YAMAHA

DX7

DIGITAL PROGRAMMABLE ALGORITHM SYNTHESIZER

Operating Manual

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 instruments'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.

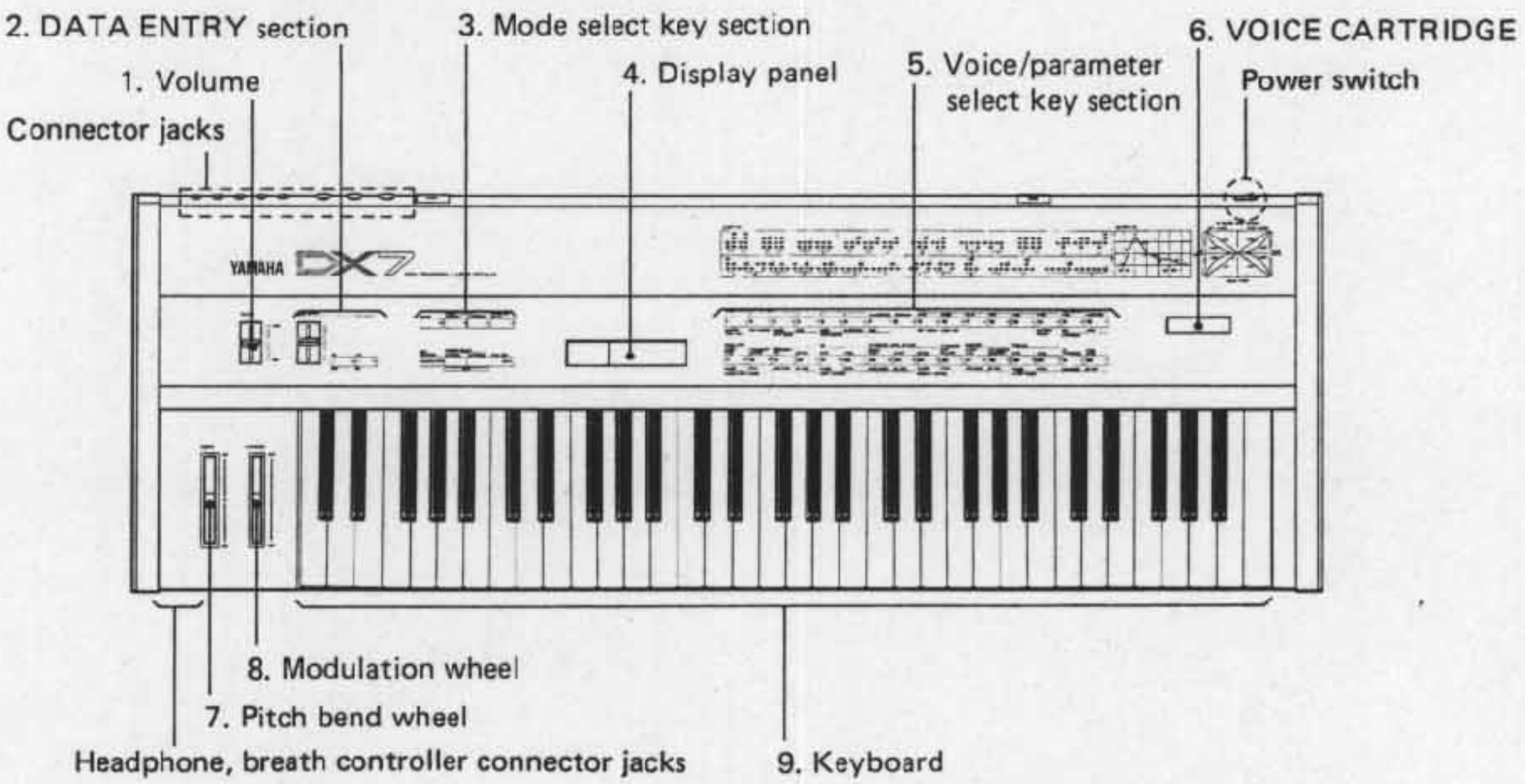
- **EDIT Mode**

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.

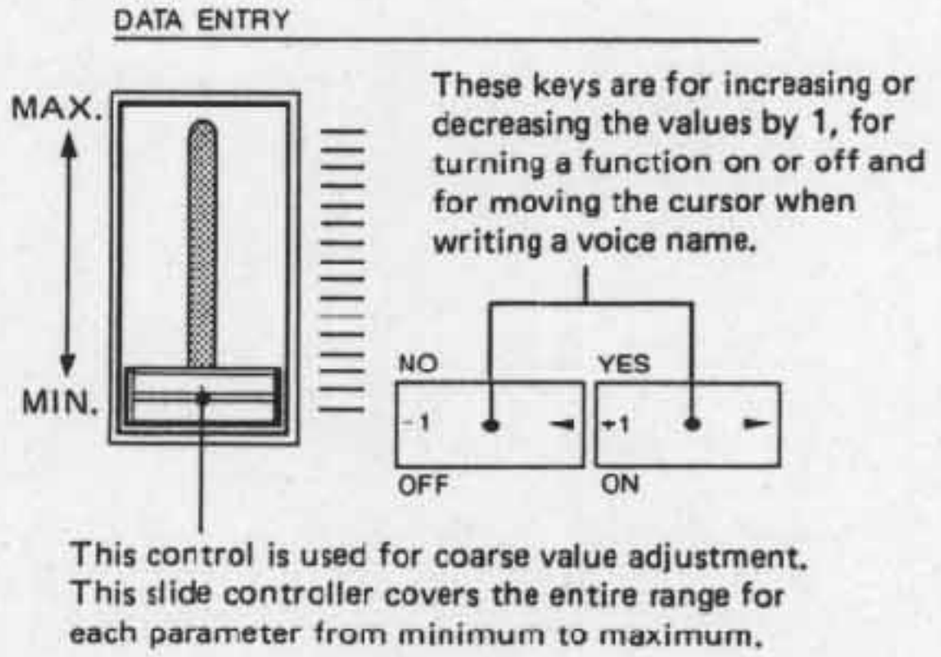


1 VOLUME

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

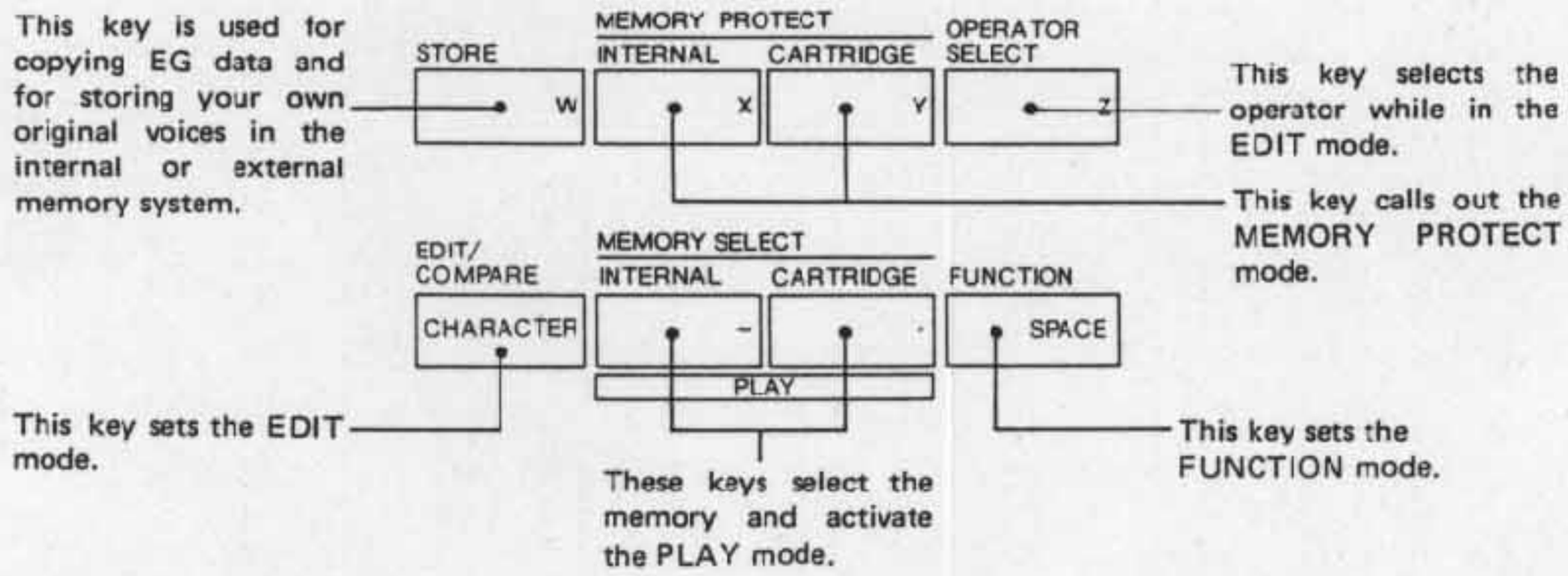
2 DATA ENTRY

This combination of keys and linear control is used to enter and modify data.



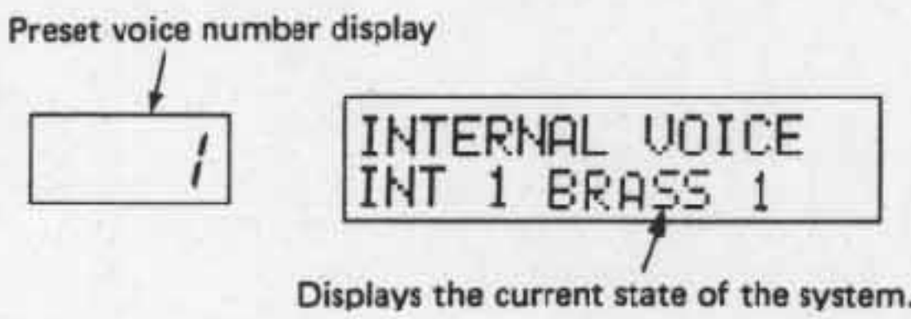
3 MODE SELECT KEY

Selects the operating mode, "operators" (these will be explained later) and memory protect functions.



