




Contest Forum
Friedrichshafen - June 29, 2013



HP Triplexers and their Use in Contest Stations

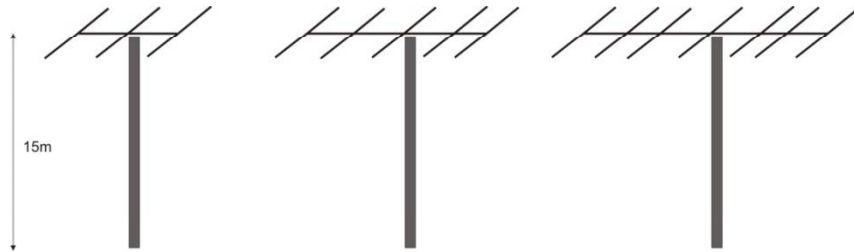
Ranko Boca, 4O3A
SKY SAT Communications

WHY SHOULD WE USE TRIBANDERS?

- Let's see my basic antenna rules 
- What is the most important element determining effectiveness of contest antennas?
 - LOW TAKE OFF ANGLE!
- How to achieve low take of angle?
 - INCREASE HEIGHT!

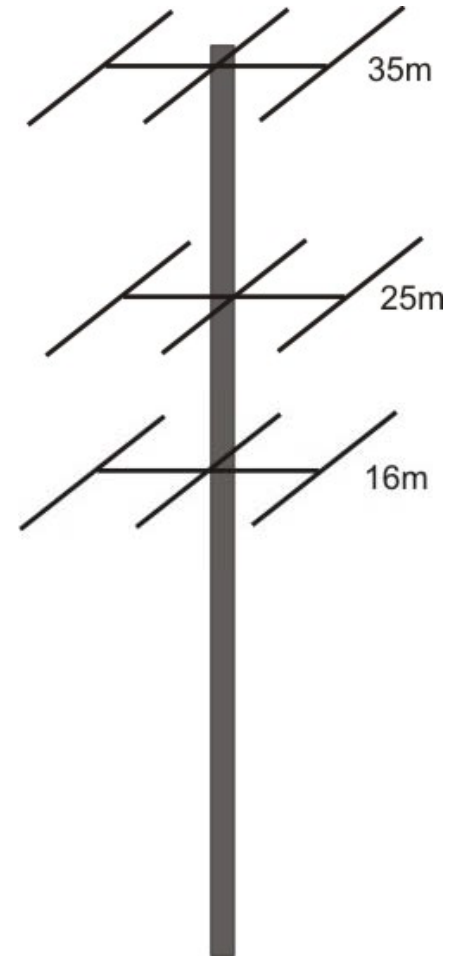
ANTENNA DIAGRAM AS FUNCTION OF HEIGHT AND SIZE

?



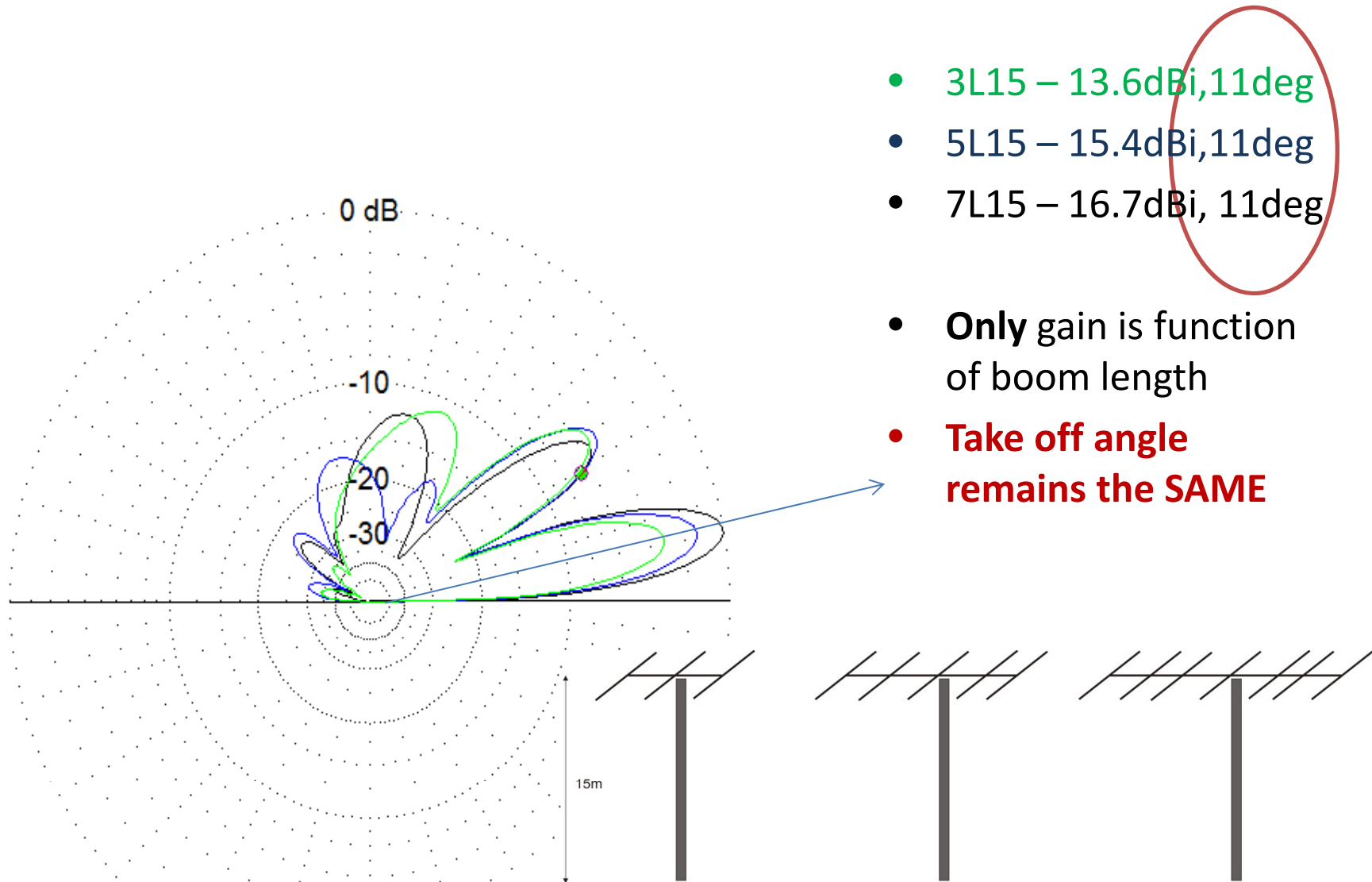
Same height – different boom length

V.S.



