



The
Miracle
Piano Teaching System™

Owner's Manual

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WELCOME TO THE MIRACLE!

Welcome to The Miracle Piano Teaching System!

You are about to take a complete beginner's piano course. In the months to come, this system will provide hundreds of Lessons to teach you about playing the piano.

These Lessons are tailored to your individual needs. The Miracle *listens* to your playing, identifies problem areas, and provides special exercises to overcome them.

In the process, you'll play many different types of music, including Classical, Jazz, and Rock & Roll.

Length of the Course

The minute you touch The Miracle, you'll be making music. But, if you want to become a good piano player, you'll need time and practice.

People learn at different rates. An average student with no prior musical training should complete the course in 6-12 months. After that time, you should be able to:

- Read music notation.
- Play with two hands using chords and common rhythms.
- Learn new pieces of music on your own.
- Perform with other musicians

Where to Set Up The Miracle

Ideally, put the keyboard where you can sit comfortably with your feet flat on the floor, and with the monitor screen directly in front of you. The screen should not be high, low, or off to the side.

A desk is a good place. Other good places are card tables and keyboard stands. The kitchen table works too, although you may need to sit on a phone book or pillow so your arms are at the right height. Avoid the living room coffee table, because it is bad for your back, and your feet can't rest flat on the floor.

No matter what table you use, put The Miracle keyboard at the edge nearest you. That way, you don't have to stretch to reach the keys.

Where to Go from Here

For information about running The Miracle on your system, see THE MIRACLE PIANO TEACHING SYSTEM USER'S GUIDE.

If you want to connect The Miracle to your stereo or to another MIDI (Musical Instrument Digital Interface), or use The Miracle as a stand alone keyboard, see ABOUT THE KEYBOARD.

GETTING THE MOST FROM THE MIRACLE

With a little patience and regular practice, you'll soon be playing the piano. The Miracle helps you every step of the way, with Lessons that make learning and practicing every Chapter fun.

Completing a Chapter

At first, you'll want to do as many Chapters as you can. That's okay, but it's best to complete one Chapter's Lessons before going to the next Chapter. Try using The Miracle like this:

1. Complete a Chapter.
2. Go to the *Practice Room* and play all of that Chapter's pieces until you can do them well.
3. Redo the Chapter, to be sure you got it. If you practiced enough, the second time won't take long.
4. Go on to the next Chapter.

Later in the course, expect Chapters that take a week or more to complete. These Chapters are more challenging to sharpen your skills. They take time to master, so don't get discouraged. With practice, you'll get it!

Practice Makes Perfect

To get the most out of The Miracle Lessons, practice a little *every day* — 45-60 minutes is ideal. Even 15 minutes is better than no practice at all! You'll learn to play sooner by practicing regularly.

When you can't get through a Lesson, you may think "I'll never get this!" This happens to everybody, and just means that it's time for a rest. Play some music you already know, or stop for awhile. Remember, if you don't get it now, you *will* get it eventually.

The Practice Room

Use the *Practice Room*. There you can work on more challenging pieces, rather than just repeating Lessons. With all of The Miracle's Activities available, you can practice many ways. For example, if you're having trouble with the right hand notes in a song, select *Right Hand* practice and work in either the *Shooting Gallery* or *Practice Notes*. If you're having trouble coordinating both hands, select *Both Hands* practice and work in *Practice Rhythms*.

The *Practice Room* has many pieces that are not in the Lessons. To learn any piece using *only* the *Practice Room*:

1. Learn the left hand rhythms.
2. Learn the left hand notes.
3. Play the entire left hand part.
4. Repeat this 3-step procedure with your right hand.
5. Repeat it again with both hands.

When learning rhythms, use *Practice Rhythms*. If you make too many mistakes, just start again. You might also try listening to the rhythm of the piece by selecting *Demonstrate the Piece*.

When learning pitches, use the *Shooting Gallery* at first. When you can hit most of the ducks with the first shot, switch over to *Practice Pitches*. Take all the time you need, and try to remember the rhythms you already learned.

If you have trouble playing the entire part, go back to *Practice Pitches* or *Practice Rhythms*.

**Special Note to
Parents**

The Miracle Piano Teaching System works with children age 8 and up, but pre-teens may need help reading Lessons, or learning to position their fingers on the keys.

This is a great way for you to get involved with your child's piano playing. If you don't know how to play piano, you might enjoy taking the course along with your child. You'll both find it rewarding to learn a creative skill together.

Children make the best progress when practicing is fun. To convince your child that practice is fun, show an interest in his or her progress during and after practice. Your excitement about the child's progress can really inspire him or her to continue. This is especially fun for everyone in activities where The Miracle accompanies your child's performance.

Special Note to Teachers

The Miracle can enhance your teaching with practice exercises that are possible only on a computer:

- **Pointers** - Give visual *what to play* cues that builds music reading confidence.
- **Pitch Practice Activities** - Advance pointers to new notes only when you play the correct pitch.
- **Properly Adjusted Metronome** - Continuously reinforces good rhythm.
- **Rhythm Practice Activities** - These play the proper pitches no matter what key you press. This lets the student actively participate in partially demonstrating the piece.
- **Shooting Gallery** - Makes practicing fun while developing note reading and rhythm skills.
- **Special Exercises** - Help students overcome specific problems. These are given as needed, when The Miracle detects error trends in a practice session.
- **Different Display Formats** - Provide variety and help students focus on specific aspects of a piece.
- **Practice is constantly varied and fun** - Students tend to practice more — and regularly!

