Rebecca Mileham visits the British Library Sound Archive and hears some fascinating sounds from the past

sounds of history

IT'S NOT often that history is rewritten quite as definitively as in the case of audio recording. Until last year, the answer to the question "Who was the first person to record sound?" was "Thomas Edison". Scientific canon held that, while he was trying to develop a recorder for telegraph signals in 1877, Edison noticed that paper indented with the signals would make a sound when pulled under a needle. He used the principle to make a machine with a diaphragm that vibrated in response to the sound of his voice, causing a needle to leave a pattern on a rotating sheet of tinfoil – and showed that it would play back the sound when the needle retraced its journey.

But although Edison did indeed create the machine he called a phonograph, he was not the first to record sound. A machine called a phonautograph had been invented and patented 20 years earlier by a French printer named Edouard Leon Scott de Martinville. His interest was in making accurate records of conversations and so his machine, which scratched a visible soundwave squiggle onto a cylinder covered in soot, had no playback method. In 2008, however, scientists at the Lawrence Berkeley National Laboratory in California analysed a rediscovered cylinder and managed to play back a ten-second recording of a song, Au Clair de la Lune, made in the 1860s.

ORAL HISTORY

"Sound is relatively simple physics, small fluctuations in air pressure over time," says Richard Ranft, head of the British Library Sound Archive. "Yet the way humans interpret sound is overwhelmingly complex and significant. A sound pattern can bring tears to our eyes."

In the case of Scott de Martinville's recording, the tears were tears of laughter – presenters on Radio 4's Today programme infamously descended into giggles on air after hearing the ancient recording, which made the singer's voice sound like an angry bee. "It had terrible wow and flutter because of the uneven speed at which the cylinder rotated," said Ranft, "yet the recording changed history."

Ranft and his team of curators and engineers oversee a 3.5 million-strong national collection of sound recordings, which spans the full range of human experience from music and speech to sounds of nature. You can hear the voice of Florence Nightingale, or Gandhi discussing his religious views in the only known English-speaking recording. Other political recordings showcase the eloquence of Martin Luther King and, by contrast, a host of verbal blunders from that master of the art George W Bush.

"When someone is speaking you are hearing their soul," says Ranft. "The voice carries their personality, with its defects, its emotions and its power." The collection also includes recordings that capture British dialects, public debates, a large collection of oral history interviews, and many artistic performances from the worlds of theatre and poetry.

CORBIS, ALAMY, SCIENCE & SOCIETY, IKE EGBETOLA

A majority of the archive's recordings are music, however, and they reach back almost as far as sound recording itself. Among the earliest are documentary recordings made in the 1890s in Torres Strait, Tasmania, of songs sung in a culture with no written tradition. "Ethnomusicologists realised that sound recording was a way to freeze a performance in time," says Ranft. Zoologists, too, benefited from sound recording in their efforts to document birdsong. Their previous attempts using a type of musical notation had been "brave, but hopeless", according to Ranft, himself a wildlife recording expert.

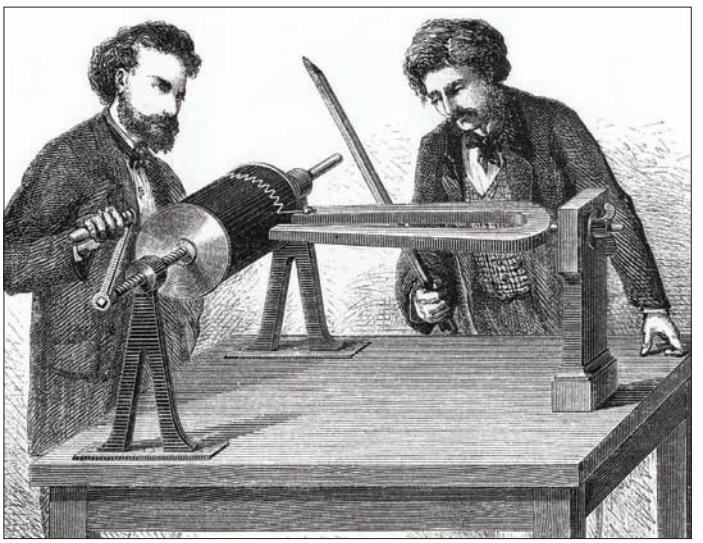
Today, hundreds of commercial discs are submitted by recording companies to accompany the historic jazz recordings, orchestral works and traditional songs already in the archive. The collection acquires around 30,000 hours of new material each year – about three minutes' worth for every minute of real time that passes.

