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A brief overview of The HEAR System

(Hospital Emergency Aministrative Radio)

The potential of mass disasters on U.S. soil is not new. While most of us think of earthquakes, chemical spills, severe weather, and major accidents, we also have long been considering the potential effects of foreign invaders, and more recently the potential of terrorists from within.

Many people today don't remember the cold war but the potential of conflict with Russia was the catalyst for developing improved emergency medical response procedures back in the late sixties and early seventies. Concern for critical infrastructure failure such as the telephone network or the power grid never crossed our minds and we certainly had no concern for failure of the cellular phone network, the Internet, or satellite communications. They hadn't been invented yet! The concerns of the sixties were much less complex.

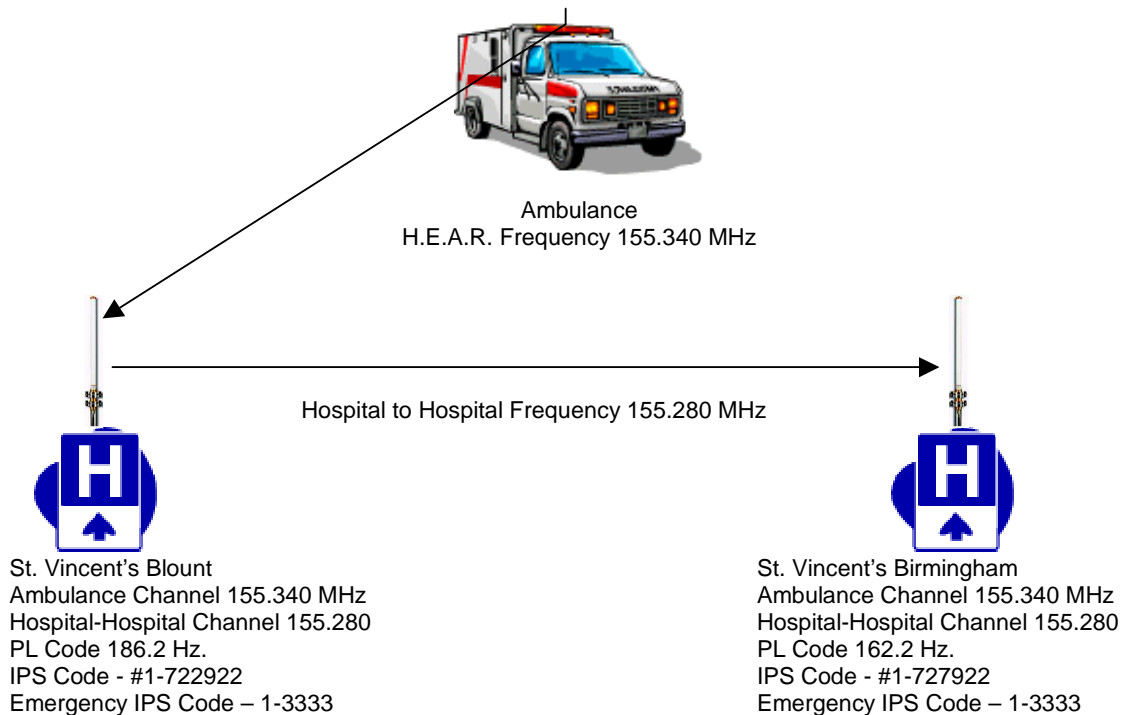
The number one emergency medical services problem in the sixties was traffic deaths in rural areas! If you were injured in a rural area, your chances for survival were not too good whether traffic related or otherwise. The *Hospital Emergency Administrative Radio* (HEAR.) system was developed primarily to address the need to reduce fatalities in rural America.

Planners in the late sixties also recognized the value of VHF wireless radio communications as a backup and/or supplement to traditional forms of communications, in particular as they related to emergency health care. It was from this recognition of this need that an integrated hospital and emergency vehicle communications evolved. Several systems were developed with HEAR. being the largest and best known. EACOM was the name for this system by General Electric and in Wisconsin, it was called WISPERN. HEAR. is the established system in Alabama and most other states. Falcon Direct is pleased to present an updated overview of the HEAR. system for those involved in hospital administration, emergency room operation, patient transport services, and other elements of emergency medical services.

