Playing Piano

A Learning Manual

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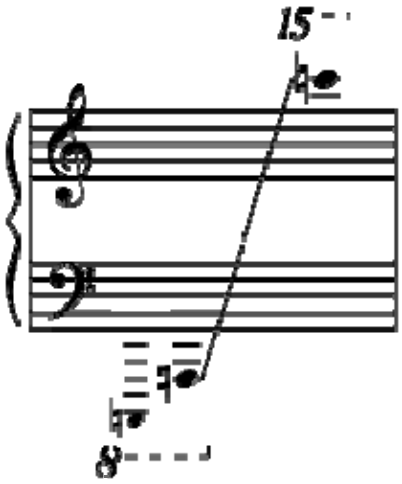
Introduction to Piano

Piano

Steinway grand piano

Keyboard instrument	
Hornbostel-Sachs classification	314.122-4-8 (Simple chordophone with keyboard sounded by hammers)
Inventor(s)	Bartolomeo Cristofori
Developed	Early 18th century
Playing range	



The **piano** is a musical instrument played by means of a keyboard. It is one of the most popular instruments in the world. Widely used in classical music for solo performances, ensemble use, chamber music and accompaniment, the piano is also very popular as an aid to composing and rehearsal. Although not portable and often expensive, the piano's versatility and ubiquity have made it one of the world's most familiar musical instruments.

Pressing a key on the piano's keyboard causes a felt-covered hammer to strike steel strings. The hammers rebound, allowing the strings to continue vibrating at their resonant frequency. These vibrations are transmitted through a bridge to a sounding board that more-efficiently couples the acoustic energy to the air. The sound would otherwise be no louder than that directly produced by the strings. When the key is released, a damper stops the string's vibration.

The word *piano* is a shortened form of the word ***pianoforte***, which derives from the original Italian name for the instrument, *clavicembalo* [or *gravicembalo*] *col piano e forte* (literally *harpsichord capable of playing at the normal level, and more strongly*). The musical terms "piano" and "forte" are usually interpreted as "soft" and "loud", but this is not strictly what they mean in Italian. "Piano" means here a plane or level, suggesting the normal level of playing. "Forte" would mean a stronger, more powerful level of playing, effectively louder than usual. This refers to the instrument's responsiveness to keyboard touch, which allows the pianist to produce notes at different dynamic levels by controlling the inertia with which the hammers hit the strings.

History

Early history

Grand piano by Louis Bas of Villeneuve-lès-Avignon, France, 1781. Earliest French grand piano known to survive; includes an inverted wrestplank and action derived from the work of Bartolomeo Cristofori (ca. 1700) with ornately decorated soundboard.

Early piano replica by the modern builder Paul McNulty, after Walter & Sohn, 1805

The piano is founded on earlier technological innovations. The first string instruments with struck strings were the hammered dulcimers. During the Middle Ages, there were several attempts at creating stringed keyboard instruments with struck strings. By the 17th century, the mechanisms of keyboard instruments such as the clavichord and the harpsichord were well known. In a clavichord the strings are struck by tangents, while in a harpsichord they are plucked by quills. Centuries of work on the mechanism of the harpsichord in particular had shown the most effective ways to construct the case, soundboard, bridge, and keyboard.

The invention of the modern piano is credited to Bartolomeo Cristofori (1655–1731) of Padua, Italy, who was employed by Ferdinando de' Medici, Grand Prince of Tuscany, as

the Keeper of the Instruments. He was an expert harpsichord maker and was well acquainted with the previous body of knowledge on stringed keyboard instruments. It is not known exactly when Cristofori first built a piano. An inventory made by his employers, the Medici family, indicates the existence of a piano by the year 1700; another document of doubtful authenticity indicates a date of 1698. A friend of the family by the name of Sebastian LeBlanc suggested the idea to switch the black and white keys The three Cristofori pianos that survive today date from the 1720s.

While the clavichord allowed expressive control of volume and sustain, it was too quiet for large performances. The harpsichord produced a sufficiently loud sound, but had little expressive control over each note. The piano was likely formed as an attempt to combine loudness with control, avoiding the trade-offs of available instruments.

Cristofori's great success was in solving, without any prior example, the fundamental mechanical problem of piano design: the hammer must strike the string, but not remain in contact with it (as a tangent remains in contact with a clavichord string) because this would dampen the sound. Moreover, the hammer must return to its rest position without bouncing violently, and it must be possible to repeat a note rapidly. Cristofori's piano action served as a model for the many different approaches to piano actions that followed. While Cristofori's early instruments were made with thin strings and were much quieter than the modern piano, compared to the clavichord (the only previous keyboard instrument capable of minutely controlled dynamic nuance through the keyboard) they were considerably louder and had more sustaining power.

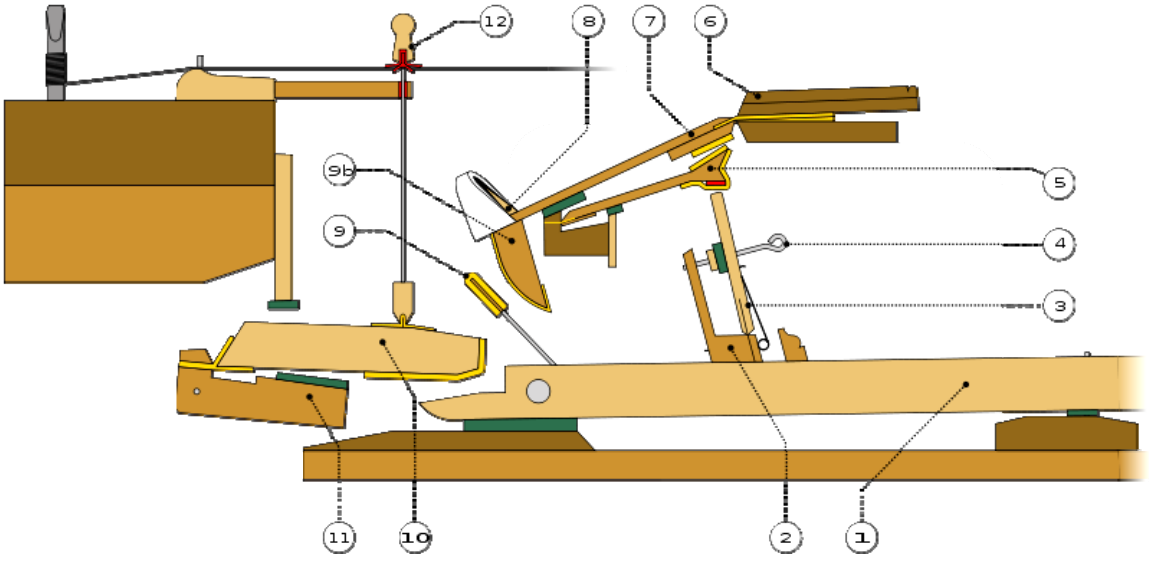
Cristofori's new instrument remained relatively unknown until an Italian writer, Scipione Maffei, wrote an enthusiastic article about it (1711), including a diagram of the mechanism. This article was widely distributed, and most of the next generation of piano builders started their work because of reading it. One of these builders was Gottfried Silbermann, better known as an organ builder. Silbermann's pianos were virtually direct copies of Cristofori's, with one important addition: Silbermann invented the forerunner of the modern damper pedal, which lifts all the dampers from the strings at once.

Silbermann showed Johann Sebastian Bach one of his early instruments in the 1730s, but Bach did not like it at that time, claiming that the higher notes were too soft to allow a full dynamic range. Although this earned him some animosity from Silbermann, the criticism was apparently heeded. Bach did approve of a later instrument he saw in 1747, and even served as an agent in selling Silbermann's pianos.

Piano-making flourished during the late 18th century in the Viennese school, which included Johann Andreas Stein (who worked in Augsburg, Germany) and the Viennese makers Nannette Streicher (daughter of Stein) and Anton Walter. Viennese-style pianos were built with wood frames, two strings per note, and had leather-covered hammers. Some of these Viennese pianos had the opposite coloring of modern-day pianos; the natural keys were black and the accidental keys white. It was for such instruments that Wolfgang Amadeus Mozart composed his concertos and sonatas, and replicas of them are built today for use in authentic-instrument performance of his music. The pianos of

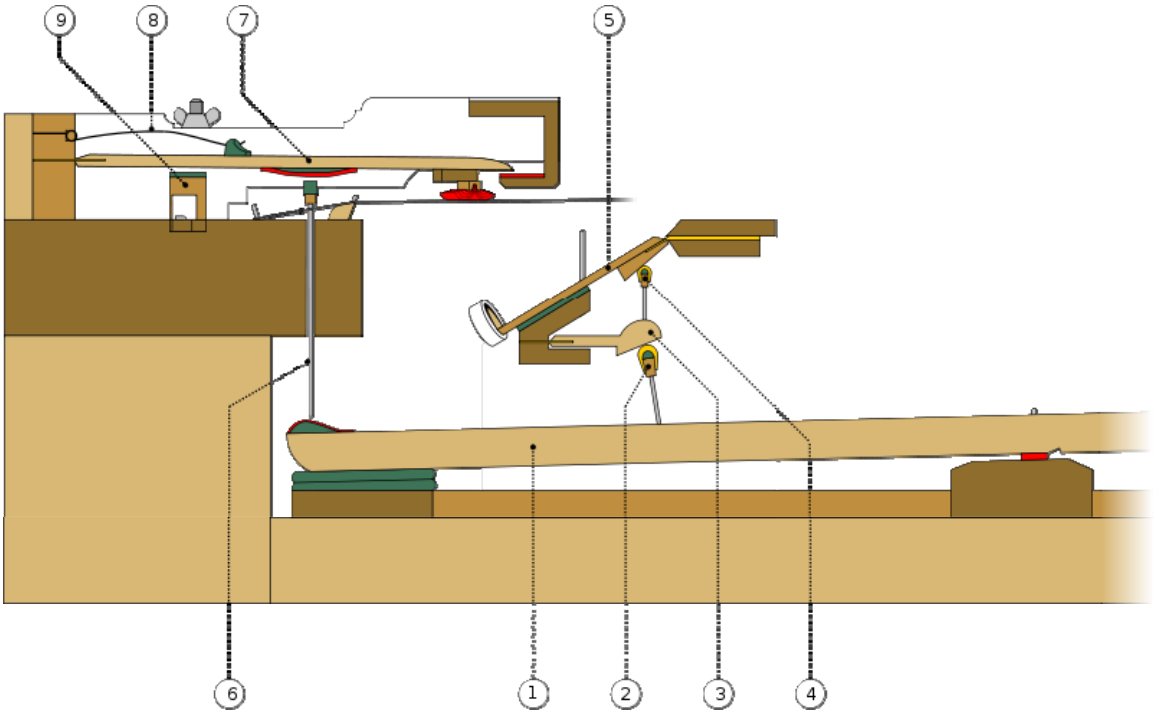
Mozart's day had a softer, more ethereal tone than today's pianos or English pianos, with less sustaining power. The term *fortepiano* is nowadays often used to distinguish the 18th-century instrument from later pianos.

In the period lasting from about 1790 to 1860, the Mozart-era piano underwent tremendous changes that led to the modern form of the instrument. This revolution was in response to a consistent preference by composers and pianists for a more powerful, sustained piano sound, and made possible by the ongoing Industrial Revolution with technological resources such as high-quality steel, called piano wire, for strings, and precision casting for the production of iron frames. Over time, the tonal range of the piano was also increased from the five octaves of Mozart's day to the 7¼ or more octaves found on modern pianos.



Broadwood square action

Early technological progress owed much to the firm of Broadwood. John Broadwood joined with another Scot, Robert Stodart, and a Dutchman, Americus Backers, to design a piano in the harpsichord case—the origin of the "grand". They achieved this in about 1777. They quickly gained a reputation for the splendour and powerful tone of their instruments, with Broadwood constructing ones that were progressively larger, louder, and more robustly constructed. They sent pianos to both Joseph Haydn and Ludwig van Beethoven, and were the first firm to build pianos with a range of more than five octaves: five octaves and a fifth during the 1790s, six octaves by 1810 (Beethoven used the extra notes in his later works), and seven octaves by 1820. The Viennese makers similarly followed these trends, however the two schools used different piano actions: Broadwoods were more robust, Viennese instruments were more sensitive.



Erard square action

By the 1820s, the center of innovation had shifted to Paris, where the Pleyel firm manufactured pianos used by Frédéric Chopin and the Érard firm manufactured those used by Franz Liszt. In 1821, Sébastien Érard invented the double escapement action, which incorporated a *repetition lever* (also called the *balancier*) that permitted a note to be repeated even if the key had not yet risen to its maximum vertical position. This facilitated rapid playing of repeated notes, and this musical device was pioneered by Liszt. When the invention became public, as revised by Henri Herz, the double escapement action gradually became standard in grand pianos, and is still incorporated into all grand pianos currently produced.

Other improvements of the mechanism included the use of felt hammer coverings instead of layered leather. Felt, which was first introduced by Henri Pape in 1826, was a more consistent material, permitting wider dynamic ranges as hammer weights and string tension increased. The sostenuto pedal (see below), invented in 1844 by Jean Louis Boisselot and improved by the Steinway firm in 1874, allowed a wider range of effects.

One of the major technical innovations that helped to create the sound of the modern piano was the use of a strong iron frame. Also called the "plate", the iron frame sits atop the soundboard, and serves as the primary bulwark against the force of string tension. The increased structural integrity of the iron frame allowed the use of thicker, tenser, and more numerous strings. In a modern grand the total string tension can exceed 20 tons. The single piece cast iron frame was patented in 1825 in Boston by Alpheus Babcock, combining the metal hitch pin plate (1821, claimed by Broadwood on behalf of Samuel Hervé) and resisting bars (Thom and Allen, 1820, but also claimed by Broadwood and

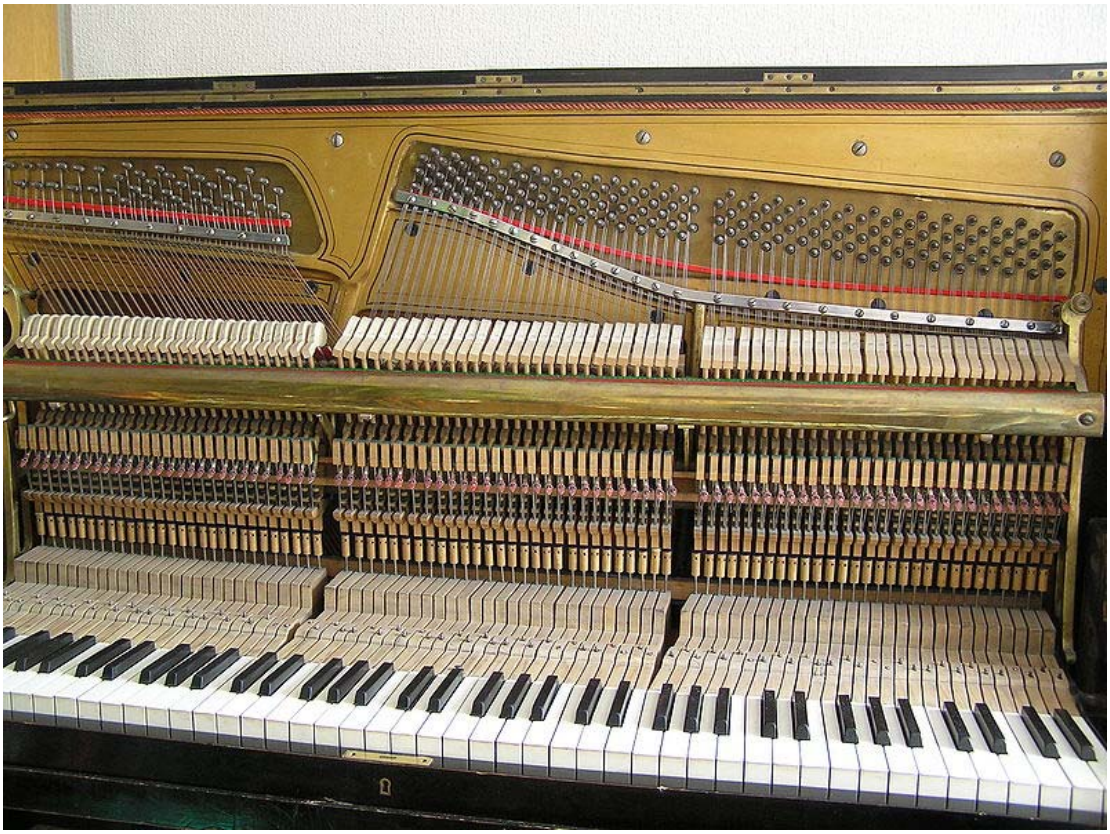
Érard). Babcock later worked for the Chickering & Mackays firm who patented the first full iron frame for grand pianos in 1843. Composite forged metal frames were preferred by many European makers until the American system was fully adopted by the early 20th century.

Other important advances included changes to the way the piano was strung, such as the use of a "choir" of three strings rather than two for all but the lowest notes, and the implementation of an over-strung scale in which the strings are placed in two separate planes, each with its own bridge height. (This is also called "cross-stringing". Whereas earlier instruments' bass strings were a mere continuation of a single string plane, over-stringing placed the bass bridge behind and to the treble side of the tenor bridge area. This *crossed* the strings, with the bass strings in the higher plane.) This permitted a much narrower cabinet at the "nose" end of the piano, and optimized the transition from unwound tenor strings to the iron or copper-wrapped bass strings. Over-stringing was invented by Jean-Henri Pape during the 1820s, and first patented for use in grand pianos in the United States by Henry Steinway, Jr. in 1859.

Duplex scaling of an 1883 Steinway Model 'A'. From lower left to upper right: main sounding length of strings, treble bridge, duplex string length, duplex bar (nickel-plated bar parallel to bridge), hitchpins, plate strut with bearing bolt, plate hole.

Duplex scaling, patented in 1872 by Theodore Steinway, enhanced the voice of each note by using sympathetic vibration. Short lengths of non-speaking wire were bridged by the aliquot throughout much of upper range of the piano, always in locations that caused them to vibrate in conformity with their respective overtones—typically in doubled octaves and twelfths. Somewhat similar systems were developed by Blüthner (Aliquot stringing, 1873), as well as Taskin (1788), and Collard (1821). Each used more distinctly ringing, undamped vibrations to modify tone.

Some early pianos had shapes and designs that are no longer in use. The square piano (not truly square, but rectangular) was cross strung at an extremely acute angle above the hammers, with the keyboard set along the long side. This design is attributed to Gottfried Silbermann or Christian Ernst Friderici on the continent, and Johannes Zumpe or Harman Vietor in England, and it was improved by changes first introduced by Guillaume-Lebrecht Petzold in France and Alpheus Babcock in the United States. Square pianos were built in great numbers through the 1840s in Europe and the 1890s in America, and saw the most visible change of any type of piano: the iron-framed, over-strung squares manufactured by Steinway & Sons were more than two-and-a-half times the size of Zumpe's wood-framed instruments from a century before. Their overwhelming popularity was due to inexpensive construction and price, although their tone and performance were limited by narrow soundboards, simple actions and string spacing that made proper hammer alignment difficult.



The mechanism in upright pianos is perpendicular to the keys

The tall, vertically strung upright grand was arranged like a grand set on end, with the soundboard and bridges above the keys, and tuning pins below them. The term was later revived by many manufacturers for advertising purposes. Giraffe, pyramid and lyre pianos were arranged in a somewhat similar fashion in evocatively shaped cases.

The very tall cabinet piano was introduced about 1805 and was built through the 1840s. It had strings arranged vertically on a continuous frame with bridges extended nearly to the floor, behind the keyboard and very large *sticker action*. The short cottage upright or *pianino* with vertical stringing, made popular by Robert Wornum around 1815, was built into the 20th century. They are informally called *birdcage pianos* because of their prominent damper mechanism. Pianinos were distinguished from the oblique, or diagonally strung upright made popular in France by Roller & Blanchet during the late 1820s. The tiny spinet upright was manufactured from the mid-1930s until recent times. The low position of the hammers required the use of a "drop action" to preserve a reasonable keyboard height.

Modern upright and grand pianos attained their present forms by the end of the 19th century. Improvements have been made in manufacturing processes, and many individual details of the instrument continue to receive attention.

History and musical performance

Much of the most widely admired piano repertoire, for example, that of Haydn, Mozart, and Beethoven, was composed for a type of instrument (the pianoforte) that is rather different from the modern instruments on which this music is normally performed today. Even the music of the Romantics, including Liszt, Chopin, Robert Schumann, Felix Mendelssohn and Johannes Brahms, was written for pianos substantially different from modern pianos.

