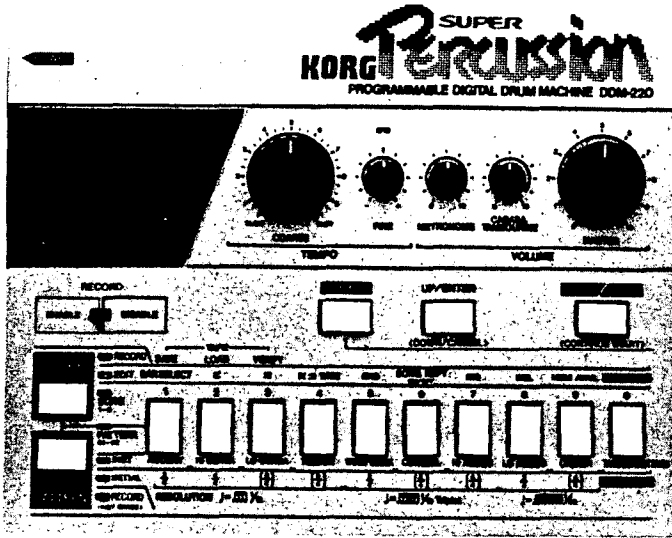


KORG®



PROGRAMMABLE DIGITAL DRUM MACHINE DDM-220 OWNER'S MANUAL

KORG®



SUPER KORG

PROGRAMMABLE DIGITAL DRUM MACHINE DDM-220
OWNER'S MANUAL

Congratulations and thank you for purchasing the KORG DDM-220 PROGRAMMABLE DIGITAL DRUM MACHINE. The DDM-220 is a programmable drum machine that uses nine real percussion sounds digitally recorded using PCM. Compact and easily portable, the KORG DDM-220 is extremely useful for multi-track recording, composing, and live performance applications. To assure optimum performance and longterm reliability, please read this manual carefully before use.

MAIN FEATURES OF THE DDM-220

- 1 Nine real drum sounds, Uses digital PCM recordings of real percussions.
- 2 You can create and store up to 32 rhythm patterns for instant access. Patterns can be written in real time, playing the keys as you would a drum kit. Or you can use the step time programming method.
- 3 Up to six songs can be stored for automatic play. Parts of songs can be repeated automatically to create longer compositions. A second song can be set to begin playing automatically upon completion of the first song.
- 4 Can be used as a "live" percussion instrument.
- 5 The tape interface lets you store rhythm patterns and "songs" on tape in the form of digital data. This information can then be loaded back into the DDM-220 whenever needed. Therefore, there is no limit to how many rhythm patterns can be stored.
- 6 Can be linked to another DDM-220 or DDM-110 drum/percussion machine via the rear panel sync jacks to enable synchronized operation.
- 7 The trigger output lets you use a synthesizer as an additional sound source.

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IMPORTANT SAFETY PRECAUTIONS

Please read and observe the following precautions to assure reliability and safety.

■ LOCATION

To avoid malfunction do not use this unit in the following locations for long periods of time:

- In direct sunlight.
- Exposed to extrem temperature or humidity.
- In sandy or dusty places.

■ HANDLE GENTLY

Knobs and switches are designed to provide positive operation with a light touch. Excessive force may cause damage.

■ MAINTENANCE

Wipe the exterior with a soft, dry cloth. Never use paint thinner, benzene or other solvents.

■ KEEP THIS MANUAL

Store this manual in a safe place for future reference.

■ POWER SUPPLY

Requires six AA size (SUM-3) 1.5V batteries or the supplied AC adaptor.

IMPORTANT SAFETY PRECAUTIONS

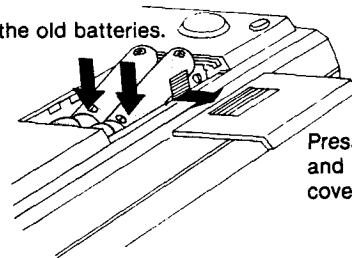
BATTERY REPLACEMENT

If the battery indicator (in the display area) grows dim, then it is time to replace the batteries. Don't wait until the batteries are completely depleted or you will lose memory contents. Battery life is about 8 hours. To replace the batteries:

- 1 Turn off power switch.
- 2 Remove cover from battery compartment.
- 3 Take out all the old batteries. If you press on the minus (-) ends of the batteries, the plus (+) ends will pop up so that you can easily lift them out. And replace with all new ones of the same kind. Observe the correct polarity (+) and (-) as marked.
- 4 Attach cover.

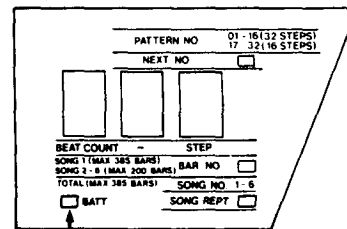
Caution: Memory contents will not be erased if you do not take longer than five minutes to change the batteries.

Take out the old batteries.



Press down with your thumb and slide off to remove the cover.

Display



Replace batteries if this indicator grows dim.

IMPORTANT SAFETY PRECAUTIONS

※READ THIS

MEMORY PROTECTION

- To protect your programmed memory contents, always leave batteries in the DDM-220, even if using an AC adaptor. Batteries back up the power supply to protect memory contents even when power is off. Memory contents may be erased if batteries become depleted or are not put in.
- Memory contents will remain protected if you do not take longer than five minutes to replace batteries.
- It is strongly recommended that you “back up” your valuable programs by using the tape interface. If you have saved your program data on tape, then you can always load that data if the internal memory is erased. See “Tape interface” section for details.

STATIC ELECTRICITY

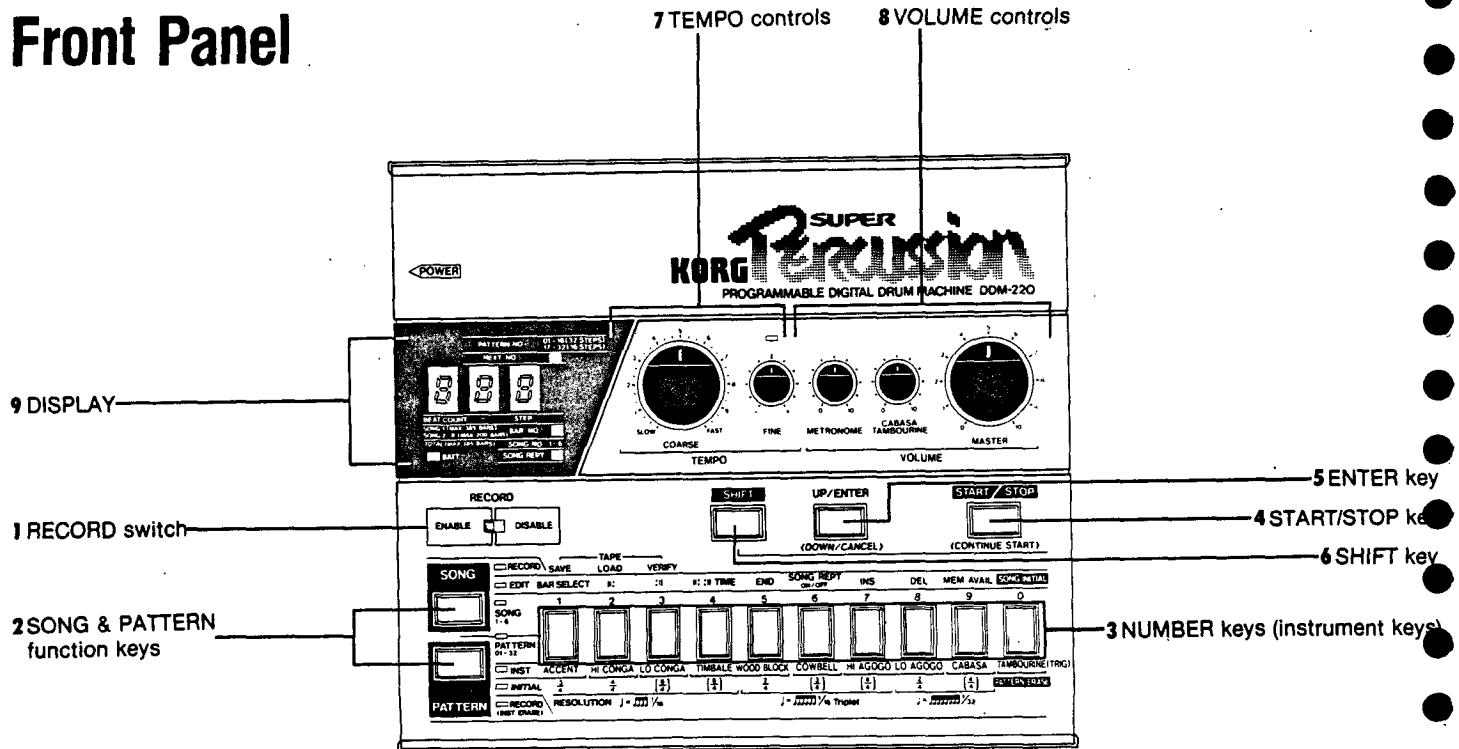
- The DDM-220 body is made of ABS plastic which may pick up a static charge leading to erratic operation. Therefore, connect to an amp or other grounded device before turning on DDM-220 power.

