

# DRUM PROGRAMMING

A Complete Guide to Program  
and Think Like A Drummer



By *Ray E. Badness*  
Foreword by Mark Simon

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## **FOREWORD**

by Mark Simon

When Ron Middlebrook of Centerstream Publishing first approached me about writing a foreword for a book on drum machine programming, I was skeptical. I thought, "who needs another book about programming drum machines, most of the tapes I hear prove that people are already quite adept at programming drum machines... *to sound like drum machines!*"

So, I read the book and was pleasantly surprised! This is not a "select pattern 22, enter edit mode B by selecting the green button labeled quantize" book. This is a book about learning to think and program like a drummer. This (in my opinion) is a very important subject.

I meet people daily who play me their tapes with incredibly simulated guitar and sax solos, great string and horn lines, but inevitably their phenomenal feats of programming are overshadowed by a lackluster drum track. Why will many composers spend hours getting the pitch-bend on a background harmonica track just right, only to use a "preset" drum pattern? I feel the problem is simply a lack of good information to help them understand a complex instrument they do not play. That's where this book comes in. Ray has taken a direct and mathematical approach to teaching you drumming. I like that he gives you solid guidelines in which to work, not "rules set in stone".

When I was a working session drummer, and I would get a call from a producer I had never worked with before, I would try to find other albums and projects he had done to become familiar with what he looked for in a drummer. I would then go to the session ready to simulate what I *thought* he wanted in a drummer. However, in many instances after the first pass he would tell me that I played *too* simple or there were *too* many fills, or what ever the style was I had heard in his previous work. He would then explain that he "had hired me for *my skill and reputation as a creative drummer*, not as a drum machine", and that "if he had wanted the same stuff again, he would have hired the same drummer". The point to this story is not to say, "don't bother doing your homework, because doing *my homework* kept me working as a *session drummer* for many years. The point to this story is to "use your creativity".

As Ray points out, go by what your ears tell you. If it sounds good, DO IT! If it doesn't, go back and try again. By following this book you can get an understanding of the drum kit that takes many drummers years to learn. In this age of technology, with sampling and computer assisted performance, it's easy to think our drum programming and sequencing sound "real" when compared to *other programming*. But remember a drum machine is an "emulation" of a drum kit, so strive to be as creative as a "human drummer" no! a "preprogrammed drummer".

Have fun with this book and may you hear many limes upon its completion my favorite question about my drum machine tracks, "Who played the drums?, you used a drum machine?!"

### BIO

Mark Simon was a "session drummer" for many years playing on countless record, TV, and demo projects before becoming a full-time composer. Although he currently doesn't earn his living as a drummer, Mark continues to play "real drums" for enjoyment and composing new rhythmic ideas. Because after all, drum machines cannot be creative, (yet) they can only play what you give them. Garbage in - Garbage out. Cool ideas in = Cool ideas out.

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I would like to express a special thank you to the following persons for their unfailing support during this long and cumbersome project:

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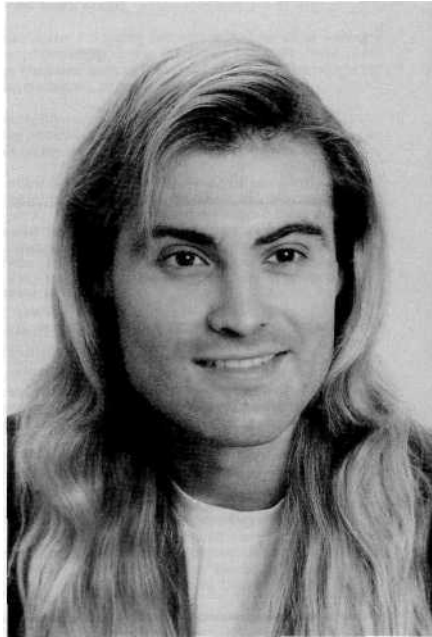
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## Preface

Learning to program a drum machine can be both confusing and frustrating. My first experience was no exception. No matter how hard I tried, I could not manage to get the machine to play the rhythms I heard in my head. This was partly because I couldn't play a real drum kit, and partly because I didn't have the six years of college needed to program the model I had. Thoroughly confused and broke from my so called "investment", I set out for college to solve all my problems.....or so I thought.

During my years at college, I searched high and low for a book such as this one. One that was geared toward the novice user and could explain both the basics of drumming and drum programming in 100 pages or less. I'm still looking for that book. Luckily, you've just found it.

Ray F.Badness



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# Introduction

The complexity of most drum machines makes them difficult, if not downright confusing to operate. To make matters worse, the owner's manuals have a tendency to assume that the reader is familiar with sheet music, song structuring techniques, and the rudiments of drumming. This couldn't be a worse assumption since many people who own drum machines are self taught musicians who cannot read sheet music or play a real drum kit. This text will therefore present material in such a manner that no music theory or drumming background is required.

Each chapter of this text will explore a different piece of drum hardware, including how it is played, and how it is programmed. In addition, short exercises throughout the book will further exemplify the concepts presented and produce a sample song when completed. Probably the most important aspect of this text is that you need not be able to play a drum rhythm with your hands in order to program. Programming will be taught using a play by number system that is so simple, anyone can learn. In a nutshell, all of the basic instruction you will need to master the art of drum programming lies in the following pages.

Realistic drumming techniques will be the focus of this text for two reasons. First, they will save you money. How? Drummers with ten arms aren't very easy to come by. Consequently, your first world tour will be quite expensive when you have to hire five drummers to play what you've haphazardly programmed. Second, lawsuits over sampling are common. You cannot possibly get yourself into trouble if you do your own drumming. Besides, anyone can digitally sample a drum riff from an old James Brown or Van Halen record. Be both original and cost effective at the same time; do your own drumming.

