by Steve Douglass, webbfeat@1s.net

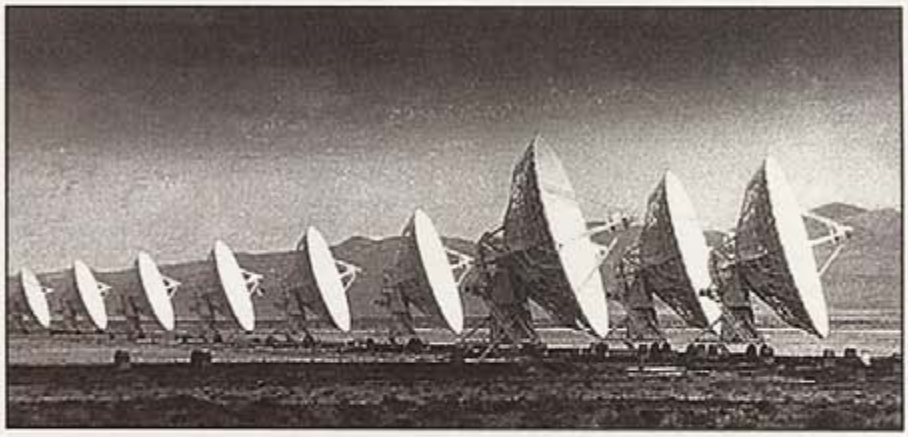
The Ultimate Intercept—Part I, And Hard Lessons Learned

Cooler fall weather brings out the daydreamer in me. On most any crisp autumn day you can find me cruising through my neighborhood on my bicycle, enjoying the wonderful fall air, the spectacular changing foliage, and life in general. On those occasions I can't help but let my mind wander a bit as I ponder life, love (and, of course), radio monitoring.

Not only is cycling a fun way to stay in shape, it also gives me the opportunity to clear my noggin of pressing duties and enables me to access the creative part of my brain, which comes in handy when writing this column. Some of my best ideas have been born of long, leisurely bike rides. For example, just last week as I cruised through the neighborhood, I began pondering an interesting question: *Just what would be the ultimate monitoring catch?*

What do you think? Maybe the President of The United States talking on an un-encrypted line from Air Force One? Or maybe a spy transmitting in the blind outside a terrorist camp? Or how about radio transmissions revealing the existence of a super-secret stealth spy plane? Those would be cool intercepts to be sure, but in my imagination the ultimate interception would be the communications from beings *not of this world!*

Now before you think this author has gone all "UFOie," let me state for the record that I don't believe that this planet has ever been visited by extraterrestrial beings, for several reasons. First and foremost being that the distances involved in intergalactic travel are too great to permit face-to-face contact (despite what you see on *Star Trek*), and the physics and the limits of space technology (as of this writing) make interstellar travel all but impossible. Some may argue that other civilizations may have advanced enough in their technological prowess to have bridged the wide gulf that is the universe, but until someone can show me hard-edged physical proof (and not just anecdotal tales or blurry photographs) that can stand up to intense scientific scrutiny, my thinking is, *it just isn't so.*



Radio telescopes of the Very Large Array in New Mexico keep an ear to the heavens, listening for the radio sounds of the universe. (Photo by Steve Douglass)

That doesn't mean I believe we are alone in the universe. Scientists agree that it is *very* possible that the conditions that allowed intelligent life to evolve on this planet could (and most likely did) occur on other planets. Although the very exacting conditions that have to be in place before life (let alone intelligent life) can arise are extremely rare in the universe, space is so huge that even if the chances are one in a billion that a planet harbors intelligent beings, then by the laws of mathematical probability there must be millions of civilizations scattered throughout the heavens.

But unfortunately today there is only one way to get proof, and right now that is through radio. Since it seems logical that intelligent beings would, in the course of their history, discover radio technology, it also seems likely that some of these radio transmissions have leaked into space, as ours have for years. That's why dedicated radio astronomers are now using million-channel receivers tied to super-sensitive antenna arrays, listening for the signs of intelligent life in the universe. Although some radio astronomers think using radio telescopes to listen for E.T. to call is a waste of expensive and important scientific resources, SETI (Search for Extraterrestrial Intelligence) scientists are convinced that the technological historical and sociologic impact of discovering intelligent life elsewhere in the universe would be so profound that to not attempt it would be the real waste. Despite what many may think, the search for extraterrestrial intelligence is a legitimate science and not tied to lunatic-fringe pseudo science or UFOs. Although the chances are slim that we will answer the E.T. question in our lifetime, maybe someday our descendants will know for sure if there is anyone else out there.

