PHONO-CYLINDERS VOL. 2

Edited and from the collection of George A. Blacker **Folkways Records FS 3887**

Cover design by Ronald Clyne-from an old poster

PHONOGRAPHIC ENTERTAINMENT

MUSIC AND ELOCUTION

BY THE

BEST MUSICIANS AND ELOCUTIONISTS

Directed by W. L. Skinner and William Treichel.

This entertainment will be the best of its kind ever given in this vicinity.

While you will be delighted and pleased, you will do more solid thinking than you ever did in the same amount of time in all your life.

Many of our records are new and were purchased by the managers at no small expense.

You may never be privileged to hear the

EDISON MILITARY BAND

In the Good Old Steamboat Days
Murry K. Hill. Edison 9619, 1907

That's Where I Come In
Edward M. Favor. Ind. 825, 1908

Farmer & the Business
Theodore Roosevelt. Edison 3708, 1912

A Confidential Chat
Press Eldridge. Edison 10121, 1909

Old Daddy Pegleg
New York Military Band. Edison 9948, 1908

The Girl Who Threw Me Down
Edward M. Favor & chorus. Edison 9837, 1908

I Used to be Afraid to Come Home in the Dark
Billy Murray. Ind. 979, 1909

Laughing Song
George W. Johnson. Edison 4004, 1902

I've Told His Missus All About Him
Helen Trix. Edison 9534, 1907

The Baseball Girl
Miss Ray Cox. Edison 2277, 1909

For You Alone
?. U. S. Everlasting 2M-413, 1909?

Street Piano Medley
August Molinari. Edison 9615, 1907

Mouse & the Clock
Edison Concert Band. Edison 9434, 1907

House Cleaning Time
Ada Jones & Len Spencer. Ind. 870, 1908

B.P.O.E. (Elk's Song)
Nat M.Wills. Edison 2320, 1909

DESCRIPTIVE NOTES ARE INSIDE POCKET

PHONO-CYLINDERS VOL. 2

FOLKWAYS RECORDS Album Nos. FS 3886, 3887

PHONO-CYLINDERS

Volumes 1 & 2

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PHONO-CYLINDERS VOL. 1

Side I Lambert Band 1	835	Second Selection from "A Country Girl" London Regimental Band.
Side I Edison Band 2	2777	Daybreak at Calamity Farm Len Spencer & Gilbert Girard.
Side I Edison Band 3	Special	Tramp, Tramp, Tramp Byron G. Harlan, Frank C. Stanley & chorus.
Side I Edison Band 4	9707	Dream of the Rarebit Fiend Edison Military Band.
Side I Edison Band 5	9923	Immortality (Excerpt from Lecture "The Prince of Peace" William Jenning Bryan.
Side I Edison Band 6	9103	The Village Seamstress Elene Foster.
Side I Ind. Band 7	1141	Kerry Mill's Barn Dance Band.
Side II Ind. Band 1	689	The Ragtime Drummer James Lent.
Side II Columbia Band 2	23232	I'm Afraid to Come Home in the Dark Arthur Collins.
Side II Edison Band 3	10000	Unlawful Trusts William Howard Taft.
Side II Ind. Band 4	4M-3268	When I was 21 & You were Sweet 16 Walter Van Brunt.
Side II Edison Band 5	Special	Hermit's Bell Overture (Maillart) American Symphony Orchestra.
Side II Edison Band 6	9315	Waiting at the Church Ada Jones.
Side II Columbia Band 7	32230	Rip Van Winkle Meets Meenie Joseph Jefferson.

PHONO-CYLINDERS VOL. 2

Side I Edison Band 1	9619	In the Good Old Steamboat Days Murry K. Hill.
Side I Ind. Band 2	825	That's Where I Come In Edward M. Favor.
Side I Edison Band 3	3708	Farmer & the Business Theodore Roosevelt.
Side I Edison Band 4	10121	A Confidential Chat Press Eldridge.
Side I Edison Band 5	9948	Old Daddy Pegleg New York Military Band.
Side I Edison Band 6	9837	The Girl Who Threw Me Down Edward M. Favor & chorus.
Side I Ind. Band 7	979	I Used to be Afraid to Come Home in the Dark. Billy Murray.
Side I Edison Band 8	4004	Laughing Song George W. Johnson.
Side II Edison Band 1	9534	I've Told His Missus All About Him Helen Trix.
Side II Edison Band 2	2277	The Baseball Girl Miss Ray Cox.
Side II U.S. Ev. Band 3	2M-413	For You Alone
Side II Edison Band 4	9615	Street Piano Medley August Molinari.
Side II Edison Band 5	9434	Mouse & the Clock Edison Concert Band.
Side II Ind. Band 6	870	House Cleaning Time Ada Jones & Len Spencer.
Side II Edison Band 7	2320	B.P.O.E. (Elk's Song) Nat M. Wills.

PREFACE

What you hear on this album of cylinder reissues is not the tinny, distorted reproduction so commonly associated with the old cylinder phonographs. You hear the full tonal range recorded on the cylinders, as reproduced electronically on a specially built electric playback machine, equipped with a high-fidelity magnetic transcription cartridge. If you have ever heard an old cylinder phonograph in somebody's rumpus room or an antiques shop, and thought that the poor sound quality was the fault of the records, prepare immediately to dismiss the notion forever from your mind. Actually, most cylinder records, especially those made by Edison, were far superior in fidelity to ANY acoustically recorded disc records sold at the time. Indeed, many collectors believe that Edisons directly recorded Amberols, especially the celluloid ones, were the best acoustic recordings EVER made, bar none. (Most of his Blue Amberols released after 1915 were dubbed from Diamond Disc masters, and their quality suffered somewhat in the dubbing process. Despite this, they offered pretty good sound.) One thing is sure: no other record producer ever tried to put his products into competition with Edison's diamond disc phonographs and records in the Edison Tone Tests. Thomas A. Edison amply deserves the title of "Father of High Fidelity".

THE RECORDS

The selections contained in this album represent a sort of "mixed grill" of cylinders, such as a cylinder collector might have accumulated over a period of years, if he had collected records seriously and tried to preserve them. You'll find a bit of everything here, from cornball comedy to military band selections to serious political speeches. Entertainment, rather than instruction, is the main purpose of this collection. So put the record on your phonograph and have fun!

RECOMMENDED BIBLIOGRAPHY

1. "From Tinfoil to Stereo" -- Oliver Read & Walter L. Welch -- Howard W. Sams, Indianapolis and Bobbs-Merrill, New York, 1959.....This is the best, most accurate history of the development of the phonograph and the art of sound recording currently available. Though written from a technical point of view, this book is not overburdened with technical terminology or mathematical formulae. It was the major source of information for these notes.

2. "The Fabulous Phonograph" -- Roland Gelatt -- J.B. Lippincott Co., 1954 -- Written from a music lover's point of view, this book does not agree with the above on some details of technical history.

3. "Talking Wax" -- Leroy Hughbanks -- Hobson Book Press, New York, 1945 -- Historically accurate, but very brief. This is worth reading for the author's personal reminiscences of his experiences with early disc and cylinder phonographs. Out of print.

4. "Cylinder Records" -- Dr. Duane D. Deakins -- Published privately by the author at 1057 Paloma St., Stockton, California, 1958. Probably out of print. *

5. "Joe Batten's Book" (Story of Sound Recording) -- Joseph Batten -- Rockliff, Salisbury Square, London, 1956....The memoirs of a recording technician and manager whose career spanned phonographic history from cylinders by the "round" to magnetic tape and the LP record. He relates many amusing stories of his adventures and mishaps in the recording studios.

* This author has published a series of Indexes of the releases of the major cylinder makers, having covered all of Edison's domestic issues and all that is known of the material issued by the Indestructible Phonographic Record Company, of Albany, N.Y. Others will be forthcoming as material is collected. Some are now out of print, Consult the author about what is still available.

