Hams in Space

by Gary L. Johnston, KI4LA

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It's possible the University of Cincinnati's OMI College of Applied Science Amateur Radio Club may hold several amateur radio world records. First club to contact STS-51F, first two-way voice contact with a shuttle, first woman to conduct a two-way conversation with a shuttle, first Boy Scout/youth group member to make contact with the shuttle, first rag chew with an astronaut, first club to contact a shuttle more that once in one mission, and, if our SSTV and CW signals were received, the list could go on!

It all started when Jim Sullivan NG8T, faculty advisor of the OCASARC, wrote the ARRL registering the club as part of the special youth program. The League sent a list of special 'secret' uplink frequencies. Jim called Paul D. Nohr at the University of Cincinnati Observatory and arranged for the club to use his excellent facility. [Paul later became so enthusiastic about the project, he took and passed his novice test during the course of the mission!] The UC Observatory and its 140 year old 11-inch Mitchel telescope (dedicated by John Quincy Adams) presented a dramatic setting for our probe into space.

Jim then involved Boy Scout Troop 98, and drafted Gerald L. Kasselmann KD4QA, a fellow OCAS faculty member, and me, Gary KI4LA and my faithful Apple //e. Of course, many others were involved including several students from OCAS and local hams.

After suffering the disappointments of the aborted first launch and the failed engine a few minutes after lift off, the mission was under way. We waited with the rest of the country for NASA to release orbital elements. As soon as we got confirmed data, we computed each orbit relative to our own position in Cincinnati. The club then made several attempts to contact the shuttle during the week. SSTV signals and the W0ORE/CHALLENGER CW ID were heard clearly, but we were unable to properly demodulate our recordings of W0ORE's SSTV signals at this point.

Recap of Saturday, 8/3/85

On Saturday, three passes proved fruitless. Orbits 79, 80 and 81 went by with a yawn. Then on orbit 82, a faint signal and glimmer of hope. The SSTV signals captured at 7:39 PM were snowy and looked like a pine tree on a mountainside, not a very space-like scene.

Preparing for orbit 83 saw many weary Earth-bound-nauts. Jerry KD4QA, who had manned the late night shift Friday, was relieved by Jim NG8T. Jerry was to return Sunday after a well-deserved good night's sleep. Several others, like Elissa N4KPG, were discouraged by the lull of the day and the 90 minute wait between 11-minute uneventful passes, and called it a day promising to come back Sunday.

I had worked the 4:28 PM pass with the crew, then had gone home to make an appearance at a church picnic and to pick up my daughter, Allison KB4LEW, so we could both work the evening passes.

One parenthetical sparkplug of interest that day had been the arrival of Tom WA8ZAH. I had been searching for someone

with higher quality SSTV equipment so we could see the signals we had received the two previous days. Our Apple //e computer, though doing a fine job tracking orbits, did not have the error-correcting and gray-scale capabilities to give us much of an image. Thanks to Reggie Brown KI4UN, who knew Tom via packet radio, for the reference.

Orbit 83 began as per usual. We had been playing musical chairs with the several jobs available: radio operator, time-keeper and radio-op assistant, tx antenna pointer, rx antenna pointer, and orbit-elevation-time shouter for the antenna pointers. I drew the later position for orbit 83. Dan N8FRY was inside on the mike, Jim NG8T was on the tx antenna, and a student from OCAS was on the rx antenna. Several others assisted on various miscellaneous jobs, and 15-20 onlookers had showed up (this was to be a 23 degree pass, one of the higher in the sky for the day).

Jim and I had a discussion about this being a possible visual orbit. Jim said It was too light, I contended that as dusk set in, it might be seeable. We both lifted our eyes to the heavens and I conceded that since we couldn't even see Polaris yet, Jim was probably right. Mathematician/Physicists always outguess trombonists, I reasoned.

We rehearsed for the pass about ten minutes beforehand. The 'pointers' got an analog 'feel' for their relative positions for the start, middle and end of the pass. We gently swept our antennas in an arc over the path we read from our computer print-out. "Five minutes to showtime," the 'shouter' shouted.

Coordination between blind positions was handled on 147.990 MHz FM with our handheld radios. We called to each other indicating readiness.

