CONGRATULATIONS

Thank you for choosing the Yamaha DX7 Digital Programmable Algorithm Synthesizer. The DX7 employs unique and sophisticated FM digital tone generation technology combined with microcomputer control to permit creation of voices that are more “live” than voices available with any other system available.

We urge you to read this owner's manual thoroughly to ensure proper operation and maximum performance of the instrument.

FEATURES

- The DX7 has a 32-voice internal memory, while external cartridges can be plugged in to provide an extra 96 voices, making a total of 128 voices available to the performer for instant selection.
- Extensive microcomputer programming control makes it possible to edit existing voices to change their character, or produce entirely new voices. New voices can also be created “from scratch.”
- Edited or new voices can be stored either in the instrument’s internal memory, or in an optional external memory cartridge, so sounds you create can be saved for future use.

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PRECAUTIONS

LOCATION
Avoid placing your synthesizer in direct sunlight or close to a source of heat. It is also important to avoid locations in which the instrument is likely to be subjected to vibration, excessive dust, cold or moisture.

HANDLING
Avoid applying excessive force to the instrument’s knobs and switches.

POWER CORD
Always grip the power plug directly when unplugging. Removing the power plug from the wall socket by pulling on the power cord can result in damage to or shorting of the power cord.
Be sure to unplug your synthesizer if you will not be using it for an extended period of time.

RELOCATION
When moving the synthesizer once it has been set up, be sure to disconnect all cords that connect to other equipment. This will help prevent accidental damage to or shorting of interconnection cables.

CONNECTION
Carefully follow the “CONNECTION” instructions given in this manual when setting up your synthesizer.
Connection errors can lead to serious damage to the instrument, amplifier, and speakers.

CLEANING
Do not use solvents such as benzine or thinner to clean your synthesizer as these may cause discoloration or staining of the instrument’s exterior. Use a soft, dry cloth.

SAVE THIS MANUAL
After studying this manual thoroughly, it should be stored in a safe place for future reference.

LIGHTNING
In the event of an electrical storm, the instrument’s power cord should be unplugged to eliminate the possibility of serious damage.

OTHER APPLIANCES
Use your synthesizer where its digital circuitry cannot be influenced by electromagnetic radiation from appliances such as televisions, radios, etc.
DX7 OUTLINE

As stated in the feature summary on page 1, the DX7 can be used to play pre-programmed voices, pre-programmed voices can be edited to alter their character, or completely new voices can be created from scratch. Newly created voices can be memorized for future use.
To accomplish all this, the DX7 has four main operating modes:

- **PLAY-MEMORY SELECT Mode**
  This is the normal performance mode, and the mode in which pre-programmed voices can be selected.

- **FUNCTION Mode**
  This mode permits setting parameters pertaining to the effect of the controllers (thumbwheel, foot controller, breath controller, key after touch) and is also used for loading and saving data.

- **EDIT Mode**
  This mode permits editing existing voice data to create new sounds as well as creation of entirely new voices.

- **STORE Mode**
  Edited or newly created voices can be programmed into the memory in this mode.

All functions of the DX7 are performed in one of the above modes. Proper understanding of the functions of each mode is the key to successful operation of and performance with the DX7.

**1 VOLUME**
This controls the output level of the DX7 and at the same time controls the volume of the headphones.

**2 DATA ENTRY**
This combination of keys and linear control is used to enter and modify data.

**DATA ENTRY**
These keys are for increasing or decreasing the values by 1, for turning a function on or off and for moving the cursor when writing a voice name.

This control is used for coarse value adjustment. This slide controller covers the entire range for each parameter from minimum to maximum.
3 MODE SELECT KEY
Selects the operating mode, "operators" (these will be explained later) and memory protect functions.

4 DISPLAY PANEL
This Liquid Crystal Display panel displays the parameters in each mode and the name of the selected pre-programmed voice.

5 VOICE/PARAMETER SELECT KEY
These keys select either the voices in the instrument's internal memory or those in an external voice cartridge. The same keys are also used to select parameters in the FUNCTION or EDIT modes. One key can have a maximum of four different functions. The function of these keys is determined by the MODE SELECT key.

6 VOICE CARTRIDGE
External voice cartridges can be plugged into the receptacle in the DX7 panel. The DX7 is supplied with two ROM (pre-programmed) voice cartridges, each containing 64 voices. An optional RAM (user programmable) voice cartridge can contain 32 voices.

7 PITCH BEND WHEEL
The pitch bend range is set in the FUNCTION mode. The pitch bend wheel then permits upward and downward pitch bend throughout the set range.

8 MODULATION WHEEL
The modulation depth range is set in the function mode. The modulation wheel then permits variation of modulation depth throughout the set range.

9 KEYBOARD
The DX7 has a 61-key keyboard with 16-voice polyphonic capability (a monophonic mode is also selectable).

- Initial/After Touch response provided.
- **Setting Up and Applying Power**

The DX7 does not have an internal power amplifier, therefore either headphones or an external amplifier/speaker system are required. A high-quality keyboard amplifier system is recommended.

Hook up your DX7 as shown in the diagram below.

- **Turn POWER ON**

The DX7 power switch is located to the right of the rear panel (viewed from keyboard side). Turn the power switch ON only after all connections to other equipment (and to the AC supply) have been properly made. The display panel will appear as in the illustration below immediately after power is switched on.

After a few seconds, the same mode that was engaged before power was turned off is re-engaged. For example, if the PLAY mode was previously engaged, the PLAY mode will be re-engaged and the previously selected voice will be ready for performance. The same applies to the EDIT and FUNCTION modes.
PLAY MODE

- **Playing the Internal Voices**
The DX7 has 32 internal voices, any one of which can be selected simply by pressing the **INTERNAL** key in the MEMORY SELECT group, and then by pressing the appropriate VOICE SELECT key.
Each VOICE SELECT key has a large numeral that corresponds to the voice number at its left edge.

```
Select the Internal voices

MEMORY SELECT
  INTERNAL   CARTRIDGE

Press "INTERNAL" voice number

1 ~ 32
and then press the voice select key corresponding to the number of the desired voices.
```

- **Set the desired VOLUME level**
With power to the DX7 and your amplifier system ON, gradually raise the volume control while playing a note on the keyboard until the desired volume level is reached. Set the volume control on your amplifier so the optimum volume is attained with the DX7 volume control set about "8".

- **Fine adjustment of volume**
Fine adjustment of volume while playing can be achieved using an optional FC-3A foot controller plugged into the VOLUME jack on the DX7 rear panel. Remember that the DX7 and amplifier volume controls should be set high enough that adequate volume control range is available using the foot controller.

- **Playing the Cartridge Voices**
An extra 64 voices can be added to the available selection simply by plugging in one of the supplied external voice cartridges.
Insert a cartridge as shown in the figure.
Select the cartridge voices by first pressing the **CARTRIDGE** key in the MEMORY SELECT group, and then select the desired voice by pressing the appropriate VOICE SELECT key, just as in internal voice selection.
Selection of cartridge voice groups A1 - A32 and B1 - B32 is accomplished using the selector switch on the cartridge.

The A voice bank, voices A1 through A32 of the cartridge memory can be used.

The B voice bank, voices B1 through B32 of the cartridge memory can be used.

Select the cartridge voices

MEMORY SELECT
  INTERNAL   CARTRIDGE

Press "CARTRIDGE"

1 ~ 32
and then press the voice select key corresponding to the number of the desired voice.

When data entry is initiated while in the PLAY mode, the parameter selected at the end of the FUNCTION mode can be controlled.
FUNCTION MODE

- **FUNCTION Mode . . . . Applying Effects**
  The FUNCTION mode permits tuning, pitch bend, modulation, and application of other effects while playing, as well as voice data load/save operations.
  Press the [FUNCTION] key to enter the FUNCTION mode. Setting controller range parameters, etc., is carried out using the DATA ENTRY controls.
  Function parameters are memorized and maintained even when power to the DX is cut off. Unlike voice data, however, function parameters cannot be saved in internal or external memory.

- **MASTER TUNE**
  MASTER TUNE adjusts the overall tuning of the DX7 to match its pitch with other instruments. Pitch is variable over a 150 cent range. Press [MASTER TUNE] and then use the inner DATA ENTRY control for tuning.

- **POLY/MONO**
  Determines whether the DX7 will function in the polyphonic or monophonic mode. Press the DATA ENTRY [−1] key for polyphonic operation, and the [+1] key for monophonic operation.
  The range of the portamento effect is different in the polyphonic and monophonic modes. Refer to the PORTAMENTO section below.

- **PITCH BEND**
  Two keys are used to determine the effect of the PITCH BEND thumbwheel.

- **RANGE:**
  The range of pitch bend can be set from 0 to 12.0 range is equivalent to no pitch bend. A setting of 12 permits pitch bend over a ±1200 cent (2 octave) range. If the range is set at 7, then pitch bend will be possible over a ±700 cent range (i.e. plus or minus one fifth).