The Drake Equation

With all the billions of stars in the heavens, how do SETI scientists calculate where intelligent life might be hiding? For years SETI researchers have used the formula

N = R fp ne fl fi fc L

as the basis for calculating the odds of detecting intelligent extraterrestrial life in a given solar system. Although this equation might look like alphabet soup to most of us, it is relatively simple. The equation is the work of Frank Drake, a professor of astronomy at the University of California, Santa Cruz, and former president of the prestigious Astronomical

Society of the Pacific and the SETI institute. To those of us who had trouble with high school algebra, the equation may look a bit intimidating, but on close examination it is simple to understand. Basically it's just a common sense series of questions that if answered would make the daunting search for extraterrestrial intelligence all that much easier. Let's take a look at the parts.

N (number of intelligent extraterrestrial civilizations)

The N in the equation stands for the number of detectable (by radio astronomy means) extraterrestrial civilizations in space. N is an unknown number since no galactic census exists.

R (number of yellow stars)

R equals the rate of the formation of yellow stars (like our sun) and their number in the universe. Scientists estimate stars like our own are not uncommon and they are the best type of stars to foster life-sustaining (stable) radiation. We can see many stable yellow stars with optical telescopes. These stars would be a great starting (or aiming) point for SETI radio telescopes.

fp (the fraction of stars that have planets around them)

Many of these stars should have planets revolving around them. Although the odds are small, some of these planets might be located in just the right temperature (orbital) plane where it is neither not too hot nor too cold for life to exist. There are so many yellow stars that some are bound to be able to support life. We can compare it to standing in the freezing cold next to a blazing campfire. Anyone who has ever been camping knows there is a zone where the temperature is just right. In space, this zone is incredibly narrow. A planet just a few million miles out of this orbit either freezes or barbecues.

ne (planets hospitable to life)

Planets hospitable to life are much more common than planets actually having life. There may be many lifeless planets riding in the temperate zone. Our moon is essentially in the same orbit as Earth, yet it can't support life for many reasons, chief among them not having enough gravity to capture and hold oxygen.

fl (planets supporting life)

Even if we have an Earth-like planet teeming with life, we (humans) would never have any hope of detecting it. It could be that the life on the planet is composed of microbes or other lower life forms incapable of constructing civilizations. SETI is a search for *intelligent* life and not just life itself. Planets inhabited by even slightly higher life forms (such as mammals and reptiles) would still be undetectable by human means. To even our closest relative, the chimpanzee, civilization is an incomprehensible concept.

fi (existence of intelligent life)

In our equation we find the symbol "fi" representing the existence of intelligent life in the galaxy, which unfortunately has an even smaller chance of forming in a solar system. Intelligent species need time and the right conditions to form. This can mean millions of years of development, without interruption by species-eradicating diseases and natural and self-inflicted technological disasters, such as nuclear war. But for the sake of our argument, let's say that hidden inside a remote solar system somewhere is a planet populated by intelligent beings. There are still other factors involved in our ability to detect them.

fc (do they have radio?)

The intelligent creatures on our target planet may have constructed an elaborate civilization rivaling any built by man. But before we could have any hope of eavesdropping on them, they would have to have mastered at least one discovery. In our equation "fc "represents intelligent civilizations capable of interstellar communications. In other words, they would have to have discovered radio. The only way any extraterrestrial civilization could ever discover our presence on Earth would be to detect the billions of everyday radio transmissions leaking out into the universe. Since Marconi invented the radio, humans have unintentionally broadcast their presence into the heavens. Ironically, it might be that reruns of *Leave It to Beaver* could be proof to an extraterrestrial civilization that intelligent life exists on Earth. In turn, it may also be that the interception of an extraterrestrial broadcast transmission might be the final proof that we are not alone.