DIGITAL CIRCUIT PROTECTION

- As a digital device employing computer circuitry, the DDM-220 is subject to interference from other electrical devices and fluorescent lamps. Avoid use near other appliances, particularly those with motors. If operation becomes erratic, turn off the power, then turn it back on.

FEATURES AND FUNCTIONS

Front Panel




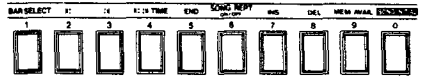

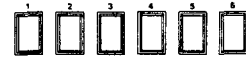

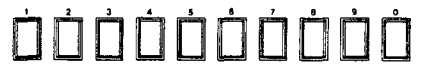



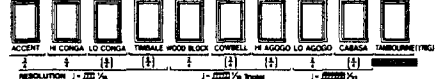
FEATURES AND FUNCTIONS

1 RECORD switch

This is set to **ENABLE** when you want to record (write) something in the memory. Set to **DISABLE** when you are playing things back from memory or during other operations that do not affect the memory contents.

2 SONG & PATTERN function keys

These keys change what happens when you press the ten **NUMBER** (instrument) keys. Your selected function is indicated by the LEDs to the right of the **SONG** & **PATTERN** keys.

Function indicated by LED	NUMBER key operation
 <p>EDIT</p>	<p>Lets you make changes and add repeats to recorded songs.</p> 
 <p>SONG</p>	<p>In this mode the first six keys are used to select the SONG NUMBER which will be played or used for recording.</p> 
 <p>PATTERN</p>	<p>Here the keys are used to select the PATTERN NUMBER for writing patterns or playing them back.</p> 
 <p>INST</p>	<p>Select this function when you want to use the keys to play the instruments (for recording or employment as a percussion instrument).</p> 
 <p>INITIAL</p>	<p>This is used when you select the resolution (the value of the shortest note that will be played) and the time signature before writing the drum pattern.</p> 

FEATURES AND FUNCTIONS

3 NUMBER (instrument) keys

The effect of these keys depends on which function you have selected with the SONG & PATTERN keys.

4 START/STOP Key

Press once to start playback of recorded patterns and songs. Press again to stop. (If you are not using the SYNC jack then the SYNC switch must be set to OUT in order to hear anything when the START/STOP key is pressed.)

5 ENTER (UP/DOWN/CANCEL) key

This key is used in the following situations:

- When setting resolution.
- When cancelling material that has been recorded (*written to memory*).
- When specifying repeat signs and number of repetitions.
- When making various kinds of corrections.
- When going forward or backward by steps (using the "step time" method of writing patterns).

6 SHIFT key

- Holding down this key and pressing the START/STOP key at the same time will cause playback to continue playing from the middle of a song (after stopping or specifying a bar number to start from).
- Holding down this key and pressing the ENTER key

enables writing something again if you make a mistake during the writing procedure. Or, in the step time mode, it takes you back a step.

7 TEMPO controls

- COARSE: Used for rough adjustment of tempo.
- FINE: Used for fine adjustment of tempo after setting with the COARSE knob. Ordinarily this knob can be left in the center position.
- TEMPO indicator: This flashes with the beat according to the tempo set by the COARSE and FINE knobs.

8 VOLUME

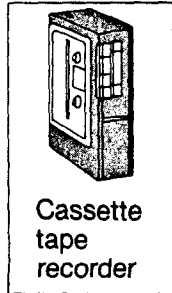
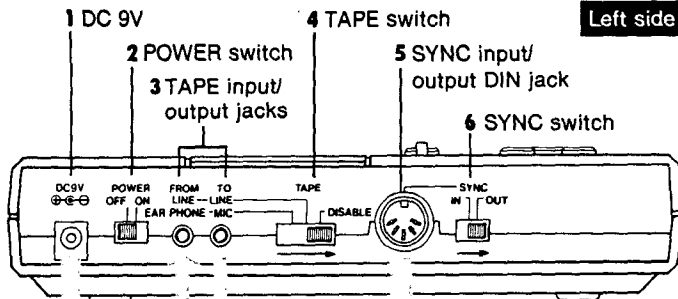
- MASTER: For overall volume adjustment.
- CABASA TAMBOURINE: For adjustment of cabasa and tambourine volume.
- METRONOME: This adjusts the volume of the metronome.

9 DISPLAY

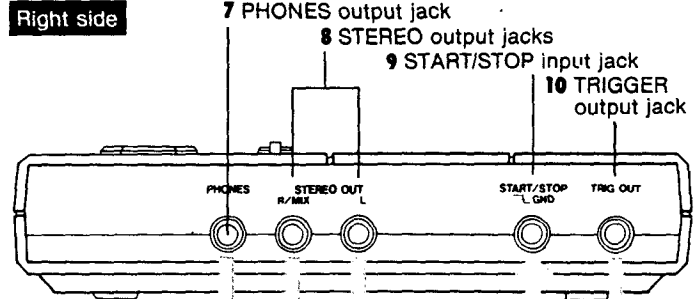
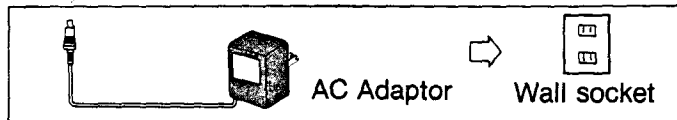
Shows a variety of information to help you write patterns and check patterns. Also confirms tape interface functions.

FEATURES AND FUNCTIONS

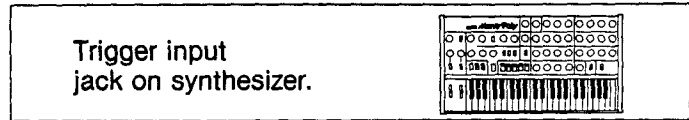
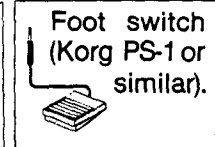
SIDE PANELS/CONNECTIONS



Another DDM-220 or DDM-110, KPR-77, sequencer or other unit equipped with a sync jack. KMS-30 for sync to tape or connection to MIDI equipment.



Amplifier or mixing console



* Be sure to set the TAPE switch to the DISABLE position and set the SYNC switch to the OUT position during normal use. If not at these positions then you will not hear any sound.

FEATURES AND FUNCTIONS

1 DC 9V

For connection of the supplied AC adaptor.

2 POWER switch

3 TAPE input/output jacks (FROM/TO)

Connect a tape recorder to these jacks when you want to save data on tape or load data from tape to the DDM-220.

4 TAPE switch

Ordinarily this should be set to *DISABLE*. When using the tape interface, select "*LINE LINE*" or "*EARPHONE MIC*" depending on what kind of tape recorder you are using.

5 SYNC input/output jack

This DIN jack is for connection to a SYNC jack of the same kind on another DDM-220, DDM-110, sequencer, or other unit. It enables synchronized operation.

6 SYNC switch

This must be set to the *OUT* position for ordinary use. You will not get any sound out of the DDM-220 if this is set to *IN* when not using the SYNC jack. See "Advanced Applications" for more details.

7 PHONES jack

For headphone connection.

8 STEREO output jacks (R/MIX, L)

Both jacks can be used for stereo connection to a mixing console, two instrument amplifiers, or a stereo amplifier. Use the R/MIX jack alone for connection to a mono amplifier or when only a single input is available on a mixing console.

9 START/STOP jack

Lets you use a foot switch (Korg PS-1, S-1, etc.) or other source of a trigger signal (\square GND) for remote controlled starting and stopping of DDM-220 playback.

10 TRIGGER output jack

This puts out a trigger signal at every point that the TAMBOURINE sound is programmed. This trigger signal (\square GND) can be connected to the trigger input jack on a synthesizer or other device. Then you will hear the sound of that device instead of the tambourine.

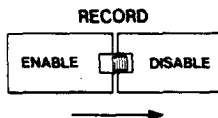
If anything is plugged into this jack then you will not hear the TAMBOURINE sound from the DDM-220 STEREO or PHONES outputs.

DEMONSTRATION

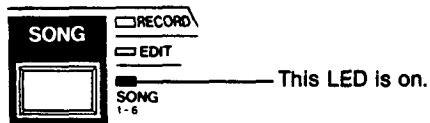
Follow these directions to play the patterns that have been loaded into DDM-220 memory at the factory. These

same patterns are supplied on the cassette tape in case memory contents have been accidentally erased.

1 Set the RECORD switch to the DISABLE position.



2 Press the SONG key so that the SONG LED lights up.



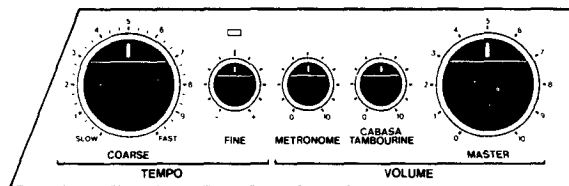
3 Press the number 1 key (ACCENT).



4 Press the START/STOP key to begin play of the pre-programmed song.



5 Adjust volume and tempo as desired.



The demonstration song will be over after a few minutes and the DDM-220 will stop automatically. If you want to stop it before the end of the song, simply press the START/STOP key.

