

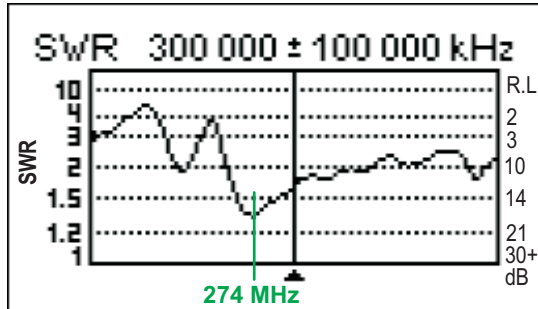
EA22 P-BAND DIPOLE TESTS

Dipole from EA22 was tested, repaired and tuned, to determine compatibility with the bandwidth of the new low band system, and effects to tuning and performance caused by lab "free space" vs. antenna installation performance.

SUMMARY:

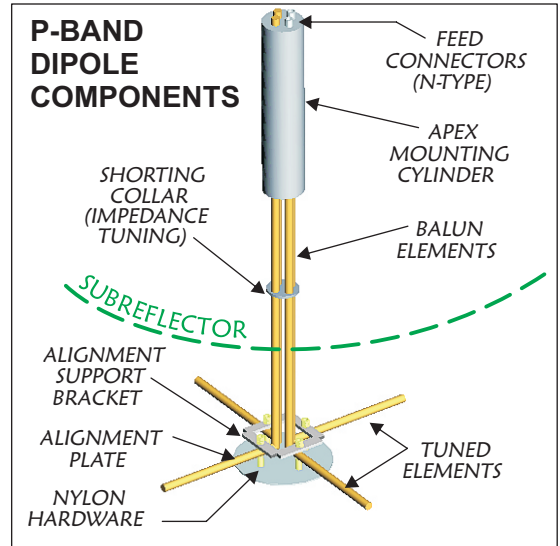
1. Alignment plate & support bracket broadens useful bandwidth of dipole to advantage (see page 2).
2. Best return loss/SWR (best impedance match) achieved by adjusting shorting collar on balun elements.
3. Installation in antenna causes about 20 MHz downward shift in resonance with little effect to reflected power
4. **The P-band dipoles may be old, but still perform well**, even for the expanded 230-470 MHz bandwidth of the new low band system.

INITIAL PERFORMANCE



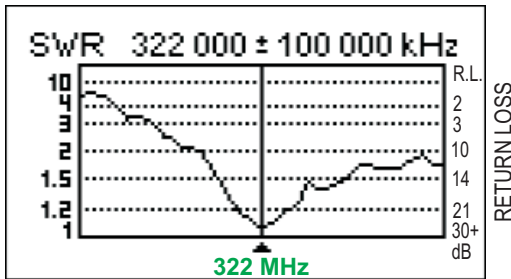
fr=274 MHz Z=37-j6Ω (L=3nH C=98pF)
VSWR=1.39:1 (R.L.=17dB)

Prior to replacing nylon insulators and hardware, and tuning balun



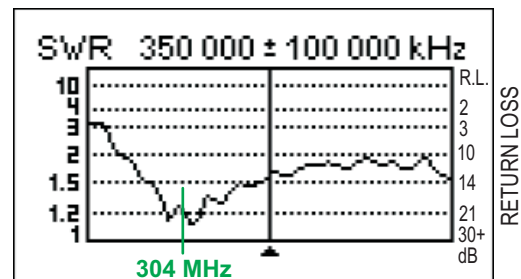
AFTER REPAIR AND ADJUSTMENT OF BALUN SHORTING COLLAR:

Performance in the lab

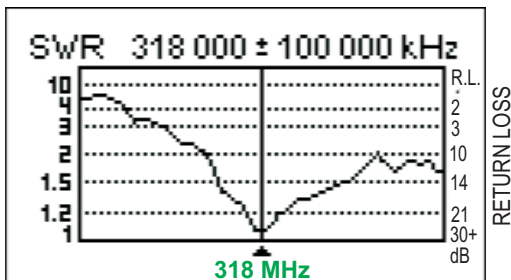


X-AXIS (LCP)
fr=322 MHz Z=51-j167Ω
VSWR=1.07:1 (R.L.=29dB)

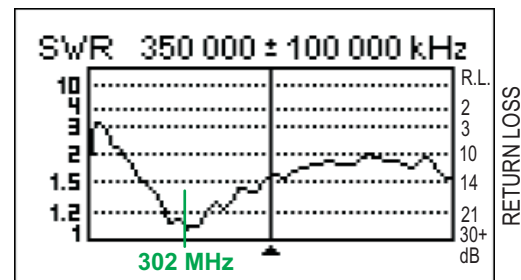
Performance in the VLA antenna



X-AXIS (LCP)
fr=304 MHz
VSWR=1.14:1 (R.L.=24dB)



Y-AXIS (RCP) - Marked "red"
fr=318 MHz Z=48-j2Ω
VSWR=1.06:1 (R.L.=31dB)