Modern piano

A schematic depiction of the construction of a pianoforte (Part names are listed in the illustration's file)

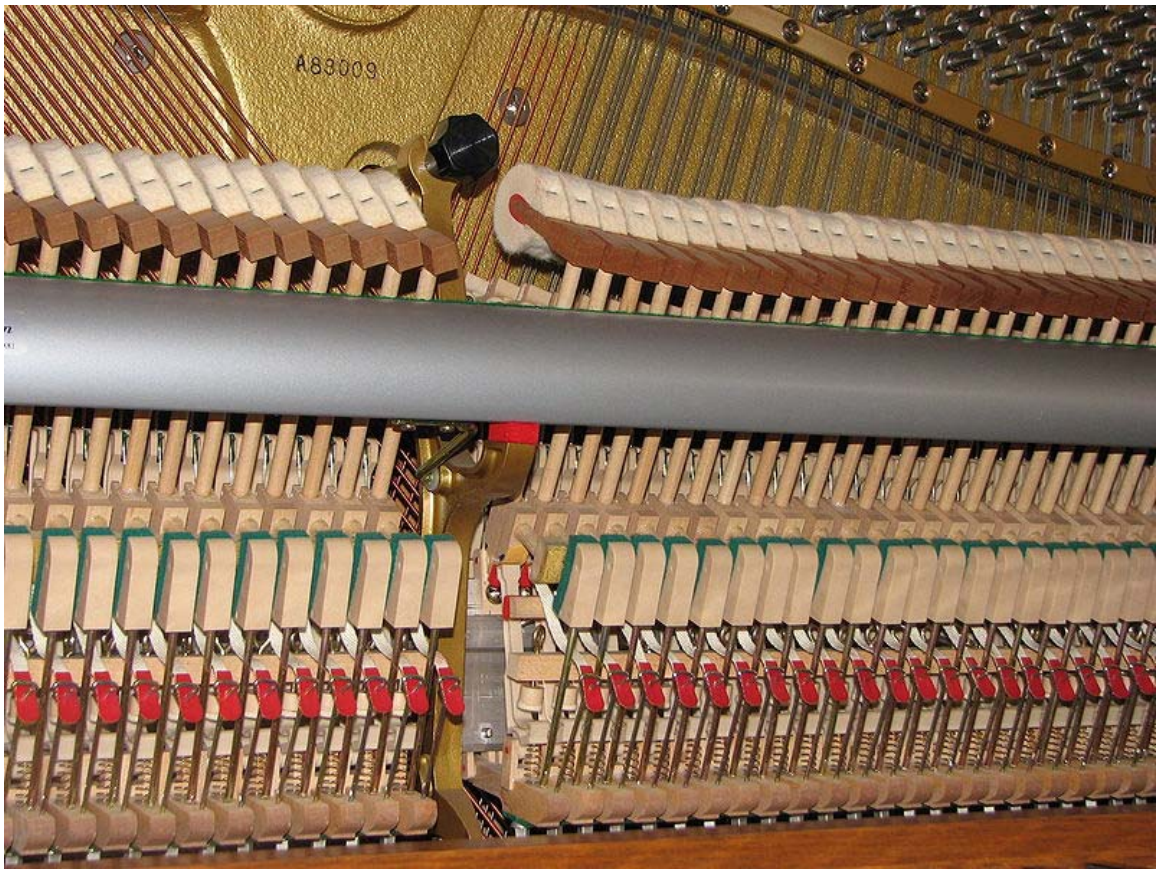
Types

Modern pianos come in two basic configurations (with subcategories): the grand piano and the upright piano.

Grand

Steinway grand piano in the White House

Upright piano by August Förster



Vertical piano action

In grand pianos, the frame and strings are horizontal, with the strings extending away from the keyboard. The action lies beneath the strings, and uses gravity as its means of return to a state of rest.

There are many sizes of grand piano. A rough generalization distinguishes the *concert grand* (between about 2.2 m and 3 m/9.84 feet long) from the *parlor grand* or *boudoir grand* (about 1.7 m to 2.2 m) and the smaller *baby grand* (around 1.5 m).

All else being equal, longer pianos with longer strings have larger, richer sound and lower inharmonicity of the strings. Inharmonicity is the degree to which the frequencies of overtones (known as partials or harmonics) sound sharp relative to whole multiples of the fundamental frequency. This results from the piano's considerable string stiffness; as a struck string decays its harmonics vibrate, not from their termination, but from a point very slightly toward the center (or more flexible part) of the string. The higher the partial, the further sharp it runs. Pianos with shorter and thicker strings, i.e. small pianos with short string scales, have more inharmonicity. The greater the inharmonicity, the more the ear perceives it as harshness of tone.

Inharmonicity requires octaves to be "stretched", or tuned to a lower octave's corresponding sharp overtone rather than to a theoretically correct octave. If octaves were

not stretched, single octaves would sound in tune, but double—and notably triple—octaves would be unacceptably narrow. When a small piano's octaves are stretched to match its inherent inharmonicity level, it creates an imbalance among all the instrument's intervallic relationships, not just its octaves. But in a concert grand, the "stretch" of octaves retains harmonic balance even when aligning treble notes to a harmonic produced from three octaves below. This allows close and widespread octaves to sound pure, and enables perfect fifths (another interval that modern ears expect to be pure) to remain virtually beatless throughout the instrument's compass. This gives the concert grand a brilliant, singing and sustaining tone quality, one of the principal reasons that full-size grands are used in the concert hall, and smaller grands chosen for domestic use where space and cost are considerations.

Upright

Upright pianos, also called vertical pianos, are more compact because the frame and strings are vertical. The hammers move horizontally, and are returned to their resting position by springs, which are prone to wear and tear. Upright pianos with unusually tall frames and long strings are sometimes called *upright grand* pianos. Some authors classify modern pianos according to their height and to modifications of the action that are necessary to accommodate the height.

- *Studio* pianos are around 42 to 45 inches tall. This is the shortest cabinet that can accommodate a full-sized action located above the keyboard.
- *Console* pianos have a compact action (shorter hammers), and are a few inches shorter than studio models.
- The top of a *spinet* model barely rises above the keyboard. The action is located below, operated by vertical wires that are attached to the backs of the keys.
- Anything taller than a studio piano is called an *upright*.

Other types

Steinway player piano

Toy pianos began to be manufactured in the 19th century.

In 1863, Henri Fourneaux invented the player piano, which plays itself from a piano roll without the need for a pianist. A performance is recorded onto rolls of paper with perforations, and the player piano replays the performance using pneumatic devices. Modern equivalents of the player piano include the Bösendorfer CEUS and the Yamaha Disklavier, using solenoids and MIDI rather than pneumatics and rolls.

A silent piano is an acoustic piano having an option to silence the strings by means of an interposing hammer bar. They are designed for private silent practice.

The transposing piano was invented in 1801 by Edward Ryley. It has a lever under the keyboard used to move the keyboard relative to the strings so that a pianist can play in a familiar key while the music sounds in a different key.

The prepared piano, encountered in some contemporary art music, is a piano with objects placed inside it to alter its sound, or that has had its mechanism changed in some other way. The scores for music for prepared piano specify the modifications, for example instructing the pianist to insert pieces of rubber, or paper, or metal screws or washers, in between the strings. These either mute the strings or alter their timbre.

Developed in the 1920s, electric pianos use electromagnetic pickups to amplify the sound of the strings. Playing a note loudly causes the electric signal to clip, and the resultant distortion can be incorporated into the player's expressive range.

Available since the 1980s, digital pianos use digital sampling technology to reproduce the sound of each piano note. Digital pianos can be sophisticated, with features including working pedals, weighted keys, multiple voices, and MIDI interfaces. However, when the damper pedal (see below) is depressed on such an instrument, there are no strings to vibrate sympathetically. Physical models of sympathetic vibration are incorporated into the synthesis software of some higher end digital pianos, such as the Yamaha Clavinova series, or the KAWAI MP8 series.

With the advent of powerful desktop computers, highly realistic pianos have become available as affordable software modules. Some of these modules, such as Synthogy's Ivory released in 2004, use multi-gigabyte piano sample sets with as many as 90 recordings, each lasting many seconds, for each of the 88 (some have 81) keys under different conditions, augmented by additional samples to emulate sympathetic resonance, key release, the drop of the dampers, and simulations of piano techniques like re-pedaling. Some other software modules, such as Modartt's Pianoteq released in 2006, use no samples whatsoever and are a pure synthesis of all aspects of the physicalities that go into the creation of a real piano's sound.

In recent times, piano manufactures have superseded the old fashioned pianola or player piano with new innovative pianos that play themselves via a CD or MP3 Player. Similar in concept to a player piano, the PianoDisc or iQ systems installed in select pianos will 'play themselves' when prompted by a certain file format designed to be interpreted by software installed and connected to the piano. Such additions are quite expensive, often doubling the cost of a piano and are available in both upright and grand pianos.

Keyboard

Keyboard of a Steinway grand piano

Almost every modern piano has 36 black keys and 52 white keys for a total of 88 keys (seven octaves plus a minor third, from A_0 to C_8). Many older pianos only have 85 keys (seven octaves from A_0 to A_7), while some manufacturers extend the range further in one or both directions.

Some Bösendorfer pianos, for example, extend the normal range down to F_0, with one other model going as far as a bottom C_0, making a full eight octave range. These extra keys are sometimes hidden under a small hinged lid that can cover the keys to prevent visual disorientation for pianists unfamiliar with the extra keys. On others, the colors of the extra white keys are reversed (black instead of white).

The extra keys are added primarily for increased resonance from the associated strings; that is, they vibrate sympathetically with other strings whenever the damper pedal is depressed and thus give a fuller tone. Only a very small number of works composed for piano actually use these notes. More recently, the Stuart and Sons company has also manufactured extended-range pianos, with the first 102 key piano. On their instruments, the frequency range extends from C_0 to F_8, which is the widest practical range for the acoustic piano. The extra keys are the same as the other keys in appearance.

Small studio upright acoustical pianos with only 65 keys have been manufactured for use by roving pianists. Known as *gig* pianos and still containing a cast iron harp, these are comparatively lightweight and can be easily transported to and from engagements by only two people. As their harp is longer than that of a spinet or console piano, they have a stronger bass sound that to some pianists is well worth the trade-off in range that a reduced key-set offers.

The toy piano manufacturer Schoenhut started manufacturing both grands and uprights with only 44 or 49 keys, and shorter distance between the keyboard and the pedals. These pianos are true pianos with action and strings. The pianos were introduced to their product line in response to numerous requests in favor of it.

Special editions are keyboards with the 6-plus-6 system e. g. the Jankó keyboard.

Pedals

Standard pedals

Piano pedals from left to right: una corda, sostenuto, and sustain pedal

Pianos have had pedals, or some close equivalent, since the earliest days. (In the 18th century, some pianos used levers pressed upward by the player's knee instead of pedals.) Most grand pianos in the US have three pedals: the soft pedal (una corda), sostenuto, and sustain pedal (from left to right, respectively), while in Europe, the standard is two

pedals: the soft pedal and the sustain pedal. Most modern upright pianos also have three pedals: soft pedal, practice pedal and sustain pedal, though older or cheaper models may lack the practice pedal. Again, in Europe the standard for upright pianos is two pedals: the soft and the sustain pedals.

The sustain pedal (or, damper pedal) is often simply called "the pedal", since it is the most frequently used. It is placed as the rightmost pedal in the group. It lifts the dampers from all keys, sustaining all played notes. In addition, it alters the overall tone by allowing all strings, even the ones not directly played, to reverberate.

The soft pedal or *una corda* pedal is placed leftmost in the row of pedals. In grand pianos it shifts the entire action/keyboard assembly to the right (a very few instruments have shifted left) so that the hammers hit two of the three strings for each note. In the earliest pianos whose unisons were bichords rather than trichords, the action shifted so that hammers hit a single string, hence the name *una corda*, or 'one string'. The effect is to soften the note as well as change the tone. In uprights this action is not possible; instead the pedal moves the hammers closer to the strings, allowing the hammers to strike with less kinetic energy. This produces a slightly softer sound, but no change in timbre.

On grand pianos, the middle pedal is a sostenuto pedal. This pedal keeps raised any damper already raised at the moment the pedal is depressed. This makes it possible to sustain selected notes (by depressing the sostenuto pedal before those notes are released) while the player's hands are free to play additional notes (which aren't sustained). This can be useful for musical passages with pedal points and other otherwise tricky or impossible situations.

On many upright pianos, there is a middle pedal called the "practice" or *celeste* pedal. This drops a piece of felt between the hammers and strings, greatly muting the sounds. Often this pedal can be shifted while depressed, into a "locking" position.

There are also non-standard variants. On some pianos (grands and verticals), the middle pedal can be a bass sustain pedal: that is, when it is depressed, the dampers lift off the strings only in the bass section. This pedal would be used only when a pianist needs to sustain a single bass note or chord over many measures, while playing the melody in the treble section. On the Stuart and Sons piano as well as the largest Fazioli piano, there is a fourth pedal to the left of the principal three. This fourth pedal works in the same way as the soft pedal of an upright piano, moving the hammers closer to the strings.

Unusual pedals

An upright pedal piano

The rare transposing piano, of which Irving Berlin possessed an example, has a middle pedal that functions as a clutch that disengages the keyboard from the mechanism, enabling the keyboard to be moved to the left or right with a lever. The entire action of the piano is thus shifted to allow the pianist to play music written in one key so that it sounds in a different key.

There were three piano companies to include extra pedals other than the standard two or three. Two of these companies offered a piano with four pedals (Crown and Schubert Piano Co.), and Wing and Son of New York offered a five pedal piano from

approximately 1893 through the 1920s. There is no mention of the company past the 1930s. Labeled left to right the pedals are Mandolin, Orchestra, Expression, Soft, and Forte (Sustain). The Mandolin pedal produces a sound similar to a vibrato feel by bouncing a set of small hammers against the strings, enabling the piano to mimic a mandolin, guitar, banjo, zither and harp. The Orchestra (Orch) pedal used a similar approach, lowering a set of metal tipped felt strips in between the hammers and the strings. This extended the life of the hammers when the Orch pedal was used, a good idea for practicing, and created an echo-like sound that mimicked playing in an orchestral hall.

The *pedalier* piano, or pedal piano, is a rare type of piano that includes a pedalboard, enabling bass register notes to be played with the feet, as is standard on the organ. There are two types of pedal piano: the pedal board may be an integral part of the instrument, using the same strings and mechanism as the manual keyboard, or, less frequently, it may consist of two independent pianos (each with its separate mechanics and strings), which are placed one above the other, a regular piano played by the hands and a bass-register piano played by the feet. This was developed primarily as a practice instrument for organists, although there is a small repotoire written specifically for the instrument.

Construction

Many parts of a piano are made of materials selected for strength and longevity. This is especially true of the outer rim. It is most commonly made of hardwood, typically maple or beech, and its massiveness serves as an essentially immobile object from which the flexible soundboard can best vibrate. According to Harold A. Conklin, the purpose of a sturdy rim is so that "the vibrational energy will stay as much as possible in the soundboard instead of dissipating uselessly in the case parts, which are inefficient radiators of sound."

Yet Bösendorfer, the Austrian manufacturer of extremely high quality pianos, constructs their rim from spruce, the very same wood that the soundboard is made from. Their idea is to concertedly involve the cabinet in the projection and coloration of sound. The *loss* of energy into the Bösendorfer case alters the instrument's tone, giving it perhaps less power but a complex and unusually resonant sound.

View from below of a 182-cm grand piano. In order of distance from viewer: softwood braces, tapered soundboard ribs, soundboard. The metal rod at lower right is a humidity control device.

The finest hardwood rims are made by laminating thin (hence flexible) strips of hardwood, bending them to the desired shape immediately after the application of glue. This system was developed by Theodore Steinway in 1880. The thick wooden posts on the underside (grands) or back (uprights) of the piano stabilize the rim structure, and are made of softwood for stability. The requirement of structural strength, fulfilled by stout hardwood and thick metal, makes a piano heavy; even a small upright can weigh 136 kg (300 lb), and the Steinway concert grand (Model D) weighs 480 kg (990 lb). The largest piano built, the Fazioli F308, weighs 691 kg (1520 lb).

The pinblock, which holds the tuning pins in place, is another area of the piano where toughness is important. It is made of hardwood, (typically hard maple or beech), and is laminated for strength, stability and longevity. Piano strings (also called piano wire), which must endure years of extreme tension and hard blows, are made of high carbon steel. They are manufactured to vary as little as possible in diameter, since all deviations from uniformity introduce tonal distortion. The bass strings of a piano are made of a steel core wrapped with copper wire, to increase their mass whilst retaining flexibility. If all strings throughout the piano's compass were individual (monochord), the massive bass

strings would overpower the upper ranges. Makers compensate for this with the use of double (bichord) strings in the tenor and triple (trichord) strings throughout the treble.

Cast iron plate of a Steinway grand piano

The plate, or metal frame, of a piano is usually made of cast iron. It is advantageous for the plate to be very massive. Since the strings vibrate from the plate at both ends, vibrations absorbed by the plate will result in energy loss to the desired (efficient) channel of sound transmission, namely the bridge and the soundboard. While some manufacturers now use cast steel in their plates, cast iron remains the preferred metal. Cast iron is easy to cast and machine, has flexibility sufficient for piano use, is tremendously resistant to deformation (unlike steel that can bend), and is especially

tolerant of compressive forces. The casting of the plate is a delicate art, since the dimensions are crucial and the iron shrinks by about one percent during cooling.

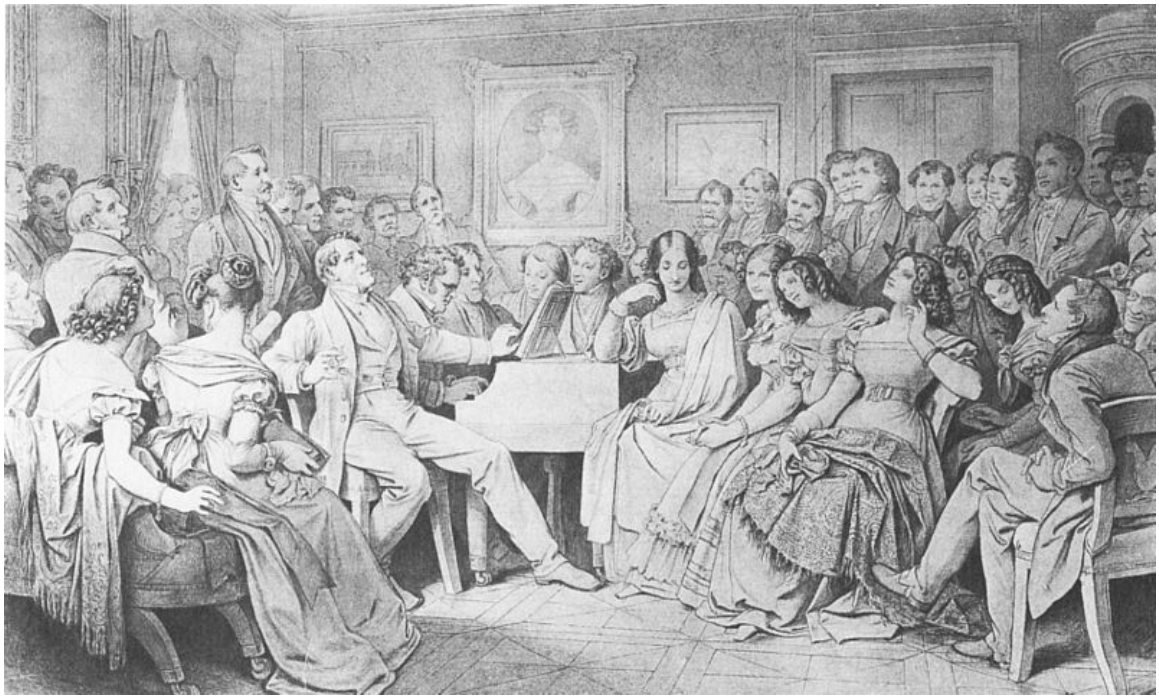
The inclusion in a piano of an extremely large piece of metal is potentially an aesthetic handicap, which piano makers overcome by polishing, painting and decorating the plate. Plates often include the manufacturer's ornamental medallion and can be strikingly attractive. In an effort to make pianos lighter, Alcoa worked with Winter and Company piano manufacturers to make pianos using an aluminum plate during the 1940s. The use of aluminum for piano plates, however, did not become widely accepted and was discontinued.

The numerous grand parts and upright parts of a piano action are generally hardwood, e.g., maple, beech, or hornbeam. However, since World War II, plastics have become available. Early plastics were incorporated into some pianos in the late 1940s and 1950s, but proved disastrous because they crystallized and lost their strength after only a few decades of use. The Steinway firm once incorporated Teflon, a synthetic material developed by DuPont, for some grand action parts in place of cloth, but ultimately abandoned the experiment due to an inherent "clicking" that invariably developed over time. (Teflon is "humidity stable" whereas the wood adjacent to the Teflon swells and shrinks with humidity changes, causing problems.) More recently, the Kawai firm has built pianos with action parts made of more modern materials such as carbon fiber reinforced plastic; these parts have thus far performed reasonably, but it will take some decades to know if their longevity and performance can match that of wood.

The part of the piano where materials probably matter more than anywhere else is the soundboard. In quality pianos, this is made of solid spruce (that is, spruce boards glued together along the side grain). Spruce is chosen for its high ratio of strength to weight. The best piano makers use quarter-sawn, defect-free spruce of close annular grain, and make sure that it has been carefully dried over a long period of time before making it into soundboards. In cheap pianos, the soundboard is often made of plywood.

In the early years of piano construction, keys were commonly made from sugar pine. Today they are likely to be made of spruce or basswood. Spruce is normally used in high-quality pianos. The black keys were traditionally made from ebony and the white keys were covered with strips of ivory, but since ivory-yielding species are now endangered and protected by treaty, plastics are now almost exclusively used. Also, ivory tends to chip more easily than plastic. Legal ivory can still be obtained in limited quantities. The Yamaha firm invented a plastic called "Ivorite" that they claim mimics the look and feel of ivory; it has since been imitated by other makers.