If you haven't done so already, read or skim through your owner's manual to get a basic understanding of how your machine operates. It is not necessary that you master all of its operations, just take a few moments to recognize the many functions that it can perform and note some of the most common keystrokes used such as pattern creation, pattern clearing, tempo adjustment, time signature specification, and quantization change. There is no question that you will not understand everything the first time around. That is hopefully where this text will fill in the gaps. In just a few hours you will be well on your way to making great music and having great fun.

As a precautionary note, you will need 42 empty patterns in your drum machine to complete this text. Check your machine and verify that patterns 01 through 42 are indeed empty. If they are not, consult your owner's manual for the specific keystrokes required to clear them. Good luck!

# The Basics

## The Drum Kit

Drums, cymbals, sticks....now what? Confusion! Drummers make it look so easy. Their seemingly effortless motions impose an aura of magic over a drum kit. Similarly, a "good" martini also seems magical, but in actuality, the methods used to master both are really quite simple (only simple in thought however). The critical and most difficult part is the physical motion. This is the part that takes years to master and consequently, is the magic.

Upon first glance, drumming may seem to be complex because of the number of different motions and amount of gear involved. But upon closer inspection, you will notice that certain rituals are repeated over and over for generic outcomes. Let me try and put it in perspective for you. When you get up in the morning, why do you go to work? Because you need to catch up on your sleep? Well, some do, but most people go to work because they need money. The ritual here is work, and the outcome is money. Drumming is much the same. When you want a bare bones basic drum beat, play the Kick Bass, Snare, and Hi-hat. When you want to accent a note or chord in your music, strike the Kick and a Cymbal at the same time. When you want to speed up your music, play faster. I think you get the picture. Honestly, the only complex part of drumming is disciplining your hands and feet to play different rhythms at the same time.

The modern day musician has therefore been confronted with a modern day dilemma; to be or not to be a real drummer. A real kit takes years to master. To gracefully pound it with all four limbs and look smooth at the same time is a real challenge. Not only this, but finding a place to practice can also be a time consuming venture. On the other hand, all of this pain and suffering can be bypassed for a few hundred bucks, this text, and a pair of headphones. Yes, once again modern electronic technology has prevailed. For a fraction of the cost of a real kit, a drum machine will allow you to own a digital sample of most every piece of drum hardware in existence. But, although the price of a drum machine is right, none of the current models can "identically" mimic a real drummer, yet! Nevertheless, it's an alternative that must be considered given the fact that drum machines have been steadily improving.

Most modern day drumming uses patterns borrowed from the past. In this sense, half of your work has already been done for you. All you have to do is repeat history. For this reason, as we make our way through this text, you are sure to recognize many of the patterns. This is yet one more example that drumming is not that difficult.

Figure 1 shows a typical drum kit. Let's take a look at its composition. Notice that every kit will contain at least one Kick, a Snare, Cymbals, and Tom-toms. Generally, the **Kick** and **Snare** are used to set the basic beat of the pattern. The **Hi-hat** cymbals, although omitted by some programmers, are crucial to include because they add a realistic feel and rhythm to the overall sound. The remaining **Cymbals** (Crash, China, Splash, etc..) are often used to accentuate climactic peaks and valleys in the music. And lastly, the Tom-toms, or Toms, are most commonly used for fills which will be discussed in great detail in Chapter 4. Keep in mind that these are only rough guidelines and should be taken accordingly.



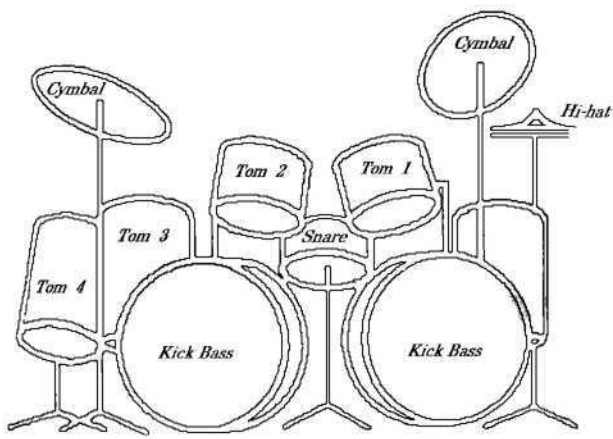


Figure 1 : The Drum Kit

As we've just discussed, each piece of drum hardware has a musical purpose. You will generally find that each is struck with a repeating pattern and force. Probably the most important thing to remember is that a drummer has only two hands and two feet. Since you too have only four limbs, obviously (here is a limit as to how many pieces you can strike at one time).

In general, a basic drum rhythm will entail controlling the amount of Hi-hat separation with your left foot, and producing the Kick Bass rhythm with your right. Your left hand strikes the Snare drum, and the right strikes the Hi-hat. It is important to note that the Snare will be on your right and the Hi-hat on your left (your right arm crosses over the left to strike the Hi-hat). Notice that only three pieces of drum hardware are used. The Kick Bass, Snare, and the Hi-hat. Also notice that it takes all four limbs to control them. However, your arms and legs are not confined to this configuration. Just about anything is possible. As you will see in Chapter 3, the right hand can also be used to strike the Ride Cymbal instead of the Hi-hat. I encourage you to be creative when programming and experiment with the hardware at your disposal. Figure 1 will help you picture realistic arm motions.

Keep in mind that your drum rhythms should theoretically match your music. If this statement confuses you, take a closer listen to your favorite records. Listen to the way the Kick and Snare rhythm compliments the music. You will find that, there is a definite correlation between the strum of the guitar and the rhythm that the Kick and Snare produce. If there is no guitar in your music, you will find that this correlation occurs with another instrument. In Rap music for example, the syllables in the lyrics follow the Kick and Snare rhythm. For now, just keep this in mind. We'll talk more about how to do this in Chapter 2.