Side I Lambert Band 1	835	"Second Selection from 'A Country Girl'" - London Regimental Band -- The show was a hit in England many years ago, and it is possible that the record is English in origin, as the company had a vigorous English division for a while. Lambert was the first record maker to offer a molded non-breakable cylinder record for sale. (See Notes for details) (App. 1904)
Side I Edison Band 2	2777	"Daybreak at Calamity Farm" - Len Spencer & Gilbert Girard -- A rural tragicomedy, which will suggest that the place is well named. Presumably, Girard does the animal imitations here, leaving the voice characterizations to Len Spencer. Rel. (App. 1916?)
Side I Edison Band 3	Special	"Tramp, Tramp, Tramp" -- Byron G. Harlan, Frank C. Stanley & chorus -- This was one of a series of ten records "numbered" A thru K (omitting the latter "I") which was given to owners of older phonographs with conversion outfits which made it possible for them to play the new four-minute records. This is a real production number. Rel. 1910.

Side I Edison Band 4 9585 — "Dream of the Rarebit Fiend" - Edison Military Band -- Edison is known to have made a short movie bearing this title, but whether the selection was meant for use as background music is not certain. Somebody here does a real tailgate job on those trombone glissandos. (1907)

Side I Edison Band 5 9923 — "Immortality" (Excerpt from Lecture "The Prince of Peace") -- William Jennings Bryan -- One of a series of records made by "The Great Commoner" in 1908, during the Presidential campaign of that year.

Side I Edison Band 6 9103 — "The Village Seamstress" -- Elene Foster -- It is a matter of regret that this lady didn't make more records, for she had in this record one of the most authentic "Down-East" Yankee monologues ever put on wax. She has captured the accent with such accuracy that one suspects she was herself a native of the area. (1905)

Side I Ind. Band 7 1141 — "Kerry Mills' Barn Dance" -- Band -- As was the practice with most band and orchestral recordings issued by Indestructible, no name was given to the band or orchestra, which was probably a studio pickup group. The tune itself has a rollicking appeal, and deserves revival. (1909)

Side II Ind. Band 1 689 — "The Ragtime Drummer" - James Lent -- This record, cut in 1907, is the first drum solo ever recorded and about the only cylinder ever issued that is even of marginal jazz interest. (I exclude the Edison Blue Amberol dubs of the Louisiana Five and others, since they are not original cylinder issues.) Lent recorded the same selection later on Emerson 779 and 5 (7-inch and 6-inch discs, respectively) and Victor 17029. Of the three versions, Emerson 779 is the most interesting from a jazz point of view. This cylinder version, being the first, is well deserving of preservation.

Side II Col. Band 2 33232 — "I'm Afraid to Come Home in the Dark" -- Arthur Collins -- This is an amusing song, but improbable. The average wife is less naive (App. 1908)

Side II Edison Band 3 10000 — "Unlawful Trusts" - William Howard Taft -- This, too, is one of a series of record made by Mr. Taft in the Presidential campaign year of 1908. Anyone who bought both series had a complete political debate, plus Bryan's views on "Immortality". Taft recorded one group of "Irish Stories" as his contribution to the non-political side.

Side II Ind. Band 4 4M-3268 — "When I was 21 & You were Sweet 16" - Walter Van Brunt, vocalist -- Happy Anniversary, Folks! (App. 1912)

Side II Edison Band 5 Special — "Hermit's Bell Overture" (Maillart) -- American Symphony Orchestra -- This overture represents our bow to haute couture. The selection is not a familiar one, though. Who knows? We may get credit for resurrecting it! (1910)

Side II Edison Band 6 9315 — "Waiting at the Church" -- Ada Jones -- The song was first popularized by English comedienne Vesta Victoria, but apparently not recorded by her in the U.S. Beatrice Kaye revived it in the 1940's, but this is the earliest version. (1906)

Side II Col. Band 7 32230 — "Rip Van Winkle Meets Meenie" - Joseph Jefferson -- Jefferson was a well-known actor of the turn of the century who rewrote Washington Irving's story into a 19th-century "smellerdrayma", complete with a villain. (App. 1907)

Side I Edison Band 1 9619 — "In the Good Old Steamboat Days" -- Murry K. Hill -- Mark Twain must have enjoyed this one! (1907)

Side I Ind. Band 2 825 — "That's Where I Come In" -- Edward M. Favor -- The Neighbor who let his chickens run loose deserved to have his flock decimated. At least Mr. Favor came out ahead there! (1908)

Side I Edison Band 3 3708 — "Farmer & the Businessman" -- Theodore Roosevelt -- He made this one during his "Bull Moose" campaign of 1912. It would seem that the country had a farm problem then, too.

Side I Edison Band 4 10121 — "A Confidential Chat" - Press ('Commander-in-Chief of the Army of Fun') Eldridge -- Mr. Eldridge here delivers himself of his opinions of how best to seek marital bliss. One question that he doesn't answer, though, is who is to marry the gal first. The supply of widows is limited! (1909)

Side I Edison Band 5 9948 — "Old Daddy Pegleg" - New York Military Band -- A lively two-step. Want to roll back the rug? (1908)

Side I Edison Band 6 9837 — "The Girl Who Threw Me Down" -- Edward M. Favor, vocalist w. chorus & orchestra -- Mr. Favor tells sad tale of unrequited love. (1908)

Side I Ind. Band 7 979 — "I Used to Be Afraid to Come Home in the Dark" (Now I'm Afraid to Go at All) -- Billy Murray -- This is the sequel to "I'm Afraid to Come Home in the Dark". Wifey got hip, and now Daddy is in the dog house (or is it the Y.M.C.A.F.E.? (1909)

Side I Edison Band 7 (Eng.) — "The Laughing Song" -- Harry Bluff -- We switch across the "pond" for a visit from one of England's pioneer recording artists. (Release date unknown)

Side II Edison Band 1 9534 — "I've Told His Missus All About Him" - Helen Trix -- This song is a sequel to "Waiting at the Church". Revenge was sweet! (1907)

Side II Edison Band 2 1747 — "The Baseball Girl" - Miss Ray Cox, comedienne -- The moral is that you'd better not take your girl friend to a ball game, expecially if she's a bit on the gabby side. (1909 (orig. issue)

Side II U.S. Ev. Band 3 2M-413 — "For You Alone" -- Unidentified vocalist -- The song is one of the sentimental type such as "Because"; the record itself is the product of the U.S. Phonograph Company of Cleveland, Ohio, a latercomer to the cylinder business which began operations in 1908. Record issued (App. 1909).

Side II Edison Band 4 9615 — "Street Piano Medley" - August Molinari -- Give the money, if any, to the monkey. Go ahead, he doesn't bite! (1907)

Side II Edison Band 5 9434 — "Mouse & the Clock" - Edison Concert Band -- "Listen to the mouse!" was the invitation of the monthly supplement of in which this record was listed. Well, you CAN hear him if you listen VERY carefully.(1907)

Side II Ind. Band 6 870 — "House Cleaning Time" - Ada Jones & Len Spencer -- House cleaning hasn't changed much, has it? Too bad it can't be completely abolished! (1908)

Side II Edison Band 7 2320 — "B.P.O.E." (Elks' Song) -- Nat M. Wills -- Honest, fellas, we're sure he was just kidding! 1909 (original issue).

THE PHONOGRAPH'S SALUTATION

I seize the palpitating air.
I hoard music and speech.
All lips that speak are mine.

I speak, and the inviolate word
Authenticates its origin and sign!

I am a tomb, a paradise, a throne,
An angel, phophet, slave, immortal friend!

My living records, in their native tone
Convict the knave, and disputations end.

In me are souls enbalmed. I am an ear,
Flawless as Truth, and Truth's own tongue am I.

I am a resurrection, and men hear
The quick and dead converse as I reply.

-- Written and recorded by the Reverend Horatio N. Powers, of Piermont-on-the-Hudson, N.Y., at Edison's laboratory, on June 16, 1888.