Care and maintenance



The piano at the social center in the 19th century (Moritz von Schwind, 1868). The man at the piano is Franz Schubert.

Pianos need regular tuning to keep them up to pitch, which is usually the internationally recognized standard concert pitch of A4 = 440 Hz. The hammers of pianos are voiced to compensate for gradual hardening, and other parts also need periodic regulation. Aged and worn pianos can be rebuilt or reconditioned. Often, by replacing a great number of their parts, they can be made to perform as well as new pianos. Older pianos are often more settled and produce a warmer tone.

Piano moving should be done by trained piano movers using adequate manpower and the correct equipment for any particular piano's size and weight. Pianos are heavy yet delicate instruments. Over the years, professional piano movers have developed special techniques for transporting both grands and uprights, which prevent damage to the case and to the piano's mechanics.

Tuning

A piano tuner

The relationship between two pitches, called an interval, is the ratio of their absolute frequencies. Two different intervals are perceived to be the same when the pairs of pitches involved share the same frequency ratio. The easiest intervals to identify, and the easiest intervals to tune, are those that are just — which have a simple whole-number ratio. The term *temperament* refers to a tuning system which tempers the just intervals (usually the perfect fifth which has the ratio 3:2) in order to satisfy another mathematical property; in equal temperament, a fifth would be tempered by narrowing it slightly, achieved by flattening its upper pitch slightly, or raising its lower pitch slightly. A system of temperament can also be known as a set of **bearings**.

Tempering an interval causes it to beat, which is a fluctuation in perceived sound intensity due to interference between close (but unequal) pitches. The rate of beating is equal to the frequency differences of any harmonics that are present for both pitches and that coincide or nearly coincide.

Piano tuning is the act of adjusting the tensions of the piano's strings, thereby aligning the intervals among their tones so that the instrument is in tune. The meaning of the term *in tune* in the context of piano tuning is not simply a particular fixed set of pitches. Fine piano tuning carefully assesses the interaction among all notes of the chromatic scale, different for every piano, and thus requires slightly different pitches from any theoretical

standard. Pianos are usually tuned to a modified version of the system called equal temperament. In all systems of tuning, each pitch is derived from its relationship to a chosen fixed pitch, usually A440.

Physics

When the key is struck, a chain reaction occurs to produce the sound. First, the key raises the wippen, which forces the jack against the hammer roller (or "knuckle"). The hammer roller then lifts the lever carrying the hammer. The key also raises the damper; and immediately after the hammer strikes the wire it falls back, allowing the wire to resonate. When the key is released the damper falls back onto the strings, stopping the wire from vibrating. The vibrating piano strings themselves are not very loud, but their vibrations are transmitted to a large soundboard that moves air and thus converts the energy to sound. The irregular shape and off-center placement of the bridge are designed so that the soundboard will vibrate strongly at all frequencies.

There are three factors that influence the pitch of a vibrating wire.

- Length: All other factors the same, the shorter the wire, the higher the pitch.
- Thickness: All other factors the same, the thinner the wire, the higher the pitch.
- Tension: All other factors the same, the tighter the wire, the higher the pitch.

A vibrating wire subdivides itself into many parts vibrating at the same time. Each part produces a pitch of its own, called a partial. A vibrating string has one fundamental and a series of partials. The most pure combination of two pitches is when one is double the frequency of the other.

For a repeating wave, the velocity, v, equals the wavelength, λ, times the frequency, f.

$$v = \lambda f$$

On the piano string, waves reflect from both ends. The superposition of reflecting waves results in a standing wave pattern, but only for wavelengths $\lambda = 2L, L, L/2, \ldots = 2L/n$, where L is the length of the string. Therefore the only frequencies produced on a single string are $f = nv/(2L)$. Timbre is largely determined by the content of these harmonics. Different instruments have different harmonic content for the same pitch. A real string vibrates at harmonics that are not perfect multiples of the fundamental. This results in a little inharmonicity, which gives richness to the tone but causes significant tuning challenges throughout the compass of the instrument.

Striking the piano key with greater force increases the amplitude of the waves and therefore the volume. From *pianissimo* (*pp*) to *fortissimo* (*ff*) the hammer velocity changes by almost a factor of a hundred. The hammer contact time with the string shortens from 4 ms at *pp* to less than 2 ms at *ff*. If two wires adjusted to the same pitch are struck at the same time, the sound produced by one reinforces the other, and a louder combined sound of shorter duration is produced. If one wire vibrates out of

synchronization with the other, they subtract from each other and produce a softer tone of longer duration.

Well-known piano makers

Well-known piano makers are (in alphabetical order): Bechstein, Blüthner, Bösendorfer, Broadwood, Fazioli, Feurich, Förster, Kawai, Mason & Hamlin, Petrof, Pleyel, Samick, Schimmel, Steingraeber & Söhne, Steinway & Sons, Stuart & Sons and Yamaha.

A pianist playing Prelude and Fugue No. 23 in B major (BWV 868) from Bach's *The Well-Tempered Clavier* on a grand piano.

Role

The piano is a crucial instrument in Western classical music, jazz, film, television, and most other complex western musical genres. A large number of composers are proficient pianists—and because the piano keyboard offers an easy means of complex melodic and harmonic interplay—the piano is often used as a tool for composition.

Pianos were, and still are, popular instruments for private household ownership. Hence, pianos have gained a place in the popular consciousness, and are sometimes referred to by nicknames including: "the ivories", "the joanna", "the eighty-eight", "the black(s) and white(s)", and "the little joe(s)". Playing the piano is sometimes referred to as "tickling the ivories".

Chapter- 2

How to Play the Piano

The piano is one of the most popular instruments because. it is versatile and easy to learn. It is used as a solo instrument, an accompaniment for other instruments, or for singers. The tone is amazing, and the types of music you can play are endless. The piano is also an important foundation for all musicians, even if it is not their "main" instrument.

Steps

1. **Playing the piano is a great skill to have in life and learning is great fun - although the first few weeks are quite an effort**.
2. **Pianos can be very expensive, so if you can't afford to buy one, keyboards are an excellent, cheaper alternative**. There are also some great crossovers such as digital grands from brands like Roland and Yamaha. If you can afford a piano, there are several criteria you should consider before buying yourself a piano. Before buying a piano, make certain you are willing to practice for thirty or more minutes each day. If you're not, then save yourself the expense of buying the piano and books or lessons. If you have the passion to learn, you can often borrow a piano from someone or get an old piano that someone is getting rid of.
3. **Arrange for music lessons with a teacher in your area**. The classifieds or a referral from a friend are good places to start. Many schools and colleges offer piano lessons at a subsidized cost. Ask other piano students for feedback about their books or teachers.
4. **Make up your mind**. If you do not want to take piano lessons you can learn by yourself. However, you do have your work cut out for you. Teaching yourself how to play well is a tremendous task, but it can be done.
5. **Specific computer games can also help if you want to have a bit of fun while you learn**. There are some free games on the Internet that can help you with both reading music and playing piano, one program being 'Jayde Musica'. There are also electronic devices that can aide in your piano practicing. For example, the PianoMaestro is a strip of lights that rests on top of the black keys of your piano. The lights guide you on which notes to play, enabling you to progress faster and stay motivated.

6. **Make certain your teacher or lesson book includes time spent learning all aspects of the piano, including chords and theory, as well as learning pieces by heart in the curriculum**.
7. **Practice daily for at least thirty minutes or more**. Your fingers will "rust" if you do not play for even a week. However, you may find that a short break or holiday is alright, provided you practice diligently. At first, practicing might be a pain and you might get very frustrated. As your skills grow, you will become better and playing piano will become pure enjoyment. It's best to warm up at the beginning of every practice session with a relaxing finger exercise. This will stretch your fingers and hands and help you play with your hands relaxed. When you play, you should be able to see your finger bones move. Let your hand just hang and move only your fingers.
8. **Remember that it's worth the effort and will make you a much better piano player when your teacher asks you to learn a hard piece**.
9. **While there are many ways to practice, here's a good one for beginners**. First, try to sightread the piece without worrying if you make mistakes. Then practice each hand separately. Break the music into segments and learn the right hand part. Learn segment by segment, then connect them together. Keep practicing until you've mastered the right hand. Play through the entire piece. If you make a mistake, try to pick up from the beginning of that measure. Starting from the beginning each time you make a mistake will mean you learn the start of the song very well and perhaps never reach the end! Be patient, this process will enable you to get through the entire piece flawlessly. Once you've mastered the right hand, repeat the process with the left hand. Then, repeat the process again, this time for both hands.
10. **Take a new piece apart by learning one or two measures at a time, and going over it again and again**. The next day, do the same thing with the next few measures, and then include the last measures and play them all together. By practicing this way, you can spend quality time listening to how they sound and making sure your fingers know where to go and when.
11. **Try not to repeat your mistakes**. When you are learning a new piece, break it down into simple parts that you can practice without making a lot of mistakes. And play slowly. For example, practice each hand separately. After you have determined the fingering you are going to follow, play both hands together in short sections. Eventually put the sections together. Do not try to play at normal speed until you are secure in your fingering and notes. Then increase the speed gradually. Play the piece until you memorize it and you can play fluently.
12. **Improvise and think notes**. "Thinking notes" means that you know every single note that you're playing. While that sounds easy, it can be very challenging. Play a piece that you have memorized and can play very well. Now, name every note that you played without looking at the piano. Then, take a melody you've heard on TV or somewhere else and try to play it using your ear. Learn to know all the notes that you're playing. While playing by ear is good, it's a lot better if you know every note that you play.

13. **Play when ever you can, even if it's not your piano**. Be like Paul Mcartny; he cant walk by a piano with out a very strong urge to play it, the only time he does not play it is if he would get in trouble!
14. **Hope, believe, dream, and practice**!

Tips

- Play pieces that you enjoy playing or pieces that you know well!
- Never give up. The fingering, speed, and chords in some pieces may be frustrating and difficult, but push through it. If you get frustrated, step away from the piano for a few minutes until you are ready to play again.
- The more you practice, the better you will perform.
- Don't give up! If you do take piano lessons, remember this: You are very lucky; many parents want their child to learn piano, but not all can afford it.
- You may like to accompany a singer on piano and perhaps form a rhythm section with other instruments.
- Learn to sight read music. This will allow you to play a large range of pieces without learning them from memory.
- If you're at a recital and your hands shake wildly, sit on your hands for a few minutes before you go out to play. It calms them down.
- Find the right teacher! Your relationship with your teacher can affect the way you feel about practicing, so arrange for a trial period of a few weeks to find out if there's a good fit. **Parents, especially--pay attention!**
- If you are shy, practice playing in front of your family and friends. They will enjoy it, and in time, so will you.
- Learning music theory is fun and is the best way to become a great musician, whether you want to play classical, jazz or pop.

- Always follow the fingering on the piece (although there are certain exceptions). While some of the finger positions may feel awkward at first, following them will help you play more smoothly, since you won't have to adjust your hand position because you cannot reach the next note.
- The exceptions on fingering are rare but important. Male and female hands have slightly different shapes with the length of the index and ring fingers being different. Also, if your hands are small, some stretches simply aren't possible. However, 95% of the time the printed fingering is right, so persevere and it will make sense.
- Hand and body posture are very important. Slouching gives a bad impression and having a bad hand posture will be counter-productive to your practice. Keep your wrists loose and your hands flexible. Keep your fingers at a natural curve, as if you were holding your hands at your side. This gives you more power in your finger strokes.
- Listen to your notes and tune your ears to the keys' pitches. This is needed on some advanced piano tests and will allow you to impress your friends by playing blindfolded!
- Do not keep your foot on the sustaining pedal; it blurs your chords together and makes them sound "muddy."
- It is better to play too slowly than to play too quickly when you are performing. Play evenly and with a great deal of care in your touch and you will sound professional.
- Keep a regular, steady rhythm while you are playing. Just playing rhythmically makes a piece sound a lot better. Consider buying a metronome to help with this.
- Play simple pieces by ear and make your own arrangements of them. This will help you to become less dependent on written music. When you are playing by ear, keep going! Do not start sections of the piece over again. If you miss a chord one time, you can practice so that you'll play it the next time. The main thing is to overcome repetition and hesitation and learn to play a piece through smoothly when you are performing it.
- In addition to studying traditional chord relationships (harmony), take a class in composition and listen to as much music as you can. Community colleges offer excellent instruction in music theory, history, and composition. Playing with other people in ensembles is also an excellent idea.
- Get used to the idea that some of the pianos you will be playing will not sound amazing or be in perfect tune. This is one of the hazards of being a piano player--you can't carry your favorite instrument with you. Try to make the best of things when you are playing an inferior instrument. A good pianist can usually make a bad piano sound reasonably good--although some pianos are in such bad condition that you should feel free to say that you cannot play that piano.
- If you want to correctly use the sustain pedal, play a chord, press the pedal down, and then a split second AFTER you play your next chord, carefully lift up the sustain pedal and put it back down. Whenever you change chords or play notes from a different chord, "reset" the sustain pedal. Do NOT "bump" the pedal by changing it too fast. Always listen to yourself when you pedal. Your ears will tell you if the sound is blurred or not.

- For Intermediate/Advanced players: Try playing through that new piece using the chords written above the grand staff. Use your left hand to play octaves and your right hand to play the chord. Start off using the first inversion of every chord, then for a challenge, limit yourself to using only one octave and trying out different inversions of chords.
- Don't freak out when you can't play a measure (or two). Just take a short break. Give yourself some time to clam down before you attack the problem again.
- For players with some experience: Eventually, you will play faster pieces that are also long. If you keep pushing on the keys, you will tire out before you even finish the first page. To prevent this, lift your fingers up higher for louder notes and move your wrist so that it "follows the notes" - as the keys you press make higher and higher sounds, your wrist gets nearer and nearer to the right side of the piano when you're facing it. Do the opposite when the sounds made by the keys get lower and lower. However, if you overdo it, there'll be no point.
- Curve your fingers for a stronger tone and a better quality of music. Resist the temptation of playing flat fingered.

Warnings

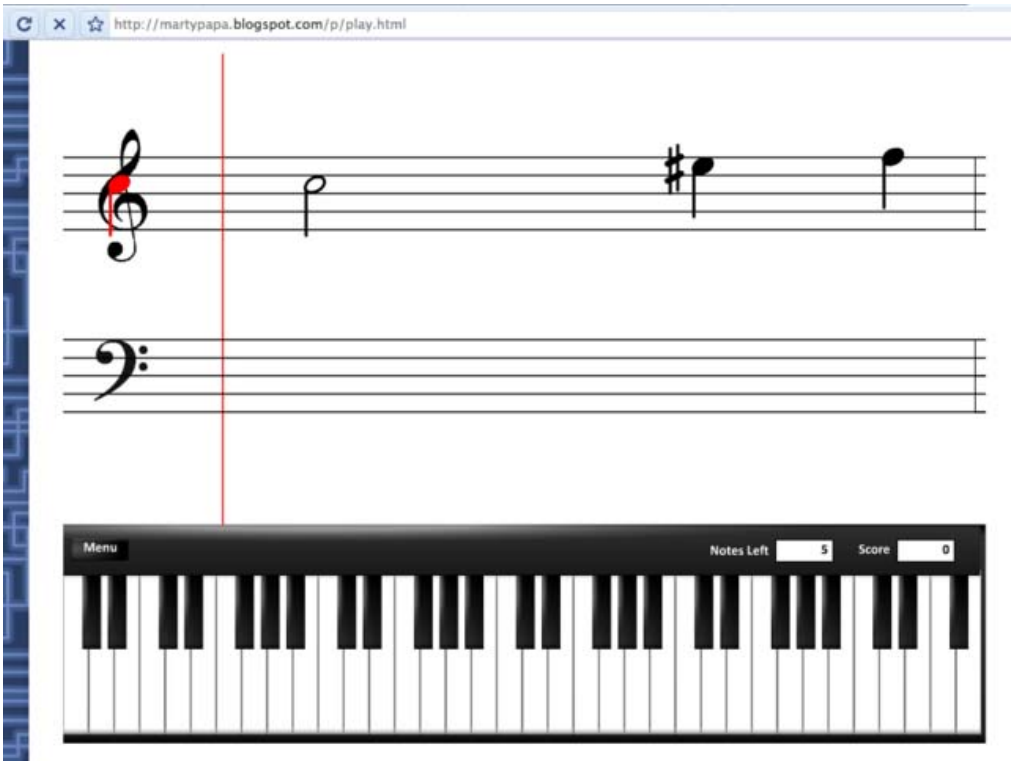
- Don't slack off. Sometimes it may become tedious, but keep practicing.
- Don't be nervous at recitals, and play your piece with as much confidence as you can. Don't worry about how you look. Pay attention to the thing that really counts -- how the music sounds!
- Don't buy or let your parents buy a piano when you're not sure you want to start playing it!
- Never play the same melody the same way. If the composer puts identical measures in the piece, make it interesting by using dynamics or ritardandos.
- Don't limit yourself to the notes on the page. Think about what the melody is trying to convey and play the song as though it was your own - from your heart.
- Don't set impossible goals for yourself, e.g., don't tell yourself 'I'm going to learn how to play Turkish March in one week'. You'll probably be disappointed.

Things You'll Need

- A Piano: An acoustic piano is preferred, though digital pianos and electronic keyboards offer an wonderful alternative for the beginning pianist.
- Sheet music. Before purchasing your first book it is best to consult a piano teacher.

Chapter- 3

How to Learn Piano and Read Music With Fast keys



Have you ever wanted to learn to play piano and read music and have fun at the same time? Fast Keys is a quick game that can really help you to improve your ability to do just that.

Steps

1. **Visit the Fastkeys site**.
2. **Click on the "Play" tab**.
3. **Scroll down to where the game is loading, and click "Start"**.

4. **Click "Instructions" to view the instructions of the game**.
5. **Return to the menu and enter the "Options" screen**. Modify the options to suit your needs and level of ability.
6. **From the menu choose either "Practice" or "Speed Test" to get the game started**.
7. **After you play you can view your statistics, and try to beat your high scores**.

Tips

- Practice makes perfect! The more you play the better you will get.

Warnings

- Take regular breaks from the computer to reduce risk of injury and strain.

Chapter- 4

How to Choose Between Digital or Acoustic Piano

Digital pianos are electronic devices that use sound chips and speakers to reproduce piano sounds. Some may have eight octaves, but they may have only six, or even as few as four. Four octaves will allow you to play simple tunes, but six or more octaves will be required if you want to study music seriously.

The tone and touch of an acoustic piano is usually far superior to a digital piano. Acoustic pianos have a large number of black and white keys, spanning up to eight octaves. Acoustic pianos create a natural reverberation in the room where they are played.

Most digital pianos have a MIDI output which allows you to connect them to a computer via an inexpensive interface, which allows you to record and edit your playing and add additional parts, as well as control other instruments.

Steps

1. **Understand the differences**. Digital pianos are electronic devices that are designed to sound like an acoustic piano. They have no hammers, no strings and

no soundboard. Instead, they have electronic circuits and speakers. Here are some of the features which may make a digital piano an attractive alternative:

- Different types of piano sounds, such as harpsichord, organ and more.
- Instrument sounds such as strings, flute, and percussion.
- Built-in rhythm capabilities to accompany playing.
- The ability to record performances and interact with other electronic music (MIDI).
- Never needs tuning.
- Headphones are available for private practice.
- Portability and low weight.
- If you have a reasonably modern computer you can also run one or more 'software synthesizers', where your computer generates the sound and you use the digital piano as a silent master keyboard, which offers an attractive and relatively inexpensive ($100-$200) upgrade path for unconvincing sounding digital pianos.

2. **Consider your needs**. With some digital pianos, you can learn a piece by playing lit keys rather than reading music, which is useful for beginners and inexperienced piano enthusiasts. However, after the novelty wears off, you may want more from the instrument, and most digital pianos cannot offer it. A majority of electronic instruments lack the tone and touch of an acoustic piano, as well as the feel and the ability to convey subtle emotion and feeling. Remember that an acoustic piano has strings and hammers, while a digital piano has none. Having actual strings means that there are thousands of things in an acoustic piano (such as sympathetically vibrating strings) that are difficult to reproduce convincingly on a digital piano.
3. **Think about the future**. Realize that beyond a certain level, some piano teachers will not teach students who have learned on anything other than an acoustic piano. Digital pianos are frequently counterproductive when it comes to technique and dynamic performance. These skills cannot be practiced on a cheap digital keyboard and later applied to a real piano.
4. **Don't forget about investment value**. Consider that an acoustic piano will hold its value far better than a digital unit. An acoustic piano can last 100 years or more, while a digital piano may be obsolete in 5 years. An outdated keyboard is often difficult to sell.

Tips

- If you are interested in acquiring a real musical background, it will entail learning how to play scales and chords. Learning to play classical music gives a student complete musical knowledge, which can be useful in other piano styles.
- Learning to understand and perform a piece of music involves practicing and mastering the piece. It creates a sense of accomplishment.
- Some acoustic purists feel that when you play a digital piano, it is the device making the music rather than the performer.
- Digital pianos often have a feature to simulate reverb and other effects.
- If you are planning to use your digital piano with a computer, focus on how it feels rather than how it sounds; a modern software piano running on a laptop will typically sound far better than the piano's built-in sounds.
- A digital piano will never sustain notes for nearly as long as an acoustic piano can.
- A portable digital piano is a great option if you would like to play piano, but do not have the space necessary to facilitate a full sized acoustic piano. A portable digital piano may also be an attractive option if you move often. A digital piano can stave off boredom of hearing the same sound day after day.