- **STEP:**
  The step parameter can be set from 0 to 12. A setting of 0 corresponds to 0-cent steps, and a setting of 12 corresponds to 1200-cent (1 octave) steps. If STEP is set to 0, then a perfectly smooth pitch bend will result. If STEP is set to 1, the pitch will bend in 100-cent (semitone) steps.
  Pitch bend will not function if RANGE is set to 0.

- **PORTAMENTO**
  The portamento effect varies according to whether the DX7 is in the polyphonic or monophonic mode.

  **MONOPHONIC MODE:**
  In this mode press the DATA ENTRY [−1] key to activate "FINGERED PORTA." In this mode portamento is applied only to legato notes.
  Press the DATA ENTRY [+1] key to activate "FULL TIME PORTA." In this mode portamento is always applied.
  
  **POLYPHONIC MODE:**
  Press the DATA ENTRY [−1] key to activate "SUS-KEY P RETAIN." In this mode the pitch of keys released while the sustain pedal is on or of notes that have a long sustain time does not change. However, portamento is effected between two subsequently pressed keys.
  Press the DATA ENTRY [+1] key to activate "SUS-KEY P FOLLOW." In this mode the pitch of a key released while the sustain pedal is held slides (portamento) to a previously pressed key. There is no change with continuously pressed keys.

  **GLISSANDO:**
  The glissando function is turned either ON or OFF. When it is OFF a normal portamento effect is produced.
  **TIME:**
  Adjusts the speed of the portamento/glissando effect from 0 to 99. A 0 setting results in no effect, while a setting of 99 produces the longest (slowest) portamento or glissando.
- The portamento/glissando effect can also be turned ON or OFF using an optional FC-4 or FC-5 foot pedal once the portamento/glissando function has been turned on using the front-panel controls. Pressing the foot pedal turns the effect ON. The effect is OFF when the foot pedal is released.

- An FC-4 or FC-5 foot pedal can also be connected for sustain pedal control. In the monophonic mode, a key pressed while another key is held will take priority, and the sustain effect will apply to the new key. Releasing the pedal turns the sustain effect OFF.

- **EDIT RECALL**

  ![Image 0x0 to 1138x1599](image)

  This function makes it possible to recall a voice that was previously being edited or created. If, for example, the PLAY mode is accidentally or purposely entered while editing, the voice that was being edited can be recalled with this function. If the [EDIT RECALL] key is pressed, the display shows "EDIT RECALL?". Pressing the DATA ENTRY [YES] key then causes the "ARE YOU SURE?" display. Verify by pressing the [YES] key again, and the voice previously being edited will be restored.

- **VOICE INIT (Voice Initialize)**

  ![Image 0x0 to 1138x1599](image)

  This function sets up the basic voice data for creating new voices. Press the [VOICE INIT] key and the display panel will read "VOICE INIT?". Press the [YES] key and the DX7 will respond with "ARE YOU SURE?". Verify by pressing the [YES] key second time. This sets up the basic voice data and activates the DX7 EDIT mode.

- **CARTRIDGE FORMATTING**

  ![Image 0x0 to 1138x1599](image)

  Since the format of a RAM cartridge used for other purposes such as DX1 performance memories, etc., will vary from that of a cartridge used for voice memory, make sure you observe the following procedure when storing or saving DX7 internal voices into such a cartridge. Press "11" to select this function. The "CARTRIDGE FORM?" display will appear. Press [YES] and the instrument will respond with "ARE YOU SURE?". Press [YES] again and all 32 memorybank in the RAM cartridge are initialized to the basic voice data.

- **BATTERY CHECK**

  ![Image 0x0 to 1138x1599](image)

  A backup battery power supply is built into the DX7 so that voice data will be maintained even when power to the instrument is off. The state of the backup system can be checked by pressing the [BATTERY CHECK] key. The operational battery voltage range is from 2.2 volts to 3 volts. If the backup battery voltage drops below 2.2 volts, replacement of the backup system is necessary. The backup system consists of special batteries which can be replaced only by a Yamaha dealer. Contact your nearest Yamaha dealer when replacement becomes necessary.

- **CARTRIDGE**

  ![Image 0x0 to 1138x1599](image)

  **SAVE**:
  32 voices contained in the internal memory system can be saved on an external programmable memory cartridge.

  **LOAD**:
  32 of the voices contained in an external voice cartridge can be loaded into the internal memory at a time.

  - Refer to the STORE/SAVE/LOAD section on page 19 for detailed instructions.

- **MODULATION WHEEL/FOOT CONTROLLER/BREATH CONTROLLER/AFTER TOUCH**

  ![Image 0x0 to 1138x1599](image)

  The modulation wheel, foot controller, breath controller or keyboard after touch can be used to control LFO modulation depth applied to pitch, amplitude or envelope producing controllable tremolo or vibrato effects while playing. Setting the RANGE, AMPLITUDE and ENVELOPE GENERATOR BIAS parameters for each controller is basically the same process, so we'll concentrate mainly on the MODULATION WHEEL.
1. MODULATION WHEEL
RANGE:
Range can be set from 0 to 99. No effect is produced with a 0 setting, and a setting of 99 produces maximum effect.

To add modulation effects

2. FOOT CONTROLLER
The LFO modulation effect programmed can be controlled using an optional FC-3A foot controller. Maximum effect is produced by pressing the foot controller all the way down, while raising the controller fully eliminates the effect.

3. BREATH CONTROLLER
The LFO modulation effect programmed can be controlled using an optional BC1 breath controller. The effect is controlled by blowing into the BC1 mouthpiece. The effect will not be audible unless breath is applied to the controller.

4. AFTER TOUCH
This feature makes it possible to vary the degree of modulation by varying pressure on the keys. No effect is produced with normal key pressure, but the effect can be introduced by pressing harder on the key(s). The amount of pressure applied determines the depth of the effect.

PITCH:
Determines whether LFO modulation is applied to pitch. Pitch is modulated if ON, and not modulated if OFF.

AMPLITUDE:
Determines whether LFO modulation is applied to amplitude. Amplitude is modulated if ON, and not modulated if OFF.

EG (ENVELOPE GENERATOR) BIAS:
When EG BIAS is ON, volume or brilliance (wow) variation effects can be added with the controllers by varying the level of each operator's envelope generator. MOD. SENSITIVITY (AMPLITUDE) is used to set the sensitivity (refer to page 14).

Applying EG BIAS to a modulator results in brilliance effects, while applied to a carrier it results in volume variation effects. In some cases, if the carrier sensitivity is maximum and the controller is set to its minimum, no sound will be produced.

- These parameters will have no effect if the PITCH MODULATION SENSITIVITY or the AMPLITUDE MODULATION SENSITIVITY of the voice used are zero.

Refer to the MODULATION SENSITIVITY section on page 14 for details.
FM TONE GENERATION

FM Tone Generation . . . Understanding the Basics

The DX7 is an entirely new type of synthesizer employing an entirely new FM digital tone generation system. This unique Yamaha system permits finer control over subtle musical nuances and vastly expanded voice creation potential compared to conventional synthesizers.

1. The Meaning of FM
FM stands for Frequency Modulation. FM radio broadcasts use the same principle. One signal—the modulator—modulates a second signal—the carrier. In FM radio the carrier is an extremely high "ratio" frequency and the modulator is the music signal to be broadcast. In effect, the carrier "carries" the modulator signal through the atmosphere to your receiving antenna.

FM broadcasting

<table>
<thead>
<tr>
<th>Carrier wave</th>
<th>(signal to be modulated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound signal</td>
<td>(modulator signal)</td>
</tr>
<tr>
<td>FM signal (modulated signal)</td>
<td>Extremely high carrier/modulator frequency ratio. The &quot;density&quot; of the transmitted carrier waveform varies according to the modulating signal.</td>
</tr>
<tr>
<td>Loose wave Dense wave</td>
<td></td>
</tr>
</tbody>
</table>

The FM tone generator system is similar in principle, but in this case both the carrier and modulator are audible signals, and their frequencies can be almost equal.

FM tone generation

<table>
<thead>
<tr>
<th>Carrier</th>
<th>(sound to be modulated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modulator</td>
<td>(modulator signal)</td>
</tr>
<tr>
<td>FM sound (modulated sound)</td>
<td>Close carrier/modulator frequency ratio results in FM sound.</td>
</tr>
</tbody>
</table>

2. FM Tone Generation In the DX7
In the DX7, the carrier signal determines the pitch of the note produced and modulator determines the shape of the waveform produced and therefore its timbre. This explanation may make it look like the carrier and modulator are two entirely separate things. In fact, they are one and the same. A special oscillator unit called an "operator" can be used as either a carrier or modulator in the DX7.

1) Pitch Frequency Data
Pitch frequency data from the DX7's microcomputer system determines the operator's oscillation frequency. When the operator is used as a carrier, this frequency is equivalent to the pitch of the note produced. When the operator is being used as a modulator, the ratio of its frequency to that of the carrier determines the timbre of the note produced.

2) Modulation Data
This is the modulation data received from the previous operator's (modulator) output.