Notes by George A. Blacker

BRIEF HISTORY OF THE ART OF SOUND RECORDING

Before beginning with the history of sound recording, the three methods of recording should be clarified. VERTICAL RECORDING was the method in which the groove of the record was varied in depth by the recorded signal, creating a series of "hills and dales". This method was used on all cylinders and many discs. LATERAL RECORDING was the method by which the sylus moved from one side of an imaginary straight line to the other with the signal, but the depth of the groove was unchanged. It was used on nearly all disc records. MAGNETIC RECORDING is the method of recording sound on which the magnetic alignment of iron molecules on a moving oxide-coated tape (or a steel ribbon or wire) is varied by an electromagnet of special design.

The first known workable sound recording device was the "phonautograph", invented in 1856 by a Frenchman, Edouard-Leon Scott de Martinville. It transcribed sound vibrations in the form of lateral undulations on a cylindrical sheet or round disc of lampblacked paper. While it could record sound waves, it was unable to reproduce them. It was used for many years as a laboratory instrument for measuring and analyzing sound waves, a function now filled by the cathode-ray oscilloscope. A lucky accident set Thomas A. Edison to thinking of the possibility of recording sound; his curiosity was piqued by the odd behavior of a telegraph recorder on which he was conducting experiments in the summer of 1877. This machine transcribed telegraphic messages on a moving paper tape in the form of indentations of varying length corresponding to dots or dashes. While running an indented tape rapidly through the machine, Edison heard a faint humming sound "resembling human talk heard indistinctly". The sound was caused by a tension spring on the machine which came into contact with the indentations on the paper strip, and was set in vibration by them. He then tried an experiment with a diaphragm to which an embossing stylus was attached. This assembly was held in contact with a moving strip of paraffin-coated paper. When he spoke into the diaphragm, a faint but distinct recording of his voice was produced upon the paper strip. Thus, in one of Edison's happier instances of serendipidity, the art of sound recording was born on July 18, 1877.

The now famous tinfoil phonograph was built by John Kreusi, a machinist in Edison's laboratory, on August 12, 1877. To Mr. Edison's astonishment, the machine worked properly the first time he tried it out. According to him, this was NOT usual for a laboratory prototype.

The invention was widely publicized, and a few hundred phonographs were manufactured and sold during 1878. Most of the machines sold went to traveling lecturers, who put on very entertaining shows with them. In a short time, public interest in the phonograph subsided and the lecturers had to turn to other subjects. The tinfoil phonograph was an interesting novelty, but it had shortcomings. For one

thing, its fidelity left much to be desired. For another, the tinfoil recordings didn't play much more than a minute and wore out after a few playbacks. Improvements were needed, but they were not to be forthcoming for nearly ten years. In 1878, Edison was offered virtually unlimited financial support to develop a practical and inexpensive electric light. He threw himself into the project enthusiastically dropping all other work in his new preoccupation. Further development of the phonograph was postponed for a while.

In previous experimentation, Edison had developed a carbon-button transmitter for use on telephones which was markedly superior to that used by Alexander Graham Bell. He sold the rights to it, not to the Bell Telephone System, but to Western Union, to which concern he had also sold many patents on telegraphic equipment. Armed with the Edison transmitter, Western Union had set up a telephone system in competition to Bell's group. Bell was probably far from pleased that Edison had sold the transmitter rights to a competitor, and his anger may have been a factor in his decision to try further developmental work on the phonograph.

In 1880, Bell had won the Volts Award from the French Academy of Science in recognition of his invention of the telephone. He used the $20,000 which accompanied the award to set up a research laboratory in Washington, D.C. His brother Chichester and Professor Sumner Tainter joined him as associates.

Bell and his associates directed their efforts first toward the development of a more reliable telephone transmitter, since the Bell Telephone System was badly in need of one. They developed and patented several telephonic devices, including a transmitter that operated by flashing light from a mirror onto a selenium cell, producing a voice-modulated current. None of their devices were used commercially, however, since they were too complex to be easily or cheaply produced. Edison's carbon-button transmitter could not be readily improved upon and, indeed, it is still used -- in slightly modified form -- on all telephones produced today.

Relatively early in the course of their work, Prof. Tainter suggested that they turn their attention to the phonograph, since telephonic research had proven relatively fruitless. They did so and, after a lengthy delay, the reasons for which are obscure, they applied for a series of patents on their machine, which they named the "graphophone". This was a hand-cranked cylinder mechanism similar to Edison's tinfoil machines in many respects. The main difference was that the recording surface was not tinfoil, but a wax compound. The cylinder was made of cardboard, coated with the way, and was six inches long and one and 5/16 inches in diameter. This cylinder could be more easily removed without damage to the recording than Edison's early tinfoil strips. The main difference, however, between the Bell-Tainter patents and Edison's was that Bell and Tainter specified precisely that their recordings were made by incising the recording medium and thereby removing material to form a groove, as opposed to Edison's method of indenting metallic foil. Edison had experimented with various improvements on the phonograph before beginning work on the incandescent lamp in 1878. He had experimented with both disc and cylinder machines, and with various types of recording surfaces for both. His British Patent No. 1644, dated April 24, 1878, shows a number of various types of phonographic devices on which he had worked. It is reproduced in its entirety for the first time in "From Stereo to Tinfoil", by Oliver Read and Walter Welch (See Bibliography). Edison did not specifically mention incising of the recording surface in this patent, probably because he assumed that it would be automatically deduced that a recording stylus would incise a softer surface just as well as it would indent metallic foil. His failure to spell out the incising process was a costly error. Upon the quibbling of legalistic difference between incising and indentation, an entire corporation was to depend and upon it much litigation was based which had profound effects upon the evolution of the phonograph. Most of the other devices upon which the Bell associates worked were similar to those described by Edison in his British patent. One invention of theirs, however, was unique: a disc phonograph in which the speed of the turntable increased as the recorder or reproducer approached the center of the disc. This permitted the velocity of the record surface to remain constant under the stylus, which made it possible to maintain a constant frequency response from beginning to end of the record. This was not possible with the constant speed disc, as the surface velocity decreases toward the center and it becomes increasingly difficult adequately to record higher frequencies. This problem is still present today, especially so at slower speeds, and has been only partially offset by special equalization used in the cutting of record masters. The principle was never adopted by any maker of disc records, but it is used today in disc-type dictating machines produced by the Gray Mfg. Company of Hartford, Conn. Edison always favored the cylinder record, since its surface velocity was constant at all points on the record. Should anyone wonder how an electrically recorded cylinder would sound, he should investigate Edison Blue Amberol cylinders issued between 1928 and 1929. Most of these were dubbed electrically from electric Diamond Discs.

In 1886, after their graphophone patents were issued to them, the Bell brothers and Mr. Tainter organized the Volta Graphophone Company at Alexandria, W. Va. (This company was the corporate ancestor of today's Columbia Phonograph Company.) An attempt on the part of the Volta associates to demonstrate their machine to Edison and to invite him to join forces with them had fallen through, since Mr. Edison was ill at the time. No further efforts were made to join forces in phonographic research and Edison and the Volta group pursued independent courses thenceforth.

The organization of the Volta Graphophone Co., and the fact that many of their devices were similar to those proposed by him in his 1878 British patent, inspired Edison to resume developmental work on the phonograph. Since he had completed most of the work involved in developing the electric light and a suitable power distribution system for it, he was better able to devote time to work on the phonograph. What eventually emerged from the laboratory was a machine similar in its general characteristics to the later Edison Home Phonograph. It was powered by an electric motor and used a solid wax cylinder that was tapered to fit the mandrel* the same size as the two- and four-minute entertainment cylinders commonly seen today. The solid wax cylinder was easily removed from the machine without damage and could be reused oftener than the graphophone cylinder with its cardboard base. (Some years later, American Graphophone Company, corporate successors to Volta Graphophone, were to adopt the Edison-type cylinder.)

Before the two firms could get a real start in business, both were approached by Jesse Lippincott, a Pittsburgh businessman who proposed that the two merge into a common sales and distribution agency. Mutual distrust between the Edison and Graphophone camps made negotiations difficult, but separate agreements were eventually reached between Lippincott and the competitors. The corporation thus formed in 1888 was called the North American Phonograph Company.