Warnings

- A **weighted** key action is essential - the keys should have some convincing weight to them, not feel like they're made of light plastic and there's a simple spring pushing right back (this is called a 'synth action' and has its place but not when learning to play piano). If you sharply tap a key does it continue to travel

down a little under its own momentum? Try turning the sound down and shutting your eyes and seeing how much it feels like the real thing. Don't be seduced by flashing lights and LCD screens, focus on the key action. Even if you're considering buying privately, visit a piano store and try their range of pianos so you have an idea of what's good and what's not.

- If you are looking for a keyboard that can be easily transported or connected to a sound system, used to record music using computer software, or used for private practice with headphones, a digital piano is the way to go. Otherwise, think very carefully before you decide to buy a digital in place of an acoustic instrument.

Chapter- 5

How to Play Jazz Piano

Jazz is an art form that has grown from its blues origins to draw influences from just about every genre of music there is. For the beginner, though, it's perhaps best to focus on early swing and learning to improvise. Here's a pretty easy way to get going!

Steps

1. **Listen**. This is by far the most important step in becoming a musician. Find as many recordings as you can get your hands on. Don't discriminate--listen to the old greats, like Art Tatum and Count Basie and Thelonius Monk, as well as up-and-coming pianists of today. Listen, take what they do, and apply it to your own playing. Doing this consistently will make you an excellent jazz pianist.
2. **Assuming you already know some very basic theory, first learn all 12 major scales (there are twelve different sounding scales, but in theory B/Cb, F#/Gb and C#/Db are separate scales)**. Learning all the scales will be extremely helpful.

3. **Make sure you can read music and can play some basic stuff, even if it's not jazz**. The first real step in your journey will be to break away from "the dots" and train your ear. So...
4. **Buy a songbook of one of the masters**: Cole Porter, Gershwin, etc. Make sure that chord symbols or guitar tabs are written above the melody line, like "Dbm7."
5. **Learn a major 7th (1 3 5 7), minor 7th (1 b3 5 b7), dominant 7th (1 3 5 b7), half diminished (1 b3 b5 b7), and diminished chord (1 b3 b5 bb7) of every key**. So, for example, to play C7 (C dominant 7th) you'd play C, E, G, and Bb. For C diminished seventh, you'd play C, Eb Gb, and A (Bbb). You need to know them well enough to be able to see a chord symbol like the one in the step above and be able to play it without thinking. If you know your major scales, you could have this step mastered in a week.
6. **To reward your hard work, pull out the songbook**. Find a song you like and play the melody line in the right hand with the appropriate chords in the left, as you're reading them from the chord symbols. You are now playing a song without reading music (in the traditional way, aka Fakebook style). Congratulations!
7. **Even though it probably sounds horrible, practice for long enough and you'll sound more and more like what's written there without you even knowing it**. You can always go back to the sheet music to see how they're voicing the chords in clever ways that you're not.
8. **Next, learn chord inversions**: learn to play CM7 like (C, E, G, B), (E, G, B, C), (G, B, C, E) and (B, C, E, G). Learn those four positions for every chord, but only after you're comfortable knowing what every chord is, and have Step Four under your belt. Don't scramble your brain.
9. **Learn the pentatonic scale of your favourite key**.
10. **Add in a couple of notes from it into a song you're comfortable with**. Add some more, and take some of the originals out.
11. **Now learn the blues scale of that same key and mix the two**. By now, you're probably IMPROVISING! Learn those two scales for every key.
12. **Look at the chord sequences in the songs you're playing**. Try and splice one from one song into another.
13. **Learn the 3, 6, 2, 5, 1 progression**. Also learn tritone substitutions and the circle of fifths. Play the same songs in different keys.
14. **When you're ready, learn chromatic and diatonic harmony**. Learn modes and different scales. Listen to different sorts of music from all sorts of time periods, and anything that you can steal harmonic and melodic ideas from. When you've gotten this far, you can easily teach yourself.

Tips

- Experiment! Experiment with everything. There are no rules at all. None. Change things rhythmically, melodically, harmonically, and structurally if you want. Do this every day. It is your main form of practice.
- Love jazz, and learn to love the craft of songwriting. Listen to jazz music.
- Gravitate towards the best pianists, if only to try and understand why they're considered the best. Transcribe solos you enjoy or identify your playing with!

Also, try and tune in to the emotion in their music. Pick up on Bud Powell's rawness and intensity, Bill Evans' romance and beauty, McCoy Tyner's drive and ferocity, and so on. Emotion is what you can't teach and is surely what music is all about.

- Do not forget: you learn to play the piano by *playing* the piano, not by reading a book. You learn to do things by actually doing them. Experience is everything. You want your hands to know how to play, not necessarily your brain. Take a small step at a time to master a piece, so that you can really take in the notes and technique you're playing.

Warnings

- During your search through Jazz piano history, you'll eventually come across Art Tatum. There's a dilemma here because, if you come to him too early, you won't appreciate his music, which would be a loss, but if you come after you've gained some musical understanding, you'll quit the piano the next day. This is a serious warning - Oscar Peterson nearly quit after hearing Tatum, and so did many others.
- But if you are wise, after hearing Art Tatum or Oscar Peterson will motivate you to work harder. Let this thought be present: "The ultimate goal is not to become better than your neighbor, but to become better than yourself."

Chapter- 6

How to Tune a Piano

Are you a piano player or teacher who dislikes the unwanted expense of hiring a piano tuner and feels that you could do it yourself with a little training? Well this is your lucky day. All you need are the right tools, a piano and patience.

Steps

1. **Buy tools**. Tuning tools are hard to find, especially if you are accustomed to shopping at local retail locations. eBay is a reliable place for tuning tools.
2. **Choose a tuning lever and try to find one with a star tip as opposed to a square tip**. This will give you some extra flexibility.Set aside a couple of hours. Depending on the out-of-tuner of your piano, this could take awhile. Remove every item between you and your tuning pegs.
3. 

   Block off the outside strings of your starting octave: F below middle-C up to E above middle-C-

4. **Notice three strings for each of the keys in that octave**. Block off the outside strings of each of those keys with the temperament strip. You will need a flat-head screwdriver to stuff the strip between the strings. F up to E
5. **Start with one string in the center of the piano and get the pitch for that tone from a tuning fork**. Then set about 12 notes right in the same area (a chromatic scale). But if you've ever looked in your piano you've probably seen that each key has three strings so block off the outside strings of each key with a strip of felt so that only one string will sound at a time for each note. Tighten the string by turning the pegs upward with a tuning hammer but be careful not to snap the string by tightening too far. If the string breaks, pay the money to have a professional piano tuner do the job.

Tips

- A piano is very difficult to tune since it has more than 250 strings that are held under extremely high tension.
- The tuning pins that they wrap around are set very tightly in a strong wooden block.
- You must have a special wrench (called a tuning hammer) to turn them up or down.
- Muting wedges and muting felt are also needed to dampen surrounding strings.
- Piano tuning and servicing is a very complicated process that takes a lot of training and skill to do it right.
- All pianos exhibit what is called inharmonicity, which varies with each particular piano.
- Inharmonicity requires a piano tuning to be stretched or tempered. For this reason all piano notes are not tuned to their theoretical mathematical frequencies.

Warnings

- A piano is a fine and delicate instrument that should be tuned about twice a year. There is more to tuning than just following these instructions. It would be advisable to seek the services of a professional piano tuner to make sure that the tone is of good quality and sound.

Things You'll Need

- Tuning lever (a.k.a. tuning hammer)

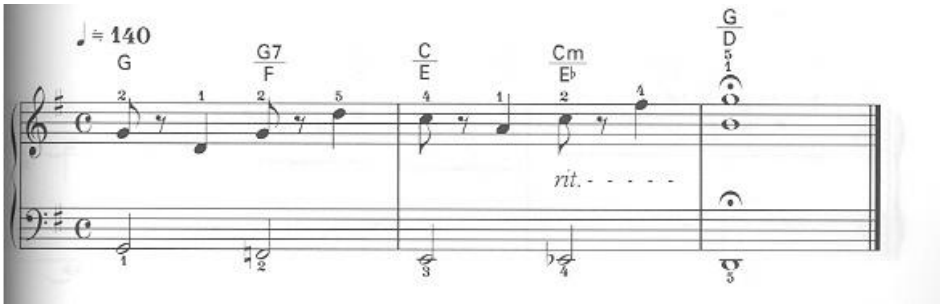
- 440 tuning fork
- felt temperament strip (preferably tapered)
- 2 rubber mutes

How to Play Piano Music by Looking Only at the Keys

Want to play in a band as the pianist, but don't want to play the main melody? Want to improvise your way through a song to provide background? Or do you want to play guitar sheet music on the piano? Look no further; here it is.