4 DISPLAY PANEL

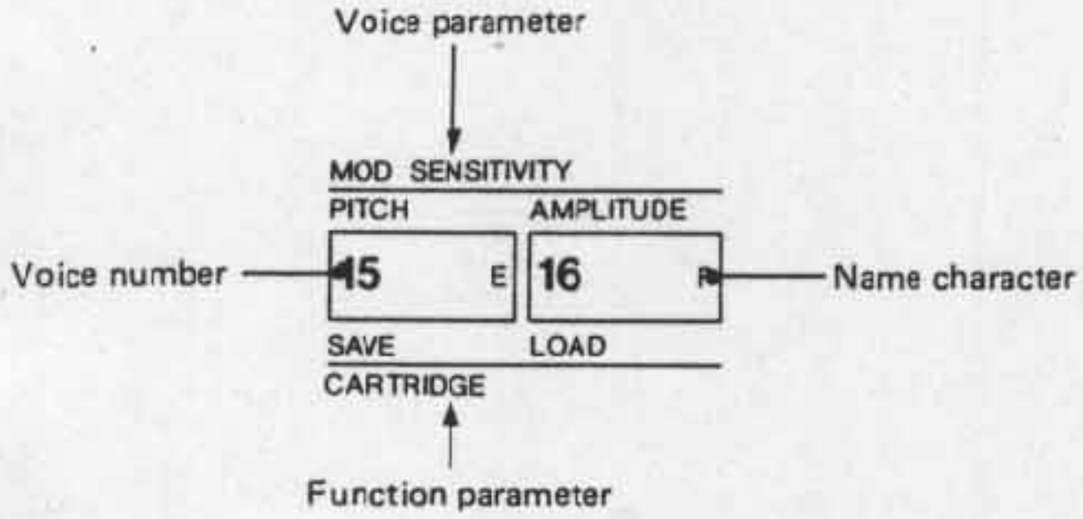
This Liquid Crystal Display panel displays the parameters in each mode and the name of the selected pre-programmed voice.



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).

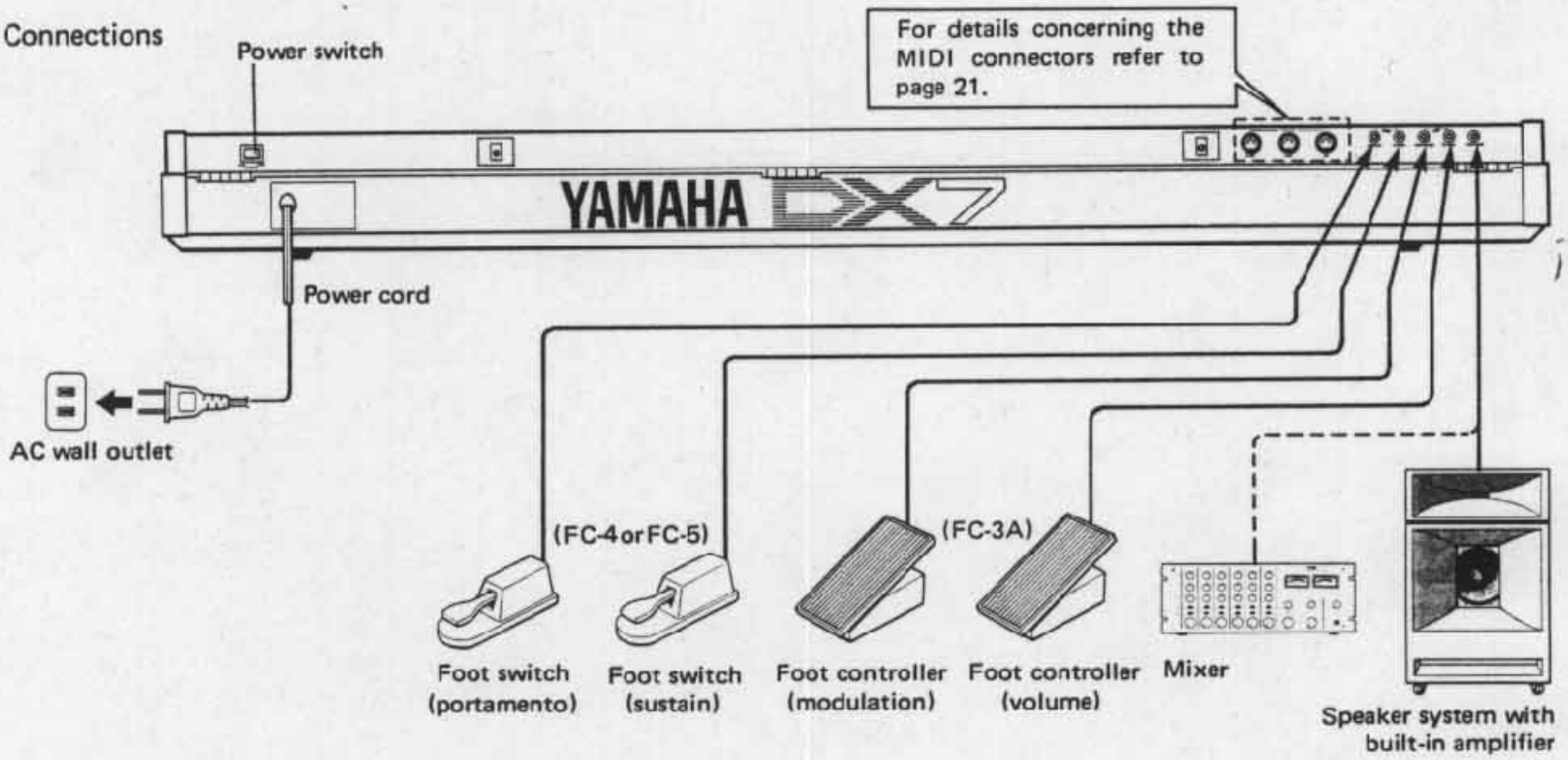
- Initial/After Touch response provided.

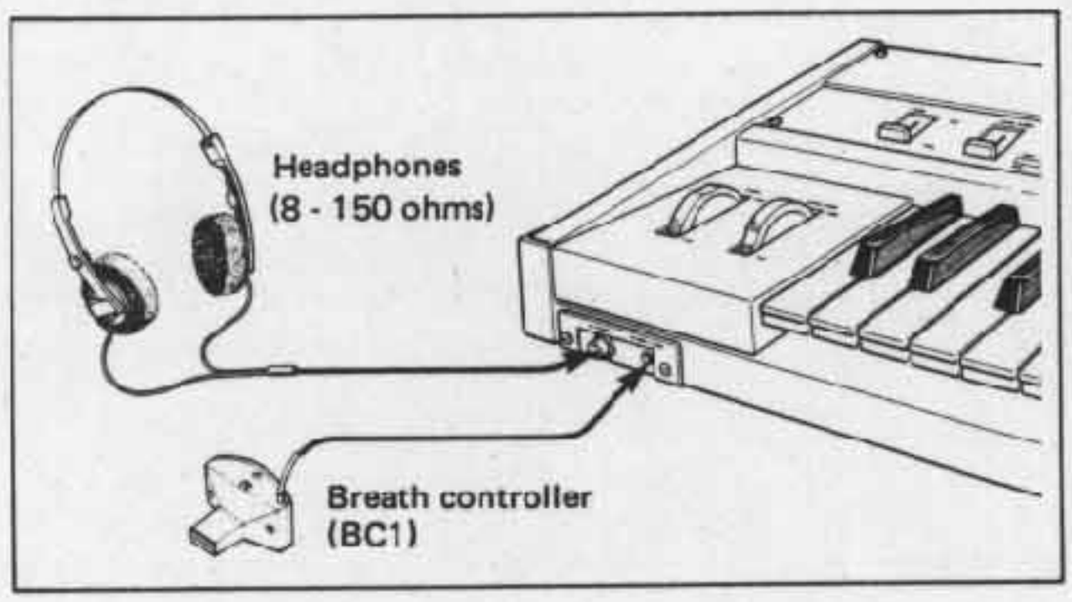
CONNECTIONS

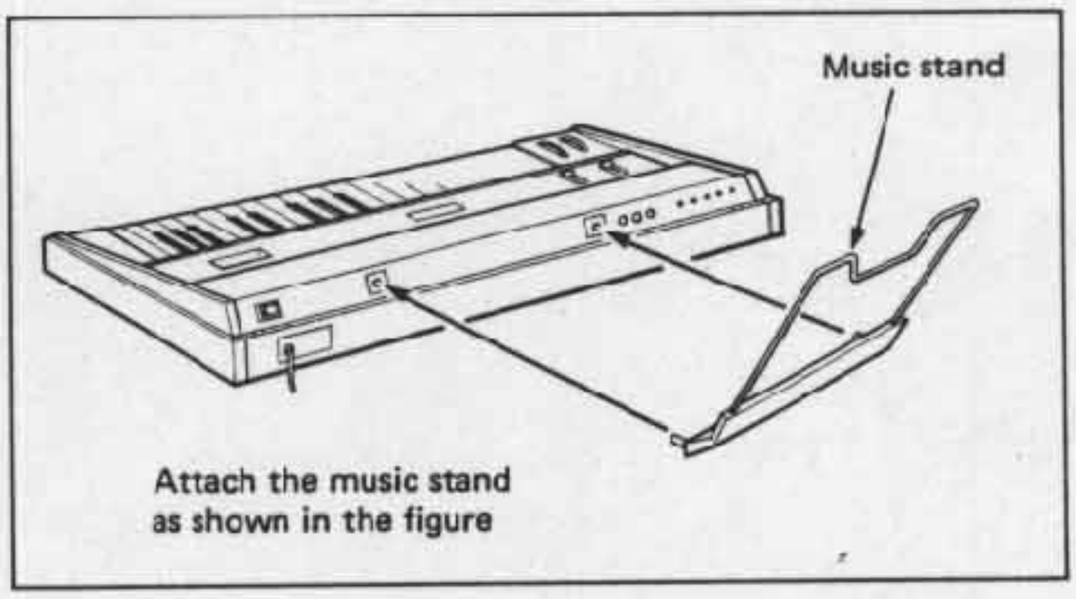
- **Setting Up and Applying Power**

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.

Connections

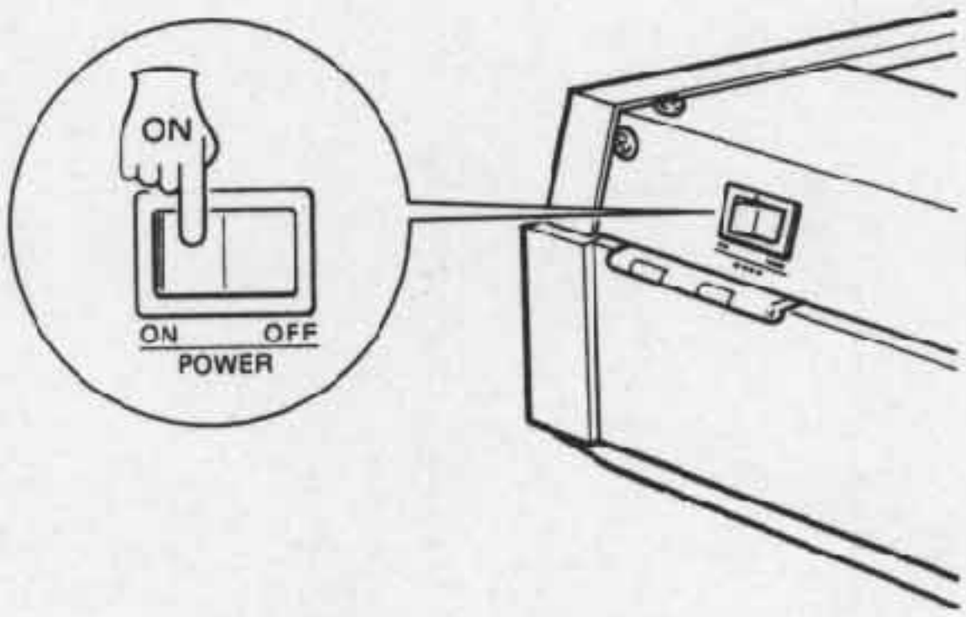






- **Turn POWER ON**

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.



