



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE CIVIL ENGINEER SUPPORT AGENCY

DEC 19 2000

FROM: AFCESA/CES
139 Barnes Drive, Suite 1
Tyndall AFB, FL 32403-5319

SUBJECT: **Engineering Technical Letter (ETL) 00-12: Fire Protection Engineering Criteria – Conversion of Fire Alarm Radio Systems to Narrowband Technology**

1. Purpose. This ETL provides guidance to help the Base Civil Engineer (BCE) and other users manage the conversion of radio-based fire alarm reporting systems to required narrowband bandwidths.

2. Application: Requirements of this ETL are mandatory for all commands with radio-based fire alarm reporting systems. It applies to all Air Force installations, both inside and outside the U.S., its territories, and its possessions.

Note: Use of “will” or “must” indicates a mandatory requirement. “May” or “should” indicates a non-mandatory action or condition.

2.1. Authority: Air Force Instruction (AFI) 32-1023, *Design and Construction Standards and Execution of Facility Construction Projects*.

2.2. Effective Date: Immediately.

2.4. Ultimate Recipients: MAJCOM and Base Civil Engineers

2.5. Waivers. Waivers to requirements of this ETL require approval as specified in MIL-HDBK-1008, *Fire Protection for Facilities Engineering, Design, and Construction* (latest edition).

2.6. Coordination: MAJCOMs and HQ AFCA/CCQM (The Air Force Communications Agency Civil Engineer).

3. Safety Summary:

CAUTION

Excessive delay converting to narrowband radio technology may result in inadequate fire protection for Air Force facilities. (Refer to paragraph 7.5.)

4. Referenced Publications.

4.1. National Telecommunications and Information Administration (NTIA):

- *Manual of Regulations and Procedures for Federal Radio Frequency Management*

4.2 Department of Defense (DoD):

- Department of Defense Instruction (DoDI) 6055.6, *Department of Defense Fire Protection Plan*
- MIL-HDBK-1008, *Fire Protection for Facilities Engineering, Design, and Construction*

4.3. National Fire Protection Association (NFPA):

- NFPA 70, *National Electrical Code*
- NFPA 72, *National Fire Alarm Code*

5. Definitions:

5.1. Radio Channel: A characteristic center frequency along with a frequency band that is designated to be occupied by a radio signal.

5.2. Bandwidth: The width of the frequency band necessary to ensure the transmission of information at the rate and quality required under specified conditions.

5.3. Narrowband Systems: Radio systems designed to operate with a necessary bandwidth less than 12.5 kHz.

6. Background.

6.1. In the early 1990s, the NTIA, part of the Department of Commerce, levied requirements for the use of narrowband systems in certain parts of the Very High Frequency (VHF) and Ultra High Frequency (UHF) bands. These requirements affect nearly all radio-based fire alarm systems and most other BCE-operated radio systems in use on Air Force bases.

6.2. The NTIA requirements reduce the radio channel from 25 kHz to 12.5 kHz bandwidth (narrowband). This allows creation of a new channel between formerly adjacent channels for the purpose of providing greater radio frequency spectrum access for all Americans. However, the change requires that radio equipment become more accurate to prevent interference between the new adjacent radio channels.

6.3. The NTIA-required transition to narrowband systems is mandatory for all radio frequency spectrum users, including Department of Defense (DoD) users. No provisions are included for waivers or delayed implementation. The required timetable for transition to narrowband systems is as follows:

- VHF 138 - 150.8 MHz Band
 - New systems must use narrowband technology (effective 1 Jan 1998).
 - Existing systems must be converted by 1 Jan 2008.

- VHF 162 - 174 MHz Band
 - New systems must use narrowband technology (effective 1 Jan 1995).
 - Existing systems must be converted by 1 Jan 2005.

- UHF 406.1 - 420 MHz Band
 - New systems must use narrowband technology (effective 1 Jan 1995).
 - Existing systems must be converted by 1 Jan 2008.

6.4. The most commonly used fire alarm radio system on Air Force bases are those made by Digitize, King-Fisher, Monaco Enterprises, Motorola, and REPCO. The same narrowband technology requirements apply to equipment made by these manufacturers and any others that might be installed. Information provided by the manufacturers related to the narrowband conversion can be found at Attachment 1. Facilities using any other radio fire alarm equipment or system should contact the manufacturer for conversion guidance. Radio fire alarm systems that cannot be converted to narrowband should be removed or replaced.

Note: If too many users delay ordering upgrade parts until close to the narrowband transition deadline, the manufacturers do not expect to be able to provide replacement parts quickly enough to support continued fire alarm system operation.