AUDIO OBSOLESCENCE

Although most of this new intake is now digital, the team works continuously to digitise the remaining analogue recordings to the highest standard. "We hope the first digitisation is the last," says Ranft, but he admits that "whatever the recordings are on now, they will have to move again." To try to counter the problem of serial obsolescence (the Archive recently expended considerable resource re-digitising everything previously recorded to Betamax), digital material is now ingested into a multiple-redundant storage system with replica sites in London, Yorkshire and Aberystwyth.

Sound engineering has only been around for a century or so, and yet its development is strewn with technological dinosaurs. One system after another has been consigned to extinction by new formats offering higher fidelity or greater convenience. For the archivists seeking to access the precious information stored on each successive format, it's a remarkable challenge.

"The archivist's dream of something inerasable is impossible – short of engraving things into granite," explains Ranft. The very fact that a medium is recordable means it may be vulnerable to the effects of damp, heat, magnetic fields or just the ravages of time. "In the archive we need to be able to digitise content from tinfoil onwards. The early recordings are so fragile – thinner than a KitKat wrapper – that if you were to play them on an original machine they would literally self-erase. Very, very few survive."



The phonautograph predated Edison's phonograph by two decades

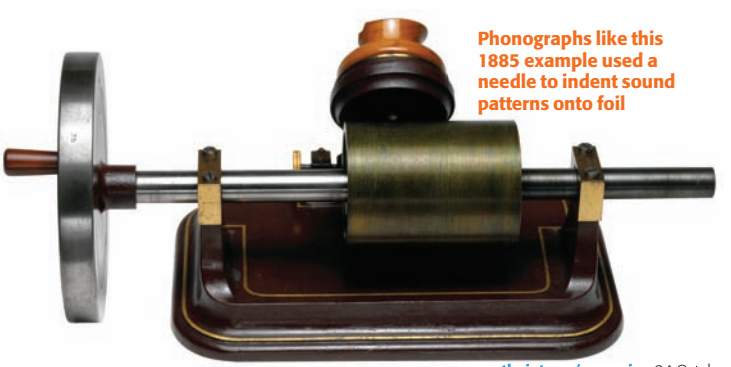
The collection does contain one foil cylinder made on one of Edison's original machines. Despite their delicacy, such recordings weren't superseded until a decade later by an invention of Chichester Bell (cousin of Alexander Graham Bell) and Charles Tainter. The graphophone recorded onto wax-coated cardboard cylinders and was intended for recording dictation. With a needle that made a V-shaped groove, it gave better sound reproduction than Edison's invention.

When fitted with a clockwork motor, wax cylinder machines were portable enough for ethnographers to take on expeditions. "It takes considerable skill to replay these recordings now," Ranft explains. "With some cylinders we have no documentation of the recording speed and so we don't know what the pitch should be – or even if it's a man or a woman's voice." The Sound Archive team has used a modern hi-fi version of a wax cylinder player to play and digitise all its rare cylinder recordings of music, songs and speech, made between 1898 and 1915.

Commercial recording was already well underway by this time – long before microphones – with performers required to sing at the tops of their voices into the recording horn to leave a replayable trace. The tenor Enrico Caruso had a voice that matched the frequency range and volume to which the technology was particularly sensitive, and made dozens of recordings of which many exist in the Sound Archive.

Inventor Emile Berliner patented his gramophone in 1887 and had simplified it by 1888 so that it played flat discs instead of cylinders. A key commercial advantage of this was that it solved the problem of duplicating recordings. He coated metal with wax and cut a recording into it, then etched the metal to make a master from which copies could be stamped out.

Gramophones became a household name, bringing recorded music into people's



Phonographs like this 1885 example used a needle to indent sound patterns onto foil

FOUNDATION OF THE BRITISH LIBRARY SOUND ARCHIVE

Today, it seems obvious that sound and video recordings should be preserved – but this was not always so. In 1930, a teenage music-lover called Patrick Saul discovered that a record he wanted to buy had been deleted from the publisher's catalogue. He proceeded to the British Museum expecting at least to be able to listen to the recording – where staff told him there were no gramophone records in their collection. Saul vowed he would stop these 'living performances' from disappearing, and in 1955 opened the British Institute of Recorded Sound, the precursor to the contemporary Sound Archive at the British Library. From its beginning, the collection was extremely broad, but Saul always claimed his own personal favourite was a recording of the mating call of the haddock.

living rooms for the first time. With the invention of the microphone, engineers could record orchestras and ensembles, and the new technology allowed the music industry to grow. When radio broadcasts began, however, records were played over the airwaves, creating a need for copyright laws that remain a current issue today.

Ranft highlights the similarity between the challenges facing the recording industry then as now. "Early radio broadcasting did affect record sales. But the industry responded by increasing the fidelity of records beyond the quality then offered by radio. The public became more discriminating." Today, the specifics of the issue are different but the challenge to the recording industry is the same. "Yes, the Internet is facilitating pirate recordings," says Ranft, "but based on past experience, a sustainable new business model for the music industry will surely emerge."