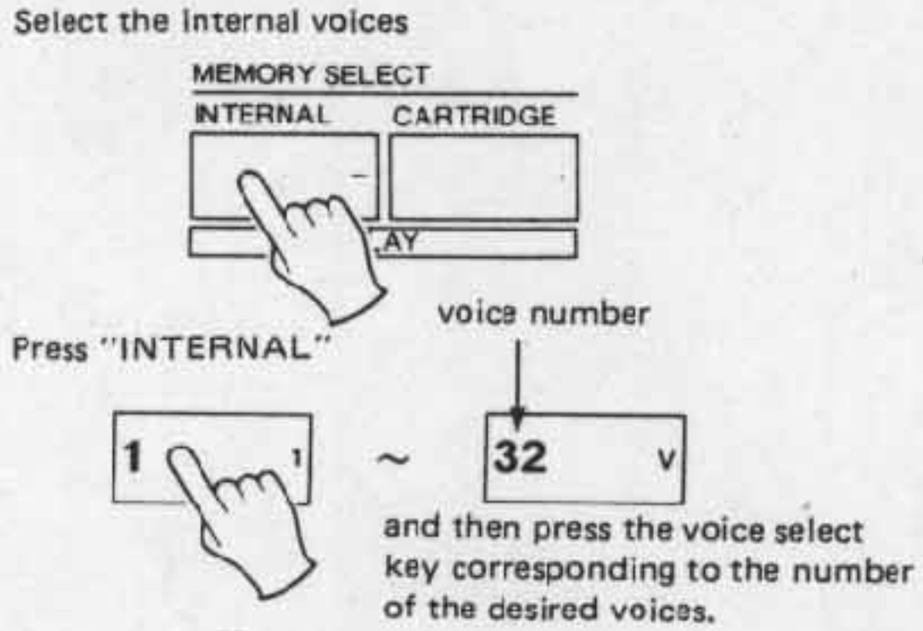

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* YAMAHA DX7 *
* SYNTHESIZER *
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PLAY MODE

• 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.

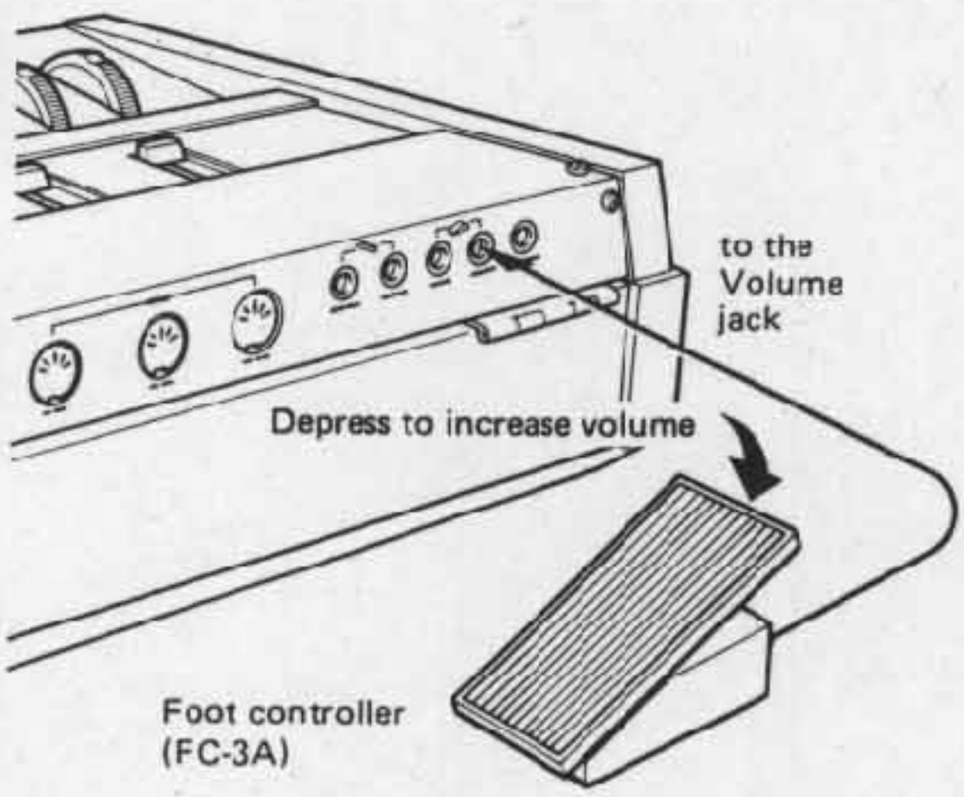
Each VOICE SELECT key has a large numeral that corresponds to the voice number at its left edge.



• 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 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.



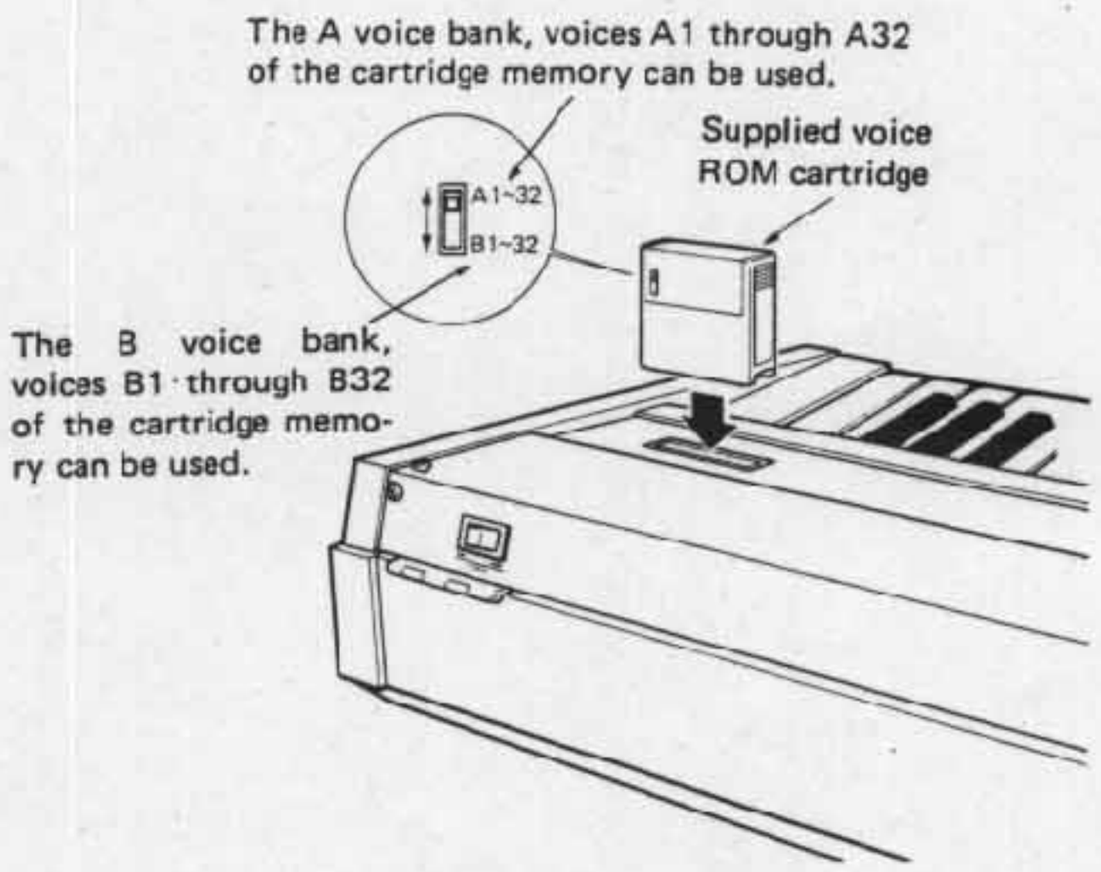
• Playing the Cartridge Voices

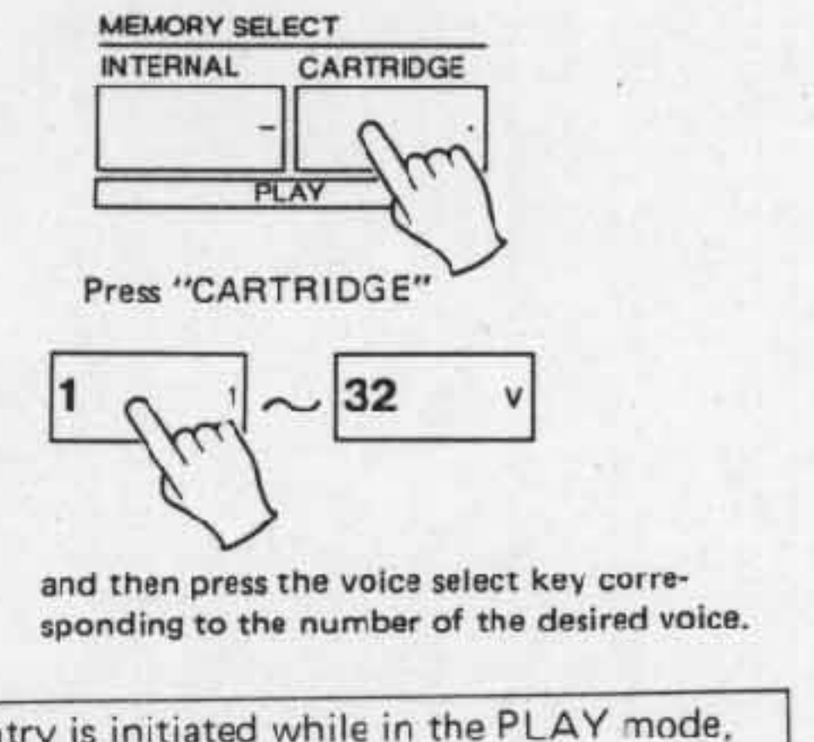
An extra 64 voices can be added to the available selection simply by plugging in one of the supplied external voice cartridges.

Insert a cartridge as shown in the figure.

Select the cartridge voices by first presseing 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.