North American planned to organize state regional companies who would lease phonographs to business firms for use as office dictating machines. The policy of leasing rather than selling the machines outright was adopted in the hope that it would thus be easier to induce businessmen to try the phonograph. Unit costs were relatively high in the early years of production, so much so that many firms would have balked at buying the machines outright.

Despite the optimism with which Lippincott and his associates entered the dictation phonograph business, the picture was never very rosy. Secretaries, fearing what was to be known in later years as "technological unemployment", opposed the introduction of phonographs into their jobs as strenuously as possible. It is even suspected that many were not above sabotaging the machines. The phonographs themselves were occasionally temperamental and the conveniences common to later cylinder dictating machines, such as reliable stop-start devices and indexing indicators, had not yet been developed. The Bell-Tainter graphophones were proving notoriously unreliable and were being widely replaced by Edison phonographs.

In view of the poor showing of the phonograph as a dictating machine, many of the local companies began to convert their machines to coin operation, placing them in suitably strategic locations. The machines then in use were designed only for recording the speaking voice and were not well suited to the making of musical records. In addition, there was no means of conveniently duplicating cylinders, so that titles had to be repeated many times to secure any sizable number of copies. The development of machanical (pantographic) duplication techniques was only a partial solution. As early as 1889, Edison had begun work on a method of duplicating unlimited numbers of cylinders from one master record. When he failed to arouse sufficient interest (and financial support) from the officials of the local companies and North American, the introduction of molded records was delayed until 1901. (If suitable molding methods had been perfected earlier, even by the mid-'90's, we might still be using cylinder records and phonographs today. The biggest competitive advantage of the disc record in the earlier years of its commercial history was the ease with which unlimited numbers of copies could be made from a single master record.) In recognition of the developing trend toward use of the phonograph for entertainment purposes, North American began supplying "master" cylinders to the local companies. These could be duplicated locally and the copies placed in the coin phonographs. Many of the local companies also made records themselves. This was fine for the local operators, but North American wasn't making any profit on these local recordings. Many of the local companies, being semi-autonomous, were operating independently of the central company. An effort by North American to cut off supplies to the local operators by restricting the sale of cylinder blanks failed. Presumably many of the local operators either purchased them illegally or they made their own.

It has been stated before that most of the Bell-Tainter graphophones had proven unreliable in service and had been withdrawn in favor of Edison phonographs. In spite of this, Lippincott was being compelled by the American Graphophone Company to buy from them 5,000 machines a year, as had been agreed when North American was organized. What Lippincott was to do with them was a secondary matter. He couldn't have used so many graphophones, even if they had worked, since there were only about 3,000 machines of either type in operation in 1891. This contractual obligation was one of many contributing factors to Lippincott's bankruptcy and death in 1892. Edison, as a chief creditor of North American, eventually became president of the company. He tried to achieve a settlement of affairs with the local companies by repurchasing phonograph and equipment sales rights from them for a percentage of their sales to date. This effort to centralize the operations of the sprawling corporation failed when the local companies could not agree to any terms. The American Graphophone Company was the chief instigator of the opposition and litigation brought by them was to plague Edison for years. As a last resort, Edison was forced eventually to declare the North American Phonograph Company bankrupt; at the subsequent bankruptcy sale, he was sole bidder on the combined assets of the Edison Phonograph Co. and what remained of North American. He was able thereby to regain control of many of his valuable patents, which he had assigned to North American. (On this subject, it is worth noting that as of 1895, Edison had applied personally for 81 patents on the phonograph; the Bell brothers, Charles S. Tainter and Thomas Hood MacDonald had secured a total of ten on the graphophones. Moreover, the Graphophone Co. had pirated certain features of the Edison phonograph: the tapered mandrel, the solid wax cylinder, and the improved sapphire recording stylus. Ethical considerations aside, this did result in a standardization of the records produced by the two companies which simplifies matters considerably for the collector of early cylinder records. The patent scorecard

*The tapered roller on the phonograph that holds the record.

is cited to show who did the most research and development work on the phonograph.)

After the break-up of the North American combine, the Graphophone Co. and a semi-autonomous local company, the Columbia Phonograph Company, combined to form the American Graphophone Company, lineal descendant of today's Columbia Phonograph Company. The Edison Phonograph Co. was likewise reorganized into the National Phonograph Company, still later renamed Thos. A. Edison, Inc. (The Edison Company still survives as a division of McGraw-Edison and part of the old Edison Factory in West Orange, N.J., has been taken over by the National Park Service as the Thomas A. Edison Laboratory National Monument).

Both companies proceeded to produce phonographs and records for the home market, which was to prove to be most profitable. Both also made and sold cylinder dictating equipment for years, but as a sideline. Columbia got a head start on the home phonograph business since Edison was plagued by financial difficulties but, when these were finally overcome, the two companies became brisk competitors.

The record business was hampered severely by the lack of a suitable method of mass production of cylinders from a single master. It was necessary to resort to various dubbing methods, mechanical and acoustic, to produce even a moderate number of copies from one recording session. It was possible, generally speaking, to make no more than four or five "master" cylinders at one time. This was accomplished by placing recording machines around the performers and directing their horns toward them. Each "master" record thus made could produce an average of 25 copies, after which its quality deteriorated so much that it could no longer produce good duplicates. Obviously, it was still necessary for the artist to repeat his performance many times to make it possible to produce a substantial number of commercial copies.

Edison had discovered in the early 1890's that he could make records of better quality as he increased the velocity of the recording surface under the recording stylus. This made it easier, as has been stated, to record the higher frequencies. It was possible to increase surface velocity in two ways: increase the rotational speed of the record or increase its diameter leaving rotational speed unchanged. The first solution was not very practical as it would have further curtailed the already short running time of the record, which was about two minutes. The second was the better expedient, and Edison adopted it for use with the existing duplication process. The "master" cylinder was five inches in diameter. These large cylinders could more successfully be used for the making of duplicates in the standard two-inch diameter because their better quality offset the loss in response that was inevitably encountered in dubbing. The use of specially shaped recording and playback styli also helped to improve higher frequency response.

Late in 1898, American Graphophone Co. (Columbia) began selling cylinders commercially in the 5-inch size. The "Graphophone Grand" and the "Grand" records were trumpeted as "the greatest achievement of the art", offering the most natural reproduction, and loudness with clarity. Edison was compelled, as a matter of business, to issue large cylinders and machines, too. Loud and relatively clear they were, but their size, cost and fragility didn't endear them to phonograph buyers. Storage of large numbers of cylinders of any size is an awkward proposition at best, as this writer has learned to his grief. The large cylinders accentuated the storage problem greatly and served largely to point up, by contrast, the relative ease of storage of the 7-inch, relatively unbreakable disc records that Emile Berliner was beginning to put on the market. Eventually, production of the large cylinders was discontinued for lack of demand, although Edison continued to supply them on special order until at least 1907.

The large phonographs, though not popular with private collectors, were used extensively by the producers of "phonograph concerts", since their loudness was a distinct advantage in large halls. Incredible as it seems, people used to pay admission to such "phonographic entertainments", just to listen to records! (A "phonographic entertainment" poster, exact age unknown, is reproduced elsewhere in this booklet.)

As the demand for cylinders increased, it became more and more difficult to meet it with pantographically duplicated copies. Both companies were busily seeking a practicable method of molding cylinders from a single master. Edison had begun investigations into such a process as early as 1889, but had been unable to push them vigorously for lack of money.

The search for an improved duplication method had led on one hand to an effort to develop a master cylinder whose surface would be soft when recorded, but could then be hardened and used extensively for duplication with a minimum of wear. None of the attempts made in this direction proved to be workable. One French experimenter, M. Lioret, had tried to use celluloid softened in hot water as a recording medium. When this proved impractical, he reversed his field, so to speak, and tried molding celluloid records by softening a cylindrical blank, inserting it in a mold, and pressing it against the electroplate. After a suitable length of time, the mold was cooled in water and the celluloid cylinder, having had the signal waveforms pressed into it, shrank sufficiently upon cooling to be withdrawn. The celluloid cylinder was unbreakable in normal use and wore well, even under heavy stylus pressures. Since heavy stylus pressures were required to extract a loud signal from the record, the use of celluloid permitted loud reproduction with minimum distortion. The combined virtues of extra loudness and durability would have given the cylinder a large competitive edge over the fast-rising disc.