3) Envelope Data
When the operator is used as a carrier the envelope data determines the volume envelope of the note produced. When the operator is used as a modulator the envelope data determines the timbre envelope of the note produced. For example, the pitch frequency data applied to an operator used as a carrier determines the frequency of the sine wave output from the operator. Inputting envelope data results in an output waveform similar to that shown in the figure.
- Basic Operator Functions
  1) Relationship of Carrier to Modulator
  An operator can be used as either a carrier or modulator. These two basic operator functions are the basis for the FM tone generation system. Two operators can be combined in two different ways.

  1. Modulator and carrier combinations

  ![Modulator and Carrier Diagram](image1)

  2. Carrier and carrier combinations

  ![Carrier and Carrier Diagram](image2)

  3) Modulator and Carrier
  In the modulator/carry configuration using two operators, shown in the figure, the operator on the left is the modulator and the operator on the right is the carrier. In the FM system, the last operator in a chain of two or more operators is the carrier. By varying the ratio of the modulator and carrier frequencies, and by varying the envelope of the modulator, an extremely broad range of highly complex waveforms (complex harmonic structure) can be created.

- Carrier and carrier combinations

  ![Carrier and Carrier Diagram](image3)

  2) Carrier and Carrier
  This configuration results in a pure sine wave output from both operators. The combination of these waveforms can sound much like a conventional organ.
Examples of output waveforms

- Modulator and carrier combinations
  Frequency ratio of modulator to carrier equals 1:1

- Carrier and carrier combinations
  Frequency ratio

3. Algorithms . . . Combining Several Operators

The DX7 has a total of six operators. The way in which these operators are combined is known as an "algorithm." The DX7 has 32 different pre-programmed algorithms. The 32 algorithms are displayed graphically along the top of the control panel above the selector keys. Taking algorithm number one as an example, the lowest two operators—1 and 3—are carriers. The four operators above the carriers will function as modulators. The output of operator 6 is fed back (feedback) to its input.

The above is a brief description of the internal workings of the FM tone generator system. By varying the pitch frequency, modulation and envelope data it is possible to edit pre-programmed voices or to create entirely new voices.
EDIT MODE

EDIT MODE ... Creating Voices
The EDIT mode can be used to edit pre-programmed voices or to create entirely new voices. Press the [EDIT/COMPARE] function key to enter the EDIT mode.

<table>
<thead>
<tr>
<th>OPERATOR ON-OFF/EG COPY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>MASTER TUNE ADJ</td>
</tr>
<tr>
<td>OSCILLATOR</td>
</tr>
<tr>
<td>MODE</td>
</tr>
<tr>
<td>17</td>
</tr>
<tr>
<td>RANGE</td>
</tr>
<tr>
<td>MODULATION WHEEL</td>
</tr>
</tbody>
</table>

Setting and modifying parameters is carried out using the DATA ENTRY controls just as in the FUNCTION mode. A small dot will appear next to the voice number in the display if any data is modified. The original voice can be recalled at any time while editing by pressing the [EDIT/COMPARE] key again. The preset number will flash indicating that you are hearing the original voice. To continue editing press the [EDIT/COMPARE] button again.

Now for an explanation of the DX7’s functions and operation.

The indicators display for EDIT mode:

- The number of the algorithm which is being used for that particular preset voice.
- Displays the current state of the operators from OP1 through OP6 beginning at the left.

The dot will appear when any data has been modified.

Displays each parameter.

The operator selected will be displayed only for the parameters that can be modified.

- OPERATOR ON-OFF/EG COPY

<table>
<thead>
<tr>
<th>OPERATOR ON-OFF/EG COPY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

In the EDIT mode these keys permit turning any of the operators on or off, and copying the EG data of any operator to any other operator (EG COPY).

OPERATOR ON-OFF:
Pressing keys [1] through [6] will result in the corresponding operator being turned OFF, indicated by a “0” in the appropriate location on the display panel (the group of six 1's and/or 0's corresponds to operators 1 through 6). Press the key again to turn the operator back on-indicated by a “1” on the display.

1: Signifies that the operator is activated
0: Signifies that the operator is disabled

No sound will be produced if the carrier operators have all been disabled.

EG COPY:
This function copies the EG data from one operator to another. While holding the selector [STORE] key, press the number of the operator from which you want to copy EG data.

While pressing the [STORE] key, the display panel when the STORE key has been pressed.

Press the key for the operator number that you wish to copy.

- ALGORITHM

This key permits selection of one of the 32 algorithms.
Press the DATA ENTRY [+1] key to increment (advance) the number of the selected algorithm, and the [-1] key to decrement the algorithm number. The slide control can be used for large variations.
Feedback

One operator in each of the 32 algorithms has its output fed back to its input. This is the feedback operator. The amount of feedback applied can be adjusted over a range of 0 to 7. By increasing the FEEDBACK level the harmonics are increased, resulting in the generation of noise-like sounds.

![Feedback Diagram]

LFO

The Low Frequency Oscillator produces low-frequency sine, saw-tooth or square waves, or a SAMPLE/HOLD waveform. The LFO waveform can be used to apply vibrato, tremolo or "wow" effects to the voices. The amount of LFO modulation applied can be controlled using the modulation wheel, foot controller, breath controller or keyboard after touch once appropriate WAVE, SPEED, DELAY and KEY SYNC parameters are set. (Refer to page 26)

WAVE:

- This selects the waveform output by the LFO. Any of the six waveforms shown below can be selected.

![LFO Waveform Diagram]

SPEED:

The speed (frequency) of the LFO can be set from 0 to 99. 0 is the slowest LFO speed while 99 is the fastest.

DELAY:

This creates a delay between initial key closure and application of LFO modulation. A setting of 0 results in no delay—LFO modulation begins the instant a key is pressed—and a setting of 99 creates the longest delay.

PMD (Pitch Modulation Depth):

Varies, over a 0 to 99 range, the depth of LFO modulation applied to pitch. A 0 setting produces no pitch modulation, and a setting of 99 produces maximum modulation.

The PMD function is separate from the effect of the controllers, and can be used to apply vibrato effects that are entirely independent of the controller settings.

AMD (Amplitude Modulation Depth):

Varies, over a 0 to 99 range, the depth of LFO modulation applied to amplitude. A 0 setting produces no amplitude modulation, and a setting of 99 produces maximum modulation.

The AMD function is separate from the effect of the controllers, and can be used to apply tremolo effects that are entirely independent of the controller settings.

SYNC (Synchronize):

Pressing the SYNC key alternately turns the SYNC function ON and OFF. When SYNC is ON LFO modulation begins at the same point in the LFO waveform when a key is pressed. With SYNC OFF LFO modulation begins at a random point in the LFO waveform since the LFO is free running in this mode.
**MOD. SENSITIVITY (Modulation Sensitivity)**

<table>
<thead>
<tr>
<th>MOD. SENSITIVITY</th>
<th>PITCH</th>
<th>AMPLITUDE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>F</td>
</tr>
</tbody>
</table>

This adjusts the sensitivity (depth) of pitch and amplitude modulation. This parameter must be greater than 0 before any amplitude or pitch modulation can be applied.

Be sure to check this parameter before using the modulation wheel or other controllers.

![ALG 4 111111 OP2 P MOD SENS. = 1](image)

This display will change to:

![ALG 4 111111 OP2 A MOD SENS. = 0](image)

**PITCH:**

Sensitivity to pitch modulation is variable from 0 to 7. This value sets the modulation sensitivity for all operators. Applying pitch modulation results in vibrato type effects.

**AMPLITUDE:**

Sensitivity to amplitude modulation is variable from 0 to 3. Amplitude modulation sensitivity is set independently for each operator. Applying amplitude modulation to a modulator creates "wow" effects, while applied to a carrier it results in tremolo effects.

**OSCILLATOR**

<table>
<thead>
<tr>
<th>OSCILLATOR</th>
<th>MODE/SYNC</th>
<th>FREQUENCY (RATIO)</th>
<th>FREQUENCY (HZ)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MODE/SYNC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FREQUENCY</td>
<td>COREASE</td>
<td>FINE</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>18</td>
<td>19</td>
</tr>
</tbody>
</table>

These keys set the pitch data for each operator.

![ALG 4 111111 OP2 ALG 4 111111 OP2](image)

**MODE/SYNC:**

Pressing this key alternately switches to MODE and SYNC.

**MODE:**

Pressing the DATA ENTRY key sets the operators to the FREQUENCY (RATIO) mode, in which operator pitch is scaled to the keyboard as normal. Pressing the key sets the FIXED FREQ (HZ) mode in which a fixed frequency is produced no matter what key is pressed. The frequency is set using the [FREQUENCY Coarse] and [FREQUENCY Fine] functions in both modes.

**SYNC (Synchronize):**

When the SYNC function is ON, all oscillator begin operation from the same phase angle (0 degrees). With SYNC OFF the phase angle at which an operator begins oscillation is carried over smoothly from the preceding note. In the polyphonic mode, for example, maximum simultaneous output is 16 notes. If a 17th key is pressed the first note makes a smooth transition to the 17th note.

