

CYLINDER RECORDS:

Significance, Production, and Survival

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This document is a response to requests for comments and data that might help to inform the National Recorded Sound Preservation Study. It describes the significance of cylinder phonograph records and offers quantitative estimates regarding their production and survival.

1 Respondent's Background and Affiliation

I write partly as a private record collector and partly as a representative of the Association for Recorded Sound Collections (ARSC).

ARSC is a nonprofit organization, founded in 1966, dedicated to the preservation and study of sound recordings—in all genres of music and speech, in all formats, and from all periods. ARSC is unique in bringing together private collectors, historians, discographers, engineers, and institutional professionals, including representatives of some of the world's largest libraries and archives.

I chair the Cylinder Subcommittee of the ARSC Technical Committee, which developed the *ARSC Guidelines for Cylinder Playback Equipment* (funded by grants from the National Academy of Recording Arts & Sciences). I am a Founding Member of the National Recording Preservation Board, representing ARSC.

For more than thirty years, I have researched the history, technology, and products of the cylinder record industry. My personal collection currently includes 7,277 cylinder records, of nearly all types and brands.

2 Significance of Cylinder Records

Mechanical sound-carriers configured in cylindrical form represent an important part of our recorded-sound heritage, for many reasons:

2.1 World's Oldest Format for Sound Recording and Playback

Thomas Edison's tinfoil phonograph of 1877—which employed a thin sheet of metal foil, formed into a cylinder—was the first device to successfully “capture” and reproduce sound.

The earliest recorded sounds that can be heard today come from wax cylinders recorded by Edison (or his colleagues), for purposes of experiment and exhibition, in 1888. These cylinders are the incunabula of sound recording, just as Gutenberg Bibles are the incunabula of moveable-type printing.

2.2 Dominated the U.S. Recording Industry for 23 Years

Commercial production of cylinder records for musical entertainment began at the Edison Laboratory, in May 1889—the genesis of the worldwide recording industry. From evolving styles of popular music—sentimental ballads, comic songs, military marches, ragtime, and jazz—to classical music, the recorded repertoire was broad and varied. Artists ranged from stage celebrities to versatile studio musicians paid to record what was asked of them. Entertainment cylinders brought minstrel shows, Broadway productions, vaudeville sketches, and operas to urban audiences, and also reached remote rural folks located far from theaters.

Though Emile Berliner demonstrated his Gramophone and lateral-cut disc records in 1888, Berliner's products were not manufactured in significant quantities until the late 1890s.

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Cylinder records ruled the market, well into the 1900s. For example, in 1901, Edison sold *eight times* as many cylinders as the Victor Talking Machine Company sold discs. In 1903, the Edison-to-Victor sales ratio was 4 to 1. Victor disc production did not eclipse Edison's 1903 cylinder volume until 1912.

Cylinder-sector sales thus led the U.S. recording industry throughout its first 23 years (1889 to 1912). Despite fluctuating sales and declining demand, several firms persevered, releasing new cylinder titles into the 1920s. The last holdout, Edison stopped making entertainment cylinders on July 6, 1929—ending forty years of musical cylinder production.

2.3 Vast Global Output Produced by Many Small, Lesser-Known Companies

Four firms account for a majority of the commercial cylinder records manufactured worldwide: Edison, Columbia, Pathé, and Edison Bell.

However, it is important to appreciate that *hundreds* of lesser-known companies produced *at least 536 brands of cylinder records*—primarily in the U.S. and Europe, but also in far-flung corners of the globe such as Australia, China, India, Japan, the Middle East, and South America.

These diverse recordings carry a rich sonic legacy representing cross-sections of many musical cultures, spanning two decades (roughly, 1890 to 1911, outside the United States).

2.4 Unique, “Unpublished” Historical Recordings

Beyond the commercial entertainment products described above, tens of thousands of unique, noncommercial cylinders survive today, carrying “field recordings” of considerable anthropological, ethnographic, linguistic, or musicological importance. Other unique, unpublished cylinder recordings preserve our earliest oral history narratives and interviews.

As early as 1890, academic researchers were using cylinder phonographs “in the field,” on scientific expeditions, to objectively capture music and speech for later transcription, analysis, and preservation—often by experts located far from the remote performance venue. Scientists and explorers continued to make extensive use of wax cylinders until the late 1930s, when portable electrical recording equipment became available.

2.5 Pioneering Educational Recordings

From the 1890s to the 1910s, several competing firms published courses of instruction in foreign languages, pairing a series of cylinder records with accompanying textbooks. Some of the leading correspondence courses were *interactive*, in that students recorded examples of their progress on wax cylinders, for evaluation by “professors.”

Additional courses guided physical exercise programs, taught the vocal arts or cornet mastery, informed physicians about new developments in medical diagnosis and treatment, and even attempted to cure stuttering and stammering—all by means of cylinder recordings.

In the 1920s and again during World War II, the U.S. Army Signal Corps commissioned the production of special cylinder phonographs and Morse code records, for use in training and testing military telegraphers and radio operators.

2.6 Longevity of the Cylinder Format in Business Applications

Spoken-word business dictation was the earliest and most enduring application for sound recording in the cylinder format.

The Bell-Tainter Graphophone of 1887 was designed specifically for dictation purposes. The wax-coated cardboard tube known as “the Bell-Tainter cylinder” saw limited use, because of technical shortcomings

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in the Bell-Tainter Graphophones. Nonetheless, the six-inch length of that cylinder persisted in office-dictation products of the Columbia Phonograph Company and their offshoot, the Dictaphone Corporation, for sixty years (1887-1947).