The original function of HEAR. was to provide a rapid and efficient means for an ambulance to transport a patient as quickly as possible to the nearest medical facility capable of providing treatment promptly. This required a link between the ambulance and the hospital as well as a link between hospitals via VHF radio. Two frequencies were used – 155.340 primarily for vehicle to hospital communications, and 155.280 for hospital to hospital communications.

A radio station was set up in the Emergency Room of each hospital capable of providing trauma care with a control console for use by ER personnel. All hospitals use the same two frequencies which could cause potential noise pollution in the ER. To reduce this unwanted interference and the likelihood of ER personnel turning down the volume, a fairly sophisticated selective addressing system was developed comprised of a specific sub audible code (Private Line, CTCSS or PL) was assigned to each hospital as well as a unique Interrupted Pulse Signaling (IPS) address code.

The sub audible, or PL, code was used primarily to eliminate interference from distant stations on the same frequency while the IPS code was used to allow a transport vehicle to communicate directly with a single hospital without disturbing other hospitals. Each state developed a plan for the use of 21 PL codes and IPS individual code assignments as well as an operating protocol. In Alabama, this information is available in the EMS Directory published by the Planning and Economic Development Division of the Alabama Department of Economic and Community Affairs. The diagram below showing two hospitals in the Birmingham metro area may better explain the workings of the HEAR system.



In the example above a transport vehicle in Blount County calls in to the nearest hospital (St. Vincent's Blount) on the frequency of 155.340 MHz with a PL code of 186.2 and an IPS code of 1-722922 to connect to the ER in Oneonta. After discussion with ER personnel, it is determined that the patient should be transported to another hospital. In this particular example, there are three nearby hospitals that are part of the St. Vincent's system (Pell City, Birmingham East, and Birmingham central).

The ER personnel in Oneonta can communicate with these other hospitals directly by radio even if the phone system is not working by using the frequency of 155.280. In this example, St. Vincent's Birmingham is contacted by selecting a PL code of 162.2 and an IPS code of 1-727922. After discussion, it is determined that the transport vehicle should be diverted to St. Vincent's Birmingham. Instructions are passed on to the transport driver on 155.340 using the PL code of 186.2 (no IPS code is necessary for the hospital to communicate with the transport vehicle driver).

In a mass casualty emergency situation, the Emergency IPS code of 1-3333 could be used to communicate directly with all hospitals within radio communications range (typically on the order of 30 miles – more about this later).

It should be noted that a companion UHF system was established at the same time as HEAR that utilized 10 pairs of UHF frequencies for combined voice and telemetry use. Known as the Radio-Telephone Switch Station system (RTSS), the channels were identified as MED-1 through MED-10. The function of this system was primarily to send patient vital signs (EKG) over the air to the ER while simultaneously providing a voice radio link between on scene first responders and ER physicians.

Unfortunately the RTSS system is not operational in most areas due to changing technology. The frequencies have great value in the potential use of a more modern system utilizing digital technology but that is the subject for another discussion.

In Alabama, a model system for centralized control has been developed for use in the Birmingham metro area by the Birmingham Regional Emergency Medical Services System (BREMSS). This system is primarily built around network services provided by SouthernLINC and is a model emergency trauma care system with worldwide recognition. We view the BREMSS system as an adjunct, not a replacement for the HEAR system since any public wireless network is subject to disruption of service when needed most. We learned this lesson well with Katrina and elsewhere.

Ideally, the combined elements of HEAR, RTSS, BREMSS, an interoperable wireless communications link with private ambulance operators, fire and rescue departments, law enforcement agencies, volunteer rescue squads, transportation, and utility services plus coordination with local area Amateur Radio operators, EMA and 911 would be a giant step forward in total emergency preparedness. (An interesting article is available at <http://members.aol.com/emcom4hosp/codeblue.html> that shows what can happen when the phones go down). The State of Hawaii recently called upon us to provide a means of directly connecting Amateur Radios operators with their hospitals. This shows a growing trend of governmental, institutional, and concerned user groups to enhance emergency preparedness capabilities. Regrettably, we don't have it all together yet. But, we can get there, and it all starts with a revitalization of the HEAR system!

It begins with an FCC license. Originally the Alabama Department of Health held the FCC license for all users of the HEAR system in Alabama. As budgets were cut, the responsibility for maintaining a valid FCC license was passed on to the user hospitals, most of which were totally unprepared to address this requirement.