![Diagram](image)

16 notes at once
First note  ---  First note fades away
Second note
Sixteenth note
Seventeenth note

When on, oscillation will always begin from 0 phase

When off, a smooth transition occurs to the next note

Previous note  ---  Next note
FREQUENCY COARSE/FREQUENCY FINE:
If MODE is set to FREQUENCY (RATIO) the operators are set to a standard frequency of 1.00 (3 feet) when the PITCH COARSE key is pressed. The frequency can then be varied from by one half (0.5 times) to 32 times. FINE adjustment is possible over a range of from 1 to 1.99 times. If the frequency is increased by 2 times, for example, the pitch will increase by one octave.
If MODE is set to FIXED FREQ (HZ), COARSE adjustment is possible in four steps—1, 10, 100 and 1000. FINE adjustment is possible from 1 to 9.772 times.

**Frequency (ratio) display**

```
ALG 4 111111 OP2
F COARSE = 2.00
```

Adjust using the coarse control
Adjust using the fine control

**Fixed (Hz) display**

```
ALG 4 111111 OP2
F FINE = 977.2 Hz
```

Adjust the frequency using the coarse and fine controls

---

**DETUNE:**
The operator frequencies as determined by the FREQUENCY COARSE and FREQUENCY FINE controls can be detuned over a -7 to +7 range.

```
ALG 4 111111 OP2
OSC DETUNE = +6
```

Select the operator

---

* EG (Envelope Generator)

<table>
<thead>
<tr>
<th>RATE</th>
<th>LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>22</td>
</tr>
</tbody>
</table>

The envelope generator determines how the amplitude (volume) or timbre (tone) of a note will vary over time. Envelope modulation of a modulator results in time-based timbre variations, while envelope modulation of a carrier produces amplitude variations.

The parameters which determine the "shape" of the envelope are RATE 1 through RATE 4 and LEVEL 1 through LEVEL 4. The RATE parameters determine how long it takes the envelope to reach one LEVEL from another. The envelope, applied to each operator can be set individually, permitting an essentially infinite range of envelope combinations.

<table>
<thead>
<tr>
<th>PITCH</th>
<th>EG</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOD</td>
<td>OP 1</td>
</tr>
<tr>
<td>OP 2</td>
<td>EG</td>
</tr>
</tbody>
</table>

Tone will change

Volume will change

```
ALG 4 111111 OP2
EG RATE 1 = 69
```

This value will change

```
ALG 4 111111 OP2
EG LEVEL 1 = 99
```

---

**RATE:**
Pressing the [RATE] key successively selects RATE parameters 1 through 4. Each RATE parameter can be set from 0 to 99. A 0 setting produces the longest (slowest) RATE, and a 99 setting produces the fastest RATE.

**LEVEL:**
Pressing the [LEVEL] key successively selects LEVEL parameters 1 through 4. Each LEVEL parameter can be set from 0 to 99. 0 is no output, while 99 is maximum level.

- Normally LEVEL 4 will be set at "0". In this case LEVEL 1 should be greater than "50" to ensure proper EG operation.
- **KEYBOARD LEVEL SCALING**

  **BREAK POINT**

  The \[ \text{BREAK POINT} \] key—the reference key for the scaling function—can be specified anywhere between A-1 and C8.

  **CURVE**

  Permits variation of the scaling curve to the left and right of the \[ \text{BREAK POINT} \] key. Pressing the \[ \text{CURVE} \] key alternates between \[ \text{R KEY SCALING} \] and \[ \text{L KEY SCALING} \] displays. Four different curves are available, as shown in the figure.

  **DEPTH**

  Varies the depth of each curve over a 0 to 99 range. A 0 setting results in a flat (no variation) curve, and a 99 setting produces maximum scaling depth.

  - ALG 4 111111 OP2
  - BREAK POINT=A -1
  - R KEY SCALE=+EXP

  This value will change

  ALG 4 111111 OP2
  OUTPUT LEVEL =85
  This value will change

- **OPERATOR**

  **KEY VELOCITY SENSITIVITY**

  Permits adjusting of key touch response. That is, how the velocity with which the keys are played affects the sound. Since touch response can be applied to carriers or modulators, variations in timbre as well as level can be produced. Sensitivity can be set from 0 to 7. No touch response will be produced with a 0 setting, while a setting of 7 produces maximum response.

  - ALG 4 111111 OP2
  - OUTPUT LEVEL =85

  This value will change

  OUTPUT LEVEL:

  Controls overall EG level, like the EG DEPTH controls in conventional synthesizers. OUTPUT LEVEL can be set between 0 and 99.

  For example, if a specific operator is found to be unnecessary once a voice has been created, its output level can be set to 0.

  - **OPERATOR ON-OFF** function operates only in the EDIT mode and OPERATOR ON-OFF data is not stored in memory, the OUTPUT LEVEL of all unnecessary operators should be set to 0.

  KEYBOARD LEVEL SCALING depth is also set to “0”.

  Setting a large DEPTH value and either the +LIN or +EXP curve will result in output from the operator even if the operator’s output level is set to “0”.

  In order to maintain the same total output level regardless of which algorithm is selected, the OUTPUT LEVEL of each carrier operator is initially set to 1/2 or 1/6 depending on the configuration of the algorithm. For example, the OUTPUT LEVEL of operators 1 through 3 of algorithm 1 are set to 1/2, while operators 1 through 6 of algorithm 32 are set to 1/6.

- **KEYBOARD RATE SCALING**

  The EG for each operator can be set for a long bass decay and short treble decay—as in an acoustic piano. RATE can be set from 0 to 7.
**PITCH EG**

PITCH EG permits variation of pitch by ±4 octaves either side of standard pitch (50). The RATE and LEVEL parameters of the PITCH EG can be set just as in the other DX7 envelope generators.

![PITCH EG diagram](image)

**RATE**:  
Pressing the RATE key successively selects RATE parameters 1 through 4. Each RATE parameter can be set from 0 to 99. A 0 setting produces the longest (slowest) RATE, and a 99 setting produces the fastest RATE.

**LEVEL**:  
Pressing the LEVEL key successively selects LEVEL parameters 1 through 4. Each LEVEL parameter can be set from 0 to 99.

With a setting of 50 as standard, a setting of 99 permits +4 octaves pitch variation while a setting of 0 permits -4 octaves pitch variation.

Set LEVEL 1 through LEVEL 4 to 50 to defeat the PITCH EG function.

---

**KEY TRANSPOSE**

Transposes pitch over a ±2 octave range in semitone steps with C3 as standard. Press the [KEY TRANSPOSE] key and then the keyboard key corresponding to the desired amount of transposition according to the illustration on page 18. To transpose up one octave, for example, press the [KEY TRANSPOSE] key and then press C4 on the keyboard.

---

**VOICE NAME**

Name for original voices can be specified using up to ten characters. Characters are chosen from those printed in small type to the right of the MODE SELECT and VOICE/PARAMETER SELECT keys. The available characters are 1 through 0, A through Z, -, a period and a space. When the [VOICE NAME] key is pressed, a cursor appears over the first character of the current voice name. Input the new name by pressing the buttons with the appropriate characters printed to the right of the button while holding the CHARACTER button.

![Character input](image)

While pressing the CHARACTER key, press either NO or YES key.

---

Keyboard layout:

```
ALG 4 111111
NAME= ABCDEFGHIJ
```
STORE/SAVE/LOAD . . . Storing the Voice Data

With the DX7, voices you create can be stored in the internal memory or an external memory cartridge. You can also save all the internal voices in a cartridge. In addition, you can load all the voices in a cartridge into the internal memory.

1. Memory Protect . . . . Protecting Your Work
The DX7's internal MEMORY PROTECTION function will prevent any accidental erasure of the INTERNAL or CARTRIDGE voice data. In addition, the voice cartridge itself has a protection switch so that the data is doubly protected. You will first have to turn the DX7 MEMORY PROTECT OFF in order to STORE/SAVE/LOAD the voice data. Also, do not forget to turn the MEMORY PROTECT function back ON after the STORE/SAVE/LOAD operation.

2. Storing Newly Created Voices
Newly created original sounds can be erased by selecting other preset voices or disconnecting the power supply. Please store any voice data that you wish to keep in the internal memory or in a voice cartridge.

- The Voice Cartridge Protection Switch
This switch is used for protecting the voice data contained in the cartridge, even if the CARTRIDGE PROTECTION function of the DX7 is turned off. The only time this protection switch should be turned off is when you wish to store or save voices in the cartridge. In all other cases this PROTECTION switch should be turned on.

Note: If you save contents of the DX7's internal memory or newly-created sounds in a cartridge that is already full, the previous cartridge contents of that particular preset number will be erased from the memory and the new voice data will replace it. Be sure to save new voice data in preset numbers that are empty or that are no longer needed.

3. Saving Internal Voice Data
You can save the entire data contents of the internal memory in a separately available blank cartridge. This will open up the internal memory for original voices and will allow you to increase the number of voices available. If you should decide that all of the voice data contained in the cartridge is unwanted, the entire contents of the internal memory can be transferred to the cartridge. You'll then have an entirely new voice cartridge. For this procedure, turn the protection switch of the cartridge off.

