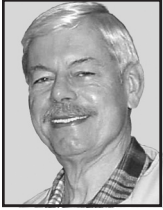


Taking a look at The Ancient ME's Notebook



A postcard from the AME

As reported in the last issue of TEST, the Ancient ME has recently been heavily involved in creating and implementing a training program. The program's objective was to train a platoon of Oregon National Guard (ONG) troops to fly radio-controlled (R/C) airplanes(!). These individuals have been tasked by the Army to fly Unmanned Aerial Vehicles (UAVs) for surveillance missions both overseas and here in the US.¹ The AME became involved because he's the president of a local R/C model airplane flying club and was listed as the contact person on the group's website.²

Here are his comments on the effort:

"The Portland ONG requested my help in training some of their troops to fly R/C aircraft, using commercial model airplanes, since they wouldn't receive the military UAVs for another year or so. A forward-thinking ONG major had been able to appropriate enough budget to buy the essential equipment (radios, airplanes, engines, video simulator programs, and support equipment), but wisely sought expert civilian guidance in implementing a training program. Through the miracle of the internet, they found my R/C club (the 'Barnstormers') and approached me as the president to ask for assistance.

"Regular readers of TEST already know that one of my favorite activities is mentoring. This appeared to be a good opportunity to indulge in sharing some hard-won skills and knowledge and do some good for our citizen soldiers as well as saving us taxpayers a few bucks in military expenditures. Accidentally crashing a \$300 R/C airplane is a lot cheaper than wiping out a \$300,000 UAV—and R/C airplanes get much better fuel mileage than the average UAV. So I agreed to accept the project (on a *pro bono* basis, in spite of the subliminal protests of my ever-present internal consultant).

"Thus it came to pass that once again I found myself in a meeting at a military installation, presenting a program plan to a group of uniformed individuals. It actually felt pretty good to resume the role of civilian expert in the midst of a bunch of attentive government employees. And best of all, when the meeting ended, they sincerely *thanked* me for my efforts. I don't recall that ever happening in aerospace (but my memory isn't perfect). Later, I asked for, and received, the unanimous consent of the Barnstormers Club to support the training activity. Since part of the program would involve actual in-the-air flight training, the club flying field would play a big part; permission from, and cooperation of, the members was essential. As I'd hoped, a number of club members stepped forward and volunteered their time and expertise for the four-month program.³ They felt, as did I, that "Support Our Troops" meant more than just a magnetic ribbon on the SUV tailgate.

"We began the program with 'ground school'—a classroom introduction to basic aerodynamics and principles of flight. One of the

1. These things are pretty smart; using onboard sensors, GPS and inertial guidance, and lots of computer power, they can take off, fly a mission, and land themselves on return. Usually, The FAA and other government agencies take a dim view of 'robot airplanes' in controlled airspace, so the UAVs must be continuously monitored from the ground, with a trained operator ready to take over manual control at any time. 'Manual' is the operative word; the operator must be able to fly the vehicle, basically a big R/C airplane, remotely. You get the connection.

2. Details available at www.portlandrcflyingclub.org. Click on 'ONG training.' The AME is the one with the grey hair.

3. Since the Guard meets for one weekend a month, we committed for a total of eight days. Not a big thing, but these would be all weekend days—a precious commodity to those who are not yet retired. And to those who *are* retired, as well.



FIG. 1—Flightworthiness inspection prior to actual radio-controlled flying.

club members was in the process of completing his private pilot's license studies and used some of his course materials to develop a lesson plan; it included segments on theory of flight, function of aircraft controls, and basic aerial maneuvers. Auditing the class, I was pleased to note that almost all of the students stayed awake and alert during the lecture. Maybe the eagle eye of their platoon sergeant had something to do with this.

"The next session was devoted to virtual flight training utilizing 'RealFlight G3™,' a commercially available PC-based R/C flight simulation program. Fortunately, the ONG had a video projector that enabled us to achieve a good approximation of actual flying conditions.⁴ Just as in real R/C flying, the only simulator feedback to the operator is vision; that's also true in UAV flying. After a few hours of one-on-one coaching, we (the instructors) began to discover which of the troops had a natural 'feel' for R/C flying. This was important because one of our program objectives was to select two or three individuals who would be future ONG trainers for subsequent classes.