Similarly, the six-inch-long Edison Business Blank of 1905 led to the ubiquitous Ediphone- and Voicewriter-brand wax-cylinder blanks, manufactured well into the 1960s.

Between 1917 and the 1940s (and possibly longer), Edison and Dictaphone each distributed multiple series of cylinder records that provided instruction, exercise, and testing in stenography, typewriting, secretarial practice, speech, etc.

3 Cylinder Production

3.1 Types of Cylinder Records

In assessing the relative survival rates of cylinder records, it is essential to recognize that, over the years, various *types* of cylinders were manufactured, using diverse materials, constructions, and processes. One cylinder type can differ greatly from another in sound quality, ruggedness, long-term physical stability, and resistance to environmental influences.

For the purpose of making survival estimates, we can categorize nearly all cylinder records into three basic, generic types:

3.1.1 Brown-Wax Records (1889-1902)

For more than a decade, most cylinder records intended for musical entertainment were made by cutting a modulated groove on a cylinder “blank”—a hollow cylinder cast from a relatively soft wax-like material. A range of metallic-soap compounds came to be known as “brown wax”—though the color of the material varies from very light tan to dark brown, depending on manufacturing process conditions.

The earliest brown-wax records were directly recorded “originals”—recorded either one-at-a-time or in multiples (using a bank of recording phonographs).

In July 1890, Thomas Edison was making duplicate copies from “master” records by two different methods, one of which invoked an early form of molding. From July 1891 on, it was common practice in the fledgling industry to produce duplicates *pantographically*, by mechanically tracing a master record and coupling the motion of the tracing stylus to a cutting stylus, which copied the original recording onto a wax blank. Most brown-wax records surviving today were made by mechanical duplication.

In the pantographic duplication process, gradual wear and degradation of the master record limited the number of acceptable-quality duplicates that could be copied from a given master. To maintain a continuous supply of good-selling titles, studio managers often needed to call recording artists back, to make a new batch of master records. Over time, the company issued many *different* performances (later termed “takes”), all under the same catalog number and title, without any markings on the records to differentiate each take. When the original performers were unavailable for further work, substitute vocalists or musicians cut “re-makes”—again, usually issued under the same catalog number as the earlier version. Such variations in recorded content now complicate matters for catalogers, discographers, and collection curators.

The making of brown-wax records was not limited to the corporate recording studio, as was the case for contemporary disc records. Virtually anyone owning a cylinder phonograph was equipped to make recordings on brown-wax blanks, at home or “in the field.” Recordists could shave and reuse their soft-wax cylinders, a number of times.

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3.1.2 Molded Black-Wax Records (1902-1923)

Brown-wax cylinders were constrained by the technical tradeoff between recordability and durability: the “wax” material had to be soft enough to be accurately cut by the recording stylus, yet hard enough to deliver an acceptable playback “life.” Further, wax blanks intended for repeated use (in home recording or business dictation) needed to be readily shaveable, to prepare the recording surface for reuse.

On the other hand, a duplicate record intended strictly as a permanent copy, *for playback only*, could be made of a much harder, more durable material. In the late 1890s, the high demand for entertainment records drove the development of a rapid, low-cost duplicating process. After years of experiments, Edison’s laboratory team devised a “black wax” metallic-soap compound suitable for molding high-quality duplicate cylinder records.

The new Edison Moulded Records, which began shipping in January 1902, employed the black-wax compound. (The more widely used brand name, “Edison Gold Moulded Records,” was introduced in November 1903.) These hard-wax cylinders could be made to yield louder playback than the soft brown-wax records, without rapid wear, allowing the new molded product to compete more effectively with the rather loud-playing lateral-cut disc records.

Columbia followed suit with a cylinder molded of rather soft brown wax—their XP Record—in March 1902. After August 1903, Columbia used a harder black-wax material for XP Records.

Major cylinder makers in Europe and elsewhere quickly adopted the black-wax molding technology. Only the smallest companies continued to produce brown-wax records (whether “original” or pantographed) after 1902.

These leading firms made black-wax cylinder records until, at least, the dates shown:

- Columbia (December 1907 in England; May 1909 in U.S.)
- Pathé (1906 in England; 1911 in France; 1917 for Norway)
- Edison (January 1914)
- Edison Bell (December 1914)
- Clarion Record Co., Ltd. (November 1923).

3.1.3 Celluloid Records (1900-1929)

Wax cylinders are fragile. If dropped, struck, or squeezed, a wax record is likely to crack or break. Inventors seeking a more rugged material that could serve for the mass-production of duplicate cylinder records were attracted to celluloid (which had been developed for industrial molding processes in the 1870s). Edison considered using the material, early on, but instead chose to pursue waxes and metallic soaps—probably because, in the late 1880s, his focus was on *recordable* blanks.

In France, Henri Jules Lioret made a small number of celluloid cylinder records in 1893, followed by modest commercial quantities during the rest of the 1890s.

The first celluloid cylinders marketed in the U.S. were the Lambert Indestructible Records, manufactured in Chicago by The Lambert Company, between 1900 and 1905. The patent rights and technology of that firm (bankrupt by January 1906), passed on to the Indestructible Phonographic Record Company, which produced celluloid cylinders in Albany, New York from 1907 to 1922.

