JERROLD

TECHNICAL BULLETIN

#113A

Subject: Hybrid Splitters (Model 1562*) Recommended for Antenna Phasing in Stacked Arrays.

INTRODUCTION

To obtain the desired gain from stacked antennas it is required that signals from each antenna arrive at the combining points in phase. It is also required for maximum power transfer that the impedance of the combined array match the impedance of the load (preamplifier).

On the basis of theory and recent practical field experience, the use of Jerrold's Hybrid Splitters (Model 1562/1522) for combining 75 ohm antennas has proven to be very practical and efficient. The results obtained and the ease of installation recommend their use in preference to the 1/4 wave 50 ohm coax transformer ("Q Sections") previously discussed in bulletin #113.

*Model 1522 is interchangeable in low band (2-6) applications.

DESCRIPTION

The recommended method as applied to the common two (2), four (4) and eight (8) yagi stacked arrays involves combining each pair of antennas through equal lengths of 75 ohm coax to a 1562, thus (Figure 1).

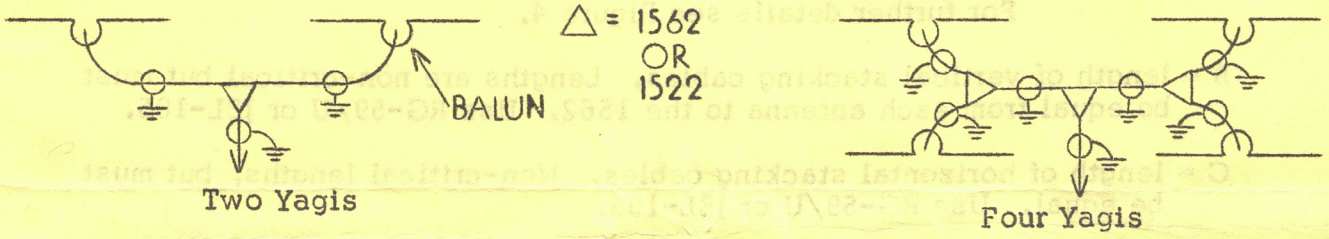

Figure 1 - Schematic Drawings of Yagi Array Stacking

The question naturally arises as to why a gain rather than the characteristic loss expected from a splitter is achieved. To understand this, it is helpful to consider each antenna as a generator and the splitter, in reality, as simply a paralleling device which combines the generator outputs in phase and transforms the generator impedances to match the load. Thus, two equal generators in parallel, each producing equal voltages in phase, provide twice the power available from one generator - result, 3 db gain. Likewise four generators provide four times the power of one generator, or gain of 6 db.

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Method (Figure 2)

The general method of stacking yagis as outlined below will prove very effective in the majority of cases (where the wavefront at the antenna site represents a uniform field).

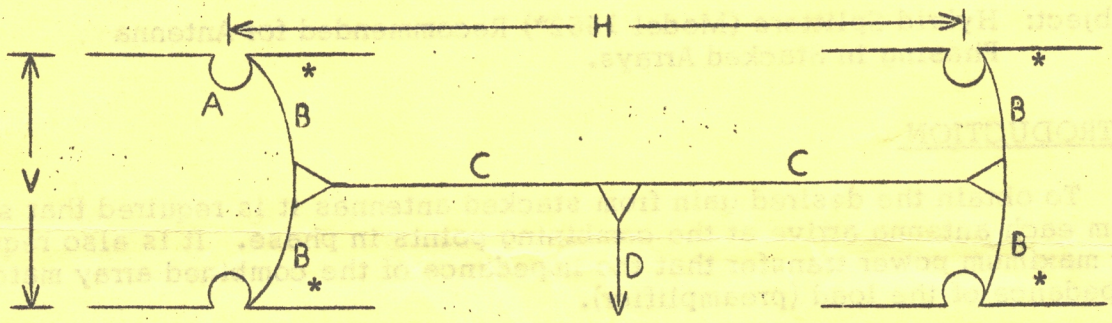

Figure 2 - Detailed drawing of stacking harness.

H = $\frac{11,800}{f}$ = horizontal "center-to-center" air spacing of yagis in inches where f = mid channel frequency in megacycles.

NOTE: For co-channel interference refer to Appendix A. Use spacing from curve showing "H" vs. co-channel angle.

V = $\frac{7,900}{f}$ = vertical separation of yagis in inches.

A = $\frac{3,900}{f}$ = length of "balun" (0.5 wave, 300 to 75 transformer in inches. Cut baluns from 75 ohm coaxial cable, RG-59/U or JEL-105. For further details see Figure 4.

B = length of vertical stacking cables. Lengths are non-critical but must be equal from each antenna to the 1562. Use RG-59/U or JEL-105.

C = length of horizontal stacking cables. Non-critical lengths, but must be equal. Use RG-59/U or JEL-105.

D = Coax downlead to preamp. Length not critical. Use RG-11/U, RG-59/U, or XE-100A depending on length involved.

△ = 1562 hybrid transformers. Mount on supporting frame. Use HB-1 housing for weather protection, or completely protect with covering of Silicone compound.

Construction: Use an "H" frame supporting structure for the array so the entire array can be turned at the center point and oriented for max. signal