Same boom lengths – different heights

SAME HEIGHT-DIFFERENT BOOM LENGTH



ANTENNAS OUTCOME AS FUNCTION OF HEIGHT AND SIZE

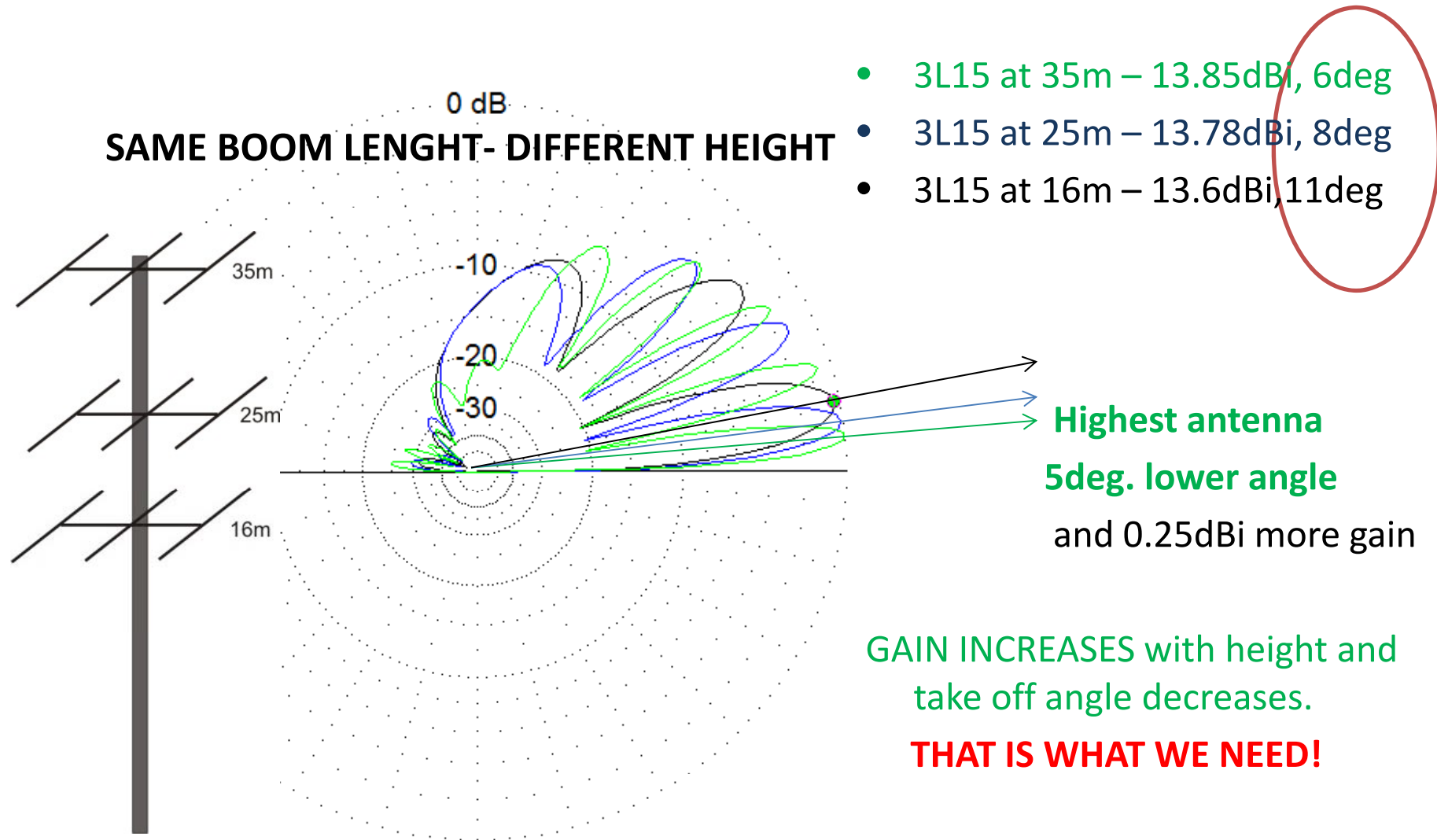
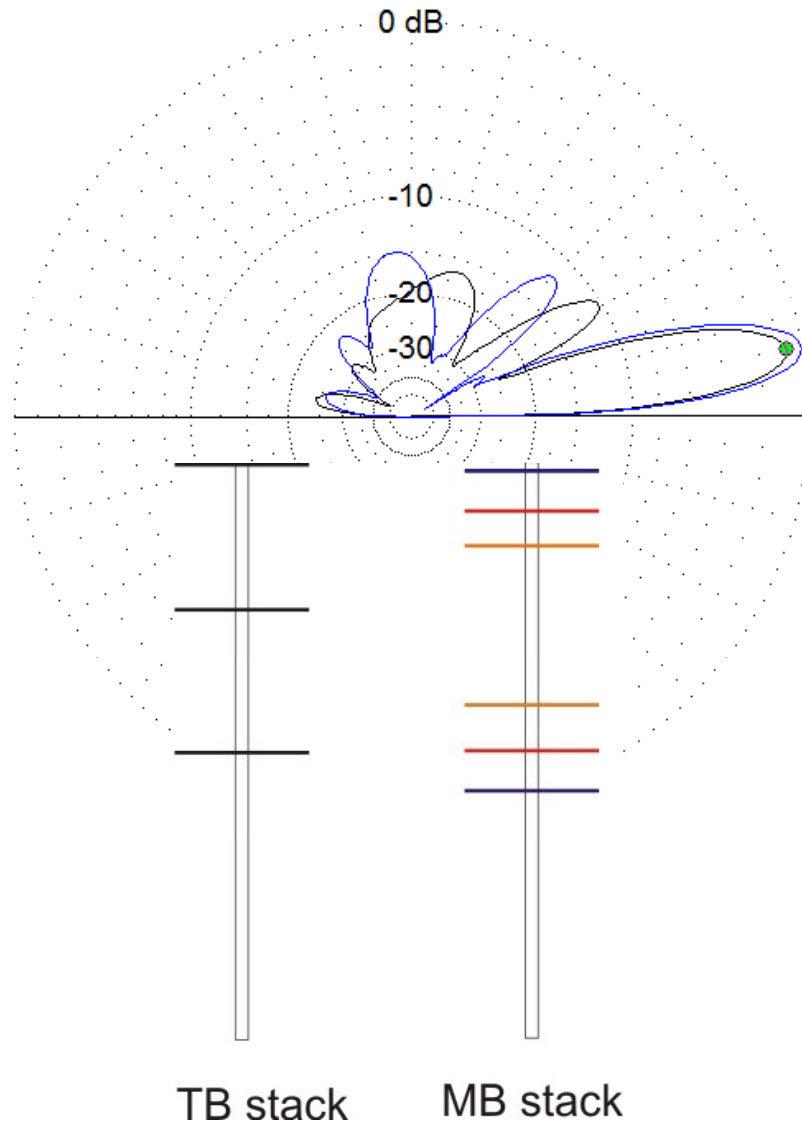


DIAGRAM COMPARISON ON 20M



STACK 2x5L20

36m_16m

17.21dBi – 10deg

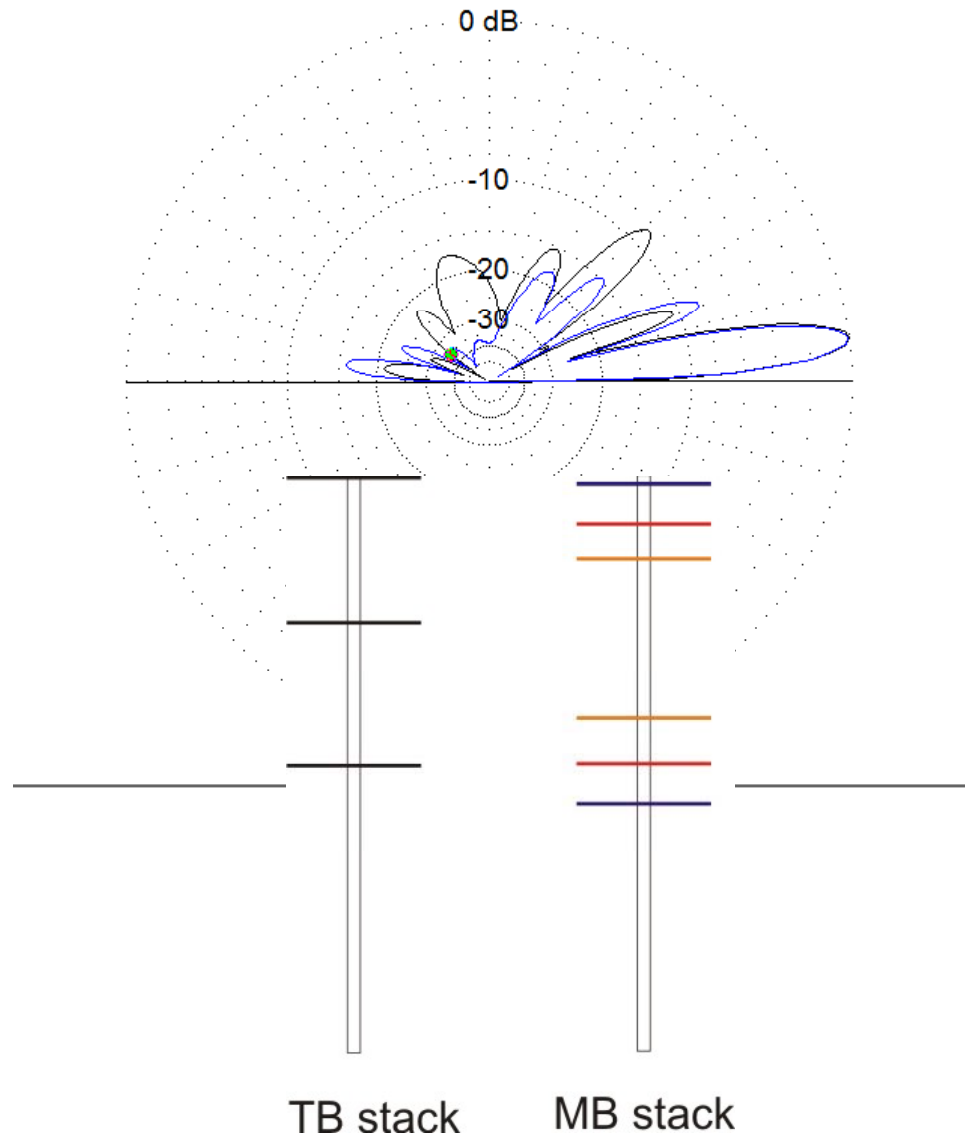
Tribander STACK (3x3L20)

