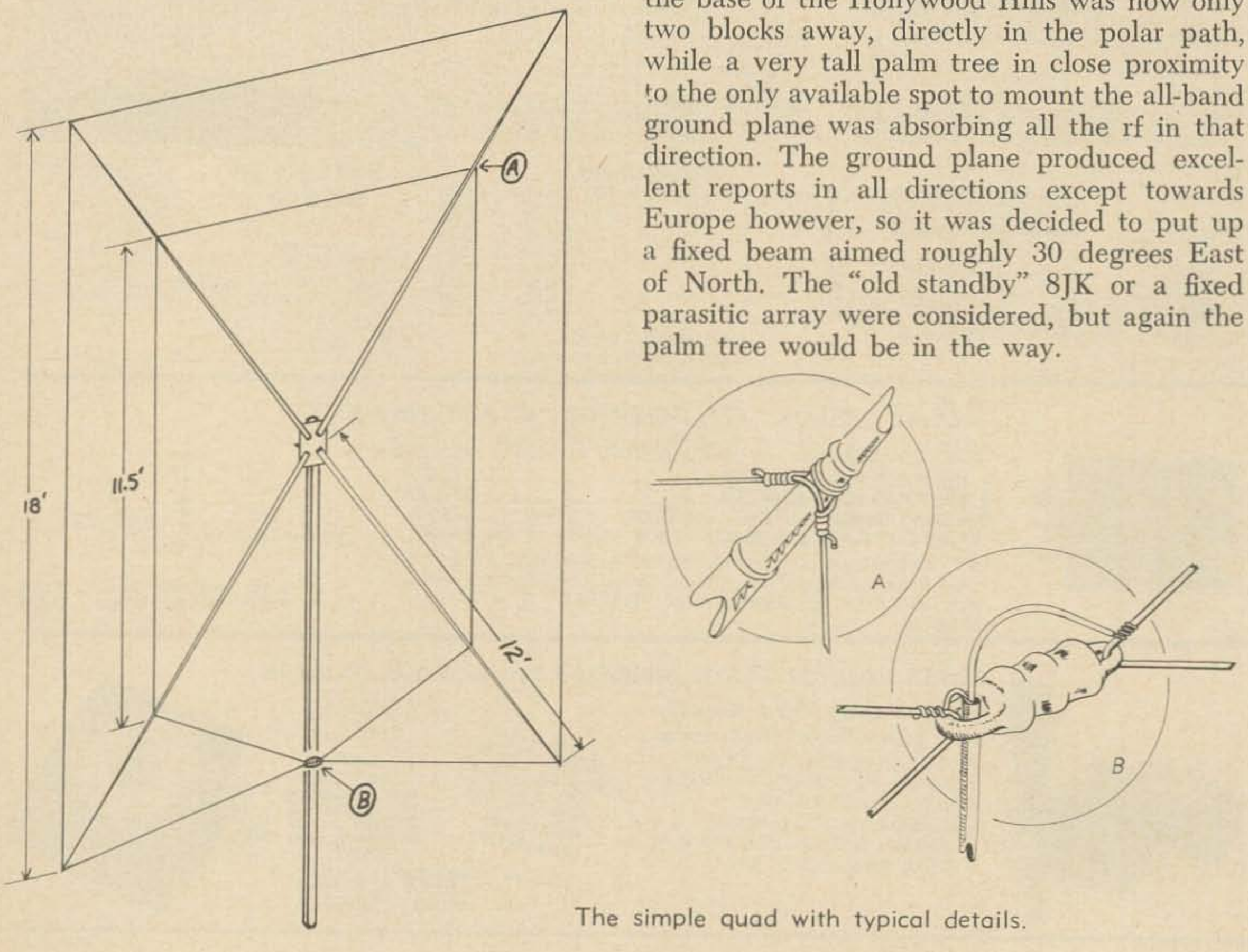
James Young W6WAW
1412 N. Fairfax Avenue
Hollywood, California

A Simple DX Antenna

A simple quad element forms a simple and effective DX antenna for the amateur faced with a limited space problem. This antenna will provide considerably better results than a simple dipole, due to the lower vertical angle of radiation achieved at heights below a half-wavelength. Similarly, the quad will afford less noise pickup in the receiver than a vertical or ground plane. Addition of a reflector element at a future date can easily be accomplished if the additional gain is desired.

A recent change in location at W6WAW resulted in a drop to zero in European contacts. Although the actual move was less than a mile, several discouraging factors soon became apparent. Primary among these was the fact that the base of the Hollywood Hills was now only two blocks away, directly in the polar path, while a very tall palm tree in close proximity to the only available spot to mount the all-band ground plane was absorbing all the rf in that direction. The ground plane produced excellent reports in all directions except towards Europe however, so it was decided to put up a fixed beam aimed roughly 30 degrees East of North. The "old standby" 8JK or a fixed parasitic array were considered, but again the palm tree would be in the way.



