

His Majesty's Voice, or how the GPO became involved in the record business during World War II (Andrew Emmerson)

More by accident than by design, the British Post Office became involved in many strange activities during World War II. Its work devising the Colossus, Cobra and Tunney devices for breaking enemy codes at Bletchley Park is now fairly well known, whereas similar work producing high-speed computers for co-ordinating anti-aircraft gunnery and for timing bomb release has not received the same recognition.

Other less well-known episodes include the freight trains run by the Post Office tube railway in London (to carry spoil from new bunkers under construction and bring it to the surface away from the sensitive location) and the assistance the Post Office submarine cable team provided for the design of 100 miles of hollow three-inch cable which carried vital fuel across the Channel to support the Allied armies in the invasion of Europe.

But perhaps the most unlikely of all unusual assignments was the Post Office's involvement in the development of hi-fi recording techniques. During World War II materials for recording radio programmes were so scarce in Britain that the Post Office was forced to commandeer a factory to produce blank recording discs and in so doing, its boffins made significant improvements to recording techniques.

The BBC relied on vast quantities of blank discs for sound recording – the corporation alone used 7,000 a week for making transcriptions of its own programmes and the enemy propaganda monitored by its listening stations. The armed forces (and the secret services, it is rumoured) also made heavy demands on the supply of direct-cut discs; they were used for covertly recording the conversations of prisoners-of-war and also for capturing weak radio signals (by replaying these many times, it was hoped that they would eventually be read correctly).

The reliance on these discs was so great that it was felt necessary to put their manufacture under closer direction and to safeguard supplies the Post Office took control of one of the two factories which produced them. They and the BBC also improved record cutting head technology and a microgroove recording cutter using these blanks was first used on VE-Day.

This is to anticipate events, however. The story really starts back in the mid-1930s when Cecil Watts invented a sound recording technique using a metal disc coated with cellulose nitrate lacquer (people often call these discs 'acetates' but this title is a misnomer). This direct recording disc was – and is – a remarkably high quality sound recording medium and with its high signal-to-noise ratio and power versus bandwidth ratio it has not been improved upon. Surface noise is low and in fact the technique is still used today for mastering some albums. The discs themselves were fairly soft, the disc cutter being a sapphire cutting tool.

It was not the only method and in 1939 the commercial record companies were still using wax for mastering, an inferior process. The BBC, however, did use these cellulose nitrate discs for short-term sound archiving. In addition, they had two other recording systems at their disposal, the Marconi-Stille (which recorded magnetically onto steel tape) and the Philips-Miller (which made an optical sound track on a material similar to cinema film).

With the war under way, these other two systems hit problems. The special steel for the Marconi-Stille recorders came from Sweden but supplies ceased in August 1940, whilst the optical film for the Philips-Miller machines came from Gevaert in Antwerp and after this city had fallen to the Germans in May 1940 supplies of this tape also ceased. Alternative sources were tried for both technologies but were not ideal. This left the BBC dependent on the direct recording cellulose nitrate discs alone at a time when the demands on recording for broadcast purposes was mushrooming.

There were only two sources of the blank discs, EMI and Cecil Watts' firm, MSS Recording Company. In the summer of 1941 it was decided that the MSS factory should come under the control and management of the Post Office, who also provided additional capital to boost output. In effect the manufacture of these discs was nationalised. Two scientists from the Dollis Hill research station, J.F. Doust and F.G. Hopwood, were put in charge of this activity.

In a separate initiative, the BBC devised an improved recording cutter and this cutter used these MSS blanks. The frequency response extended beyond 10kHz and so it could be called high fidelity; later on it could and did cut microgroove records. The new system was first used on VE-Day.

As well as blank discs, Cecil Watts's MSS Company had made disc cutting machines since the mid 1930s, and these also came under the control of the Post Office when they took charge in 1941. Improvements to the MSS disc cutters were also made during the period of Post Office management, so it can truly be said that the Post Office played a part in improving recording technology, even if it was more by historical accident than by previously planned intention. The Post Office did not, however, invent the microgroove record, as some people have alleged.

The story of the GPO's wartime involvement in acoustics doesn't end here, however; there were many other interesting projects. Special noise-cancelling microphones and headphones were devised by the Post Office for tank use. Deep below their Dollis Hill research station a special chamber with deafening sound effects was constructed to simulate a tank's interior. Producing the sound effects with which to test these devices was another matter; recordings on 78rpm gramophone records would not last long enough and the chosen solution made good use of other Post Office technology. First of all recordings were made – on direct-cut disk – of a tank rumbling past a microphone. Ten-second recordings made in this way were transferred to 35mm film by the Crown Film Unit (a new name for the old Post Office Film Unit) and a two-second long section finally transferred to glass disc, for playing continuously on a speaking clock machine. Apparently the joint in the recording and the two-second repetition were not noticeable in use.

Similar machines were made for the Royal Air Force; these generated continuous background aircraft noise effects for training radio operators. Four different aircraft types were covered, at normal speed and at absolute maximum. Yet another machine was for training fighter pilots; this was a twin-channel simulator, providing continuous aircraft noise and spasmodic machine-gun effects as and when required.

At the end of hostilities all this development activity came to an end. The MSS factory was handed back to Cecil Watts and all these matters were effectively forgotten. At this distance in time nonetheless they form a fascinating sideline in the history of sound recording and reproduction.

[Thanks are due to Peter Copeland of the National Sound Archive for his assistance. Some details were taken from the book BBC Engineering 1922-1972 by Edward Pawley and others from an IEE paper by Arnold Lynch entitled Some Derivatives of the Speaking Clock.]

CAPTION:

Unprepossessing they may look but blank discs (similar to these) for one-off recordings played a vital role during WWII. So important were they to the war effort that the Post Office commandeered a factory to safeguard supplies (image to from National Sound Archive).

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