As the teacher, these tools can effectively speed your students' progress. This gives you time to focus on:

- Maintaining good hand position.
- Phrasing and tapering of phrases.
- Rubato or subtleties in the tempo.
- The art of pedaling.

Note: The pedal that connects to The Miracle is a *sustain* pedal. Its use is introduced in the later Lessons.

Note to Experienced Players

Experienced piano players often find The Miracle course a wonderful way to refresh their memories and improve their playing skills. Also, since The Miracle is designed to teach music to beginners, experienced players can zip through the initial Lessons. Complete the first two Chapters, to see how the system works. Then skip ahead as far as you want.

The interactive nature of The Miracle lets it teach piano using unique, new techniques that only a computer can provide. You'll find learning with it quite different from a course presented by traditional instructors, although all of the standard elements are there. These elements are sometimes presented in a different order than they are in standard courses. As a result, you might find an occasional Lesson that covers things you already know.

About The Miracle Keyboard

You do not need to connect The Miracle keyboard to the computer to use it. In fact, it is an excellent stand-alone keyboard with a variety of features:

- **128 different instrument sounds** (patches). Each patch is fully accessible from the buttons on the top panel.
- **16 voices**. The Miracle can play 16 different notes simultaneously or 8 in stereo patches.
- **Velocity sensitive keys**. This means that the quicker you strike a key, the louder it sounds, and the slower you strike a key, the softer it sounds.
- **MIDI support**. You can connect The Miracle to a sequencer, computer, or other MIDI compatible device.
- **Split keyboard function**. The left half of the keyboard can sound like one instrument while the right half sounds like another.
- **Performance and Library modes**. You can play with combinations of many instruments and sound effects.

To find out how to use these and other features of The Miracle keyboard, see ABOUT THE KEYBOARD.

WHERE TO GO FROM HERE

Congratulations! You've finished The Miracle Piano Teaching System and mastered the basics of an exciting skill. You have every reason to be proud!

You now know how to:

- Recognize commonly found symbols in piano sheet music.
- Read and play notes, rhythms, and fingerings for a piece.
- Separate pieces into smaller sections and parts, such as pitch and rhythm.
- Coordinate changing keyboard positions and chords.
- Blend notes using the pedal.

Now, continue your training by learning pieces on your own. Select pieces that interest you and try to practice daily. Your skills in both playing and sight reading will continue to improve.

Practice the way you did with The Miracle for 45 minutes to an hour each day. Don't forget that playing for even a few minutes is better than not playing at all.

Selecting New Pieces

Visit your local music store, browse through the sheet music section, and choose some music that you like. Here are some guidelines.

Consider trying some of the following:

General

- Scott Joplin piano rags
- Spiritual and Gospel arrangements

Contemporary

- Folk music collections
- Movie soundtracks
- Popular songs
- Rock collections, such as The Beatles, Elton John, and Billy Joel
- Beginning Jazz collections

Classical

- Bach's *2-Part Inventions*
- Bartok's *Mikrokosmos*
- Schumann's *Kinderszenen*
- Sonatas and sonatinas by Clementi, Kuhlau, Haydn, and Mozart
- Easy pieces by Grieg

Getting Further Instruction

In addition to practice, you can further your studies by taking piano and/or music theory lessons through group classes or private instruction.

Group Piano Lessons

Group lessons are an excellent way to continue from The Miracle course. Try your local Parks & Recreation departments, community programs, adult education programs, and community, state, and private colleges.

Private Piano Lessons

There is no substitute for a good piano teacher to improve your playing technique, phrasing, dynamics, touch, musical style, and interpretation. With a good teacher, you'll learn different styles and more difficult pieces. Many piano teachers include theory lessons in their training programs. Playing in public is fun and exciting, and with a good piano teacher you'll get a chance to do recitals, competitions, and other performances.

To find a good teacher, contact the music department in a nearby college and ask for a list of qualified music teachers in your area.

Theory Classes

Music theory teaches you the underlying concepts behind music and how it is put together. Among other things, you'll learn about the formation of chords and chord progressions.

Rock and Jazz musicians need music theory because they must improvise as they play. Classical pianists use it to recognize patterns in complex pieces. If you want to compose music, theory is invaluable.

Theory classes are also offered through community programs, adult education programs, and community, state, and private colleges. Prices vary.

If You're Interested in Playing Jazz

A private instructor is your best bet for learning Jazz and improvisation. Again, your local college is a good source on where to find a qualified instructor. If you want to learn Jazz, music theory is invaluable.

If You're Interested in Playing Rock

Keyboardists are in demand by Rock bands. If you're interested in Rock, learn about improvisation, Blues, and Jazz. Make up stuff you like and play it. Listen to other Rock keyboardists to get ideas and discover different styles of playing. Copy styles you like while you develop your own.

Playing With Friends

Playing music with your friends is a fabulous, fun way to learn any style of music you choose. There is a wide range of classical material for piano and one or two other instruments, and a rich repertoire for Jazz and Rock bands.

Playing in a group increases your confidence, improves your sight reading, develops your rhythm skills, and introduces you to new challenges and material. Most importantly, you'll get excited about practicing with your friends.

Listening to Music

If you want to be a musician, the best thing to do is listen to a lot of music. Choose music that you like, for piano or for groups and orchestras.