WHatever the material used for cylinders, it was obvious that electroplated master molds would have to be used. Edison had developed two ways of making electroplated molds from a wax master. To electroplate the wax master, it was necessary to apply some sort of electrically conductive surface to it. Edison's two methods involved the use of gold leaf, electrostatically deposited, or a coat of finely powdered graphite dusted on the wax. He favored the former process and used it for several years; hence the trade name "Gold Moulded" seen on so many Edison cylinder containers.

In his first experiments with molded cylinders in 1889, Edison had tried first to use wax, but ran into difficulties. The trouble was that the wax had to shrink upon cooling to be withdrawn from the mold. Further compounding this difficulty was the fact that the grooves on the early cylinders were incised more deeply than those on the later records. Segmented molds had proven unworkable, since the finished records inevitably had seams on them which detracted from reproduction quality. He chose celluloid as a better material for molded records and began to work on perfecting the technique of molding celluloid cylinders. As early as 1888, Edison had filed a "caveat" with the Patent Office, in which he declared his intention of inventing a method of moulding celluloid records. (A "caveat" was a formal declaration of intention to invent, which is now obsolete.) It took nearly ten years to get the "bugs" out of the process and a patent application was filed on March 5, 1898.

On August 14, 1899, Thomas B. Lambert, a Chicago inventor, filed a patent application in which he described a process of producing celluloid cylinders from a copper mold which was made by electroplating a graphite-dusted master cylinder. Any similarity between this process and Edison's was obvious. Whether Lambert had "pirated" the Edison process, this writer does not wish to guess. Let us give Mr. Lambert the benefit of the doubt and assume that he could easily have been working independently along the same line. "Simultaneous inspiration", while unusual, is not impossible. Lambert's patent was granted on December 18, 1900, by which time the Lambert Company had been organized and was already selling its molded celluloid cylinders. Many of the early Lambert cylinders were made of pink celluloid -- perhaps for milady's boudoir phonograph. Lambert also made molded cylinders in the 5-inch "Concert" size, the only record maker to do so. Lambert cylinders of either size are quite rare. In sound quality, they seem to be somewhat inferior to contemporary Edison molded cylinders.

Why the patent examiners passed on Lambert's later application instead of Edison's earlier one is still a mystery. By so doing, they effectively deprived Edison of the right to use celluloid as a record material. He was forced to turn to a less durable wax compound. Since this restricted the available sound volume from a cylinder phonograph, and since the records wore less well, the cylinder lost by default a potential competitive edge over the louder, less fragile disc record. It is easy to prove that Edison's molded cylinders offered a quality of sound and a freedom from surface noise that the disc of that time could not possibly match. Regrettably, the cylinder's technical superiority failed to guarantee its survival in the market place. The sad case of the Stanley Steamer comes to mind, too....

The lateral disc record was not invented by Emile Berliner, though he was the first to produce them commercially. The Scott phonautograph of 1857, though incapable of reproducing sound, recorded it in the form of laterally moving undulations on both cylinders and discs of lamp-blacked paper. Edison had experimented with disc records and described a disc recording device in his British phonograph patent of 1878. The Bell Brothers and Charles S. Tainter had experimented with a constant velocity, vertically cut disc record, as previously described. Early in the summer of 1877, Charles Cros, a French amateur scientist and writer, had described a process of recording sound laterally on a master disc made of lamp-blacked glass. Reproduction of commercial copies was to be accomplished by photoengraving.

Berliner, a German-born immigrant, did experimental work in accoustics and physics as a sideline to his regular job, that of clerk in a dry-goods store. His first major invention in 1877 was a telephone transmitter, the rights to which he sold to the Bell Telephone Company. Bell bought them eagerly, as they needed badly a transmitter that would be as reliable as the Edison carbon-button transmitter, which had been bought by Western Union. Actually, Berliner's transmitter patent was eventually denied on the ground that it was similar to Edison's earlier design. To compound the irony, even Berliner himself admitted in later years that his transmitter never worked properly. Since possession of the Berliner patents was more of legal than technical advantage to the Bell Telephone Company, its operability was not crucially important.

Berliner was engaged by Bell Telephone for some years on a retainer basis and it was the money from Bell that enabled Berliner to carry on his experiments in disc recording, which he began about 1885. It took him several years to perfect his recording and duplicating processes. The method of recording on lamp-blacked glass, which he had borrowed, perhaps unwittingly, from Cros, had proven relatively impractical, and Berliner evolved a variant of his own. He recorded on a master blank made of zinc which was thinly coated with a soft, wax-like substance. The recording stylus removed the wax from the blank, exposing bare metal. When the recording was finished, the zinc blank was dipped in an acid bath for about 15 minutes. The acid ate away the metal exposed by the stylus, reproducing and deepening the undulations and the groove spiral. The zinc master itself could be played back as a recording, or used as a master from which stamping electroplates were made.

Commercial records were made at first from vulcanite, or hard rubber. Later, a shellac compound was adopted, whose basis formula was retained with little change for years until vinyl plastic superseded it.

His playback machine, dubbed the "gramophone", was a hand-propelled turntable, with a reproducer coupled directly to a short horn,

which was pivoted toward its large end. He applied for his patent in 1887.

As a musical instrument, the gramophone left much to be desired. The acid etching process by which grooves were made in the master blank had a major weakness in that the acid ate sideways as well as downward into the zinc. Because of this, and because of occasional impurities in the metal, the groove walls were jagged and rough, creating noise and distortion and playback. Furthermore, it was very difficult to keep the turntable revolving at a constant speed with a hand crank, and the pitch of a sustained note might fluctuate widely. Obviously, a more practical and better regulated form of motive power was needed. Electric motors were used on a few models, but a suitable spring-powered motor was needed. Fred Gaisberg, a recording technician and accompanist who had formerly worked for the Volta Graphophone Company, had been hired by Berliner and got the job of finding or developing a suitable spring motor. His search led to a Philadelphia inventor who had devised a spring motor for use on sewing machines. He said that he could adapt his motor for use with the gramophone. The Philadelphian submitted his specifications to Eldridge R. Johnson, of Camden, New Jersey, operator of a machine shop which made devices on order for inventors who lacked the facilities of a machine shop themselves. The motor design submitted by the Philadelphia inventor didn't work well, but the gramophone attracted Johnson's attention and held it fast. He designed a workable motor himself and submitted it to the directors of the Berliner Gramophone Company. They found it satisfactory and Johnson was given a contract to make gramophones for them. Frank Seaman, a New York promotion and advertising man, was given change of national advertising and sales and by 1897 the gramophone began to make itself felt in competition to the cylinder.

The inadequacies of the acid etching process led Berliner to adopt the use of wax masters blanks in the spring of 1898, after experiments had been carried on for some time. The change to wax was not publicized, since Berliner didn't wish to run afoul of American Graphophone Co. and the Bell-Tainter patents.

The rising sales of gramophones and discs records led the American Graphophone directors to attempt to get into the disc business themselves. They got their key, after a series of relatively fruitless legal skirmishes, in a patent issued on December 10, 1901, to Joseph W. Jones, a young man who had worked briefly for Berliner in the late 1890's. While there, he had seen experimental work being carried on in recording disc masters on wax. Berliner's reluctance to patent this process has already been explained, but young Jones, apparently theorizing that he had nothing to lose, wrote out a patent specification describing a lateral disc recording cut into a wax master blank. He submitted the application in November of 1897. Almost immediately after his patent was granted, American Graphophone Company representatives bought the rights from him for $25,000 and engaged him as a recording technician. The Jones patent was actually nothing more than a re-wording of Berliner's earlier gramophone patent and contained nothing new except to specify the use of incising as a method of recording the master. Berliner's original processes had not incised, in the sense that they removed metallic base material from the blank. Berliner and American Graphophone eventually agreed to pool their patents, permitting both companies to continue in the disc record business. Eldridge Johnson, who had formed a disc record and gramophone enterprise of his own which eventually became the Victor Talking Machine Company, ultimately persuaded Berliner to merge with him, and the two disc enterprises, Victor and Columbia, had a virtual monopoly on the disc record business for many years.