L (survival of the species)

There is one remaining factor in the Drake equation that we need to consider in the search for extraterrestrial intelligence. It is represented by the last character in our equation. The "L" stands for the length of time that a civilization capable of interstellar radio communication remains detectable. Intelligent humans have inhabited this planet for millions of years, yet it has only been for a relatively short time that we have been capable of radio communication. In relation to how long humans have existed, the time we have been radio-capable is a mere *half* a blink of an eye. Even if by chance the number of extraterrestrial civilizations capable of interstellar communications in the galaxy is large, the chances that we (humans) would be pointing an antenna at the right planet at the exact time they were radio-active are very slim indeed. It is possible that millions of intelligent societies have sprung up throughout the heavens, becoming radio capable and yet for some reason existed for only a brief moment in time. Maybe they destroyed themselves in a nuclear holocaust or were wiped out in some natural cataclysm before they could radio their presence.

Unfortunately many scientists theorize that the invention of radio usually heralds the mastering of the atom (as in atomic weapons). The chances of any society surviving a nuclear age may be slim. So far humans have survived, but only time will tell if we will be able to keep these world-killing weapons leashed.

As a broad analogy, I'm sure many of us can remember the fun of chasing fireflies on summer nights. The preferred technique for catching lightning bugs was to stare into the darkness waiting for one to flicker, then running to the spot before the firefly flew away. Sometimes the firefly would be in relatively the same place when we got there, at other times it would have flown away, making capture impossible. Searching for extraterrestrial intelligence must be a lot like chasing fireflies, yet immensely more difficult. Millions of intelligent societies must have "blinked" on and off without anyone ever knowing of their existence. Will Earth share that same fate?

The recent discovery of microbes embedded in rocks from Mars found in Antarctica offers new hope to SETI astronomers, giving them an answer to one of the questions in the Drake equation. It is possible that life in the universe may be more common than we at first believed. If so, our chances of intercepting a signal may have increased...or have they?

The Digital Factor

Alas, there is a new wrinkle to this equation that Drake never thought of. The window in which one can detect an intel-

ligent civilization sending radio waves into space is a made even more narrow by the acquisition of new technology. Not only does our hypothetical extraterrestrial civilization have to have managed not to destroy itself as it struggles to survive its own technological adolescence while somehow surviving (and thriving) in a chaotic universe filled with planet-killing comets, but to be heard it must not have advanced *too* far! Making the task of intercepting an extraterrestrial radio signal even more difficult is the inevitable technological evolutionary step of a civilization going from an analog-based technology to a digital one. Once a civilization becomes 100 percent digital, chances of intercepting its very brief, narrow-band radio transmissions become almost infinitesimal.

In light of this, our only chance of receiving any E.T. DX would be broadbanded, *very* powerful signals *intended* for reception. Let's hope that somewhere in the universe intelligent beings have evolved and survived long enough to *radio-shout* into the stars the proof of their existence. Since Earth technology is also evolving from the analog to the digital, the window of opportunity for humankind's weak signals to be snatched out of the electromagnetically noisy universe by an extraterrestrial civilization is also closing rapidly. Maybe what's needed is a project that will shout our existence into the universe before we go the way of the dodo?

Results?

Because the universe is so vast, searching for SETI signals among the billions of stars has been a hit and miss affair, so far with only tantalizing, but not convincing, hits. Therefore, chances that a SETI antenna would be pointed at the right star system at right time to receive a flicker-brief extraterrestrial transmission are extremely small, almost beyond calculation. But, since the proof of intelligent life would have profound impact on all mankind, the hunt for the ultimate intercept continues.

SETI searches can be compared to searching every beach of the world for one certain granule of sand before the tide can sweep it away. Hope continues that, despite the great odds against it, someday in the future SETI scientists will point their antennas in the right direction at the right time and tap into a galactic Internet. But for now, searching the universe for intelligent life is a lot like knowing where a firefly will be the next time it blinks. Luckily, though, that task will only become easier through evolving information about our universe, advancement in radio technology, and the intelligent deduction and dedication of SETI scientists.

Although it may now seem impossible, with the odds stacked heavily in the failure column, humans throughout history have exhibited the unique capacity to ignore the odds and carry on with seemingly impossible quests. At some point in time, going to the moon or taming the atom also seemed like impossibilities, but as we all know, on hot summer nights from time to time, kids still somehow manage to catch fireflies.

Right here next month, we'll take a look at the technical aspects of SETI and show you how you can participate in your own SETI project. But now, let's move on to more worldly utility monitoring!