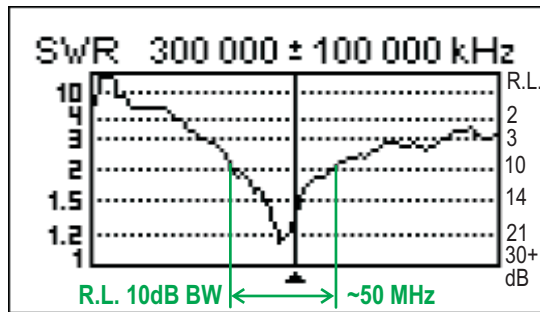
Y-AXIS (RCP) - Marked "red"
fr=302 MHz
VSWR=1.10:1 (R.L.=26dB)

EFFECTS OF OPTICAL ALIGNMENT PLATES

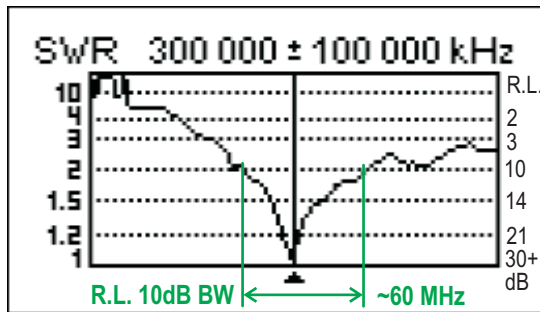
A circular alignment plate is mounted to the P-band dipole to define subreflector center. It is electrically isolated from dipole with nylon hardware. The alignment plate, with cross-hairs on the bottom surface, is used for indexing the subreflector and optical feed horn alignment. These tests were to characterize the tuning effects of the alignment plate.

SUMMARY:

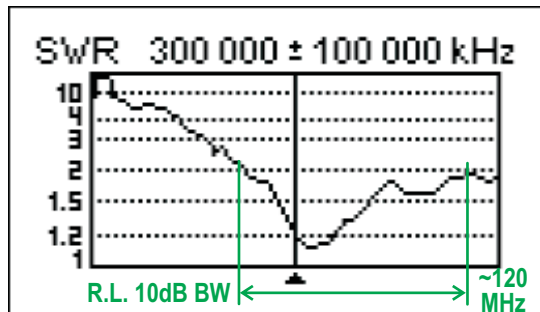
1. Without the alignment plate hardware, dipole resonance is very narrow, only about 50-60 MHz.
2. Alignment support bracket (top, square plate) has the largest effect on dipole bandwidth.
3. **The alignment plates detunes dipole for a broader bandwidth**, advantageous for the new low band system.
4. In the field, nylon hardware supporting alignment plates become sun damaged and brittle, or break, causing plates to become loose or out of alignment. This degrades dipole performance. This is repaired when antenna is in the barn.



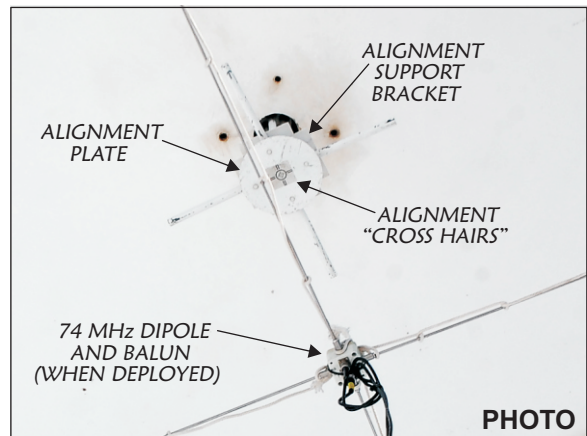
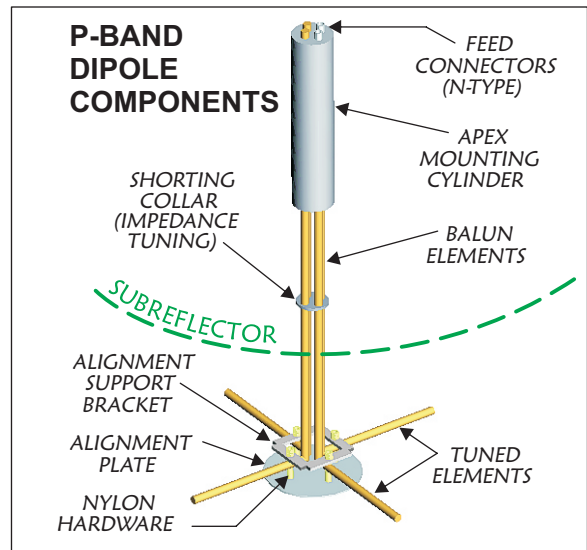
No alignment plate, no support bracket
 fr=292 MHz Z=52-j7Ω
 VSWR=1.15:1 (R.L.=23dB)



Alignment plate only (No support bracket)
 fr=298 MHz Z=48-j2Ω
 VSWR=1.05:1 (R.L.=32dB)



Support bracket only (No alignment plate)
 fr=310 MHz Z=46-j6Ω
 VSWR=1.12:1 (R.L.=25dB)



VSWR	Ret. Loss	VSWR	Ret. Loss
1.01:1	46 dB	1.45	15 dB
1.05	32 dB	1.50	14 dB
1.10	26 dB	1.60	13 dB
1.15	23 dB	1.70	12 dB
1.20	21 dB	1.80	11 dB
1.25	19 dB	1.90	10 dB
1.30	18 dB	2.00	9.5 dB
1.35	17 dB		
1.40	16 dB		