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

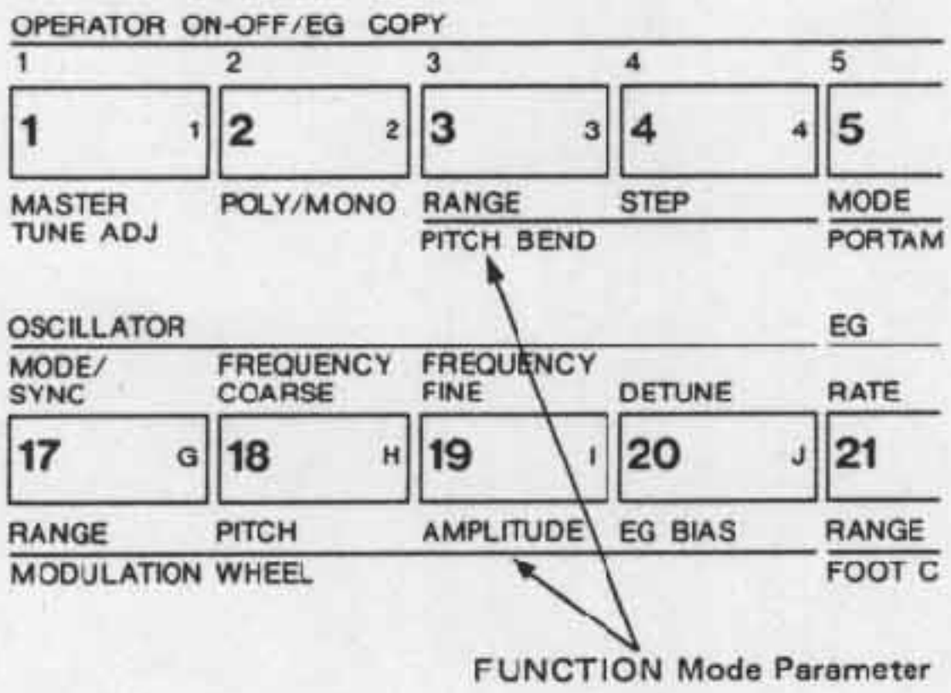
FUNCTION MODE

- **FUNCTION Mode . . . . Applying Effects**

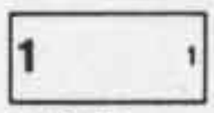
The FUNCTION mode permits tuning, pitch bend, modulation, and application of other effects while playing, as well as voice data load/save operations.

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.**

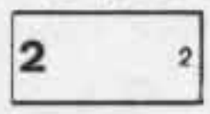


- **MASTER TUNE**



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 liner 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.

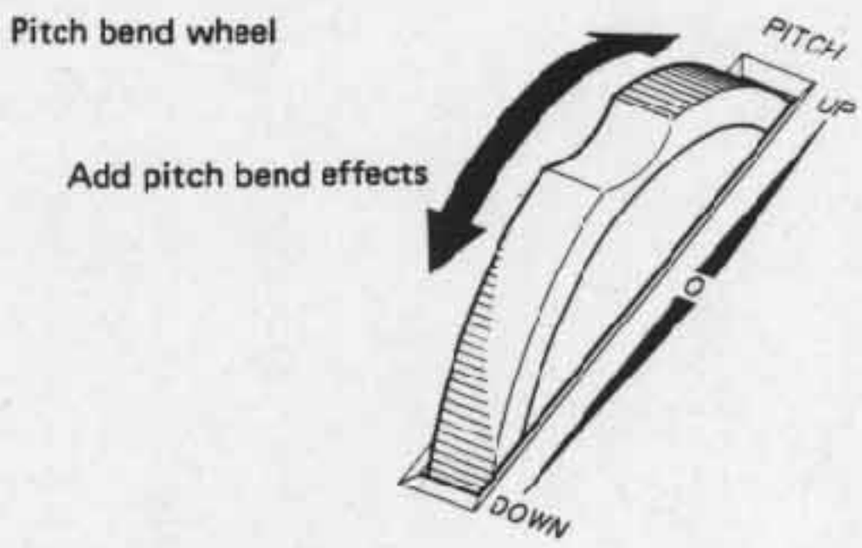
RANGE:

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).

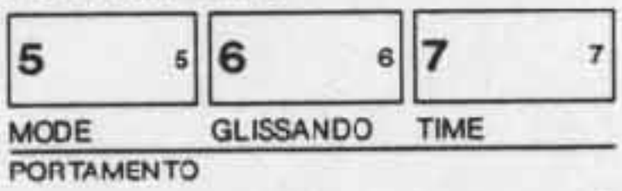
STEP:

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.

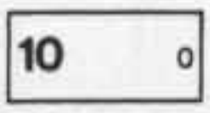
- An FC-4 or FC-5 foot pedal can also be connected for sustain pedal control. In the monophonic mode, a key pressed while another key is held will take priority, and the sustain effect will apply to the new key.
  Releasing the pedal turns the sustain effect OFF.

- **EDIT RECALL**



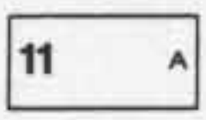
This function makes it possible to recall a voice that was previously being edited or created.
If, for example, the PLAY mode is accidentally or purposely entered while editing, the voice that was being edited can be recalled with this function
If the [EDIT RECALL] key is pressed, the display shows "EDIT 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)**



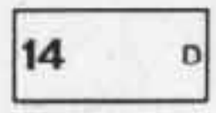
This function sets up the basic voice data for creating new voices. Press the [VOICE INIT] key and the display panel will read "VOICE INIT?" Press the [YES] key and the DX7 will respond with "ARE YOU SURE?" Verify by pressing the [YES] key second time. This sets up the basic voice data and activates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

- **CARTRIDGE FORMATTING**



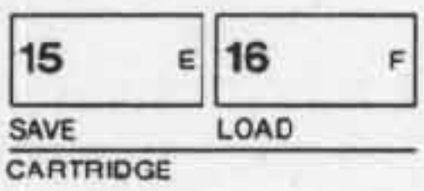
Since the format of a RAM cartridge used for other purposes such as DX1 performance memories, etc., will vary from that of a cartridge used for voice memory, make sure you observe the following procedure when storing or saving DX7 internal voices into such a cartridge.
Press "11" to select this function. 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**



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.

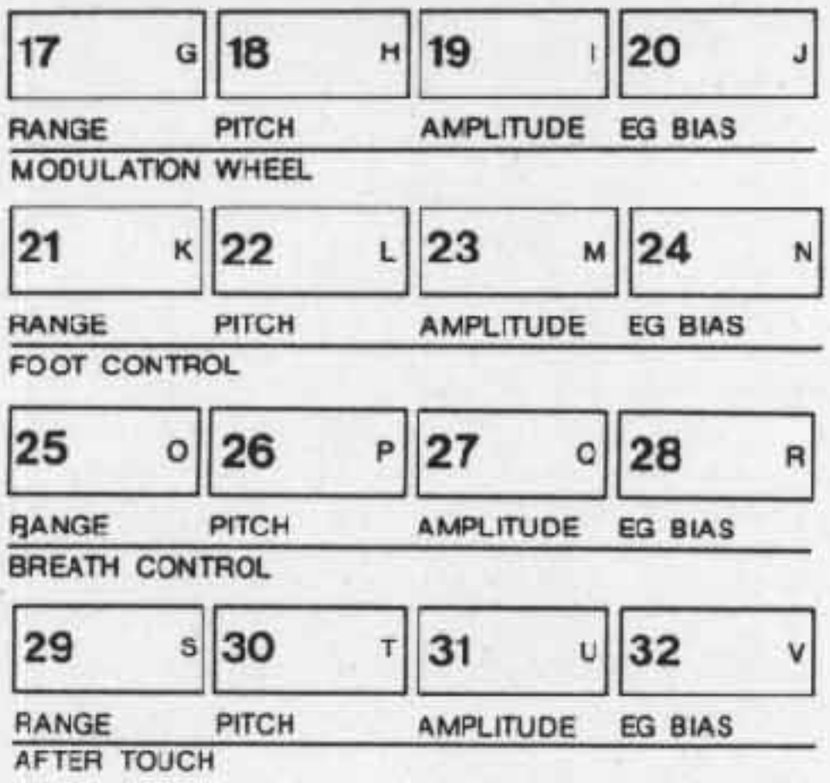
- **CARTRIDGE**



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**

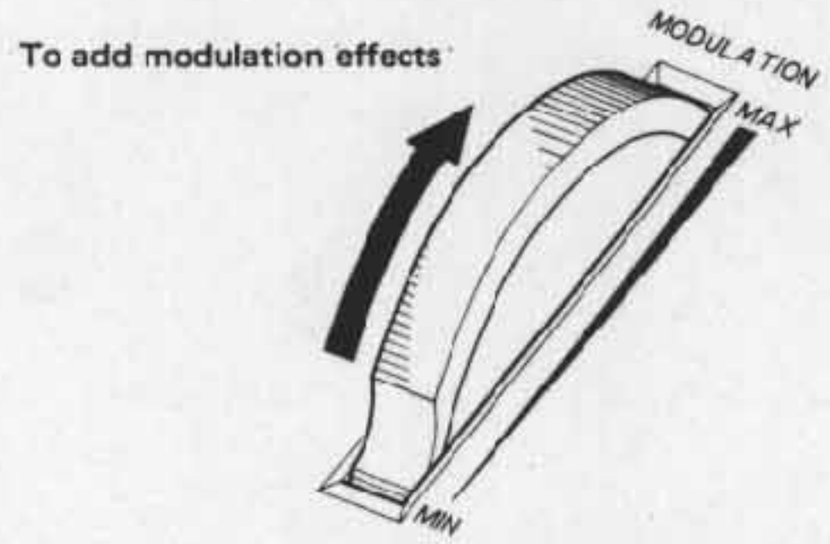


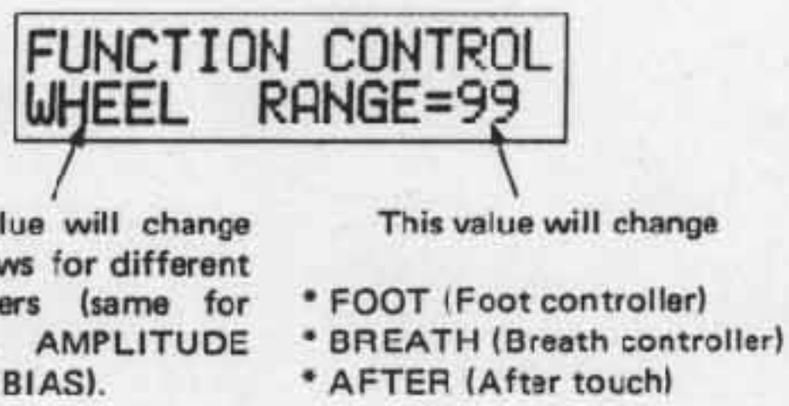
The modulation wheel, foot controller, breath controller or keyboard after touch can be used to control LFO modulation depth applied to pitch, amplitude or envelope producing controllable tremolo or vibrato effects while playing. Setting the RANGE, AMPLITUDE and ENVELOPE GENERATOR BIAS parameters for 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.