9/11 And Beyond

As of this writing, I am about halfway through the *9/11 Commission Report*. I must say that everyone should read this amazing book. This is the definitive, true account (despite what wacko conspiracy theorists think) of what happened on that tragic day in September. Not only is it an amazingly good read, describing in great detail the second by second timeline of the attack, it also explains who the terrorists were, what motivated them, and how we can prepare and prevent future assaults on our country. For communications monitors, it also provides insight into the massive communications failures that occurred. Everything from police, fire, and rescue communications to cellular, government, military, and aviation channels suffered mass over-loads and eventual breakdowns that exacerbated the disaster.

There is an also amazing amount of information concerning the inner workings of the FBI, CIA, and other intelligence agencies, as well as an informative look of what happened inside the highest government offices before, during, and after the attack. Particularly interesting for UTE monitors is the account of what happened when the President learned of the attack, what happened aboard Air Force One, and also the scramble deep inside NORAD to get information from the FAA, and other sources, in an attempt to decide what course of action to take against an enemy armed with huge, fully fueled human-guided-missiles packed with innocent civilians.

After reading this report it becomes clear that we can't let our guard down for a second. It's not a matter of *if* but *when* the next attack will come. These terrorists hate America and all it stands for with a deep passion. They have perverted and twisted their religion to justify their evil intentions. To quote the *9/11 Commission Report*: "We learned about an enemy who is sophisticated, patient, disciplined and lethal. The enemy rallies broad support in the Arab and Muslim world by demanding redress of political grievances, but its hostility towards and our values is limitless. Its purpose is to rid the world of religious and political pluralism, the plebiscite and equal rights for women. It makes no distinction between military and civilian targets. Collateral damage is not in its lexicon."

Therefore it is imperative that radio-monitoring hobbyists keep a sharp ear to their receivers. When the attack comes, what we monitor will become very important. As is detailed in the *Report*, during a disaster, information becomes the most important, and yet hardest, asset to obtain. As an example, after the first aircraft hit the WTC North tower, the President was notified by his staff of a report that a twin-engine plane had hit one of the towers. No one suspected terrorism, with most thinking it must have been a tragic accident. But anyone monitoring the FAA ATC frequencies in the area would have been aware that something extraordinary was happening. For instance, at 8:24 AM (EDT) terrorists on American Flight 11, thinking they were using the hijacked aircraft's public address system, mistakenly radioed over VHF civil aviation frequencies, "We have some planes. Just stay quiet and you'll be okay. We are returning to the airport." Another transmission came seconds later, "Nobody move. Everything will be okay. If you try to make any moves you'll endanger yourself and the airplane. Just stay quiet." Another example involved United Airline's Flight 175, the second aircraft hijacked. Before the hijacking occurred, however, the pilots radioed the New York Center with a transmission that any aero-monitor could have intercepted: "UAL 175: Ah, we heard a suspicious transmission on our departure out of Boston…ah…someone…ah…it sounded like someone keyed the mikes and said…ah…everyone stay in your seats." Beginning at 8:51 AM EDT, a New York Center controller

noticed an unauthorized transponder change from UAL 175 and *repeatedly* (over VHF channels) tried to contact the aircraft but had no success. Another commercial aircraft radioed New York Center about "radio reports of a commuter plane hitting the World Trade Center."

At this point it would have been clear to anyone monitoring civilian VHF aircraft frequencies that a terrorist attack was underway. Incredibly, most federal agencies would only learn of the attack much later, and not through official communications channels, but by watching reports on CNN! In this case, monitoring hobbyists (if any were listening in at the time and I haven't seen any reports that any had monitored these transmissions) could have been more informed on what was going on then the President of the United States and most people in the military, CIA, NSA, or NORAD! So before the next attack happens—and it will—monitors need to sharpen their monitoring skills, improve and expand their monitoring coverage, enhance and organize their monitoring equipment, and document or record everything of importance. The following list of monitoring-related priorities should help get you thinking about what needs to be done—now!

Terrorist/Disaster Preparedness List

Improve Existing Monitoring Capabilities: Do everything you can to make physical improvements to your monitoring system such as replacing aging leaky coaxial cables, repair, purchasing or building new antenna systems and finding ways to improve output audio.

Increase Your Monitoring Coverage: Think about expanding what you monitor. Try not to focus on just one aspect of monitoring, such as only aviation. Consider buying additional receivers so you can dedicate each receiver to a communications genre type. For example, use one receiver for public safety monitoring and one for military, etc.