18m_27m_36m

16.51dBi – 10deg

0.7dBi less gain, SAME ANGLE

DIAGRAM COMPARISON ON 15M



STACK 2x5L15

33m_18m

18.04dBi – 7deg

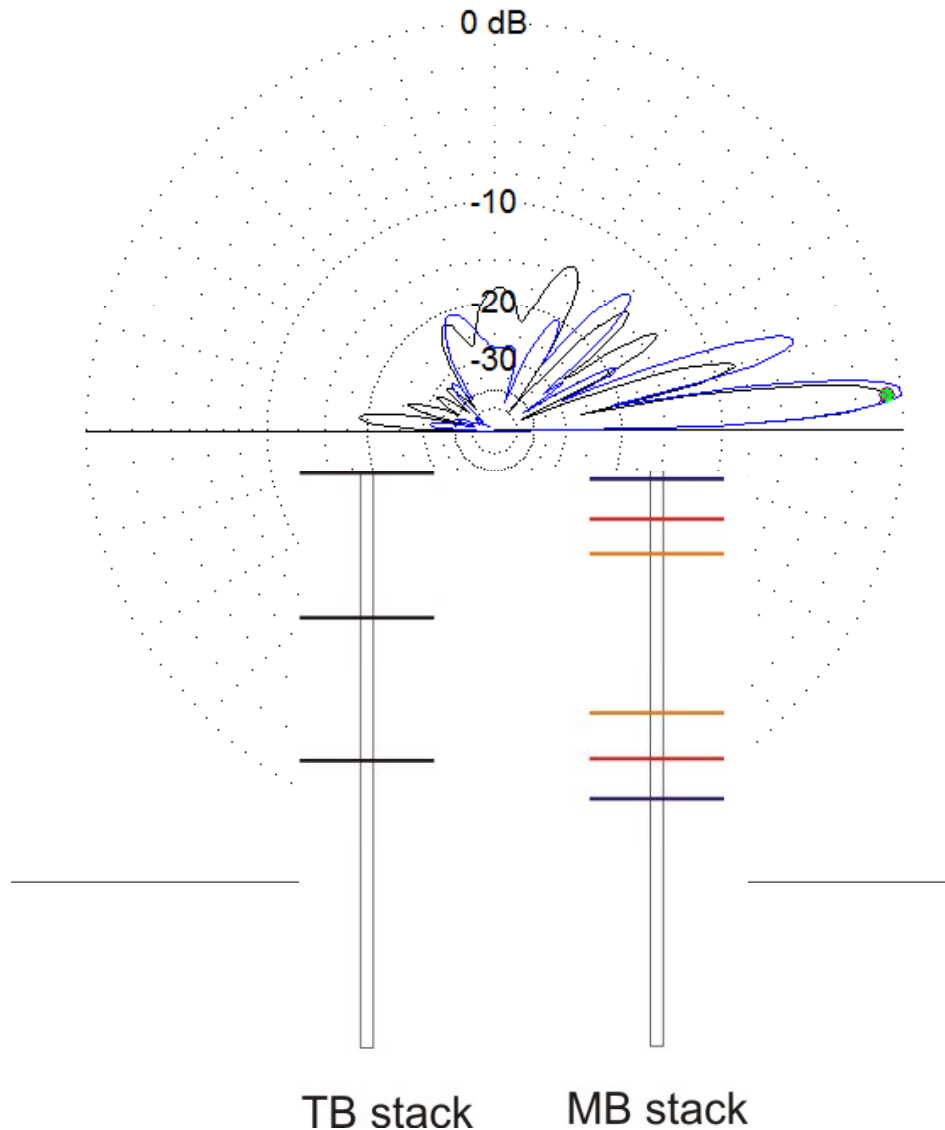
STACK 3x3L15

18m_27m_36m

17.98dBi – 7deg

EQUAL!!

DIAGRAM COMPARISON ON 10M



STACK 2x6L10

31m_22m

19.05dBi – 5deg

STACK 3x4L10

18m_27m_36m

18.47dBi – 5deg

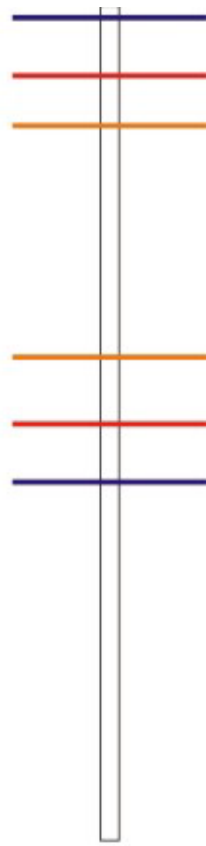
SAME ANGLE

0.58dB less gain

COMPARISON



TB stack

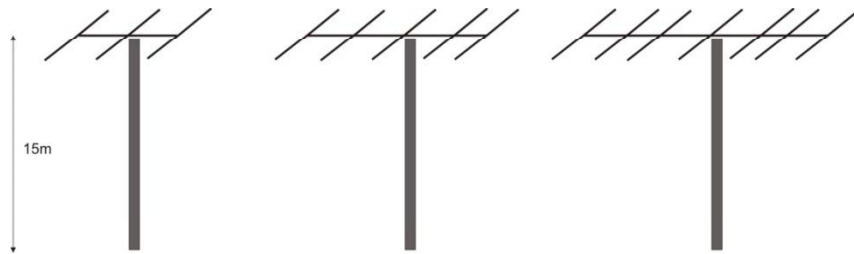


MB stack

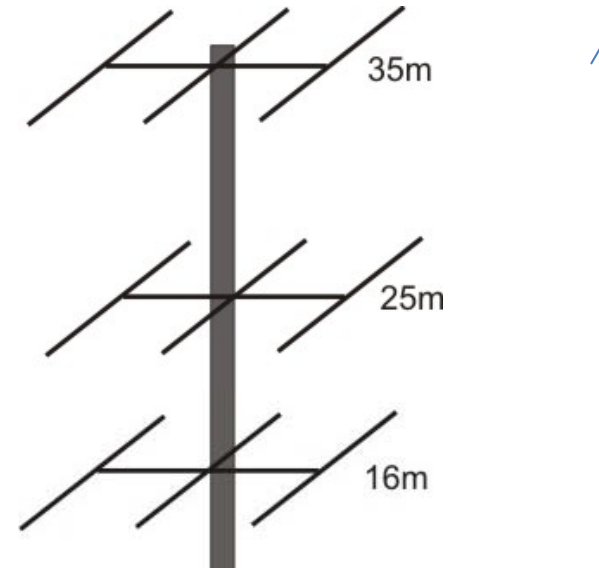
MONOBANDERS	TRIBANDERS
More antennas	Less antennas
Bigger antennas (6 monobanders)	Smaller antennas (3 small TB)
3x coax feed	One coax feed
More connectors	Less connectors - more reliable
Bigger weight on tower	Less weight
Larger wind surface	Smaller wind surface
	Wider AZ pattern
	SAME or lower EL angle
	About the same gain

THINK VERTICALLY – DO NOT WASTE MONEY ON LARGE ANTENNAS

POOR APPROACH



Same height – different boom length



GOOD APPROACH

V.S.

Same antennas – different boom length



TRIBANDERS' ADVANTAGES

(Smaller is better?)