6.5. MAJCOM/SC frequency managers are fully aware of the NTIA narrowband requirements and should be contacted for specific frequency allocation information.

7. Specific Requirements.

7.1. Repairs and Replacements. Install only narrowband-compliant radio transmitters and receivers in new and existing radio fire alarm systems. When feasible, perform the narrowband conversion while performing other routine or corrective maintenance in a facility.

7.2. Meet with the SC/Frequency Manager. Meet with the appropriate frequency manager (wing or command) and determine the overall time schedule for the narrowband conversion. Determine if the assigned fire alarm radio channel will be changed as part of the narrowband conversion. A change in radio channel will typically require a change to the antenna systems and could significantly affect the conversion costs.

7.3. Equipment Survey. Perform a survey of all fire alarm radio transmitters and receivers (or transceivers) and determine which specific items of equipment must be converted to meet narrowband requirements.

Note: Users should also evaluate whether any wideband analog systems that must be converted to narrowband could also be converted to digital technology for better system performance.

Note: Small facilities might expect to upgrade or replace less than 50 transmitters, receivers, or transceivers. Larger bases may need to upgrade or replace 200 to 300 (or more) transmitters, receivers, or transceivers.

7.4. Conversion Project List and Schedule. Based on the survey, establish a conversion project list and schedule. These will give the project manager a complete picture of the conversion project over time.

7.5. Funding Chart. Develop a funding chart with the general goal to distribute spending evenly over the full length of the conversion schedule. This funding chart will show how much the conversion will cost by fiscal year.

CAUTION

Excessive delay in completing the conversion to narrowband radio technology may result in inadequate fire protection for Air Force facilities. (*Refer to paragraph 7.5.*)

Note: At the time of publication of this ETL, no central Air Force funding for the narrowband radio conversion has been established. Bases are advised to plan to accomplish the conversion assuming no central Air Force funding will be provided.

8. Technical Assistance. Contact the MAJCOM fire protection engineering office for assistance. HQ AFCESA Technical Support Directorate can assist MAJCOMs and Design Agents in applying ETL requirements. AFCESA assistance with the fire protection system design process is most beneficial at the Project Definition stage.

9. Point of Contact: Mr. Raymond N. Hansen, P.E., HQ AFCESA/CESM, DSN 523 6317, commercial (850) 283-6317, e-mail ray.hansen@tyndall.af.mil, or Internet www.afcesa.af.mil/Directorate/CES/Mechanical/FireEngr.

Michael J. Cook, Colonel, USAF
Director of Technical Support

- 2 Atch
1. Manufacturer Information
 - a. Digitize
 - b. King-Fisher
 - c. Monaco
 - d. Motorola
 - e. REPCO
 2. Distribution List

Digitize

Note: The manufacturer provided the following information, but AFCESA has not verified its technical completeness or its compliance with the regulations of the National Telecommunications and Information Administration (NTIA). Users of this ETL are encouraged to work closely with the manufacturer to ensure correct technical solutions are applied in each application.

A1a.1. Digitize offers two fire alarm system radio products: a one-way (“NFPA 1221” type) system and a two-way polling system.

A1a.2. The one-way radio system uses radio transmitters that presently meet the narrowband requirements; however, the model MARK IV radio receiver might not function properly if radio transmitters are installed using the new adjacent radio channels that will become available in the narrowband conversion process. It may become necessary to upgrade the radio system by installing a model MARK VI radio receiver to achieve acceptable performance.

A1a.3. The two-way polling radio system uses Motorola transceivers that may not be narrowband-compliant. In this case, replacement of the transceivers will be required.

A1a.4. Point-of-Contact:

Mr. Abraham Brecher
Digitize, Inc.
158 Edison Road
Lake Hopatcong NJ 07849
Telephone: (800) 523-7232
FAX: (973) 663-4333
E-mail: abraham@digitize-inc.com

King-Fisher

Note: The manufacturer provided the following information, but AFCESA has not verified its technical completeness or its compliance with the regulations of the National Telecommunications and Information Administration (NTIA). Users of this ETL are encouraged to work closely with the manufacturer to ensure correct technical solutions are applied in each application.

A1b.1. King-Fisher radio fire alarm systems use one transmitter in each fire alarm control panel and two (redundant) receivers at the central alarm station. These transmitters and receivers are subsystems within the equipment. The conversion to narrowband will need to be accomplished by the manufacturer.

A1b.2. King-Fisher can provide personnel on-site to perform the conversion. Alternately, the base could purchase a small number of narrowband-compliant circuit boards, and use them to swap with non-compliant circuit boards. The removed non-compliant circuit boards would then be sent to the manufacturer for narrowband conversion, and quickly returned to the base to continue the conversion project.