A random check of hospitals across the State of Alabama indicates that the HEAR systems are far from being in an operational ready status. Some hospitals administrators are unaware of a State Board of Health mandate that fully functional H.E.A.R. facilities are a necessary part of accreditation requirements. We found that many of the systems were not functional, and we found only a few hospitals that understood or implemented the calling plan requirements as outlined by the State of Alabama EMS plan. Many states are already well advanced into utilization of the HEAR system as an integral part of their disaster planning. One of the more interesting programs is in Washington State. See http://emd.wa.gov/telcom/telcom_other_radios_systems.shtml for more information.

Not only are many Alabama hospitals out of compliance with State regulations, but Federal as well. A cursory check of hospitals in an Alabama metropolitan area revealed that FCC licenses either did not reflect current hospital ownership or had expired years ago. Virtually none of them had a current contact name and phone number. Any hospital not in compliance with these issues faces the potential of sanctions, fines and forfeitures. Accordingly, any plan involving updating of a HEAR system to current operational standards MUST begin with addressing FCC licensing issues. We will be glad to assist. Just give us a call at 205.854.2611. For now, we suggest checking the FCC database to determine the licensing status for your institution. We have prepared a listing of all licensed users in Alabama at www.info4u.us/Alabama_HEAR_Licensees.pdf.

COMPLIANCE ISSUES

If you intend to provide emergency care services with access to the HEAR system, your first action should be to check the status of your license (See above). If you are properly licensed by the FCC, that is a good start. If your point of contact, ownership, or other information has changed, your information on file with the FCC should be updated. If your license has expired or if you don't have a license, the issue is a little more serious.

Fines, forfeitures, and even imprisonment are the potential penalties for operating a radio system without a license. If you are currently operating a HEAR system station and you do not have a current license, immediate action is necessary. We are here to help you in whatever way possible. On the assumption that you have a valid FCC license, let's review the operational requirements of the HEAR system

We know of a number of hospitals that are listed as emergency service providers that do not have an operational system. We know of an even greater number that are not operating their system in accord with Department of Health protocols. We know that many hospitals do not utilize the PL and IPS signaling used as a part of the State plan. The reason we know this is that we have supplied hundreds, if not thousands, of radios to fire and rescue organizations that have the HEAR system frequencies in their radios with the proper PL and IPS coding. This tells us that there is a great deal of misunderstanding on the purpose and use of the HEAR system. Accordingly, the next step is to address the need of bringing hospital HEAR stations up to the operational standards originally defined.

Regrettably, Motorola no longer manufactures or supports HEAR system equipment. In plain language, this means it is not economically repairable, if repairable at all. Additionally, the original system does not meet HIPAA standards. The example provided earlier by the hospital working with Amateur Radio operators was a well intentioned plan of cooperation and service to the public. Unfortunately, the example does not appear to meet HIPAA standards. Good intentions or not, HIPAA is a force to be reckoned with, and it doesn't go away just because the responsible institution *doesn't know*.

The traditional HEAR system utilized a tower of 50 to 100 feet in height at the hospital. Some installations use remote transmitters connected by telephone lines or even the Internet. Unfortunately, this type of installation is not *hardened* to the needs of emergency communications services. If the phone lines or Internet fails, such systems would be useless.

The point is that as you are reviewing your HEAR system, it would be a good idea to look not only at the original operational requirements, but the expanded needs of today. So, let's take a look at our options beginning with the antenna system. The chances are fair that the original antenna system (if installed at the hospital) may still be usable without replacement. If the antenna is at a remote location, we would suggest construction of a local antenna system at the hospital. The remaining elements – the ER controller unit, and the associated HEAR station transceiver should be replaced with HIPAA compliant equipment that is backwards compatible with older equipment. Here's how we do it!

HEAR System Components

Pricing of a new HEAR system will depend on several factors including whether or not you need a new or reinstated license, whether or not your existing antenna system can be used, whether or not you assist in wiring, and whether or not you prefer a basic HEAR station or a HIPAA and SAFECOM Federal standard P25 digital base station.