- Tribanders are always:
- On maximum effective height on all 3 bands
(Max gain and **lowest EL angle possible**)
- Optimized for best performance on the same boom

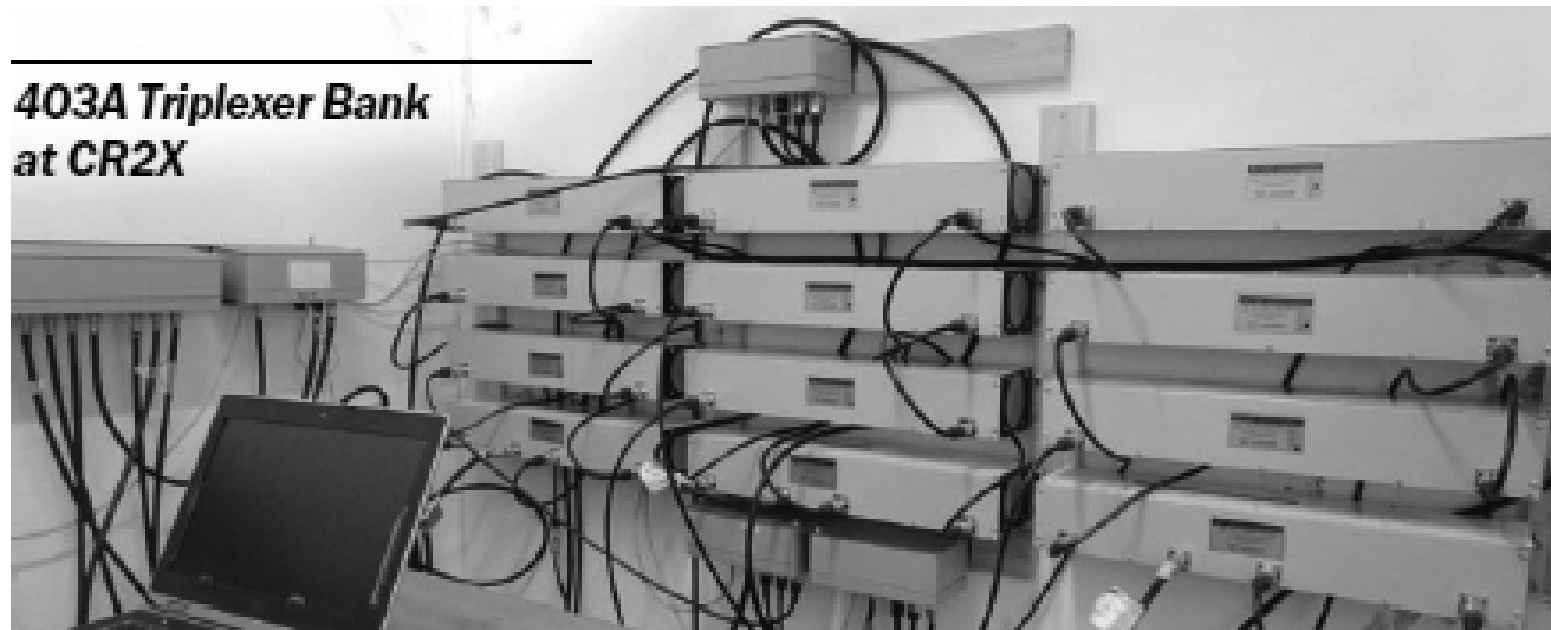
HOW TO USE TRIBANDERS MORE FLEXIBLY

- Only limit we had in the past was that we have one coaxial cable feeding antenna and it was impossible to use it on more than one band per time
- With High Power Triplexer for HF you can share antenna through one coaxial line on 3 radios at the same time, with no interference