The simple quad with typical details.

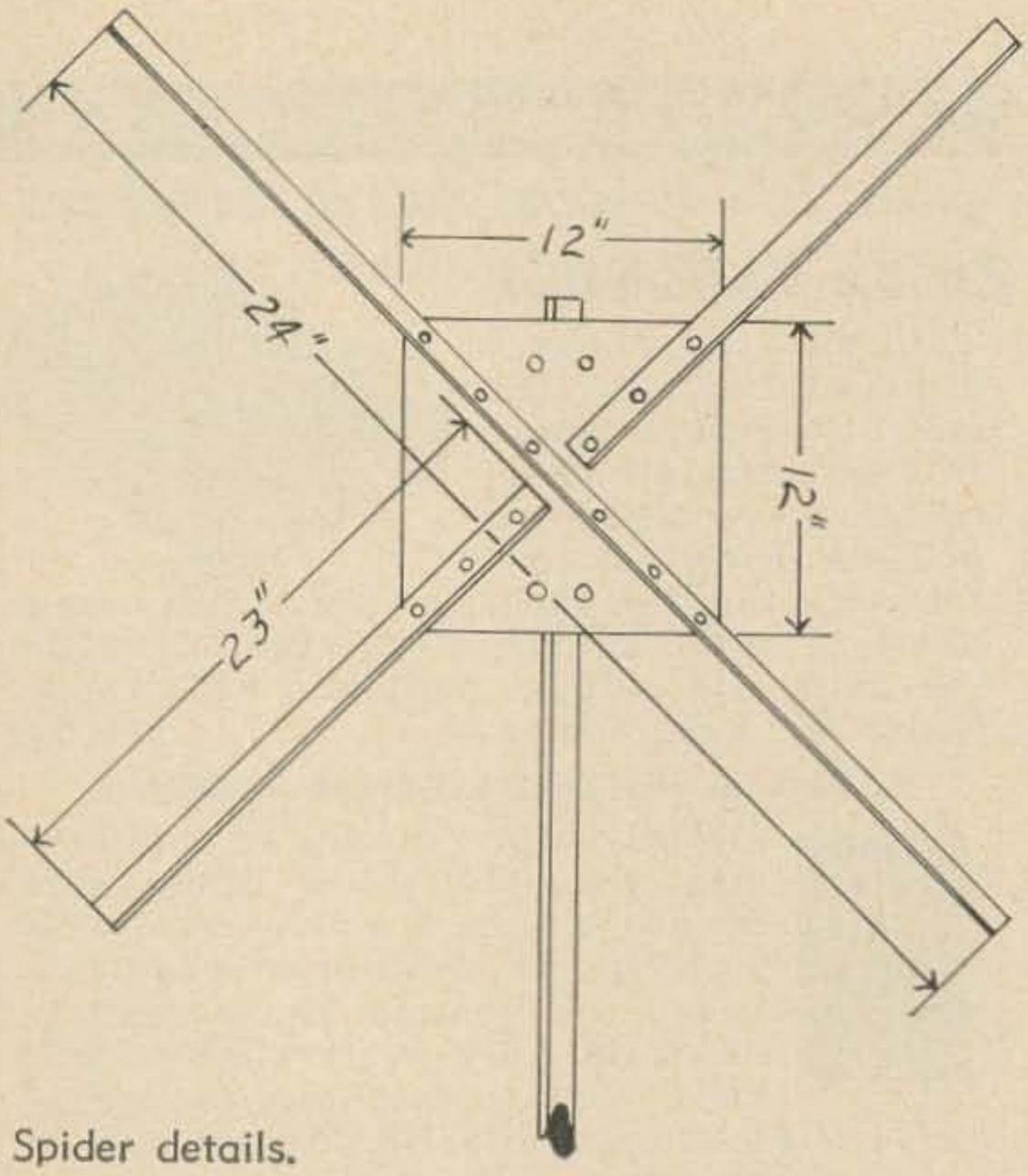
After researching the possibilities of various antenna configurations, a quad was selected as the best solution, and a two element 14 mc array drawn up. However, as the first weekend of the DX contest was only 24 hours away at this point, it was decided to put up a single quad element for use during the contest and hope for the best. The results obtained with this antenna were much better than had been anticipated, including reports from Europe that equalled those from the old QTH. The decided decrease in receiver noise was also a boon, especially as Fairfax Avenue is one of the major North-South streets in the Hollywood area.

