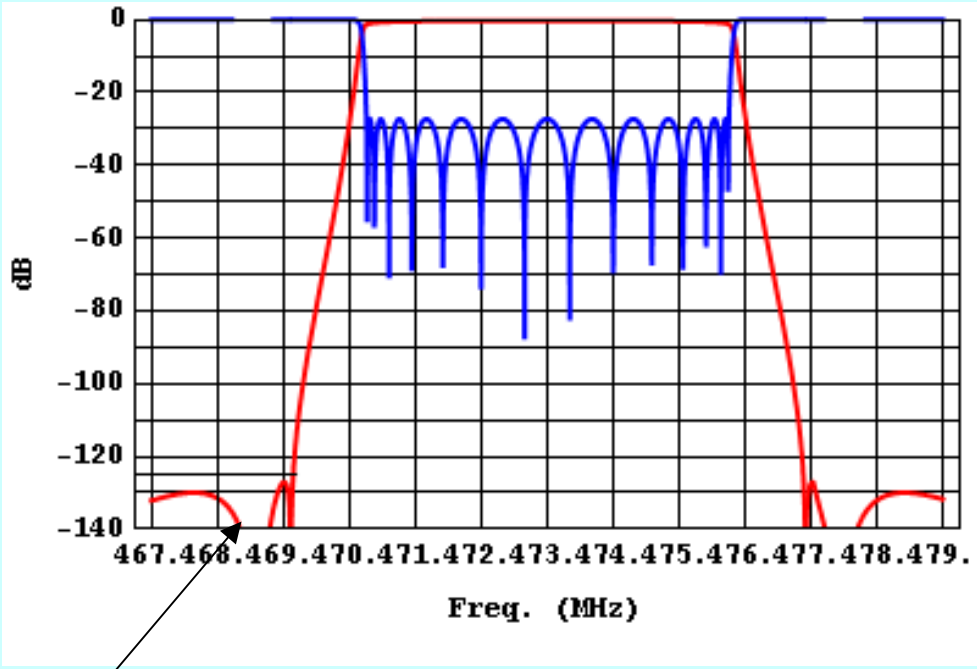
PROPOSED 14 SECTION “STF” BANDPASS FOR PROTECTION BELOW CH 14 465-470MHz CLOSEST MOBILE IS 468.2875MHz

POST-FILTER SUPPRESSION REQUIREMENT

143dB @ 468.2875MHz



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Cascaded Filter Experiment

•Existing installation with 6 pole filter requiring additional out of band attenuation after sign-on

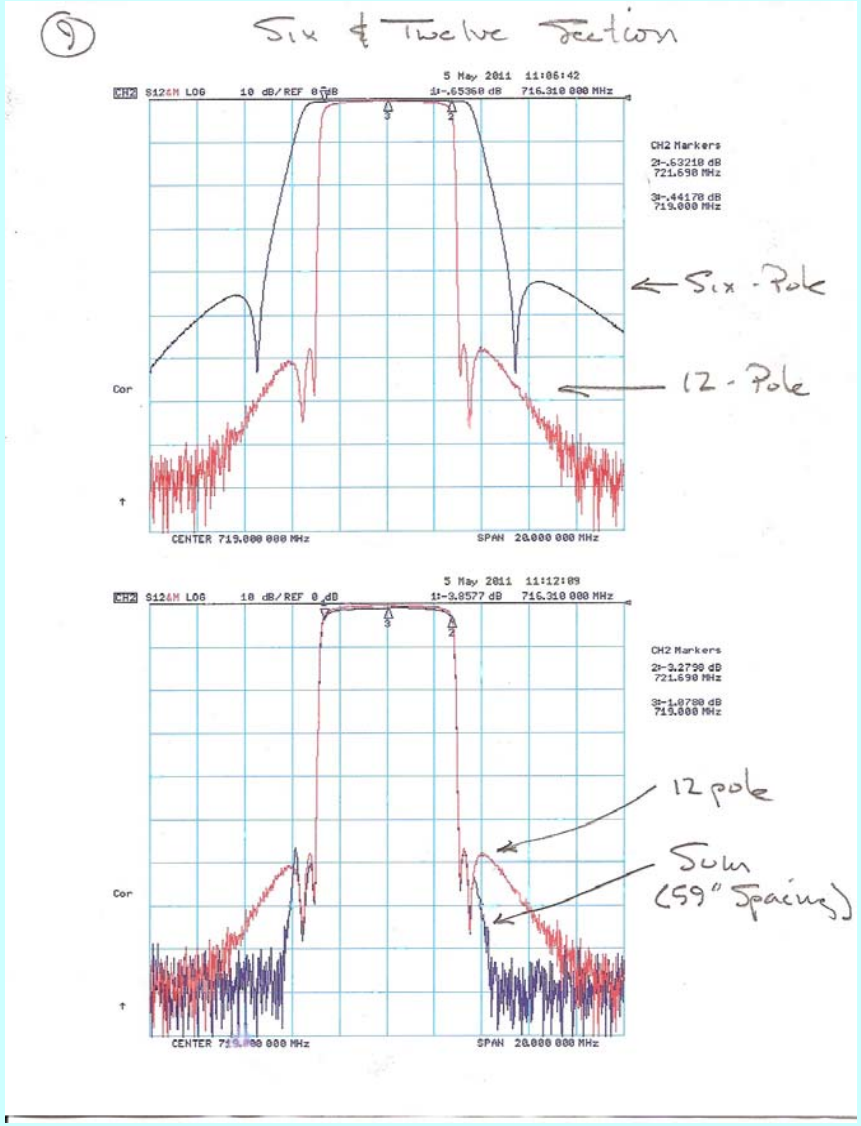
•A new filter was be added to the output of the existing 6 pole filter.

•The spacing between these two filters was adjusted

• The sum rejection is shown in lower plot

• Group Delay numbers add

• VSWR can be optimized



INDIVIDUAL RESPONSES

SUM OF BOTH FILTERS CASCADED

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PERFORMANCE SUMMARY

	6 pole	8 pole	10 pole	12-mild	12-special	14 pole
VSWR	1.08:1	1.08:1	1.1:1	1.2:1	1.2:1	1.2:1
LOSS (dB)						
@ Fc	0.15 dB	0.15 dB	0.20 dB	0.60 dB	0.70 dB	0.35 dB
+/- 2.69MHz	0.25 dB	0.35 dB	0.9 dB	1.2 dB	2.4 dB	1.25 dB
REJECTION (dB)						
+/- 3.0	0.30 dB	1.0 dB	30 dB	20 dB	55 dB	30 dB
+/- 3.5	6 dB	25 dB	40 dB	75 dB	60 dB	125 dB
+/- 6.0	40 dB	55 dB	60 dB		70 dB	125 dB
+/- 9.0	64 dB	64 dB	70 dB	90 dB	90 dB	125 dB
DELAY (ns)						
+/- 2.69MHz	100 ns	400 ns	1000 ns	990 ns	1800 ns	2200 ns

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QUESTIONS ?

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