Here are some rock and jazz artists you may want to consider:

Rock

The Doors
 Joe Jackson
 Billy Joel
 Elton John
 Jerry Lee Lewis
 Talking Heads

Jazz

Bill Evans
 Oscar Peterson
 Art Tatum
 Teddy Wilson
 Claude Bolling
 Andre Previn

Classical

Listen to music written by:

Bach
 Beethoven
 Brahms
 Chopin
 Debussy
 Gershwin
 Liszt

Mozart
 Prokofieff
 Rachmaninoff
 Ravel
 Scarlatti
 Schumann
 Tchaikovsky

Friends and record store employees can also offer suggestions.

HISTORY OF THE PIANO

In the Pidgin trading language of New Guinea, the piano is called "a box of music with teeth like a crocodile, suppose you fight it hard, it cries out." Amazingly, this accurately describes the piano's earliest ancestor.

Pipe Organ

The piano's earliest ancestor is the organ, which was invented in the 3rd century B.C. by the Greek engineer Ktesibios. His *Hydraulos* was the first keyboard instrument. The wooden "keys" looked like tongues and worked like hydraulic pumps. Key presses used water pressure to force air through pipes, which made sounds. This was not easy. *Hydraulos* players had to pound keys with their fists to fight the water pressure!

Pipe organs with easier actions appeared around the 6th century, and quickly became the favorite instrument of The Church. They are still popular there today.

Clavichords

The clavichord was the first keyboard instrument that used strings instead of pipes. Invented during the Middle Ages, the clavichord became popular in the 1400s. Key presses moved flattened brass pins against brass strings that vibrated when struck. The pressure on the keys controlled the volume; however, at its loudest, the clavichord was as quiet as a mouse.

This made the clavichord ideal for home practice and the instrument of choice in nunneries. Nuns loved it, because they could play without disturbing those around them.

Harpsichords

An Italian, Giovanni Spinetti, was less impressed. He wanted a more powerful instrument that made louder sounds. To increase the volume, Spinetti made the soundboard and strings longer. On his harpsichord, key presses firmly plucked strings with quills. This made the loud sound that Spinetti wanted, but there was no way to quiet it down!



Cembalo, 1599, by H. Ruckers, Antwerpen

Orchestras

During the 16th century, orchestras appeared with harpsichords as standard instruments. Performances by early orchestras were either private affairs for royalty, or associated with a new musical form called opera.

Although keyboard music became popular, few people owned keyboards. Because harpsichords and clavichords were complicated, hand-made instruments, they were quite expensive. Royalty and wealthy people displayed them proudly, but they were rarely seen elsewhere. Music was an art for the rich.

Public Performances

Public performances by individual musicians were unheard of until 1672. That year an English violinist, John Bannister, realized there was money to be made from them. At 4 o'clock every afternoon, Bannister charged "a shilling a head" for anyone who wanted to come to his house and listen to musicians.

Keyboardists introduced themselves to the public in 1678 when another Englishman, Thomas Britton, rose to fame holding concerts in the loft above his coal store. Handel (best known today for his *Messiah*) was one of many who performed on the harpsichord in Britton's well-heated loft. Here is an early ad for these performances:

"anybody that is willing to take a hearty Sweat may have the Pleasure of hearing many notable performers in the cheering Science of Musick."

By the early 1700s, public performances were common, and the harpsichord's volume made it the logical keyboard instrument to play. This frustrated many composers, who wanted subtle volume variations to express their music. In fact, Johann Sebastian Bach publicly called the harpsichord a "soulless instrument."

What the world needed was an instrument that combined the harpsichord's volume with the clavichord's expressiveness.



Kirk Nurock's *"Sonato for Piano and Dog,"* a work in four movements, Carnegie Hall, 1983

The Piano is Born in Italy

In 1709, the piano was born. The inventor, Italian harpsichord designer Bartolommeo Cristofori, called it the Gravicembalo Col Piano E Forte (Harpsichord with Loud and Soft).

The Pianoforte, as it was known, used hammers and dampers to control the strings. A key press threw a small wooden hammer up against a string, making it vibrate. A hard key strike struck the hammer hard, making a loud note. A soft key strike struck the hammer softly, making a quieter sound. When the key was released, a damper fell on the string, silencing it. This is essentially how pianos work today.

Cristofori was excited about his invention. Unfortunately, no one else seemed to be. Despite the piano's advantages, the harpsichord continued to dominate the musical world.

German Piano Manufacturing

A German organ maker, however, was excited by Cristofori's hammer action design. In 1725, Gottfried Silbermann began copying Cristofori's piano and promoting it throughout Germany. But he too fought an uphill battle to get it recognition.

In 1736, Silbermann tried to promote the design by introducing his piano to one of the harpsichord's harshest critics, the great Johann Sebastian Bach. Silbermann had high expectations as Bach played the instrument and considered it.

The famous composer agreed that the piano had a pleasant tone, but declared that the treble was too weak and the action too stiff. This infuriated Silbermann, who refused to speak to Bach for many years.

Eventually, Silbermann improved the features of the piano that Bach criticized. By 1747, 11 years after his introduction to it, Bach said the piano was "coming along."

First Public Concert

The first public concert featuring a piano was held in 1767, 58 years after the instrument's invention. An ad promoted the concert as a benefit by a "Miss Brickler," who sang while accompanied "on a new instrument called a Piano Forte."

