Analog or Digital Recorders?

There has been an argument for some time as to which is better, digital voice recorders or magnetic tape recorders. I am asked this question almost everywhere I go. While both work well for EVP work, with some operational modifications, tape machines give you a clear edge in the field. Let me explain why.

The basic idea involves an electromagnet (the recording head) that applies a magnetic flux (frequency) to the oxide on the tape. The oxide permanently "remembers" the flux it sees. A tape recorder's record head is a very small, circular electromagnet with a small gap in it. This electromagnet is tiny, roughly the size of a flea (even smaller in pocket recorders). The electromagnet consists of an iron core wrapped with wire. Bias is a special signal that is applied during recording. The first tape recorders simply applied the raw audio signal to the electromagnet in the head. This works, but produces a lot of distortion on low-frequency sounds. A bias signal is a 100-kilohertz signal that is added to the audio signal. The bias moves the signal being recorded up into the "linear portion" of the tape's magnetization curve. This movement means that the tape reproduces the sound recorded on it more faithfully. It acts much like a carrier frequency does in radio. During recording, the audio signal is sent through the coil of wire to create a specific magnetic field in the core. At the gap, magnetic flux forms a fringe pattern to bridge the gap (shown in red), and this flux is what magnetizes the oxide on the tape. During playback, the motion of the tape pulls a varying magnetic field across the gap. This creates a varying magnetic field in the core and therefore a signal in the coil.

Since EVPs are electromagnetic in nature, you will get your highest class of EVP using this type of device.

In digital recording, the analog signal of a sound is converted into a stream of discrete numbers, representing the changes in air pressure through time; thus making an abstract template for the original sound. The analog signal is transmitted from the input device to an analog to digital converter (ADC). The ADC converts this signal to a series of binary numbers. The count of the numbers produced per second is called the sample rate. A bundle of wires transmits these numbers into storage, usually a flash memory chip. So people ask “how you can get an EVP at all with a digital recorder?” The flash memory is electromagnetic in nature. Also, picking the right microphone is very important.

No matter what type of recorder you use, never use the built in microphone. Built in Microphones are electret type microphones. An Electret Microphone is part dynamic and part electrostatic or condenser in nature. In a capacitor microphone, also known as a condenser microphone, the diaphragm acts as one plate of a capacitor, and the vibrations produce changes in the distance between the plates. Since the plates are biased with a fixed charge (*Q*), the voltage maintained across the capacitor plates changes with the vibrations in the air, according to the capacitance equation: Q=C x V, where Q = charge in coulombs, C = capacitance in farads and V = potential difference in volts. The capacitance of the plates is inversely proportional to the distance between them for a parallel-plate capacitor. Capacitor microphones can be expensive and require a power supply, commonly provided from microphone inputs as phantom power, but give a high-quality sound signal and are now the preferred choice in laboratory and studio recording applications.

Capacitor microphones will never capture an EVP.

An electret microphone is a relatively new type of condenser microphone invented at Bell laboratories in 1962 by Gerhard Sessler and Jim West, and often simply called an electret microphone. An electret is a dielectric material that has been permanently electrically charged or *polarised*. The name comes from *electr*ostatic and magn*et*; a static charge is embedded in an electret by alignment of the static charges in the material, much the way a magnet is made by aligning the magnetic domains in a piece of iron. They are used in many applications, from high-quality recording and lavalier use to built-in microphones in small sound recording devices and telephones. Though electret mikes were once considered low-cost and low quality, the best ones can now rival capacitor mikes in every respect (apart from low noise) and can even have the long-term stability and ultra-flat response needed for a measuring microphone. Unlike other condenser microphones, they require no polarising voltage, but normally contain an integrated preamplifier which does require power (often incorrectly called polarizing power or bias). This preamp is frequently phantom powered in sound reinforcement and studio applications. While few electret microphones rival the best DC-polarized units in terms of noise level, this is not due to any inherent limitation of the electret. Rather, mass production techniques needed to produce electrets cheaply don't lend themselves to the precision needed to produce the highest quality microphones. Since the electret Microphone is polarized, it does respond to magnetic fields, but is nowhere near as sensitive as a Dynamic Microphone.

In a dynamic microphone a small movable induction coil, positioned in the magnetic field of a permanent magnet, is attached to the diaphragm. When sound enters through the windscreen of the microphone, the sound wave vibrations move the diaphragm. When the diaphragm vibrates, the coil moves in the magnetic field, producing a varying current in the coil through electromagnetic induction. The principle is exactly the same as in a loudspeaker, only reversed. Dynamic microphones are robust, relatively inexpensive, and resistant to moisture, and for this reason they are widely used on-stage by singers. They tend to have a poor low-frequency response, which is advantageous for reducing handling noise as a vocal mic, but tends to exclude them from other uses.

The Dynamic Microphone offers the best possible performance in capturing EVPs.

Additionally, you do not want to use the built in microphone on an analog tape recorder because it also records all of the mechanical noise generated by the tape transport mechanism and the motor.

Recently, I have been asked some specific questions concerning recording in areas with either high ambient noise, or high EMF interference. The high ambient noise is quite often found in ruins with open walls to traffic noise and such, or wind noise or any background noise. First try using a windsock on your microphone. A windsock is a small foam cover that covers the ball and diaphragm of the microphone, and eliminated some popping and some ambient noise. For higher levels of noise, get an old Styrofoam cooler. Take off the lid and lay it on its side with the opening away from the ambient noise source. Lay a bath towel folded up to fit inside the cooler, then place your microphone on the towel, with the head facing the back of the cooler. This will provide a somewhat isolated environment for your microphone and will decrease background noise without interfering with the EVP capture.

For High ambient EMF fields, the solutions is a little different, but not expensive. Get a card board box large enough to compare to the cooler used above. Cover the entire box except for the open end with aluminum foil. Tape it up good like a present. I then take a metallic tent spike with a clip lead attached to it and clip the lead to the spike and the aluminum foil of the box. I then push the spike down into the ground, creating a grounded enclosure. The same towel trick is used, only this time face the microphone outward, but behind the opening of the ox. Believe it or not, this helps significantly in reducing EMF bleed over.

Finally, use an omni-diretional mic when indoors, and a super hypercardiod pattern outside. The hyper-cardiod pattern is very narrow and rejects anything audio outside the area just in front of the element.

I hope this helps you in recording EVPs….