The major technical improvements to the disc phonograph in the early 1900's were the conceptions of Eldridge Johnson. His first major improvement was the tapered tone arm. The first disc phonographs were built with the horn coupled directly to the reproducer, and the reproducer arm bore the weight of the entire assembly. As the size of the horn increased, so did the inertial mass of the arm and with it record wear. The best transfer of sound from a vibrating diaphragm to the air is accomplished through a horn of constantly increasing diameter. Edison had designed many such horns, whose dimensions were very similar to those of many "exponential" horns used in modern public address speakers. By designing a light swiveling tone arm whose diameter increased along its length and a relatively airtight but flexible coupling between the arm and the horn, Johnson was able to reduce drastically the inertial mass of the arm assembly, as well as stylus pressure on the record, without sacrificing the quality of sound reproduction.

Johnson's next improvement was the invention of the internal horn phonograph, known as the "Victrola". The external horn phonograph was inevitably an awkward-looking thing, and as the designers increased the size of the horns, their esthetic appeal was further reduced. The pressence of the huge horns made it almost impossible to design a suitable lid to cover the mechanism when it was not in use, so the phonograph became a major dust-catcher. Furthermore, few machines were designed with record storage space built into their cabinets and phonograph buyers had to turn to other sources for record cabinets. Johnson combined an internal horn and built-in record storage space into the cabinet of his first upright "Victrola", introduced in 1906. The internal horn design necessitated the sacrifice of the functionally important flaring bell so common to all external phonograph horns, but the slight impairment of reproduction was readily accepted in exchange for the more attractive and cabinet design.

Few, if any, important innovations in phonographs and records were introduced between 1906 and 1925. Columbia did try a brief flirtation with unbreakable disc records in 1907. The "Marconi" record, supposedly invented for them by the "Father of Wireless" who had been engaged as a "consulting physicist", was a good idea that was too much ahead of its time. The heavy reproducers of the day were not kind to them, and Columbia soon reverted to the use of shellac. A British firm, Neophone, made unbreakable vertical disc records in 1904, but went out of business within a few years. Neophone also made the first long-play record, a 20-inch monster that must have played nearly ten minutes per side.

Disc records were beginning to make decided inroads on cylinders, especially in the matter of playing time. The ten-inch record offered almost three minutes of playing time, and the twelve-inch record offered four minutes. The cylinder could give no more than two. This was not too little for popular selections, but it wasn't enough for operatic and classical selections. Edison issued a few operatic recordings on two-minute cylinders, but they never sold very extensively.

Columbia's solution to the playing time problem was the introduction in 1907 of their "Twentieth Century" records and graphophones. The "Twentieth Century" record was a standard diameter cylinder, grooved at 100 threads per inch. To add an extra minute of playing time, its length was increased from four to six inches. This was about the same size as a dictating machine cylinder. It played for three minutes. Dictating machine cylinders used somewhat finer grooves and recorded at slower speeds, so they could run longer. Because of their extra length, they could not be played on older model phonographs, and few people bothered to buy the new machines.

Edison tackled the problem from another angle. He made the grooves twice as fine (200 per inch instead of 100), thereby doubling playing time. He retained the standard length of four inches and the standard speed of 160 rpm, adopted in 1901 with the molding process. To permit the owners of older phonographs to play the new four-minute "Amberol" records, conversion kits were offered for sale at a nominal cost. The price of the conversion kit included an assortment of ten Amberol records, which gave the collector a good start on a library of four-minute records. Unfortunately, the wax Amberol records didn't wear as well as the two-minute records. The reason was that the stylus pressure was concentrated on a smaller unit area of the record groove. The Amberols were well recorded, but the lack of durability was a marked disadvantage. If Edison had been able to make them of celluloid, he would have had far better luck. When he was able finally to buy up the rights to the celluloid process from a British firm in 1912, the trend away from cylinders toward discs had gone beyond reversing. 1912 marked three changes at Thomas A. Edison, Inc.: the manufacture of two-minute cylinders was discontinued entirely; the four-minute cylinders were made of celluloid (the familiar "Blue Amberol"); and the Edison Diamond Disc phonographs and records were introduced.

The Diamond Disc record was vertically recorded like the cylinders. Because its grooves were somewhat finer than those of a lateral record, it was possible to get four minutes of music on one side of a ten-inch disc. Edison never sold twelve-inch records commercially until he introduced his ill-fated LP records in 1926, though a few twelve-inchers were made for dealers' use. At about the time the Diamond Discs were introduced, Edison had discovered that the frequency range of his vertical cutterheads could be substantially increased by the use of a viscous damping fluid around the edges of the diaphragm. The results of this discovery were apparent in the excellent sound of all discs and cylinders issued from that time on. The excellence of the Diamond Disc, especially in recording vocal and instrumental solos, was emphasized by the Edison Tone Tests. These were demonstrations, held at various places throughout the country. Various Edison artists made personal appearances, and sang side by side with an Edison phonograph. On repeated occasions, unbiased observers and music critics testified that they could detect no difference between the live artist's performance and his (or her) recordings. No other record maker submitted his products for a similar critical comparison, which was just as well. Even today, Edison records, played on modern equipment, reveal consistently excellent sound. High as the fidelity of Edison's records was, however, they could not always be heard to best advantage on the Edison phonographs, especially the cylinder phonographs. Almost all Edison reproducers were designed with a flexible linkage between the stylus and diaphragm. This was necessary to permit free lateral and vertical movement of the stylus, to accommodate irregularities in the record surface. Unfortunately, this flexible linkage often generated buzzes, rattles and distortion which detracted greatly from the quality of reproduction. The earlier distortion which detracted greatly from the quality of reproduction. The earlier cylinder reproducers were the worst offenders in this respect. The later Amberol and Diamond Disc reproducers still used the flexible linkage, but the stylus pressure was greatly increased by a heavy weight that kept the linkage under tension. This served to minimize, but failed completely to eliminate, the offending distortion. The obvious solution to the problem would have been a reproducer in which the stylus was coupled directly to the diaphragm, eliminating the linkage. Columbia designed such a cylinder reproducer that performed quite well. The weakness of most cylinder reproducers in this respect was a major factor in this writer's decision to design an all-electric, distortion-free reproducer for cylinders.

The first known experiment with electric recording took place in England in 1919. Two inventors named Guest and Merriman recorded portions of a memorial service in Westminster Abbey. The recordings thus made were not issued commercially, but their work inspired H.M.V. and Columbia in England to begin investigations into the feasibility of all-electric recording. Neither company pressed the issue very hard, though; they didn't think it necessary.

In America, almost nobody paid any attention to the British experiments. For many years, the number of people who had heard live orchestras and singers were a comparative minority. Lacking a standard for comparison, most people accepted the accoustic phonograph and records unquestioningly -- that is, until

radio came along. The first radio sets rarely had enough power to drive more than a pair of headphones. By the early 1920's, their capabilities had been improved to the point where they could provide reasonably adequate sound from primitive loudspeakers, most of which resembled high-powered earphone units either coupled to a large horn or directly driving a large paper diaphragm. Some earphone-type speaker units were even sold that could be used with the internal horn of any phonograph when substituted for the soundbox. (Later models of phonographs were made with storage compartments for radio chassis, and the radio speaker unit was attached to the horn internally.) More and more, people who heard the improved radios began to draw unfavorable comparisons between them and their phonographs. Phonograph and record sales declined sharply as a result. The phonograph officials, who had grown rich, unimaginative and complacent, were jolted sharply awake, but they didn't know how to reverse the tide. Few, if any, had investigated the rising science of electronics. Many refused even to won a radio and Walter Clark, who joined Victor as an executive in 1924, even states that he was requested not to mention radio in the high shrines at Camden.