Edison wanted to use celluloid for making molded cylinders in 1900, but was barred from doing so by a court decision citing a prevailing Lambert patent. Faced with declining sales of wax cylinders in 1911, Edison at last paid for a license permitting Thomas A. Edison, Inc. to mold cylinder records from tubes of celluloid.

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The resulting Edison Blue Amberol Record debuted in October 1912. Until the end of 1914, Blue Amberol Records were derived from directly recorded wax “Cylinder Masters”—closely duplicating the sonic quality of the master recording. In contrast, most Blue Amberols issued after December 1914 were mastered by horn-to-horn copying (“dubbing”), from a Diamond Disc Submaster to a Cylinder Master. Consequently, dubbed Blue Amberols suffer from a noticeably restricted audio bandwidth and increased noise and distortion.

The Blue Amberols released in June 1929 were the final commercially manufactured entertainment cylinders.

3.2 Cylinder Record Producers and Production Quantities

3.2.1 Coin-Slot Novelty in the NAPCo Period

During the first half of the 1890s, Americans were most likely to hear recorded music through listening tubes and earpieces, after depositing a nickel in the coin slot of an “automatic” cylinder phonograph. The typical listener was standing in a “phonograph parlor”—strategically located in a railroad station, ferry terminal, shopping arcade, or saloon. *Almost no one owned a phonograph, at home.* This situation arose through an early and abrupt shift in the commercial use of phonographs.

From July 1888 until August 1894, the North American Phonograph Company (NAPCo) controlled the manufacture and distribution of cylinder phonographs in the United States and Canada.

Thirty-four regional NAPCo “sub-companies” were formed, intending to rent and service phonographic equipment in specific territories, for use in business dictation. However, NAPCo was very slow in delivering enough dependable machines for office use. Most of the sub-companies soon saw greater potential for profit in the public exhibition of phonographs equipped with coin-slot mechanisms and *musical* records.

NAPCo had granted the Edison Phonograph Works exclusive rights to make musical records. In May 1889, Thomas Edison began a program to produce musical “phonograms” at his laboratory in West Orange, New Jersey. Sub-companies purchased the resulting cylinder records from NAPCo and deployed them in nickel-in-the-slot machines, arrayed in parlors located in major cities. The parlors proved to be incredibly profitable. Some machines reportedly earned as much as \$24 per day—at a time when the average weekly wage was less than \$10.

After Edison received complaints about the quality of records delivered by NAPCo to the local companies (due in part to damage during shipment), he shut down his Music Room operations, on January 23, 1890. Edison suggested, “It might be more satisfactory for the different phonograph companies to make their own records.”

When Edison halted his recording activity, NAPCo was left holding some 600 orders for records that they could not immediately fill. (The NAPCo parent organization, a *sales* agency, had no manufacturing facilities.) NAPCo arranged for the New York Phonograph Company to fill some of the orders, but also permitted the individual franchisees to make their own records.

Indeed, a number of the sub-companies—desperate for a steady supply of musical records—hired local musicians, singers, and comics, to record their performances on brown-wax blanks bought from NAPCo. Coin-slot profits motivated extensive production of both original and duplicate records by the local firms, despite their ostensible territorial restrictions. The quality of the locally generated records naturally varied from quite good to very poor, yet certain titles commanded prices as high as \$5 each, in the intercompany trade. (Records typically sold for \$1.00 to \$2.50, in 1890.)

The sub-companies’ growing need for low-cost entertainment records of consistently high quality presented a new business opportunity for Edison. On December 11, 1890, he wrote: “I do not want to

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make original cylinders [and] I have no objection to the local companies making theirs[;] what I want is the manufacturing of duplicates.”

Edison’s laboratory team had experimented off and on since April 1888 toward the development of various processes for duplicating cylinder records. In July 1891, Edison was at last ready to offer a duplication service. He advised the NAPCo sub-companies that, if they shipped their cylinders to his laboratory, his staff could make “from 30 to 150 duplicates of good quality” for a duplicating charge of 35 cents per record (*not* including the cost of blank cylinders, boxing, or packing).

Eight of the NAPCo sub-companies confirmed that they were producing records locally, as of June 14, 1892:

- Columbia Phonograph Co.
- Kansas Phonograph Co.
- Louisiana Phonograph Co.
- Michigan Phonograph Co.
- New England Phonograph Co.
- New Jersey Phonograph Co.
- New York Phonograph Co.
- Ohio Phonograph Co.

Columbia, New York, and the Metropolitan Phonograph Company had begun recording in 1889. Other NAPCo local firms, including the Chicago Central Phonograph Company and the Pacific Phonograph Company, at times made their own records.

Production of Edison Records resumed at West Orange, as indicated by *Bulletin No. 1, The North American Phonograph Co. List of Musical Records for the Phonograph*, dated April 1, 1892. NAPCo endeavored to maintain a stock of 25 to 150 copies of each title, “made exclusively for this company.” During the summer of 1893, Edison supplied NAPCo with about 9,000 duplicate records per month.

On September 30, 1893, NAPCo Vice President Alfred O. Tate wrote to Thomas Edison, predicting a market for 150,000 to 200,000 records per year. At the time, Tate could not have known that *other* firms would end up supplying those records, after Edison intentionally caused the bankruptcy of NAPCo, in August 1894 (in a move to regain control of his phonograph patent rights).

3.2.2 Post-NAPCo Period: Growth of the Home Entertainment Market

Litigation following the NAPCo bankruptcy temporarily prevented Edison from making and selling any further musical records. Several of the NAPCo franchisees continued their local recording activities, happily filling the supply void left by the idled Edison Phonograph Works.