Acquire as Much Frequency Data as Possible: Use the search functions on your receivers to discover active channels in your area. Do frequency research on the Internet, purchase commercial frequency databases, and trade information with other monitors. Try to build a complete map of all the active frequencies (and who uses them) and continually keep it updated. Search out and identify *ALL* users of the radio spectrum in your community, from shortwave to microwave, including users you would never monitor on a daily basis, such as business users, GMRS, utilities, news media, construction, transportation, public and private schools, and railroads. Update these lists periodically and keep them current. Since you never know what target terrorists might strike, it's a good idea to have even mundane communications frequency listings at your fingertips.

Document your Findings: Purchase recording equipment, such as digital or standard cassettes, to capture your intercepts. In the event of an attack your recordings could provide valuable insight. You might consider buying a device, such as a NITELOGGER, a Capri ScanRecord, or a VOX-operated recorder, that lets you only record when the scanner is active. Record during the night and review your tapes everyday. This is a great way to compress your monitoring time from hours to minutes.

Keep Written Logs: It's equally important to make notations of stations, modes, and callsigns used. Be sure to make hardcopy prints of all your accumulated data, frequency, and information lists so you'll have some kind of record that you can access away from your computer.

Emergency Power Considerations: What if the electrical power is knocked out due to a terrorist attack or natural disaster? All that data you accumulated would be inaccessible trapped in a dead computer and your receivers will be totally. Useless. Consider buying a UPS (Uninterruptible Power Supply) for your computer. A reliable alternate power supplies for your receivers such as 12-volt rechargeable gel cell or standard rechargeable batteries (kept at the ready) will keep you in the know when everyone else is in the dark.

Consider Alternate Sources of Information: I have no less than three television sets in my monitoring shack so I can watch all the major networks at once. During a terrorist attack you'll find press reports a valuable source of additional information. Also, it pays to purchase a good standard AM/FM broadcast band receiver and keep it connected to a good outside antenna. You'd be surprised at how much info was broadcast on normal talk radio stations during the 9/11 attacks. AM stations can be very helpful in getting information on events that happen within a radius of a couple hundred miles (and further at night) when most VHF/UHF public safety communications are out of range of your receivers.

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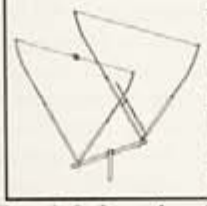

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Shortwave broadcasters can be a great source on international news, but be aware that their newscasts are usually politically biased. When atmospheric noise is a factor, you can listen in on many local, state, national, and international stations on the Internet.

Collect Additional (Radio- and Non-Radio-Related) Data: Obtain some good maps of your listening area, including, aviation, topographic, and standard street maps. Satellite images are also very helpful. Point your browser to www.digitalglobe.com for some excellent samples. Consider buying mapping programs for your PC. Improve your radio-related library and purchase books on monitoring techniques, radio-electronics, antenna construction, and the like. Other books you might consider for your library include aircraft spotting guides, books about government intelligence agencies (such as James Bamford's excellent works *The Puzzle Palace* and *Body of Secrets*), books on terrorism, and, of course, the *9/11 Commission Report*.

Network!: Join Internet radio monitoring hobbyist e-mail newsgroups to share your information. A great place to start is www.QTH.net. There you'll find dozens of groups with thousands of monitors who share frequency lists, near real-time monitoring news, and technical tips.

Report: If you intercept something of a suspicious nature, don't hesitate to notify the proper authorities. But before you do, be *certain* you know what you have monitored isn't bogus. Just because you heard someone on an FRS frequency shouting "death to America," it might not be anything other than someone playing around. Real terrorists are very aware that their cell and satellite phones and HF communications can be intercepted, so it's very unlikely you'll ever hear anything in the clear (unless its disinformation), and you'll just end up looking like an overzealous CIA wannabe. However, if you intercept anything remotely like what was detailed in the *9/11 Commission Report* notify the authorities immediately. You could be saving lives.

Let's pray that day never comes, but just in case, we should follow the Boy Scout's motto and *be prepared*. Let's hope for the best and prepare for the worst.

Speaking Of Terror Tapes...