WRITING RHYTHM PATTERNS

The DDM-220 has the following nine instrument sounds:

- | | |
|---------------|---------------|
| 1: Hi conga | 6: Hi agogo |
| 2: Lo conga | 7: Lo agogo |
| 3: Timbale | 8: Cabasa |
| 4: Wood block | 9: Tambourine |
| 5: Cowbell | |

The instrument sounds above are PCM digital recordings of the real thing. In other words you are listening to the reproduction of digitally encoded recordings of real instrument sounds stored in ROM chips.

Memory and Pattern Numbers

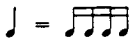


Memory and Pattern Numbers

The DDM-220 lets you store up to 32 short drum patterns or rhythmic phrases. Each pattern can be one to two bars long. Each pattern is identified by a number from 1 to 32. Therefore, when you write a pattern to memory you must first assign it a number. Similarly, if you want to play back a pattern, you must first specify its number.

Resolution

Resolution

Resolution is the value of the smallest note in a pattern. On the DDM-220 you have a choice of three resolutions which can be used with various time signatures. High resolution is desirable when writing syncopated or funky patterns. Low resolution makes it easier to write patterns in real time.

Resolution	Applications	Time
 1/16	16th note: 4 steps per beat; for 8-beat & 16-beat rhythms.	$\frac{3}{4}$, $\frac{4}{4}$ $\frac{6}{4}$, $\frac{8}{4}$
 1/16 Triplet	16th note triplet: 6 steps per beat; for jazz swing rhythms and others using triplets.	$\frac{2}{4}$, $\frac{3}{4}$ $\frac{4}{4}$
 1/32	32nd note: 8 steps per beat; for 32-beat rhythms.	$\frac{2}{4}$, $\frac{4}{4}$

WRITING RHYTHM PATTERNS

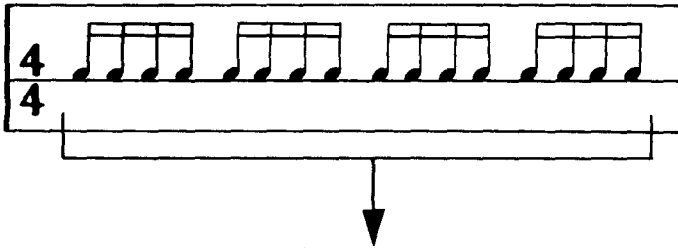
Steps

The value of the smallest note is called its resolution. Each of those notes is then called a step. So if you use 16th note resolution then each 16th note will be one step.

The number of steps in a pattern is determined by the resolution and the time signature. Specifically, you can find the number of steps by multiplying the number of steps in a beat by the number of beats per bar. The number of beats per bar is the upper number in a time signature.

Example 1:

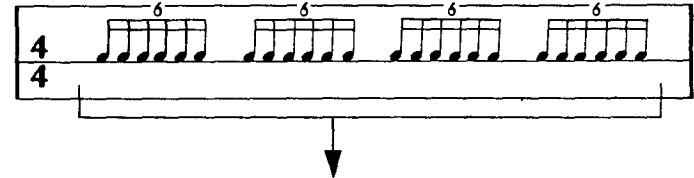
16th note resolution and 4/4 time.
Resolution is 4 steps per beat.
Time signature is 4/4 (4 beats per bar).



There are 16 steps in one bar.

Example 2:

16th note triplet resolution and 4/4 time.
Resolution is 6 steps per beat.
Time signature is 4/4 (4 beats per bar).



There are 24 steps in one bar.

We have pointed out that there are 32 pattern memories. Pattern numbers 1 ~ 16 can hold patterns of up to 32 steps, while pattern numbers 17 ~ 32 can hold patterns of up to 16 steps. When you write a pattern to memory you must figure out the number of steps it has and choose a pattern number accordingly.

Pattern numbers	Maximum step capacity
01 ~ 16	Up to 32 steps
17 ~ 32	Up to 16 steps

WRITING RHYTHM PATTERNS

Accents

If you put an accent in a step then all instruments played on that step will sound louder.

Pattern Recording

There are two ways to record or "write" a rhythm pattern into the DDM-220 memory.

"**Step time write**" lets you specify which instruments you want played a step at a time. The machine waits until you tell it to go on to the next step.

With "**real time write**", you listen to the metronome (and any instrument sounds already written) and play along, tapping the instrument keys as you would play a drum kit.

On the DDM-220 you can create a rhythm pattern by using either of these methods or a mixture of the two. If you can play drums then the real time method will be relatively easy for most patterns. In any case you always have the option of programming a step at a time so you can do things that would be extremely difficult to perform on a real drum kit. Real time programming is done after starting playback. Step time is done in the stop mode. In other words you can switch back and forth between real time and step time by pressing

the START/STOP key. For example, you could put down the basic pattern in real time, then switch to step time to add the details.

Important Note:

As in real life, you can not play hi agogo and lo agogo sounds at the same time. Nor can you play timbale and wood block at the same time. On the DDM-220, hi agogo has priority over lo agogo and wood block has priority over timbale. This is true whether you write in real time or step time.

WRITING RHYTHM PATTERNS

Step Time Write

Try writing the following pattern.

- Hi agogo
- Lo agogo
- Hi conga
- Lo conga
- Cowbell

Step Chart

Pattern number = 01 (resolution = ♩ - ♪ 1/16 : time = 8/4)

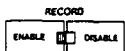
Beat & step sound	1				2				3				4				5				6				7				8														
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4											
Hi agogo			○	○	○							○		○	○							○	○	○												○		○	○				
Lo agogo	○							○	○	○						○		○												○	○												
Hi conga			○									○						○											○	○	○	○											
Lo conga	○							○	○						○	○	○												○	○													
Cowbell	○			○				○					○					○										○		○													
Beat	1				2				3				4				5				6				7				8														

*○Circles indicate steps played by each instrument.

WRITING RHYTHM PATTERNS

■ Operation

- 1 Set the RECORD switch to the ENABLE position.

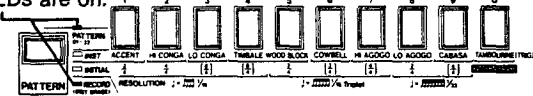


← The LED is on.

The RECORD LED will turn on in the SONG or PATTERN section.

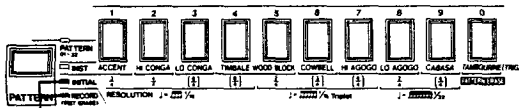
- 2 Press the PATTERN key so that the PATTERN LED lights up. Use the numbered keys to select a pattern number to assign to the pattern that you will write.

These LEDs are on.



- In our example there are 32 steps in all. This is higher than 16 so we must assign a pattern number within the range of 01 to 16. (Pattern numbers from 17 to 32 can only hold patterns of up to but not more than 16 steps.)

- 3 Press the PATTERN Key again so that the INITIAL LED lights up.

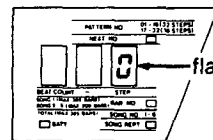


— These LEDs are on.

- 4 Press the 0 number key marked PATTERN ERASE. Then press the ENTER key. This clears any previous data that has been stored under your selected pattern number.



Press PATTERN ERASE



flashing. →

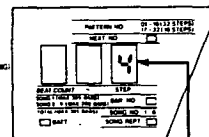
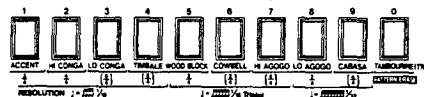
Press ENTER



Display stops flashing.

- 5 Select resolution and beats per bar (time signature).
 - In our example, resolution is 16th note and time is 8/4 (8 beats to the bar). Press the number 4 key since this is marked 8/4 and is in the group marked 1/16. (You can think of 8/4 as two bars of 4/4.) Then press the ENTER key.

Press number 4



flashing.

Press ENTER.

UP/ENTER



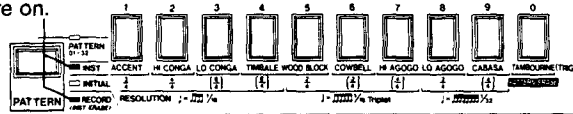
Display stops flashing.

WRITING RHYTHM PATTERNS

* If you press the wrong key at this stage (while the INITIAL LED is on), but have not yet pressed ENTER, cancel your mistake by holding down the SHIFT key and pressing the ENTER (CANCEL) key at the same time. You can then go on and press the correct key.

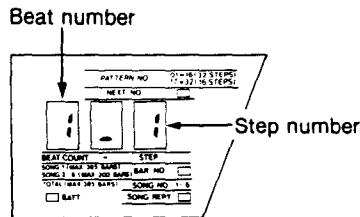
- 6 Press the PATTERN key so that the INST LED lights up.

These LEDs are on.



- 7 Since we will first try writing a pattern in the step time mode, the START/STOP key should not be pressed. If you have started it then press the START/STOP key again to make it stop.

- 8 The display will show the beat number and the step number.

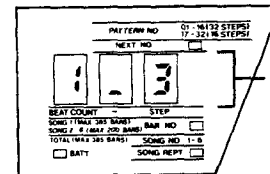


A: Writing one instrument track at a time

1. Press the key for the desired instrument at those steps where there is a circle marked on our sample chart. The display advances to the next step when you release the key.
2. For rests, press the ENTER key (UP key). This advances a step without writing any instrument sound.