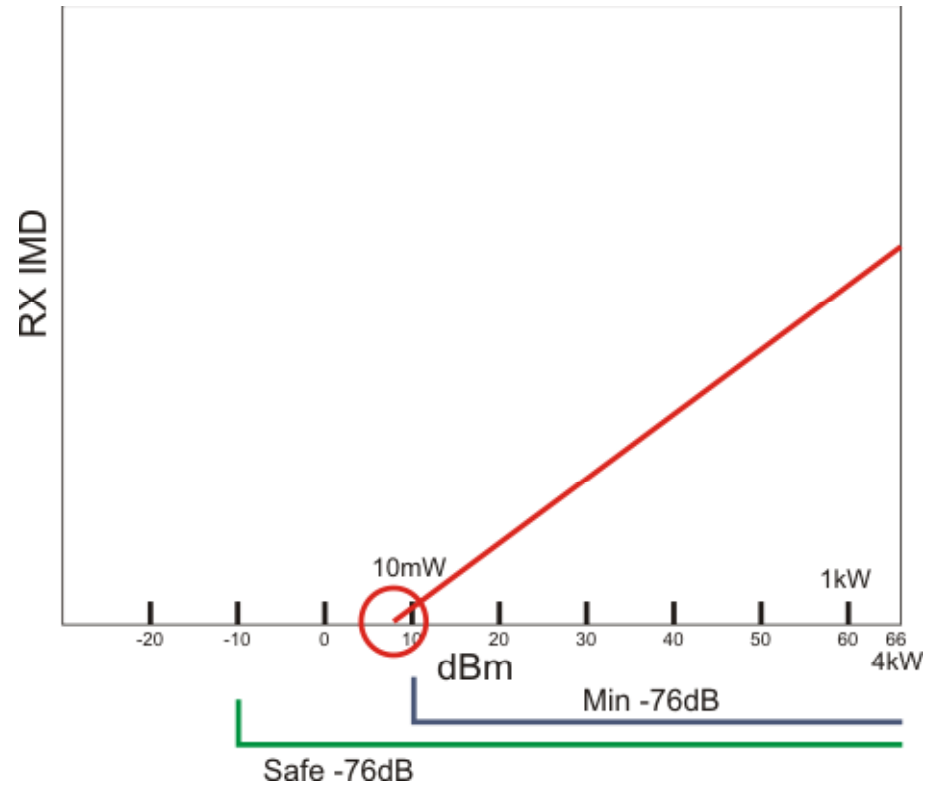
HP HF TRIPLEXER

Opens new horizons for tribanders usage

- Triplexer system consists of a combiner and 3 band pass filters

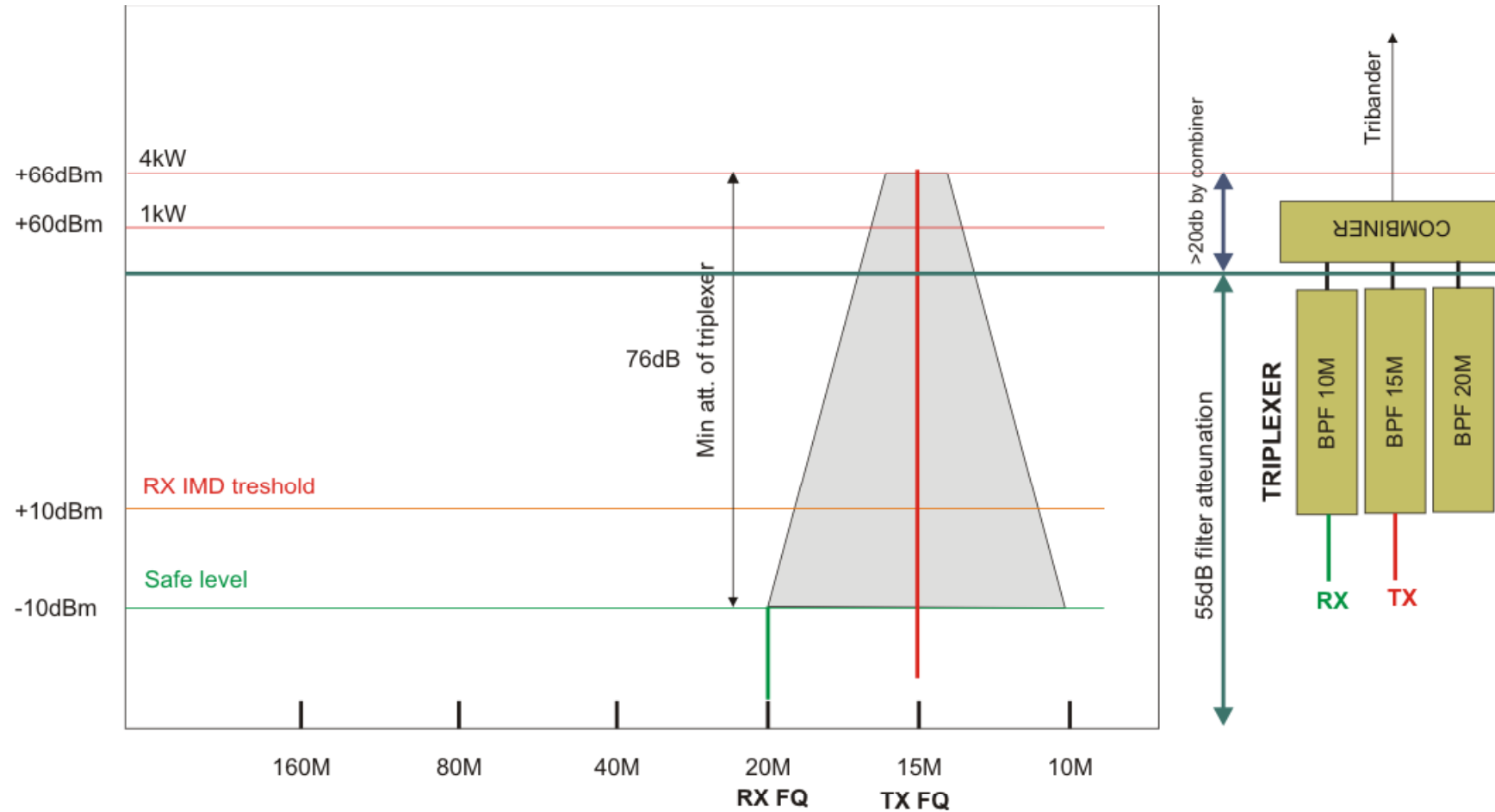


WHAT IS SAFE RF LEVEL FOR OUR RECEIVER?





WHAT IS THE TASK?





COMBINER'S TASK



- Combining 3 x 50 Ohm band inputs to one 50 Ohm output
- Adding necessary attenuation of minimum 20dB

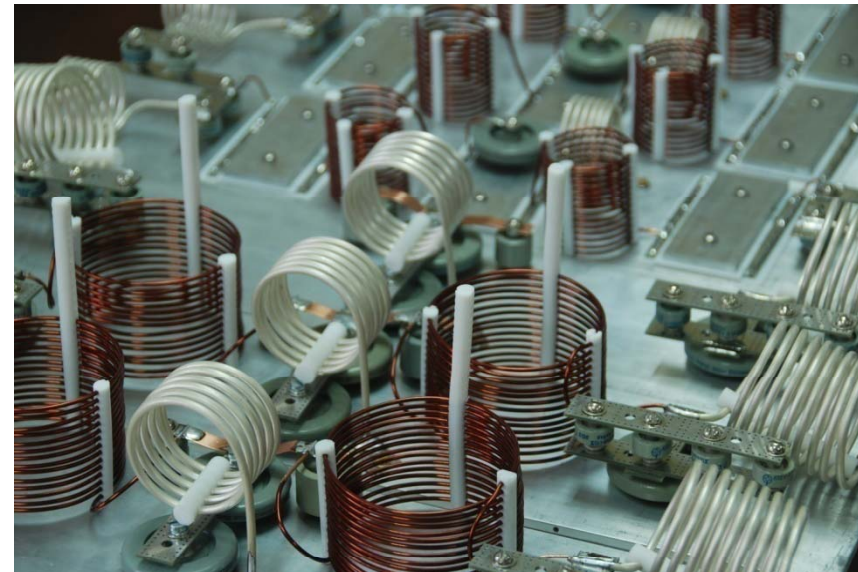




WHAT IS INSIDE



- Well designed RF circuits
- Mechanically stable Hi Q coils and High Current/Hi Q ceramic capacitors
- Professional work shop
- Highest quality RF material
- Experience built in
- Every product measured and passed QC





SAVINGS VS MONOBANDERS



- Lighter tower
- Less antennas
- Less space
- Smaller antennas
- Less coaxial cables
- Less connectors – higher reliability
- One power splitter on tower, instead of 3