The Columbia Phonograph Company of Washington, D.C. had been one of the most active suppliers of records, during the NAPCo Period. With NAPCo in bankruptcy, the “Columbia Phonograph Company, General” emerged as an independent player, openly marketing entertainment cylinders, nationwide. The United States Phonograph Company of Newark, New Jersey (spun off from the New Jersey Phonograph Company) was another prolific record maker, between 1894 and 1897. United States Phonograph even supplied duplicate records to Columbia, in 1894 and 1895.

In late 1894, as before, Columbia, United States Phonograph, and their competitors were selling most of their records to coin-slot operators. Fewer than 1,000 phonographs had made their way into American homes.

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The electric-motor phonographs made between 1888 and 1894 were large, heavy, and required messy wet-cell batteries. They were initially *leased* (at a rental fee of \$40 per year). Unrestricted outright sales of phonographs began after the July 12, 1892 settlement of a legal dispute. However, since the various Edison “Class M” Phonograph Outfits cost from \$150 to \$315, only highly motivated and affluent people bought them for personal amusement.

Columbia’s sister firm, the American Graphophone Company, pioneered in manufacturing practical spring-motor machines. Their Spring-Motor Graphophone, priced at \$110, was first advertised in August 1894. Truly affordable Graphophones, designed for use in the home, followed a bit later: the \$40 Type N (in 1895) and the \$25 Type A (in December 1896). Edison responded with the Home Phonograph, priced at \$40 in December 1896, and the Standard Phonograph, at \$20, in February 1898. These low-cost machines created a large home-entertainment market eager for music on cylinders.

The National Phonograph Company had been organized in January 1896, as an Edison-controlled successor to NAPCo. The new firm initially concentrated on the sale of NAPCo equipment assets and the development of spring-motor machines.

Research authority Ray Wile could find no evidence that National Phonograph sold any records at all during 1896. Wile concluded that the “Edison Records” marketed by the company, starting in May 1897, were, at first, pantographic duplicates of masters recorded by the United States Phonograph Company.

Edison resumed his own recording operations in West Orange on October 9, 1897, but apparently could not keep pace with the growing demand for new titles. Between August 1898 and April 1899, the National Phonograph Company regularly purchased master records from Walcutt & Leeds, Ltd., a New York City firm. Many titles listed in the National Phonograph catalogs of 1898 and 1899 reflect the Walcutt & Leeds recordings.

The National Phonograph Company reported manufacturing 87,690 brown-wax records during Fiscal Year 1897. Their output increased nearly fivefold in FY1898, to 428,310 records.

Production of brown-wax Edison Records plateaued at roughly two million per year, during 1899, 1900, and 1901—perhaps limited by the capacity of Edison’s pantographic duplication facilities.

3.2.3 Mass Production of Molded Cylinders

With the early-1902 introduction of the Edison Gold Moulded Record, Edison’s cylinder sales surged to 4.38 million in 1902 and 7.66 million in 1903.

Unfortunately, I haven’t yet found dependable production figures or sales figures for Columbia’s cylinder record activity, and I hesitate to trust the numbers that Columbia occasionally gave in their advertising.

For example, in a 1903 popular-magazine ad, Columbia cited “Our enormous output of Two Million Records a month,” claiming “We Hold the Record.” However, in February 1904, the National Phonograph Company reported to their dealers: “An investigation into the output of every factory in the country making cylinder Records shows that we are to-day, and have been for months, making fifty per cent more Records than any other company. This statement is made on the most reliable information, and the claim of others to the contrary is the merest buncombe.”

Perhaps Columbia tallied their *worldwide* production of cylinder and disc records, to yield the figure of 2 million records per month. Still, that impressive number (which implies an annual volume of 24 million Columbia records) must have been bold hyperbole created by the Columbia sales staff. The *Census of Manufactures* (taken every five years, between 1899 and 1919) indicates that the entire U.S. industry manufactured a total of 21 million cylinders and 4 million discs, in 1904.

The peak year for U.S. cylinder record production seems to have been 1907, when Edison was making as many as 110,000 wax records *in a single day*.

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The next *Census of Manufactures* shows that 18.6 million cylinders and 8.6 million discs were manufactured in the U.S. during 1909.

Between 1911 and 1929, Edison sold 21.4 million cylinder records.

Clearly, hundreds of millions of cylinder records were manufactured, worldwide, between 1889 and 1929.

3.3 Census of Titles Issued on Cylinder Records

Since 1999, I have gradually compiled a “census” enumerating the number of distinct titles (that is, recorded “selections”) known to have been commercially issued on various brands of entertainment cylinder records.

Most entries in my *Cylinder Record “Title Output” Census* spreadsheet are based on *exact* title counts, taken from catalog listings studied series by series, for each major record brand and cylinder type. A few entries are based on the best available *estimates*—from my own judgment or provided by an expert familiar with a specific brand or series.

My preliminary analysis shows that the global tally of commercial cylinder record titles is at least 82,477. Approximately 47,000 of those titles were produced in U.S. recording studios.

The eventual tallies will surely be much higher, since the “*Title Output*” *Census* covers only 69 cylinder-record brands, while my *Cylinder Industry Database* currently lists more than 536 brands! (Sadly, we may never have access to the catalogs or company files needed to document the recordings produced by the smaller, now very obscure firms.)

4 Cylinder Survival

4.1 Dispersion and Conservation: Where are the cylinders?

Despite their age and fragility, quite a few cylinder records survive today. Groups of cylinders reside in thousands of places, around the world, by chance or by intent. Naturally, the owners and custodians differ widely in their attitudes, goals, and activities surrounding these “old records.”

