Orbit

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Journal of the Radio Amateur Space Program

Published by AMSAT — The Radio Amateur Satellite Corporation

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Power	Hi	25	10
	Lo	1	1
Memories		5	4
Initial Offset		600KHz	5MHz
1MHz Up Button		Not Req'd	Yes
Normal Tuning Rates (KHz)	FM1	5	5
	FM2	Not used	25
	SSB	0.1	0.1
	CW	0.1	0.1

ICOM

The World System

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Our Cover: Thanks to Dr. Robert Leonard, KD6DG, for providing us with this print of the SRI International dish antenna system used to restore UoSAT to an operational condition. Can you identify the year (approximately) that this photograph was taken?

LET'S TALK OSCAR

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Ellipsis...

An Editorial By Vern Riportella, WA2LQQ*

There are two things we wish for AMSAT in 1983. We wish a successful Phase IIIB launch. And we wish an improved *Orbit* Magazine for the new year as well!

We've been reading and listening to your comments about your magazine over the last year and they're pretty interesting. You really like the magazine, basically, but when it doesn't come when expected you're really disappointed. We understand you're sentiments and are really trying to get on a regular schedule with *Orbit*. But with an all-volunteer staff and meager resources, it's darn difficult to do all the things we'd like to do with this fine magazine.

Now we're not ones that generally offer nor easily accept excuses in place of performance. We figure you're about the same on that score too. So we aren't offering any excuses. But by the same token we do feel we owe you an explanation as to why when we planned to have a magazine out every other month we couldn't quite make it. Why, in fact, *Orbit* is affectionately, if a bit facetiously, called "Aperiodic Excellence!" *Orbit* magazine was born from a perceived need to upgrade the quality and quantity of published material available to members. *Orbit* was to have a four-fold purpose: 1. To provide a "literature" resource of articles on amateur satellites. 2. To provide a meaningful "token" for membership. 3. To provide a unifying element for the organization. 4. To attract new members with an attractive, "glossy," colorful publication as good as the best available in amateur radio magazines.

In many respects *Orbit* started out in that direction under founding Editor, G3ZCZ. Joe had been Editor of the predecessor to *Orbit*, AMSAT's quarterly publication, *AMSAT Newsletter*.

G3ZCZ set the stage and many precedents for *Orbit* in his tenure at the helm. But in early 1981, Joe announced that he would resign in connection with his transfer to 4X4-land. The job of *Orbit* editor was held open for any taker for months. No one stepped forth. In desperation President W3IWI turned to your editor to keep the presses rolling as an interim editor until a permanent replacement could be found. Accepting the new task was a very difficult decision. Having at least three other "hats" for AMSAT was a burden. Adding another was flirting with disaster. Yet somehow, with the help of Managing Editor W1XT and some competent column-writing from K2ZRO, W6SP and G3IOR we've managed to get to this point. But the burden is, I'm sure, showing. It is no longer possible for WA2LQQ to continue at the present workload.

What does this mean in terms of *Orbit's* future?

A month or two ago I thought that *Orbit* would have to be shelved...put on "hold" indefinitely until a new editor could be found. There seemed no alternative. Moreover, for various reasons the out-of-pocket costs to AMSAT of the magazine were running higher than expected and a short "retirement" for *Orbit* began to look attractive for financial reasons as well. Would *Orbit* survive to see the Phase III launch after all?

Well there's a happy ending to this true story. As in the movies, in rode the cavalry in the nick of time to rescue the besieged editor. In this scene the cavalry comprises N1DM (Dom Mallozzi), W4OWA (Bob Ruedisueli) and KB2M (Harold Winard). In short order these three heroes strode up to say, in effect, "We'll save this magazine!"

And they will!

Beginning immediately these three AMSAT veterans will be assuming growing responsibility in the editing and production coordination of your *Orbit* magazine. And a fine staff they are indeed. N1DM works for Raytheon, a major New England electronics manufacturer. W4OWA recently retired after a rewarding career with the Long Lines Division of AT&T. KB2M is an experienced editor with *Electronic Design Magazine*.

