Another All-Band Antenna

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SOME YEARS AGO John Kraus, W8JK, performed some excellent research in the field of directive antennas. One of the developments of this research was the 8JK end-fire, bi-directional, fixed beam which in succeeding years has enjoyed wide popularity.

Upon the resumption of amateur radio operation in the United States in the later part of 1945, the writer constructed a four-section, 28-mc, 8JK fixed beam antenna for use with a 400-watt transmitter. This antenna was initially end fed with a two-wire feed line. Results were excellent and performance all that could be desired.

However, the antenna as constructed was definitely for use on 28 mc only. A tentative survey was made of the family homestead to determine the possibilities of erecting an antenna for the lower frequencies. When the object of this survey became known to the wife, complications immediately developed.

When the gentle southern breezes of this tourist mecca had dispelled the smoke of domestic friction, it had been definitely and finally established that:

1. One antenna, and only one would be conceded to each husband, if required. (The antenna—not the husband).
2. There are many potential husbands who don't require antennas. (An inference, I believe.)
3. Should other antennas be constructed, same would be on real estate other than that occupied by the *whole* family.

Having been established as facts, these statements were given careful consideration in the tranquil privacy of the shack with the reciever tuned to the low end of 20. Current real estate prices, together with obvious domestic complications, made it

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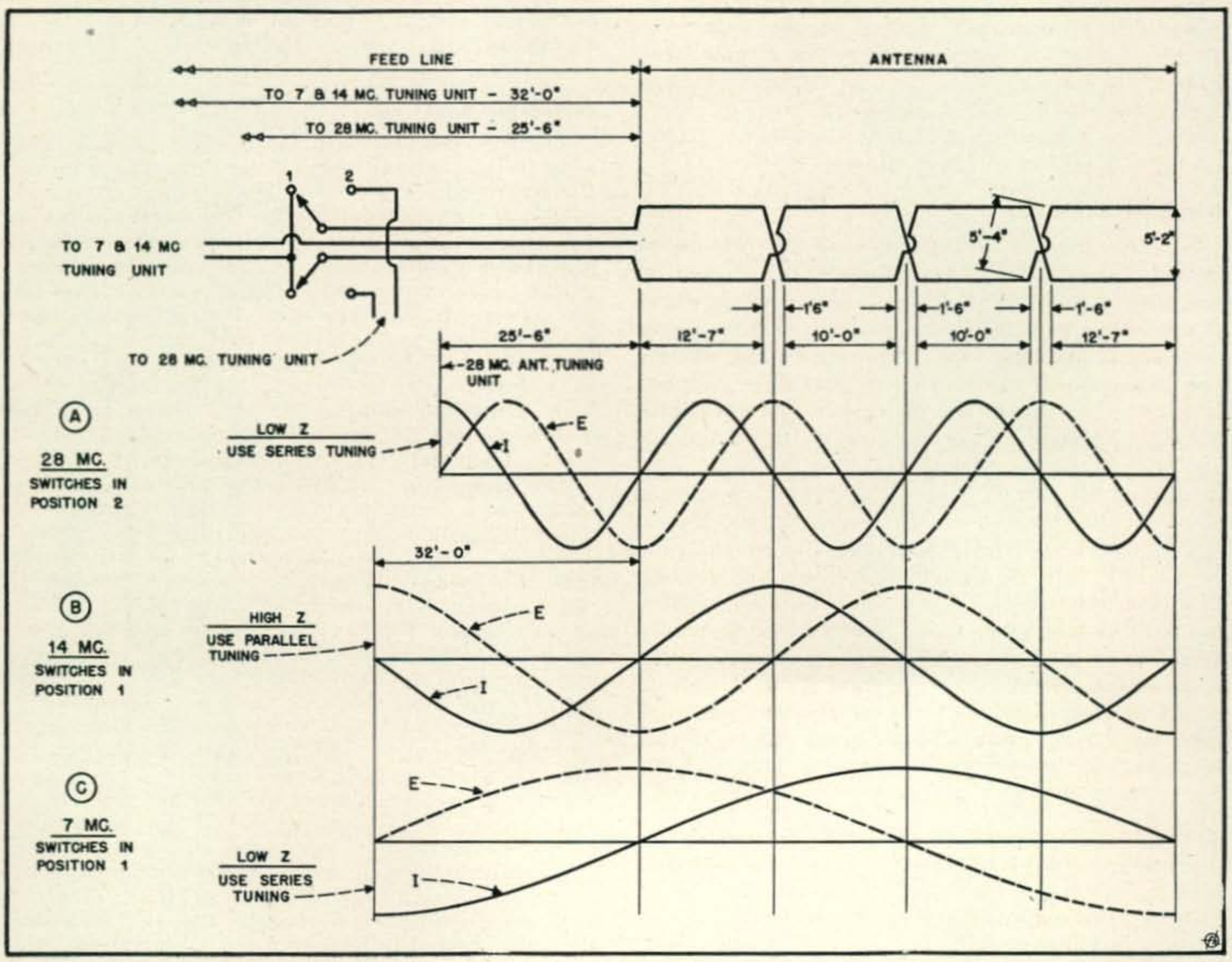

Fig. 1. Schematic diagram of modified 8JK showing feed system and current and voltage distribution along the antenna and feed line for three-band operation.

when bursts on 100.0 mc were observed two minutes after those on 200.0 mc, while those on 60.0 mc occurred over four minutes later than the similar bursts at 100.0 mc.

No entirely satisfactory theory has been proposed to show why the sun should radiate these tremendous amounts of radio energy. The delayed action of the bursts does indicate that the radio signals are generated at different levels of the sun's atmosphere. The velocities of propagation involved closely approximate those assumed in the generation of the prolonged ionosphere storm and aurora borealis.

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immediately apparent that any action governed by preceding third item was quite impractical.

In the agenda of deliberations the preceding second item was ignored.

As the right of eminent domain had been established by erection of the aforementioned 28-mc beam, it was decided, as a compromise, to utilize this antenna for operation on the 7 and 14-mc bands. The only remaining question was how this would be accomplished.

Inspection of the antenna revealed that the total length of each of the two wires was 61′2″. While this length was somewhat shorter than the 64 to 66′ required, for full-wave 14 or half-wave 7-mc Zepp antennas, past experience with the type of radiator had shown that it would perform well even when slightly shortened.

With this thought in mind the antenna was hauled down and the feed line changed to the three wire arrangement shown in *Fig. 1*. After replacing the antenna, the old 7 and 14-mc transmitter was reconditioned and installed with antenna switching and tuning equipment.

Voltage and current distribution along the antenna and feed line for 28, 14, and 7 mc, together with connections, is shown by *Figs. 1A, 1B, and 1C.*

On 28 mc the antenna performs as a bi-directional, end-fire beam and is series tuned.

On 14 mc the antenna performs as a full-wave Zepp with half-wave feeders and is parallel tuned.

On 7-mc the antenna performs as a half-wave Zepp with quarter-wave feeders and is series tuned.

With the methods of tuning shown, loading on the three mentioned bands is excellent. The actual performance of this antenna on 40 and 20 is surprisingly good. It has been noticed that even on these bands the antenna has marked directional characteristics approximately at right angles to the axis of the radiator.

Spacing of feeders is not at all critical. It is suggested that these wires be spaced approximately 3″ apart and that triangular feeder spreaders be used. These spreaders can be conveniently made from plexiglass or cellulose acetate.

By connecting all feeder lines together and operating the antenna in conjunction with a good ground system, good performance can be obtained on frequencies in the 3.5-mc region if the antenna height is fifty feet or so.