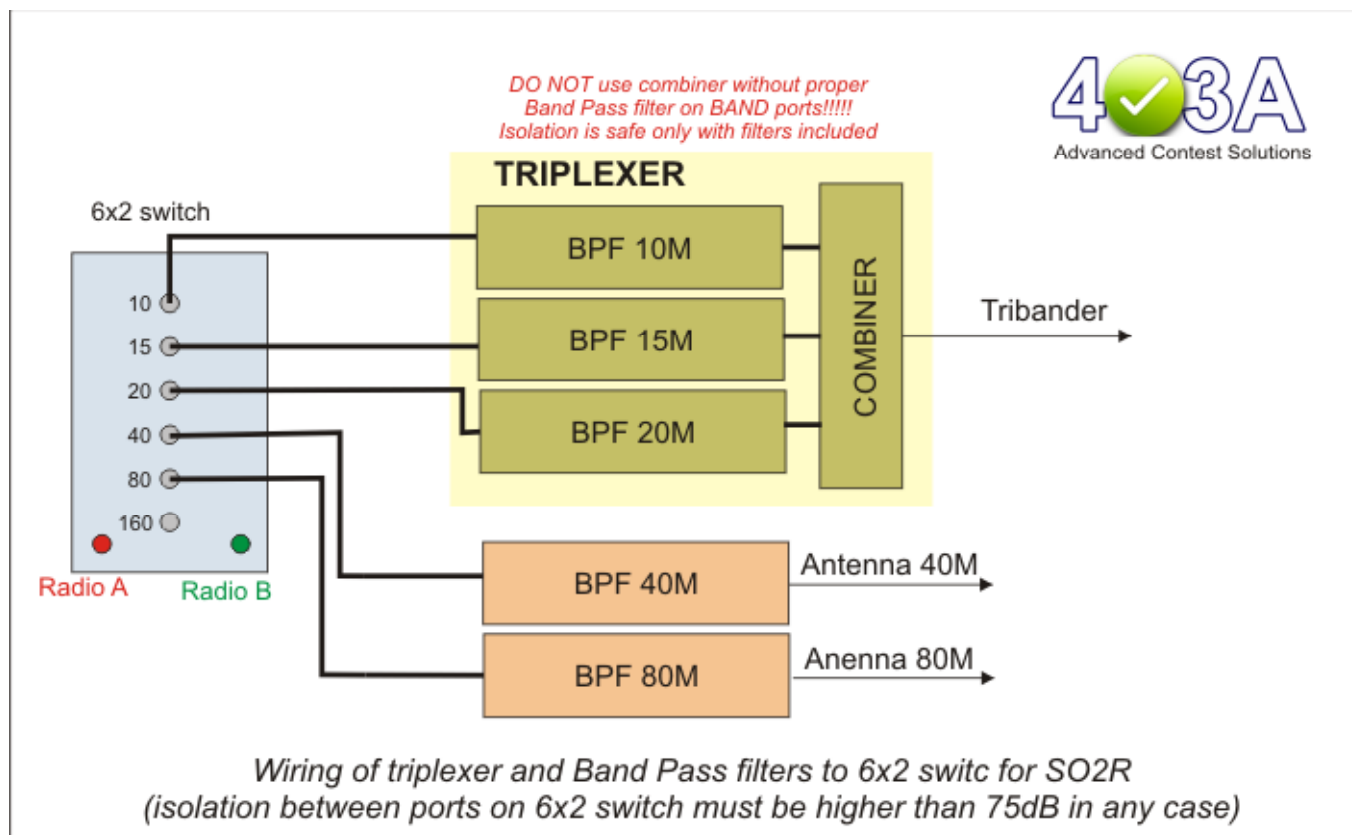
SIMPLICITY

Same tower@403A with tribanders and monobanders



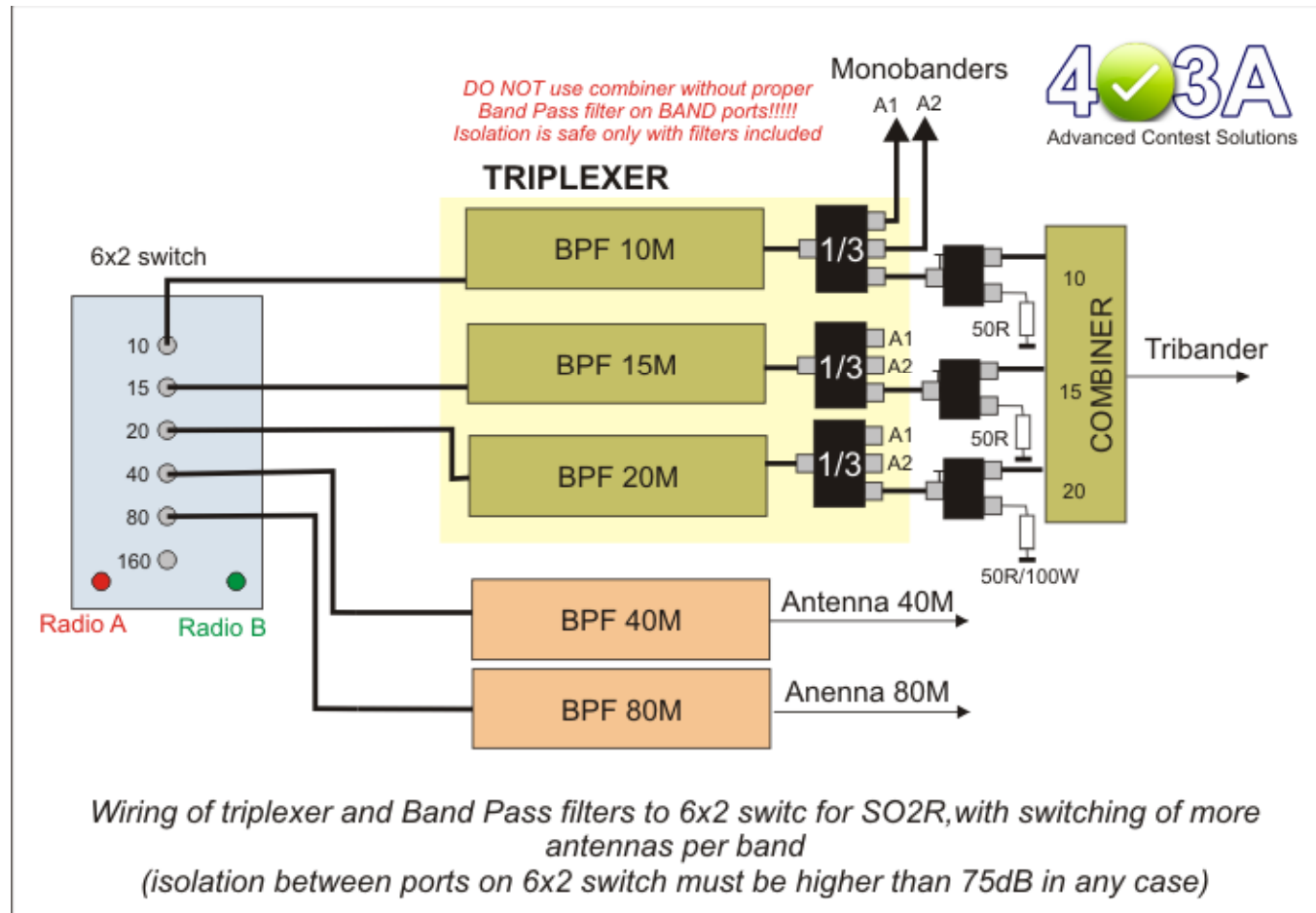


SO2R WITH TRIBANDER





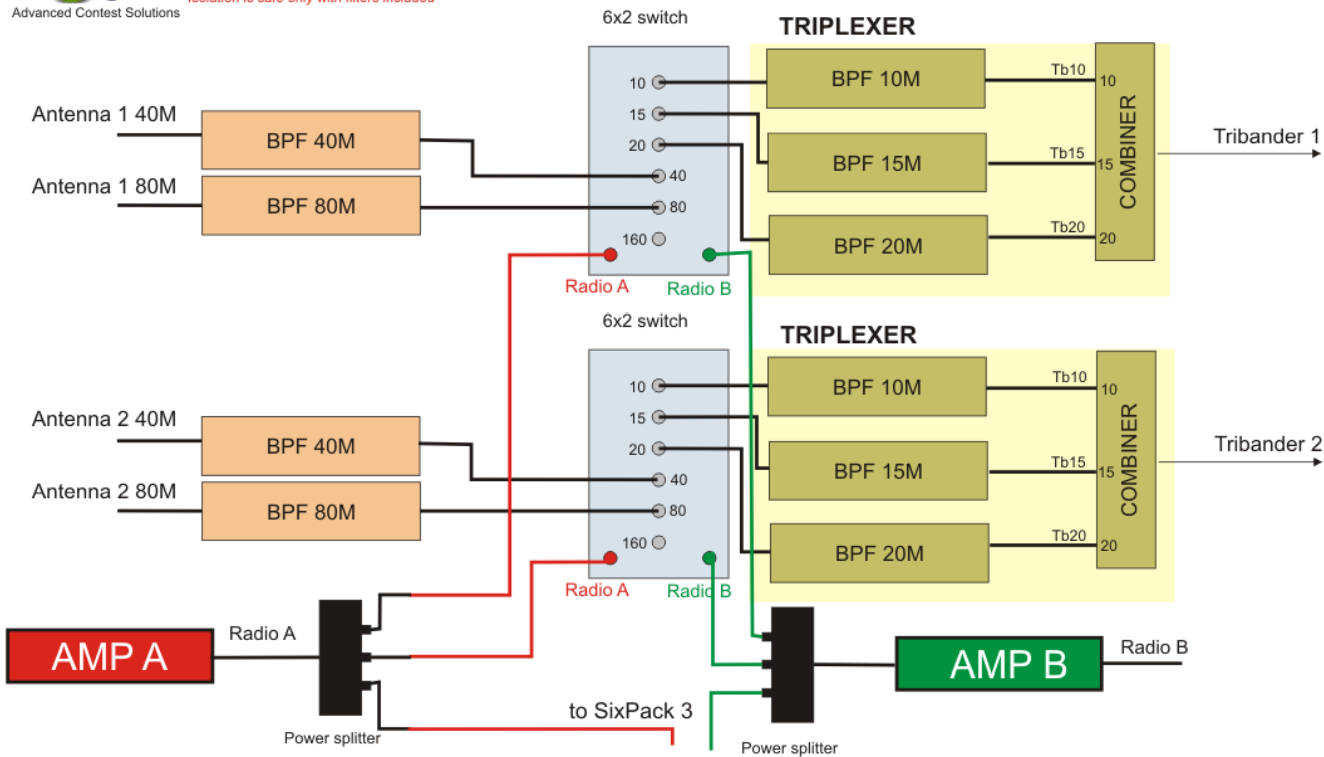
SO2R WITH TRIBANDERS AND MONOBANDERS



TWO TRIBANDERS WITH TWO DIRECTIONS



*DO NOT use combiner without proper Band Pass filter on BAND ports!!!!!!
Isolation is safe only with filters included*