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.

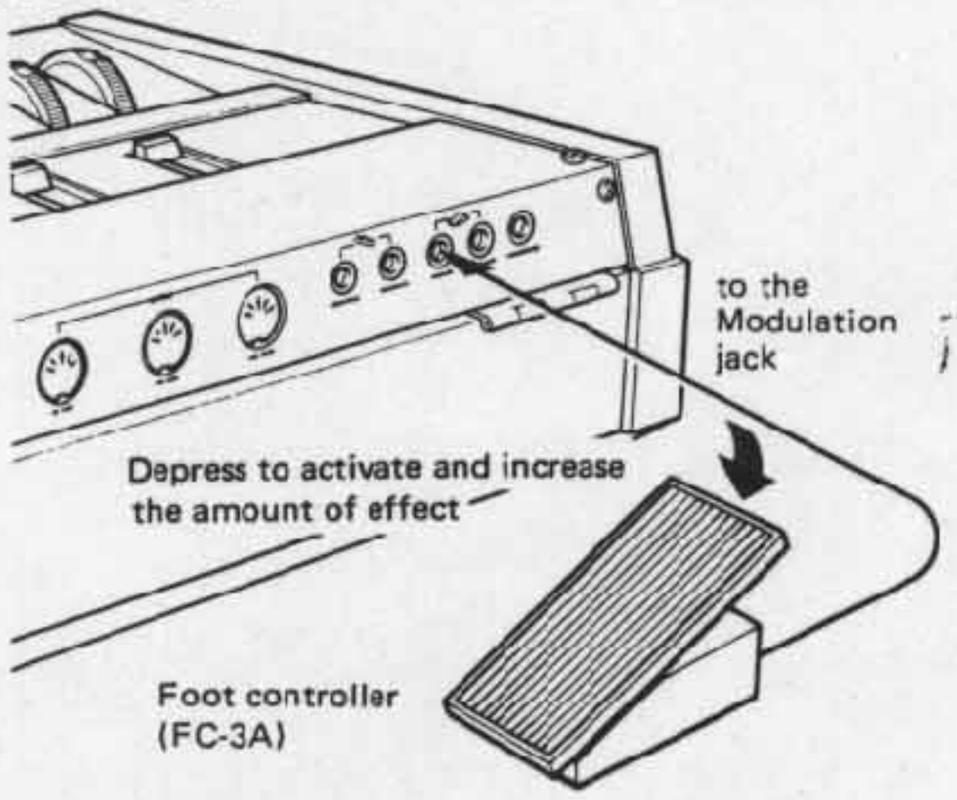
- **These parameters will have no effect if the PITCH MODULATION SENSITIVITY or the AMPLITUDE MODULATION SENSITIVITY of the voice used are zero.**

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

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.

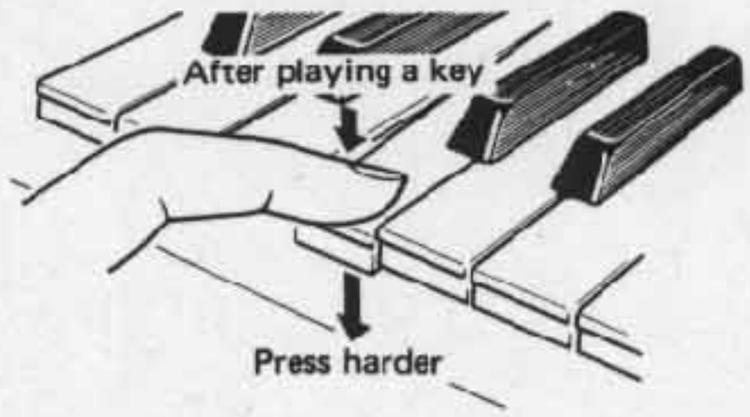


3. BREATH CONTROLLER

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.



FM TONE GENERATION

FM Tone Generation . . . . Understanding the Basics

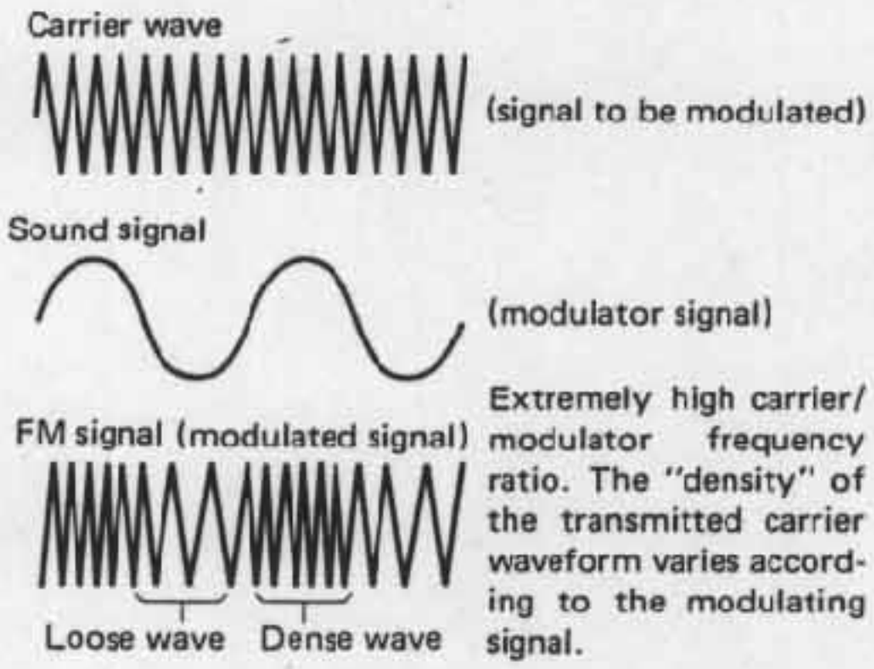
The DX7 is an entirely new type of synthesizer employing an entirely new FM digital tone generation system. This unique Yamaha system permits finer control over subtle musical nuances and vastly expanded voice creation potential compared to conventional synthesizers.

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.

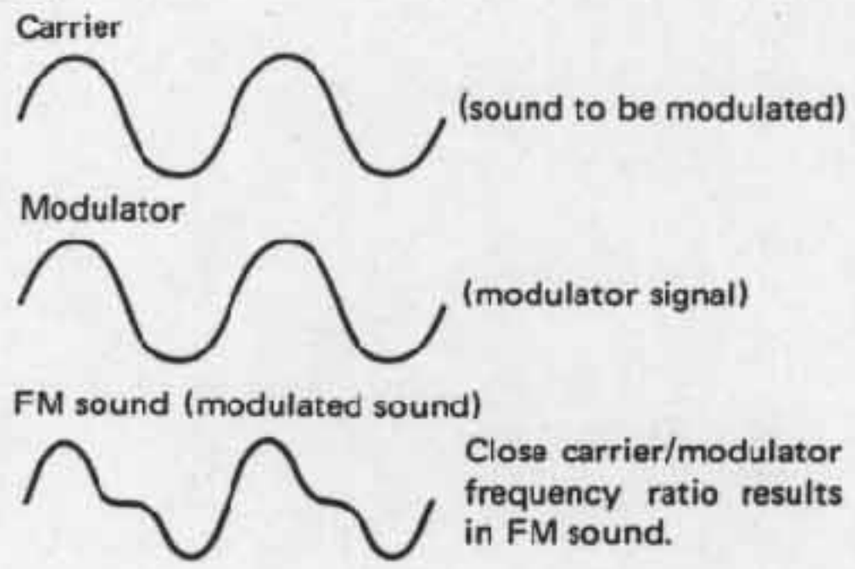
In FM radio the carrier is an extremely high "ratio" frequency and the modulator is the music signal to be broadcast. In effect, the carrier "carries" the modulator signal through the atmosphere to your receiving antenna.

FM broadcasting



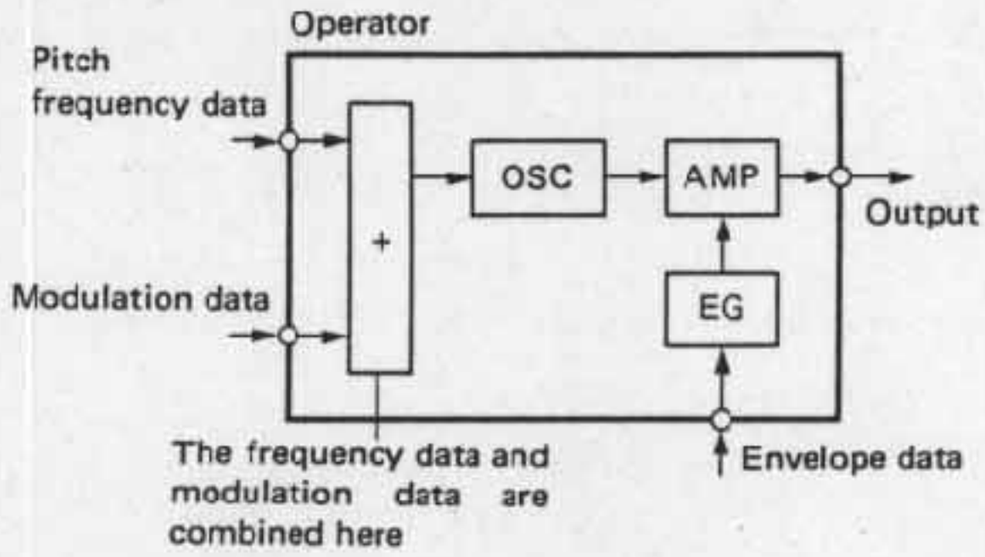
The FM tone generator system is similar in principle, but in this case both the carrier and modulator are audible signals, and their frequencies can be almost equal.

FM tone generation



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.

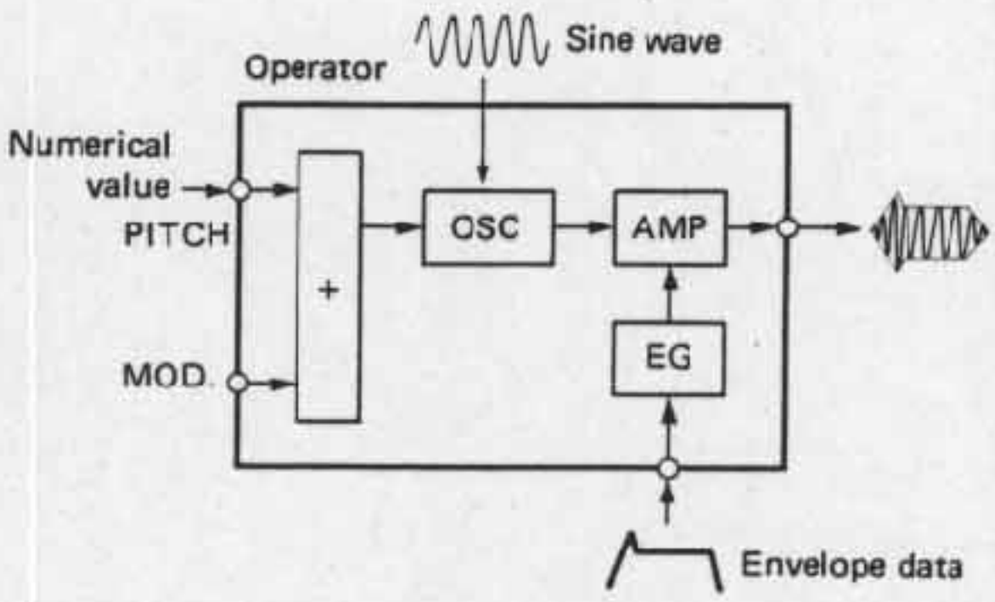
2) Modulation Data

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.