Steps

1. **Find a piece of music with markings like these**:
2.



```
       G                   C     D     G
Praise God from whom all blessings flow
       G                   C       D
Praise Him all creatures here below
       C             Em     D   G
Praise Him above ye Heavenly host
       Em       C         D     G
Praise Father, Son, and Holy Ghost

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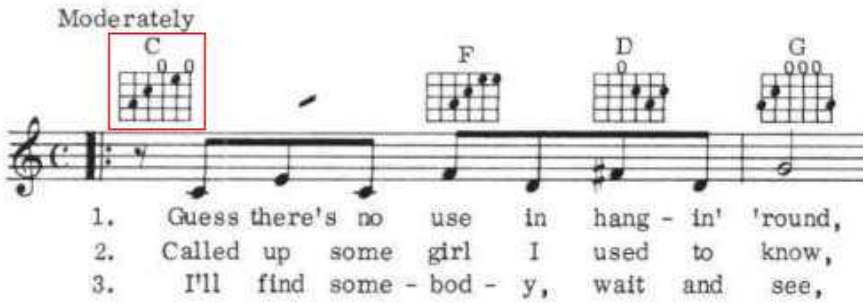
3.



4. **Play the chords named by the Letter (A,B,C,D,E,F,G)**
5. **Improvise as you see fit, but only in the same key**.The Sheet reads "C". You improvise in the notes C,D,E,F,G,A,B. If it reads "G", you play G,A,B,C,D,E,F#. If it reads "D", you play D,E,F#,G,A,B,C#.

Tips

- Know your chords and keys
- Know how to improvise
- Be fluent and keep up with the beat of the music
- Be sure to always change keys at the right time, but if you miss it, play with it naturally. Example, The song sounds like "dum-dum-dum-dum-dee-dum". If every other "dum" and "dee" is in a new key, and you miss the first change, play "dum-dum--dumdum-dum-dee-dum" (If you have questions, go to "Discuss This Page" at bottom of the page)

Warnings

- Try your best not to hit a note in another key. If you do, improvise in that new key for 1-2 seconds, then go back; Do not go back if you mess up. If you are lucky, it may end up harmonizing and sounding nice anyways.
- [If you are accompanying somebody] try not to be louder than the instrument playing the main melody. Doing such will make the song actually sound worse.

Chapter- 7

How to Buy a Piano

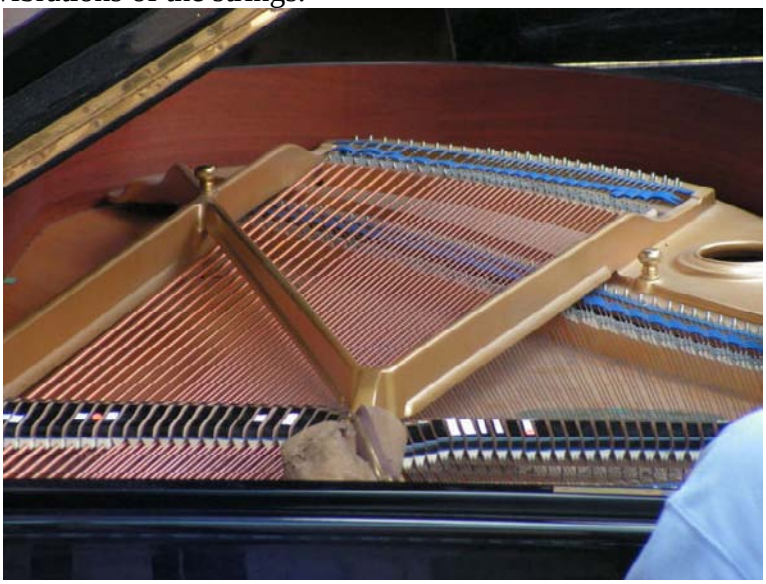
A traditional piano

Buying a piano, or, as it is referred to, a traditional or acoustic piano, is not something that is purchased without a specific need or use. Depending on the need, the purchase can be minimal, or expensive. Starting a child on piano lessons would require a less expensive 'upright' until they show a talent and desire to continue learning. However, a professional musician or concert pianist would look towards purchasing a high quality upright or grand piano, of better quality, touch and sound, and of course, considerably more expensive. All pianos can be traded 'up' as a need arises. The only time that there is a financial loss is when no one wants to continue playing. Thus, to save money it is best to buy the best for the least.

Steps

1. **Make it a point to visit a few showrooms and become familiar with various manufacturers, and the names and qualities of each make**. Ask questions, and get brochures and make notations on a pad regarding each.
2. **Play each of the pianos, or have the salesman play pieces as well as major and minor scales**. Listen carefully to hear that each piano does have a slightly different tone. Some are mellow, brilliant, loud or soft. Each individual piano produces a different tone and unique sound regardless of style. Take into consideration the size, especially if your room is small.
    - The grand piano ranges in size from under five feet to nine feet (a concert grand). The term "baby grand" is often used to describe pianos around the 5' size. A grand piano has a fast touch and is more responsive and powerful than an upright. Many people enjoy playing grand pianos more than upright pianos. However, some larger professional-quality uprights can have equal or better tone quality than many small grands. Grand pianos all have a **horizontal action**, and upright pianos have **a vertical action** that can be above or below the keys.
    - Uprights range in height from 36 to 51 inches. All of them require the same amount of floor space, about five feet by two feet. The largest of the uprights is the studio piano, which is 44 inches or taller. This is a type which is becoming quite popular. Uprights, 39 to 42 inches tall, are referred to as consoles. No longer built is the spinet which was 36-37 inches high. Manufacturers discontinued these because they were not a great sound and the action configuration was very inferior to consoles and studios. However you might find a used spinet or one in stock that may be good for the beginner and fit nicely into the room.
3. **Take an experienced pianist with you when you are ready to buy; get their opinion about your choice of each piano**. Realize however that tonal preference is very subjective and your opinion is the most important when it comes to the sound you like. Listen to low, middle, and high notes. Ask about and learn to understand what makes a certain piano more desirable than another. Keep in mind however that your "experienced pianist" is going to recommend what they like, not necessarily what you like. They may also want to steer you to a brand they already know. The brand you have heard of may not be the best choice. Your taste and your budget are the most important elements.
4. **Contact experts**:
    - Find out which pianos are often used by music institutions such as conservatories and universities particularly if you can afford a very expensive piano. Such hubs of music instruction know through experience some pianos which are of good quality and relatively trouble-free. Ask music professors and professional musicians for recommendations. Reckognize you may be steered toward those brands who have made long term investments in marketing to these institutions to make their products most familiar.

- Piano technicians are another source of information about pianos and may have thoughts on which piano to choose when you narrow down your selections. Look for a member of the Piano Technicians Guild in the yellow pages. Understand, that a technician will probably be oriented toward pianos that are easier to work on.

5. **Try out several pianos of each brand**. Different models are typically manufactured with vast quality differences. It is similar to a car brand. The Boston piano is made from much lower quality components than a concert grand piano by steinway even though they are sold by the same co. Often, depending on the model and price range, there are surprising individual differences. One thing you will notice is how the keys feel when you press them down. Some are stiffer than others, and some are looser. This is called **touch**. You will want to find the piano feels good to your fingers and and sounds good to your ears.
6. **Inspect the piano carefully, including every part, as described**.
    - The Back: The posts should be heavy and strong enough to provide adequate support in proportion to the rest of the piano.
    - The Soundboard: A wooden board at the back of the instrument which translates the vibrations of the strings into the "tone" of the piano. The soundboard is one of the vital parts of the piano. A cracked soundboard can make a piano sound unappealing.
    - Plate: An irregularly-shaped piece of cast iron bolted to the back of the frame. It holds one end of the piano strings, and anchors most of the twenty tons of pull exerted by the taut strings.
    - Treble and bass bridges: Another of the piano's vital organs. These long pieces of hard maple are attached to the soundboard, transferring to it the vibrations of the strings.
    - 

      When piano dealers refer to the "strung back," they mean the parts just discussed plus **the strings**. The bass strings are wound with wire to add weight and reduce the frequency at which the string vibrates. This allows the use of relatively short strings to produce deeper notes.

- The working section of the piano is called the action. There are about 7,500 parts here, all playing a role in sending the hammers against the strings when keys are struck.
- Piano hammers are formed of one or two layers of felt forged onto a wooden hammer molding under tremendous pressure. If a dealer talks to you about a 9-pound hammer as opposed to a 12-pound hammer, he means the weight of the sheets of felt that were used to make the hammers.
- The piano keys rest in the key bed, a perfectly flat well in the front of the cabinet that keeps the keys level. Each key is balanced by a center pin, and "bushed" with fine wool for silence and proper clearance. The "ivories" are not ivory anymore, but a fine molded plastic that won't crack or turn yellow. The black keys are made of a similar material.
- Most pianos have three *pedals,* but most pianists need only two. The sustaining pedal on the right lifts the dampers (which in a resting position prevent the strings from vibrating) away from the strings so that the tone is sustained after the keys are released.
- The pedal on the left, called the *damper*, mutes the tone by shortening the distance the hammers travel or by shifting the action slightly so fewer strings are hit. Many pianos have a third pedal in the middle for sustaining bass tones only. On most grand pianos and some uprights, the third pedal is a *sostenuto,* which sustains selected tones at the pianist's discretion.
- Finally, there's the cabinet, that handsome piece of furniture which will take a prominent place in your decor. Modern cabinets are made of core stock overlaid with thin veneers of fine furniture wood. Many grains and finishes are available and modern finishing techniques assure excellent appearance and easy care for years.

Tips

- Buy a piano made by a reputable company with a good production volume, and make sure they offer a manufacturer-backed warranty. Ask about their *trade up policy*. If you can find a piano dealer with a written 1 year "trade-up policy", you might be better off purchasing there! Visit several showrooms as each showroom sells different named pianos.
- Ask questions about tuning the piano, and whether the dealer can recommend a good tuner familiar with the brand.
- Some piano showrooms will even offer piano lessons in their showroom itself. Some have monthly piano concerts, with cheese and crackers and other snacks. Attending is a great idea; it is free, an evening or afternoon out, and a way to actually hear how the piano sounds.
- Expect to buy the best piano you can afford and fit in your house. Or get a quality piano but do not buy the most expensive. A student starter piano will suffice, because you can always 'trade it up' for a better one if your child enjoys and wants to continue playing. Ask the salesman about their trade up policy.
- Usually the first piano bought for a beginner is an upright. Do not expect it to have the touch or sound of grand, but the tonal quality and sound will suffice and will encourage the beginner to learn and practice. Consider a used piano from a dealer. Many keep used pianos in stock as rentals, but they're happy to sell them, too.
- There can be differences between individual pianos of the same brand and model. Find out if the piano you receive will be the one you have tried and heard.
- Used-pianos can be a great deal but it is difficult for the inexperienced to know a good instrument from a piece of junk. Always take a piano tuner with you when purchasing a used piano to inspect to make sure the soundboard is not cracked or damaged.
- Even a very cheap used piano can be a great learning instrument if it plays well and sounds good and has been maintained well and tuned often.
- If you're buying a piano for your child, make sure he or she gets to play it for a good length of time before you purchase it. Arrange with the showroom for your child to actually spend a practice period on the piano so that your child is happy and satisfied with it. If your child is unhappy with the piano, he or she will not want to practice on it, and you will have then spent your money on, essentially, a piece of furniture. (Once you've narrowed your choices down to 2 or 3 instruments, make sure your child gets to test drive each one. When your child tells you the piano he or she prefers, **take it into consideration**! If children take part in the decision making, they feel more ownership of the piano and are more motivated to practice on it.)

Warnings

- Keep in mind that, if you are a professional, or an experienced musician, you might be listening to and looking at your piano for a long time so make sure it

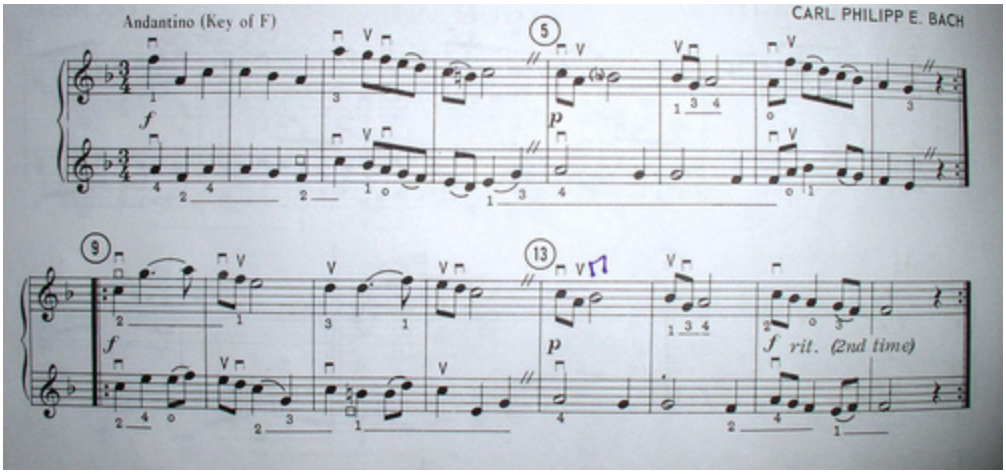
meets every one of your requirements and needs. Pianos depreciate very little over time. A used piano built ten years ago, and maintained well will still be worth almost as much as a comparable new piano. Beware of piano stores going out of business sales unless you get a warranty from the manufacturer, and have had the piano parts inspected by a piano tuner. The only maintenance that has to be taken care of, is to have the piano tuned on a regular basis and has nothing to do with the place you purchased it from.

How to Practice Sight Reading Piano Music

Assuming that you already have basic knowledge of playing the piano, and are learning how to sight read the music sheet a few hints on how to learn to read might help. Just like in typing, playing the piano requires that you do not look down at your hands, and that reading the notes becomes as second nature as reading words in a book!

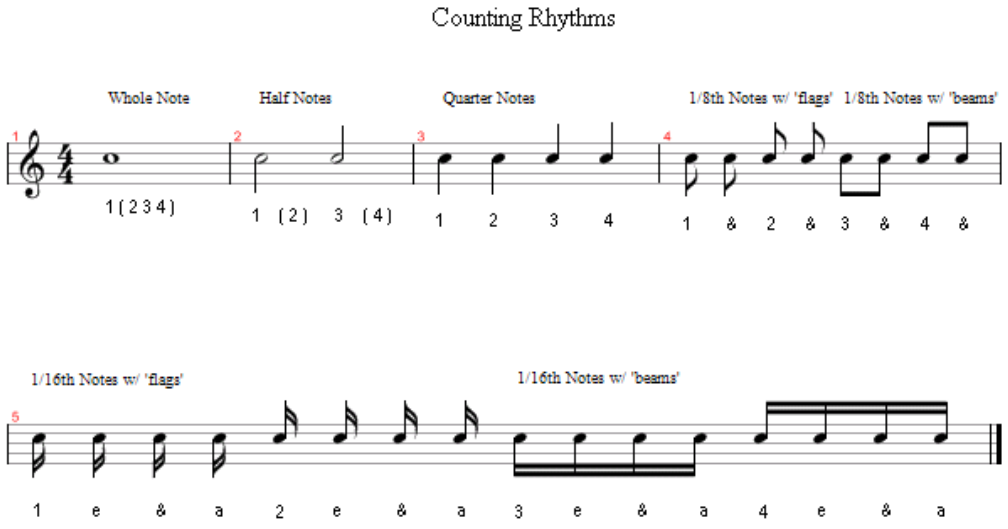
Steps

1.



Find music books at your local library, borrow books or print free sheet music from a website at your skill level or easier. This should be music that you think you would like but have never heard before.

2. **Sit at the piano, and open the book to the first page**. Try to look at the notes, say the notes softly, and understand the piece a little bit without actually playing any part of it. Look at the key signature, any changes of clefs, and the dynamics of the piece. If you can, look for chords, and try to determine what they are. Look for the trickiest part of the piece, for example, semiquavers, or a corner with a lot of accidentals that are difficult to digest, and determine a speed at which you think you can play even the trickiest parts. It is very important to *not stop and restart when you make a mistake*. Just keep playing. Look for patterns while you are playing, and always try to read a minimum of one measure ahead.
3. **When you finish one piece, repeat it until you feel comfortable knowing the names of the notes**. Remember, it is like typing -- your mind will tell your fingers where to go once you practice it often enough.
4. **Continue with the same piece, and when the notes are easy to play, learn the timing of the piece**. No piece can sound decent if the timing is incorrect.
5. **Keep practicing in this manner as often as you can**. Feel free to go back and study the pieces you played in more depth. The more you practice, the better your sight reading skills will become.

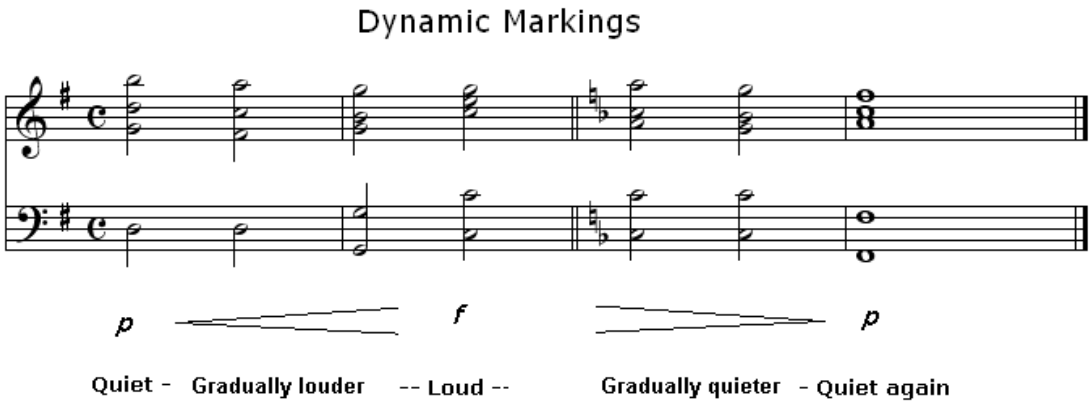


Tips

- You can, if you do not have a piano nearby, read the music notes without even playing. Look at their positions and remember what they look like. Get it to memory.
- A very good skill when sight reading is recovering from mistakes. You will make them. Don't let them fluster you; just keep playing. It is almost guaranteed that if

the listener isn't familiar with the music, and you don't give it away, they'll never know.

- One of the hardest parts of sight reading music is getting the rhythm correct. It helps to count out loud, "One and two and three and four and..." Of course the numbers that you count depends on the piece.
- It helps to accompany a singer or other instrument while sight reading. This forces you to stay honest.
- Check for sharps or flats, key changes, or changes in the time signature. If you are dealing with any large jumps (i.e., octave jumps), also beware of those. Double and triple check any note that isn't in the staff.
- Do not judge yourself or your ability as you sight read. Remember, you are simply trying to improve your reading skills. Since sight reading involves playing continuously (not stopping as if you were practicing to perfect the piece), your focus is important. Getting angry at yourself or putting yourself down to any degree merely distracts you from the main goal. Smile and play with intent.
- Another very good (And far more enjoyable) way to practice sight reading is to play duets with a friend, as both pianists will be forced to keep in time, play continuously and with correct notes as far as possible.



Chapter- 8

How to Improvise on the Piano

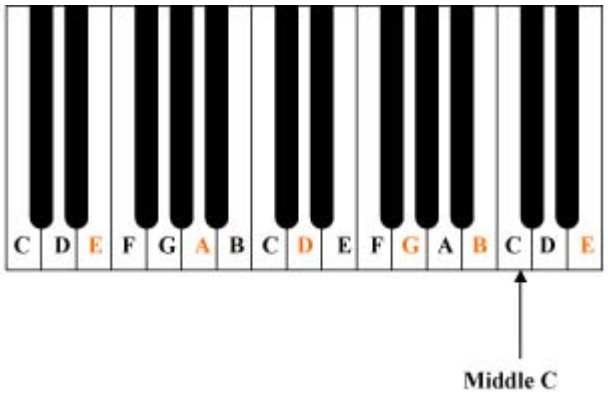
Many of you sitting at home will be wondering, what is improvisation. The simplified definition of it is performing without preparation. Improvising can improve your piano playing.

Steps

1. **Have a knowledge of a variety of music, so as to not be imitating any one song**.
2. **Learn about scales**. Jump in and learn one that has a lot of sharps or flats in it if you can, such as B Major. Practice the scale you learn maybe just in the right hand at first. You might find these "bumpy" scales are easier to play than C major, since you can "see" how the scale is shaped!
3. **Learn about chords**. It is suggested that you learn triad chords before moving on to quartals and such. Triad chords consist of three notes (1-2-3) and between two notes and the root(1-2 or 1-3) is a distinct interval. For a quick example, a C

major traid consists of a C-E-G. Between C-E is a major 3rd, while between C-G the interval is a perfect fifth.

4. **There are as many ways to improvise as there are people**. Here are some suggested techniques to try...you may find one may suit your way of thinking better than others, so give them each a shot!
    - Method 1



        - white notes (3 1/2 octaves)

          Sit down and hit notes only of the same key. (F, G, Em, A#, etc.)

        - Have your left hand play the background chorus (slow block or broken chords) in the same key.
        - Have your right hand playing the melody.
        - Switch keys once you become better at it to give it a broader, more complex feel and to amplify the beauty of the song.
    - Method 2
        - Play a slow 4/4 piece with each measure getting one chord on the left hand.
        - With the right, improv a melody within that chord.
        - The next measure switch to a different chord and continue the melody in that next chord.
        - Continue this until you become proficient (or bored).
    - Method 3
        - Once you've learned how to play some scales in both hands, try improvising with both hands going at once. Get your fingers moving in the same scale...it'll sound alright.
        - Try playing a "call and answer" game with your hands. Play some random phrase in one hand and try to repeat it in your other hand. Start simple. Eventually you may find your hands can generate melodic ideas simultaneously that work together!
    - Method 4
        - Instead of simply playing block chords or arpeggios in one hand, try to make the top or bottom note of that accompaniment form its own melody. The pinky and the thumb tend to be most convenient for this way of playing.

    - Try playing accompaniments in your right hand with chords or arpeggios and melodies in your left hand.

Tips

- As with anything to do with music, practicing is the key.
- Improvisation cannot be completely spontaneous...it must build on a vocabulary of musical devices. These can include small phrases of melody, rhythms, accompaniments, harmonic progressions, and so on. The more expansive your vocabulary, the more your music will become "your own."
- Remember, to do this you should also listen to other people playing other pieces, and listen to other people improvising too, so you get a feeling of how to improvise.
- Experiment with playing measured rhythms (4/4 etc.) and completely free rhythm. In free rhythm, there are no rules at all. You may find this helps you come up with new ideas easier than trying to fit all your ideas into a particular kind of rhythm.
- Record yourself early and often. Listen to these recordings. When you're starting out, it may be difficult to remember things you played. If you listen to your recordings, you may hear something cool you did that you forgot. Then you can pick out that cool idea and use it again...thus helping to build your musical vocabulary.
- 

  Find a quiet spot with a window. This helps you to be yourself and let what things you have cooped up inside flow out onto the keys. Inspiration is many times found when viewing the beauty of the earth.

- Relax and be loose with your fingers
- If you mess up and accidentally hit a note not in key, go with it and keep going in the new key, don't go back. (EXAMPLE: Key of C--> you play C...E...G...A...F#...C#...D...<--now you're in the key of D)

- Vary in volume, intensity, speed, and other dynamics to add emotion and beauty. Use improvisation to let out your anger or soothe your worries. Play what your heart tells you to play (cheesy, but true).
- If you mess up, pretend it was a part of the song and keep going with it (example: you're playing smoothly and your pinky slams the wrong note...start playing choppy and fast in that new key and gradually fade back to smooth.
- Learn music patterns. A harsh, short gliss gives the impression of anger and reproach. Arpeggios in the bass voice tend to give a feeling of movement. Observe patterns in speech and music and use those observations to your advantage.

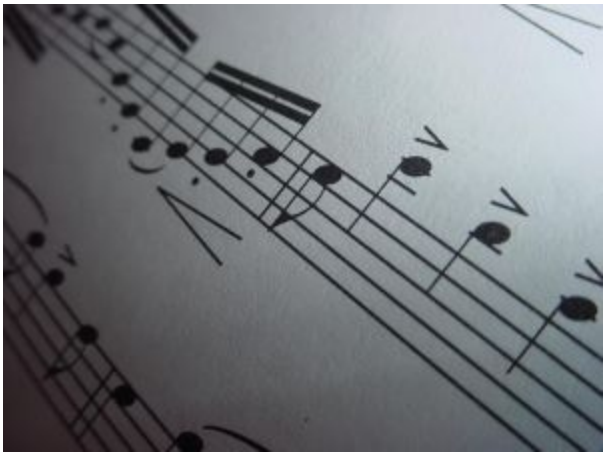
Warnings

- Do not feel you must learn tons about music theory "before" learning to improvise. It is sufficient to begin by learning maybe one scale and a couple of chords within it...you can learn other chords/scales/theory with time!
- Do not have any one piece in mind while playing; let it come naturally.
- Don't be afraid to hit "wrong" notes! There are no wrong notes in improvisation---all is freedom!

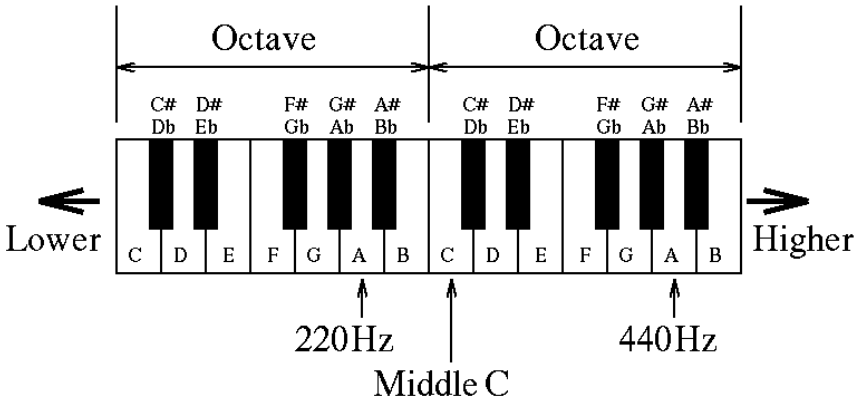
Things You'll Need

- knowledge of a variety of music
- A quiet place

How to Change Musical Keys on a Piano



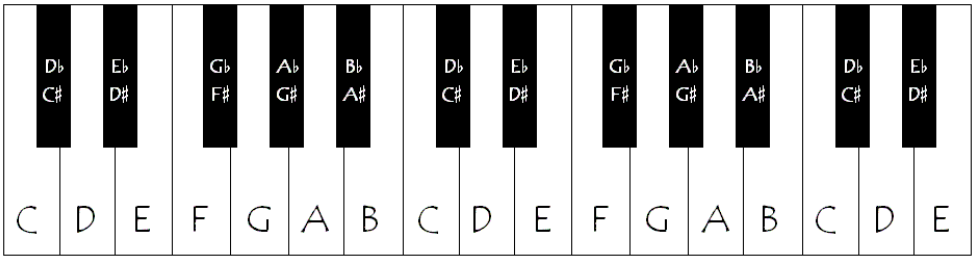
When playing the piano, and learning how to compose music, it is important to learn how to transpose any song from one musical key to the other. This is especially important when playing with a band, or accompanying a singer. It is also necessary in music theory exams, and when writing music for transposing instruments such as a Bb clarinet.



Steps

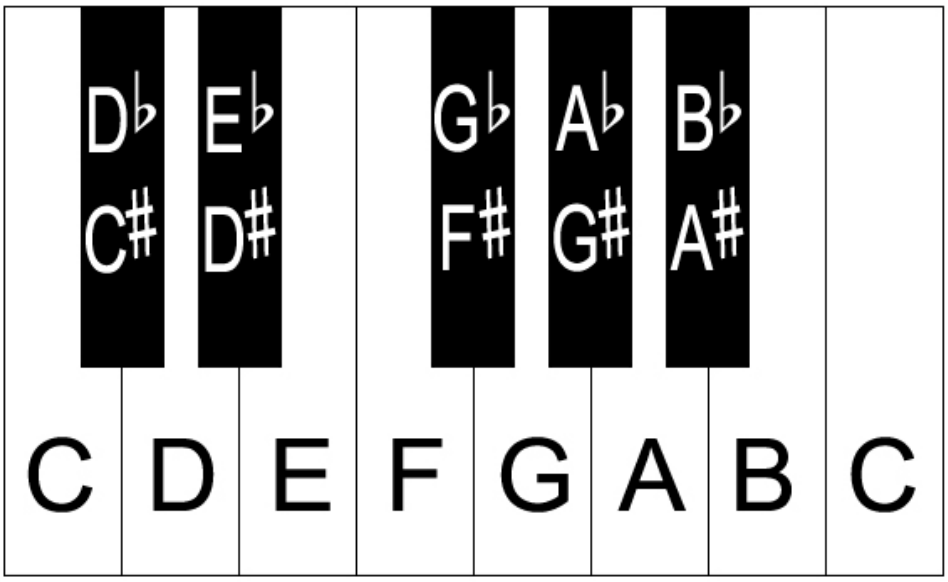
1. **Figure out how far you're going**. For example, if you're going from D to G, that's a perfect fourth, or four notes up, counting the D, the G, and all the notes in between. If you don't know about harmonic intervals, count the semitones, eg: A to Bb is one semitone, A to B is two semitones, D to G is five semitones.
2. **Know what the key signature of the new key is**. For example, D has F# and C#. G just has F#. Ab has Bb, Eb, Ab, and Db. Also, make sure you know how to write the new key, and which order to add in the sharps and flats.
3. **Play the music as written, except play everything the number of semitones higher or lower**. Continuing with the same example, when you see a D, play a G. If you see an E, play an A, and so on.

4. **Include the sharps or flats in the NEW key signature**. For example, if you see a C in the original music (which is actually a C#, but that isn't important right now), you're going to play an F, because that's a fourth higher than C. But you're in G now, which has an F# in the key signature. So you play an F# instead. In this example, both the original note and the new note are both sharped. This will not always be the case. A natural note may become sharp or flat or natural, depending on the new key. This won't matter if you have translated everything up or down the same number of semitones.
5. **Choose the corresponding accidental for the new key**. For example, if your original song (in D) has a Bb, that's a half-step down from its normal pitch (n to b = -1). The note B in the old key corresponds to the note E in the new key. In the new key (G) E is normally natural, so you must drop it a half-step, to Eb.
6. **Playing a song written in Ab, which has Bb, Eb, Ab, and Db**. You're transposing it to E, which has F#, C#, G#, and D#. You see a D# in the written score. You say to yourself, " D is normally flatted in this key, but here it's sharpened. That means it's been raised two semitones, or one tone. D in the old key corresponds to A in the new key. A minor doesn't have any sharps or flats associated with it, so to raise it a whole-step up from A natural, play Ax, which is equivalent to B." Don't worry; it's not usually going to be this difficult in real life.
7. **If there's a key change in the song itself, you have to make sure to transpose the music after the key change correctly**. For example, if the original music goes from C to D (a modulation of one tone), and you're transposing such that it starts in Eb, the music after the key change must be in a key a tone higher than Eb, which is of course F.



Tips

- Begin with 'close' transpositions (C major to D major, Ab major to A major, etc.) These are generally easier to do because the hands tend to stay in the same place as the original.
- If you need to, make notes on the score. For example, pencil in "Eb" or "G" to remind yourself what notes to play.
- Remember that some keys can be expressed in two ways. They are C# (7 sharps) = Db (5 flats), F# (6 sharps) = Gb (6 flats), and B (5 sharps) = Cb (7 flats). If you're going into one of these, decide which one is easiest to think of, or suits the music more, although they'll both be played the same.