Although the piano was well received at the Brickler concert, it was a performance in the following year by Johann Christian Bach (the youngest son of Johann Sebastian Bach) that finally brought the instrument public acceptance. Suddenly, pianos of numerous designs appeared all over Europe and the New World. Future American President, Thomas Jefferson, an extraordinary violinist and passionate music lover, bought a piano in 1771.

More Piano Manufacturing

At this time, the largest manufacturers of pianos were the French, led by Sebastien Erard, and the English, led by John Broadwood. French pianos were known for their crisp, delicate touch, while the English pianos were known for their fullness of sound. The virtues of each were a topic of many arguments among composers in the late 1700s.

The first American piano factory opened in Philadelphia in 1774, manufacturing instruments in the English design.

Mozart

Around that same time, the fame of an amazing keyboard performer was spreading across Europe. Wolfgang Amadeus Mozart was a child prodigy of exceptional talent. When the child began composing music at age 4, his father realized there was money to be made. By age 6, Wolfgang was paraded past the royalty of Europe, stunning them with his performances.

At age 14, Mozart was so skilled that at a single exhibition, he was challenged to play the following:

“a Symphony of his own composition; a harpsichord concerto which will be handed to him, and which he will immediately play *prima vista* (on first look); a Sonata handed to him in like manner, which he will provide with variations, and afterwards, repeat in another key; an Aria, the words for which will be handed to him, and which he will immediately set to music and sing himself, accompanying himself on the harpsichord; a Sonata for harpsichord on a subject given to him by the leader of the violins; a strict Fugue on a theme to be selected, which he will improvise on the harpsichord; a Trio, in which he will execute a violin part all’ *improvviso* (improvised); and finally, the latest Symphony composed by himself.”

Mozart met the challenge and the concert was a success.

Mozart was another composer who disliked the limits of the harpsichord. Unlike Bach, he embraced the piano, making it a serious professional instrument.

With the piano’s endorsement by Mozart and his contemporaries, piano teachers soon found themselves in demand. By 1779 in Vienna, over 300 piano teachers were making a comfortable living.



Piano on which Mozart played in Prague, 1787

Beethoven

In 1787, a 31-year-old Mozart heard a performance by a young prodigy, the somber but brilliant Ludwig van Beethoven.

Mozart was never easily impressed. He correctly believed that few, if any, composers were even close to being his equal. Of the 17-year-old Beethoven, however, he claimed "This young man will leave his mark on the world."

Not everyone agreed with Mozart. Seven years later, when Beethoven studied counterpoint with Johann Georg Albrechtsberger, the famous Viennese instructor insisted that Beethoven "has learned nothing, and will never do anything properly."

Albrechtsberger was frustrated because Beethoven's active imagination distracted him from the dry, traditional course of study. This imagination, however, was Beethoven's strength, and it made him one of the greatest composers in the world. To him, music was just a puzzle to be solved. His imaginative solutions yielded works of great power and expression, often built from seemingly dull themes. In fact, Beethoven's performances were so powerful that he hired musicians to run around the piano and remove the strings and hammers that he broke.



Early performance of the London Quadrophonic Society

Piano Frames

Then again, Beethoven's performances had to be powerful. Concert halls were getting bigger and outgrowing the carrying power of 18th century pianos. Although manufacturers knew that thicker strings would increase the piano's volume, the 16-ton tension required to tune such strings would snap a wooden piano frame like a twig.

A Bostonian, Alpheus Babcock, solved the problem in 1830 by making a cast iron piano frame. Within a few decades, his design revolutionized the industry. A variation of Babcock's cast iron design is still standard in today's pianos, in which the thicker strings require tensions of over 30 tons!

Russian School

Babcock's design helped the rise of pianists such as Anton Rubinstein, a Russian known for thunderous performances. In Europe, most critics wondered at all the fuss, since Rubinstein often played sloppily, botching notes during his energetic recitals. Audiences, however, loved the energy of Rubinstein's performances, and left his concerts feeling well entertained. Today Rubinstein is remembered as the founder of the Russian School of piano playing, which emphasizes fiery performances and virtuosity.

Liszt

Another exciting performer was Franz Liszt, whose handsome features, unrivaled skill, and dramatic playing style got the same response from the women of his day that the Beatles got from their fans in the 1960s. Women charged the stage, throwing jewels and shrieking in ecstasy. A fight always broke out over the green gloves that Liszt left on stage after the performance. One woman supposedly fished through trash for a cigar stub that Liszt smoked, then carried it in her bosom until she died.

Chopin

Although Liszt was the most popular pianist in Europe, another composer, Frederic Chopin, had a greater impact.

Chopin was a small, foppish man to whom social circles and proper fashion meant everything. Although lacking Liszt's personal magnetism, he amazed audiences by playing with a grace and agility that seemed impossible to achieve with his tiny, delicate hands. Today, Chopin is remembered as the pioneer of a style of music, called Romanticism. This form, which is still popular today, concentrated on the emotional aspect of music instead of the technical, and often abandoned the rigid forms imposed by the earlier composers.

The Steinway Piano

As music changed, so did the piano. In 1836, German cabinet maker Heinrich Steinweg of Steinway & Sons built a piano in his kitchen, which combined Babcock's cast iron frame with the recent English notion of pedals and the hammer action improvements made by the French. It was the first modern piano, and the beginning of the most prestigious piano manufacturer, Steinway & Sons.

In 1853, Steinweg moved his business and family to New York, where it remains today. By this time, piano playing had spread like wildfire, and the instruments were everywhere. They were even common in the rugged American west, where piano players appeared in dance halls, bar rooms, and bordellos.