It is with pleasure (and no small measure of relief) that we welcome our new editors aboard. Each brings with him a unique and special suite of talents. Each is a staunch advocate of the ideals of amateur space utilization. And each will lend his touch to the creation of your continuing pleasure in *Orbit*. As we begin the transition to the new team we can be optimistic that *Orbit* will improve in regularity. And the quality of content and presentation you've told us you enjoyed so much will be preserved. We take satisfaction in knowing that we helped shape the team that "rescued" *Orbit* from grave peril. Please make the new team feel welcome and give them your full support!

**Editor-In-Chief*

Helix Review

By Dom Mallozzi,* N1DM

What type of antenna will you use for Phase IIIB? A Helix might just be the answer.

With the coming launch of Phase IIIB, many hams are preparing improvements and additions to their stations for use with the new bird. Because circular polarization is a necessity with Phase III, many hams are studying which antenna to use. Along these lines, Dick Jansson, WD4FAB has written three articles in *Orbit*[1], [2], [3] about helical antennas. It might be instructive to expound a bit more on Dick's articles. In this article I will address a few of the common questions on helicals with explanation to further understanding the construction of a helical antenna.

One of the most-asked questions is: What diameter should the conductor of the helical be? To answer this question I referred to the authoritative text on helicals, Kraus' "Antennas."[4] Dr. Kraus (W8JK) states that conductor diameters from 0.006 wavelengths to 0.05 wavelengths result in the normally recognized helical characteristics. Table 1, below, shows the acceptable conductor diameters for the helicals that will be common for Phase IIIB.

As stated by WD4FAB, ¼" copper tubing is great on 436 MHz.[2],[3] I have used helicals made of it on Mode B and they work well and tolerate the New England weather too! Also, it is stocked by most hardware stores and is relatively easy to work with. For 2 meters, tubing of the required size is difficult to form and is usually very expensive. I used a suggestion from some NASA papers[5] and used a piece of RG8 for the element. Its shield is just about the right diameter for 2m helicals and it is easy to form. I take the center conductor and short it to the shield at each end. For those thinking of 1269 MHz the ¼" copper tubing still looks like a good bet.

Now we come to the matching system. WD4FAB states that the stub matching system described by W7US[6] will not work as presented. This is not true. I have used just that matching system on my helicals for Mode B for the past three years and it performs fine. The other method mentioned in WD4FAB's article was presented in *QST* by K6ZMW.. I have not tried it personally but it looks good. After all, it was developed by W8JK,[8] so it will no doubt work like a charm. A third method was presented by DeMaw in *QST*.[9] It involves a ¼ wavelength series matching transformer made of coax transmission line. In fact, those wishing to use their helicals over the entire 70 cm band (420-450 MHz) might wish to consider the 2-series-quarter-wave transformers suggested by Stegen.[10] Stegen's method will result in improved SWR characteristics throughout the whole band. (For the limited bandwidth used for amateur satellites any of the methods mentioned previously will perform well.) If you plan to use quarter wave matching transformers to match a 50 ohm transmission line to a 1 wavelength circumference helical, you will require a coax line of about 84 ohms for the matching section. You can build this as suggested by DeMaw or you can change the feedpoint impedance of the helical to make the matching transformer a "standard" impedance for commercial coax. In my article in the *AMSAT Newsletter*[11] I suggested a helical circumference of 0.8 wavelengths. This reduces the feedpoint impedance to 112 ohms (a 1 wavelength circumference helical has a feedpoint impedance of 140 ohms). This means the matching section can be 75 ohm coax (such as RG-11 or RG-59). One may wonder what effect changing the circumference from 1 wavelength to 0.8 wavelengths has. The 0.8 wavelength circumference helical has a slightly lower gain. But, by trading off this gain we not only get an easier to build matching section but also produce a slightly wider half power beam width which makes tracking a bit less critical. This comparison is shown in Table 2. If you examine the EIRP column of Table 2 you will see that a 100 watt (output) transmitter will yield much more than the required EIRP for Phase IIIB. In fact, with a 6 turn 0.8 wavelength circumference helical and a 100 watt transmitter, you

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