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# The Drum Machine

Today's drum machines are of superb 16 bit audio quality and contain standard features that could only be dreamt of ten years ago (human feel, automatic drum fills, MIDI, etc.). Whereas it was excusable to sound awful with the first generation of drum machines, today there is no excuse for bad drum programming.

Over the last decade, drum programming has found its way into almost every genre of music. From the music we hear on our radios and televisions, to the P.A.'s at our local night clubs, it's everywhere. For those of us who know how to program, it's music to our ears, but to the live drummer it must surely seem to be a forecast for extinction.

Fortunately, no one is becoming extinct, including the live drummer. Not only are his techniques and methods in great demand by us, the programmers, but he also has something that our modern electronics will never replace...his human essence. Would you pay to see a band with no human members? I rest my case. It's terribly more exciting to watch humans perform than to listen to a box full of electronics spit out pre-programmed data. On the other hand, if you were a record producer interested in keeping recording costs to a minimum, you would surely opt for the box full of electronics. What's my point? There is plenty of room in the world of music for drummers and drum machines. In fact, they are both necessities!

*What is a drum machine?* A drum machine is a computer whose sole purpose is to facilitate the recording and playback of drum rhythms. It is different from a personal computer (PC) in two regards; one, it has drum sounds stored inside of it, and two, it has a built in sequencer. That is not to say that a personal computer cannot be configured to play drum rhythms. Quite to the contrary, it is entirely possible. However, it costs a significant amount of money to buy the sequencing software, MIDI interface, and sound source. If you are short on cash, a drum machine will get you the most bang for your buck.

What does a sequencer do and where do the drum sounds come from? A sequencer does just what you might guess. It allows the composer to arrange sounds and patterns in any sequence, then play them back as arranged. As for the drum sounds, they are merely digital samples stored on memory chips inside the machine.

*What is a digital sample?* A digital sample is a non-continuous approximation of an analog sound. In plain English, an analog sound is the real thing, or in our case, the one that emanates from a drum when hit. As for a digital sample, think of a "connect the dots" puzzle in a child's game book. By drawing a line through the dots placed on a page, you can create a picture. This picture is not the real thing, but it's so close that anyone can tell what it is. Digital sampling is a similar process of storing audio dot locations in memory. When played back, they sound very close to the original, so close in fact that it's hard, if not impossible, to tell the difference.

As you might imagine, if there were more dots on your page, your picture would look much better. Theoretically, with a very large number of dots placed very close together, the dots would appear to form the picture without having to connect them. So how do you electronically put more dots on a page? Take a higher bit sample. I'm sure you have heard of 12 bit or 16 bit samples? Higher bit samples have improved audio quality, just as more dots on a page make a better picture. For this reason, 16 bit samples sound better than 12 bit. It is interesting to note that the current electronic technology will allow sampling in excess of 16 bits. Unfortunately, your ear probably wouldn't be able to hear the difference and most musicians wouldn't be able to afford it.

As you can imagine, the first commercially available drum machines were dramatically different than those available today. They drew heckling and disgust from live drummers, and for good reason. To say that they sounded phony is putting it mildly. Not only this, but most contained barely enough memory to program a few elaborate, non-repetitive songs. This meant that if the user were to perform for any extended period of time, he would either have to repeat patterns often, or take frequent breaks to reload the memory of the machine. This was all compounded by the fact that memory cartridges were expensive and only available for some machines. These early drum machines also had reputations for being very unreliable. System crashes, or failures, were common. As with any budding technology, time was needed for perfection.

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Today, perfection is near. Not only do the most recent machines sound more realistic than ever before, but they all support a standardized set of MIDI (Musical Instrument Digital Interface) features. These standardized MIDI features enable them to talk to one another and to other MIDI equipped devices. This ability has many applications including but not limited to, syncing your drum patterns to taped music, triggering samples existing in other machines, transferring and storing your machine's memory onto floppy or fixed disk, and remote starting and stopping of other machines. Please refer to your local library or book store if you wish to find out more about the applications and protocol of MIDI. There have been many excellent books written on the subject, and you will surely wish to explore them after mastering the art of drum programming. Keep in mind that knowledge of MIDI is not required in order to program your drum machine.

## Song Structure

Your song structure will make or break your song. However, if you wish to forge into the nineties by breaking traditional song structures, skipping this section will be your destiny.

If it is pop stardom you desire, your songs should generally last between 3 and 4 minutes. Longer compositions will tend to do one of two things; bore the listener, or overexpose your catchiest passages. As they say, too much of a good thing can be detrimental. When in doubt, leave the listener wanting more. Along the same line, instrumental sections are fine, but 12 minute solos may also bore the listener.

As for the title of your song, something so simple could never be more important. If you've ever gone into a music store in search of a recording but been unable to find it because the lyric line stuck in your mind had absolutely nothing to do with the song title, you know what I mean. Theoretically, by taking your song title from the catchiest passage of your tune, you will allow the listener to immediately locate it when in doubt. Let me show you what I mean. I'll give you a few song titles and you see if you can remember the melody. "**Sweet Home Alabama**" -Lynyrd Skynyrd, "**Lucille**" -Kenny Rogers, "**Rhinestone Cowboy**" - Glenn Campbell. These are all songs that we love to hear but the song title immediately brings to mind the catchiest passage. This of course translates into additional record sales, which of course means more money for the writer (i.e. you).

All songs are comprised of blocks that fit together in many ways. These blocks are known as the *Verse*, *Chorus*, *Bridge*, *Intro*, and *Finale*. The Intro is used to begin the song, and the Finale is used to end it. The portion of your song that repeats over and over is called the Chorus. Likewise, the part that does not repeat, or vocal story telling portion, is done in the Verse. A Bridge is used to smooth the transition between Chorus and Verse and vice versa. Your song may or may not need one. However, if a transition doesn't sound pleasing, that is probably a good indication that you do.