■ Writing the hi agogo track

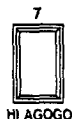
- 1 Write steps 1 and 2 in the first beat.
Press the ENTER Key twice.
The display will appear as shown here.



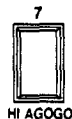
This means that the DDM-220 is ready to accept input for the third step of the first beat.

WRITING RHYTHM PATTERNS

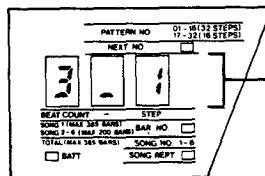
- ② Write steps 3 and 4 or the first beat.
Press the HI AGOGO Key two times.



- ③ Write the first step of the second beat (5th step in pattern).
Press HI AGOGO once.



- ④ Write in steps 2~4 of the second beat (steps 6~8 of song).
Press ENTER three times.






This indicates that you can now write step 1 of best 3.

- ⑤ Continue writing the high agogo track for all 8 beats (all 32 steps) of the pattern.
Then write the parts (tracks) for the other instruments.
- ⑥ After finishing writing all the instruments for all the steps in the song, set the RECORD switch to the DISABLE position.

B: Writing two or more instruments at once

1. Hold down one of the instrument keys that you want played on a particular step. Then press and release any of the other instrument keys that you want played.
2. Finally, release the key that you have been keeping depressed. The machine will advance to the next step. For steps without instruments, press ENTER as we have been doing so far.

WRITING RHYTHM PATTERNS

- ① (1st step)
Write holding down LO AGOGO , press and release LO CONGA  and COWBELL .

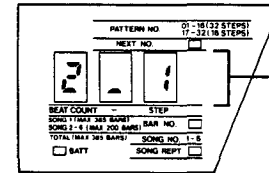
Then release LOW AGOGO.

- ② (2nd step)  Press ENTER.

- ③ (3rd step)
Write high agogo and hi conga.
Hold down HI AGOGO and press and release HI CONGA. Then release HI AGOGO.

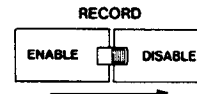


- ④ (4th step)
Write high agogo and cowbell.
Hold down HI AGOGO and press and release COWBELL. Then release HI AGOGO.



This indicates that the DDM-220 is ready to accept input for step 1 of beat 2.

- ⑤ Continue in this way until you have finished writing the last step in the pattern.
- ⑥ After finishing writing all the instruments for all the steps in the song, set the RECORD switch to the DISABLE position.



WRITING RHYTHM PATTERNS

Checking the Pattern (Set RECORD switch to ENABLE)

- If you are using the step time mode to write a pattern and you want to check what it sounds like, simply press the START/STOP key. (Press START/STOP again to stop playback when you like.)
If you press any of the instrument keys during play, then that sound will be written in for the step on which it was pressed. In other words, the machine is now operating in the real time mode.

Making Corrections (Set the RECORD Switch to ENABLE)

Follow the directions below to correct errors when you have accidentally written an instrument into a step where you don't want it.

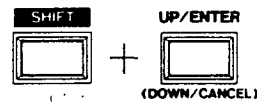
1. Press the ENTER key to advance to the step where the error occurred. To go back a step, press ENTER while depressing the SHIFT key.

- Press ENTER to go forward (UP).

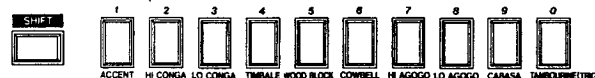
UP/ENTER



- Hold down SHIFT and press ENTER to go backward (DOWN).



2. To erase an instrument, hold down the SHIFT key and press the instrument key. The instrument will be removed from that step. Keeping the SHIFT key depressed, press the key for the instrument that you want to erase.



3. After erasing undesired instruments, add desired instruments in the usual way.

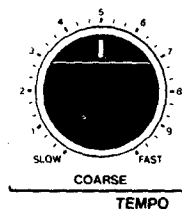
WRITING RHYTHM PATTERNS

Writing Patterns in the Real Time Mode

To use this mode, you start play by pressing the START/STOP key. You then play the instrument keys in time with the metronome sound.

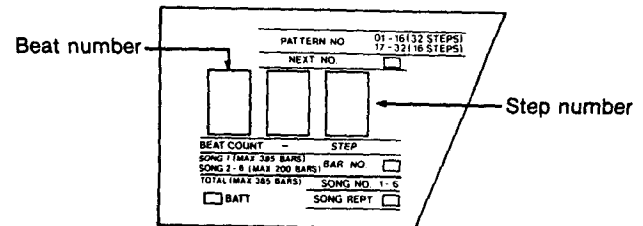
● Operation

- 1 Follow steps 1-3 of the instructions for writing patterns in the step time mode. (See page 16)
- 2 Press the START/STOP key to begin play.
- 3 Adjust the volume of the metronome.
- 4 Adjust the COARSE and FINE tempo controls to find a suitable speed.



- 5 Press the instrument keys in time with the metronome. Instrument sounds will automatically be written at those steps where instrument keys are pressed. When the pattern is repeated you will hear all sounds written so far. It is sort of like having a short endless tape loop on a multi-track recorder.

- The first time around the loop you can play the hi conga part. The second time you can play the lo conga, and so on. Or you can play hi conga and lo conga together from the beginning.
- The display shows the beat and step number (just as in the step time mode). Refer to this as well as the metronome sound while you play the instrument keys.

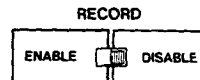


WRITING RHYTHM PATTERNS

- 6 When you are finished writing press the START/STOP key to end play.



- 7 Set the RECORD switch to the DISABLE position if you want to stop writing.



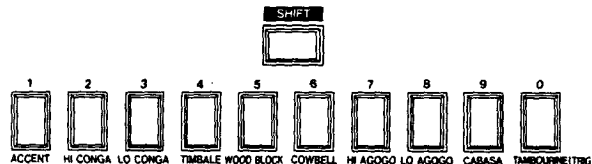
Making Corrections

If you accidentally wrote an instrument at a step where that sound is not wanted, you can easily make corrections as follows.

Set the RECORD switch to ENABLE.

1. Press the START/STOP Key to begin play. While holding down the SHIFT key, press the instrument key for the sound you want to erase at the step where that instrument is heard. If you keep the key depressed, then that sound will be erased from all steps played during that period until you release the key. This means that if you wanted to erase the snare from every step of the pattern, you would start play, hold down SHIFT and then also hold down the HI CONGA Key for a full cycle of the pattern. The pattern will then have all instruments that have been written except for the snare sound.

While depressing the shift key, press the instrument key for the sound that you want to erase.



2. After erasing undesired sounds, write in sounds where desired, following the real time or step time write procedures described in previous pages of this manual.

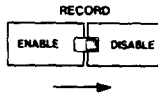
WRITING RHYTHM PATTERNS

Pattern Play

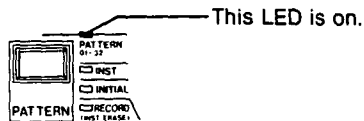
To play back recorded patterns, follow the directions below.

● Operation

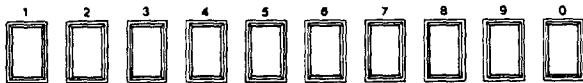
Set the RECORD switch to the DISABLE position.



Press the PATTERN key so that the PATTERN LED lights up.



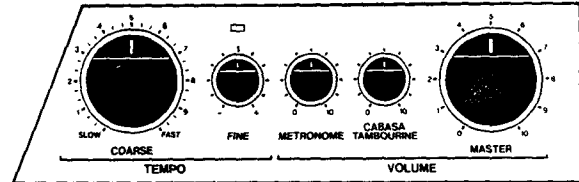
Key in the pattern number from 01 to 32 that you want to hear.



Press the START/STOP key to begin playback of the rhythm pattern that you have just selected.



Adjust volume and tempo.



You can change to a different pattern by selecting its pattern number. Your new selection will be played after the previous selection has finished.

The new selection will be shown on the display and the "NEXT NO" LED will light up until the previous selection has finished playing.

WRITING SONGS

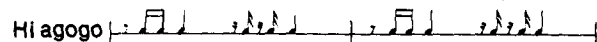
About Song Numbers and Memory

Instead of switching back and forth between pattern numbers by hand, you can program the DDM-220 to perform the switching sequence automatically at just your desired times. You have up to 32 pattern numbers to work with. You can arrange these in any order and store each of your arrangements as a song. Up to six songs can be stored on board (that is, without using the tape interface) at one time. Just as you give each of your patterns an identifying number from 01 to 32, so must you assign any of numbers 1~6 to each of your six songs.

Bar Number and Bars

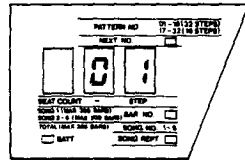
To enable increased resolution and extended song lengths, the DDM-220 counts one pattern as one bar. Therefore, even if you select what might be considered a 2-bar pattern (8/4 time) because you want high resolution, you still count the whole pattern as one bar when you put patterns together to create songs.

Example: Pattern number 01 (resolution: 1/16, 8/4)



The DDM-220 counts one pattern as one bar.