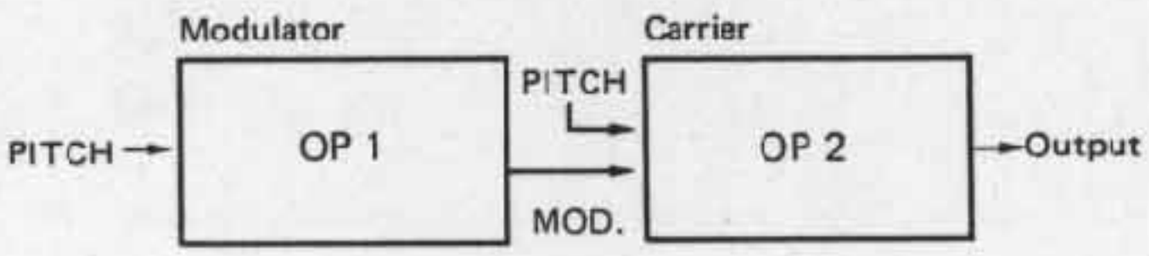


• Basic Operator Functions

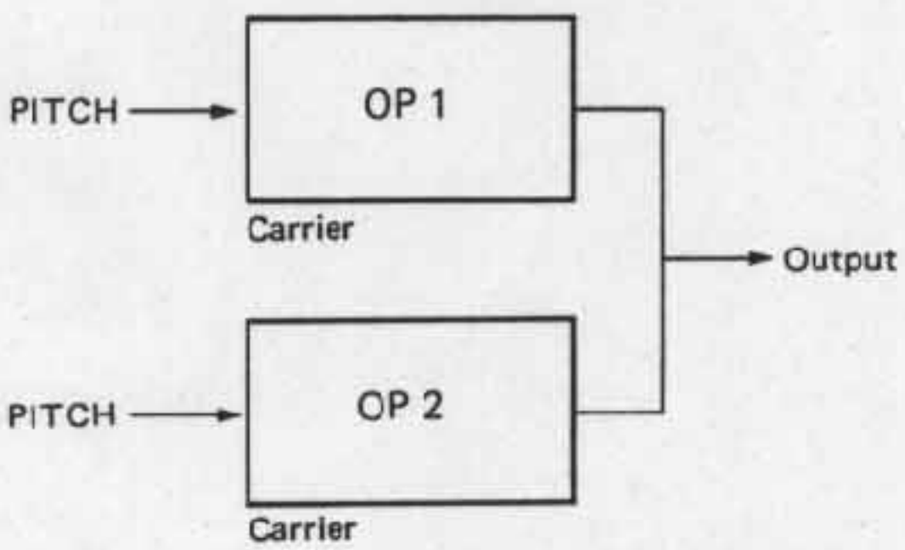
1) Relationship of Carrier to Modulator

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



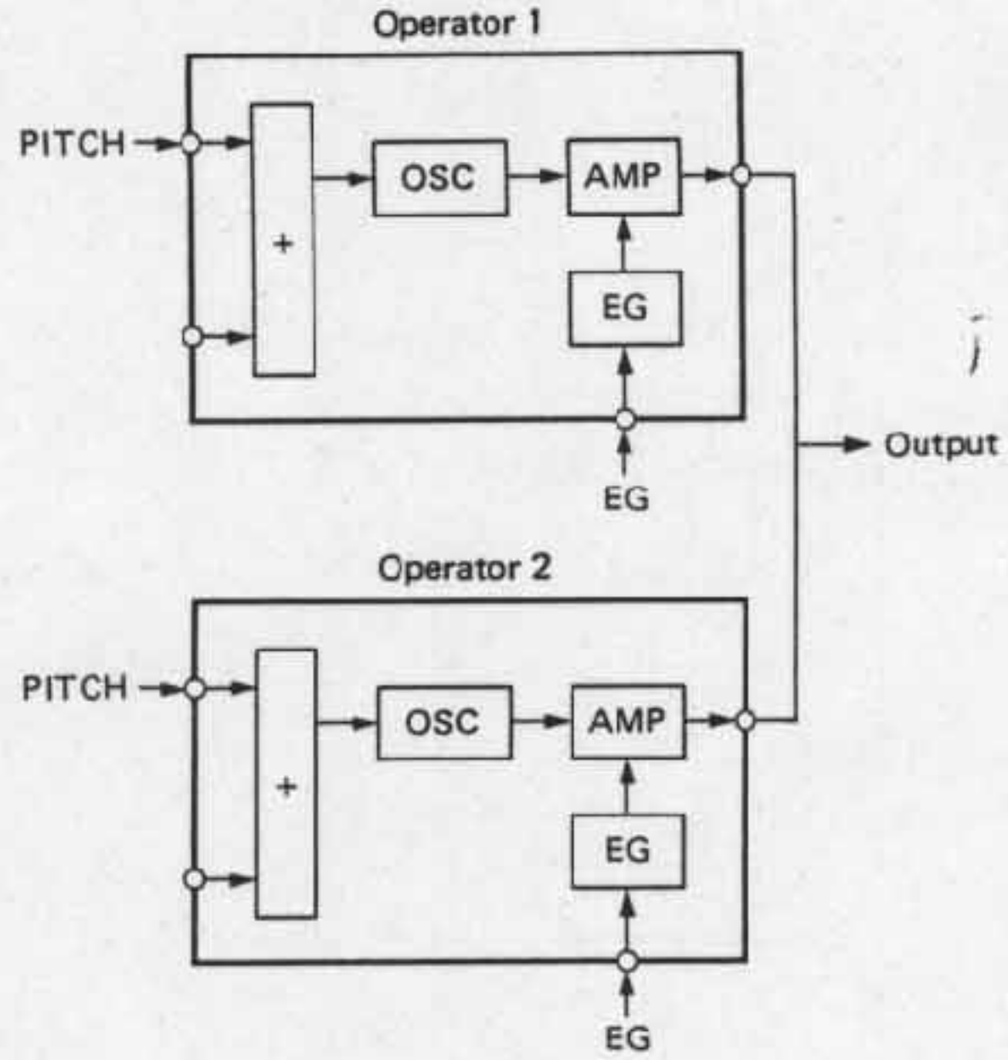
2. Carrier and carrier combinations



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.

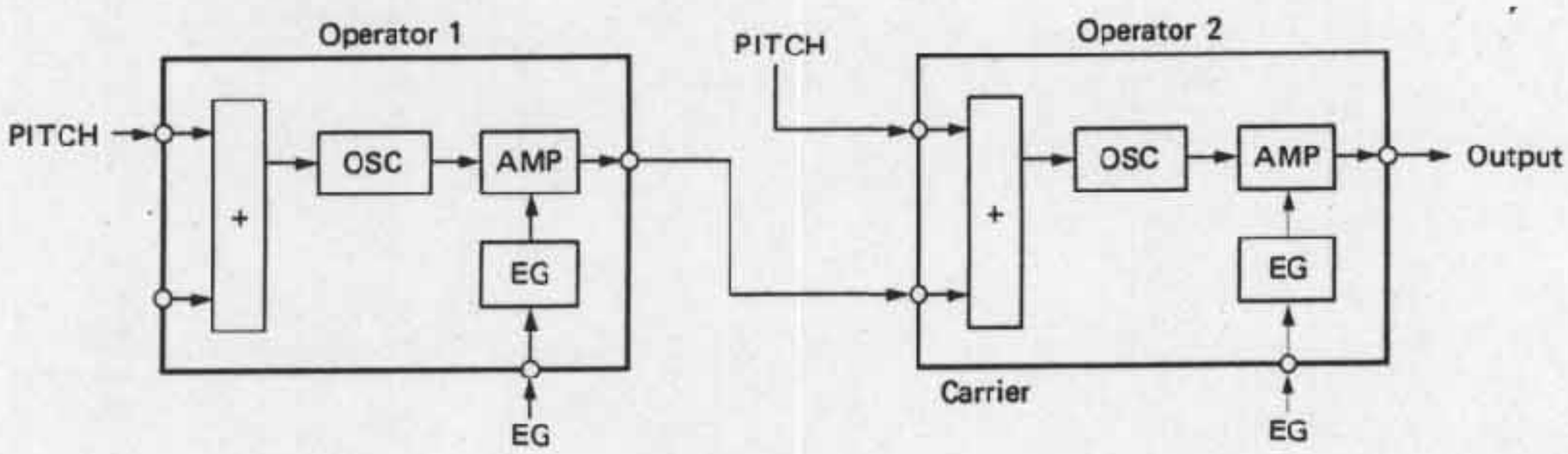
• Carrier and carrier combinations



3) Modulator and Carrier

In the modulator/carrier 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.