P25 is an operating standard that will assure compliance with FCC licensing standards through 2018. It is a digital operating system that is backwards compatible with existing analog radio systems and is the mandatory standard for all Federal agencies. You can learn more about P25 and SAFECOM at http://ts.nist.gov/Standards/E-Gov/upload/The_SAFECOM_Process.pdf. For now, we will say that any institution or agency involved in public safety with interoperability considerations would be well advised to consider P25 digital equipment rather than somewhat less expensive analog equipment.

Budgetary pricing for each component follows on the next page.

HEAR System Price Guide



FCC license. Required only if license is expired or if a license has never been issued, or ownership has changed since original issuance. Additional information at www.fcc.gov. **\$1,000**



Antenna system replacement. Required only if existing antenna system at hospital is found to be defective for reasons of wear, lightning or other damage. Installation is included anywhere in the State of Alabama. Additional info at www.falcondirect.com/daniels/sinclair. **\$2,500**



Antenna tower. Required only if a tower is not already installed at the hospital. Assumes 100' guyed type tower, installed. Installation is included anywhere in Alabama. Additional info at www.cox-antenna.com/rohn_25.asp. **\$4,000**

Base Stations – Select one of the following:



HEAR base station, 110 watt P25 digital with for use with ER controller unit shown below. Recommended model meets HIPAA and SAFECOM P25 standards. More information is available at www.midlandradios.us/4.html. **\$8,495**

Optional



HEAR base station, 50 watt analog only for use with ER controller unit shown below. Additional info at www.falcondirect.com/basestations/prices. **\$1,849**



HEAR system ER controller. This phone style controller provides channel selection, selective address reception, and the ability to encode access codes to other HEAR system hospitals. Includes adapter for either of the two base stations listed above. **\$1,995**



Installation, programming, setup, and on-site user training. Remote wiring on new installations not included. This may be performed by hospital personnel or at slight additional charge by our personnel. **\$1,000**

In a worst case scenario, a new digital station with FCC license, antenna system and tower would be \$18,990 or \$12,344 with an analog station. Assuming a valid FCC license, suitable antenna and tower system, the price would be \$11,490 for a digital system replacement or \$4,844 for an analog system replacement. Information on transport vehicle equipment follows on the next page.

HEAR System Mobile Price Guide



Virtually every patient transport vehicle and many handheld radios used by volunteer fire and rescue squads in Alabama are equipped with the operating frequency of 155.340 MHz. Almost everyone knows that this is the HEAR frequency. What they don't know is that such a radio is virtually useless if it is equipped with proper coding options.

Most commercially available radios are capable of being programmed on the frequency of 155.340 MHz as well as any one of the 21 assigned PL codes used by Alabama hospitals (or at least, supposed to be used). To our knowledge, NONE of the available radios from BK, HYT, ICOM, Johnson, Kenwood, MA-COM, Midland, Motorola, Relm, TEKK, or Vertex is available with the ability to transmit the necessary IPS coding required to properly access a designated HEAR station. In reality, if a hospital becomes compliant with HEAR operational requirements, no one will be able to talk to them!

Once all hospitals are properly equipped, they will be able to communicate with each other – typically at distances of up to 60 miles but incompatible with mobiles not equipped with proper programming and IPC coding equipment. Typically, a hospital with a 100' tower will have an operating range of up to 30 miles to properly equipped mobiles and up to 60 miles to other stations. So the question is now *how do existing mobile radios acquire the capability to communicate on a properly functioning HEAR system?*

The answer is that they need to add an IPC encoder. It is not necessary to add this encoder in every vehicle, but at least in a vehicle capable of communicating on the HEAR system when necessary. Normally, the addition of these devices involves nothing more than connecting to the accessory connector of the associated mobile radio and mounting with screws or Velcro as desired. Some users may want to purchase a new mobile pre-wired and ready for installation. We offer both standard analog and digital models as listed below. Programming is optional. Installation is optional. Mobile antenna adds \$25.



HEAR compatible pulse tone dialer connects to accessory connector of most popular radios to provide the ability to send the interrupted pulse codes necessary to access a properly functioning HEAR base station.

\$395.00



HEAR system compatible 128 channel mobile radio, 70 watt power output. This radio is available on the Alabama State Contract to all agencies and institutions at a significantly discounted price. Ready for connection to HEAR pulse tone dialer shown above. See page 8 of the Alabama State Midland contract for more information at www.info4u.us/midlandcontract.pdf

\$298.97
Plus \$35
program and
shipping



HEAR system HIPAA and SAFECOM P25 fifty watt digital/analog mobile radio. Available on ICOM Federal GSA contract. See page 98 of ICOM GSA contract available at www.info4u.us/ICOM.GSA.pdf.