American Piano Manufacturing

By 1870, there were over 7,000 piano manufacturers in the USA alone, with production increasing almost twice as fast as the population. Over the next 20 years, one out of every six Americans was involved in the piano industry.

During this time, manufacturers began experimenting with stranger and stranger variations on their designs. Inventors did anything to appeal to the public's piano obsession. Some of these pianos were round. Others were square or wing shaped. Still others stood upright. Some had keyboards on each side so that several pianists could play at once. The Janko piano keyboard looked like a typewriter. And Emil J. Cost's made the smallest working piano in the world, measuring $1/2'' \times 3 \frac{3}{8}'' \times 6 \frac{1}{2}''$ — about the size of a short paperback book!

Player Piano

The most unique of these inventive pianos required no pianist. The player piano could duplicate a performance by rolling a hole-punched sheet of cardboard past a line of air jets. Each hole was one note of the performance. As a hole passed a jet, air shooting through it fired the appropriate hammer at the piano's strings.

These player pianos accurately recorded many aspects of a performance, including dynamics and pedal activity. As a result, surviving player piano rolls provide us with accurate recordings of performances that were played long before the advent of modern recording equipment.

Ragtime

A wide variety of music was available for player pianos, but the most popular of the day was a new style of playing called Ragtime, which stood for ragged time. Ragtime tunes, called Piano Rag, were highly syncopated pieces that favored fast tempos and a more staccato flow.



Typical player piano ad

As a result of Ragtime, the piano's popularity increased more than ever. By the turn of the century, almost 365,000 pianos a year rolled out of factories. The stranger designs mostly disappeared, leaving pianos primarily in the form of either wing-shaped Grands or Uprights. The Grand piano produced louder and superior sounds, so was used for concert performances. The Upright's smaller footprint, however, made it the piano of choice for the home.

Jazz

The Upright was also the favorite of artists in another new style of music, Jazz. This uniquely American form had its roots in both Blues and Ragtime. Unlike these single instrument styles, however, Jazz was played by small bands, usually with a piano, a coronet, a trombone and a bass.

The thing that made early Jazz most unique, however, was that it was rarely written down. Few Jazz musicians could read music. Instead, these musicians depended on their skill, intuition, and experience. The Jazz age heralded a return to the art of improvisation which, though applauded in Mozart's day, was frowned upon by the classical performers of the late 19th century, and is still uncommon in classical performances today.

Electric Piano

The early 1950s saw the most unique addition to the piano since the cast iron frame — electricity. This addition was first made by the Wurlitzer Company. With it, the era of portable pianos had arrived.

In an electric piano, the hammers strike metal reeds or rods whose vibrations create electrical signals. These signals are then sent to an amplifier and a speaker which reproduces them as sound. The sound, however, is somewhat different from that of a traditional piano. As a result, the electric piano found a home in new, rather than classical forms of music.

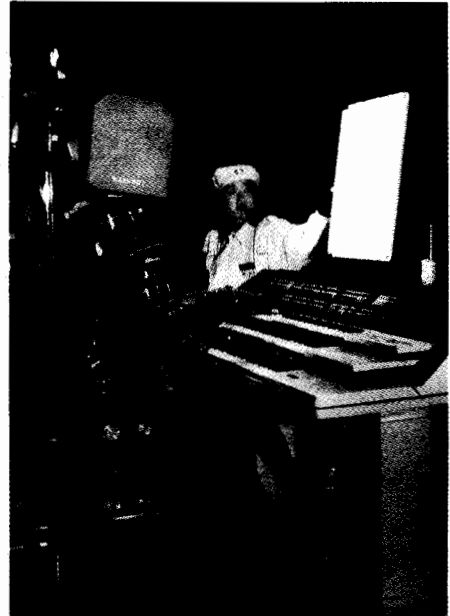
Moog Synthesizer

While the electric piano was sparking interest, German inventors and composers were learning to produce sounds by entirely electronic means. They used a device called an oscillator, which, when coupled with a keyboard by Robert Moog in 1965, formed the first synthesizer.



The 1922 Operatic Marathon winners, after 51 hours of continuous song.

Using this Moog synthesizer, composer Walter Carlos created the 1969 album *Switched on Bach*. Bach's music lent itself magnificently to the unusual sounds of this new keyboard instrument. The result legitimized the synthesizer while introducing the works of the baroque period's greatest composer to a new generation.



Japanese robot that plays organ and reads music through TV camera "eyes"

Sound Sampling

Synthesizers have made enormous advances since the early Moogs. Although today's synthesizer can still make unique electronic sounds, it can also accurately reproduce the sound of many traditional instruments.

This is done by a process called sampling. The process starts by making a digital recording of notes played by a real instrument. Using computer technology, the sound is converted into a series of numbers, which are later converted back to sound. Compact Discs also work by the same process.

In synthesizers, these numbers are stored in a computer chip rather than on a disc. When the keyboardist plays a note, the synthesizer converts the numbers for that note back into sound. The result is the exact sound of the instrument that was originally recorded.

By the early 1980s, computer technology was also being used to attach sequencers to electronic keyboards. Performances were digitally recorded, edited or overlaid with additional musical sequences, then played back through the synthesizer. Unfortunately, each manufacturer's sequencer only worked with their own synthesizer.