Example: Pattern number 01 is in play.

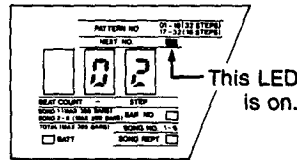


You select pattern number 02.

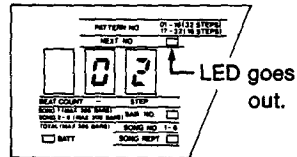
Press the 0 key,



then press the 2 key.



Pattern number 02 will be played after pattern number 01 has been completed.

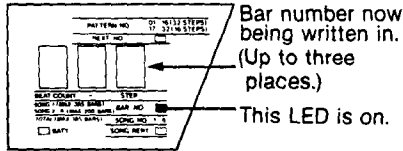


Press the START/STOP key again when you want to stop playback.



WRITING SONGS

Also, when you write songs, the display will show which "bar number" you are on. This tells you how many bars you are (according to the above definition) from the beginning of the song. The bar number display is shown here.



Memory Capacity

Up to six songs can be stored. These are called song number 1, song number 2, and so on. Song number one can be up to 385 bars long, in other words, it can take up the whole memory, leaving space for no other songs. Songs of no longer than 200 bars can be assigned any of the song numbers from 2 through 6.

Song memory	Capacity
song memory 1	385 bars
song memory 2	200 bars
song memory 3	200 bars
song memory 4	200 bars
song memory 5	200 bars
song memory 6	200 bars

The total number of bars that can be stored in DDM-220 memory varies slightly depending on how many songs (song memory numbers) are written.

Number of songs written	Capacity
Only 1 song	385 bars
Only 2 songs	386 bars
Only 3 songs	387 bars
Only 4 songs	388 bars
Only 5 songs	389 bars
All 6 songs	390 bars

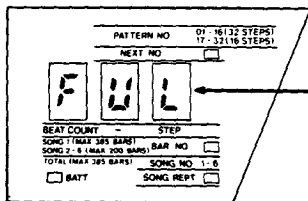
In short, you get one more bar of total memory for each additional song that you write. If you write six songs (or more precisely if you use all six song memories), then you can have up to 389 bars as the total of all bars in all songs.

If you fill up the memory while writing to song memories, the display will show "FUL". Naturally if the memory is full then you cannot store anything more.

Example: Using only two song memories.

If you have 300 bars in song 1 and then write 86 bars into song two, then the total will be 386 bars. But if you try to write a 387th bar, then the display will show "FUL", (see illustration) reminding you that the memory is already full.

WRITING SONGS



This means that you cannot write any more patterns to song memory.

Remember to check available memory from time to time as you write. (Do this by pressing the SONG key so that the EDIT LED lights up, then pressing the number 9 key marked MEM AVAIL.)

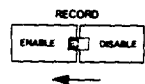
Caution:

Although song memories 2~6 only hold 200 bars each, the display will not give a FUL indication if 200 is exceeded. Since there is a chance that exceeding 200 on any particular one of the song memories 2~6 will affect other memories, please watch the bar number display closely when you start to approach the 200 figure.

Song Recording

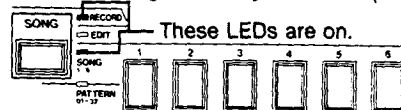
● Operation

Set the RECORD switch to the ENABLE position.

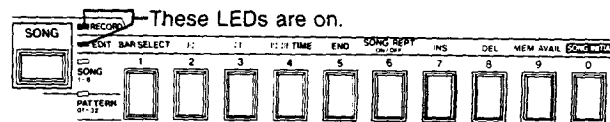


The RECORD LED will turn on in the SONG or PATTERN section.

Press the SONG key so that SONG and RECORD LEDs light up. Then press a key numbered between 1 and 6. This will be your song memory number (or "song number", for short).



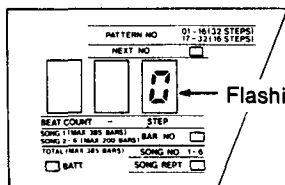
Press the SONG key again so that the EDIT LED Lights up.



WRITING SONGS

Press the SONG INITIAL (0) key to erase the previous contents of that song memory.

Press 0.



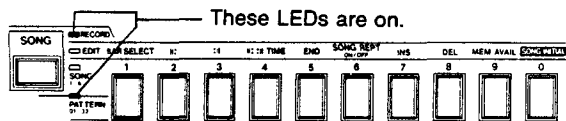
Flashing

Press ENTER



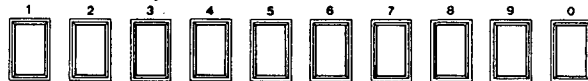
(Display stops flashing.)

Press the SONG Key so that the PATTERN LED Lights up.



These LEDs are on.

Choose the pattern number (01~32) that you want to use for the first bar of the song. Press the numbered keys to select the desired number.



If you want to hear what it sounds like, press the START/STOP key.

START / STOP



After checking the pattern, press the START/STOP key again to stop play.

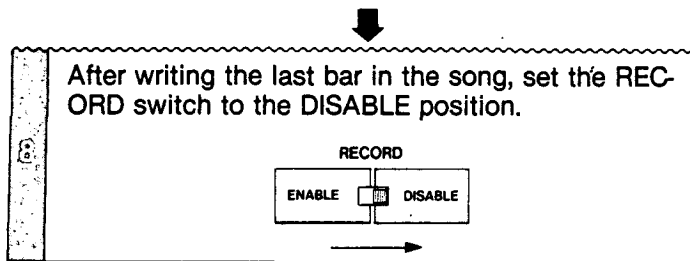
Press the ENTER Key.

UP/ENTER



To write the same pattern number again, simply press the ENTER Key.

WRITING SONGS

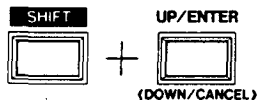


Correcting mistakes while writing

(Set RECORD switch to ENABLE)

- If you make a mistake and press the ENTER key after selecting the wrong pattern number, then follow the directions below.

1. Hold down the SHIFT key and press the ENTER key to go back a bar.



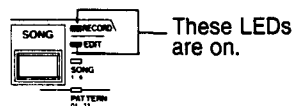
(This cancels the previous use of the ENTER key so that you can re-select a pattern number.)

2. Select the desired pattern number and press the ENTER key.

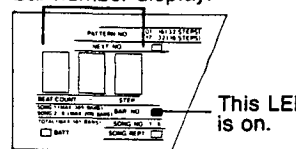
Checking the Bar Number

(Set RECORD switch to ENABLE)

- To check the bar number while writing, press the SONG key so that the EDIT LED lights up. This number is the number of the bar that can now be written.



Bar number display.

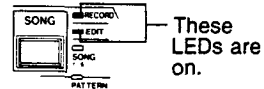


Checking How Much Memory Is Available

(Set RECORD Switch to ENABLE)

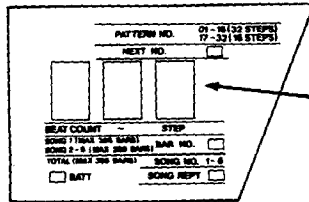
- To check how much memory is available, follow these directions:

1. Press the SONG key so that the EDIT LED lights up.
2. Press the MEM AVAIL (number 9) key.



WRITING SONGS

3. The display will show the amount of memory that remains available. This is the same as the number of bars that you can still write without exceeding memory capacity. This display flashes to distinguish it from the bar number display.



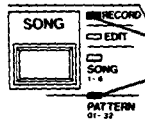
This particular indication means that there are 385 - 390 bars worth of memory available. (In other words, nothing has been written to any of the song memories.)

4. Press the ENTER key to display the bar number again.



Note:

After checking the bar number or available memory, remember to press the SONG key again so that the PATTERN LED Lights up. Then you can resume selecting patterns and entering them in song memory.



These LEDs are on.

Using Repeat Signs

You can make the DDM-220 repeat a section of a song by putting in repeat signs at the beginning and end of that section. A section may be repeated once or a specified number of times. Repeat signs (beginning and end) can be used only once in any particular song.

● **Writing in repeat signs** || 1 | 2 | 3 || 4 | 5 | 6 | 7 : || 8 ||
 Example: Repeating bars 4 ~ 7.

1 Write in bars 1 through 8.

Press the SONG key so that the EDIT LED Lights up.

These LEDs are on.

2

Press the BAR SELECT key (number 1), then press the number 4 key.

3

WRITING SONGS

↓

Press the ENTER key. The display will stop flashing and will show the number of the bar which can now be written (004).

UP/ENTER
(DOWN/CANCEL)

Press the begin repeat key (number 2).

Press number 2 key.

Display is flashing.

UP/ENTER

Next press the ENTER Key. The display will stop flashing and show the bar number to indicate that the sign has been written into bar number 4 (004).

↓

↓

Press the BAR SELECT key (number 1) and select bar number 7 (by pressing the number 7 key).

Press BAR SELECT.

Display is flashing.

Then press 7.

Next press the ENTER key.

Press the end repeat key (number 3).

Press number 3 key.

Display is flashing.

Next press the ENTER Key.

Now that you have finished writing in the repeat signs, go on to the next section to specify the “setting the repeat time”, that is, how many times you want the section played.