4.1.1 Institutional Repositories

Cylinder collections in libraries, archives, museums, and historical societies tend to reflect the mission of the particular institution. They are likely to be more formally cataloged and stored under better (“archival”) conditions than the typical private collection.

It seems that only a few institutional repositories now actively seek to acquire commercial entertainment cylinder records. More often, existing private collections were donated to the institution, at various points in the past, perhaps toward a goal of long-term preservation or broader public access.

A number of the larger institutional cylinder collections consist primarily of unique, noncommercial cylinders recorded long ago by academic researchers or scientific professionals. Happily, in many cases, preservation transfers have already been made from these unique historic artifacts, or are planned for the near future.

4.1.2 Private Collections

Many hundreds of private collections owned by individuals account for the majority of cylinders extant today.

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Collectors can be very good custodians of their treasured objects. However, many collectors are not well informed about the preferred archival practices that would help to conserve their records; others don't have the resources to apply the best practices, even if they wish to.

Too often, collectors do not make plans for the ultimate disposition of their holdings. Important collections that took decades to gather, organize, and catalog are frequently broken up and widely dispersed, losing the integrity and accessibility the collection once had, as a localized whole. Worse, entire collections can disappear into the trash heap.

4.1.3 Dealers

It's no secret that millions of "old records" are held—at least temporarily—by antique shops, resale stores, record shops, mail-order dealers, pawnshops, and auctioneers. Web-based auction services such as eBay now facilitate very active commerce in collectibles. More vintage records change hands today, more rapidly, than ever before.

One downside to the increased movement of cylinders and shellac discs is that the records are exposed to greater risk of damage or breakage in transit, when poorly packaged for shipment. Sought after, one-of-a-kind records have been destroyed at an increasing rate, in recent years.

4.1.4 Forgotten Caches

Clusters of cylinder records still sit—unknown or forgotten—in attics, basements, garages, and barns, but most pre-1930 records either were discarded or came into the hands of collectors between the 1950s and the 1970s, as the families who originally purchased the records (and their descendants) passed on or moved away. Only very seldom does a cache of new-old-stock cylinders turn up in an old warehouse or general store—something that occasionally happened in earlier decades.

4.1.5 Record Companies

Regrettably, the firms that manufactured cylinder records did not keep their metal molds or example copies of the records for very long, after ceasing cylinder production.

Columbia and Pathé both turned their attention to *disc* product lines before 1910, and my understanding is that their corporate successors today hold no cylinders or cylinder molds at all.

Thomas A. Edison, Inc. disposed of the bulk of their cylinder molds, some time after production ended in 1929; only a few select molds were retained. A nearly complete set of Edison Blue Amberol Records was reportedly shipped to Henry Ford's Edison Institute, in Dearborn, Michigan. In October 1929, the remaining stock of 212,566 Edison cylinder records was scheduled to be destroyed by burning. The company *did* keep many of the Edison *disc* molds and example disc-pressings, which are now expertly conserved at the Edison National Historic Site.

4.2 Global Cylinder Survival: Projected Figures

In 1995, for an *ARSC Journal* article, I estimated that at least 300,000 cylinder records survive in public and private collections in the United States, "with fewer in Europe." I based the estimate on my knowledge of holdings in the largest U.S. and European institutions, and in major private collections, at that time.

Now, after ten years of monitoring eBay sales activity, I realize that *many* more cylinders are "out there"—singly, or in random groups, if not part of a formal collection. Thousands of cylinders have "come out of the woodwork," thanks to the economic incentive of an expanded, more lucrative marketplace.

I now believe that at least one million cylinders survive, worldwide.

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4.3 Threats to Cylinder Survival

Like many historical artifacts, cylinder records are subject to threats posed by a variety of adverse influences. Archival conservation should seek to minimize the effects of these influences:

4.3.1 Humid Environments

Most types of “wax” cylinders are vulnerable to biological attack from fungi that feed on the natural-wax components of the metallic-soap compounds. Moisture and elevated humidity promote and accelerate these attacks.

Brown-wax records seem to be most susceptible to fungal growth, with black-wax records only slightly less so. The very hard metallic soap used to make Edison Amberol Records (and some late-production Edison Gold Moulded Records) appears to be immune to fungal attack, as are celluloid records (though their core materials may not be).

It is prudent to keep all types of cylinders clean, dry, and free from condensation.

4.3.2 Temperature Extremes

High ambient temperatures, caused by exposure to direct sunlight, steam-heat radiators, or tropical environments can soften and permanently distort or efface the recorded surface of many wax cylinders.

Celluloid cylinders are vulnerable to damage at low temperatures, because the celluloid sleeve is likely to contract against the constraining core, causing catastrophic splits in the sleeve. “Important” celluloid cylinders should not be taken outdoors or shipped during the winter months.

4.3.3 Handling and Transport

Different types of wax cylinders are composed of diverse metallic-soap compounds, with mechanical properties ranging from very soft to quite hard and brittle. For example, the playing surface of a soft brown-wax cylinder is vulnerable to physical scratching or abrasion that will distort or destroy the sonic-information content of the record. In contrast, Edison Amberol Records were made of a hard metallic soap that is now so brittle and fragile that even slight mechanical forces or small temperature changes can catastrophically shatter the cylinder.

Personnel who handle cylinder records should be trained to recognize the different cylinder types and to treat each type appropriately.