MEMORY PROTECT
INTERNAL | CARTRIDGE

Press the key

FUNCTION
Set to Function mode, and press the

SAVE MEMORY
ALL OF MEMORY?
Asking if you want to SAVE all data (if MEMORY PROTECT is ON at this time, the "MEMORY PROTECTED" display appears and SAVE will not function).

Press "YES" key and

SAVE MEMORY ARE YOU SURE?

this display appears.

The internal microcomputer asks "SAVE MEMORY, ARE YOU SURE?" to prevent accidental erasure of important voice data in the RAM cartridge. Check to see that the RAM cartridge inserted in the instrument does not contain important voice data, then press [YES] once more. The "UNDER WRITING" display appears and the save operation begins (if the PROTECT switch on the RAM cartridge is ON at this time, a "WRITE ERROR" message will be displayed and the save operation will be terminated).

When the SAVE operation is finished, the "COMPLETED" message will appear, MEMORY PROTECT should now be turned ON.

Press "YES" key and

SAVE MEMORY UNDER WRITING!

this display appears indicating that SAVE is in progress.

SAVE MEMORY COMPLETED

This display appears when SAVE is finished.

Note: If a "FORMAT CONFLICT", "ID CONFLICT", or "READ PROTECT" message is displayed during a STORE or SAVE operation using a RAM cartridge, it means the cartridge must be reformatted. For details, please refer to the Cartridge Formatting section on page 7.

4. Loading Cartridge Data
You can load all the contents of a cartridge into the internal memory of the DX7. First, insert the cartridge that contains the voice data that you wish to load.

Turn the protection switch of the internal memory off.

Pressing the key

MEMORY PROTECT INTERNAL
OFF

Set to Function modes, and press the
FUNCTION

Pressing the key

LOAD MEMORY ALL OF MEMORY?

this display appears.

Asking if you want to LOAD all data (if MEMORY PROTECT is ON at this time, the "MEMORY PROTECTED" display appears and LOAD will not function).

Press "YES" key and

LOAD MEMORY ARE YOU SURE?

this display appears.

The microcomputer asks "LOAD MEMORY, ARE YOU SURE?" to prevent accidental erasure of important voice data in the instrument's internal memory. If it's OK to LOAD, press [YES] a second time and wait for the "COMPLETED" display. MEMORY PROTECT should then be turned ON.

Press "YES" key and

LOAD MEMORY COMPLETED

this display appears indicating that LOAD has finished.

* Let's keep records of voices for future reference.
At the end of this manual you will find a voice data list. Use this list to record the values of every parameter used. Make copies of this list and use them to record the parameters of any new voices you create yourself. This will be useful to restore voices that have been erased, and will serve as an excellent guide for creating new voices.
MIDI (Musical Instrument Digital Interface)
The MIDI terminal is for external control of electronic musical instruments. Any instrument equipped with a MIDI terminal can be connected using the MIDI cable and used for transmitting data to or from the instrument. MIDI can be used for the following types of data transmission and control:

- **Real-Time Control**
  This is used for controlling more than one electronic musical instrument at once using a sequencer to form a musical ensemble. It can also be used to control a second electronic musical instrument via the keyboard of the main instrument.
  1. Key pitch ON/OFF, etc.
  2. Pitch bend, modulation wheel, sustain switch, etc.
  3. Voice number.

- **Connecting the MIDI Cable**

  ![Diagram of MIDI connections](image)

  As can be seen in figure 1, the data output from the sequencer is transmitted via a single MIDI cable and input to synthesizer A, where it is sent to the next instrument to be controlled via the THRU terminal. In this case, the sequencer is outputting multi-channel data. Therefore, the desired channel number on the receiving side must be selected accordingly. Both the sending side and the receiving channel numbers will have to be specified with the system shown in figure 2.

- **Selecting the Receiving Channel**
  While the unit is in the FUNCTION mode, pressing the button will produce the display shown in the figure. The selection of the MIDI receiving channel number can be carried out using the DATA ENTRY controls. Select system information YES/NO for both the receiver and the transmitter. Pressing the button again will produce the display "SYS INFO UNAVAIL". Press the button to change this to "AVAIL", and the instrument will enter the system information transmit/receive mode.

- **System Information**
  Certain types of data can be transferred between certain groups of instruments of the same manufacturer. The following types of data can be exchanged using the YAMAHA DX7 and/or DX9.
  1. Data for one voice or for all voices.
  2. The data for a single parameter within a certain voice.
  3. The data for a single parameter within the FUNCTIONS.
USING MIDI.

- **Real-Time Control**
  1. **Sequencer Controlled Automatic Performance**
     With the system shown in figure 1, let us use the DX7 as synthesizer A, and the DX9 as synthesizer B. Specify the DX7 receiving channel as 1, and the DX9 receiving channel as 2. This will enable automatic performance under sequencer control.

  2. **Remote Control Performance**
     Hooking up the remote keyboard KX1 to a DX7 as shown in the figure, will enable you to remotely control the DX7 from the KX1 keyboard. In addition, by connecting a DX7 and a DX9, the DX9 can be controlled from the DX7 keyboard. The DX7's send channel number should also be specified as 1.

  ![Diagram](image)

- **Transmit System Information**
  1. **Transmit Single Voice Data**
     When the display appears as shown in the figure, press either [INTERNAL] or [CARTRIDGE]. Then press the voice number key for the voice you wish to send. The corresponding voice data will be output from MIDI OUT.

    ![Diagram](image)

  2. **Transmit Voice Data for All 32 Voices**
     Press the [ENTRY] key when the display appears as shown in the upper area of the figure. The display will change to that shown in lower area of the figure. Pressing the [ENTRY] key will cause the voice data for all 32 voices to be output from MIDI OUT.

    ![Diagram](image)

  3. **Transmit Voice or FUNCTION Parameters**
     When the display reads "SYS INFO AVAIL", press either [EDIT] or [FUNCTION]. Pressing the key corresponding to the parameter that you wish to transmit will output the data for that parameter from MIDI OUT.

     Note: For all of the above, the transmit channel number of the DX7 is 1.

- **Receiving System Information**
  1. **Receiving Single Voice Data**
     First, set the INTERNAL MEMORY PROTECT to OFF. When single voice data is received, the panel displays the message "INTERNAL VOICE" and the received voice name, the first character of which will flash.

  2. **Receiving the Voice Data for All 32 Voices**
     Switching the PROTECT off for the INTERNAL memory, will cause the voice data for all 32 voices to be memorized into the internal memory.

  3. **Receiving Voice or FUNCTION Parameters**
     When receiving this information, the unit will vary the data for that particular parameter.
EDIT OPERATION

Using the EDIT mode of the DX7, you can modify the pre-programmed voices or even create your own original voices.

1. Modifying a pre-programmed voice

1) First, select the pre-programmed voice you wish to modify. Select either the internal or cartridge memory, and then the preset number 1 to 32.
2) Enter the EDIT mode by pressing the EDIT key.
3) Select the parameters you wish to modify and change their values.

A small dot will appear next to the display voice number when there is a data modification.

Voice number

```
18
```

ALG 4 1111110P2 OUTPUT LEVEL = 85

The dot will appear when any data has been modified.

When you wish to hear what the original voice sounded like, press the EDIT/COMPARE key once again. The voice number will flash and the sound of the original voice will be reproduced (during this procedure, you can not modify data). Pressing the EDIT/COMPARE key will cause the DX7 to revert to the original voice. When you wish to continue your efforts in voice creation, press the EDIT/COMPARE key again. In this manner, you can compare your sound with that of the original voice in order to see how your voice is progressing.

```
EDIT/COMPARE

You wish to hear the original voice, press the key again.

18

ALG 4 1111110P2 OUTPUT LEVEL = 99
```

The voice number will flash.

```
EDIT/COMPARE

You wish to continue editing

press the key again

18

ALG 4 1111110P2 OUTPUT LEVEL = 85
```

4) Store the edited voice in the internal memory. See the STORE/SAVE/LOAD section on page 19, and carry out the store procedures using it as a reference.

2. Creating an Original Voice.

To create an entirely new voice, you can use one of the pre-programmed voices as the "raw material" for modification. However, the feedback and LFO parameters can complicate the procedure and make things quite difficult. Therefore, it is advisable to use the "basic" voice parameters when beginning voice creation from scratch.

We'll create a CLARINET sound to exemplify this procedure.

1) Press the FUNCTION key to set the DX7 to the FUNCTION mode.
Press VOICE INIT key. Next press the YES key. The display will then show "ARE YOU SURE?". Pressing the YES key once again will cause the voice data to be set to the basic settings, and the DX7 will exit the FUNCTION mode and enter the EDIT mode. It is now ready to create new sounds.

2) Selecting the Algorithm

Choose one algorithm out of the 32 available. For example, we'll select Algorithm 3. Press the ALGORITHM key. Set the DATA ENTRY section to 3.

