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**ANALOG/DIGITAL SOUND.
NATIONAL LIBRARY OF SERBIA DIGITAL COLLECTION
OF 78 RPM GRAMOPHONE RECORDS**

Abstract: Historical informations on sound recording issues, machines and techniques, brings an overview on importance of the sound heritage. Afterwards, Collection of Old Gramophone Records of National Library of Serbia is presented, number of records, some problems we are facing during its cataloguing, and through short global analysis of Collection. The second section brings questions and answers on digitization issues of sound recordings, on one side, and on the other, it shows each step of digitization process, from its beginning to its end, which is digital object, public available. At the end our project is shortly analyzed, and some ideas and possible actions for future are stated.

Keywords: Digitization, Gramophone records, Collection, Digital collection, Sound restoration

BCB (Before Compact Disc)

To understand importance of digitization of oldest gramophone records, we present a short historical preview. To record and preserve sound – speech, song or music, was eternal man's need for transfer information, knowledge or emotion. First attempt, fairly well, made Thomas Young, two centuries ago, 1807.

Fifty years later, Frenchman Leon Scott de Martinville designed phonoautograph, a device consisted of a horn that terminated in a thin membrane. A graph of the vibrations would be traced by the bristle, first on to a lamp-black glass plate and later on a lamp-black white paper fixed on a drum or cylinder.



Leon Scott de Martinville's phonoautograph

Two decades later, another Frenchman, Charles Cros, took Scott's idea and pushed it one step further by inventing paleophone, a device designed to register and reproduce sounds

which had been engraved with a diaphragm. He replaced the charcoal paper with a wax cylinder onto which a needle would engrave the traces transmitted to it by the sensitive membrane. This is a major step, for by incising these waves, they could subsequently be retraced by another needle which could translate them back into an acoustic event.

Crucial moment happened one hundred and thirty years ago, when Thomas Alva Edison invented phonograph. He experimented with a diaphragm which had an embossing point and was held against rapidly-moving paraffin paper. The speaking vibrations made indentations in the paper. Edison later changed the paper to a metal cylinder with tin foil wrapped around it. The machine had two diaphragm-and-needle units, one for recording, and one for playback. When one would speak into a mouthpiece, the sound vibrations would be indented onto the cylinder by the recording needle in a vertical groove pattern.



Edison's gramophone

Charles Sumner Tainter and Alexander Graham Bell from 1881 to 1885 used the Volta prize money granted to Bell for his telephone invention to develop an improved phonograph called the graphophone. They replaced tin cylinder with one coated with the wax.

Each of mentioned inventions was leading to one special moment when Emil Berliner invented a gramophone, device made for recording and playing sound from flat disc made of glass, later zinc, and eventually plastic. A spiral groove with sound information was etched into the flat record. The record was rotated on the gramophone. The "arm" of the gramophone held a needle that read the grooves in the record by vibration and transmitting the information to the gramophone speaker. Berliner's disks (records) were the first sound recordings that could be mass-produced by creating master recordings from which molds were made. From each mold, hundreds of disks were pressed. One decade later he starts to sell gramophone records. At the beginning of the 20th century, the clock mechanism is built in gramophone.

At the mid twenties, Brunswick company shows its first electric gramophone.

National Library of Serbia Collection of 78 rpm gramophone records

Collection of old gramophone records counts around one thousand and one hundred of records, published abroad, and with opening Jugoton factory, in former Yugoslavia. These records are very old, some of them one hundred years; many of them are in bad condition, brittle and dusty.

This collection is completed with albums of gramophone records sorted by publisher (for example, His Master's Voice album), composer (all Beethoven's Symphonies albums) or on some other way.

There are recordings of Serbian and foreign authors and performers, so many different kinds of music and small number of speech recordings.

Serbian performers were recording for 55 foreign publisher houses, till The Second World War. It worked like this – a technician would come to Belgrade, Subotica, Kikinda, Sabac, Mostar or some other city, with his huge equipment and made a whole set of recordings (from 30 to 100 of them). Afterwards, he took back recordings to factory where the records were pressed and published.

First factory for gramophone records on ex-Yugoslavia territory was Edison Bell Penkala Record, established in the mid twenties in Zagreb. After The Second World War it was nationalized and in that way, Yugoslavia got its first gramophone records factory named Jugoton.

Just a few publishing houses whose records we have in National Library of Serbia collection will be mentioned here: His Master's Voice, Odeon, Decca, Pathe, Edison Bell, Concert Record Gramophone, Jugoton etc.

One of the largest problems we are facing during identification of records is definitely lack of publishing year information. Mostly, it was not placed on the label at the first time. Only a small number of records had that information. Sources of informations are publisher's catalogues (although they can be in some cases doubtful), articles and advertisements from periodical and other publications, and less reliable but sometimes very precious informations from Internet or collectors.

The oldest record in the National Library of Serbia dates from the very beginning of 20th Century. It is His Master's Voice one-sided edition from 1902 (Verdi's aria from Don Carlos opera).



His Masters's Voice, 1902, both sides

As for Serbian records, the oldest date from the period 1907 to 1910. The earliest Serbian recordings, around 20 of them, were made in Belgrade, around 1900, but published almost one decade later. The oldest recordings in the National Library of Serbia are performances of Joca Mimika, Stevan Bacic Trnda, Milan Busin (clarinet player from Belgrade), then Tamburitza band Sriem, King Guard's Orchestra and comedian Petar Hristilic, as well.



*Concert Record Gramophone, 1909, comedy piece
The Peasant in front of the Minister performed by Petar Hristilich*

Musical works of Serbian composers recorded on our old 78 rpm's are not so numerous. We will, among others, mention Stevan Stojanovic Mokranjac, Stevan Hristic, Isidor Bajic, Stanislav Binicki.