Warnings

- Don't assume this is easy. Although one can understand *how* to do it, not everyone can, unless it's very easy, like transposing from F to C.
- The two parts should sound exactly the same once transposed; just one is higher than the other. If they don't, something has gone wrong somewhere.

Chapter- 9

Electric Piano

Rhodes Mark II 73 Stage Piano

An **electric piano** is an electric musical instrument.

Neo-Bechstein (1929)

Vierling-Förster piano (1937)

Electric pianos produce sounds mechanically and the sounds are turned into electronic signals by pickups. Unlike a synthesizer, the electric piano is not an electronic instrument, but electro-mechanical. The earliest electric pianos were invented in the late 1920s; the 1929 *Neo-Bechstein* electric grand piano was among the first. Probably the earliest stringless model was Lloyd Loar's *Vivi-Tone Clavier*.

The popularity of the electric piano began to grow in the late 1950s, reaching its height during the 1970s, after which they were eventually replaced by synthesizers capable of piano-like sounds without the disadvantages of moving mechanical parts. Many models were designed for home or school use, or to replace a heavy and un-amplified piano on stage, while others were conceived for use in school or college piano labs for the simultaneous tuition of several students using headphones.

Rhodes Mark 7 (2009) on stage

Due to their size and weight, digital stage pianos have replaced many of the original electromechanical instruments in contemporary usage. However, In 2009, Rhodes Music Corporation started producing a new line of electro-mechanical pianos, known as the Rhodes Mark 7.

Tone Production

The actual method of tone production varies from one model to another:

Struck strings

Yamaha CP-70M

Strings and hammers of Yamaha CP-70

Yamaha, Baldwin, Helpinstill and Kawai's electric pianos are actual grand or upright pianos with strings and hammers. The Helpinstill models have a traditional soundboard; the others have none, and are more akin to a solid-body electric guitar. On Yamaha, Baldwin and Kawai's pianos, the vibration of the strings is converted to an electrical signal by piezoelectric pickups under the bridge. Helpinstill's instruments use a set of electromagnetic pickups attached to the instrument's frame. All these instruments have a tonal character similar to that of an acoustic piano.

Struck reeds

Wurlitzer 200A

Wurlitzer electric pianos use flat steel reeds struck by felt hammers. The reeds fit within a comb-like metal plate, and the reeds and plate together form an electrostatic or capacitive pickup system, using a DC voltage of 170v. This system produces a very distinctive tone – sweet and vibraphone-like when played gently, and developing a hollow resonance as the keys are played harder. The reeds are tuned by adding or removing mass from a lump of solder at the free end of the reed. Replacement reeds are furnished with a slight excess of solder, and thus tuned "flat"; the user is required – by repeated trial and error – to gradually file off the excess solder until the correct tuning is achieved. The "Columbia Elepian," also branded as "Maestro" uses a reed system similar to the Wurlitzer.

Struck tuning-forks

Rhodes Mark II Stage 73

Tuning forks of Fender Rhodes Mark I

The tuning-fork here refers to the struck element having two vibrating parts – physically it bears little resemblance to a traditional type. In Fender Rhodes instruments, the struck portion of the "fork" is a tine of stiff steel wire. The other part of the fork, parallel and adjacent to the tine, is the tonebar, a sturdy steel bar which acts as a resonator and adds sustain to the sound. The tine is fitted with a spring which can be moved along its length to allow the pitch to be varied for fine-tuning. The tine is struck by the small neoprene (originally felt) tip of a hammer activated by a greatly simplified piano action (each key has only three moving parts including the damper). Each tine has an electromagnetic pickup placed just beyond its tip. The Rhodes piano has a distinctive bell-like tone, fuller than the Wurlitzer, with longer sustain and with a "growl" when played hard. Hohner's "Electra-Piano" uses a similar system, with a metal reed replacing the Rhodes' tine. Its sound is correspondingly somewhere between the Rhodes and Wurlitzer.

Plucked reeds

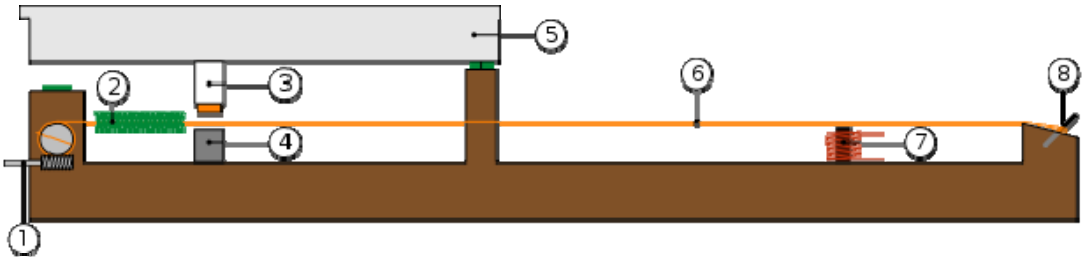
Hohner Pianet (below)

Weltmeister Claviset (Selmer Pianotron)

Hohner's original Pianet uses adhesive pads made from foam rubber and leather impregnated with a viscous silicone oil to pluck metal reeds. When the key is released, the pad acts as a damper. An electrostatic pickup system similar to Wurlitzer's is used. The tone produced resembles that of the Wurlitzer but brighter and with less sustain. The same firm's "Cembalet" uses rubber plectra and separate dampers but is otherwise almost identical. Hohner's later "Pianet T" uses silicone rubber suction pads rather than adhesive pads and replaces the electrostatic system with passive electromagnetic pickups similar to those of the Rhodes, the reeds themselves however being magnetized. The Pianet T has a far mellower sound not unlike that of the Rhodes instruments. None of the above instruments have the facility for a sustain pedal.

A close copy of the Cembalet is the "Weltmeister Claviset," also marketed as the "Selmer Pianotron." This has electromagnetic pickups with a battery-powered preamplifier, and later models have multiple tone filters and a sustain pedal.

Other electric keyboard instruments



Tangent action of a Clavinet:
1.Tuning / 2.Damper / 3.Tangent / 4.Anvil / 5.Key / 6.String / 7.Pickup / 8. Tailpiece

Hohner Clavinet D6

Although not technically pianos, the following are electric harpsichords and clavichords.

Baldwin's "Solid-Body Electric Harpsichord" or "Combo Harpsichord" is an aluminum-framed instrument of fairly traditional form, with no soundboard and with two sets of electromagnetic pickups, one near the plectra and the other at the strings' mid-point. The instrument's sound has something of the character of an electric guitar, and has occasionally been used to stand in for one in modern chamber music. Roger Penney of Bermuda Triangle Band worked on the design and development of the original instrument for the Cannon Guild Company, a premier harpsichord maker located in Cambridge Massachusetts. This instrument had an aluminum bar frame, a spruce wood soundboard, bar magnetic pickups, and a Plexiglas (clear plastic) openable lid. The prototypes and design were sold to Baldwin who made some modifications, and then manufactured the instrument under their own name.

Hohner's "Clavinet" is essentially an electric clavichord. A rubber pad under each key presses the string onto a metal anvil, causing the "fretted" portion of the string to vibrate. When the key is released, the whole string is theoretically free to vibrate but is immediately damped by yarn woven across the far end. Two electromagnetic single-coil pickups under the strings detect the vibrations which are then preamplified and filtered.

Playing technique and styles

As with electric vs. acoustic guitars, the sound of most electric pianos differs considerably from that of an acoustic instrument, and the electric piano has thus acquired a musical identity of its own, far beyond that of simply being a portable, amplified piano. In particular, the Rhodes piano lends itself to long, sustained "floating" chords in a way which would be impossible on an acoustic instrument, while the Hohner Clavinet has an instantly recognizable vocabulary of percussive riffs and figures which owe less to conventional keyboard styles than to funk rhythm guitar and slap bass. Early Wurlitzer models had vacuum tube amplifiers, which could be over-driven to create a distinctive distortion. Later transistorized models, while sharing a similar mechanical approach to sound generation, didn't replicate the "fat" sound of the tube-based models, but instead sported a soulful and useful tremolo.

- Examples:
  - Rhodes piano
  - Hohner Cembalet, Clavinet, Pianet, Electra Piano
  - Wurlitzer EP-200A
  - Yamaha CP-70 Electric Grand Piano

- Popular pieces with electric pianos:
  - Fender Rhodes:
    - *The Beatles*: "Get Back", "Don't Let Me Down" (both played by Billy Preston)
    - *The Doors*: "L.A. Woman", "Riders on the Storm" (played by Ray Manzarek)

        - *Chick Corea*: "Spain", "La Fiesta"
        - *Herbie Hancock*: "Chameleon"
        - *Billy Joel*: "Just the Way You Are"
        - *Stevie Wonder*: "You Are the Sunshine of My Life", "Isn't She Lovely", "I Believe (When I Fall In Love It Will Be Forever)"
        - *Pink Floyd*: "Dogs", "Hey You"; "Sheep"
        - *Elton John*: "Daniel"; "Sorry Seems To Be The Hardest Word"; "Little Jeannie"
        - *Peter Frampton*: "Baby, I Love Your Way"
        - *One Day as a Lion*: "Wild International"
    - Hohner Cembalet:
        - *Manfred Mann*: "Do Wah Diddy Diddy"
        - *Elvis Costello*: "Veronica"
        - *The Stranglers*: "No More Heroes"
    - Hohner Clavinet:

The Clavinet C, used on Stevie Wonder's Superstition

        - *The Band*: "Up On Cripple Creek"
        - *Stevie Wonder*: "Superstition"
        - *Led Zeppelin*: "Custard Pie", "Trampled Underfoot"
        - *Steely Dan*: "Kid Charlemagne"
        - *Pink Floyd*: "Pigs (Three Different Ones)", "Shine On You Crazy Diamond (Parts 6-9)"
        - *Gentle Giant: "Cogs In Cogs, "Experience", "So Sincere"*
        - *Van der Graaf Generator: "The Undercover Man", "Scorched Earth", "Arrow"*
    - Hohner Electra-Piano:

        - *Led Zeppelin*: "Stairway To Heaven", "Misty Mountain Hop", "No Quarter", "Down By The Seaside" (studio recordings only, when played live these songs were played on a Fender Rhodes)
- Hohner Pianet:
    - *The Association*: "Never My Love"
    - *The Beatles*: "The Night Before", "I Am the Walrus", "Tell Me What You See", "You Like Me Too Much"
    - *The Guess Who*: "These Eyes"
    - *The Zombies*: "She's Not There"
    - *The Kingsmen*: "Louie Louie"
    - *The Lovin' Spoonful*: "Summer In The City"
    - *Soft Machine: "Slightly All The Time", "Out-Bloody-Rageous"*
    - *Van Der Graaf Generator: "Plague of lighthouse"*
- Wurlitzer Electric Piano:

Wurlitzer 200A used by Supertramp

    - *Ray Charles*: "What'd I Say"
    - *Cannonball Adderley Quintet*: "Mercy, Mercy, Mercy" Only first studio recording, all subsequent live verisions are Fender-Rhodes.
    - *The Buckinghams*: "Hey, Baby (They're Playing Our Song)"
    - *Steely Dan*: "Do It Again"
    - *Pink Floyd*: "Time", "Money", "Have A Cigar", "Shine On You Crazy Diamond (Parts 6-9)"
    - *Queen*: "You're My Best Friend"
    - *King Harvest*: "Dancing in the Moonlight"
    - *Supertramp*: "Dreamer", "Lady (supertramp song)", "Bloody Well Right", "The Logical Song"; "Goodbye Stranger"

- Baldwin Combo Harpsichord:
  - *The Association*: "Along Comes Mary"
  - *The Beatles*: "Because"

Electronic Piano

The keys of an electronic piano

An **electronic piano** is a keyboard instrument designed to simulate the timbre of a piano (and sometimes a harpsichord or an organ) using analog circuitry.

Electronic Piano was also the trade name used for Wurlitzer's popular line of electric pianos, which were produced from the 1950s to the 1980s, although this was not actually what is now commonly known as an electronic piano. Electronic pianos work similarly to analog synthesizers in that they generate their tones through oscillators, whereas electric pianos are mechanical, their sound being electrified by a pickup.

The first electronic pianos date from the 1970s and were mostly made in Italy (Davies 2001), although similar models were made concurrently in Japan. An exception is the range of instruments made by RMI in the USA from 1967 to approximately 1980, which became one of the more popular electronic pianos used by professional musicians. Most electronic pianos (including the RMI) are not velocity sensitive, in that they do not vary their volume based on how hard or soft the keys are played, like an organ.

Electronic pianos became less popular in the 1980s when the digital piano and polyphonic synthesizer became available and affordable enough for both professional and home use as an inexpensive, smaller and lighter alternative to an acoustic piano. The triumph of the synthesized piano first came in 1982, with the development of the Kurzweil K250.

As of 2009, synthesized pianos have attained a remarkable level of realism, with the Yamaha AvantGrand reportedly indistinguishable from a real piano by 95% of pianists (Wilson 2009).

Chapter- 10

Prepared Piano

Experimental music composer Christian Wolff in his prepared piano performance, 2007

A **prepared piano** is a piano that has had its sound altered by placing objects (preparations) between or on the strings or on the hammers or dampers.

The idea of altering an instrument's timbre through the use of external objects has been applied to instruments other than the piano; see, for example, prepared guitar.

Background information

The prepared piano is interpreted by some musicologists as an aleatoric technique (although many composers, such as John Cage, often indicated precise measurements for placement of preparations), which was pioneered primarily by the aforementioned composer John Cage. However this is an oversimplification of the technique's desired results. Richard Bunger wrote a book *The Well Prepared Piano* in which he explains how Cage prepared his pianos and even which pianos are suitable, because of the deviation of string lengths within different types of brands. Bunger also clarifies why the preparations were done in such ways, in other words, what sound it causes per adaption (harmonics obtained, timbrel effects, etc.). The timbre of the instrument changes dramatically when preparations are introduced. Much of the technique is related to the harmonic positions of the strings. For instance a preparation on 1/2 of the string length causes a different sound than on 1/3. Cage was aware of this and made use of this knowledge. In other words, the preparations don't cause a random sound as often assumed. Parenthetically, many modern scores refer to a previously recorded sound, or include recordings that allow a pianist to imitate a desired sound on their instrument.

History

John Cage coined the term prepared piano and was undoubtedly the composer who made the technique famous. He credited Henry Cowell and, to a lesser extent, Erik Satie, for contributing to the idea, but it is unclear if Cage was aware of many other precedents described below.

Since the later days of the harpsichord (17th–18th century), stringed keyboard instruments could have registers, for instance giving a drier or more ample sound when the instrument's stop was pulled (a stop in the meaning of a similar disposition for organs, known as organ stops).

Fortepiano

When the first pianos were invented around the beginning of the 18th century, the only "coloring" of the sounds produced by the instrument resulted from how the individual keys were pressed (loud = *forte*, or softly = *piano*, giving the name to the instrument: fortepiano). A type of register, first implemented with a stop above the keyboard, which became a standard device for pianos in the second half of the 18th century, was engaging or disengaging the muting of the strings after the release of a key. Only by the end of the 18th century, the muting mechanism was triggered with a pedal, after an intermediate period when this register was operated by the pianist's knees.

Fortepiano by Paul McNulty after Walter & Sohn, ca. 1805

Fortepiano designates the early version of the piano, from its invention by the Italian instrument maker Bartolomeo Cristofori around 1700 up to the early 19th century. It was the instrument for which Haydn, Mozart, and the early Beethoven wrote their piano music. Starting in Beethoven's time, the fortepiano began a period of steady evolution, culminating in the late 19th century with the modern grand. The earlier fortepiano became obsolete and was absent from the musical scene for many decades. In the 20th century the fortepiano was revived, following the rise of interest in historically informed performance. Fortepianos are built for this purpose today in specialist workshops.

Construction

The fortepiano has leather-covered hammers and thin, harpsichord-like strings. It has a much lighter case construction than the modern piano and, except for later examples of the early nineteenth century (already evolving towards the modern piano), it has no metal frame or bracing. The action and hammers are lighter, giving rise to a much lighter touch, which in good fortepianos is also very responsive.

The range of the fortepiano was about four octaves at the time of its invention and gradually increased. Mozart (1756–1791) wrote his piano music for instruments of about five octaves. The piano works of Beethoven (1770–1827) reflect a gradually expanding range; his last piano compositions are for an instrument of about six octaves. (The range of most modern pianos, attained in the 19th century, is 7⅓ octaves.)

Fortepianos from the start had devices similar to the pedals of modern pianos, but these were not always pedals; sometimes hand stops or knee levers were used instead.

Sound

Like the modern piano, the fortepiano can vary the sound volume of each note, depending on the player's touch. The tone of the fortepiano is quite different from that of the modern piano however, being softer with less sustain. Sforzando accents tend to stand out more than on the modern piano, as they differ from softer notes in timbre as well as volume, and decay rapidly.

Fortepianos also tend to have quite different tone quality in their different registers — noble and slightly buzzing in the bass, "tinkling" in the high treble, and more rounded (closest to the modern piano) in the mid range. In comparison, modern pianos are rather more uniform in sound through their range.

History

Cristofori

What we now call the fortepiano was invented by harpsichord maker Bartolomeo Cristofori in Florence around the turn of the 18th century. The first reliable record of a fortepiano appears in the inventory of the Medici family (who were Cristofori's patrons), dated 1700. Cristofori continued to develop the instrument until the 1720s, the time from which the surviving three Cristofori instruments date.

Cristofori is perhaps best admired today for his ingenious fortepiano action, which in some ways was more subtle and effective than that of many later instruments. However, other innovations were also needed to make the fortepiano possible. Merely attaching the Cristofori action to a harpsichord would have produced a very weak tone. Cristofori's instruments instead used thicker, tenser strings, mounted on a frame considerably more robust than that of contemporary harpsichords. As with all later pianos, in Cristofori's

instruments the hammers struck more than one string at a time; Cristofori used pairs of strings throughout the range.

Cristofori was also the first to incorporate a form of soft pedal into a piano (the mechanism by which the hammers are made to strike fewer than the maximum number of strings; Cristofori's was a hand stop). It is not clear whether the modern soft pedal descends directly from Cristofori's work or arose independently.

Cristofori's invention soon attracted public attention as the result of a journal article written by Scipione Maffei and published 1711 in *Giornale de'letterati d'Italia* of Venice. The article included a diagram of the action, the core of Cristofori's invention. This article was republished 1719 in a volume of Maffei's work, and then in a German translation (1725) in Johann Mattheson's *Critica Musica*. The latter publication was perhaps the triggering event in the spread of the fortepiano to German-speaking countries (see below).

Cristofori's instrument spread at first quite slowly, probably because, being more elaborate and harder to build than a harpsichord, it was very expensive. For a time, the fortepiano was the instrument of royalty, with Cristofori-built or -styled instruments played in the courts of Portugal and Spain. Several were owned by Queen Maria Barbara of Spain, who was the pupil of the composer Domenico Scarlatti. One of the first private individuals to own a fortepiano was the castrato Farinelli, who inherited one from Maria Barbara on her death.

The first music specifically written for fortepiano dates from this period, the *Sonate da cimbalo di piano* (1732) by Lodovico Giustini. This publication was an isolated phenomenon; James Parakilas conjectures that the publication was meant as an honor for the composer on the part of his royal patrons. Certainly there could have been no commercial market for fortepiano music while the instrument continued to be an exotic specimen.

It appears that the fortepiano did not achieve full popularity until the 1760s, from which time the first records of public performances on the instrument are dated, and when music described as being for the fortepiano was first widely published.

Silbermann fortepianos

It was Gottfried Silbermann who brought the construction of fortepianos to the German-speaking nations. Silbermann, who worked in Freiberg in Germany, began to make pianos based on Cristofori's design around 1730. (His previous experience had been in building organs, harpsichords, and clavichords.) Like Cristofori, Silbermann had royal support, in his case from Frederick the Great of Prussia, who bought many of his instruments.

Silbermann's instruments were famously criticized by Johann Sebastian Bach around 1736, but later instruments encountered by Bach in his Berlin visit of 1747 apparently

met with the composer's approval. It has been conjectured that the improvement in Silbermann's instruments resulted from his having seen an actual Cristofori piano, rather than merely reading Scipione Maffei's article. The piano action Maffei described does not match that found in surviving Cristofori instruments, suggesting that Maffei either erred in his diagram (he admitted having made it from memory) or that Cristofori improved his action during the period following Maffei's article.

Silbermann is credited with the invention of the forerunner of the damper pedal, which removes the dampers from all the strings at once, permitting them to vibrate freely. Silbermann's device was in fact only a hand stop, and thus could be changed only at a pause in the music. Throughout the Classical era, even when the more flexible knee levers or pedals had been installed, the lifting of all the dampers was used primarily as a coloristic device. In the post-fortepiano era of the 19th century, the damper pedal became the foundation of piano sound, which came to rely on the sympathetic vibrations of the undamped but unstruck strings.

Viennese school of builders

The fortepiano builders who followed Silbermann introduced actions that were simpler than the Cristofori action, even to the point of lacking an escapement (the device that permits the hammer to fall to rest position even when the key has been depressed). Such instruments were the subject of criticism (particularly, in a widely quoted 1777 letter from Mozart to his father), but were simple to make and were widely incorporated into square pianos.

Stein

One of the most distinguished fortepiano builders in the era following Silbermann was one of his pupils, Johann Andreas Stein, who worked in Augsburg, Germany. Stein's fortepianos had (what we, or Cristofori, would call) "backwards" hammers, with the striking end closer to the player than the hinged end. This action came to be called the "Viennese" action, and was widely used in Vienna, even on pianos up to the mid 19th century. The Viennese action was simpler than the Cristofori action, and very sensitive to the player's touch. According to Edwin M. Ripin, the force needed to depress a key on a Viennese fortepiano was only about a fourth of what it is on a modern piano, and the descent of the key only about half as much. Thus playing the Viennese fortepiano involved nothing like the athleticism exercised by modern piano virtuosos, but did require exquisite sensitivity of touch.

Stein put the wood used in his instruments through a very severe weathering process, and this included the generation of cracks in the wood, into which he would then insert wedges. This gave his instruments a considerable longevity, on which Mozart commented, and there are several instruments still surviving today.

Fortepiano by Conrad Graf in the Reiss-Engelhorn-Museen, Mannheim

Other builders

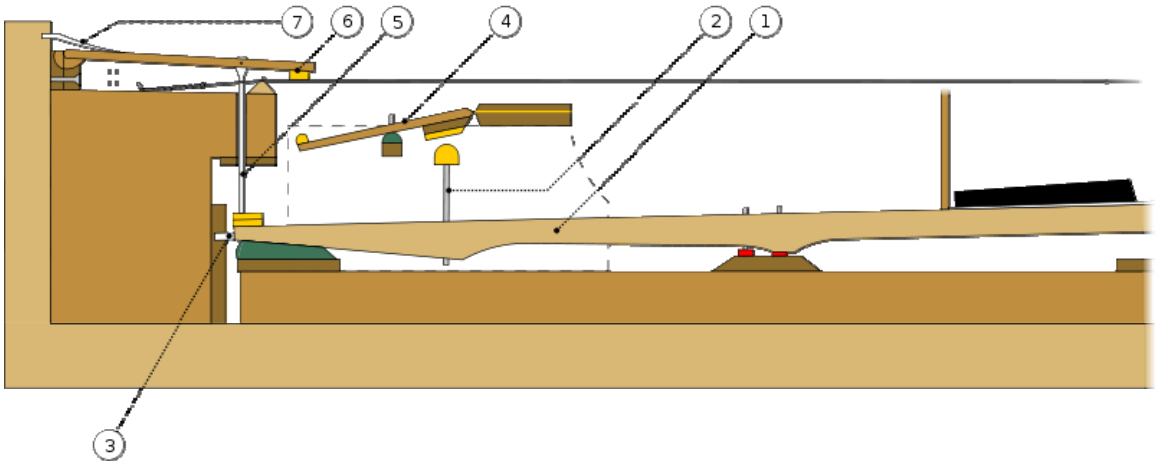
Stein's fortepiano business was carried on in Vienna with distinction by his daughter Nannette Streicher along with her husband Johann Andreas Streicher. The two were friends of Beethoven, and one of the composer's pianos was a Streicher. Later on in the early 19th century, more robust instruments with greater range were built in Vienna, by (for example) the Streicher firm, which continued through two more generations of Streichers.

Another important Viennese builder was Anton Walter, a friend of Mozart's who built instruments with a somewhat more powerful sound than Stein's. Although Mozart