How important your intercepts could be is clearly illustrated by the recent admission by the FAA that an hour-long audiotape account of six air traffic controllers who were communicating with two of the hijacked aircraft on 9/11 has been destroyed. Managers at the FAA New York Air Route Traffic Control Center directed controllers make the tape to provide information for investigators examining the events as they were experienced by the ATC controllers involved. But, according to a report by the Transportation Department's Inspector General (asked to review the FAA's responsiveness to the 9/11 Commission's request for documentation), the tape was destroyed by a center manager. According to FAA managers, the tape was only made to provide interim information until written statements could be prepared and was not transcribed or duplicated, nor was its existence disclosed to anyone, nor was it listened to before it was destroyed.

The Inspector General's report said the controller's union local president had been consulted before the tape was made and agreed to the recording only under the understanding it would be destroyed after a written account had been prepared. The tape was made at approximately 11:40 a.m. on September 11 as center controllers and managers were reviewing what had just occurred. According to the Inspector General, "We have no indication there was anything on the tape that lead anyone to conclude they had something to hide or that controllers did not properly carry out their duties."

Terrorists Or Pranksters?

John Tomlinson, KA5QYR, of Blackwell, Texas, writes us with this interesting intercept. You decide if it's the product of pranksters or of evil minds plotting against the United States. Send comments to webbfeat@1s.net.

I thought I would share something with you that I have only told a couple of people about.

It was around three years ago and I really don't remember if it was before or after 9/11. As usual I went out to my ham shack while my wife was getting ready to go to work. I went to the 30-meter ham band to try for some DX. Tuning through the band I ran into a medium signal and stopped to see what it was. At first I had to do a double take when I began to copy in CW (at around 18 wpm) the words "American (expletive deleted) kill them all off! There was no callsign and the insulting phrase was all they sent. It had a regular pattern and they would transmit this phrase about every 90 seconds. After copying about four transmissions I went on and figured it was just a prankster. I never heard of any other hams speak of it to this day . I have always wondered where it came from but it was between, I believe, 10.115 and 10.120 MHz. I use a Gap Titan vertical so was not able to get a bearing. Time of intercept was 6:00 AM CST.

Anyway I thought I would share this with you. I'm definitely not a glory seeker but maybe you or your readers have heard something about it

Readers Logs

I want to remind you that you can send in your MILCOM loggings above 30 MHz, including UHF aero band catches. Just do so in the format below. As always, thanks to our ever-faithful UTE monitors who submit their logs every month. This month the logs are kind of skimpy, so I'm putting the word out to you regulars and beginning contributors to get on the stick and send those logs in!

0000: (Frequency MHz): STATION, Anytown, USA, summary of traffic heard, MODE at 0000Z. (monitor/location)

5696: Rescue 1717 w/pos and ops rpt to CAMSLANT Chesapeake. (DS2 WI)

6694.0: Halifax Military: 0055 USB w/Canforce Rescue 908 (unidentified-not heard) in pp w/Rescue Coordination Center (RCC) who advises that vessel is at 4402N/5627W and will continue proceeding north until it reaches the harbor. (RP)

7849.0: CORE7 (Commander, Military Region 7, Venezuelan Army): 2323 USB/ALE TO CGGN (HQs, Venezuelan National Guard). (RP)

8012.0: 043SERCAP (Southeast Region, Civil Air Patrol): 2054 USB/ALE TO 022NHQCAP Civil Air Patrol, Nat'l Ops Center, Maxwell AFB AL). (RP)

8012.0: 043MERCAP (Middle East Region, Civil Air Patrol): 2132 USB/ALE sounding. (RP)

8037.0: CPSNY (Nat'l Guard Bureau, Cooperstown, NY): 1347 USB/ALE sounding. (RP)

8047.0: HQ703N (probably Nat'l Guard Readiness Center, Arlington, VA): 1034 USB/ALE TO R010IN (Nat'l Guard unit, Rhode Island). (RP)

8047.0: HQ703N (probably Nat'l Guard Readiness Center, Arlington, VA): 1022 USB/ALE TO V010TN (Nat'l Guard unit, Vermont). (RP)

8047.0: HQ703N (probably Nat'l Guard Readiness Center, Arlington, VA): 1008 USB/ALE TO M010AN (Nat'l Guard unit, Massachusetts). Also noted on 10816.5. (RP)

8047.0: HQ7 (probably Nat'l Guard Readiness Center, Arlington, VA): 1201 USB/ALE TO W030VH (Nat'l Guard unit, West Virginia). (RP)

8047.0: HQ7 (probably Nat'l Guard Readiness Center, Arlington, VA): 1231 USB/ALE TO K040YN (Nat'l Guard unit,