Set the respective values at the DATA ENTRY section.

```
ALG 3 111111 ALGORITHM SELECT
```

```
Algorithm 3

Modulator

Carrier

We will use only OPERATORS 1 and 2. The other OPERATORS will not be used in this example.
```

3) Disable all OPERATORS that are not immediately necessary.

The carrier parameters should be defined first. The carriers for algorithm 3 are OPERATORS 1 and 4. As we will only be using OPERATORS 1 and 2 for this example, OPERATOR 1 will act as the sole carrier. First, set the output level of OPERATOR 1 to any value. Press the OPERATOR OUTPUT LEVEL key. Set OPERATOR 1 to 1 to 99. Set OPERATOR 2 to 70. The unused OPERATORS 3 through 6 should be set to 0. Pressing the OPERATOR SELECT key, select the OPERATORS. Disable all OPERATORS not immediately necessary.
Press the [OPERATOR ON-OFF] keys 2 through 6. OPERATORS 2 through 6 are now disabled.

4) Determining the CARRIER FREQUENCY.
When attempting to create the sound of a clarinet, the CARRIER versus MODULATOR frequency ratio should be set to 1:2. Press the [FREQUENCY FINE] and [FREQUENCY COARSE] keys, and set the pitch to 1.00.

5) Determining the amount of DETUNE.
In our attempt to create the sound of a clarinet, only OPERATOR 1 will be functioning as a carrier and therefore DETUNE should be set to 0. Press the [DETUNE] key. Set the value of “OSC DETUNE” to 0.

6) Setting the ENVELOPE GENERATOR.
First, we'll set the ENVELOPE GENERATOR of the carrier. For example, we'll set the parameters to the following values:
Pressing each key in succession will cause the values to advance from 1 to 4.

```
LEVEL 1
RATE 1
LEVEL 2
RATE 2
LEVEL 3
RATE 3
LEVEL 4
RATE 4
```

With the DX7 set in this mode, play on the keyboard and listen to the sound produced. The sound produced will be a pure sine wave from the carrier only. Now set the envelope of the carrier for an appropriate sound. Next, we'll set up the modulator data.

7) Using the modulator.
In this attempt to create the sound of a clarinet, OPERATOR 2 will be functioning as the sole modulator. Press the [OPERATOR 2] key. OPERATOR 2 is now engaged.

8) Setting the MODULATOR FREQUENCY
Set the MODULATION FREQUENCY to 2.00 using the [FREQUENCY COARSE] and [FREQUENCY FINE] keys. Set the DETUNE for OPERATOR 2 to 0. Set the “OSC DETUNE” to 0 using the [DETUNE] key.

9) Setting the MODULATOR ENVELOPE GENERATOR.
To create the sound of a clarinet, the parameters of the modulator's envelope generator should be identical to the parameters of the carrier's envelope generator. This process can be carried out in a few seconds by using the COPY function. Using the COPY function, copy the OPERATOR 1 envelope generator data to OPERATOR 2. Set the display to “OP 1” by pressing the [OPERATOR SELECT] key.
While pressing the [STORE] key, press this key. The display will show the number of the operator that was selected with the [OPERATOR SELECT] key. This signifies that the envelope generator parameters, keyboard level scaling and keyboard rate scaling parameters of OPERATOR 1 are being copied to OPERATOR 2.

```
STORE
```

```
EG COPY from OP1 to OP?
```

While pressing the

```
2
```

This signifies that the EG data of OP1 are being copied to OP2.

10) Adjusting Tone
At this point, listen to the sound. The sound produced will probably be a little harsh. In this case, lower the OUTPUT LEVEL of OPERATOR 2 by pressing on the [OPERATOR SELECT] key. While pressing on the [OPERATOR OUTPUT LEVEL] key, lower the value of the output level using the DATA ENTRY slide control. With an output level setting of 61, the sound produced will approach that of an actual clarinet. Let's set the output level of OPERATOR 2 to 61. Later on, with more careful control of the envelope generators of OPERATORS 1 and 2, you can tailor the sound more precisely for your requirements.

11) Adding Modulation
Let's add a vibrato effect to the clarinet sound produced. Set the modulation controls so that the MODULATION wheel can be used to add a subtle touch of vibrato.

1. Set the LFO Waveform.
Pressing the [LFO WAVE] key, set the wave form to “TRIANGLE”.

</24>
2. Set the LFO Speed.
   Pressing the [SPEED] key, set the LFO's speed to "28". This will produce a moderately slow vibrato.

3. Set the LFO DELAY.
   Pressing the [DELAY] key, set the LFO DELAY to "36". The vibrato effect will begin a few seconds after a key is played.

4. The modulation controls should be set so that the vibrato effect will be controlled solely by the Modulation wheel. Pressing the [PMD] key, set the "LFO PM DEPTH" to "0". Pressing the [AMD] key, set the "LFO AM DEPTH" to "0". The settings for both OPERATORs 1 and 2 should be "0".

5. Set the MODULATION SENSITIVITY.
   Pressing the [PITCH] key, set the "P MOD SENS" to "1". This means that the pitch will be modulated slightly by the LFO.

6. Control the Vibrato Effect with the Modulation Wheel.
   Pressing the [FUNCTION] keys, set the DX7 to the FUNCTION mode.

7. Set the Modulation Wheel RANGE.
   Pressing the [MODULATION WHEEL RANGE] key, set the RANGE to "33". This produces a slight amount of vibrato.

8. Turn PITCH ON, AMPLITUDE OFF.
   Pressing the [PITCH] key, set the PITCH to "ON". This signifies that the modulation wheel controls the LFO modulation of the pitch.

9. Set the EG (Envelope Generator) BIAS to OFF.
   Pressing the [EG BIAS] key, set the EG BIAS to "OFF" 

Now, by manipulating the MODULATION WHEEL, you should be able to control the amount of vibrato on the clarinet while playing.

12) Naming the New Voice
   Nearly any name can be given to a VOICE, as long as it is within ten characters in length. As the sound produced here is close to that of an actual clarinet, let us call this VOICE: "CLARINET-A". Pressing the [EDIT/COMPARE] key, set the DX7 back to the EDIT mode. While pressing the [NAME] key, press the character keys in succession as shown in the figure. The cursor will move every time you write in a new character.

3) Saving Your Original Voice In Memory.
   Refer to the STORE/SAVE/LOAD section on page 19.
### SPECIFICATIONS

**Keyboard**
- 61 keys, C_1 ~ C_8 (Initial & After touch sensitive)
- FM Tone Generator: 6 operators, 32 algorithms
- POLY mode: 16 notes
- MONO mode: 1 note

**Simultaneous Output Notes**
- Internal RAM Memory: 32 Bank (32 Memory)
- External RAM Memory: 32 Bank x 2 (64 Memory)
- STORE, MEMORY PROTECT (INTERNAL, CARTRIDGE), OPERATOR SELECT, EDIT/COMPARE, PLAY-MEMORY SELECT (INTERNAL, CARTRIDGE), FUNCTION VOLUME, DATA ENTRY (lever, switch: YES ON)/NO (OFF), PITCH WHEEL, MODULATION WHEEL, OPERATOR ON-OFF, EG COPY

**Controls**

**Voice Parameters**
- ALGORITHM
- FEED BACK
- LFO WAVE
- SPEED
- DELAY
- PITCH MODULATION DEPTH
- AMPLITUDE MODULATION DEPTH
- SYNC
- PITCH MODULATION SENSITIVITY
- AMPLITUDE MODULATION SENSITIVITY
- OSCILLATOR MODE
- RATIO/FIXED (HZ)
- SYNC
- FREQUENCY COARSE
- FREQUENCY FINE
- DETUNE

**EG Rate (1 ~ 4)**
- LEVEL (1 ~ 4)
- KEYBOARD LEVEL SCALING
- BREAK POINT
- CURVE (L/R)
- DEPTH (L/R)
- KEYBOARD RATE SCALING
- OPERATOR OUTPUT LEVEL
- KEY VELOCITY SENSITIVITY
- PITCH EG RATE (1 ~ 4)
- LEVEL (1 ~ 4)
- KEY TRANSPOSE
- VOICE NAME

**Function Parameters**
- MASTER TUNE: ±75 cents
- POLY/MONO
- PITCH BEND RANGE: 0 ~ 12
- STEP: 0 ~ 12
- PORTAMENTO MODE
- POLY: RETAIN/FOLLOW
- MONO: FULL TIME/FINGERED
- GLISSANDO: ON/OFF
- TIME: 0 ~ 99
- MODULATION WHEEL
- RANGE: 0 ~ 99
- PITCH: ON/OFF
- AMPLITUDE: ON/OFF
- EG BIAS: ON/OFF
- FOOT CONTROL
- RANGE: 0 ~ 99
- PITCH: ON/OFF
- AMPLITUDE: ON/OFF
- EG BIAS: ON/OFF
- BREATH CONTROL
- RANGE: 0 ~ 99
- PITCH: ON/OFF
- AMPLITUDE: ON/OFF
- EG BIAS: ON/OFF
- AFTER TOUCH
- RANGE: 0 ~ 99
- PITCH: ON/OFF
- AMPLITUDE: ON/OFF
- EG BIAS: ON/OFF
- EDIT RECALL
- VOICE INITIALIZE
- CARTRIDGE FORMATTING
- BATTERY CHECK
- CARTRIDGE SAVE/LOAD
- MIDI CHANNEL: 1 ~ 16
- SYSTEM INFORMATION: AVAILABLE/UNAVAILABLE
- MIDI TRANSMIT: OUTPUT (600 Ω)
- UNBALANCED
- PHONES (6 ~ 150 Ω)
- Control Terminal
- FOOT SWITCH (SUSTAIN, PORTAMENTO)
- FOOT CONTROL (VOLUME, MODULATION)
- BREATH CONTROL
- MIDI (IN, OUT, THRU)
- LCD DISPLAY
- CARTRIDGE INTERFACE
- 10.18 x 10.24 x 32.90 cm
(40.1 x 4.0 x 13.0) /
14.2 kg (31.2 lbs)
- Power Consumption: 40 W
- Accessories
- ROM Cartridge x 2
(64 values x 2),
Music Stand

*Specifications and design are subject to change without notice for improvement.*
This table shows all the data of the first sound (BRASS 1) in the internal memory.
The upper part of each select button is the Voice parameter and the lower part is the Function parameter. The Voice parameter is memorized as the table indicates. The Function parameter can be changed as you desire.