The pass began with our antennas aimed at the horizon at 307 degrees azimuth. In this case, 307 degrees meant the base of the building closest to us. Not a very encouraging prospect. Therefore we aimed our antennas just to the right of the building waiting for the shuttle to reach that point. At 0114 UTC the shuttle was -4 degrees below the horizon. Three minutes later the shuttle should have emerged from behind the building at 0117 at 322 degrees azimuth at 7 degrees elevation. This is the point in elevation experience has shown that we begin to pick up a signal. The tapes showed that we did not pick up a signal, only the quiet hiss of the ethers beyond did we record at that point. At 0119 355x19 degrees the shouter reported that the craft should be emerging from behind a large tree.

Suddenly there was a shout from an unnamed onlooker. "There it is!" A quick scan revealed the shuttle moving steadily across the sky. It appeared as a bright dot moving steadily in a slow arc downward toward the eastern horizon. The 'official shouter' (ha) directed the 'pointers' to forget the azimuth/elevation business and to "point those antennas right at that dot!"

Meanwhile, inside the observatory, the radio operator was dutifully calling "W0ORE this is K8ORW K8ORW K8ORW from Cincinnati Ohio..." over and over. Between calls he thought he detected a slight voice over the hiss (the real-time recording being made via a slightly more sensitive receiver was later to reveal that he was right). One more call, then the payoff.

Both local newspapers and all three local TV stations carried stories on our effort at the Cincinnati Observatory. Cincinnatians and Northern Kentuckians soon learned how difficult and frustrating it can be to try and contact a target 199

miles up, 450-2500 KM away, and moving 5 miles per second! The only thing we had heard on previous passes had been SSTV signals. SSTV signals that we couldn't decode until this to-be-remembered Saturday.

"We got him. We made contact." There was a split second of dead silence as the 10 or so of us standing out there contemplated whether or not we had really heard what we thought we had heard. Then a shout. Then spontaneous applause.

As the craft receded below the trees and finally beyond our direct radio reach below the horizon, we shook each others hands and headed for the building to listen to the tape. We were still not quite believing that it had happened. Back in the recesses of each of our minds we were each thinking that our calls were so close (ORE-OEW) that Dan may not have heard what he thought he heard. You could have cut the air with a knife.

It took a while to get the tape re-wound and cued up to the right spot. It seemed like an eternity. There was the faint sound of our call, we thought. "Ok, this is W0ORE aboard the spaceship challenger..I ahhh copy WA9er Bravo Zulu Whiskey in Wisconsin...also W Kilo 8ORW the College of Applied Science Cincinnati Ohio.....how you doing down there? We're doing great up here [then he unkeyed, and on the tape you can hear Dan call him again]." Then a brief silence, then, as clear as face to face conversation came "Ok, this is W0ORE...not Tony though, but Gordo [Tony refers to Tony England W0ORE, Gordo refers to Gordon Fullerton, a former novice amateur radio operator and the Commander of this Shuttle flight], the alternate operator here on the SAREX

experiment...I copy W..K8ORW [that's us!] ...also WA9er Bravo Zulu Whiskey...nice to talk to you folks...we're goin' by quick, though...about 5 miles per second...I'll ahhh turn on one of our ahhhh slow scan sequences...if you have a recorder...you might listen in [unkeyed here, then acknowledges 2-3 three more stations, and, as his signals fade, turns on SSTV]."

"We are all walking on cloud nine," as Jim Sullivan, the chief organizer of the OCAS effort reported to a local newspaper editor who rushed to the scene. I called my wife on autopatch and gave here the good news. Then I made a land-line long distance call to George Wilson W4OYI, our ARRL Director.

George and I had been keeping in close contact throughout the mission: passing orbital elements and pass information as we gleaned them from Goddard, Houston or the League. "George, we got it, we got it," I reported. George said they hadn't heard it at all that pass.

It was particularly gratifying that we had beaten George and the Owensboro ARC to the punch. We are using hand-pointed 10 element beams with 85 watts. OARA is using a 100 foot tower, an 'H-frame' 44 element azimuth/elevation beam, and a KW amp known as 'Big Bertha.' Although George and I are best of friends (at least before this!) and have helped each other throughout the space program for at least the last 10 years (OSCAR to Owen Garriott), it gives me a kind of heh-heh-heh rub-your-hands-together devilish-satisfaction to have beaten them to a two-way contact!