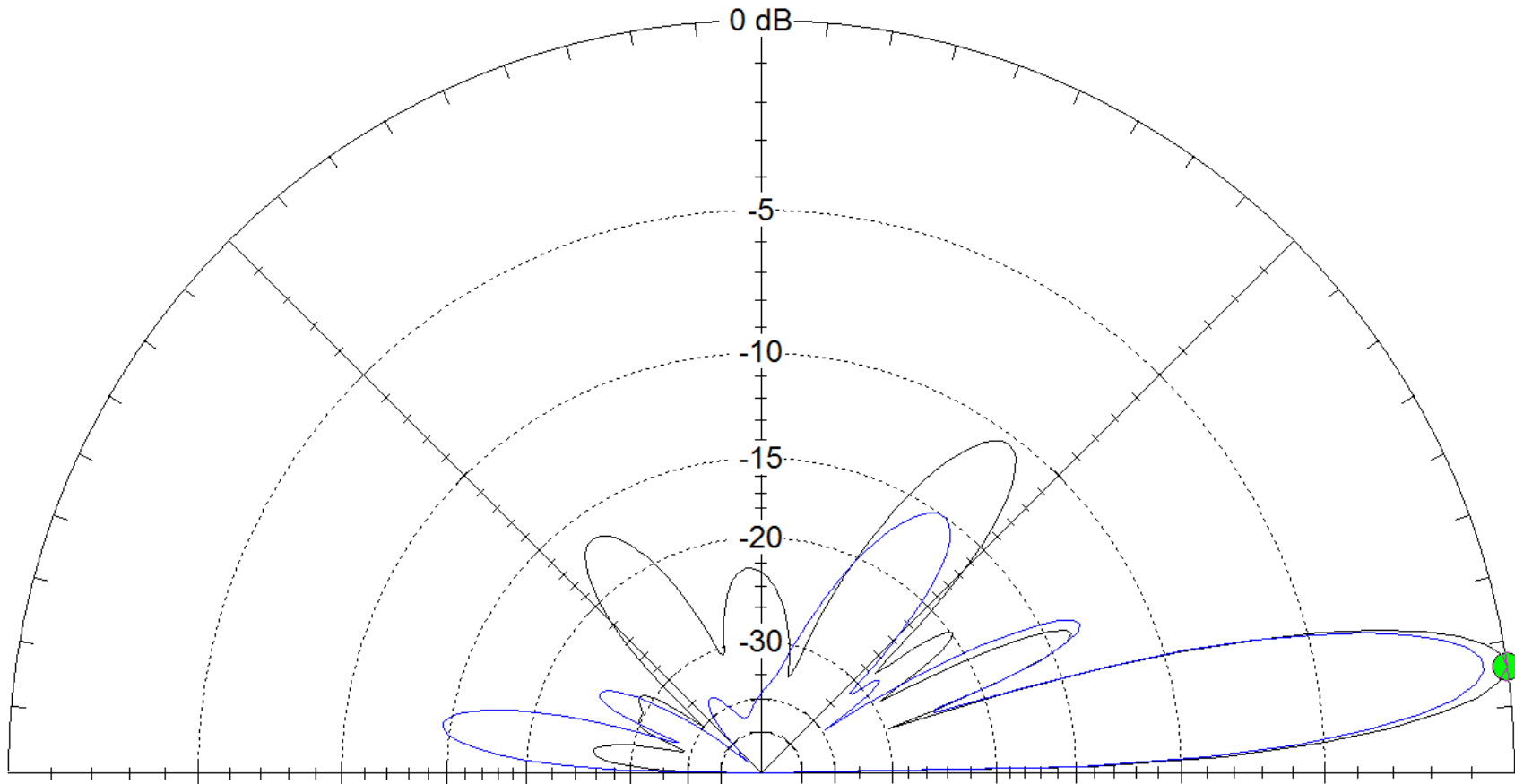
*Wiring of triplexer and Band Pass filters to 6x2 switch for SO2R, with splitting power in 3 directions
(isolation between ports on 6x2 switch must be higher than 75dB in any case)*

OE3K

ES5TV - TRIBANDERS VS MONOBANDERS

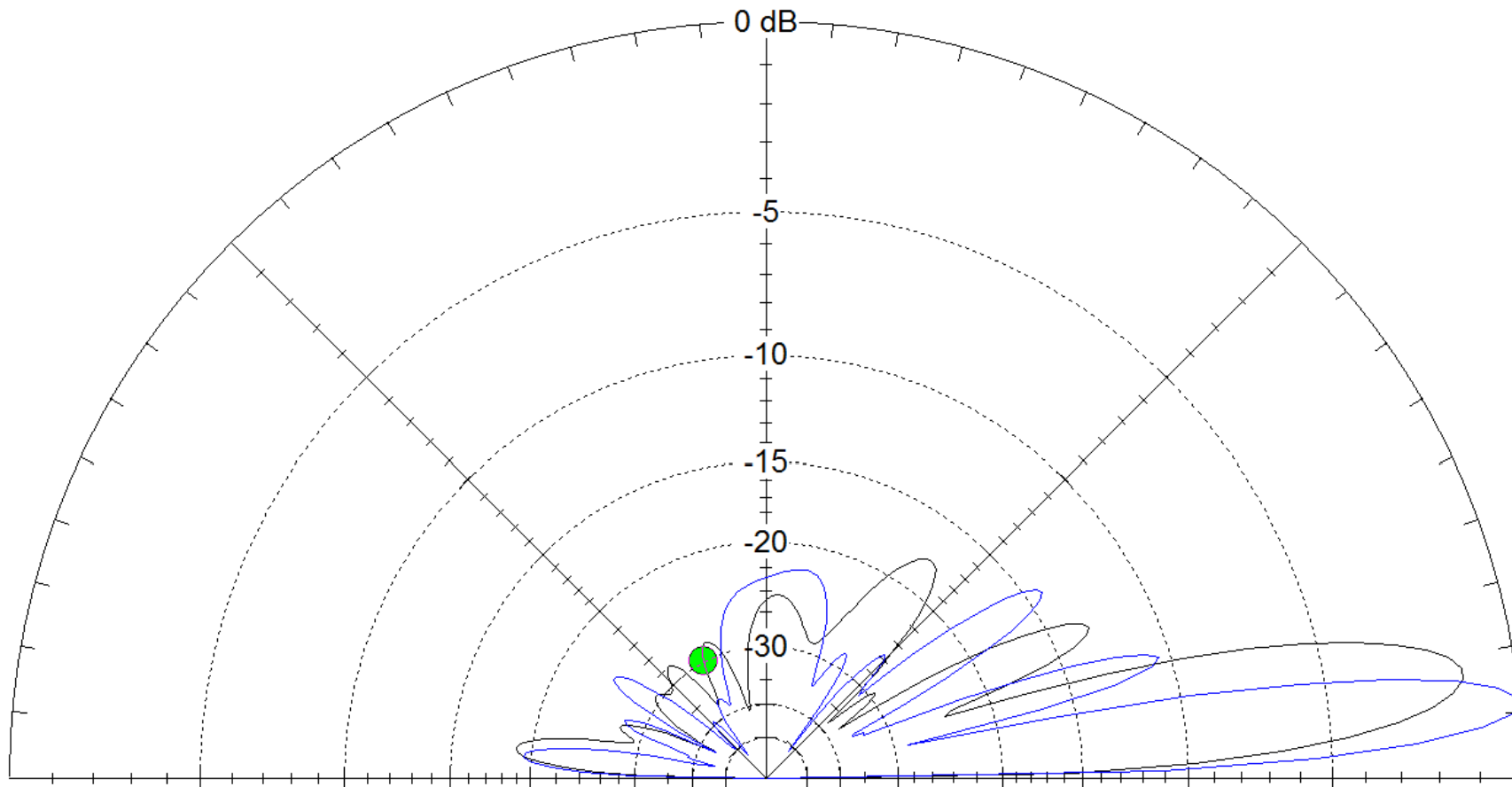


- Tribanders 45/36/27/18 – 17.69 dBi at 8 degrees
- 2 x 5 el 42/22 – 18.47 dBi at 8 degrees
- In real life tribanders tend to win



14,2 MHz

- Tribanders 45/36/27/18 – 19.22 dbi at 6 degrees
- 2 x 5 el 29/19 – 18.12 dbi at 8 degrees / 17.26 dbi at 6 degrees
- Tribanders always win



