Jamming: Counterpoint

Editor's Note: An article on electronic jamming ("Jamming: Will It Be Tactically Effective?") by Mr. Follis in the Summer 1978 issue of TAC elicited several reader comments: "The Electronic Piranha Can Jam" (LTC Don "Flash" Gordon and CPT Bill Anton, Fall 1978); and "Jamming: It's sticky business" (CPT David M. Fiedler, Winter 1979). Mr. Follis offers "Jamming: Counterpoint" as a rebuttal to the comments his initial article evoked. As in the past, TAC welcomes readers to put in their "two cents" on this controversial topic.

by Lawrence E. Follis

My article, "Jamming: Will It Be Tactically Effective?," which appeared in the Summer 1978 issue of TAC, resulted in some reader comments to which I would like to respond.

The first comments were made by LTC Don "Flash" Gordon and CPT Bill Anton in an article entitled "The Electronic Piranha Can Jam" (Fall 1978). Based on experience with field training and test exercises, they concluded that "you can beat jamming only with well-trained radio operators who understand the basics of radio-wave propagation and electronic counter-countermeasures (ECCM)."

Now I certainly agree that more electronic warfare tests should be conducted and that better trained radio operators are needed. What my article stressed, however, was that several factors work together (very often, if not always) which render attempted jamming ineffective. Consider these factors: range, power, terrain, availability of alternate channel, use of realys and ECCM devices, well-trained operators, vulnerability of ground jammers to hostile action, communications time delays, which will often have little tactical effect when they result from "effective" jamming; and the possibility of tying up enemy jammers by using meaningless signals. Just these examples—and there are more—suggest that effective ground jamming of ground receivers will not be a simple matter. Computer modeling very definitely has a place in examining the large number of possible situations in which the effectiveness of attempted jamming might be assessed.

I would like to comment on some of the specific points made by LTC Gordon and CPT Anton. With regard to stationing jammers close to the forward edge of the battle area (FEBA), I think it is obvious that the closer a jammer is to the FEBA, the better its chances are of jamming enemy receivers, especially those receivers close to the FEBA. (Incidentally, the jammer-receiver range in my base case was 8 kms, not 9-18 kms.) But these are the receivers which generally are not receiving important message traffic; hence, if they do get jammed for a while, the results are not likely to be tactically very significant.

But how successful a jammer is in denying or delaying tactical information of high importance being sent from, say, a division main command post to a tactical command post will tell us a good deal more about real jammer effectiveness. Thus, during our tests and training exercises, we would do well to determine the effectiveness of jammers which are not endangering themselves by being close to the FEBA and which are not positioned at choice terrain locations but which are trying to seriously delay important message traffic.

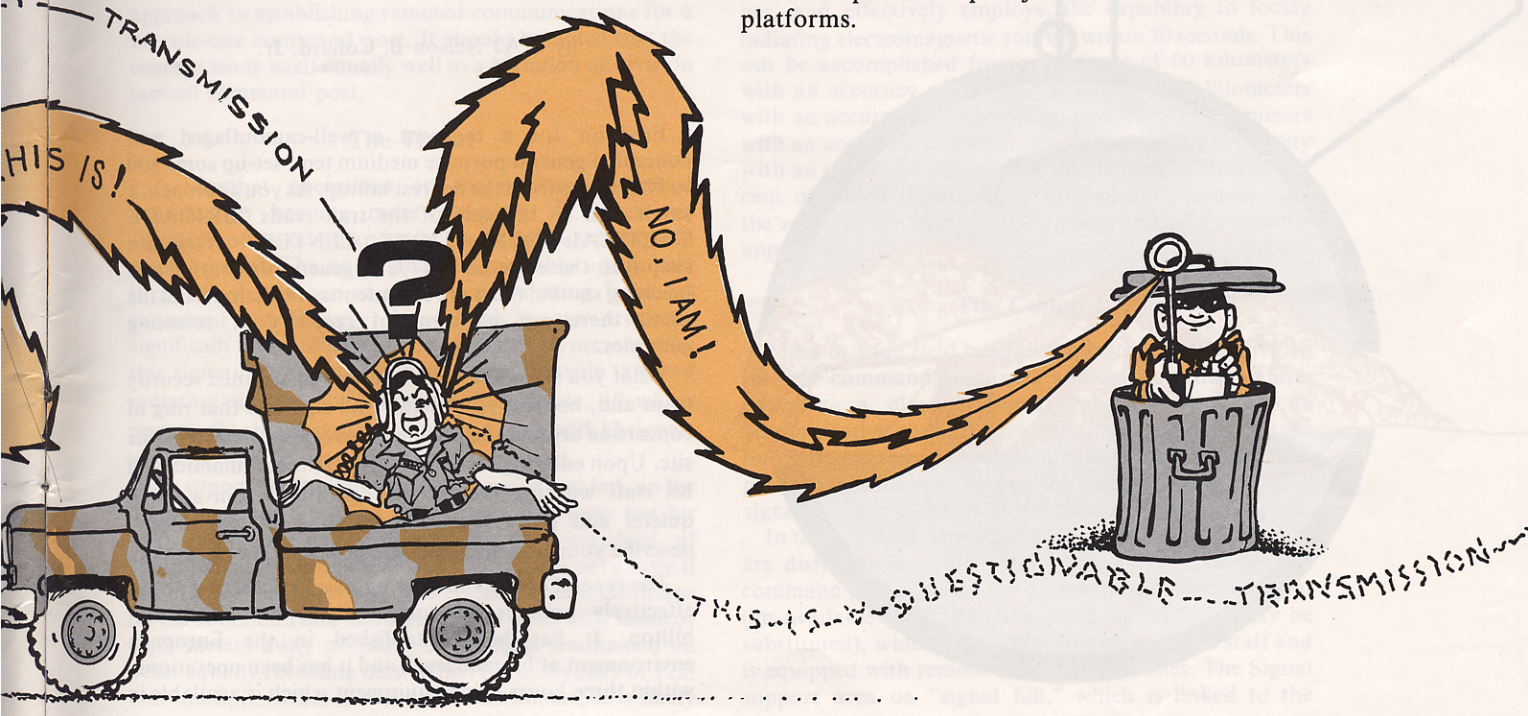
As to the use of the steerable null antenna processor (SNAP) to cancel out attempted jamming, LTC Gordon and CPT Anton suggest the use of two jammers as a possible counter-counter-countermeasure. It is true that the use of two well-separated jammers operating on the same frequency could deny communications to a receiver operating on that frequency. However, since this practice would effectively reduce the number of enemy jammers by half, it does not appear to be an attractive tactic for the enemy at all.