MIDI

In 1982, representatives of the top synthesizer manufacturers met to discuss this compatibility problem. The result was MIDI (Musical Instrument Digital Interface), which became the standard format for sending data between instruments and sequencers (or other instruments). MIDI is so versatile that it is also used to control stage lighting, special effects, and video equipment. All manufacturers, including The Miracle's, support the MIDI standard today.

The combination of sampling and MIDI changed the way many composers work. Making a recording no longer requires dozens of musicians, a studio, and a room full of recording equipment. A single composer with a sequencer and a keyboard can create the sound of everything from a rock band to a symphony orchestra. To do this, the composer uses the synthesizer to create one instrument sound at a time, then sequences all sounds together. In fact, most of today's movie soundtracks are created in exactly this manner.

MIDI keyboards are also a boon to Rock musicians. A keyboardist can replace an entire wind, brass, or string section, providing an instrumentation range once impossible to create in live Rock performances. In addition, some bands use sequencers to help them perform songs that normally require many more musicians.

The Miracle

All these things are done on synthesizers similar to The Miracle keyboard, which can reproduce 128 different sampled stereo sounds. In The Miracle Piano Teaching System, you'll use a synthesizer to learn an instrument with a rich 300-year tradition ... the piano.



Life before The Miracle

THE THEORY BEHIND THE MIRACLE

The Miracle Piano Teaching System is the first computer program that teaches you how to read and play music on the piano. It does this by providing interesting activities and games that build your knowledge and playing skills step by step. If you've been through The Miracle course, you're familiar with how this works.

But what happens inside The Miracle Piano Teaching System? This chapter describes the inner workings of the software and how The Miracle seems to "know so much" about piano playing.

Lessons and Chapters

The Miracle teaches piano in hundreds of small steps called Lessons, which are grouped into Chapters. One Chapter, for example, introduces rhythm. Another Chapter introduces staff notation (how music is written).

These Chapters are arranged to give you basic skills first, then to improve on these skills while introducing more advanced concepts. When you successfully complete a Lesson, you go on to the next Lesson in that Chapter. When you complete the last Lesson in a Chapter, you go on to the next Chapter.

But what happens when you don't get through a Lesson the first time?

Human piano teachers watch you practice. If you don't get through a Lesson properly, the teacher gives you special exercises to help you get over the problem.

The Miracle does the same thing. It "listens" to how you play, then analyzes your performance. If you had problems, it too creates a special exercise to help you overcome those problems.

The Analysis Phase

The Miracle analyzes your playing both during the performance and afterward.

During your performance, The Miracle listens to make sure you are playing the right notes at the right times.

The Miracle also records your performance for later analysis. It records which keys you press, when you press them, how hard you press them, and when you release them. The Miracle calls this data the AMS, or Actual MIDI Stream.

When you finish playing, The Miracle compares your AMS with its IMS, or Ideal Music Stream. This is its recording of how the performance is supposed to sound.

Choosing the Most Significant Error

When you play the piece incorrectly, it is not enough for the program to say, "Well, you played some notes wrong." The goal of an expert teaching system is to determine why you played the notes wrong, then offer corrective measures.

The Miracle classifies each of your errors as one of 200 error types. These types are sorted into 41 main categories. Some examples of the main error categories are:

- Ignoring an accidental mark
- Holding a note too long
- Playing the notes too fast
- Misunderstanding the previous accidental rule
- Ignoring a rest
- Not holding a dotted note long enough
- Firing the wrong finger
- Striking the crack between two keys

Because different Lessons develop different skills, The Miracle pays particular attention to the error categories associated with those skills. For example, when evaluating a Lesson that focuses on rhythm, The Miracle is less picky about a few wrong notes than it is about bad rhythm.

The Miracle determines which categories are important by assigning an importance value or weight to each of the 41 error categories for that Lesson. The more important the error, the higher the number.

Each category's weight is then multiplied by the percent of mistakes made in that category. This creates a score in each of the 41 error categories.

Low scores mean you made few mistakes. If your scores are low enough, The Miracle gives you a passing grade and takes you to the next Lesson. Otherwise, The Miracle identifies your most significant error (the one with the highest score), and designs an exercise to help you overcome this problem.

Creating Exercises

Each of the 41 error categories has a half-dozen or more exercises that can help you overcome a problem in that category. These exercises use The Miracle's various Activities, such as *Shooting Gallery*, *Rhythm Practice*, and so on.

When The Miracle chooses an exercise, it first eliminates any exercise for the category that is not appropriate to the Lesson. For example, if you haven't learned how to play with both hands yet, it won't ask you to play with both hands.

From the remaining exercises, The Miracle then selects the one that uses the least recent Activity. For example, if you have a pitch error, you'll get a *Shooting Gallery* exercise. In this way, you constantly work in a variety of Activities.

Repair Chalkboards

Once the exercise is selected, The Miracle creates a *Chalkboard* screen that tells you what your error was, and what exercise you'll do to work on it. It does this by combining two pieces of text:

- The first comes from a phrase list associated with each error category; it tells you what you did wrong.
- The second comes from a phrase list associated with the Activity; it tells you what to do to correct the problem.

The two phrases are combined using common rules of English.

This explains why the repair *Chalkboards* have no Chapter and Lesson numbers on them. They are custom-made to match your error, so they don't come from any particular Lesson.

After the Exercise

Your performance in the exercise is analyzed in much the same way as your performance in the Lesson. If you receive a passing grade, The Miracle returns you to the Lesson where you had the problem. If you make many mistakes in the exercise, The Miracle creates another practice exercise.