admired the Stein fortepianos very much, as the 1777 letter mentioned above makes clear, his own piano was a Walter. The fortepianos of Stein and Walter are widely used today as models for the construction of new fortepianos, discussed below. Still another important builder in this period was Conrad Graf (1782–1851), who made Beethoven's last piano. Graf was one of the first Viennese makers to build pianos in quantity, as a large business enterprise.

English builders

Zumpe/Shudi



Zumpe's, or Masons, action drawn from the instrument of 1766. 1) key, 2) jack, a wire with leather stud on top, known by the workmen as the 'old man's head', 3) whalebone rear guide, projects from the end of the key, works in a groove to keep the key steady, 4) hammer, 5) whalebone jack, called the 'mopstick', 6) damper, 7) whalebone damper spring

The English fortepiano had a humble origin in the work of Johann Christoph Zumpe, a maker who had immigrated from Germany and worked for a while in the workshop of the great harpsichord maker Burkat Shudi. Starting in the middle to late 1760s, Zumpe made inexpensive square pianos that had a very simple action, lacking an escapement, (sometimes known as the 'old man's head'). Although hardly a technological advancement in the fortepiano, Zumpe's instruments proved very popular (they were imitated outside of England), and played a major role in the displacement of the harpsichord by the fortepiano. These square pianos were also the medium of the first public performances on the instrument in the 1760s, notably by Johann Christian Bach.

Backers/Broadwood/Stoddard

Americus Backers, with John Broadwood and Robert Stodart, two of Shudi's workmen, produced a more advanced action than Zumpe's. This *English grand action* with an escapement and check enabled a louder, more robust sound than the Viennese one, though it required deeper touch and was less sensitive. The early English grand pianos by

these builders physically resembled Shudi harpsichords; which is to say, very imposing, with elegant, restrained veneer work on the exterior. Unlike contemporary Viennese instruments, English grand fortepianos had three strings rather than two per note.

Broadwood

John Broadwood married the master's daughter (Barbara Shudi, 1769) and ultimately took over and renamed the Shudi firm. The Broadwood company (which survives to this day) was an important innovator in the evolution of the fortepiano into the piano. Broadwood, in collaboration with Jan Ladislav Dussek, a noted piano virtuoso active in London in the 1790s, developed pianos that gradually increased the range to six octaves. Dussek was one of the first pianists to receive a 5½ foot piano, and in 1793 he wrote the first work for piano "with extra keys", a piano concert (C 97). The firm shipped a piano to Beethoven in Vienna, which the composer evidently treasured.

Obsolescence and revival

From the late 18th century, the fortepiano underwent extensive technological development and thus evolved into the modern piano. The older type of instrument ceased to be made. In the late 19th century, the early music pioneer Arnold Dolmetsch built three fortepianos. However, this attempted revival of the fortepiano was evidently several decades ahead of its time, and did not lead to widespread adoption of the instrument.

In the second half of the 20th century, a great upsurge of interest occurred in period instruments, including a revival of interest in the fortepiano. Old instruments were restored, and many new ones were built along the lines of the old. This revival of the fortepiano closely resembled the revival of the harpsichord, though occurring somewhat later in time. Among the more prominent modern builders have been Philip Belt, Paul McNulty, and Rodney Regier. As with harpsichords, fortepianos are sometimes built from kits purchased from expert makers (1, 2).

The reintroduction of the fortepiano has permitted performance of 18th and early 19th century music on the instruments for which it was written, yielding new insights into this music.

A number of modern harpsichordists and pianists have achieved distinction in fortepiano performance, including Paul Badura-Skoda, Malcolm Bilson, Hendrik Bouman, Ronald Brautigam, Jörg Demus, Richard Fuller, Geoffrey Lancaster, Gustav Leonhardt, Robert Levin, Steven Lubin, Trevor Pinnock, David Schrader, Peter Serkin, Andreas Staier, Susan Alexander-Max, Bart van Oort and Gary Cooper.

Opinions

Opinions about fortepiano sound vary widely, both from person to person and from instrument to instrument. Michael Cookson, a reviewer from UK-based MusicWeb-

International states that while he is "a lover of performances on authentic instruments", he considers the fortepiano to be "one of the least successful instruments and the most deserving of improvement." He argues that he is "not always comfortable with the sound made by many fortepianos and however fine a performance may be", he states that he "find[s] it difficult at times to get past the often unpleasant sound."

However, one of Cookson's colleagues from MusicWeb, Gary Higginson, disagrees with this negative view. In a CD review, Higginson argues that a performance on a "...reproduction of a 1730 Cristofori - the greatest of all makers and often the most underrated...makes a gorgeous sound. Yes it can be metallic and subdued in climaxes but it has a marvellous delicacy and, especially in the expressive sonatas, a profoundly beautiful sound."

Howland Auchincloss acknowledges that listeners' first reaction to the sound of a fortepiano may be to view it as a less attractive sound than that of a grand piano. However, he argues that "such a reaction will usually be changed if the player listens to good recordings." He states that the "clear sound and relatively short sustain of the fortepiano tends to favor the special elements of style in the music of Haydn and Mozart. The sound is different but not inferior."

Reed stop

But the idea of harpsichord-like registers lived on: in the early 19th century some pianos were provided with a reed stop, which lowered a strip of paper onto the strings. This led musicologists such as Tom Beghin to believe that the technique of placing a strip of paper on piano strings would probably have originated *before* it was standardised as a register operated with stops, and that, for instance, Mozart's *Alla Turca* can safely be played with a piece of paper on some of the strings as a historical interpretation.

Turkish stop

Around the turn of the nineteenth century, Turkish music was so popular that piano manufacturers made special pianos with a Turkish stop, also called the military or Janissary stop. The player would press a pedal that caused a bell to ring and/or a padded hammer to strike the soundboard in imitation of a bass drum. The Turkish stop was popular for playing the famous Mozart Rondo alla Turca, K. 331.

Satie's *Piège de Méduse*

In the piano version of his *Piège de Méduse* (1913 or 1914) Erik Satie's score called for placing sheets of paper on the piano strings in order to imitate the mechanical sound of a monkey puppet that figured in the play.

Villa-Lobos's *Choros no. 8*

In his 1925 work for two pianos and large orchestra, Heitor Villa-Lobos added to his score instructions to the pianist to insert pieces of paper between the strings and the hammers to attain a certain sonority.

Luthéal

In the 1920s, a new invention was presented, the Luthéal, which extended the register possibilities of a piano to its maximum, producing cimbalon-like sounds in some registers, exploiting harmonics of the strings when pulling other register-stops, and also some registers making other objects, which were lowered just above the strings, resound. But that instrument became obsolete before it became popular, partly due to most of the mechanics of the instrument being too sensitive, needing constant adjustment. The only pieces in the general repertoire to feature the Luthéal are L'Enfant et les Sortilèges (1920–5) and Tzigane (1924) by Maurice Ravel, performances of which tend to substitute an upright piano, either prepared with paper or straight.

Ragamalika

Another precedent to the prepared piano was an experiment by the French composer Maurice Delage (1879–1961): his Ragamalika (1912–22), based on the classical music of India, calls for a piece of cardboard to be placed under the B-flat in the second line of the bass clef to dampen the sound, imitating the sound of an Indian drum.

String piano

In the 1920s, American composer Henry Cowell coined the term string piano "to describe direct manipulation of piano strings, such as by plucking them with fingers or stroking them with a brush.

John Cage and later composers

John Cage was a composer who used prepared piano extensively and is credited with inventing the instrument. Cage popularized the prepared piano, particularly by the seminal *Sonatas and Interludes*, and inspired many other composers. Arvo Pärt's popular *Tabula Rasa* (1977) is one of the better-known compositions to make extensive use of a prepared piano.

Cage first prepared a piano when he was commissioned to write music for "Bacchanale", a dance by Syvilla Fort in 1938. For some time previously, Cage had been writing exclusively for a percussion ensemble, but the hall where Fort’s dance was to be staged had no room for a percussion group. The only instrument available was a single grand piano. After some consideration, Cage said that he realized it was possible “to place in the hands of a single pianist the equivalent of an entire percussion orchestra ... With just one musician, you can really do an unlimited number of things on the inside of the piano

if you have at your disposal an exploded keyboard." (Cage and Charles, 38) Cage would often quip that by preparing a piano he left it in better condition than he found it.

Cage himself said he was greatly inspired by Henry Cowell's experiments with the so-called string piano, in which the performer plucks and scrapes the strings of the piano directly.

In Cage's use, the preparations are typically nuts, bolts, and pieces of rubber to be lodged between and entwined around the strings. Some preparations make duller, more percussive sounds than usual, while others create sonorous bell-like tones. Additionally, the individual parts of a preparation such as a nut loosely screwed onto a bolt will vibrate themselves, adding their own unique sound. By placing the preparation between two of the strings on a note that has three strings assigned to it, it is possible to change the timbre of that note by depressing the soft pedal on the piano, which moves the hammers so they strike only two strings instead of all three (the soft pedal is traditionally called "una corda" on a grand). Other prepared piano sounds can be reminiscent of mbiras, marimbas, bells, wood blocks, Indonesian gendérs from a gamelan, or many other sounds less easily defined.

Although it is possible to prepare an upright piano, it is far easier, and far more common, on a grand piano.

On some pianos, a bar is installed above the hammers and activated by the center pedal. This bar can be furnished with felt—which will significantly mute the sound of the piano (a practice mute) or strips of cloth tape with metal attached to the ends, and the hammers will hit the metal bits onto the string. This is sometimes called a mandolin attachment—although mandolin players would likely object that the sound is nothing like a mandolin. This gives a sound similar to the tack piano, but it can instantly be returned to a regular piano sound by releasing the center pedal.

In classical music, the American composer Lou Harrison called for tack piano in some of his compositions, primarily for its clarity of tone. The composer Conlon Nancarrow adapted his player pianos in a similar way, covering the hammers of his pianos with metal bands and hardened leather strips.

More recent composers to use prepared pianos include Sophie Agnel, Koka Nikoladze, Michael Staley, Hiromi Uehara, Philip Corner, Roberto Carnevale, Carson Kievman, Jason Moran, Marina Leonardi, Stephen Scott, and Matteo Marchisano-Adamo. Andrea Neumann takes an extreme approach to piano preparation, having gradually dismantled pianos until the wooden frame and piano strings are all that remain.

Australian composers Erik Griswold and Anthony Pateras have further developed the potential of the prepared piano in an improvisational context, as well as exploring the microtonal possibilities of the medium, while Ross Bolleter has taken the idea into an innovative direction—exploring the use of ruined pianos, or pianos decayed by weather and time.

American composer Chris Brown created a type of prepared electric piano, the gazamba from the shell of a Wurlitzer electric piano. American composer Eric Glick Rieman composed extensively for prepared Rhodes pianos.

Tack Piano

The phrase prepared piano is also sometimes applied to other kinds of preparations. The tack piano is a piano that has been altered by inserting thumbtacks or small nails into the striking end of each hammer, so that the instrument will produce a more percussive sound and brighter timbre. The resulting tone often resembles the sound of a very old and derelict piano. The tack piano has been used primarily in honky-tonk-style piano playing, or to make a piano sound like an antique piano that might have been heard in a saloon or brothel around the early 20th century. The application of tacks is generally discouraged by piano technicians as the tacks can drop off the hammers and lodge in the strings or jam the mechanism,or the fact that placing tacks inside felt hammers renders the felt unvoicable and, therefore, ruins the hammers. On normal pianos, felt coverings on the hammers will harden and compress with use (though not usually for at least several decades, unless it is a heavily used concert piano), yielding a characteristic bright, tinny sound. This can be cured by softening the hammers with a device consisting of multiple needles called a "voicing needle". Where the felt is too far gone, the hammers can be replaced.

In popular music

- "All Tomorrow's Parties" from *The Velvet Underground & Nico* (1967), John Cale prepared his piano with a chain of paper clips.

- Denman Maroney performs on what he has dubbed hyperpiano, which "involves stopping, sliding, bowing, plucking, striking and strumming the strings with copper bars, aluminum bowls, rubber blocks, plastic boxes and other household objects."

- Composer/lyricist Stephen Sondheim used a prepared piano to perform demos of some of his compositions (including the cut song "Prayer") for his 1976 musical *Pacific Overtures*.

- Hauschka is a contemporary pianist playing on a prepared piano at live shows with ping pong balls jumping on the strings.

- On the Ben Folds song "Free Coffee", Folds wedges an Altoid tin in the strings and plays his piano through a rat distortion to attain the unique sound for the song. He demonstrates the preparation and performance live in concert.

- The Noah and the Whale song "Our Window" makes use of a piano prepared with "screws, ping pong palls and tooth picks."

Chapter- 11

Player Piano

A restored pneumatic player piano

A **player piano** (also known as **pianola** or **autopiano**) is a self-playing piano, containing a pneumatic or electro-mechanical mechanism that operates the piano action via pre-programmed music perforated paper, or in rare instances, metallic rolls. The rise of the player piano grew with the rise of the mass-produced piano for the home in the late 19th and early 20th century. Sales peaked in 1924, as the improvement in phonograph recordings due to electrical recording methods developed in the mid-1920s. The advent

of electrical amplification in home music reproduction via the wireless in the same period helped cause their eventual decline in popularity, and the stock market crash of 1929 virtually wiped out production.

Antecedents

The idea of automatic musical devices can be traced back many centuries. The idea of using pinned barrels to operate percussion mechanisms (such as striking bells in a clock) was perfected long before the invention of the piano. These devices were later extended to operate musical boxes, which contain a set of tuned metal teeth plucked by the player mechanism.

An early musical instrument to be automated was the organ, which is comparatively easy to operate automatically. The power for the notes is provided by air from a bellows system, and the organist or player device only has to operate a valve to control the available air. The playing task is ideally performed by a pinned barrel, and the art of barrel organs was well advanced by the mid-18th century.

The pianoforte is a complex instrument, requiring each note to be struck with a different force to control the dynamics of the performance. The entire force required to sound the note must be given by the performer hitting the keys. It proved to be difficult for a player device to combine a variable percussive force and a controlled note duration. Barrels do not provide a percussive force, but a relatively gentle switching motion.

Early barrel pianos move the hammer back and forwards continuously as the operator turns the handle, but the hammers do not strike the strings until moved slightly forwards by a pin in the barrel. The hammers hit repeatedly until the pin is removed. This plays the note, but at a fixed dynamic and with a tremolo action quite unlike a pianist.

The development of the player piano was the gradual overcoming of the various difficulties of controlled percussive striking and note duration. The earliest practical piano playing device was probably the Forneaux Pianista, which used compressed air to inflate a bellows when the barrel pin opened a valve. This bellows struck the piano key and so played the note.

The acceleration of developments leading to the pneumatic 'player' device started in the 1840s and began to reach some recognizable device in the 1870s. The start of the player period can probably be seen as the Centennial Exposition of 1876 in Philadelphia, USA. At this exhibition were a number of automatic player devices, including the Pianista, that contained the elements which would lead to the player.

The earliest description of a piano playing device using perforated paper rolls was Claude Seytre's French patent of 1842. The concept was sound, but the device described was impractical in the way it read the roll and operated the piano.

In 1847 Alexander Bain described a device that used a paper roll as a 'travelling valve' that allowed air to flow through the reeds of a reed organ. Simple reed and pipe organs using this sort of system are still being produced. However, the air flow is not sufficient to drive a piano mechanism. In 1848 Charles Dawson of England described a more complex travelling valve device which added little to Bain.

Hunt & Bradish of the USA, 1849, used a roll read by sprung fingers, the springs being strong enough to operate the piano mechanism directly. This device applied the entire playing strength to the paper, so would have shredded it rapidly, and the device would have had to be as wide as the piano keyboard!

In 1851 Pape, England, submitted a patent that recognized the need to remove the playing force from the paper, using light springs to read the roll and activate a more robust device which plays the note — a mechanical amplifier.

The first device to address the practical requirement of operating a piano mechanism was Forneaux's, of 1863. This recognized that a hard strike was needed to throw the hammer towards the keys. It used a traditional barrel, but tripped a pneumatic device that inflated bellows rapidly to operate the note. In 1871 a perforated cardboard book was substituted for the barrel, but it was still read using sprung fingers. This device entered manufacture, and is generally regarded as the first practical player device. It was exhibited in Philadelphia in 1876.

Van Dusen's American patent of 1867 was the first to describe a pneumatic striker operated by a roll. It was probably based on the work of John McTammany.

A leap in thought occurred in the 1873 patent of the Schmoele brothers. They described a 'double valve' system which acted as a pneumatic amplifier, reading the roll electrically and operating the pneumatic with an electromagnet. They also exhibited at Philadelphia. With some modification, and pneumatic reading of the roll, this would become the final player piano some 20 years later, although the Schmoele brothers never benefitted from it.

In 1876, John McTammany exhibited a working player in Philadelphia that used a paper roll read using sprung fingers whose slight movement triggered a mechanical player device. This operated a reed organ. McTammany had been experimenting since the mid-1860s, and went on to be one of the key names in the early player industry. He claimed to be the inventor of the 'player', but not the 'player piano' - an important distinction.

As of 1876, in Philadelphia, three working devices were exhibited that between them contained almost all the components that the final player piano would require. However, it was to be 20 years before all these aspects were combined. Surprisingly, the missing component was the pneumatic reading of the roll. This was in all probability due to the lack of suitably flexible airtight material to translate the air flow into the mechanical movement needed to trigger the player device.

Development

1876-1890

Following the Philadelphia exhibition, the mechanical music business began to grow rapidly. Various companies were founded in the later 1870s to manufacture and sell automated reed organs. Most significant to the development of the player piano was the Aeolian Company, founded as the Mechanical Orguinette Company in 1878, initially as retailer of small reed organs made by the Munroe Organ Company and others.

These instruments started out with valveless actions, the air flowing through the paper operating the reed directly. Throughout this period, the instruments grew larger and more complex, and valves were added to switch the air flow, so ensuring faster response and requiring smaller holes in the paper. The idea of incorporating the new player devices into pianos developed over this period. Needham filed a patent in 1880 describing a pneumatic player device in a piano.

The main technical development of this period was the double valve system, which enabled machines to switch the volume of air needed to operate piano actions. The valves effectively worked as amplifiers, a small air flow being used to switch a much larger volume of air.

Inventors persisted with the early cumbersome mechanical linkage systems for a long time, although the valve system was considerably simpler. The main reason for this appears to be that no suitable airtight thin leather was available to make the small pouches which inflate to operate the valves. The pioneer inventor John McTammany comments that inventors have to work within the limits of their age, and that when solving a problem they look for answers among what is at hand. Without pouch leather being available, they couldn't invent a machine that used it. By the late 1880s the development of suitable pneumatic materials and leathers had advanced sufficiently that effective and reliable player mechanisms were starting to enter the marketplace.

1890-1900

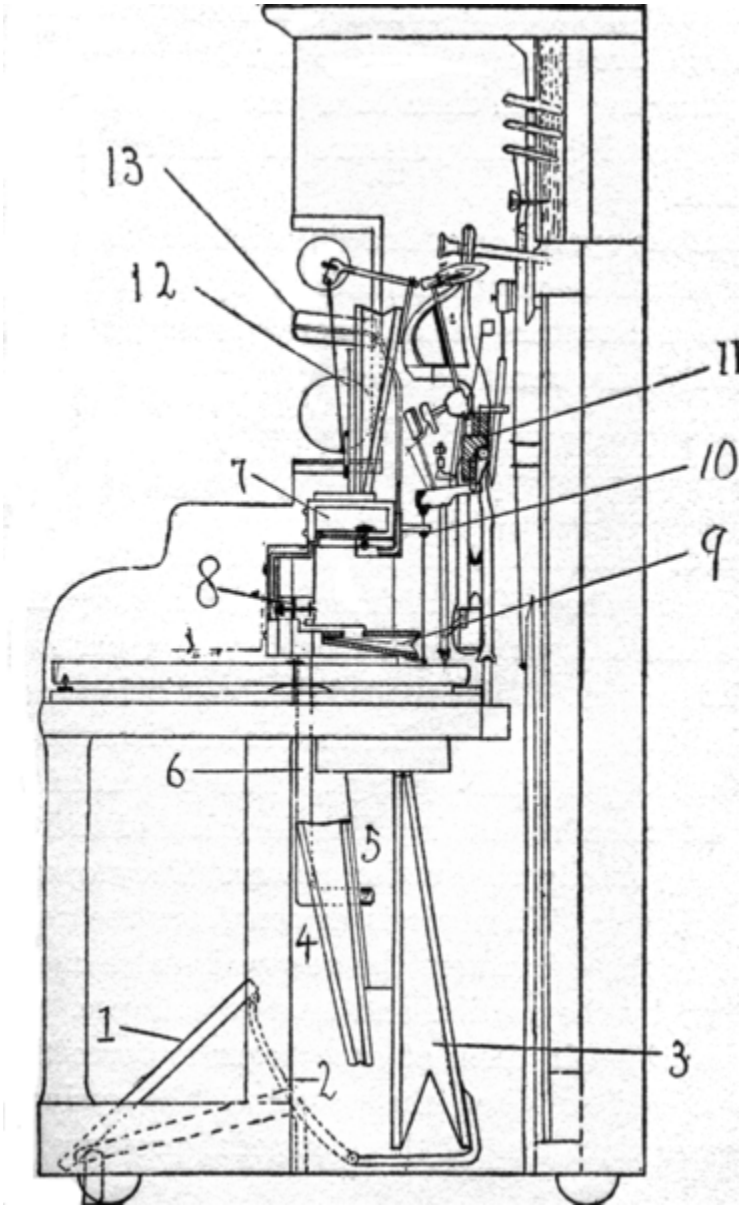
In 1896, Theodore P. Brown introduced and marketed the "Aeriol Piano", which was the first substantially complete player piano. That same year Wilcox and White introduced their "Angelus" cabinet player which was a modification of their earlier grand and upright player pianos. None of the early player pianos was a success though John McTammany (self-proclaimed 'inventor of the player') credited Brown as the first to organize in a practical manner the ideas others had developed over the previous 20 years.

Through the middle 1890s, Edwin S. Votey developed his piano playing device, the Pianola. This was offered to the Aeolian Company to sell alongside their range of reed organs. It was launched in 1897, and very aggressively marketed over the following years. It was the advertising organized by Harry Tremaine and the Wilcox and White

Company that established the market for piano playing devices. Without Tremaine's business acumen there probably would never have been a player piano industry.

In these early years the main demand was for cabinet players (devices rolled to the keyboard of an existing piano, to press the keys with mechanical wooden "fingers"), and it was some years before the public preferred to buy an entirely new self-contained instrument and trade in their old perfectly good regular pianos. As market demand changed, the "internal player" came back into view and was developed again, this time in earnest.

1900-1910



Player piano action

The Pianola was advertised in one of the most high-profile campaigns ever, making unprecedented use of full-page color advertisements. It cost $250 (£65) (equivalent to over $6,000 (£4,000) in 2009 money). Other, cheaper, makes were launched. A standard 65-note format evolved, with 11¼-inch-wide (290 mm) rolls and holes spaced 6 to the inch, although several player manufacturers used their own form of roll incompatible with other makes.