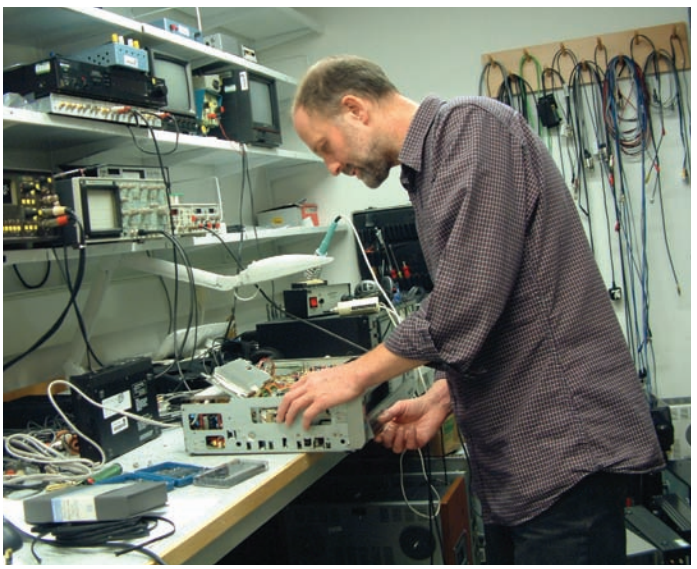
WAR RECORDINGS: HITLER AND BLUMLEIN

Conflict rather than commerce drove the development of magnetic recording technology. As early as 1898, Danish engineer Valdemar Poulsen had built a magnetic recording device called a telegraphone.

Reel-to-reel tape machines, first known as *magnetophons*, offered the first widely-available magnetic tape format in the early 1930s. The Second World War pushed high-fidelity tape format to prominence, and Hitler made recordings onto steel tape to give the impression that he was broadcasting live from multiple locations. The high-quality recordings relied on a lethally fast tape speed of 80in per second.

The principles of stereo sound reproduction had been patented by British electronics whiz Alan Blumlein in 1933. In his short life he gathered up 128 patents for sound recording and telecommunications, and he was working on the development of radar during the war when he died in a test-flight crash at the age of 38. One of the state-of-the-art studios at the Sound Archive's British Library premises is named in his memory.

And in these studios Ranft's team brings every trick to bear in creating faithful copies of original recordings. Different magnetic and disc recordings, for example, are made using a range of filters to correct frequency imbalances inherent in the particular tape stock or machinery – and these have to be recreated in order to replay the original as intended.



Preserving playback machinery is a crucial task

The Sound Archive holds over a million recordings on disc

DIGITISING FOR POSTERITY

Preserving playback machinery is just as important as the recordings themselves if a format is to be kept alive. "We've sometimes appealed to the public for help in finding obsolete machines, or even purchased them on eBay," says Ranft. The team must also find manuals, gather spare parts, and develop first-hand engineering experience of using the kit.

No wonder they want to digitise everything for posterity. The underlying principles of pulse code modification were the brainchild of telecommunications engineer Alec Reeves, who developed the concept to reduce interference on analogue telephone calls. The trouble was that he had the idea in 1937 when costly valve technology prevailed, but it is the basis of the electronic digital recording so familiar today.

Digital tools are now opening up new options for people using the vast wealth of material in the archive. "If you're a linguist studying a dialect, you can search written records very fast," Ranft explains. "But sound recordings are more laborious – you have to listen in real time." Software tools that automatically segment and intelligently analyse the sounds may soon help.

And, wherever copyright allows, Ranft wants to put recordings on the Web for a global audience. "On a single day, a sound file on the website gets more use than it has probably had in the previous 50 years," he says. "The web is our shop window – and we want to get the recordings heard." ■

■ **Further information:**
http://kn.theiet.org/magazine/issues/0918/weblinks.cfm

HEAR IT ONLINE

Over 11,000 recordings are now available from the Sound Archive website http://sounds.bl.uk/, including:

- A 110-year-old recording of a Tasmanian man singing a Hunting Song, captured using a phonograph on wax cylinder by a British expedition to the Torres Strait.
- A 1909 recording of the dagger speech from Hamlet performed by Arthur Bourchier.
- All the recordings of Bach's orchestral repertoire made before 1957 (accessible from UK computers only).
- 1960s recordings of birdsong including a capercaillie and her chicks.
- Survivors of the holocaust, speaking in the 1980s about wartime experiences.

You can also hear the recording of Au Clair de la Lune in restored and original 'trapped bee' form at www.firstsounds.org/sounds/