A1b.3. Users will not need to modify the King-Fisher antenna system if the assigned frequency remains the same. However, if the frequency is changed in the upgrade process, the manufacturer must also modify the antenna and associated electronics in the panels. In this case, it may be possible to tune one of the redundant central alarm station receivers to the new frequency for the period of conversion.

A1b.4. Point-of-Contact:

Mr. Mike Klein
King-Fisher Company
2350 Foster Avenue
Wheeling IL 60090-6574
Telephone: (847) 398-7100
FAX: (847) 255-1507
E-mail: mike@KFCO.com

Monaco

Note: The manufacturer provided the following information, but AFCESA has not verified its technical completeness or its compliance with the regulations of the National Telecommunications and Information Administration (NTIA). Users of this ETL are encouraged to work closely with the manufacturer to ensure correct technical solutions are applied in each application.

A1c.1. Monaco uses transceivers that are separate components within the building fire alarm control panels and the central alarm station. The Monaco central alarm station may be upgraded (for example, recently modified to meet year 2000 (Y2K) requirements), but still contain an older, non-narrowband Monaco transceiver.

A1c.2. Users will not need to reprogram any existing Monaco narrowband transceivers installed at individual buildings or the central alarm station.

A1c.3. Some Monaco transceivers (including BT2-3, BT2-4, BT2-R, M-1, BT2-7, BT2-8, BT2-8S, and M-2) don't need to be replaced, but rather can be upgraded with narrowband upgrade kits. Older Monaco transceivers will need to be replaced.

A1c.4. Users will not need to modify the Monaco antenna if the assigned frequency remains the same. However, if the frequency is changed in upgrade process, the Monaco antenna network must also be modified.

A1c.5. Users will not need to upgrade to narrowband Monaco transceivers all at once. Instead, narrowband and non-narrowband Monaco transceivers are fully compatible and will operate correctly together (on the same radio channel) throughout the conversion project.

A1c.6. Monaco has field survey kits available for use in the conversion project. Additionally, the existing GSA contract could be used to perform the narrowband conversion.

A1c.7. Point-of-Contact: Local Monaco representative, or

Monaco Enterprises, Inc.
East 14820 Sprague Avenue
PO Box 14129
Spokane WA 99214-0129
Telephone: (509) 926-6277
FAX: (509) 924-4980
E-mail: gene@monaco.com

Motorola

Note: The manufacturer provided the following information, but AFCESA has not verified its technical completeness or its compliance with the regulations of the National Telecommunications and Information Administration (NTIA). The users of this ETL are encouraged to work closely with the manufacturer to ensure correct technical solutions are applied in each application.

A1d.1. Motorola has not published any general guidance on narrowband conversion because there are too many possible models and applications of radio equipment that could be in use. Motorola recommends that users contact their local distributor for specific technical assistance.

A1d.2. The name and telephone number of the local distributor can be obtained from Motorola by calling (toll-free) (877) 873-4668, or by contacting the DoD support personnel listed on the Internet at: <http://www.motorola.com/cgiss/NA/contact/usfedgovtsyssol.html>.

REPCO

Note: The manufacturer provided the following information, but AFCESA has not verified its technical completeness or its compliance with the regulations of the National Telecommunications and Information Administration (NTIA). Users of this ETL are encouraged to work closely with the manufacturer to ensure correct technical solutions are applied in each application.

A1e.1. REPCO radio fire alarm systems typically use model MS-128 units. Resetting the transmit deviation to 2.5 kHz will allow these units to comply with the narrowband requirements.

A1e.2. A change to a different radio channel will require new crystals.

A1e.3. Point-of-Contact:

Mr. Ted McDonald
Aerotron-Repco Systems, Inc.
4602 Parkway Commerce Boulevard
Orlando FL 32808-1016
Telephone: (407) 313-1121
FAX: (407) 856-1960
E-mail: mcdonald@aerotron-repco.com

DISTRIBUTION LIST

DEPARTMENT OF DEFENSE

Defense Commissary Service (1) Defense Technical Information Center (1)
Director of Facilities ATTN: DTIC-FDA
Bldg. 8400 Alexandria, VA 22034-6145
Lackland AFB TX, 78236-5000

AAFES/ATTN: CFE (1)
PO Box 660320
Dallas, TX 75266-0320

SPECIAL INTEREST ORGANIZATIONS

IHS (S. Carter) (1) Construction Criteria Database (1)
15 Inverness Way East Stop A-111 National Institute of Bldg. Sciences
Englewood, CO 80112 1201 L Street NW, Suite 400
Washington, DC 20005