4.3.4 Inherent Failure Mechanisms

Some types of cylinder records are afflicted by inherent, ongoing physical or chemical failure mechanisms. These processes degrade recordings and may doom them to eventual destruction.

For example, celluloid cylinders can develop devastating cracks and splits in the record surface, caused by internal tension built up over time, as volatile camphor (originally employed as a plasticizer) gradually evaporates from the celluloid material and the celluloid shrinks.

Certain wax-cylinder compounds may undergo chemical decomposition, such as efflorescence, in which a powdery “bloom” coats the surface of the record, interfering with the retrieval of the recorded sound. Efflorescence may be mistaken for fungal mold or mildew, but it is not a biological phenomenon. Today, it is most often seen as a thin, light-bluish-gray coating on some Edison Amberol Records—the result of an apparently self-limiting decomposition process.

Attempting to replicate Edison’s metallic-soap “wax” material, Thomas Macdonald formulated a lead-soap compound for the American Graphophone Company, in late 1892. His lead soap rapidly effloresced, causing unacceptably noisy playback. Cylinder blanks that American Graphophone supplied

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to Columbia (prior to August 1895) came to be termed “the blue cylinders.” Some Columbia Records made on Macdonald’s troubled blanks self-destructed—“Sweating destroyed the record entirely.” Even with help from outside chemists, it was roughly November 1896 before Macdonald succeeded in making blanks free from clouding, “sweating,” and air-bubble pinholes.

The best advice here is to transfer vulnerable recordings, as soon as possible.

4.3.5 Playback with Improper Equipment

The nature and use of playback equipment affect the retrieved sound quality *and* the life of the sound carrier. When accurate playback is needed for archival transfer and preservation of cylinder recordings, antique cylinder phonographs should not be used. The *ARSC Guidelines for Cylinder Playback Equipment* describe a set of recommended features, functions, and minimum performance levels of equipment for archival-quality playback of cylinder records.

4.4 Title Survival

To provide an idea of “what is extant” and “how much is lost,” I offer estimates of the number of titles that can be found, as of 2007, for various types and brands of commercial entertainment cylinder records.

Here, I define a *title* as “a given musical or spoken piece, listed under the name of a particular artist, in the catalog(s) of a specific company.” I have not attempted to count the multiple performances (different recorded events: “takes” or “re-makes”) sometimes issued for a specific title, over time. That level of detailed information is no longer available for most types of cylinder records.

Extant means “at least one playable copy exists, somewhere.”

Please note that it’s very tricky business to accurately extrapolate survival rates, in the absence of a detailed and far-reaching census of current holdings. As human beings, collectors naturally have their own special interests, preferences, biases, and misunderstandings. Truth and objectivity can be elusive, in making projections of this sort.

The survival figures and percentages given in **Table 1** convey my personal opinion, informed by discussions with other veteran record collectors. The numbers are based on our study of record-industry catalogs, together with decades of experience observing the trade in surviving cylinder records.

4.4.1 NAPCo-Era Edison Records

Between May 1889 and April 1892, the Edison Laboratory produced approximately 1,978 unnumbered record titles. That early commercial output was followed by another 1,468 titles, issued between April 1892 and August 1894, in a Numerical Series of “Edison Records,” sold through NAPCo.

Virtually all of these soft brown-wax Edison/NAPCo records were played over and over, day and night, in coin-slot machines installed in public phonograph parlors. After perhaps 200 plays, the worn-out cylinders were discarded or recycled. That typical usage pattern explains the very low survival rate of these early records. Today, we would be lucky to find just 3% of the catalog titles, carried on playable Edison cylinders surviving from the NAPCo Period.

Now, it’s not always possible to determine, with certainty, exactly when a surviving brown-wax cylinder record was recorded or duplicated. An artist who recorded a given title in 1890 can also have recorded the same title a decade later. A good example is George W. Johnson’s “Laughing Song”—arguably the most popular title of the 1890s. Johnson repeatedly performed that song for several NAPCo sub-companies, between 1890 and 1894. He continued to record the piece on brown wax, for many different cylinder brands, through 1902. Without a distinctive announcement, it can be hard to identify and date these assorted recordings.

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TABLE 1
Number of Titles Issued and Estimated Title Survival, for each major brand of cylinder record distributed in the United States

PERIOD of ISSUE	COMPANY / BRAND NAME	SERIES	ISSUED TITLES	ESTIMATED SURVIVAL	
				Titles	% Extant
1889-1894	NAPCo Edison Records	all available listings	3,689	100	3%
1889-1894	NAPCo Local Companies	all available listings	3,860	80	2%
1895-1902	17 small firms, taken together	post-NAPCo brown wax	8,174	400	5%
1895-1902	Columbia P Records	post-NAPCo brown wax	3,929	2,000	51%
1898-1902	Edison Records	post-NAPCo brown wax	2,390	1,200	50%
1900-1905	Lambert Indestructible Records	standard-size	953	750	79%
		Concert-size	125	80	64%
1902-1912	Edison Gold Moulded Records	U.S. Popular	3,173	3,000	95%
		Grand Opera	113	110	97%
		Foreign	6,365	3,150	49%
1902-1909	Columbia XP Records	U.S. Popular	2,224	1,800	81%
1907-1922	Indestructible Records	all	1,598	1,590	99.5%
1908-1912	Edison Amberol Records	U.S. Popular	1,157	1,150	99%
		Concert and Grand Opera	212	210	99%
		Foreign	1,709	900	53%
1910-1913	U-S Everlasting Records	U.S. Popular	978	960	98%
		Grand Opera	51	45	88%
		Foreign	163	80	49%
1912-1929	Edison Blue Amberol Records	U.S. Popular	4,198	4,196	99.95%
		Concert	189	187	98.9%
		Royal Purple Amberols	77	77	100%
		Foreign	1,705	730	43%
TOTALS:			47,032	22,795	48%