### YAMAHA DX7 VOICE DATA LIST

<table>
<thead>
<tr>
<th>DATE/PRESET No.:</th>
<th>/</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOICE NAME:</td>
<td>BRASS 1</td>
</tr>
<tr>
<td>PROGRAMMER:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POLY/MONO</th>
<th>PITCH BEND</th>
<th>PORTAMENTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLY</td>
<td>7</td>
<td>FOLLOW OFF</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>CP</th>
<th>R</th>
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<th>3</th>
<th>2</th>
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<tr>
<td></td>
<td>1</td>
<td>00</td>
<td>0</td>
<td>81</td>
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<td></td>
<td>2</td>
<td>00</td>
<td>1</td>
<td>77</td>
<td>87</td>
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<td>00</td>
<td>-2</td>
<td>77</td>
<td>87</td>
<td>0</td>
<td>3</td>
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<tr>
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<td>4</td>
<td>00</td>
<td>+1</td>
<td>77</td>
<td>87</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>00</td>
<td>0</td>
<td>87</td>
<td>87</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>00</td>
<td>-1</td>
<td>87</td>
<td>87</td>
<td>0</td>
<td>3</td>
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</table>

<table>
<thead>
<tr>
<th>MODE</th>
<th>FREQ.</th>
<th>FREQ.</th>
<th>DETUNE</th>
<th>OSCILLATOR</th>
<th>MODULATION WHEEL</th>
<th>FOOT CONTROL</th>
<th>BREATH CONTROL</th>
<th>AFTER TOUCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>sync</td>
<td>coarse</td>
<td>fine</td>
<td>eg</td>
<td>eg</td>
<td>range</td>
<td>range</td>
<td>range</td>
<td>range</td>
</tr>
</tbody>
</table>

* MODE: R(RATIO), H(HZ)
YAMAHA DX7 VOICE DATA LIST

DATE/PRESET No.: 

VOICE NAME: 

PROGRAMMER: 

<table>
<thead>
<tr>
<th>POLY/MONO</th>
<th>PITCH BEND</th>
<th>PORTAMENTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>RANGE</td>
<td>STEP</td>
<td>MODE</td>
</tr>
<tr>
<td>GLISSANDO</td>
<td>TIME</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALGORITHM</th>
<th>FEEDBACK</th>
<th>WAVE</th>
<th>SPEED</th>
<th>DELAY</th>
<th>PMD</th>
<th>AMD</th>
<th>SYNC</th>
<th>PITCH</th>
<th>AMPLITUDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODE/SYNC</th>
<th>FREQ. COARSE</th>
<th>FREQ. FINE</th>
<th>DETUNE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>KEY TRANSPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSCILLATOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>MODULATION WHEEL</th>
<th>FOOT CONTROL</th>
<th>BREATH CONTROL</th>
<th>AFTER TOUCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>RANGE</td>
<td>PITCH</td>
<td>AMPLITUDE</td>
<td>EG BIAS</td>
</tr>
</tbody>
</table>

| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |
1. Transmission Data

1-1. Channel Information

<table>
<thead>
<tr>
<th>C</th>
<th>Parameter</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Modulation wheel</td>
<td>0~127</td>
</tr>
<tr>
<td>2</td>
<td>Breath controller</td>
<td>0~127</td>
</tr>
<tr>
<td>4</td>
<td>Foot controller</td>
<td>0~127</td>
</tr>
<tr>
<td>6</td>
<td>Data entry knob</td>
<td>0~127</td>
</tr>
<tr>
<td>64</td>
<td>Sustain foot switch</td>
<td>0:OFF, 127:ON</td>
</tr>
<tr>
<td>65</td>
<td>Portamento foot switch</td>
<td>0:OFF, 127:ON</td>
</tr>
<tr>
<td>96</td>
<td>Data entry +1</td>
<td>127:ON only</td>
</tr>
<tr>
<td>97</td>
<td>Data entry -1</td>
<td>127:ON only</td>
</tr>
</tbody>
</table>

1001nnnn  Key ON & Channel number (n=0; ch1)
0kkkkkkk  Key number (k=36; C₁ ~ k=96; C₆)
0vvvvv   Key velocity (v=0; Key OFF, v=1; ppp ~ v=127; fff)

1011nnnn  Control change & Channel number (n=0; ch1)
0ccccccc  Control number
0vvvvvv   Control value

1100nnnn  Program change & Channel number (n=0; ch1) (transmitted when it is unavailable)
0ppppppp  Program number
(p=0:INT1 ~ p=31:INT32, p=32:CR1 ~ p=63:CR32)
1101nnnn  After touch & Channel number (n=0; ch1)
0vvvvv   Touch value (0~127)

1110nnnn  Pitch bender & Channel number (n=0; ch1)
0vvvvvvv  Pitch bender value LS byte
0vvvvvvv  Pitch bender value MS byte (0~64~127)

<table>
<thead>
<tr>
<th>MS byte</th>
<th>LS byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ~ 64</td>
<td>0</td>
</tr>
<tr>
<td>65 ~ 127</td>
<td>2 (MS byte ~ 64)</td>
</tr>
</tbody>
</table>

1-2. Bulk data of 1 voice

11110000  Status byte
0iiiiii   Identification number (i=67; YAMAHA)
0ssnnnn  Sub status (s=0) & Channel number (n=0; ch1)
0ffffff  Format number (f=0; 1 voice)
0bbbbbb  Byte count MS byte (b=155; 1 voice)
0bbbbbb  Byte count LS byte
0ddddd   Data 1st byte
dddddd   Data 155th byte
0eeeeee  Check Sum (add 155th byte and make the 2's complement)
11110111  EOX

1-2-3. Bulk data of 32 voices

11110000  Status byte
0iiiiii   Identification number (i=67; YAMAHA)
0ssnnnn  Sub status (s=0) & Channel number (n=0; ch1)
0ffffff  Format number (f=9; 32 voices)
0bbbbbb  Byte count MS byte (b=4096; 32 voices)
0bbbbbb  Byte count LS byte
0ddddd   Data 1st byte
dddddd   Data 4096th byte
0eeeeee  Check Sum (add 4096th byte and make the 2's complement)
11110111  EOX

1-2-4. Parameter change

11110000  Status byte
0iiiiii   Identification number (i=67; YAMAHA)
0ssnnnn  Sub status (s=1) & Channel number (n=0; ch1)
0gggggp  Parameter group number (g=0; DX common Voice parameter, g=2; DX7 Function parameter)
0pppppp  Parameter number
0ddddd   Data
11110111  EOX

1-2. System exclusive information

1-2-1. MIDI active sensing

11111110  Status byte

This message usually requests transmission every 80msec (except for the period of transmitting/receiving the bulk dump).
### g=0 : DX 共通 Voice parameter