A musical unit known as a *Measure*, or *Bar*, is used to define the length of a music block. A measure will vary in time duration depending on the time signature and tempo of the music. In 4/4 time, which we will discuss later, one measure consists of 4 beats, each one quarter note in length. Don't worry if you don't understand the music theory, drum machines and sequencers know how long a measure lasts. They automatically determine its length when you specify the tempo and time signature to them. Since most all music is written in 4/4 time, this leaves only one thing for you to specify which is the tempo. The upcoming section entitled *Tempo and Time Signature* lists approximate tempos for a few styles of music. You may wish to increase or decrease these to suit your needs.

*In most well structured songs, you will generally find that the length of a Chorus or Verse will be a multiple of 8 bars. For example, a 16 bar Verse and 8 bar Chorus are quite common. Why multiples of 8 bars? It just seems to sound best when done in this fashion. To say that you cannot do otherwise is quite to the contrary. I encourage creativity and new thinking. Intro's and Finales can be short (1 or 2 bars) or long (8 or 16 bars), just remember not to bore the listener and to keep the overall song time around 4 minutes. Likewise, the length of a Bridge is completely arbitrary, but generally one or two bars are used.*

The solo is generally played over the music of a Verse. Note that it can also be played over a Chorus or any bit of music you desire, but the standard lengths are 8, 16, or 32 bars depending on skill and the situation. A good rule of thumb is to limit your solo to the length of a Verse.

Keep in mind that composing a song is not an instantaneous process. It will take time to explore different ideas and song structures. Experiment with the guidelines that have been presented and don't give up until it sounds the way you want. Your persistence will pay off.

There have been many successful song structures over the years. Here are a few of them listed in Table 1.

Table 1 : Song Structures

SONG STRUCTURES			
Structure A.	Structure B	Structure C	Structure D
Intro	Intro	Intro	Intro
Verse #1	Verse #7	Chorus	Chorus
Chorus	Bridge	Verse #1	Verse #1
Verse #2	Verse #2	Chorus	Bridge
Chorus	Chorus	Verse #2	Chorus
Intro	Verse #3	Chorus	Verse #2
Solo	Chorus	Bridge	Bridge
Chorus	Solo	Solo	Chorus
Chorus	Chorus	Chorus	Solo
Finale	Chorus	Chorus	Bridge
	Finale	Chorus	Chorus
		Fade	Chorus
			Finale

*Note that there are many possible variations and combinations of these structures. Mix and match! Also, you are not restricted to end your song with two or more Choruses.*

## Real Time and Step Time Programming

There are two ways to program a drum machine: *Real Time* and *Step Time*. *Real Time* programming is more complex than *Step Time* and requires playing the drum pattern you desire while the machine records your motions. This method can be frustrating for a non-drummer who doesn't know what he wants to hear, let alone how to play it. As a matter of fact, this method is so difficult for beginners that I recommend using *Step Time* Mode exclusively until you get a good feel for the machine. *Step Time* programming, which I like to call "*play by number*", involves dividing a measure into an equal number of pieces of time, then placing sounds on numbers. It is very simple and will allow composition without actually playing, programming of faster fills, and easy deletion of closely spaced sounds. In the end, I think you will find that the most efficient method of programming will be a mixture of both.

*Note : These two modes may have slightly different names depending upon the manufacturer of your machine. See your Owner's Manual for specifics.*

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## Save Your Work

I can't stress this enough. Save your work frequently! As with all micro-computers, there is a tendency to crash just when you've finished your best work (Murphy's Law). You will find that some drum machines operate very erratically when 95% or more of the memory is used. If you must operate in this area, save frequently and be prepared for the worst.

Most drum machines will allow memory storage to an expensive external memory cartridge, or to a cassette. It takes a lot longer to save to cassette, but for the price you can't beat it. If you are programming a drum machine and have a personal computer (PC) available, check your music software manuals because some sequencing software will allow you to do a bulk memory dump and store data on your hard drive. This is much faster than saving to cassette, and much cheaper than a memory cartridge. If you do not own a personal computer there is another way to save your data quickly. For a few hundred bucks you can purchase a portable floppy drive. This unit represents a somewhat large initial investment, but keep in mind that floppy disks can be purchased inexpensively and can hold quite a large amount of data. As a side note, if you are using a personal computer to sequence your drum programming, make a backup copy of your sequencing files. Believe me, you'll be happy you did when your hard drive fails.

I can't help but remember my first drum machine crash. I had been blindly punching buttons for three months and had somewhat perfected 10 songs. I was just making some final changes to the drum patterns for a gig the following week when "all of the sudden", the machine started going through its start-up routine. After it finished, to my extreme disappointment, I discovered everything was gone. Everything! Three months of work vanished into thin air in only a few seconds. Maybe you can relate or have experienced this kind of extreme disappointment. While I was hyperventilating, my concerned roommate called the paramedics because he "thought" I was going into shock.

When the fire truck arrived, the paramedics asked me, "What happened?" I felt so stupid saying my drum machine crashed. Here were six paramedics expecting a heart attack victim. Finally, with great reluctance I said, "My drum machine crashed", trying to retain what little bit of self esteem I had. As you can imagine, the laughter that ensued was the best these men had had all week.

Let this be a lesson to you. My machine completely cleared itself to the factory showroom state in seconds, through no fault of my own! As a result, we didn't play the gig the following week, or the week after. I thought things would be different if I bought a new drum machine. Yah, you guessed it. That one crashed too, but this time I was ready for it.

Save your work!

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## Tempo and Time Signature

Drum machines have limitations as to how fast or slow they will play your music. On the low end, it's generally around 50 beats per minute and on the high end, around 250. As you might guess, the tempo of a style of music will vary greatly depending on the artist. I have listed the approximate tempos for various styles of music in Table 2. You may wish to increase or decrease these tempos to suit your needs. In any case, they will give you a place to start.