Setting the Repeat Time

The “repeat time” is the number of times that the DDM-220 will play the section within the begin and end repeat signs.

Repeat time = number of times section is played.

So a repeat time of 1 means that the section will be played once — it will not be repeated.

Repeat time 1: played once: not repeated

Repeat time 2: played twice: repeated once

Repeat time 3: played 3 times: repeated twice

Repeat time 4: played 4 times: repeated 3 times

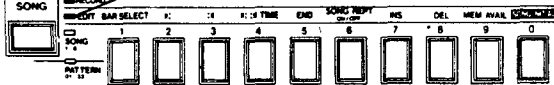
So if the repeat time is 9 then the segment will be played nine times or repeated eight times.

The repeat time is specified by pressing the numbered keys 1~9.

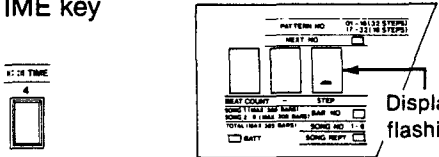
Set the RECORD switch to the ENABLE position and proceed as follows.

1 Press the SONG key so that the EDIT LED Lights up.


These LEDs are on.



2 Press the TIME key (number 4).




3 Specify the repeat time by pressing a number key (1~9).



The selected number will flash on the display. Remember, a repeat time of 1 is the same as no repeat.

4 Press the ENTER key.



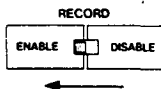
WRITING SONGS

Checking the Sequence

The following procedure lets you see which pattern number is located at which bar number in the song.

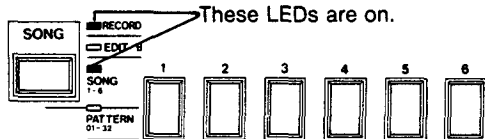
● Operation

Set the RECORD switch to the ENABLE position.



The RECORD LED will turn on in the SONG or PATTERN section.

Press the SONG key so that the SONG LED lights up. Then select the number of the song that you wish to check the contents of.

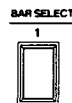


Press the SONG key so that the EDIT LED lights up.

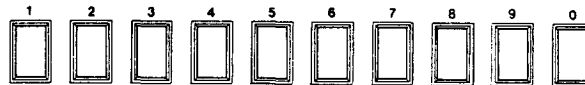


These LEDs are on.

Press BAR SELECT (number 1 key)



Key in the bar number that you want to check.

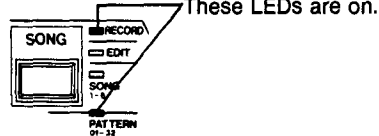


Press ENTER.

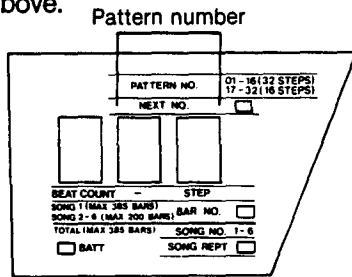


WRITING SONGS

Press the SONG key so that the PATTERN LED lights up.



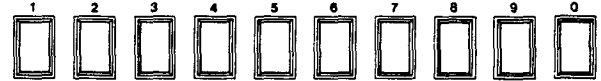
The display will now show you which pattern number is written into the bar number that you specified in step 4 above.



To find the pattern numbers for other bar numbers, repeat step 3~6.

If you find something that needs changing, you can rewrite the contents of a bar number as follows.

1. Key in the desired pattern number.



2. Press the ENTER Key.



Note:

If you specify a bar number that is higher than the last bar number in the song, then the display will show the pattern number at the last bar number.

After checking and making any necessary corrections, set the RECORD switch to the DISABLE position.

WRITING SONGS

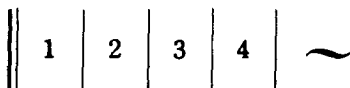
Editing

Inserting bars

If you forget to put in a bar or decide later that you want to add a bar in the middle of a song, then you can do so with insert editing.

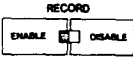
● Operation

Example:



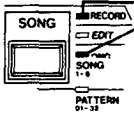
(Pattern number 32) ... Inserting a new bar between bar number 3 and 4.

1 Set the RECORD switch to the ENABLE position.



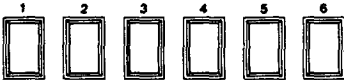
The RECORD LED will turn on in the SONG or PATTERN section.

2 Press the SONG key so that the SONG LED lights up.

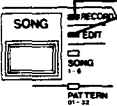


These LEDs are on.

3 Choose the song number that you want to edit.

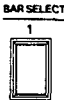



4 Press the SONG key so that the EDIT LED lights up.






These LEDs are on.

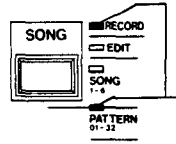
WRITING SONGS

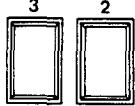
5 Press the BAR SELECT key. 


6 Choose the bar number where you want to insert a new bar. In our example, this would be 4 since we want to insert a new bar between bar number 3 and 4. 

7 Press the ENTER key. 

8 Press the INS (number 7) key. 
Then press the ENTER key. 

9 Press the SONG key so that the PATTERN LED lights up.  These LEDs are on.

10 Select the pattern number that you want to insert. (In our example this is pattern 32.) 

Press the ENTER key. 

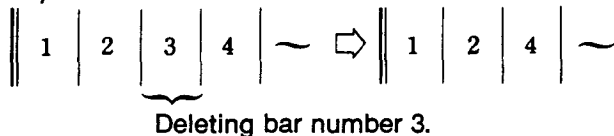
WRITING SONGS

Deleting bars

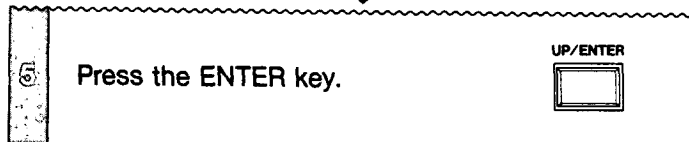
Follow this procedure when you want to cut out a bar.

● Operation

Example:



1	Follow steps 1~5 for insert editing.	
2	Select the bar number that you wish to delete. (In our example this is bar number 3.)	
3	Press the ENTER key.	
4	Press the DEL key (number 8).	



Caution:

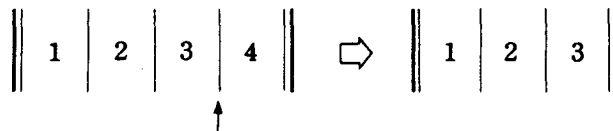
Do not use the delete function on song numbers where nothing is written. This may cause changes in the contents of other song numbers.

Adding an END Mark to Shorten a Song

You can shorten a song by writing in an END mark at a bar number before the last bar.



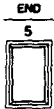

● Operation

Example:



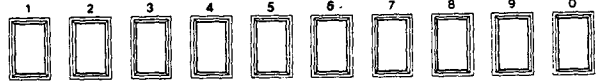


WRITING SONGS

Changing Repeat Signs and Repeat Time

1	Follow steps 1~5 for insert editing.
2	Select the bar number that you want to end with. (In our example, this is bar number 3). 
3	Press the ENTER key. 
4	Press the END key (number 5). 
5	Press the ENTER key. 

You can change the location of repeat signs and the number of times the section will be played (repeat time).


● Operation

1	Follow steps 1~5 in the instructions for insert editing.
2	Select the bar number where you want to put the repeat sign. (This is the same whether you are changing the position of the begin or end repeat sign.) 
3	Press the ENTER key. 
4	Press the begin or end repeat key 






WRITING SONGS

↓

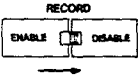

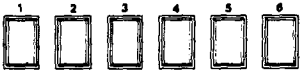

5 Press the ENTER key. 

To change the repeat count, now follow these directions.

1. Press the TIME key (number 4).

2. Key in the repeat time (1 ~ 9).

3. Press the ENTER key.


Song Play

● Operation

1. Set the RECORD switch to the DISABLE position.

2. Press the SONG key so that the SONG LED lights up.
 This LED is on.
3. Select the song number that you want played.

4. Press the START/STOP key.


(Play will stop automatically after the last bar.)

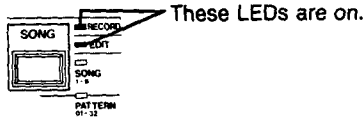
WRITING SONGS

Song Repeat

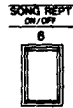
With this procedure the DDM-220 will repeatedly play any single song number of your choice.

● Operation

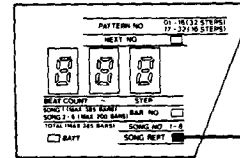
Set the RECORD switch to the ENABLE position and press the SONG key so that the RECORD and EDIT LEDs light up.



Press the SONG REPT key (number 6).

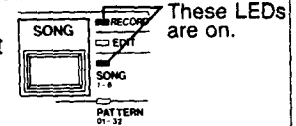


Press the ENTER key.



This LED is on to indicate that the SONG REPEAT function is operating.

Press the SONG key so that the SONG LED lights up.



Press the START/STOP key to begin play. The song will be played repeatedly until the START/STOP key is pressed again.