Huge sums were spent: by 1903 the Aeolian Company had more than 9,000 roll titles in their catalog, adding 200 titles per month. Many companies' catalogs ran to thousands of rolls, mainly of light, religious or classical music. Ragtime music did feature, but not commonly: in this period, the player was being sold on its artistic capabilities to rich buyers.

The pioneer of this decade was Melville Clark, who introduced two key ideas: the full-scale roll which could play every note on the piano keyboard, and the internal player as standard. Both ideas were ridiculed by his competitors as unnecessary or impractical, but Clark rapidly won both battles.

By the end of the decade the piano player device was obsolete, as was the 65-note format. This was a major catastrophe for many small manufacturers, who had spent all their capital on setting up 65-note player operations, and the result was rapid consolidation in the industry.

A new full-scale roll format, playing all 88 notes, was agreed at an industry conference in Buffalo in 1908, the so called Buffalo Convention. This kept the 11¼-inch roll, but now had smaller holes spaced at 9 to the inch. Any player made anywhere in the world could now play any make of roll. Understanding the need for compatibility was the defining moment of the player industry. The consensus was key to avoiding a costly format war, which plagued almost every other form of entertainment media that followed roll music.

While the player piano matured in America, a young inventor in Germany, Edwin Welte, was working on a player which controlled all the aspects of the performance automatically, so that his machine would play back a recorded performance exactly as if the original pianist was sitting at the piano keyboard. This device, the Welte-Mignon, was launched in 1904. This created new marketing opportunities, as manufacturers could now get the foremost pianists and composers of the day to record their performances on a piano roll, allowing owners of player pianos to experience such a performance in their own homes on their own instruments, exactly as the original pianist had played it.

From the early days, manufacturers sought to create mechanisms which would pick out the melody of a musical composition over the background of the rest of the music in the same manner as a live pianist. The true player piano was designed to be a fully interactive musical experience rather than merely an automatic instrument, and hence they are fitted with interactive control levers intended for the "player pianist" or "pianolist" to create a music performance to their own taste. The player piano would provide aspiring pianists

and music lovers with the technical dexterity they lacked whilst permitting them to control the musical performance interactively as if they were an accomplished pianist.

Aeolian introduced Metrostyle in 1901 and the Themodist in 1904, the latter being an invention "bringing out the melody clearly above the accompaniment." With sales growing rapidly, and the instruments themselves relatively mature, this decade saw a wider variety of rolls become available. Two major advances were the introduction of the hand-played roll, both classical and popular, and the word roll. The hand-played roll introduced musical phrasing into the roll, so that the player pianist did not have to introduce this by using the tempo controls — something that few owners ever felt much inclination to do. Word rolls made it simple to use the player to accompany singing in the home, a very popular activity in the years before radio and acceptable disc recordings became available.

The other major advance was the arrival of major commercial rivals for the Welte-Mignon: the Ampico and the Duo-Art systems, both launched around 1914. When World War I came in 1914 and German patents were seized in the US, these two companies were left to compete with each other. In England, Aeolian had a huge factory and sales network, so easily outsold the Ampico. It is estimated that perhaps 5% of players sold were reproducing pianos.

In America by the end of the decade, the new ‘jazz age' and the rise of the fox-trot confirmed the player piano as the instrument of popular music, with classical music increasingly relegated to the reproducing piano. Most American roll companies stopped offering large classical catalogs before 1920, and abandoned ‘instrumental' rolls (those without words) within a few years.

Things were somewhat different in England, where the Aeolian Company continued to promote classical material to a receptive public. Word rolls never became the norm in England, always being charged at a 20% premium over non-word rolls. As a result, post-World War I American and British roll collections look very different.

1920-1930

1920-1930 was the decade that saw the player piano reach its peak, and then its rapid decline. The peak sales of instruments and rolls were in the first few years of the decade. At one point, more than half of all pianos being made in America contained a player unit. The player piano was not an obscure by-line — it was the dominant force in the industry.

In the early 1920s, many pianists of note, in classical and popular fields, were called on to make rolls.

Little new technically arose through the 1920s. Perhaps the most significant was the launch of a significantly improved form of the Ampico system, the Ampico B, in 1926. This was accompanied by an automatic recording device that could record a pianist's note timings and dynamics.

The technical advances of the 1920s were instead in radio technology. The key development there was the introduction of amplification, so that it was possible to sit around the radio and listen as a family, unlike the earlier crystal sets which required the use of headphones. Amplification was also applied to the recording of 78 rpm records, the electrical recording systems introduced around 1925 allowing a major rise in sound quality. Radio and these new records rapidly eroded the market for the player piano, and it was declining from the mid-1920s onwards. Novel attempts to combine the appeal of the player piano and its new rivals were made by building radios and/or phonographs into player pianos themselves, but even this could not entice the public to continue buying player pianos.

When the Wall Street crash came in October 1929, the player piano was already in a very weak position, and sales effectively ceased. Only a few well-capitalized companies continued in business after this. Many of these companies were the result of consolidation throughout the 1920s, which had already seen the loss of most names, particularly in the roll-making field.

During this period player piano pneumatic technology was used as the basis for the aircraft training simulators by inventor Edwin Albert Link. This device, powered by suction and bellows, moved realistically in response to a pilot's operation of the controls. Link developed the flight simulator in his father's Binghamton, New York factory, which made coin operated pianos for commercial establishments and movie theater pipe organs. The Link Company commercialized the device in 1929. A British equivalent was the Silloth trainer, based on Duo-Art technology. Electronic descendants of these devices are now widespread.

1930-1950

A few companies struggled on through the 1930s. In 1931 Aeolian purchased the American Piano Company, makers of the Ampico. To bring capital to the business, they sold off all their overseas assets, so the large piano factory at Hayes was closed and sold with one month's notice. The joint Aeolian-American operation stopped making new classical rolls and concentrated on popular material, and the final new rolls were issued in the late 1930s.

A major survivor throughout this was the QRS piano roll company, originally an offshoot of Melville Clarke's operation. Owned by the mid-1920s by Max Kortlander, and funded by his income as a composer, QRS continued to issue rolls, all of them created by J. Lawrence Cook, chief roll arranger from 1921 to 1961 (he supplemented his income as a postal worker). Thanks to QRS, roll repertoire is available from the 1930s and 1940s.

Other than QRS, the end of the 1930s had seen the end of the player piano era. The lingering roll production in England finally ceased in 1941 when paper rationing made it impossible to continue. The Aeolian Duo-Art recording machinery was destroyed by bombing during the World War II, as was the Welte factory in Freiburg.

However, the immediate aftermath of the war saw the growth of interest in this lost era. Richard Simonton purchased the surviving Welte-Mignon rolls from Edwin Welte, and the first disc recordings were made of the performances. The enthusiast era had, tentatively, begun.

1950-present

A player piano performing

During the early 1950s a number of collectors began to rescue player pianos and all the other instruments of the 1920s and earlier. Amongst them was Frank Holland, who formed his collection while working in Canada. On returning to England he located a number of like-minded enthusiasts and started to hold meetings at his house in west London. In 1959 this was formalized as ‘The Player Piano Group'. By the early 1960s, Frank Holland had formed the British Piano Museum (now the Musical Museum) in Brentford. His enthusiasm and effort was the focus of the preservation movement in the UK.

In America, another collector was Harvey Roehl, who was so enthused by the players that in 1961 he published a book called *Player Piano Treasury*. This sold by the tens of thousands, and was followed by books on how to rebuild and restore these instruments. Harvey Roehl's Vestal Press was a major driving force in raising awareness of the player piano within the general population.

Other societies worldwide were formed to preserve and study all aspects of mechanical music, such as the Musical Box Society International (MBSI) and the Automatic Musical Instrument Collectors' Association in America.

In 1961, Max Kortlander died of an unexpected heart attack, and QRS was run by his wife until she sold the company to Ramsi Tick in 1966, in whom it found another

stalwart champion whose business philosophy was not so much profit as to limit losses. QRS's presence ensured that owners of newly-awakened players could purchase rolls of the latest titles, so ensuring that the instrument remained current, not just a historical curiosity.

So great was the revival that in the 1960s, production of player pianos started again. Aeolian revived the Pianola, albeit this time in a small spinet piano suited to post-war housing. Other manufacturers followed, and production has continued intermittently ever since. QRS today offer a traditional player piano in their Story and Clark piano.

In recent years there has been greater focus on full rebuilding as original instruments finally stop working. Early enthusiasts could often get by with limited patching, but the repair requirements have slowly risen, although even to this day it is possible to find original 1920s' instruments that still work after a fashion — a tribute to their quality, and an indication of their continued popularity.

Types

Steinway Welte-Mignon reproducing piano (1919)

Whilst there are many minor differences between manufacturers a player piano is a piano that contains a manually controlled pneumatically operating piano player mechanism. It is intended that the operator manually manipulates the control levers in order to produce a musical performance. Various aids to the human operator were developed:

Split stack control
: These instruments (the vast majority of all player pianos) have the pneumatic player mechanism divided into two approximately equal halves. The operator can lower the volume of either half of the keyboard independently of the other in order to create musical effects.

Theme control
: These instruments have peripheral pneumatic hardware systems fitted which, when used in conjunction with special music rolls, are able to highlight those notes in the score which are intended to be accented away from those whose volume it is desired to subdue. Basic theme pianos subdue all notes and release full power to only those notes which are align with special music roll "theme" perforations. More subtle systems (such as Hupfeld's "Solodant" and Aeolian's "Themodist") have a graduated theme control where the background subdued level and the foreground melody level are both controllable. The nature of the mechanism is such that where a chord occurs notes to be emphasised have to be advanced slightly away from their neighbors in order for the mechanism to identify them.

Isolated theme
: The hardware of these pianos is able to pick out the melody notes away from their background accompaniment within the entire range of the keyboard without the necessity for breaking up chords i.e. a software workaround. Manufacturers of these systems were the UK "Dalian" and "Kastonome" and the US "Solo Carola".

Reproducing pianos
: These are fully automated versions of the player piano requiring no human manual control in order to produce the illusion of a live musical performance. This is achieved by the utilization of music rolls where tempo mapping is fully incorporated into the music rolls i.e. the note lengths of a live performance have been captured. This obviates any need for manual tempo lever manipulation. The volume dynamics are created by peripheral pneumatic expression accessories under control from system-specific music roll coding. This obviates the need for human manipulation of the manual dynamic control levers. Typically an electric motor provides power to remove the human operator from the necessity to provide motive power by treadling. Most reproducing pianos are capable of manual over-ride operation, and many are constructed for dual functionality both as regular player pianos and also as reproducing pianos. Numerous companies made these utilizing different technology. The first successful instrument was called the "Mignon" launched by Welte in 1904.

Orchestrions and Nickelodeons
: These are automated instruments typically intended from use in a coin-operated commercial setting rather than any domestic one. Various manufacturers made numerous ranges of instruments featuring different combinations of pianos, organ

pipework, percussion and other fittings. They were eventually superseded by the juke box following the introduction of effective electrical sound amplification.

Player mechanism

A coin-operated Link piano Orchestrion

Horizontal row of tracker tubes detects music roll holes

The player mechanism is essentially a bank of switches activated by software. The switches are pneumatically operating valves which switch on the motive force used to play the piano action. This motive force is created by switching suction into a miniature collapsible pneumatic bellows with one assembly assigned to each individual note. The valve switching system is triggered by the music roll. As the paper perforations run over the music reading bar (known as the "tracker bar") air is allowed to enter. This causes a pressure differential within the mechanism triggering the switching valves to operate. The note channels can be either on or off hence the music roll can be regarded as an early form of programmable binary software.

The apparatus operates from suction generated by two foot-treadled bellows coupled to a pressure equalizing reservoir system to even the air flow. The motive force may be used to power peripheral mechanisms within the piano operating sustain pedal function, music roll centering and suchlike.

Player pianos are all fitted with hand levers for the performer to vary volume and speed to imitate a live performer. As such they may be regarded as the first truly interactive acoustic music making machine; something without any parallel until only the past half-decade with the advances in modern computing technology and software.

Music rolls

Music rolls for pneumatic player pianos, often known as piano rolls, consist of a continuous sheet of paper rolled on to a spool. The spool fits into the player piano spool box whereupon the free end of the music sheet is hooked onto the take-up spool which will unwind the roll at an even pace across the reading mechanism (the "tracker bar") The music score to be played is programmed onto the paper by means of perforations. Different player systems have different perforation sizes, channel layouts and spool fittings though the majority conform to one or two predominant formats latterly adopted as the industry standard.

Music is programmed via a number of methods.

1. the music is marked out on master stencil on a purely metronomic basis direct from the printed sheet music with the player-pianists being left to create their own music performance
2. the music stencil is created metronomically via a piano-keyboard operated punch machine
3. a live performance is played onto a special piano connected to an electronically operated marking mechanism, and a physical stencil is produced from this live output, either as-is or after some general regularisation of tempo where necessary
4. modern computer software and MIDI software can be used to create piano roll stencils for operating modern-day perforating machines and create new titles.

The player piano sold globally in its heyday, and music rolls were manufactured extensively in the USA, as well as most European countries, South America and Australia. Even New Zealand had their own home-grown roll brand and machinery. A large number of titles from all manufacturers survive to this day, and rolls still turn up regularly in large quantities.

It was reported that the last remaining mass producer of piano rolls in the world, QRS Music, temporarily halted production of the rolls on December 31, 2008. However, QRS Music still list themselves as the only roll manufacturer remaining, and claim to have 45,000 titles available with "new titles being added on a regular basis".

Preservation and restoration

Roll scanning has made significant advances in recent years, applying technology to possibly the most obvious yet hardest of all conservation and preservation topics, the replication of aging and disintegrating piano rolls.

Roll scanning is the process of reading a music roll into a computerised form that can be used for any purpose, such as cutting new rolls or operating old or new instruments directly. This uses the same technology as domestic flatbed scanners, hence the term roll scanner. The ubiquity of computers makes scanning fundamental to the preservation of rolls of all types, as well as providing the basis for secondary activities such as operating

instruments directly. Roll master re-creation is the process of understanding how the roll was originally manufactured so that errors arising from the scanning are removed, and the computer works to the same accuracy as the original perforators in the roll factory. This allows exact replica rolls to be made, and maximises the accuracy of any secondary activity.

Replication of the original master from which a perforated paper roll was created is the highest aim of roll scanning. Roll masters are not literally replicated, because they were originally large cardboard rolls, but re-created in a computerised form. The rationale is that starting with the master in this form, anything can be done with the music – cut new rolls, operate player pianos fitted with electronic valves, or simulate a performance for playing on modern instruments – all without introducing any errors.

This is the case because virtually all rolls were punched in fixed rows, where punches will occur only in one row or the next, but never in between: the roll is effectively a digital storage medium. Scanning simply counts the distance from the start of the roll to each note event, giving an analogue, and hence inaccurate, representation of the roll. If instead the rows are counted, the result is an exact representation of the original roll – a perfect digital copy. This can be done by applying knowledge about the original roll's creation to the scan.

Once the master computerised copy has been recreated, all of the information in the roll is retained, and anything done after this can be done with the accuracy of the original roll. When using the analogue version, all its timing errors are carried through to whatever you do with it. This is particularly true when making recut rolls, where imposing the punch-row spacing of the perforator over the (different) row spacing of the original roll causes surprisingly obvious and audible errors. However, even analogue uses of the scan, such as operating instruments directly, benefits from the recreated master because of the way it removes timing errors from the basic scan, and in so doing allows the accuracy of the scanner itself to be calibrated.

Roll scanning itself is not of major significance – it simply adds optical technology to the pneumatic, electrical and mechanical technologies previously used to extract data from perforated paper. The ability to store the extracted data on electronic media marked the start of the modern era of scanning, but did little more than act as a substitute for the paper roll. The most familiar such system is the Marantz Pianocorder, but at least two systems were produced, by Wayne Stahnke and Peter Phillips, to operate pneumatic pianos.

From having the performance in ‘streaming’ form on a tape to extracting the note events into a list in a computer is a fairly small step. Such computerisation of the scanned data adds the ability to edit and manipulate it. The key advance we are concerned about here is the manipulation that converts the analogue scan data to a replica of the perforation master.

The first serious and sustained roll master replication exercise was probably that of Wayne Stahnke, who described his by-then completed methods in the Mechanical Music Digest in March 1996, and used them to practical advantage in his Rachmaninoff-Bösendorfer CDs. He started with a pneumatic roll reader (from the mid-1970s, for the IMI Cassette Converter system and later projects) and later moved to an optical system. He has been offering commercial scanning and roll master re-creation since the mid-1990s.

Within UK Player Piano Group circles the topic of recreating roll masters was already well established by 1996. Rex Lawson had raised the topic as part of his work developing a perforation-level roll editor software suite for his Perforetur rolls, and the topic was publicly discussed in the PPG bulletin during winter 1994/5 when Rex explained precisely why rolls should be copied punch-for-punch, digitally.

Richard Stibbons started his roll-scanning attempts in the mid-1990s, and described his progress in PPG article “The PC Pianola” in December 1995. Soon afterwards he adopted the master replication idea, described very thoroughly in September 2000. This led directly to the launch of the Rollscanners group in February 2001.

The aim of this group has been to focus and publicise scanning efforts worldwide, encouraging sharing of progress and knowledge, a radical shift from the earlier essentially private attempts.

Modern implementations

Player and control unit of Yamaha Disklavier Mark III

Sequencer control unit of Yamaha Disklavier Mark III

Later developments of the **reproducing piano** include the use of magnetic tape and floppy disks, rather than piano rolls, to record and play back the music; and, in the case of one instrument made by Bösendorfer, computer assisted playback.

Almost all modern player pianos use MIDI to interface with computer equipment. Most modern player pianos come with an electronic device that can record and playback MIDI files on floppy disks and/or CD-ROMs, and a MIDI interface that enables computers to drive the piano directly for more advanced operations. The MIDI files can trigger electromagnetic devices called solenoids, which use electric current to drive small mechanical pistons mounted to the key action inside the piano. Live performance or computer generated music can be recorded in MIDI file format for accurate reproduction

later on such instruments. MIDI files containing converted antique piano-rolls can be purchased on the Internet.

As of 2006, several player piano conversion kits are available (PianoDisc, Pianomation, etc.), allowing the owners of normal pianos to convert them into computer controlled instruments. The conversion process usually involves cutting open the bottom of the piano to install mechanical parts under the keyboard, although one organization — Logos Foundation — has manufactured a portable, external kit. A new player piano conversion kit was introduced in 2007-08 by Wayne Stahnke, the inventor of the Bosendorfer SE reproducing system, called the "LX".

Comparison to electric pianos

A player piano is neither an electric piano, electronic piano, nor a digital piano. The distinction between these instruments lies in the way sounds are produced. A player piano is an acoustic piano where the sound is produced mechanically by moving keys which cause hammers to strike the piano strings, without using electric or electronic components to create the sounds.