One or more of these criteria can help to identify cylinder records produced during the NAPCo era:

- a channeled end-rim (originally intended to accept a narrow paper ring, printed with title information—though very few surviving examples are still so labeled)
- a spoken announcement that cites an Edison Record *Number* (from the Numerical Series of 1892-1894)
- a typically lengthy announcement that includes the name of a NAPCo sub-company
- an accompanying original paper “record slip,” printed in a format and style used during the NAPCo era, which can be clearly tied to a catalog title of the era
- a distinctive topical title listed in a NAPCo catalog but *not* listed in post-NAPCo catalogs.

Lacking such explicit identifying evidence, it’s tough to prove that a given cylinder record was actually made during the NAPCo Period.

Genuine NAPCo-era records are exceedingly scarce artifacts. Their rarity all too often inspires collectors and dealers to “age” their brown-wax records—erroneously believing or describing a fairly common post-NAPCo cylinder to have been made years earlier than it actually was.

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4.4.2 Records Produced by NAPCo Local Companies

At least ten of the NAPCo sub-companies made their own records, but surviving cylinders can't always be ascribed to a specific franchisee. Sub-companies seeking to sell or trade records outside their assigned geographic territories often omitted the company name from the title-and-artist announcement spoken at the beginning of the recording.

The sampling of NAPCo-era sub-company record catalogs and supplementary lists now available for study does not convey the full extent of the local-company output. The number of Issued Titles given in Table 1 is accordingly understated.

The vast majority of the records made by the NAPCo local companies simply wore out, in coin-slot service. Many parlors changed their "program" daily, to provide fresh selections for their patrons and assure a high-quality listening experience. Operators were urged to replace records after no more than two days of use. These policies assured the rapid destruction of most local-company cylinders.

For example, only one Louisiana Phonograph Company cylinder is known to exist, and it is now so worn as to be barely decipherable. I'm aware of a couple records actually announced with the Michigan Phonograph Company name. A smattering of *possible* Ohio Phonograph Company cylinders has been reported. Columbia, New England, and New Jersey records are a bit more plentiful.

Phonograph exhibitors, who traveled from town to town, demonstrating the novelty of recorded entertainment, may have unwittingly saved some of the sub-company records that survive today. The very few private collectors active in the early 1890s may have retained other examples.

Unfortunately, I doubt that more than 2% of the sub-company titles are now extant.

4.4.3 Post-NAPCo Brown-Wax Records

Between 1895 and 1902, Columbia, Edison, and seventeen smaller firms issued at least 14,000 titles on brown wax, in the United States.

That seemingly large number *still* doesn't represent the total U.S. cylinder-title output during this period. Other shoestring outfits briefly flourished, making their own cylinder records. We know their corporate names, locations, and key personnel, but typically haven't seen any of their catalogs and therefore lack a good basis for estimating their title output.

Most post-NAPCo brown-wax records were sold directly to consumers, in the burgeoning home-entertainment market. Many examples survive today because they were played mainly on Sunday afternoons, when the family gathered with visiting relatives and friends, in the home parlor. As treasured possessions, these records were generally treated with care and respect. They were not quickly "played to death" the way NAPCo-era coin-slot records were.

The "big seller" titles distributed by Columbia and Edison turn up repeatedly today, but copies of their slower selling titles have largely been lost to fungus, breakage, wear, etc. On average, it seems that perhaps 50% of the Columbia and Edison brown-wax title output can still be found.

Lamentably, the 8,000 or so titles issued by seventeen independent companies have not fared so well. Confirmed extant examples suggest a title-survival rate no higher than 5%. In fact, it seems that the *entire* output of several small companies that each offered more than a thousand titles may now be lost.

4.4.4 Lambert Indestructible Records

Harbingers of durable molded products to come later, Lambert celluloid cylinders were manufactured on a smaller scale than the contemporary wax records made by Columbia and Edison, and carry a similar repertoire.

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Collectors tend to prize Lambert cylinders—particularly those dyed a bright pink color—as desirable oddities among the commonplace celluloid cylinders colored blue or black. The rarely seen “Concert-size” Lambert Indestructible Records were the only five-inch-diameter cylinders made of celluloid, rather than wax. The collectibility and rising market value of Lambert records could be skewing their survival rate toward higher percentages.

4.4.5 Edison Gold Moulded Records

The brand of wax cylinder most commonly found today, Edison Gold Moulded Records were distributed by the tens of millions in the U.S. alone. Thirty million of these black-wax records had been sold in Europe by January 1904—just two years after sales of the brand began.

Most of the titles in the U.S.-popular and Grand Opera series can eventually be found, through persistent effort. However, many foreign-series titles *cannot* be located today.

4.4.6 Columbia XP Records

Columbia’s molded wax cylinders (at first brown, later black in color) may have initially been produced in even greater numbers than the competing Edison Gold Moulded Records, yet Columbia XP Records seem to have disappeared at a faster rate than the Edison product.