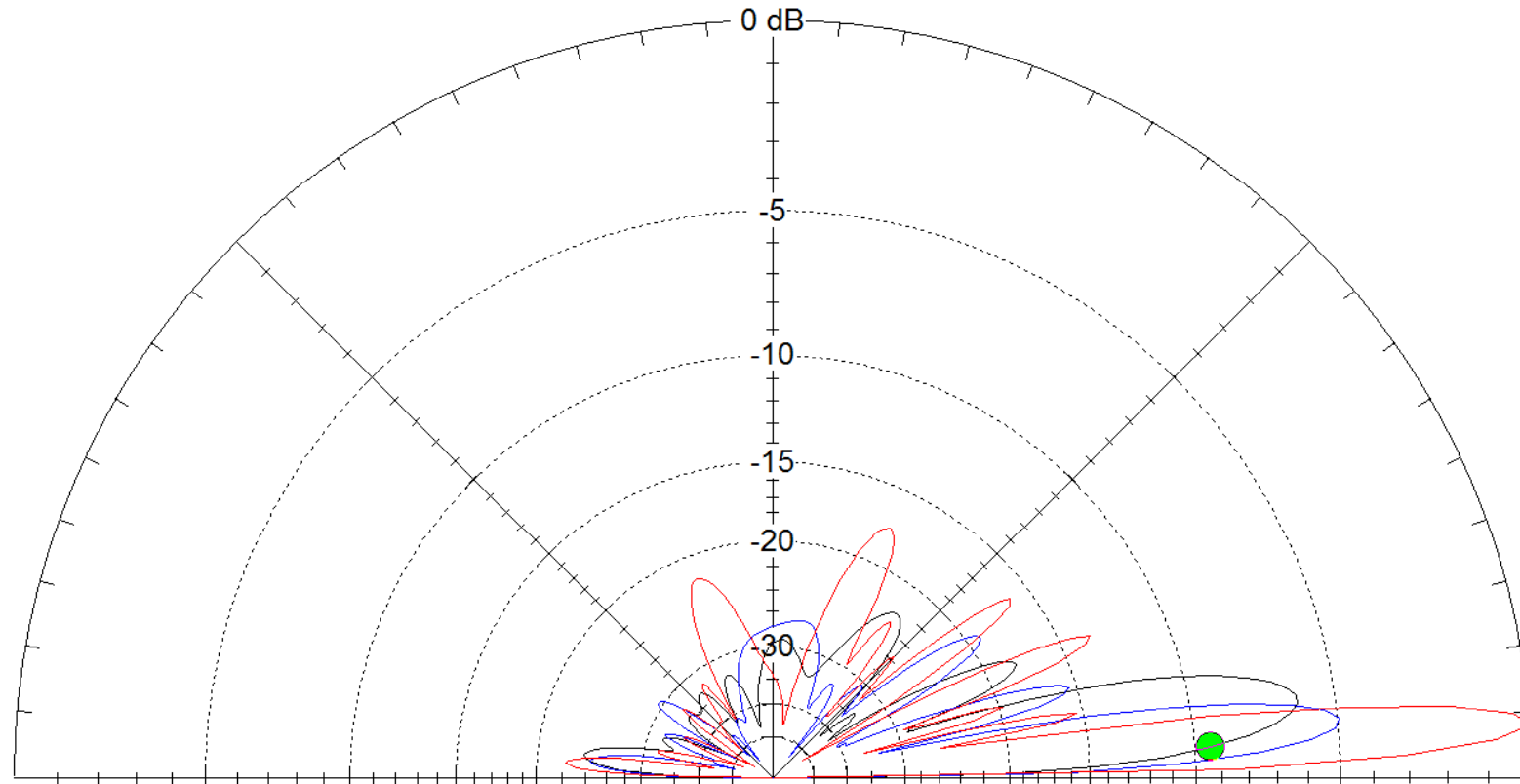
21,2 MHz

- Tribanders 45/36/27/18 – 19.22 dBi at 6 degrees
- 2 x 5 el 29/15 – 18.12 dBi at 8 degrees / 17.26 dBi at 6 degrees
- 8 x 5 el H Frame 24.29 dBi at 4 degrees 😊

Total Field

* Primary
JPx4 15m
15 clean

EZNEC+



21,2 MHz

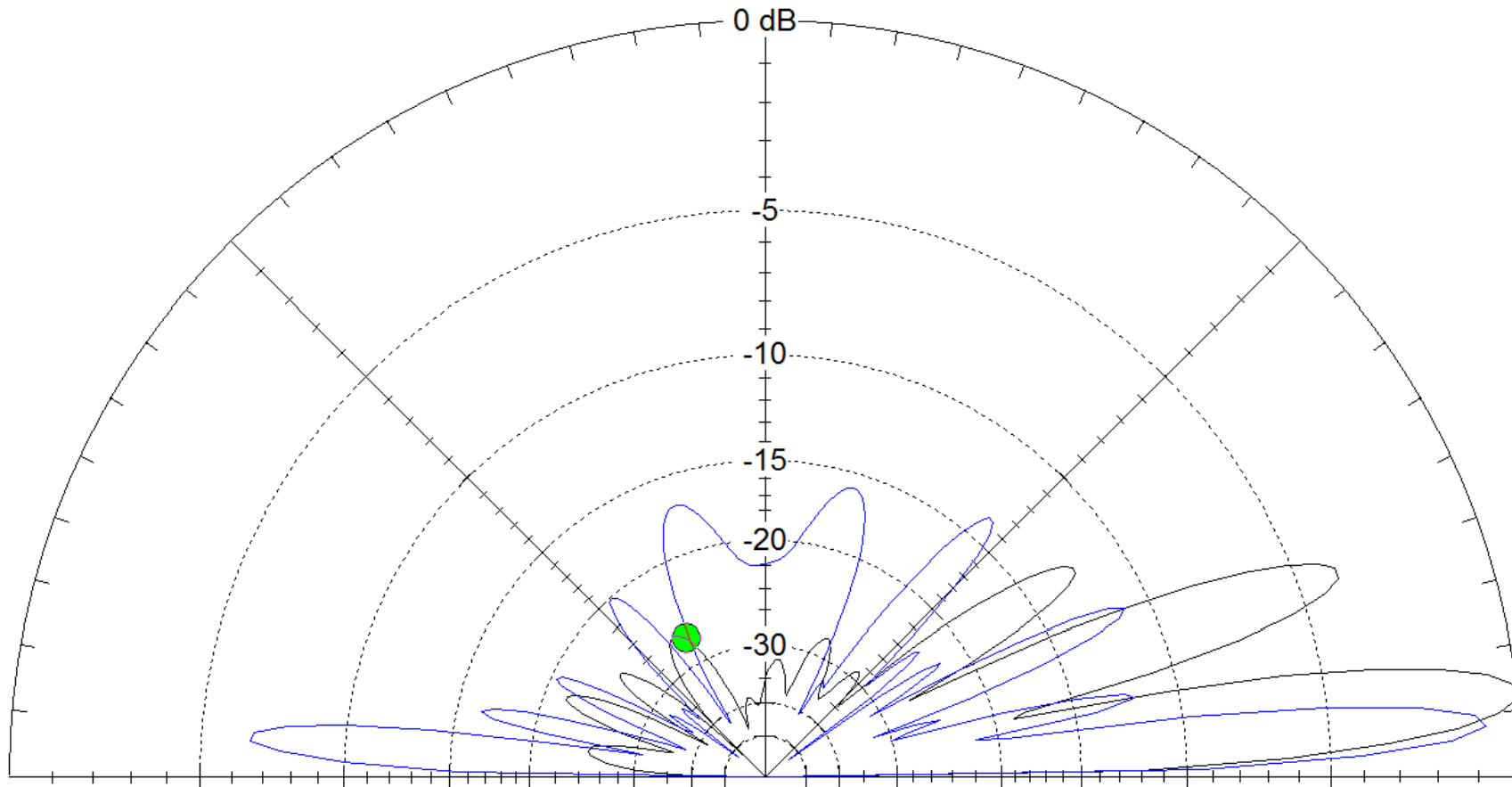
Elevation Plot
Azimuth Angle 0,0 deg.
Outer Ring 24,29 dBref

Cursor Elev 4,0 deg.
Gain 14,9 dBref
-3,22 dBmax

Slice Max Gain 18,12 dBref @ Elev Angle = 8,0 deg.
Beamwidth 9,0 deg.; -3dB @ 4,2, 13,2 deg.
Sidelobe Gain 6,41 dBref @ Elev Angle = 25,0 deg.
Front/Sidelobe 11,71 dB



- Tribanders 45/36/27/18 – 18.53 dBi at 4 degrees
- 2 x 6 el 26/19 – 19.3 dBi at 6 degrees / 17.82 dBi at 4 degrees
- No clear winner



28,3 MHz



Find 3 triplexer
banks😊



SOME COMMENTS



- Monobanders are a bigger compromise due to not optimum stacking distance and interaction between antennas, for JP2000 9m stacking distance is almost ideal on all bands
- Tribanders and triplexer result in even LESS interference between bands in the air!
- I have become to appreciate the beamwidth of the tribanders in the contest (new radios help to fight QRM, bands have been widened)
- I love having just one cable and matching box at the tower, 3 times less reason to climb
- Triplexers have been tested in heavy CW MM environment with 3 HP stations running through the same triplexer with the same antennas at the same time!



WHAT IS COMING NEXT?



- QUADRIPLEXER – 40M-20M-15M-10M
- WARC Triplexer – 30M-17M-12M
- DXpedition 1KW triplexer – compact, small size

CU IN CONTEST

73!!