As you work with these exercises, your skills gradually improve. Eventually, you will be able to get through the initial Lesson and move on to the next.

ABOUT THE KEYBOARD

This chapter provides the following details about The Miracle keyboard:

- How to connect the foot pedal
- How to connect the earphones
- How to connect The Miracle to a stereo system
- How to select different patches (instrument sounds)
- How to split the keyboard between two patches
- How to use The Miracle with MIDI

Connecting the Foot Pedal

The pedal that comes with The Miracle functions as a *Damper* pedal. To connect the pedal:

1. Plug it into the two-pin **Foot Pedal** jack on the back of The Miracle keyboard. It doesn't matter which side of the plug is up.
2. Put the pedal on the floor with the foam (squishy) side up.

Connecting the Earphones

The stereo earphones included with the hardware bypass The Miracle's speakers when connected, so you can practice without disturbing others.

To connect the earphones, plug them into the **Head Phone** jack on the back of The Miracle.

Connecting The Miracle to a Stereo

You can play the sound from The Miracle through your stereo for enhanced sound. This also lets you record performances, if you attach a tape deck to your stereo.

To connect The Miracle to a stereo:

1. Purchase two Male-to-Male RCA-type connection cables, one for each stereo channel, in any store that sells stereo or electronic equipment.

Note: This is the same type of cable that connects your stereo receiver to your tape deck, CD player, or turntable. Some stores also sell a single stereo cable that combines two regular cables. Such cables have two RCA-type plugs on each end. These work fine too, and you'll only have to buy one.

2. Connect one cable between the **LT Audio Out** jack (back of The Miracle) and the **Left AUX In** jack (on receiver).
3. Connect the other cable between the **RT Audio Out** jack (back of The Miracle) and the **Right AUX In** jack (on receiver).

Plugging in these cables does not disable the speakers on The Miracle. Instead, The Miracle volume control affects both the internal speakers and your stereo speakers. If you want to use your stereo and not The Miracle speakers, connect The Miracle to your stereo and connect the earphones.

Selecting Different Patches

Musicians use the term *patches* for the different instrument sounds in a synthesizer. The Miracle contains 128 different patches. Of these, 6 are the default sounds assigned to the left 6 buttons on the keyboard top. They are:

(Grand) Piano Harpsichord (Pipe) Organ
(Motor) Vibraphone (Dyno-Rhodes) Electric Piano Synthesizer (Pad 5)

To use those instruments, press the button for the instrument you want. The light (called a LED) above the selected button lights up.

You can also select from 9 predefined groups of sounds, called *Presets*. Or, you can enter a special **Library Select Mode** that lets you select any of The Miracle's 128 patches.

Selecting Presets

To select a group of Presets:

1. Place the keyboard overlay over the buttons and lights on the top of The Miracle.
2. Hold down the **Select** button and press the **Scroll Down** button.
The light next to the first Preset, *Classical*, starts to blink.
3. Take one of these alternatives:

To select from the five patches in this Preset, press the buttons (**Melody 1, Melody 2, Accompany, Bass, Percussion**).

To select a different Preset, hold down **Select** and **Scroll Down** or **Scroll Up** until the light flashes next to the group you want.

To return to the default Preset, hold down **Select** and **Scroll Down** or **Scroll Up** until none of the LEDs flash.

The following preset groups are available:

PRESET	MELODY 1	MELODY 2	ACCOMPANY	BASS	PERCUSSION
Classical:	Clarinet	Oboe	Strings	Sfz Brass 1	Xylophone
Rock:	Fuzz Guitar	Stop Guitar	Pluck Synth	Stick Bass	Percussion 1
Jazz:	Saxophone	Vibraphone	Jazz Guitar	Fretless Bass	Percussion 3
Blues:	Harmonica	Organ	Steel Guitar	Electric Bass	Percussion 1
Rap:	Katimba	Mod Synth	Clean Guitar	Moog	Effects 2
Latin:	Pan Flute	Marimba	Guitar	Upright Bass	Percussion 2
Country:	Banjo	Violin	12-String Guitar	Detuned Piano	Percussion 1
Cathedral:	Harp	Horns	Vox 3	Pipe Organ	Church Bells
New Age:	Harmonica	Tube Bells	Digital Waves	Fretless Bass	Log Drum

Library Select Mode To enter **Library Select Mode**:

1. Place the keyboard overlay over the buttons and lights on the top of The Miracle.
2. Hold down the **Select** button and press the **Scroll Up** button.

The light next to the words **Library Select** starts to blink, and **Melody 1** lights up. This selects Patch 0, *Grand Piano*.

3. Use the buttons on the keyboard to scroll through the list of patches as shown below.

MELODY 1 - Scrolls forward through the patches, one at a time.

BASS - Scrolls backwards through the patches, one at a time.

MELODY 2 - Scrolls forward through the patches, jumping ten at a time.

PERCUSSION - Scrolls backward through the patches, jumping ten at a time.

ACCOMPANY - Jump to patch 64 (Synth Bells).

SELECT - Jump to patch 0 (Grand Piano).

If you scroll past the ends of the list, you will wrap around to the other end of the list.

