

ACCIDENTAL TONES – MAJOR SAFETY ISSUE AND UNNECESSARY PAIN FOR AIR TRAFFIC CONTROLLERS

Inadvertent “toning” of controllers has been an unsolved problem for decades. FAA has a huge network of telecommunications circuits nationwide to connect various remote communications facilities into Air Route Traffic Control Centers (ARTCC). In order to achieve the required availability performance for air traffic control, the equipment must be maintained by thousands of Telephone Company and FAA technicians nationwide.

Due to the complexity, there is always room for human error, and when the error causes an inadvertent tone to a controller’s headset, the potential for disaster exists. FAA has tried solving this by establishing procedures to follow after a controller is toned. Processing, documenting and tracking a tone incident is time consuming and expensive from the controller toned to everyone else involved. The best solution is to install a proven product into the system that *eliminates* the tones.

In Alaska some proactive FAA employees had an idea to solve the problem once and for all. They got a small company in southern Minnesota, Danville Signal Processing, to develop a device using modern digital signal processing technology that essentially eliminates the tones. The equipment has been installed at four major ARTCCs and has proven extremely successful.

Since the installation of this equipment in Anchorage, and three other ARTCCs, Minneapolis ARTCC (without tone suppression equipment) has had over 100 tone incidents resulting in 75 OWCP claims filed, while in a similar period, Anchorage ARTCC has had essentially NONE. This means that in a similar time frame, Minneapolis incurred dozens of hearing injuries and spent thousands of staff hours and filled out hundreds of forms and had the potential for disaster on many occasions, and Anchorage had none.

This issue is not only one of working conditions. It is a safety issue for the employees, but most importantly, the distraction from a toning, if occurring at the wrong time, could have catastrophic results. Four controllers were severely toned on 10-Sept-2008!

The Danville equipment is reliable, fail safe, and can be delivered quickly. It notches out any tone of any frequency, automatically. The controller hears no tone, and pilot audio is unaffected. It even notches out heterodynes from two aircraft transmitting simultaneously, and allows the controller to hear both voices. Danville has teamed with The Enterprising Edge, an 8(a) business in Washington DC to try to convince FAA to do the right thing and establish a national program for tone suppression.

This is not an expensive fix. Deployment cost for Minneapolis ARTCC (the largest center) is less than \$220,000. The entire nation’s ARTCCs could be equipped with the latest version of the equipment for less than \$6 million. It needs to be a national program and not a piecemeal approach as it has been, to ensure proper life cycle support. FAA has actually installed this type of protective circuitry in new ATC terminal voice switches. The enroute system has not, and the existing enroute system is not due for replacement until 2020. [See the following ATTACHMENT for more details]

Status of Tone Suppression Systems in FAA Air Traffic Control Facilities

Terminal Facilities (Problem Solved). Air Traffic Control Towers and TRACONS): Multiple efforts to deal with tone incidents have been conducted by Terminal systems organizations:

1. The ETVS system (Enhance Terminal Voice Switch) has been modified nation-wide with a digital signal processor that suppresses harmful tones.
2. Most other terminal facilities have had external tone suppression systems installed through an effort about 6 years ago that was funded due to language inserted in the FAA's budget by a Congressman in Virginia.

Flight Service Stations (Problem Solved). Multiple approaches have essentially solved the toning problems in this arena:

1. The Automated Flight Service Stations (AFSS) throughout the US have recently been converted to contract services with Lockheed Martin Corporation. LMC uses a new voice switch in these facilities that has built in tone suppression processing.
2. AFSSs in Alaska (still FAA owned, operated and maintained) have external tone suppression equipment installed that was supplied by Danville Signal Processing.

Enroute Facilities (PROBLEM NOT SOLVED):

1. Air Route Traffic Control Facilities have no tone suppression equipment installed, except at Anchorage, Denver, Salt Lake, and Seattle centers. These facilities took action about 8 years ago to solve their own problems using Danville Signal Processing equipment without FAA headquarters support. Minneapolis center is in the process of doing this now.
2. Instead of eliminating the tones with "intelligent" signal processing, as done in terminal and flight service, the Enroute Program Office in Washington DC purchased a "varistor headset" which only clamps the tone to an OSHA specified audio level that supposedly will not harm controller's hearing. The varistor is a simple diode clamping device. The controllers can still hear the tones and are distracted from their job by the tones. The Enroute Program made a valiant, however unsuccessful attempt to solve the problem, perhaps without knowledge of superior technology available.
3. FAA has developed procedures to deal with tone complaints that immediately assume that the controller is exaggerating the severity. A very uncomfortable working environment has developed. Tone incidents are still logged, but OWCP claims are seldom filed even in the severest cases, because upon filing, the controller's medical certification is immediately revoked, and he is placed either on sick leave or leave without pay. The controller must personally pay for any medical examinations and cannot return to work until reinstated.