My impression is that Columbia’s metallic-soap compounds readily support fungal growth, under humid conditions. Consequently, many Columbia cylinders may have been discarded as “ruined,” based on their altered appearance. Ironically, it is possible for a moldy-looking Columbia XP Record to remain somewhat playable, while the recording on a moldy Edison Gold Moulded Record is likely to be destroyed, at the site “eaten” by fungus.

Perhaps the presence of Thomas Edison’s name and photo on virtually every Edison cylinder box made past owners think twice before throwing away a group of Edison cylinders. “Lady Columbia” (the trademarked graphic design employed on Columbia cylinder boxes) may not have carried the same historical cachet.

4.4.7 Indestructible Records

The rugged celluloid cylinders manufactured by the Indestructible Phonographic Record Company have survived well. Their particular construction is practically immune to splitting, even as the celluloid shrinks.

Nearly all Indestructible Record titles can be found today.

4.4.8 Edison Amberol Records

Standard-size molded cylinders made after 1901, recorded at 160 RPM, had a playing time of approximately two minutes—comparable to that of the 7-inch disc records in common use at that time. However, the increasingly popular 10-inch discs could play for three minutes, and 12-inch discs could approach 4½ minutes.

To compete with the perceived disc threat, Edison established a new type of cylinder, of the standard size, but recorded at a groove pitch of 200 turns per inch (200 TPI), instead of the usual 100 TPI, thereby doubling the playing duration. Edison needed a “very hard and tough” material for the 200-TPI record, but he refused to pay for a license to use celluloid. Instead, he pushed his staff to develop a new, harder metallic-soap compound.

When the Edison Amberol Record was first sold to the public, in October 1908, National Phonograph Company advertisements boasted: “Amberol Records are the longest playing Records of any kind yet produced.” (The company claimed a maximum playing time of four minutes and forty-five seconds.)

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Unhappily for Edison and the National Phonograph Company, the “Amberol wax” was not sufficiently durable. While indeed quite hard, it was too brittle. Customers quickly found that Edison Amberol Records wore prematurely, mistracked, and fractured all too easily. Mounting complaints from dealers finally forced Edison to switch to celluloid, for the Edison Blue Amberol Record.

The technical shortcoming of the wax Amberol was linked to the relatively high forces and pressures applied to the record groove by the mechanical reproducers employed on phonographs of the day. That problem notwithstanding, the typical Edison Amberol Record was in fact expertly recorded. An unworn wax Amberol carries remarkably high-fidelity sound, from an era when Edison catalogs proudly listed acclaimed celebrities of the Broadway stage, leading opera houses, and the best bands and orchestras in America.

Though thousands of wax Amberols have been damaged, broken, and lost over the years, it’s still possible to find virtually all U.S.-popular, Concert, and Grand Opera titles, in playable condition.

Among foreign-series wax Amberols surviving in North America, records in the British, German, and French series are most common. Examples from the other 25 ethnic series are seldom seen. Many foreign-series wax-Amberol titles were later duplicated as Blue Amberols, which increases the likelihood of access to those recordings.

4.4.9 U-S Everlasting Records: Special-Case Data

The U-S Phonograph Company of Cleveland, Ohio was the last new venture to challenge Edison and Columbia, in the cylinder field. Between 1910 and 1914, U-S Phonograph manufactured a line of technically advanced phonographs and high-quality celluloid cylinder records.

Intrigued by the history and products of this plucky little company, I am attempting to acquire an example copy for each of the 1,192 issued U-S Everlasting Record titles. This is no easy task, because a typical population of 500 cylinder records might include just one U-S record. (U-S cylinders were produced in *much* smaller quantities than Edison or Columbia cylinders.)

After 26 years of ardent search and acquisition, I have managed to gather examples for 93% of the company’s popular-series titles. However, I have so far found just 57% of the U-S Grand Opera titles and only 26% of the foreign-series titles.

Since they are based on *known extant* holdings, the above percentages serve as definitive low-end baseline values for the title-survival rates of one brand (and type) of celluloid cylinder. They also illustrate the relative difficulty of building a comprehensive collection of scarcer cylinder records, nearly a century after the records were first sold.

4.4.10 Edison Blue Amberol Records

Despite being manufactured in smaller lots than their wax predecessors, Blue Amberols are by far the most populous cylinders among all types and brands surviving in the 21st century. Edison had 13,000 dealers in 1912, when the Blue Amberol was introduced—meaning *lots* of shelves to stock. Seventeen years of production and distribution spread these blue celluloid records far and wide.

Essentially all of the U.S.-popular and Concert series can be located (with some effort). Titles in certain foreign series can be difficult to find, even more so than for the wax Amberol counterparts.

A Blue Amberol variant, having the celluloid dyed purple instead of blue, was issued between 1918 and 1921, as a follow-up to the earlier premium-priced Concert series. Edison Royal Purple Amberol Records carry Grand Opera selections and other recordings by celebrity artists. Copies of all 77 Royal Purple titles are known to exist today.

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5 Preservation Suggestions

Programs to make archival-quality audio extractions from cylinder records (before the original carriers deteriorate further) can help to assure the long-term preservation of these vintage and historic recordings.

When prioritizing preservation activities for various types and series of cylinders, I suggest that attention be given first to:

- vulnerable types most in danger of deterioration, coupled with
- series having the lowest title-survival percentages.

Those two criteria point strongly to the brown-wax records of the 1890s as the leading contenders for the most urgent and careful processing.

Next in line should be molded wax cylinders, followed closely by the celluloid cylinders most prone to catastrophic failure (splitting), such as U-S Everlasting Records.

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