**Table 2** : Suggested tempos for various styles of music.

Style of Music	Tempo (beats / minute)
<i>Slow Rock and Country</i>	<i>50 - 100</i>
<i>Rock, Metal, Pop, Country, Hip-Hop, House, Funk, and Industrial</i>	<i>100 - 150</i>
<i>Fast Rock and Country</i>	<i>150 - 200</i>
<i>Slow Punk Rock</i>	<i>250</i>

The time signature of your music is also very important. Most music on the radio and television is 4/4 time. It is the single most popular time signature used today. Even though most drum machines will allow you to play in a variety of time signatures, I think you will find 4/4 the easiest. For this reason, all patterns in this book are written for the 4/4 time signature.

What does 4/4 stand for? The numerator represents the number of beats per measure and the denominator represents the note given a value of one beat. In this signature there are 4 beats per measure with a quarter note carrying the value of one beat. Simply put, 1 measure = 4 beats = 4 quarter notes or  $4 \times 1/4 = 4/4 = 1$ . Complete understanding of this concept is not crucial. What is important is that the time signature of your drum machine is set to 4/4 when programming any patterns in this text.

# Quantization

I know you've heard this word before and wondered what it meant. Quantization is a fancy word for dividing a measure into an equal number of pieces of time. For 8 pieces you will need 1/8 quantization. For 16 pieces you will need 1/16 quantization. I think you get the picture.

One sixteenth quantization will be used as the standard in this text because it lends itself nicely to programming today's popular drumming techniques including, double kick bass and 1/16 note hi-hat rhythms.

Table 3 contains a listing of some standard quantizations for most drum machines. It is there to illustrate an important concept. Notice that if you are programming in 1/8 quantization and change to 1/16 quantization, the numbers on which notes appear, will change respectively. For example, if you have a Snare on numbers 3 and 7 in 1/8 quantization, they will move to 5 and 13 in 1/16 quantization. Don't worry, the pattern will sound exactly the same. The only change will be the number of pieces that the measure is divided into. In this case, we are doubling the number of pieces so the note locations must move to accommodate this change. This is mentioned here for an important reason. If you ever change quantization while programming, you may be confused when your notes move to different numbers. Now you won't, but just in case we'll do an example in Chapter 4.

**Table 3** : Quantization Table

Quantization	One Measure																															
	1				2				3				4																			
1/4																																
1/8	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																
1/16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																
1/32	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1/96																																

Why would you ever want to change quantization? Well, imagine you are about to fight the Heavyweight Champion of the World. First, let me say I hope you have a nice funeral. Second, if you had your choice of throwing 8 punches every second or 16, which would you choose? Stupid question right? Well obviously, when fighting The Champ, you would like to get in many punches as quick as possible because you may not be standing for very long. On the other hand, let's say you're fighting some Hollywood movie chump like *Rocky*. You'll probably only need 8 punches per second to take him down. Drumming is very similar. Sometimes you may want the sticking (arm motion) in your fills to happen faster, just like punches. 1/8 Quantization may be fine for slow fills, but for those faster fills you may want to go to 1/16, or 1/32 quantization. The only drawback with going to a smaller quantization is that it takes more time to step your way through all the numbers in Step Mode. 1/16 quantization will minimize your stepping time and at the same time allow programming of fast or slow fills when you need them. You will see this later in Chapter 4 when we discuss fills.

# Drum Machine Tabulature

The drum machine *tabulature* used in this book may seem confusing at first glance, but don't worry. It is quite simple to understand because it is presented in a format *anyone* can read. Here's how it works.

Table 4 contains two measures of drum programming. The drum kit hardware to be used is listed down the far left column. The drum machine pattern number in which to place your drumming is listed at the top of the hardware column. Depending upon the quantization, you will see a different number of columns per measure. For example, in 1/8 quantization, you will see 8. In 1/16 quantization, you will see 16. Table 4 contains 16 columns, thus we have 1/16 quantization. Column number 1 represents the beginning of the measure and 16 the end. Three different letters will be placed under the column numbers to designate when and how a piece of hardware is to be played. They are, **A** - **accent**, **F** - **flam**, and **X** - **marks the spot**. Placement of an unaltered drum sound is denoted by an X (thus marking the spot). In other words, wherever you see an X, place one note of that drum sound on the designated number. The A in the following tabulature represents an accented note. In this case, not only would you place a note on the designated number, but also slightly increase its volume (typically +6 on a scale of 1 to 100). Some machines are equipped with an ACCENT button for exactly this purpose. Simply hold it down while entering the note you wish to accent. Since many machines do not have an ACCENT button, consult your Owner's Manual if you are unsure. If yours doesn't, note that the volume of an individual note may also be altered by editing its level parameter while in the *editpattern mode*. (This mode is used to edit the parameters of any sound after it has been placed in a pattern. Again note that not all manufacturers will call this function by this exact name, so consult your Owner's Manual.) If you cannot accent individual notes, replace the A with an X and move on. An F in the following tabulature represents a flam. A flam occurs when a drum head is struck with both sticks a split second apart. This is a very common and important technique used in most all drumming styles, yet some drum machines do not have this feature. If your machine does not, there is a way to do it without one. We'll discuss this technique later in Chapter 4 since it involves changing quantization and may be a little overwhelming at this point. For now, consult your Owner's Manual and replace the F with an X if you are unable to flam.

*The following pattern is intended only as an example of the tabulature used in this text. It is not expected that you enter it into your drum machine.*

Table 4: Drum Machine Tabulature

00	1st Measure																2nd Measure															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Kick Bass	A						X				X				X	X	X	X				X	X								X	
Snare				X							X						X					F		F		X	X	X				



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## Kick and Snare Basics

Let's discuss some very fundamental concepts regarding the Kick and Snare drums. If you are already familiar with what they are and how they are played, you may wish to skip ahead two paragraphs.