Voices of best Serbian singers till The Second World War, make this collection more valuable. These remarkable voices belong to Mijat Mijatovic, Sofka Nikolic, Teodora Arsenovic, Zivojin Tomic (tenor of Serbian National Opera), Vojin Popovic.

King Guard's Orchestra, Cicvarici Band, Choir Obilic-Krsmanovic, Paja Nikolic's and many other orchestras are just a few of numerous vocal, vocal-instrumental or instrumental ensembles whose recordings NLS keeps and preserves.

Also, we are proud to say that this collection has large number of foreign records, among them are one of Beethoven's, Mozart's, Bach's, Mendelssohn's masterpieces.

In addition we will mention Berlin Opera Orchestra, conductor Leopold Stokowsky, Arthur Rubinstein and Richard Wagner's son, Siegfried Wagner, conducting his father's opera at The Bayreuth Wagner Festival.

Digitization – why

At the very beginning of digitization of any kind of material, it is highly important to set the digitization goal – is it protection of collection in physical meaning, or to make collection available, maybe just to take over wider library public, or it is some combination of mentioned reasons.

Gramophone records which can not be played, or are broken, scratched or dusty, are not usable in any sense. We faced a fact that there is one value and large part of our collections which is hidden, useless and not available. For these reasons, National Library of Serbia, three years ago, started project *Digitization of 78 rpm Gramophone records*.

The collection will be digitized on the whole, regardless Serbian or foreign authors or performers are recorded. Nevertheless, Serbian records will be formally set aside because National Library of Serbia, through legal proceeding, have to proclaim this part of collection for Cultural Heritage. Certainly, it will be possible when the project of digitization ends.

Digitization – how

In USA, England and many other countries, converting of analog sound recording to digital format is understood and taken very seriously. It is important to mention foundations which institutions (such as publishing houses, archives, libraries etc.) invest in such projects.

Process of digitization of old gramophone records is not so known in our country, actually, something like this has not been realized yet on insitutional and non-institutional level. That in itself is problem because there is no general rule or standard, nor any accepted model of digitization. Digitization of old records is so delicate a job which requires various skills and equipment, as well. We can proudly say that the National Library of Serbia is the pioneer of sound recordings digitization in Serbia.

Needs and deeds

At first, you need to have solid, acoustic gramophone with adjustable speed because our precious 78 rpm's are recorded from 60 to 90 rpm, which depends on publisher, production phase...

Then, you have to provide a set of appropriate needles for different phases of production, cut width etc. John Davies, one of the best known masters of remastering of old records, had and worked with almost 40 different types of needles.

It has been mentioned formerly that these records are very old, add the inadequate conditions of maintenance (dusty, wet ceilings, basements, boxes) and you get unplayable records, dirty and often damaged. It is higly important to clean the record before putting it on gramophone. For this purpose you can use special liquid for cleaning 78 rpm's. In this way you remove traces of dust, oil, tar or tobacco placed deeply in grooves of the record. The oldest records, made of cardboard covered with shelack or any other matter, could not be cleaned by the wet manner. You can clean them only by using special devices designed for that purpose, alike vacuum cleaner for gramophone records. When the need arises, you will have to use reference comlet of mechanical and chemical means for restauration of damaged or broken records, with microscope, as well.

After the record is cleaned, you can begin recording. Turntable is connected to PC (amplifier in the middle, very important in this process) and your sound card have to be half professional at least.

Now you converted an analog sound to a digital format. But this is not the end! The real thing begins right here. This is the hardest part called sound remastering. Many programs for sound editing are avilable in public domain but professional softwares for serious sound remastering are so expensive (around 10 to 15, 18 thousands of dollars). Software has to be capable to do noise reduction, click and hiss reduction and many other tasks, not automatically but guided with sharp and well trained ear for delicate sound shades.

After the recording is cleaned, you burn it on CD, save it on your PC's hard disc or put it on server. For having physically complete digital product, it will be nice to have a laser scanner for scanning label and cover.

The National Library of Serbia engaged sound engineers to do digitization and remastering of our oldest 78 rpm's. It is a longlasting process, for converting and sound editing of one record sometimes hours or days are needed.

Each record is saved on CD in 4 versions:

1. uncleaned original recording for future, more advanced methods of sound editing
2. completely edited and cleanned recording (some sounds can be lost)
3. pseudo stereo recording (78 rpm's are mono recorded and we get stereo by plain copying one channel to another)
4. optimally cleanned recording.

Digitized recordings are also backed up on servers.

Data for digital copy of each issue are entered in data base record of appropriate gramophone record. So, when a user browses our electronic catalogue and finds the gramophone record he/she was searching for, he/she can see all informations from catalogue record and then with just one click acces to the digital copy of it and listen to it.

CDs will be physically integrated in CD collection, so they get signature mark of CD collection.

Done and planned

Since the project started, we have digitized almost 700 records. We hope that the project will be over till the end of next year. Digitized records and digital copies are on application.

The National Library of Serbia made Internet presentation, accesible on web address <http://www.digital.nbs.bg.ac.yu/scc/muzikalije.php>. Also, it will be a part of The European Libraries Portal, as soon as possible.

We are still getting old 78 rpm's. The National Library of Serbia would like to create the largest collection of old gramophone records, in analog and digital format, in the country and region.

The National Library of Serbia is planning to establish the National Sound Archive, to help digitization and get together all earliest sound recordings of the Serbian music heritage at one place, huge data base.

The National Library of Serbia has preserved and made these records available to users. We certainly hope that fans of oldest sound recordings will be pleased to listen them in the National Library of Serbia's music reading room or in cyber space, from any location in the world.

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