"The month of April found us at the Barnstormers' flying field, south of Portland. For once, the early spring Oregon weather cooperated; rain and wind had been forecast but never showed up so the actual flying proceeded on schedule. The ONG brought their own training aircraft; we took them through flightworthiness inspection, radio checks, and all the preflight tasks that are necessary before any R/C flying (Figure 1). With the help of several club members, the trainees were soon able to start the model engines, make necessary adjustments, and taxi out to the flightline. Because of field insurance requirements mandating that all flyers be licensed by the AMA (Academy of Model Aeronautics, our national organization), the subsequent training was conducted using a 'Buddy Box' with a trained instructor providing instant backup when required (Figure 2).

"We spent two days in April and the same in May doing flight training. The ONG troops learned fast; they proved to be highly motivated and receptive to our instructional efforts. It helped that they were mostly young and physically fit;⁵ R/C flying requires a high degree of eye-hand coordination. The group picture (Figure 3) gives the flavor of the program.

Lessons learned

"I'm sharing this experience with the readers of TEST because

4. This is a nifty program except that the aircraft dynamics are not quite right, especially at low speeds. I found this out after flying a virtual airplane many times on the simulator, then building and flying that model in real life. While attempting the first landing, the craft stalled and fell out of the air, with unfortunate results to its structural integrity. Also, the visual pattern is unrealistic; the flying airplane gets really small really fast onscreen, especially if the 'keep ground in sight' mode is chosen. Unlike the roughly 200-degree subtended human vision angle, the image angle is maybe 90 degrees, even using a video projector. Otherwise, the program is pretty good.

5. Dammit!

the lessons learned are pretty much applicable to almost any sort of training effort. As test engineers, we're all mentors in one way or another; the ONG training program represents this mentoring process in microcosm. Here's the template:



FIG. 2—Training was conducted using a “Buddy Box” with a trained instructor (right) providing instant backup when required.

- A cadre of knowledgeable and motivated instructors was available;
- The students were motivated to learn;
- Students were first given the theoretical basics of the task to be learned;
- Initial training was performed on a realistic simulator under controlled conditions;
- Field training was given one-on-one, under real life conditions, with instant backup and support always available.

“Results? Out of a total of 10 trainees, three were ready to solo at the completion of training, four were able to take off and fly but needed more practice in landing (the toughest part of the flight profile), and the remainder of the class was a few sessions away from achieving minimum proficiency.

“This is excellent progress. Ordinarily, it takes around 10 to 12 sessions—or more—of assisted flying to prepare the average wannabe R/Cer for solo flight.

“I believe that the ‘no fear’ environment was in large measure responsible for our success. Simulator flying, of course, poses no danger to life, limb, or airplane while ‘buddy box’ flying with an instructor always at hand eliminated any consequences of student mistakes with the real hardware. Most individuals learning to fly can find expert help, but they are usually greatly concerned with



FIG. 3—Oregon National Guard troops in the training program, with civilian instructors (find the AME).

the possibility of crashing or losing the \$300–\$400 airplane that they’ve bought and built (the one that’s now 500 feet up in the air and rapidly moving out of sight). Eliminating this worry makes learning to fly a lot easier and quicker.

“There aren’t many win-win activities in life. This was one of them.”

—George Scott

George Scott is a principal of Scott Technical Services, in West Linn, Oregon, where he calls upon his 40+ years in the test and evaluation field, most of which was spent in the aerospace and automotive industries. He began his career at General Electric testing jet engines, moving to Los Angeles in time to join the Space Race and ICBM programs. In and out of retirement five times, George was most recently senior test and analysis engineer for Freightliner LLC, Portland, Oregon. He holds a BSME and an MSEngineering, and considers himself “painfully self-taught” in the discipline of digital data acquisition and analysis. **For more info about Scott Technical Services or to further discuss this topic with George—**

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