Kick drums come in various sizes and are generally located on the floor facing toward the drummer. As the name implies, foot and leg motion are used to depress a mallet clad pedal which strikes the face of the drum. Although tonality is a function of size, tuning, electronic signal processing, and what is stuffed inside of them, generally, larger diameter drums have a lower pitch than smaller.

The Snare drum on the other hand, is usually hit with a stick or brush. Although one could use just about anything including his/her hands, head, or feet, most drum machine samples were produced using a stick. The Snare also varies in tonality depending on the location of the stick impact, tuning, and electronic signal processing.

Because the Kick and Snare are the backbone of every drum rhythm, you should lay them down first when composing your patterns. How do you do this? As we will discuss later, the Snare is placed on the same numbers of every measure (5 and 13 in 1/16 quantization). The Kick however, takes a little more thought. Ideally, you would like to come up with a rough idea for your song first (i.e. rhythm guitar lick). Then, taking note of the rhythm of your strum, correlate the Kick rhythm with it. When composing your pattern, your goal should be to make most every strum fall on either a Kick or a Snare. Trial and error is the key here since you may find that some on and some off add a nice touch. The primary concern is to merely find a rhythm that compliments your music. Similarly, if you are programming Rap music, you would like to correlate the Kick and Snare rhythm with the syllables of the lyrics. As always, these generalizations merely represent a good starting point for your drumming creativity. If confusion is still abound, listen closely to the drumming in your favorite songs. Analyze and take note of the way the Kick and Snare rhythm matches the music. This will surely answer many of your questions.

Before composing a Kick and Snare rhythm, it is necessary to decide which of the many samples inside of your drum machine that you will use. This process is similar to color coordinating your clothing in the morning. While a turtle neck sweater may look absolutely phenomenal with a pair of polyester pants, combining it with a pair of paisley Bermuda shorts results in a fashion atrocity. Remember, beauty is in the eye of the beholder so choose a Kick and Snare that *you* feel not only sound good together, but also fit your music.

Matching a drum rhythm with your music will most likely be a trial and error process in the beginning. In fact, it will probably be easier to come up with a drum rhythm first, then put music to it.

This is not a very efficient way to go about writing a song though. This is because you will most likely produce bits and pieces of music that may or may not sound good when fit together. The solution lays in the programming methods of this text and practice.

On that note, let's discuss a couple of rules of thumb to keep in mind when composing patterns. First, **do not make your patterns any longer than two Bars.** (Note: Some drum machines will ask you to specify your pattern length in beats as opposed to Bars. This is not a problem since 4 beats = 1 Bar in 4/4 time. For 2 Bars, specify 8 beats.) The problem here is that your drum machine does not contain an infinite amount of memory and you will use it up very quickly. Manufacturers do this because, one, memory is expensive, and two, they would like you to buy their expensive memory cartridge. For these reasons, optimize your memory use. Two Bar patterns will do a very good job of this. Consequently they will be used exclusively throughout this text. Also keep in mind that most all song parts are generally a multiple of two Bars. For this and countless other reasons, you cannot go wrong using this rule of thumb. Second, **the Snare is always placed on numbers 5 and 13 of each measure when using 1/16 quantization.** (Note: Some drum machines utilize different numbering schemes when in Step Mode. The numbers are not 1 through 16, but instead based on the beat number of the measure. Don't let this throw you. If you have a machine that uses this convention, keep in mind that there are 4 beats per measure in 4/4 time. For this reason, the numbers may start with either a 1, 2, 3, or 4 and be followed by a slash and another number. Each of the 4 beats per measure will be divided and numbered in accordance with the quantization selected. For example, if you select 1/16 quantization you will get 16 numbers per measure each representing a discrete space on which to place a sound.) Once again, sixteenth quantization means that each measure is divided into sixteen equal pieces of time. Notice that no matter how you slice it, the numbers 5 and 13 are eight numbers apart. This translates into a regular and repeating snare beat.

Changing quantization can be a frustrating experience if you do not have a complete understanding of the concept. The Snare, and all other sounds for that matter, will change numbers respectively as you change quantization. Each pattern will sound the same, however the respective number on which each note appears will change. For example, if the Snare appears on 3 and 7 in 1/8 quantization, it will move to 5 and 13 in 1/16 quantization. Likewise, it will move to 9 and 25 in 1/32 quantization. Refer to Table 5 and note that these pairs of numbers all represent the same moments in time.

How did I determine where the Snare would appear? It's simple. Let's take 1/16 quantization for example. To get the first number, multiply the denominator of the quantization by 1/4 and add 1 ((16 x 1/4) + 1 = 5). The second number is attained in a similar fashion. Multiply the denominator of the quantization by 3/4 and add 1 ((16 x 3/4) + 1 = 13). I told you it was easy. Using this mathematical algorithm you will always know where the Snare will be for the quantization you are in. For simplicity sake, Table 3 has been reprinted as Table 5 to remove the need for the mathematical calculation as shown.

Table 5 : Quantization Table

Quantization	One Measure															
1/4	1				2				3				4			
1/8	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1/16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1/32	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1/96	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

---

*Since the Snare repeats over and over at equal intervals, it is therefore up to the Kick to produce the different sounding rhythms. This is how the drums are matched to your music.* In Step Mode, all it takes is a little trial and error to find the numbers that translate into the rhythm you hear in your mind. With a little practice, you will soon be able to make an educated guess where to place the Kicks for the rhythm you want.