Our only regret at that point was that so many who worked so hard did not enjoy our triumph first-hand. Included in that was Boy Scout Troop #98 who had made several trips to the Observatory to witness our efforts. The late hour was not

conducive to attracting young people. The only young people present during orbit 83 were Jim's son Bobby, age 11, a Boy Scout (in full uniform!), and my daughter, Allison, KB4LEW, age nine (licensed at 8!).

Hit Number Two, Sunday 8/4/85

Sunday looked like a good day. Our crew was buoyed by the success Saturday, yet we were now relaxed and 'experienced.' We sat about out orbit to orbit activities with an air of confidence that what ever it was we were doing, we were doing it right! Jim Sullivan decided that we should try more SSTV and CW since we already had one voice two-way under out belt.

Orbits 95 and 96 went by with only a whisper of white noise to show for our efforts. Orbit 97 was a voice pass. We heard a reply to a VE3 (a Canadian station), but that was it. At 2353 UTC we heard Tony in QSO with several stations, even a mobile and a KP3TC with "traffic for John." We gave our call on the 'secret' uplink frequency (144.41 MHz) and appended "with a Boy Scout" each time. We later guessed that he must have been listening on one of the public frequencies. At any rate, we were not heard.

Between orbits 98 and 99, we regrouped and decided on a new strategy. Jim and Jerry KD4QA had changed shifts again, so we decided in an act of mutiny to try one more voice orbit, this being a relatively good pass for the day (44 degrees elevation in an unobstructed patch of sky). Since it had clouded over, we knew we must depend heavily on our pointers' accuracy, so OCAS students and several hams jointly supervised the antennas.

We made another decision. Elissa Erven N4KPG, who, you will remember, just missed the last successful contact, had returned. Elissa (a medical secretary) holds an extra-class license and has a nice radio voice. I mused, "Now if I had been in orbit for a week, I know which station would perk up my ears." Elissa was an unwilling draftee at the mike, but she finally agreed to give it a try.

Elissa must not have transmitted during the first four minutes of the pass. The tape records her as calling only "K8ORW K8ORW Kilo 8 Oscar Romeo Whiskey K8ORW" in the fifth minute of orbit 99. Then, one-quarter second after she unkeyed, boom. Tony England returned to her call: "K8ORW this is W0ORE...read you loud and clear [two unclear words, unkeys]."

Elissa, awestruck and speechless, handed the mike to Joe Connett KA8KIE, who asked to continue mentioning that we had a Boy Scout present. "Ok, go ahead...W0ORE with you," said Tony. Then Joe put Andy Johnson, a 13 year old first class Scout on the radio. "Hi, I'm Andy Johnson, Troop 98. My question is, what do you think is the most important project of the flight?"

Now Andy's question was delivered in such a clear, intelligent tone, that Tony's demeanor suddenly changed from casual to very professional and thoughtful. After all, wasn't this the stated purpose of the ham radio component of the mission, to work with and spark the interest of youth groups and support the Young Astronaut Program?

Tony returned, "Ok, K8ORW...I...I would say studying the Sun is our most important project. We're trying to understand the small structure of...small features on the Sun. And, of course,

the Sun's responsible for everything that works the way it does on Earth. So we feel that that's pretty important to understand. K8ORW W0ORE." Tony then unkeyed for about 4 seconds, continued, "Ok, the Georgia Tech station take it," and our adventure was over.

Needless to say, the calls started again. We called Jim who in turn called the press. We called our wives. And then I called George.

Now this time George and the OARC were expecting my call. "It's him," Bob Darling KA4YBL told the Owensboro group as he answered the phone. "Bob," I said. "At this point I'm almost embarrassed to tell you what just happened!" "Yeah, we heard it," Bob intoned. "Why don't you guys lay out an orbit and give us a chance." His tone was goodnatured and he congratulated us on our good fortune. George came on the line and likewise passed along good words.

It has taken years of experience, months of planning, and hundreds of hours of effort by many hams and others to get to this point. Not one of us involved regrets a single second we have put in on the project!

We are all grateful to Tony, Gordo and NASA for giving us hams the opportunity to have the experience of a lifetime.

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