4. It is questionable if handling the problem this way is even legal. Also there are considerable long term risks for future class actions. OSHA has a history of arbitrarily lowering thresholds. If they do, the FAA will have a past practice of exceeding the limits provable by virtue of the headset being designed for a particular audio level.

More Detail on Terminal Tone Suppression

In 2003 funding was appropriated by Congress to address tone incidents. \$2.7M was awarded to a company in Virginia to provide the equipment. Equipment was installed in many FAA terminal facilities by FAA installation teams. The language addresses RDVS, ETVS, ICSS and VSCS systems, however VSCS was not accomplished.

Tone Suppression – Proposed Solution for Enroute

All Air Route Traffic Control Centers have the Voice Switching and Control System (VSCS) which was deployed in the early 1990's. This system has no built in tone suppression capability and VSCS is not planned for replacement until 2020. Four of these centers have external Danville Signal Processing tone suppression systems installed. At least one additional facility that utilizes the VSCS system also needs tone suppression equipment; that is the FAA Technical Center near Atlantic City, NJ.

Establish new tone suppression systems at the following ARTCC facilities:

Albuquerque (Albuquerque, NM)
Kansas City (Olathe, KS)
Atlanta (Hampton, GA)
Los Angeles (Palmdale, CA)
Boston (Nashua, NH)
Memphis (Memphis, TN)
Chicago (Aurora, IL)
Miami (Miami, FL)
Cleveland (Oberlin, OH)
New York (Ronkonkoma, NY)
Fort Worth (Eules, TX)
Oakland (Fremont, CA)
Houston (Houston, TX)
Indianapolis (Indianapolis, IN)
Jacksonville (Hilliard, FL)
Washington, D.C. (Leesburg, VA)
Minneapolis (Farmington, MN) – partially funded for purchase of Tone
Suppression equipment

Replace aging tone suppression equipment with latest Danville Signal Processing, Inc. version upgrade at the following ARTCC facilities:

Denver (Longmont, CO)
Seattle (Auburn, WA)
Salt Lake City (Salt Lake City, UT)
Anchorage (Anchorage, AK)

Establish new tone suppression systems at the following other facilities:

FAA Technical Center (Atlantic City, NJ)

Procurement Strategy

The precedence has been set that FAA needs to provide a technical solution to deal with tone incidents. Terminal and Flight Services have taken appropriate steps to solve the problem. A standard nationwide approach is now necessary to solve the Enroute problem to finally eliminate the distracting, potentially catastrophic safety hazard that currently exists in the centers.

Danville Signal Processing, Inc. (DSP), a small business in Minnesota is teamed with a small disadvantaged minority 8(a) business in Virginia, The Enterprising Edge, Inc. (TEE). The team is prepared to provide a timely, standard implementation of this equipment nationwide, in accordance with FAA practices. The team consists of experienced digital signal processing design engineers and veteran retired FAA employees with many years of NAS acquisition, deployment, program management, and operations experience at a national level.

The TEE/DSP team is the only company in existence that is prepared to manufacture and deploy turnkey tone suppression equipment to all facilities on the previous list. The team is prepared to provide all lifecycle requirements for this deployment including but not limited to system testing, spare parts, training, documentation, engineering, installation, proper coordination, risk analysis, and any other requirements of typical National Airspace System (NAS) deployments.

Current estimates show that nearly 5000 circuits in 22 facilities in the enroute environment nationwide require tone suppression equipment. The TEE/DSP team estimates this deployment can be accomplished for less than \$6 million.

Danville equipment is currently deployed in the NAS, and is tested and proven over a period of 7 to 8 years at four major enroute air traffic control facilities. The equipment is fail-safe, built from the highest reliability components, with the best performing tone suppression algorithm in the world.

For the ultimate cost efficient procurement and rapid deployment, the TEE / DSP team is eligible for noncompetitive award of a sole source contract. In case of availability of expiring funds, obligation on this type of contract can happen very quickly.