



# EAS Guide

## Interfacing EAS Into a Digital Broadcast Audio Chain

by Dennis Baldrige, CSRE, CBNT

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The advent of the 21st century has ushered digital electronics into the forefront of the broadcast industry. A few stations across the country have completed the necessary upgrades. Others are either in the process of making the transition, or making plans to do so in the future. I recently participated in upgrading an FM broadcast station.

### DIGITAL GEAR

The improvements included a new Audioarts D-70 digital audio console, Moseley Starlink SL90003Q digital STL, Omnia 6FM digital signal processor and stereo generator, all of them feeding into a new BE digital ready transmitter.

The previous audio and RF path was all analog so among the new changes included using digital AES/EBU inputs and outputs. The cables were all connected and installed according to the manufacturer's specifications; the connections were straightforward and easy to accomplish.

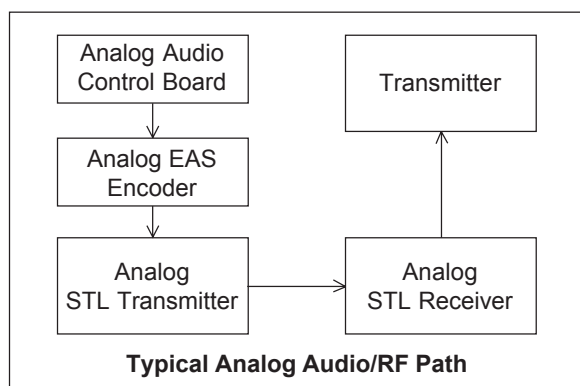
When the switchover from an analog path to digital was made, the system worked faultlessly the first time – truly an engineer's dream! Overall, the upgrade resulted in improved audio quality with a bit of signal delay due to the digital processing involved.

### THE MISSING LINK

Upon final inspection of the new system, one item was discovered missing, something that engineers always include in the analog paths without a second thought. The new path – AES/EBU output of the control board to the digital STL to the processor at the transmitter building – was missing that key piece of equipment required to meet the FCC requirements: the all important Emergency Alert System.

The FCC's FM Broadcast Checklist states the following: "EAS ENCODER/GENERATOR: All FM stations, with the exception of Class D non-commercial stations, are to have installed and operational equipment capable of transmitting the digitally encoded EAS protocol (73.11.34-35)."

A quick look at the existing EAS encoder/decoder verified that there was no way to inject an EAS signal into the digital broadcast signal. The unit only had an analog output and lacked the AES/EBU output required for our new digital system. Our system needed a digital EAS unit!

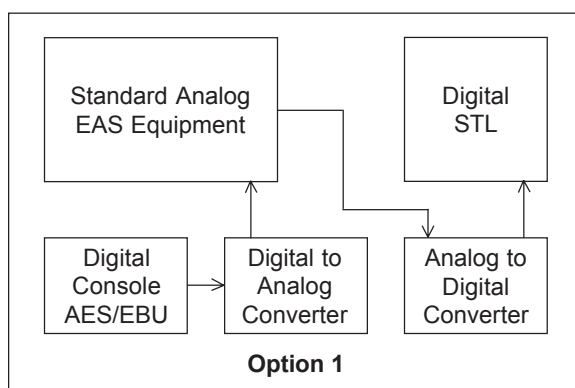


Consequently, there was an immediate need to develop a plan enabling the broadcast of the required signals. Several possible solutions materialized as a result of contacting the manufacturers of EAS equipment and consultation with other engineers.