4. To exit **Library Select Mode**, hold down the **Select** button and press **Scroll Down**.

Available Patches

The following patches are available though both **Library Select Mode** and **MIDI control**:

000 Grand Piano	043 Trumpets	086 Synth Pad 6
001 Detuned Piano	044 Horn ¹	087 Synth Pad 7
002 FM Piano	045 Horns	088 Synth Pad 8
003 Dyno	046 Trombone ¹	089 Synth Pad 9
004 Harpsichord	047 Trombones	090 Synth Pad 10
005 Clavinet	048 Cup Mute Trumpet ¹	091 Synth Pad 11
006 Organ	049 Sfz Brass 1	092 Synth Pad 12
007 Pipe Organ	050 Sfz Brass 2	093 Synth Pad 13
008 Steel Guitar	051 Saw Synth	094 Synth Pad 14
009 12-String Guitar	052 Tuba ¹	095 Synth Pad 15
010 Guitar	053 Harmonica	096 Tube Bells ¹
011 Banjo	054 Flute ¹	097 Frogs/Ducks
012 Mandolin	055 Pan Flute ¹	098 Banjo ¹
013 Koto ¹	056 Calliope	099 Shakuhachi ¹
014 Jazz Guitar ¹	057 Shakuhachi	100 Piano ¹
015 Clean Guitar ¹	058 Clarinet ¹	101 Vibraphone ¹
016 Chorus Guitar	059 Oboe ¹	102 FM Piano ¹
017 Fuzz Guitar	060 Bassoon ¹	103 Clock Bells ¹
018 Stop Guitar	061 Sax ¹	104 Harpsichord ¹
019 Harp ¹	062 Church Bells	105 Clavinet ¹
020 Detuned Harp	063 Big Bells	106 Organ ¹
021 Upright Bass ¹	064 Synth Bells	107 Pipe Organ ¹
022 Slap Bass ¹	065 Vox 1	108 Metal Guitar ¹
023 Electric Bass ¹	066 Vox 2	109 Stick ¹
024 Moog	067 Vox 3	110 Guitar ¹
025 Techno Bass	068 Mod Synth	111 Xylophone ¹
026 Digital Waves	069 Pluck Synth	112 Marimba ¹
027 Fretless Bass ¹	070 Hard Synth	113 Syn Trombone ¹
028 Stick Bass	071 Syntar	114 Syn Trumpet ¹
029 Vibraphone	072 Effects 1 ²	115 Sfz Brass 1 ¹
030 Motor Vibraphone	073 Effects 2 ²	116 Sfz Brass 2 ¹
031 Xylophone	074 Percussion 1 ²	117 Saw Synth ¹
032 Marimba	075 Percussion 2 ²	118 Church Bells ¹
033 Glockenspiel ¹	076 Percussion 3 ²	119 Marcato ¹
034 Kalimba ¹	077 Sine Organ ¹	120 Marcato
035 Tube Bells	078 Organ ³	121 Violin 2 ¹
036 Steel Drums	079 Pipe Organ ³	122 Strings 3
037 Log Drums ¹	080 Harpsichord ³	123 Synth Bells ¹
038 Strings 1	081 Synth Pad 1	124 Techno Bass ¹
039 Pizzicato	082 Synth Pad 2	125 Mod Synth ¹
040 Strings 2	083 Synth Pad 3	126 Pluck Synth ¹
041 Violin 1 ¹	084 Synth Pad 4	127 Hard Synth ¹
042 Trumpet ¹	085 Synth Pad 5	

1 These programs are single voice, which lets The Miracle play up to 16 notes simultaneously. All other programs are dual voice, which lets it play up to 8 notes simultaneously.

2 See the table on the next page for a list of these sounds.

3 To be true to the nature of the sampled instrument, these patches do not respond to velocity.

Effects and Percussion Patches

The following table describes how the special effects and percussion sounds are mapped onto the keyboard. Each effects or percussion patch contains up to 9 different sounds, which can be played on 6 keys each. Each key of a particular sound will play at a different frequency (higher or lower), just like a normal instrument.

To play these sounds on the keyboard, select the patch that has the sound you want, then play the keys that correspond to that sound. For instance, to hear the keyboard play applause, select patch 73, then play keys starting at the second set of six (the first F-sharp through the first B on the keyboard).

Patch	MIDI Note Numbers								
	30-35	36-41	42-47	48-53	54-59	60-65	66-71	72-77	78-83
072 Effects 1	Jet	Gunshot	RoboDeath	Whoosh	Punch	Slap	Duck	Owl 1	Owl 2
073 Effects 2	Yes (ding)	No (buzz)	Applause	Dogbark	Door creak	Door slam	Boom	Car skid	Goose
074 Percussion 1		Kick Drum	Snare	Toms	Cymbal	Closed Hat	Open Hat	Ride	Shaker
075 Percussion 2		Rim Shot	Exotic	Congas	Timbale	Cowbell	Bongos	Whistle	Clave
076 Percussion 3	Ratchet	Snap 1	Snap 2	Dripdrum 1	Dripdrum 2	Wet clink	Talk Drum	Agogo	Explosion

Note that the first key on the keyboard corresponds to MIDI note 36, so sounds that fall below that number are available only through MIDI.

Splitting the Keyboard

Splitting the keyboard means to assign one patch to the left half of the keyboard and a different patch to the right half. This can be done in all modes except **Library Select Mode**. To split the keyboard:

1. Press and hold the button you want to assign to the keyboard's left side (everything to the left of Middle C).
2. Now press the button you want to assign to the keyboard's right side (Middle C and everything to the right of it).

When you release the buttons, both instruments' indicator lights stay lit, and the keyboard is split.

Note: If the left patch is not velocity sensitive, neither patch will respond to velocity.

3. Cancel the split by selecting any other patch.