After step 3 you can return the RECORD switch to the DISABLE position without cancelling the repeat function.

(To turn off the SONG REPEAT function, repeat steps 1-5, above.)

WRITING SONGS

Continue Start

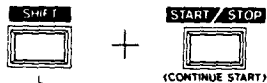
Use this procedure if you stop play in the middle of a song and then want to continue play from the same location.

● Operation

During playback, press the START/STOP key to interrupt play.

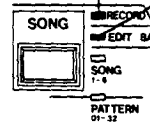


Hold down the SHIFT key and press the START/STOP key. Play will resume from the bar where it was interrupted.



You can also specify a bar number from which to begin play:

Set the RECORD switch to ENABLE and press the SONG key so that the RECORD and EDIT LEDs light up. These LEDs are on.

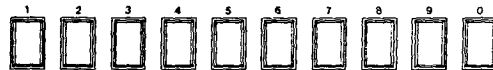


Select the bar number from which you want play to begin.

1. Press the BAR SELECT key.



2. Key in your desired bar number.



3. Press the ENTER key.

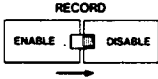


REAL TIME PLAY Using the DDM-220 as a percussion instrument

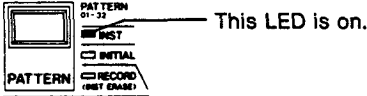
The DDM-220 can be used as a percussion instrument or as electronic drums by tapping on the instrument keys.

● Operation

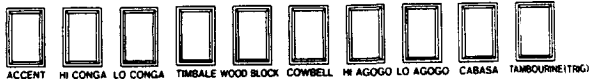
1 Set the RECORD switch to the DISABLE position.



2 Press the PATTERN key so that the INST LED lights up.



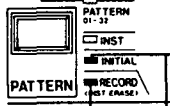
3 Press or tap the keys.



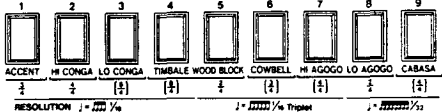
You can not play hi-agogo and lo-agogo sounds at the same time. Nor can you play timbale and wood block at the same time. On the DDM-220, hi-agogo has priority over lo-agogo and wood block has priority over timbale.

4 To obtain the metronome sound, follow the additional steps below:
Set the RECORD switch to the ENABLE position.


1 Press the PATTERN key so that the RECORD and INITIAL LEDs light up.



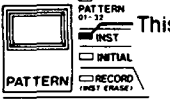
2 Select the time signature (3/4, 4/4, etc.).



3 Press the ENTER Key. Then set the RECORD switch to the DISABLE position.



4 Press the PATTERN key so that the INST LED lights up.



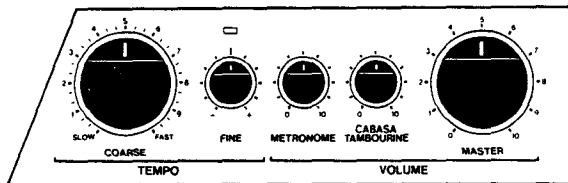
instrument



- 5 Press the START/STOP key to start the metronome. The metronome sound will match your selected time signature.



- 6 Adjust the tempo and volume controls.

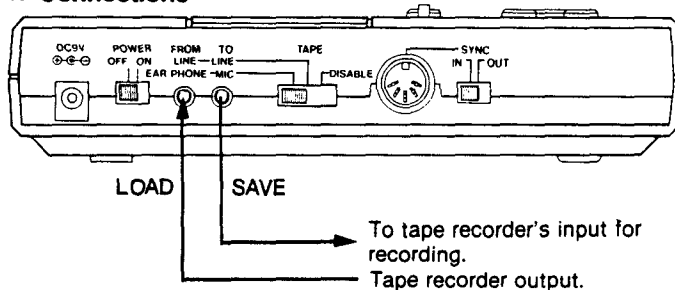


- 7 Play the keys.
To stop the metronome, press the START/STOP key again.

TAPE INTERFACE

The contents of the DDM-220's internal memory can be saved on tape. Therefore, there are no practical limitations on how many songs and patterns you can create and use. Once pattern and song data are saved on tape, you can quickly load it back into internal memory. By saving data on tape you also protect yourself from the possibility of losing internal memory contents, either because of drained batteries or because someone "accidentally" overwrote your programs.

• Connections



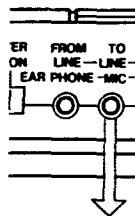
Tape Interface

Save (Tape Recording) Procedure

"Save" is to put out the data stored in a memory and record the output data in a cassette tape, etc. Following is the procedure for save operation.

● Operation

Connect the TO (LINE, MIC) jack to your tape recorder's input jack (which may be marked "mic", "line in", "rec", "aux", etc.).



To tape recorder's input for recording

Set the DDM-220 side panel TAPE switch to the LINE or MIC position depending on what kind of input you will be using on the recorder. See the chart below.

↓

Type of input for recording on the tape recorder.	TAPE switch setting.
LINE IN (AUX) and other inputs used when recording from another tape deck or mixer.	
MIC IN or other low level input used when recording from a microphone or guitar.	

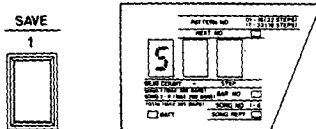
The display will appear as shown here.

↓

Tape Interface

Set up the tape recorder ready for recording in the pause mode. (Be sure to wind the cassette past the leader tape.)

Press the SAVE key (number 1) and adjust the recording level on the tape recorder.



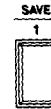
• About recording level

On recorders having VU meters, adjust the recorder's input level controls so that the VU meters give a reading of "0". However, the meters on most portable recorders are not calibrated to meet agreed upon standards. Therefore, you may have to experiment to find the optimum setting for your unit.

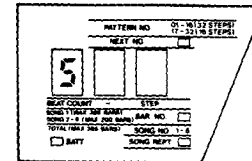
After adjusting recording level, press the SAVE key to stop data output.

Start recording.

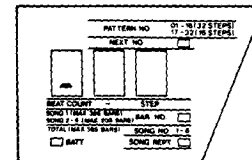
Press the SAVE key again. (Data output will begin.)



The display will appear as shown here.



Stop the tape recorder when the display appears as shown here.



- Next use the VERIFY function to check whether the data has been recorded without error.

Tape Interface

About the Data Tones

If you listen to the sound on your recorder or audio system while performing the save function, you will hear data tones of three kinds.

Clear high pitched tone (leader tone): 3 seconds



Lower pitched noisy sound (data tone): 1~2 minutes



Clear high pitched tone (end tone): 2 seconds

The **leader tone** indicates that data output is about to begin.

The **data tone** contains your patterns and songs encoded as digital data.

The **end tone** indicates that data output is over.

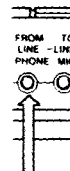
The leader and end tones have no meaning to the tape recorder. They are important when the tape is played back (for verify and loading operations) since the DDM-220 needs to know when to start capturing data and when to stop.

Verify Procedure

The DDM-220 is capable of telling whether tape playback data is the same as the data in internal memory or not. In other words, it can check whether saved data has been properly recorded. This is done by using the verify function. Always use VERIFY immediately after saving data. If you key in any pattern or song data after saving and then try to verify, the DDM-220 will give you an error message. The error message simply means that internal memory contents are different from the incoming data.

● Operation

Connect the side panel FROM (LINE, EARPHONE) jack to the output jack (marked earphone, line out, phones, etc.) on your tape recorder.



Tape recorder output.

Set the TAPE switch to the position that matches the type of tape recorder output being used.

Tape Interface

↓

Tape recorder output.	TAPE switch setting.
LINE OUT (AUX) PHONES	
EARPHONE	

↓

3. Rewind the tape and begin playback. Set the recorder to the pause mode when you hear the beginning of the leader tone.

↓

4. Set the tape recorder's output level control to the position that you use for listening at a "normal" (not too loud; not too soft) volume level. Set the tone controls (bass, treble) to the center positions.

5. Press the VERIFY key (number 3).

VERIFY

:||

3

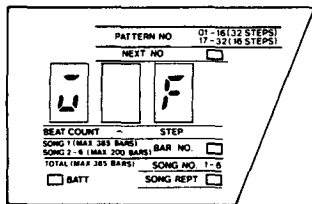
SNARE

Shows "V" for "verify".

↓

Tape Interface

Begin playback (release the pause button) on the tape recorder.

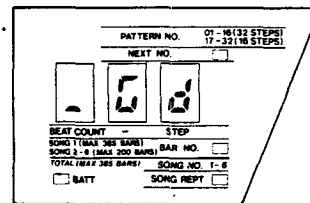


• When the data tone begins, the display should show an "F". Display shows "F" (for "found") during data tone playback.

• If the display does not give an "F" indication, then follow these additional steps.

1. Press the VERIFY key again to stop the verify procedure.
2. Rewind the tape, begin playback, and stop at the beginning of the leader tone.
3. Turn up the output level or volume control on the tape recorder.
4. Start playback on the tape recorder and press the VERIFY key.

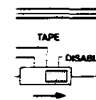
At the end tone, the display should appear as shown here ("_ F _" for "good"). The tape recorder may now be stopped.