### YOU DID SAY DIGITAL?

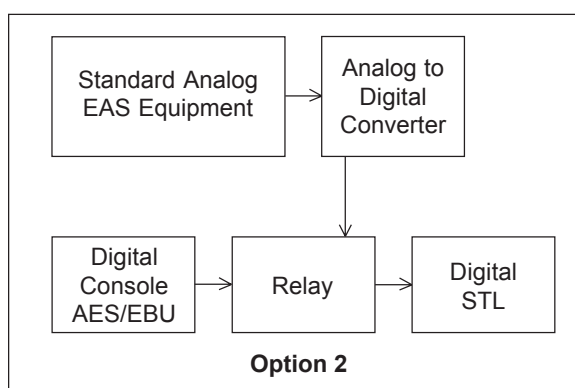
It quickly became evident that while many stations were talking about changing to an all-digital signal path, few had given serious consideration of how to insert the required EAS signal. Eventually, three solutions emerged from the research, some of which produce better results than others:

1. Break the AES/EBU audio chain between the digital console and STL, insert both a D/A (digital to analog converter) and an A/D (analog to digital converter) and use the EAS unit in a typical analog form.



Since one of the goals in moving to digital audio is to keep the audio path as pure as possible, this option is less than desirable. Every time there is a conversion from the analog to digital domain, or vice versa, additional distortion and errors are introduced. Although one might be pressed to actually hear the distortion, this option seemed a step in the wrong direction since all digital was the future goal.

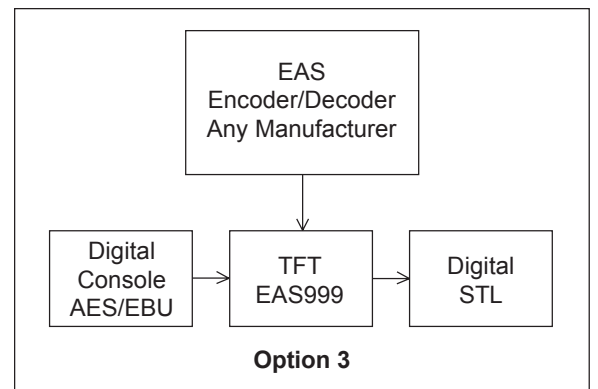
2. Install an A/D converter on the output of the EAS unit and use a relay to "switch in" the signal at the proper time.



This option presents some problems in that the digital signal of the converted EAS unit might not always be in sync with the main broadcast path. A relay switching only approach would not sense the incoming data stream, which could potentially cause a glitch, pop, click or even a delay in synchronization of the signal. This would not be a major disaster but is not ideal since an interruption of the AES/EBU signal would most likely result in lost data.

Such an A/D converter is made by M-Audio (www.m-audio.com) and is called the "Flying Cow." It would be important to verify that the data stream, including bit rate matched that of the main broadcast signal for this method to be effective.

3. Use a digital unit designed for interruption of the data stream.



A digital insertion unit, such as the TFT model EAS999 (<http://www.tftinc.com/products/datasheets/eas999.pdf>) solves the problem of getting EAS audio inserted into the audio path. The EAS999 is designed to not only function with TFT EAS equipment, but is easily adapted to work with other manufacturers' products.



The TFT EAS999

### USING THE EAS999

Use of the EAS999 is simple and straightforward. The AES/EBU signal output from the board goes directly into the unit. The output of the EAS999 will then connect to the digital STL. The unit provides seamless operation of broadcast signals and includes the following features:

- Signal detection and support of all popular sampling rates including 33, 44.1 & 48 kbps. Although it senses the incoming rate, it is transparent to the data stream.
- Switching from the broadcast signal to the EAS signal between data blocks to eliminate pops and clicks associated with abruptly inserting or changing a data stream (as in Option 2 listed above).
- Hardware bypass provides signal path in the event of a power failure within the unit.
- Standard XLR connectors.
- Easily connected to TFT EAS equipment or that manufactured by other companies.
- Front panel status indicators.
- Accepts Analog EAS audio inputs from any EAS Equipment, and does the necessary D/A conversion.

We found this third option – using the EAS999 to accomplish the digital insertion of the audio signal – to be clearly the most professional approach to solving this EAS dilemma. It provides seamless interruption of the data stream and at the same time provides the means to inject the EAS signal as required by the FCC.

In the future, as digital broadcasting becomes the industry standard, more manufacturers will produce equipment with both analog and digital switching included. This will certainly provide the options required for the next generation of broadcast facilities.

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