\$1,016.55
plus \$55
program and
shipping

We recognize that it may not be practical to install IPC encoders and associated radios in every EMS vehicle. This could be prohibitively expensive for volunteer fire and rescue squads. We believe that it might be more practical to install an IPC sending unit at the applicable dispatch center (normally, 911).

By installing an IPC sending unit at dispatch, there would be no need to equip all patient transport vehicles with these devices – they would simply call into dispatch to request call initiation to the local hospital. Once connected, the ambulance could communicate with the hospital with no further involvement by dispatch personnel.

The only *special requirement* for the transport vehicle would be the programming of the H.E.A.R. frequency and the proper sub audible access code for the local hospital. We offer a special package for 911/dispatch for the purpose of monitoring ambulance calls and initiating connection with the local hospital(s). The analog version is \$1,995. The P25 digital version is \$3,495 including antenna and installation. For additional information, please call us at 800.489.2611 or email sales@falcondirect.com.

Call Recorders

If you are not recording phone and radio calls in the ER, you are missing out on three very important benefits that are far more valuable than the small cost of a good digital recording system. Here they are!

Improved Administrative Control

Have you ever placed a call and heard that message *For quality assurance purposes your call may be monitored?* Why do you think they included this statement in their caller greeting? It's because they are recording your call. Why are they recording your call? One of the reasons is Improved Administrative Control. They want to know who is calling, the time spent on each call, the attitude and proficiency of their staff, and how well the needs of callers are being handled. In emergency medicine, the dispensing of medication or administration of procedures is a critical issue. Hospital administration needs to KNOW what is being said between the ER and incoming patient transport vehicles!

Improved Caller Service

In distress situations, people sometimes are not inclined to present their communications in a logical and progressive manner. A digital call logging recorder can address these issues and add an additional level of efficiency. In emergency medicine, this could equate to saving lives! The benefits of Improved Caller Service are worth much more than the small one-time investment in a digital call logging system.

Litigation Avoidance

The average cost for "going to court" in our area is generally estimated at ten thousand dollars (\$10,000) or more. If you can spend a few thousand dollars to avoid going to court, that investment is well spent. In general, we have concluded that most civil court cases are conducted because of a misunderstanding, or a condition we refer to as "unfilled expectations". When two people disagree, and you are one of those two people, it behooves you to have some evidence supporting your position. A digital recorder is fair and impartial. It records the entire conversation and stores it on a PC hard drive, CD, or

both for use as required. You can look up calls by date, time, or Caller ID. You can even email audio files to another party.

There are a number of ways to provide litigation avoidance, or just simple dispute resolution. Nothing is more effective than a digital logging recorder!

There are three basic types of digital logging recorders and we've got them all! All are vastly superior to the older, and much more expensive, tape recording systems. All are designed to record and playback any desired audio source whether it be a phone line, PBX extension, microphone, or 2-way radio. The three basic types are PC based, Stand alone, and Network based. Each has the capability of addressing differing requirements. Let's address each one to select the model that meets YOUR requirements!

PC Based Recorders



16 Channel USB Call Recorder **\$995**

This model has USB connections for up to 16 devices - phone, microphone, radios, or any combination. Call Analysis software is included at no extra charge!

Stand Alone Recorders



Stand Alone CD Recorder **\$1,495**

Any one can use it! Calls are stored on an internal hard drive. Creating CDs is automatic—just press a button. No PC Required. Status is displayed at a glance. Provides connection for up to 4 inputs - phone, microphone, radio, or combinations.

Network Based Recorders



Network Call Recorder **\$2,995**

Store Millions of Calls! An internal 120GB hard drive is standard. Instantly find and recall calls, even with millions of recordings stored on internal hard disk. Huge disk capacity eliminates searching through CDs or DVDs. Backup to any network device. Provides connection for up to 4 inputs - phone, microphone, radio, or combinations.

Don't see what you need? Got a question? Call Burch Falkner at 1-800-489-2611 or email burch@falcondirect.com. Thanks for visiting with us!



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