*Placing a Snare on numbers 5 and 13 is a good starting point for most drum rhythms. However, you may wish to add more Snares, especially if you are programming Rap rhythms. In a case such as this, try 8 and/or 10 in addition to 5 and 13 for a more funky feel.*

It is very common today to find two Kick drums in a drum kit. Most drum kits of yesteryear had only one. As you can imagine, with only a single Kick, drummers were limited in both speed and rhythms. Double Kick, or two Kick drums, allow the drummer to produce faster, more diverse Kick rhythms because there are two bass drums, one for each foot. Unfortunately, this also creates a dilemma. Namely, it requires removing the left foot from the Hi-hat pedal in order to play the second Kick. Because of this, you will find that some drummers have 2 Hi-hats, one locked in the closed position, and one unaltered as before. This in turn allows the drummer to play the Hi-hat in the closed position without having to remove his left foot from the second Kick to depress the pedal. Of course, this whole process adds to the complexity and cost of drumming, but the sound makes the sacrifice worthwhile.

Double Kick is not hard to master with a drum machine. In fact, you probably would have discovered it on your own if I didn't tell you. In 1/16 quantization, all you have to do is place the Kicks on adjacent numbers and increase the tempo. For ear pleasing reasons, it is not advisable to place sixteen Kicks in a row. Place them next to each other, here and there, or wherever you find produces a rhythm to your liking. Experimentation is the key. For example, placing Kicks on numbers 7, 9, 10, and 11 and increasing the tempo to around 150 will do the trick. You will see how simple it is in the next section when we key in our first patterns.

Note that a real drummer will vary the amount of force applied on each Kick. This is easily remedied in our case by increasing the volume of some of the Kicks slightly. Consult your Owner's Manual for specific instruction on editing single note parameters. Typically, increasing the volume level by +6 on a scale of 1 to 100 will improve realism greatly. Experimentation is the key here.

You may also wish to vary the pitch of your Kicks. As you can imagine, a real drummer cannot perfectly tune both of his Kicks to exactly the same pitch as you can with your drum machine. For this reason, if you vary the pitch of your Kicks slightly, you may notice an even greater increase in realistic sound.

## Programming Your First Pattern

Consult your Owner's Manual for instruction on pattern creation if you are not already familiar with your machine. Most drum machines will ask you to specify the length of your pattern before you start. *Two Bars* will be the standard length for all patterns in this book, so if you must, specify 2. Again note that some drum machines will ask you to specify your pattern length in beats. If this is the case, use *8 beats* since 4 beats = 1 Bar in 4/4 time. You will also wish designate the time signature at which you will be working. Again, all patterns in this book are written for *4/4 time* (Note that this is the default time signature for most drum machines so you can probably skip this step). As for tempo, designate *115 beats per minute*. Don't forget, some drum machines utilize different numbering schemes when in Step Mode. The numbers are not 1 through 16, but instead based on the beat number of the measure. Don't let this throw you. If you have a machine that uses this convention, keep in mind that there are 4 beats per measure in 4/4 time. For this reason, the numbers may start with either a 1, 2, 3, or 4 and be followed by a slash and another number. Each of the 4 beats per measure will be divided and numbered in accordance with the quantization selected. For example, if you select 1/16 quantization you will get 16 numbers per measure each representing a discrete space on which to place a sound.

**Exercise 1:** Our first pattern will be very basic. This brings to mind an important point. Songs do not have to be complex to be good. On the other hand, simplistic drum programming can lead to monotony so use your ears as the final judge.

Pattern 01 is just about as simple as you can get. In each measure it has a Kick on 1 and 9, and a Snare on 5 and 13. Before entering it into your drum machine, make sure the quantization is set to 1/16. After you have entered Step Mode and verified that there are 16 spaces, place Kicks on 1 and 9, and Snare on 5 and 13 of each measure. If you make a mistake, consult your Owner's Manual for note clearing instructions and try again.

<b>01</b>	<i>1st Measure</i>								<i>2nd Measure</i>																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Kick Bass</i>	X							X								X								X							
<i>Snare</i>					X							X									X								X			

**Note:** This may seem so intuitive that it need not be said, but this pattern (or any pattern for that matter) will not sound right if the sounds are not placed on the correct numbers. If the Step Mode numbers do not go up to 16, or if you do not have 16 discrete spaces on which to place your sounds, something is wrong. Consult your Owner's Manual if this is the case. Correct quantization and number placement are imperative.

After entering Pattern 01 into your drum machine, exit Step Mode and listen to your creation. Notice that the pattern is quite simple and will go with just about anything, all you have to do is adjust the tempo. If you are like me though, it's just not complex enough. For this reason, you will find 12 more patterns on the following pages that are of varying complexities and among my favorites.

**Exercise 2:** Enter each of the following patterns into your drum machine. In doing so, you will begin to get a feel for placing Kicks to produce the rhythm you are searching for. Patterns 4, 6, 7, and 11 will resemble double Kick if the tempo is increased to approximately 150. Your efforts will not be wasted here because all of these patterns will be used in the Hi-hat exercises of Chapter 3.

<b>02</b>	<i>1st Measure</i>								<i>2nd Measure</i>																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Kick Bass</i>	X							X								X								X	X			X			
<i>Snare</i>					X								X								X								X			

<b>03</b>	<i>1st Measure</i>								<i>2nd Measure</i>																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Kick Bass</i>	X							X	X							X								X				X			
<i>Snare</i>				X									X								X								X			

<b>04</b>	<i>1st Measure</i>																<i>2nd Measure</i>															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Kick Bass</i>	X	X			X				X			X				X			X	X	X	X	X	X	X						
<i>Snare</i>				X							X								X								X					

<b>05</b>	<i>1st Measure</i>																<i>2nd Measure</i>															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Kick Bass</i>	X	X			X	X			X	X			X			X	X		X	X	X	X	X	X	X	X					
<i>Snare</i>				X							X								X								X					

<b>06</b>	<i>1st Measure</i>																<i>2nd Measure</i>															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Kick Bass</i>	X							X					X	X	X	X	X	X		X	X	X	X	X	X				X		
<i>Snare</i>				X						X									X								X					