The technical innovation that saved the record business came from outside the industry. In 1919, a research group at Bell Telephone Laboratories, headed by Joseph P. Maxfield and Henry C. Harrison, began experimenting with recording by means of a condenser microphone sound pickup, vacuum-tube audio amplifier and electro-magnetic cutting head. Earlier, various experimenters (including Edison) had tried to use modified telephone equipment to record sound on cylinder and disc masters. The lack of adequate amplification and the restricted audio range of the telephone gear (which is designed to respond only to the relatively narrow range of human speech) combined to make the processes unworkable. By 1924, the Bell equipment was sufficiently perfected to be offered to the record makers.

By the spring of 1925, both Victor and Columbia had converted to the new electrical process. Victor's first electric issue (and first on the market) was 19626: "'Joan of Arkansas' Medley/ Buenos Aires" -- International Novelty Orchestra, with vocal on the medley by the Mask & Wig Glee Chorus from the University of Pennsylvania. Columbia's was 50013-D, a twelve-inch recording of "John Peel" and "Adeste Fideles" by the Associated Glee Clubs of America, recorded during a concert at the Metropolitan Opera House in New York on March 31, 1925. (This Glee Clubs' concert furnished both companies with other recordings which were issued later. "John Peel" was issued by Victor on 19961; both versions seem identical, and must have been recorded at the same time.)

The frequency range of recordings had been appreciably increased by the switchover. The old acoustic process had been able to go little lower than 200 cycles per second and no higher than 3,000. (While no data are available, Edison's vertical discs may have exceeded somewhat the foregoing figures, which apply only to lateral acoustic recording.) The range of the new electric recordings began around 100 cps and cut off slightly above 5,000. The improved bass and treble response, while it may not seem numerically greater, made a substantial difference in the sound of records.

In addition to the improved sound offered by electric recording, the process of making records was made considerably easier. Previously, it had been impossible to record a large orchestra with the players seated in their normal positions. The musicians had to crowd so closely around a recording horn as possible in order for their instruments to be picked up. It was frequently necessary to alter instrumentation to permit recording of certain parts of a score. For example, woodwinds had sometimes to replace the lower-toned strings, such as basses and 'cellos. The cramped conditions necessitated by the relative insensitivity of acoustic recording gear were apt occasionally to be risky. Joe Batten, an English recording director, relates the accident that befell Peter Dawson, a popular vocalist of many years ago, when he was making a "descriptive" record entitled "Departure of a Troopship". The script called at one point for the sound of distant thunder, to be simulated by the blows of a hammer on a piece of sheet iron. At the proper time, the sound effects man directed a lusty whack at the sheet iron, but missed it and scored a TKO on Dawson!

To play the new electric recordings, Victor and Columbia both offered improved acoustic phonographs which had been designed by the Western Electric technicians. Their chief feature was exponential horn, specially folded in on itself to fit conveniently into an average size phonograph cabinet. (If it had not been so folded, it would have been about 9 feet long.) The soundbox had been redesigned to work most effectively with the new horns. It seems that a certain amount of "planned obsolescence" a la Detroit was involved, since the characteristics of the new phonographs were such that the old acoustic records did not sound their best on them. Conversely, the new electric recordings didn't play very well on the old machines. Acoustic reproduction was chosen as the cheapest method. It was possible to build all-electric phonographs, and indeed such machines were not long in appearing on the market, often as radio-phonograph combinations. However, these were always quite expensive and offered few advantages, insofar as reduced record wear and fidelity were concerned. They did allow virtually unlimited volume and plenty of bass response, but little else. Record wear due to the grinding action of steel needles, high stylus pressure and excessive machanical rigidity of the reproducer was a bugaboo that was never completely conquered until the introduction of lighter tone arms and permanent styli in the 1940's. Stylus pressure and record wear have gone down with especial rapidity in recent years, vastly increasing longevity of records.

Oddly enough, the last record maker to convert to the new process was Thomas A. Edison, Inc. Edison was convinced that his acoustic process was as good as the new electric process, so far as treble response went. It must indeed be admitted that his vertical "Diamond Disc" records were far and away the best acoustic discs on the market in sound quality. Even so, their relatively poor bass response deprived the music of its "body". Edison's first attempt in 1926 to combat the competitive inroads of electric recording was to offer a long-playing record. This was a fine-grooved record (450 grooves per inch, compared with about 250 for LP of today.) 12 inches in diameter, recorded at 80 rpm, the same speed as that used for the Diamond Disc. Playing time averaged 20 minutes per side. Regrettably, the records failed to wear well, since the fine grooves couldn't stand up under the heavy stylus pressure typical of Edison's phonograph reproducers. They were less loud, too, than the Diamond Discs, and buyers were beginning to look for louder, not softer, reproduction. Finally, all of the Edison LP's were recorded acoustically, and many were album sets made by dubbing existing Diamond Discs to the LP master, in a manner similar to that used to dub Diamond Discs to cylinders. No recordings of longer symphonic works were recorded or issued. In a short time, the Edison LP record was withdrawn from the market. By late 1927, Edison had finally converted to electric recording, and was offering radios and electric phonographs, the latter equipped with a specially designed reproducer that could play standard lateral records and Edison Diamond Discs. Edison's electric Diamond Discs offered excellent sound which stands up well even today. In 1929, Edison also began issuing lateral records, but the company withdrew completely from the record and phonograph business at the end of that year. Regrettable though this move was, it helped greatly to keep Thomas A. Edison, Inc., from going under in the depression. Thus the last of the original phonograph pioneers who was still active had to leave the business.

The 1929 depression nearly ruined the phonograph and record industry. Victor, which had become a division of Radio Corporation of America in 1928, was about the only company to survive the worst of the depression years without too many adverse effects. Columbia, which had been in shaky financial condition since 1923, wound up eventually as a part of the American Record Corporation, makers of inexpensive records for sale in department stores. American, itself, was formed by the amalgamation of several independent companies. It was at such an inauspicious time as this that Victor introduced its Long Play records in 1931. They were cut at 33 1/3 rpm, like the LP's of today, issued in 10 - and 12-inch sizes, and some pressed in plastic. In fact, the only way in which they differed from the present-day LP was that the grooves were less fine. The timing of their introduction was unfortunate, and Victor unaccountably failed to market a good quality, inexpensive turntable that could be used with an existing radio or radio-phonograph to play the new records. To play them, one had to buy a new phonograph. Heavy magnetic pickups were still in use, and they wore the records excessively. Some of the Victor LP's were pressed in standard shellac and, while they may have worn better, they were very noisy. The Victor LP could have been improved, but the incentive to do so was lacking, and further issues of the records were soon discontinued. Radio was the prime source of entertainment in America for some time.

By 1934, the record and phonograph business, which had been just barely contriving to exist, began to show signs of greater liveliness, as the country began to pull out of the worst psychological and financial depths of the depression. Inexpensive phonograph turntables that could be connected to any radio were offered for sale. Early models used magnetic pickups. Later models used piezoelectric crystal cartridges, which were just beginning to come into use. They permitted lighter stylus pressures, and their greater compliance reduced record wear considerably. 1934 was also the year in which Jack Kapp, with extensive financial backing from England, founded the Decca Record Company, and offered, for the first time, records by topflight artists at the moderate price of 35 cents. Except for the "departmentstore" labels, most 10-inch popular records sold for 75 cents, which was a lot of money in those days. (12-inch classical records still cost $2.00 each, Columbia, which had been purchased by CBS Radio in 1938, dropped the price of these to $1.00 each in August of 1940, forcing Victor to do likewise. Much credit for the revival of interest in the phonograph record must go to the jukebox, various forms of which had been around since the 1880's. The coin-operated phonograph was never a great success until the late 1920's, when electric amplification and improved selector mechanisms were developed for it.

Wartime shortages of shellac put a crimp in the record business, and James C. Petrillo's ban, which lasted over a year, made the situation harder. The record makers combed their vaults for previously unissued material, but were, of course, unable to record the newest songs that were heard on radio and in movies.