The antenna was built and put up in less than two hours, with the further advantage that no outside help was required. The basic "spider" assembly was fabricated from a 12 x 12 inch piece of ¼ inch thick aluminum, and 8 feet of 1 inch "do-it-yourself" aluminum angle stock. A suitable piece of plywood would probably have served just as well, but the aluminum was available, so it was used. The bamboo arms are a few inches over 12 feet long, wired securely to the aluminum angle to provide maximum support.

The wire element was made up by soldering a glass strain insulator to one end of a 100 foot roll of #14 stranded antenna wire, tying it to the garage door, and then applying "VW pressure" to pre-stretch the wire. The wire was then measured off and cut to length at 72 feet. A piece of tape was placed 9 feet from the insulator, and three more at the subsequent 18 foot points to facilitate assembly by marking the points of contact between the wire and bamboo.

The spider assembly was attached to a 15 foot mast, made of 1¼ inch TV mast sections by means of two U-clamps. A vent pipe clamp was attached to the other end of the mast and three guys of nylon clothes line were pre-cut and lashed to the lower U-clamp. The wire element was stretched around the bamboo frame and secured to the end of each pole by small lengths of #14 wire, twisted tightly around the pole and well soldered. The free end of the element was then attached to the insulator and soldered after the slack was taken up. Two of the guys were secured and the antenna raised into position, slipping the vent-pipe clamp over the sink vent on the roof. The array was roughly oriented on Central Euorpe/ Australia, and the third guy line tied off.

The antenna reference books indicated that the feed point impedance of a single quad element would be around 125 ohms. The only available transmission line of sufficient length was a piece of RG-59/U, which would produce



Spider details.

a theoretical SWR of 1.75:1, but as this was under the nominal 2:1 limit it was connected across the insulator, soldered in place, and the transmitter fired up as the contest was now 16 hours old.

The first contact on the quad was with FO8AA, with the report approximately the same as that normally obtained on the ground plane. Several UAØ and JA stations were worked off the end with QSA 8/9 reports, while an HK off the other end produced an S6. This seemed to indicate a "skewed" pattern, probably caused by direct connection of the unbalanced transmission line as the shield was connected to the side "pointed" at South America. Further checks performed with a Stoddart NM-22A Field Intensity meter showed this to be true, but, as many European stations were worked without difficulty, it was decided to leave well enough alone; the antenna was serving its purpose admirably, while the one case of TVI at the new location was reduced considerably. A check on the SWR at the feed point of the antenna and also at the output of the Matchbox showed approximately 1.8:1 from 14000 to 14050 kc, and 1.95:1 at 14100 kc, which was considered low enough to be tolerated.

A 21 mc section was later added to the array and paralleled across the insulator. This element was made up in the same manner as the 14 mc element, however, the total length was 46 feet, being 11.5 feet on each side. The SWR on 21 mc was lower, ranging from 1.31:1 at 21000 to 1.71:1 at 21200 kc, while the overall effects on 14 mc operation were nil for all apparent purposes. As a bonus: 7 mc operation can be had in addition, by connecting a 28 foot 9 inch length of 300 ohm twin lead across point "X" and shorting the far end. Operation on 14 and 21 mc will not be affected.

By employing the vent pipe as a pivot point the antenna can be rotated through approximately 135 degrees of arc if the guys are properly spaced. This, together with the fairly broad lobe and bi-directional radiation pattern has provided good world-wide coverage and resulted in all six continents plus Antarctica being consistently worked on 14 mc in the midst of the sunspot slump, without resorting to opening negotiations for a kw final.

The purist may cringe at some of the engineering practices employed in this antenna, and the array at W6WAW is certainly not the optimum to be expected from the configuration. However, the antenna does provide exceptional results on G, LA, DL, UA1, VP8 etc., while the same purists are explaining their 1.01:1 match to a guy within ground wave range and bemoaning the fact that no DX is coming through!

The total height to the center of the array is 26 feet in this case; however, even at this height the low angle of radiation of the quad is apparent from the results. Mechanically the array seems quite secure, having survived one of the local 'Santa Anas' a week after it was put up.

The mismatch in feeding the antenna has not been corrected to date; however, the "skewed" pattern could easily be corrected by use of a gamma match. It was decided to let this change wait until the reflector element is added and a TV rotator installed.

In conclusion: the single element quad has the following characteristics. If any of them meet your requirements, start building; you will be pleasantly surprised at the results obtained.

1. Requires half the space of a Yagi, 8JK, or dipole
2. Requires only a single support
3. Provides lower angle radiation than other horizontal arrays at heights below a half wavelength
4. Requires no radials
5. Costs about $5.00 for a 14 and 21 mc version (excluding coax)
6. Produces less noise in the receiver than a vertical or ground plane
7. Can easily be converted to a two element configuration with approximately 6 db forward gain.

. . . W6WAW