<table>
<thead>
<tr>
<th>P</th>
<th>Parameter</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>OP6 EG RATE 1</td>
<td>0 ～ 99</td>
</tr>
<tr>
<td>1</td>
<td>&quot; RATE 2</td>
<td>&quot;</td>
</tr>
<tr>
<td>2</td>
<td>&quot; RATE 3</td>
<td>&quot;</td>
</tr>
<tr>
<td>3</td>
<td>&quot; RATE 4</td>
<td>&quot;</td>
</tr>
<tr>
<td>4</td>
<td>&quot; LEVEL 1</td>
<td>&quot;</td>
</tr>
<tr>
<td>5</td>
<td>&quot; LEVEL 2</td>
<td>&quot;</td>
</tr>
<tr>
<td>6</td>
<td>&quot; LEVEL 3</td>
<td>&quot;</td>
</tr>
<tr>
<td>7</td>
<td>&quot; LEVEL 4</td>
<td>&quot;</td>
</tr>
<tr>
<td>8</td>
<td>OP6 KEY BOARD LEVEL SCALE</td>
<td>&quot;</td>
</tr>
<tr>
<td>9</td>
<td>&quot; BREAK POINT</td>
<td>&quot;</td>
</tr>
<tr>
<td>10</td>
<td>&quot; LEFT DEPTH</td>
<td>&quot;</td>
</tr>
<tr>
<td>11</td>
<td>&quot; RIGHT DEPTH</td>
<td>&quot;</td>
</tr>
<tr>
<td>12</td>
<td>&quot; LEFT CURVE 0 ～ 3</td>
<td>&quot;</td>
</tr>
<tr>
<td>13</td>
<td>&quot; RIGHT CURVE</td>
<td>&quot;</td>
</tr>
<tr>
<td>14</td>
<td>OP6 KEY BOARD RATE SCALLING</td>
<td>0 ～ 7</td>
</tr>
<tr>
<td>15</td>
<td>OP6 MOD SENSITIVITY AMPLITUDE</td>
<td>0 ～ 3</td>
</tr>
<tr>
<td>16</td>
<td>OP6 OPERATOR KEY VELOCITY</td>
<td>0 ～ 7</td>
</tr>
<tr>
<td>17</td>
<td>OP6 OPERATOR OUTPUT LEVEL</td>
<td>0 ～ 99</td>
</tr>
<tr>
<td>18</td>
<td>OP6 OSCILLATOR MODE</td>
<td>0 ～ 1</td>
</tr>
<tr>
<td>19</td>
<td>&quot; FINE</td>
<td>0 ～ 99</td>
</tr>
<tr>
<td>20</td>
<td>&quot; DETUNE</td>
<td>0 ～ 14</td>
</tr>
</tbody>
</table>

### g=2 : DX7 Function parameter

<table>
<thead>
<tr>
<th>P</th>
<th>Parameter</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>141</td>
<td>LFO SYNC</td>
<td>0 ～ 1</td>
</tr>
<tr>
<td>142</td>
<td>&quot; WAVE</td>
<td>0 ～ 4</td>
</tr>
<tr>
<td>143</td>
<td>MOD SENSITIVITY PITCH</td>
<td>0 ～ 7</td>
</tr>
<tr>
<td>144</td>
<td>TRANSPOSE</td>
<td>0 ～ 48</td>
</tr>
<tr>
<td>145</td>
<td>VOICE NAME 1</td>
<td>ASCII</td>
</tr>
<tr>
<td>146</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>147</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>148</td>
<td>&quot;</td>
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<td>153</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>154</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>155</td>
<td>OPERATOR ON/OFF</td>
<td>0=OFF, 1=ON</td>
</tr>
<tr>
<td>156</td>
<td>&quot;</td>
<td>0 OP1 OP2 OP3 OP4 OP5 OP6</td>
</tr>
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</table>

### OP5 ~ OP1

<table>
<thead>
<tr>
<th>P</th>
<th>Parameter</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>126</td>
<td>PITCH EG RATE 1</td>
<td>0 ～ 99</td>
</tr>
<tr>
<td>127</td>
<td>&quot; RATE 2</td>
<td>&quot;</td>
</tr>
<tr>
<td>128</td>
<td>&quot; RATE 3</td>
<td>&quot;</td>
</tr>
<tr>
<td>129</td>
<td>&quot; RATE 4</td>
<td>&quot;</td>
</tr>
<tr>
<td>130</td>
<td>&quot; LEVEL 1</td>
<td>&quot;</td>
</tr>
<tr>
<td>131</td>
<td>&quot; LEVEL 2</td>
<td>&quot;</td>
</tr>
<tr>
<td>132</td>
<td>&quot; LEVEL 3</td>
<td>&quot;</td>
</tr>
<tr>
<td>133</td>
<td>&quot; LEVEL 4</td>
<td>&quot;</td>
</tr>
<tr>
<td>134</td>
<td>ALGORITHM SELECT</td>
<td>0 ～ 31</td>
</tr>
<tr>
<td>135</td>
<td>FEED BACK</td>
<td>0 ～ 7</td>
</tr>
<tr>
<td>136</td>
<td>OSCILLATOR SYNC</td>
<td>0 ～ 1</td>
</tr>
<tr>
<td>137</td>
<td>LFO SPEED</td>
<td>0 ～ 99</td>
</tr>
<tr>
<td>138</td>
<td>&quot; DELAY</td>
<td>&quot;</td>
</tr>
<tr>
<td>139</td>
<td>&quot; PMD</td>
<td>&quot;</td>
</tr>
<tr>
<td>140</td>
<td>&quot; AMD</td>
<td>&quot;</td>
</tr>
</tbody>
</table>
2. Reception Data

2-1. Channel information
This message can be received when the channel number of reception data accords with the channel number of the DX7.

1000nnnn Key OFF & Channel number
  \((n=0 \; \sim \; n=15 \; \sim \; ch16)\)
0kkkkkkk Key number \((k=0, 1, 2, 3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, f)\)
0vvvvvvv Key velocity \((v: \text{ignored})\)

1001nnnn Key ON & Channel number
  \((n=0 \; \sim \; n=15 \; \sim \; ch16)\)
0kkkkkkk Key number \((k=0, 1, 2, 3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, f)\)
0vvvvvvv Key velocity
  \((v=0 \; \text{Key OFF}, v=1 \; \text{ppp} \sim v=127 \; \text{fff})\)

1011nnnn Control change & channel number
  \((n=0 \; \sim \; n=15 \; \sim \; ch16)\)
0ccccccc Control number
0vvvvvvv Control value

<table>
<thead>
<tr>
<th>c</th>
<th>Parameter</th>
<th>v</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Modulation wheel</td>
<td>0 ~ 127</td>
</tr>
<tr>
<td>2</td>
<td>Breath controller</td>
<td>0 ~ 127</td>
</tr>
<tr>
<td>4</td>
<td>Foot controller</td>
<td>0 ~ 127</td>
</tr>
<tr>
<td>5</td>
<td>Portamento time</td>
<td>0 ~ 127</td>
</tr>
<tr>
<td>6</td>
<td>Data entry knob (MASTER TUNE only)</td>
<td>0 ~ 127</td>
</tr>
<tr>
<td>7</td>
<td>Volume (LS 4 bit are ignored.)</td>
<td>0 ~ 127</td>
</tr>
<tr>
<td>64</td>
<td>Sustain foot switch</td>
<td>0: OFF, 127: ON</td>
</tr>
<tr>
<td>65</td>
<td>Portamento foot switch</td>
<td>0: OFF, 127: ON</td>
</tr>
<tr>
<td>96</td>
<td>Data entry +1</td>
<td>0: OFF, 127: ON only</td>
</tr>
<tr>
<td>97</td>
<td>Data entry -1</td>
<td>0: OFF, 127: ON</td>
</tr>
<tr>
<td>125</td>
<td>OMNI all key off</td>
<td>ignored</td>
</tr>
<tr>
<td>126</td>
<td>MONO all key off</td>
<td>1</td>
</tr>
<tr>
<td>127</td>
<td>POLY all key off</td>
<td>ignored</td>
</tr>
</tbody>
</table>

2-2-2. System exclusive information

2-2-1. MIDI active clock
This message usually requests reception regardless of MIDI channel number. When this clock is suspended longer than 666 msec (except for receiving the bulk data), the on-going sound turned OFF.

2-2-2. Bulk data of 1 voice
This message requests reception with the same format as transmission when MIDI channel numbers are corresponded, system information is available, and Memory protect is off.

2-2-3. Bulk data of 32 voices
This message requests reception with the same format as transmission when MIDI channel numbers are corresponded, system information is available, and Memory protect is off.

2-2-4. Parameter change
Voice parameter and function parameter request reception with the same format as transmission when MIDI channel numbers are corresponded, system information is available, and Memory protect is off.

2-2-5. This message requests the performance data of the DX1 A-side.

11110000 Status byte
0 i i i i i Identification number \((i=67: \text{YAMAHA})\)
0ssssnnn Sub status \((s=0) \; \& \; \text{Channel number} \)
  \((n=0; ch1 \sim n=15; ch16)\)
0 f f f f f f Format number \((f=2:1 \; \text{performance})\)
0bbbbbbbb Byte count MS byte
0bbbbbbbb Byte count LS byte \((b=94:1 \; \text{performance})\)
0ddddd Data 1st byte
0dddddd Data 94th byte
0e e e e e Check sum \((\text{add 94th byte and make the complement on 2})\)

11110111 EOX

1100nnnn Program change & Channel number
  \((n=0 \; \sim \; n=15 \; \sim \; ch16)\)
0ppppppp Program number \((p=0: \text{INT1} \sim p=31: \text{INT32})\)
  \(p=32: \text{CRT1} \sim p=63: \text{CRT32})\)
1110nnnn Pitch bender & Channel number
  \((n=0 \; \sim \; n=15 \; \sim \; ch16)\)
0vvvvvvv Pitch bender value LS byte \((\text{ignored})\)
0vvvvvvv Pitch bender value MS byte \((0 \sim 64 \sim 127)\)