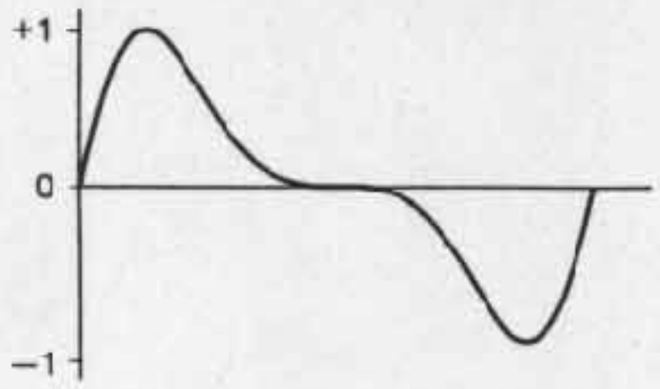
• Modulator and carrier combinations



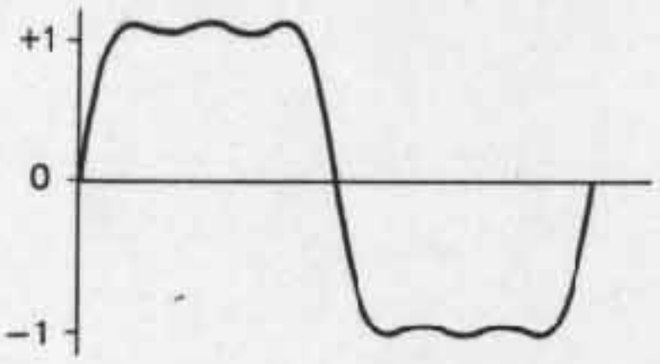
Examples of output waveforms

• Modulator and carrier combinations

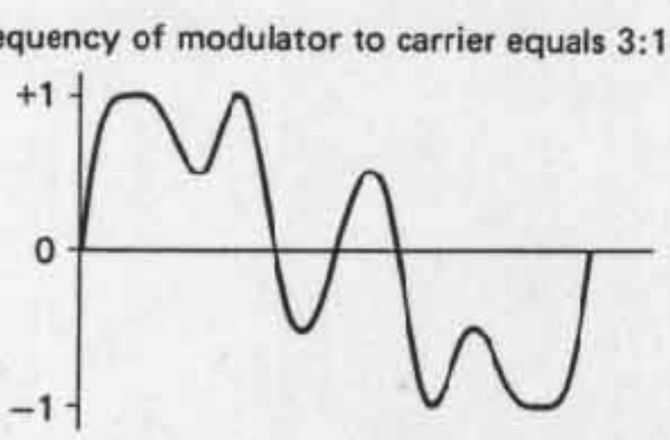
Frequency ratio of modulator to carrier equals 1:1



Frequency of modulator to carrier equals 2:1

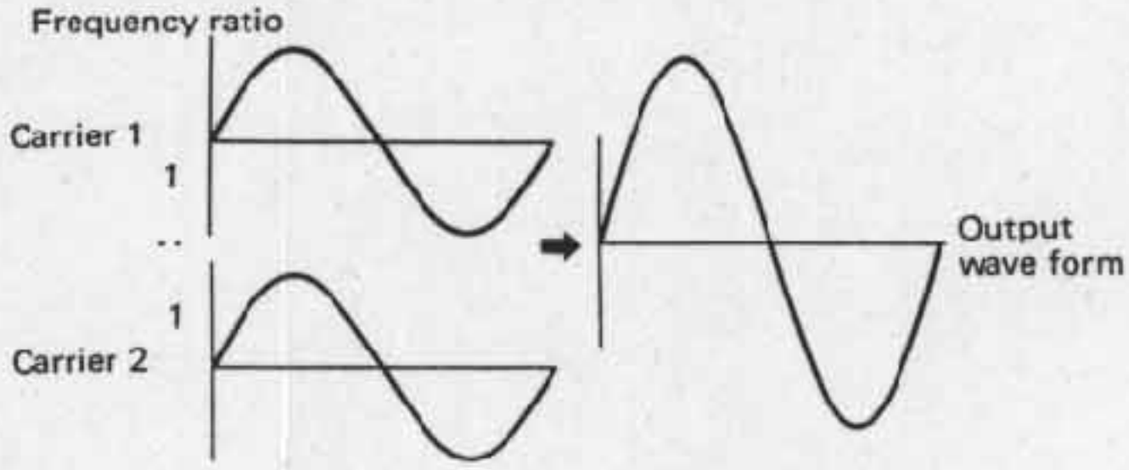


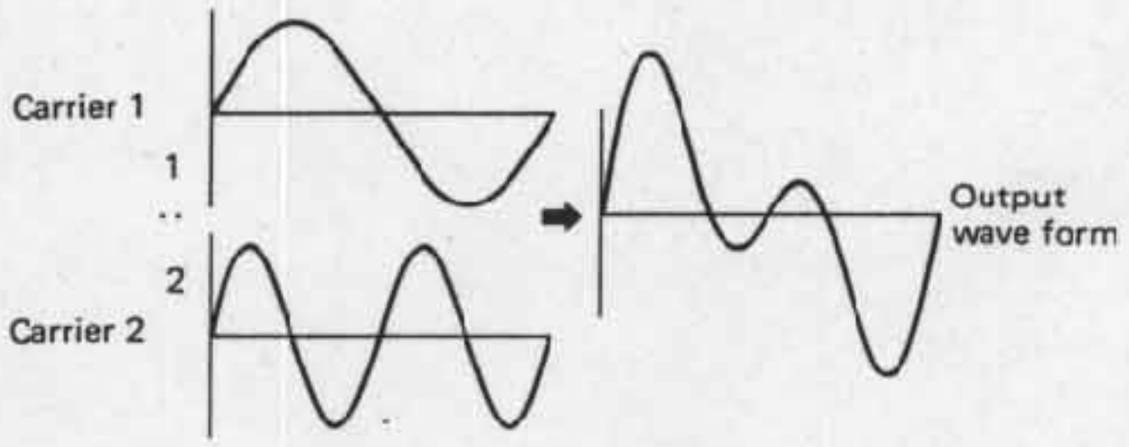
Frequency of modulator to carrier equals 3:1

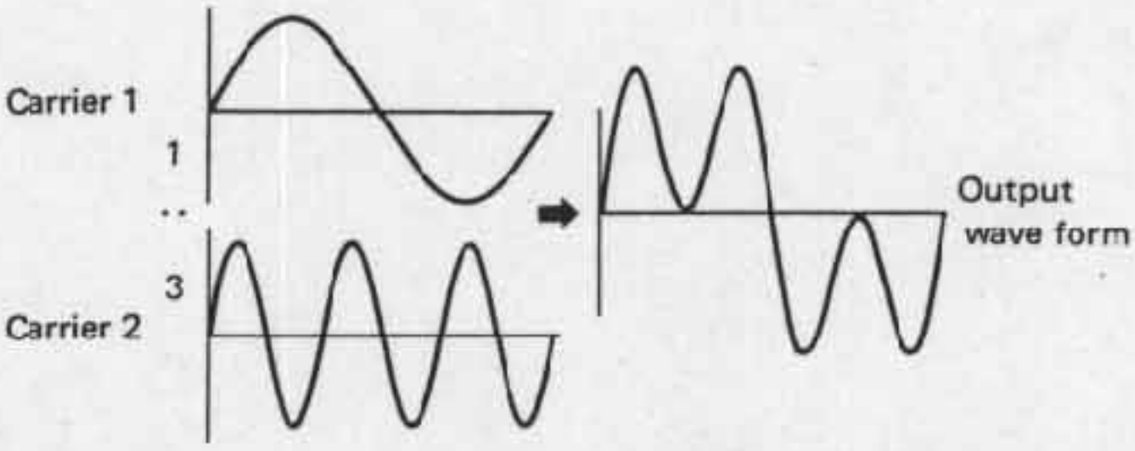


• Carrier and carrier combinations

Frequency ratio



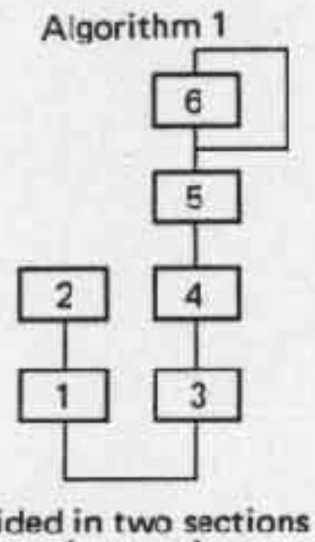


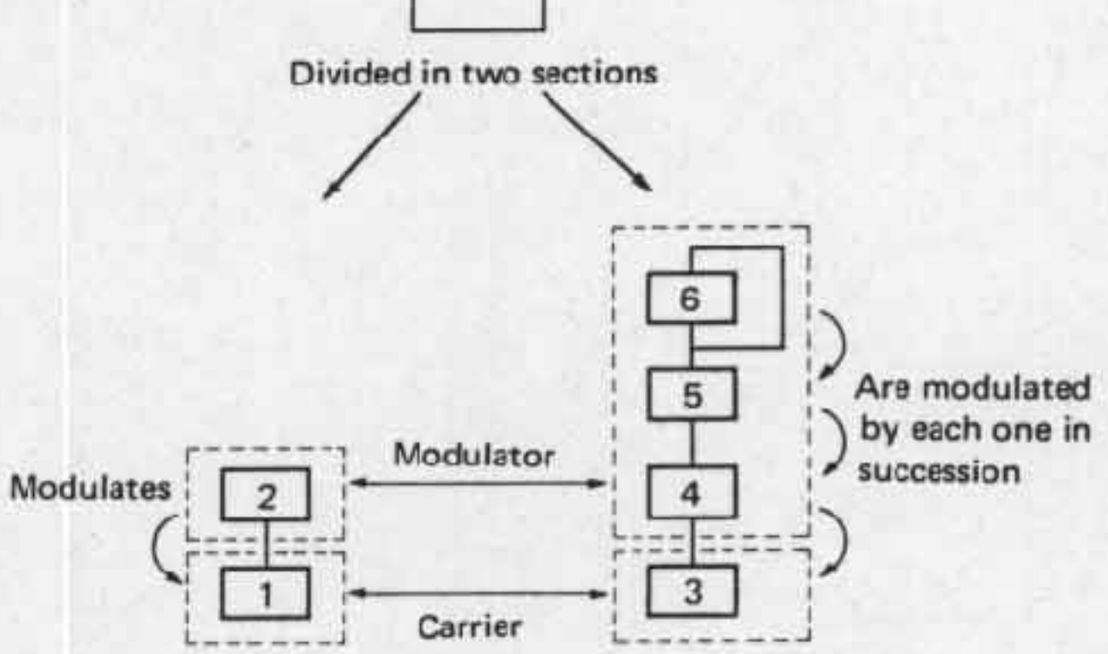


3. Algorithms . . . . Combining Several Operators

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.