<b>07</b>	<i>1st Measure</i>																<i>2nd Measure</i>															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Kick Bass</i>	X	X	X		X	X			X	X			X			X	X		X	X	X	X	X	X	X	X				X	
<i>Snare</i>				X							X								X								X					

<b>08</b>	<i>1st Measure</i>																<i>2nd Measure</i>															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Kick Bass</i>	X	X					X	X								X	X		X		X				X						
<i>Snare</i>				X							X								X								X					

<b>09</b>	<i>1st Measure</i>																<i>2nd Measure</i>															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Kick Bass</i>	X									X					X					X		X									
<i>Snare</i>					X								X						X								X					

<b>10</b>	<i>1st Measure</i>																<i>2nd Measure</i>															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Kick Bass</i>	X							X								X	X				X				X						
<i>Snare</i>					X							X									X							X				

<b>11</b>	<i>1st Measure</i>																<i>2nd Measure</i>															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Kick Bass</i>	X					X	X	X	X				X				X	X			X		X	X	X				X		
<i>Snare</i>				X								X							X								X					

<b>12</b>	<i>1st Measure</i>																<i>2nd Measure</i>															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Kick Bass</i>	X	X				X				X				X		X	X				X				X					X	
<i>Snare</i>				X								X									X						X					

<b>13</b>	<i>1st Measure</i>																<i>2nd Measure</i>															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Kick Bass</i>	X					X				X							X							X	X						
<i>Snare</i>				X								X							X								X					

# The Hi-Hat and Ride Cymbals

## Hi-hat Basics

Importance of the Hi-hat to realistic programming cannot be overemphasized. Not only does it influence the tempo of your song, but it also adds realistic feel and rhythm. Depending on how you play it, you can attain a wide variety of effects, some of which you will see as we make our way through this chapter. Now granted, your Hi-hat patterns may sound a little hokey at first, but by playing around with the attack, decay, and level of each individual note you will be able to make a large difference in the overall sound. Depending on your machine you may or may not be limited in this area so consult your Owner's Manual for specifics.

To a non-drummer, use of the Hi-hat is confusing and cumbersome. Elaborate compositions are difficult and not very intuitive. To make matters worse, most drum machines have terribly unrealistic samples. This is why you will find that many programmers refuse to use it. In most cases, you will find that owning a newer model drum machine will help, but in all cases you will have to work extra hard to obtain a realistic sounding Hi-hat.

For a non-drummer to understand how the Hi-hat is played, a firm grasp of how each sound is made is vital. Once the operation is understood, all it takes is a few hours of MTV and a little imagination to program the popular Hi-hat rhythms heard on radio and television today.

Ideally, you would like to have at least four Hi-hat samples in your drum machine. However, in some cases you will be forced to settle for fewer. The desirable four are the *Hi-hat Pedal*, *Closed Hi-hat*, *1/4 Open Hi-hat*, and *Open Hi-hat*. Let's examine them one at a time.

The *Hi-hat Pedal* sound is simply the result of slamming the two Hi-hat cymbals into one another. The top cymbal will come down and eventually meet the bottom one if the foot pedal is depressed far enough. There is no sticking involved in this operation.

The *Closed Hi-hat* is similar. This sound is achieved by striking the outer edges of the **Hi-hat** cymbals while they are sandwiched together (closed). Your foot is required to hold the pedal down during this operation.

Striking the outer edges of the two Hi-hat cymbals while they are in their normal resting position (wide open) will produce the *Open Hi-hat* sound. There is no foot motion involved here.

And lastly, the *1/4 Open Hi-hat* sound is made by depressing the Hi-hat pedal until the two cymbals are, you guessed it, 1/4 open. At this point, the outer edges are hit with a stick.

Remember that it is going to take practice to know which one of these to use and when. Don't get discouraged though, if you put in the time, the sound of your music will reflect it.

## 1/4, 1/8, and 1/16 Note Hi-hat Rhythms

The Hi-hat can be played at many different tempos. Interestingly, the speed you play it influences whether the pattern sounds fast or slow. A drummer will most commonly use three speeds. They are quarter, eighth, and sixteenth note rhythms. Music theory isn't important here. What is important is that when we're done, you understand how to enter each of these 3 different rhythms into your drum machine. Let's do an example.

First, we must select a Hi-hat sample for use in our patterns. Our choices include the Hi-hat Pedal, Closed Hi-hat, 1/4 Open Hi-hat, and Open Hi-hat. Choose the 1/4 Open Hi-hat if you have it. If not, do the following exercises with the Closed Hi-hat. As for a Kick and Snare rhythm, we have 13 excellent choices from Chapter 2 (Patterns 01 - 13). Choose Pattern 02. In the following three exercises we will add the aforementioned Hi-hat rhythms to Pattern 02 then compare the results.

**Exercise 3:** Let's start with a quarter note rhythm. Copy Pattern 02 to Pattern 14 in your drum machine. This is done so that if by some remote chance Pattern 14 gets screwed up, Pattern 02 can be recopied. Now enter Step Mode and place a 1/4 Open Hi-hat (or Closed Hi-hat if you do not have it) everywhere shown to make your Pattern 14 appear as follows.

Pattern 14		Quarter Note Hi-hat Rhythm																													
14	1st Measure								2nd Measure																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Kick Base	X							X								X								X						X	
Snare				X							X							X							X				X		
Hi-hat Pedal																															
Closed Hi-hat																															
1/4 Open Hi-hat	X			X				X				X				X				X				X				X			
Open Hi-hat																															

Notice that the Hi-hat appeared on numbers 1, 5, 9, and 13. These are all 4 apart. Why? This is because 1/4 (1/4 note rhythm) = 4/16. Hence, a quarter note equates to 4 apart in 1/16 quantization.





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