If the display shows "_ Er" (Error), then follow these additional steps:

1. Press the VERIFY key again to stop the verify operation.
2. Repeat steps 3~ 6, above. The key here is finding the proper output volume level. Some ultra compact cassette players (and microcassette recorders) simply do not have sufficient output level to be used for data playback.

Set the side panel TAPE switch to the DISABLE position.



Tape Interface

■ Important Information

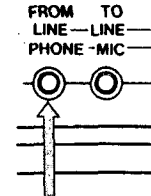
- The VERIFY function compares the data from tape playback with the data in the DDM-220 internal memory. Therefore, it is only used immediately after you have saved (recorded) data on tape. If the two sets of data match then the display will give a “_□□” (good) message (assuming that signal level is suitably high); if there is even a slight difference then the display will indicate “_Er” (Error). You can not expect to get a “_□□” message if anything has changed in internal memory either because you have entered new data or because something has been accidentally altered in internal memory or on the tape.
- If you do not succeed in getting a “_□□” message even after trying various different output volume level settings, then try recording (saving) the data again, at various different recording level settings.
- Please use new, good quality tapes. Old or inexpensive tapes may suffer from dropouts which will cause lost data.

Load (Tape Playback) Procedure

The LOAD function is used to put recorded data from tape back into the DDM-220's internal memory.

● Operation

Connect the side panel FROM (LINE, EARPHONE) jack to the output jack (marked ear-phone, line out, phones, etc.) on your tape recorder.



Set the TAPE switch to the position that matches the type of tape recorder output being used.

Tape Interface

Tape recorder output.	TAPE switch setting.
LINE OUT (AUX) PHONES	
EARPHONE	
<p>Rewind the tape and begin playback. Set the recorder to the pause mode when you hear the beginning of the leader tone.</p>	
<p>Set the tape recorder's output level control to the position that produced a "<input type="checkbox"/><input type="checkbox"/>" (good) indication when you used the VERIFY function. Set the tone controls (bass, treble) to the center positions.</p>	

Start playback (release the pause button) on the tape recorder, then press the LOAD key (number 2).

LOAD
1
2

When the data tone begins, the display should show an "F".

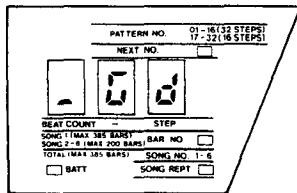
- Display shows "F" (for "found") during data tone playback.

Tape Interface

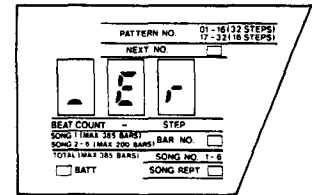
- ↓
- If the display does not give an "F" indication, then follow these additional steps.

1. Press the LOAD key again to stop the load procedure.
2. Rewind the tape, begin playback, and stop at the beginning of the leader tone.
3. Turn up the output level or volume control on the tape recorder.
4. Press the LOAD key and start playback on the tape recorder.

At the end tone, the display should appear as shown here ("□□□" for "good"). The tape recorder may now be stopped.



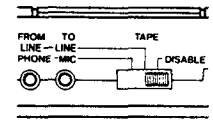
- ↓
- If the display shows "E" (Error), then follow these additional steps:



1. Press the LOAD key immediately after the "E" message appears. The display will show "L" and the loading will be started again.
2. If the "E" message remains, press the LOAD key twice in a row to stop loading.
3. Repeat steps 3~5 on page 50, try different output level settings on the recorder.
4. Start playback on the recorder, then press the LOAD key.

7

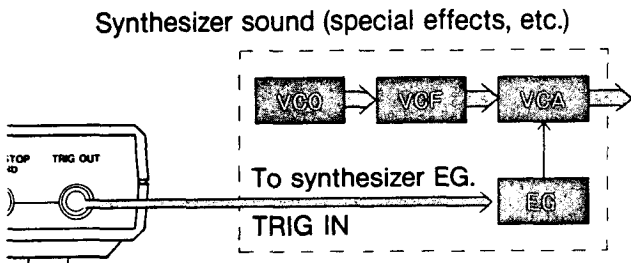
Set the side panel TAPE switch to the DISABLE position.



ADVANCED APPLICATIONS

Using the Trigger Output

The side panel trigger jack gives a trigger signal output (\square GND) that can be used to produce a sound on a synthesizer. The trigger signal is generated at the points where you program the tambourine sound. (You then get the trigger signal instead of the tambourine sound.)

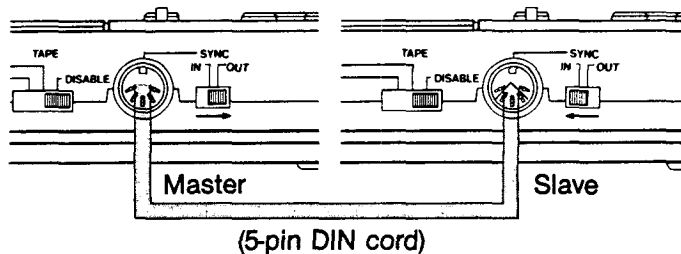


(When a cord is plugged into the TRIG OUT jack on the DDM-220, you will not hear any handclaps sound from the STEREO output.)

Using the Sync Feature

There is a SYNC jack on the left side panel which can be used for synchronized operation with another DDM-220, DDM-110, or other compatible unit. When SYNC is used the two units will start and stop together and their tempos will match. Connect as shown here.

(Another DDM-220, DDM-110, KPR-77, etc.)



Set the SYNC switch to OUT on one unit. Set to IN on the other. The one set to OUT is the master; the one set to IN is the slave. Use the master unit's controls to start and stop operation and to adjust tempo.

SPECIFICATIONS

Very complex rhythm patterns can be created with two synchronized units. The DDM-220 and DDM-110 are especially well suited for this purpose since they enable a combination of drums and percussion.

To sync the DDM-110 or DDM-220 to MIDI operated equipment, or for sync to tape operation, use the Korg KMS-30 MIDI synchronizer.

Caution:

- The time signature must be the same on both units if you want to maintain a matching bar count. On the other hand, you can take advantage of this and create "polyrhythms" by intentionally using different time signatures.
- Sync operation can not occur if the SONG key EDIT LED or PATTERN key INITIAL LED is on. If necessary, press the SONG or PATTERN Key to change to a suitable mode from which to begin synchronized play. If you pressed the START/STOP key by mistake then turn off the power, turn it back on, and start over again. This will not erase memory contents.

- **TONE GENERATORS:** Hi Conga, Lo Conga, Timbale, Wood Block, Cowbell, Hi Agogo, Lo Agogo, Cabasa, Tambourine.
- **ACCENT:** All instruments; ON/OFF; Step.
- **TEMPO CONTROL:** Coarse (SLOW ~ FAST); FINE (+ ~ -); Tempo indicator.
- **VOLUME:** Master; Metronome.
- **PATTERN KEYS:** Pattern Mode, Instrument Mode, Initial Mode, Record Mode.
- **SONG KEYS:** Song Mode, Pattern Mode, Edit Mode, Record Mode.
- **NUMBER KEYS (SOUND SOURCE KEYS):** Pattern Number Select, Song Number Select, Instrument Select, Initial Select, Pattern Erase, Song Initial Bar Select, Repeat, Repeat Time Select, Song Repeat (ON/OFF), Insert, Delete, End, Memory Avail, Tape Interface (Save, Load, Verify).
- **RECORD SWITCH:** ENABLE/DISABLE
- **START/STOP KEY:** START/STOP
- **ENTER KEY:** Enter, Step up/Down, Cancel.
- **SHIFT KEY:** Enter Key Function Select; Continue Start; Instrument Erase.

SPECIFICATIONS

- **PATTERN MEMORY:** 32 Patterns (Maximum number of steps: 32 for patterns numbers 1 ~ 16; 16 for pattern numbers 17 ~ 32).

-
- **SONG MEMORY:** 6 Songs; Maximum Memory Capacity: 385 ~ 390 bars.

-
- **DISPLAY:** Pattern Number, Song Number, Bar Number, Step Number, Beat Count, Key Number, Memory Avail, Tape Interface Modes, Battery Check.

-
- **SYNC:** 5-Pin DIN Jack IN/OUT Switch.

-
- **TAPE INTERFACE:** Tape Switch (DISABLE/FROM/TO), FROM Jack, TO Jack.

-
- **INPUTS:** DC 9V; Start/Stop (\perp GND).

-
- **OUTPUTS:** Stereo Out (R/MIX, L), Phones, Trigger Out (\perp GND).

-
- **POWER SUPPLY:** Six 1.5V "Penlight" AA size (SUM-3) batteries or AC adaptor (DC 9V, 300mA). Power Switch.

-
- **DIMENSIONS:** 226(W) × 196(D) × 49(H)mm

- **WEIGHT:** 880g (including batteries)

- **SUPPLIED ACCESSORIES:** Shielded Audio Cord (2.5m), Batteries (UM-3 × 6), AC Adaptor
-

OPTIONS

- **OPTIONAL ACCESSORIES:** Pedal Switch/PS-1, Stereo Headphones/KH-1, Soft Case, 5-Pin DIN Cord

N O T I C E

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