I do not believe the final word on SNAP is in yet, but recent field tests have been encouraging. Radio operators should certainly test and train with and without SNAP units so that more information on its effectiveness can be obtained. If SNAP units do turn out to be tactically effective, they might just pay their way by reducing the cost to train radio operators.

LTC Gordon and CPT Anton state that propagation effects are unpredictable. In the sense that one cannot make exact predictions of propagation losses, they are correct. However, approximate methods (such as those of Longley-Rice) are available and their use is invaluable. The "piranha" authors also state that, on the one hand, "the purpose of jamming in the US Army is the development of communications intelligence, and to confuse and delay," but that, on the other hand, "the doctrinal purpose of jamming by our most likely enemy (and some allies) is to prevent communications by overwhelming noise." However, the Army-approved electronic warfare concept states that "the primary function of jamming is to deny or degrade the enemy's reception of electromagnetic emissions."

As far as artillery-delivered unattended/expendable jammers are concerned, none have been made to date; if they had been, they would present an added logistics burden to the Field Artillery. These devices also have battery problems (cost, storage, availability—take your pick). LTC Gordon and CPT Anton mention the jamming range of these devices, but jamming range cannot be discussed until one has defined the link distance, power, etc., of the receiver being jammed. The suggested use of remotely piloted vehicles (RPVs) with 500 watts effective radiated power for barrage jamming might well have merit if the 500 watts could be obtained. For lightweight mini-RPVs, the maximum prime power available is not much more than 500 watts, and only a small fraction of this remains for purposes such as jamming.

Now, for a word about basics and theory. LTC Gordon and CPT Anton say in one place that "propagation effects are unpredictable" but in another place that radio operators should "understand the basics of radio-wave propagation." I would again suggest that approximate prediction methods are generally quite satisfactory, but we can expect radio operators to master little more than the basics. Also, without an understanding of theoretical factors, one can neither design a meaningful jammer test nor really understand the test results. As the great Boltzmann said, "There's nothing as practical as a good theory."

Some additional comments about my article were submitted by CPT David M. Fiedler in the Winter 1979 issue ("Jamming: It's a sticky issue"). CPT Fiedler outlined a method for testing antennas to ensure that they are operating at maximum efficiency. Although I am not familiar with the procedure he presented, it certainly appears that his procedure, or something like it, deserves serious consideration. Good antenna efficiency will both improve communications and reduce the chances of being jammed.

In conclusion, readers are cautioned that the subject matter under discussion has been limited mostly to the effectiveness of high-power ground jammers against ground receivers. The use of, say, 10 medium or low power jammers in lieu of one 1,500-watt jammer appears to be a possibility not yet explored in detail. And another possibly effective place to put jammers is on airborne platforms.