Petrillo's ban failed to make any great dent in the use of recorded music on radio and in restaurants or dance halls, but it did force the record makers to contribute toward a union relief fund for unemployed musicians.

Toward the end of the war, it was discovered that the Germans had achieved some great advances in the art of recording on magnetic tape. Magnetic recording had been around for some time -- since 1899 -- when a Danish engineer named Vladimir Poulsen invented the Telegraphone, various models of which recorded on steel wire, ribbon or a ridged steel plate which looked like a record stamper. Since no electronic amplification was available for use with the machine, it could only be heard (and rather faintly at that) on earphones. Then, too, its fidelity was no greater than that of a carbon-button telephone transmitter, which was used as a microphone. The Telegraphone was designed and used primarily as a business dictating machine, where its long continuous playing time was an advantage. Even so, the Telegraphone failed to hold its own against improved cylinder dictating machines. During the 1920's, German engineers began to experiment further with magnetic recording, taking advantages of improved microphones and audio

amplifiers. By the 1940's, wide-range tape recorders operating at 30 ips were in wide use in Europe for delayed broadcasting of special radio programs. (15 ips is now the standard professional speed.) American technicians subsequently improved the tape recorder so that a wider range of frequencies could be recorded at slower tape speeds, and the tape recorder is now a commonplace item in the home and the broadcasting station. Tape staged a highly successful invasion of the recording studio; its biggest advantage was that "fluffs" didn't necessarily mean that a record master was wasted. A perfect master tape could be made, then transferred to the disc master. This feature was especially advantageous in recording long operatic or symphonic works.

The fidelity of disc records had been gradully improved over the years, but their relatively brief playing time was a marked handicap, especially for the classical music fan. He got relief in 1948, when Columbia introduced the long-playing microgroove record. It was similar to the ill-fated Victor LP of 1931 in all respects but one -- it had a much finer groove. This permitted longer playing time and made it easier to inscribe higher frequencies on the record. This was because the physical wave length of a high frequency tone was less apt to approach the width of the groove itself. Columbia offered to license all other record makers to produce LP's. Almost everyone eventually accepted -- everyone, that is, but Victor. They introduced their 7-inch short-play 45 rpm microgroove record a few months later. For some time, during the "Battle of the Speeds", the record business underwent a sharp slump while record buyers waited to see which type of record would triumph. In due course of time, the 33 1/3 and 45 rpm records achieved a sort of coexistence, with the LP being used extensively for classical works and popular albums and the 45 rpm record for single recordings of current pops hits.

The sales of the 78 rpm record began to fall off sharply when 45 rpm became established as the best speed for popular singles, and it is now obsolete, except for occasional children's records. It can be seen now, with the wisdom of hindsight, that the "War of the Speeds" could have been eliminated, and the complexity of turntable and changer design reduced, if the best features of LP and 45 rpm records had been combined. For instance, why couldn't the 1 1/2-inch center hole of the 45 rpm record have been used on all 33 1/3 rpm LP's? If all new recordings had been cut at 33 1/3 rpm, and if all had had the 1 1/2-inch center holes, record changer and turntable design could have been simplified greatly, and the extra speed wouldn't have been needed. It never was, anyway. Columbia made 7-inch 33 1/3 rpm records for popular singles for a time. Oddly enough, though, they didn't sell very widely. Recently, Columbia introduced a line of 7-inch 33 1/3 rpm single sterophonic records. How well these have gone over, I don't know, but few record dealers to whom I've spoken were optimistic about their prospects.

Stereophonic sound is far from new, too. It's actually as old as the human head. Given normal hearing, almost anyone can tell from which side a sound is coming, even if he can't see the source. Stereophonic sound takes advantage of that ability to perceive directionality. The first known example of stereophonic recording and reproduction of sound (or at least a reasonable facsimile of it) was the Columbia Multiplex Graphophone Grand, a huge contraption that was made on special order about 1898 or 1899. It used cylinder records 5 inches in diameter (concert size) which must have been at least ten inches long, since they had three separate recorded tracks on them, each recorded by a separate horn and cutter and reproduced by a separate pickup. The result was a primitive variety of three-track stereo. The Multiplex Grand could play standard Grand and Concert records if one removed two of the three tandem reproducers, and long-playing single-track Grand records were made which played for ten minutes. Because the machine and accessories cost $1,000, it is very doubtful whether many of them were sold. A Multiplex Graphophone Grand and a new Rolls-Royce would now be approximately an even trade.

The next known attempt at recording sound from two separate pickups into a single record groove occurred about 1931, when an English experimenter, A. D. Blumlein, developed and patented a special recording head which was able simultaneously to cut a lateral and vertical signal into one groove of a 78 rpm record. The lateral and vertical cuts were used for the two sound channels. Naturally, a special reproducer was needed for playback.

In the late 1940's and early '50's, Arnold Sugden, an English engineer, made experimental stereophonic LP's, using the Blumlein lateral-vertical process.

The stereo disc recording process now accepted as standard is the 45/45 system, developed by English Decca and Westrex in the U.S. It is similar to the Blumlein lateral/vertical method, except that both channels are cut in a combined lateral and vertical motion. Audio information is cut into the sidewalls of the record groove in such a way that Stylus motion for either sound channel is at an angle of 45° with respect to horizontal (record surface).

In 1958, a few stereophonic records and a limited amount of reproducing equipment began to appear on the market. The early stereo records were not always the best in sound; some were even poorer than their monophonic counterparts. Improvements have been made in recording and mastering techniques, however, and stereo records now offer quite consistently good quality. Pre-recorded stereophonic tapes in various forms and speeds are also available. Debate continues among hi-fi fans as to whether tape or disc records offer the best stereo sound. Regardless of differences in quality, the disc is still more convenient and cheaper than tape. (Ever try to locate a selection on a reel of tape? Fun, isn't it?)

With all the improvements that have been made in records and phonographs, one fact stands out: Little effort has been made to gather and preserve recordings of historic and musical value. A major contributing factor has been the tendency among people in this country to accept the latest model of anything as the best ever, and to toss last year's model on the scrap heap or into the attic. Discs displaced cylinders, and the voices of many celebrities were all but lost. (Many valuable cylinder and disc matrices were completely destroyed in a fire at Thomas A. Edison, Inc., in 1914. Otherwise, all remaining early masters and all subsequent recordings are still stored in the vaults at West Orange, but have not been reissued extensively.) The advent of the electric recording process displaced many valuable acoustic records by great artists and celebrities in the popular and classical fields. The masters of many companies that went out of business were destroyed with them, and it is said that the master vaults of Columbia and Victor lack many recordings from their early days; metal electroplates were scrapped during the war years when copper was in short supply, and wax master records were lost through breakage and deterioration. When the LP record was introduced, many 78 rpm recordings were dropped from the catalogs because demand was not sufficient to warrant their transfer to LP or 45 rpm records. Today, the life of a popular single record is so brief that, if you find something you like, you have to buy it while it's still on the charts, or you're out of luck. (If you find any current popular records worth preserving for posterity, you've done something unusual.)

There is no such thing in this country as a national archive of recorded sound, where historic recordings may be heard or copies obtained. Private collectors have done much to preserve valuable recordings, but the results of their efforts have never been collected and collated by any central agency. This album is an effort to make some old cylinder recordings of historical and musical interest more widely available for the person who is unable to locate original copies or, for various reasons, doesn't wish to invest in old records and phonographs. If circumstances warrant, more collections of this nature will be forthcoming from time to time. The sound quality of the material contained herein is admittedly not comparable to that which is to be found on newer records, but we feel that their interest far outweighs any technical inadequacies.

If you've read this far, thanks; now enjoy the "phonographic entertainment".

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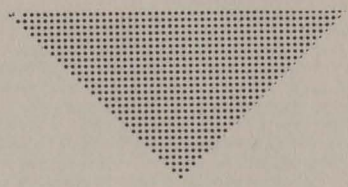

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