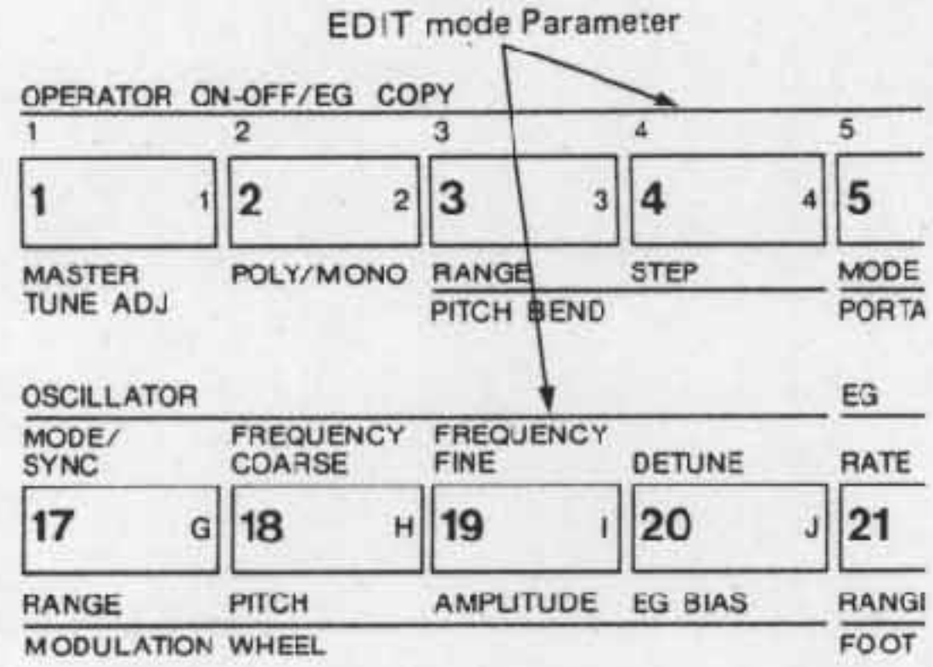




EDIT MODE

• EDIT MODE . . . . Creating Voices

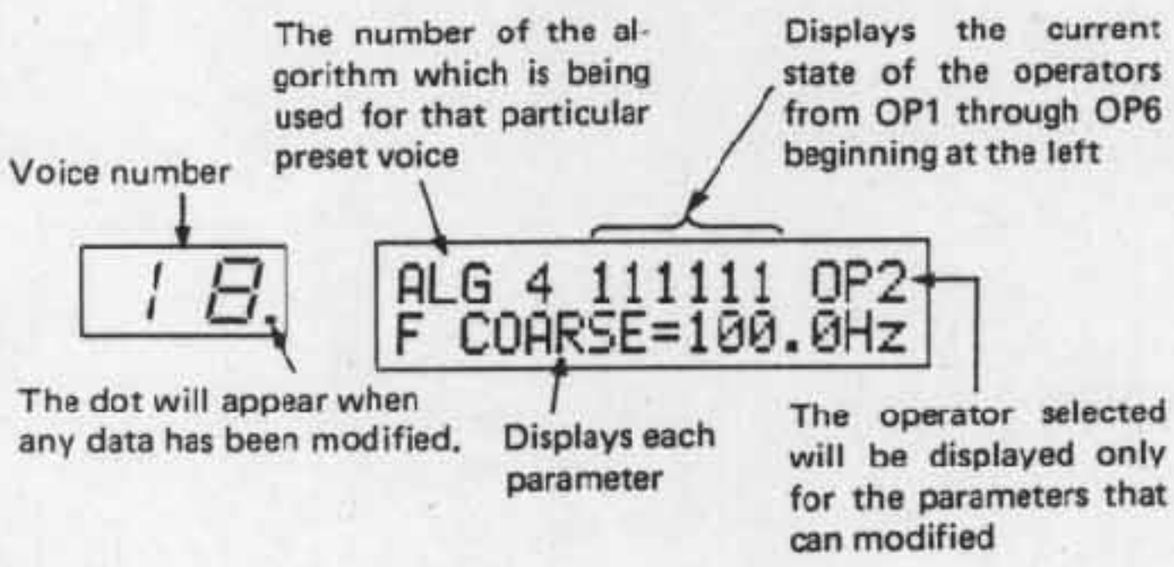
The EDIT mode can be used to edit pre-programmed voices or to create entirely new voices. Press the [EDIT/COMPARE] function key to enter the EDIT mode.



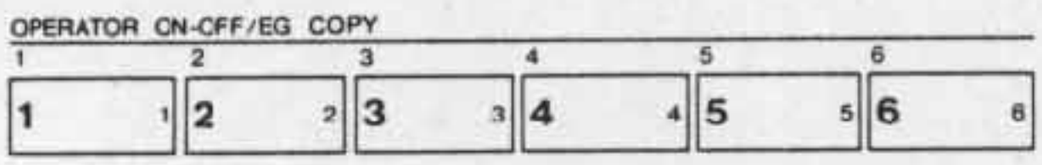
Setting and modifying parameters is carried out using the DATA ENTRY controls just as in the FUNCTION mode. A small dot will appear next to the voice number in the display if any data is modified. The original voice can be recalled at any time while editing by pressing the [EDIT/COMPARE] key again. The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



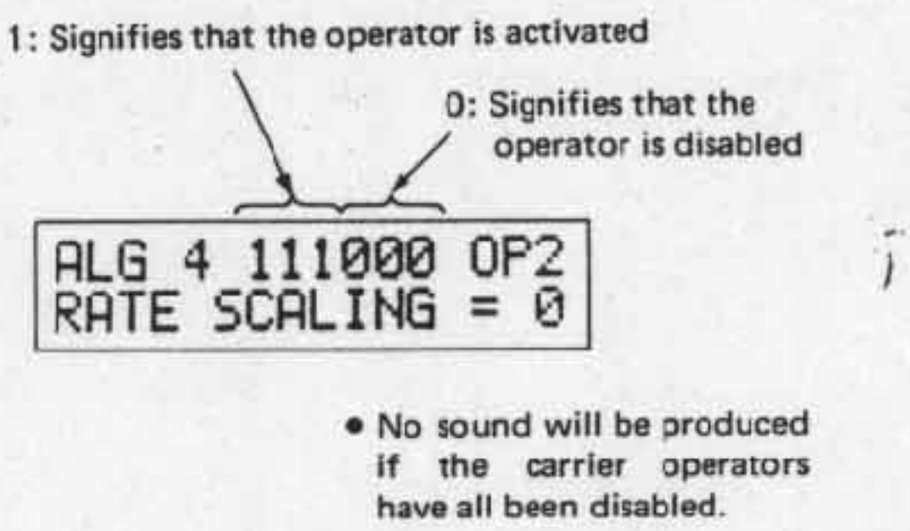
• OPERATOR ON-OFF/EG COPY



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:

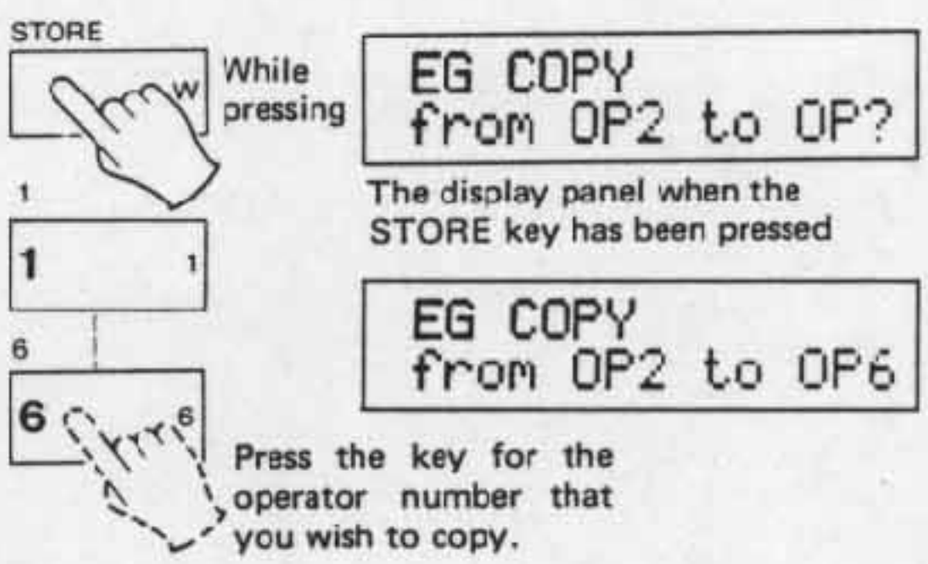
Pressing keys [1] through [6] will result in the corresponding operator being turned OFF, indicated by a "0" in the appropriate location on the display panel (the group of six 1's and/or 0's corresponds to operators 1 through 6). Press the key again to turn the operator back on-indicated by a "1" on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



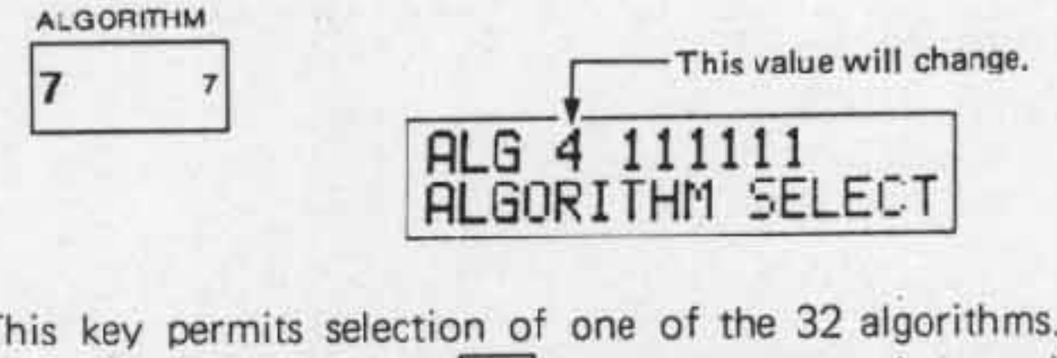
• No sound will be produced if the carrier operators have all been disabled.

EG COPY:

This function copys 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.



• ALGORITHM



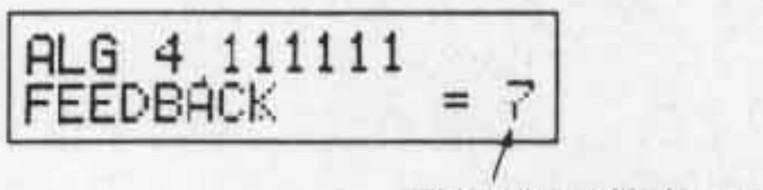
This key permits selection of one of the 32 algorithms. Press the DATA ENTRY [+1] key to increment (advance) the number of the selected algorithm, and the [−1] key to decrement the algorithm number. The slide control can be used for large variations.

- FEEDBACK

FEEDBACK

8	8

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.



- LFO

LFO

WAVE	SPEED	DELAY	PMD	AMD	SYNC
9 9	10 0	11 A	12 B	13 C	14 D

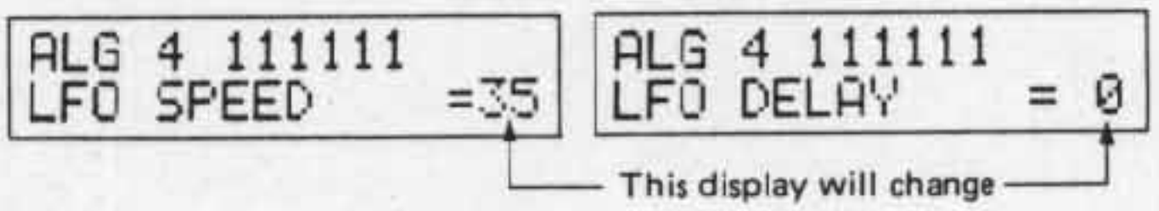
The Low Frequency Oscillator produces low-frequency sine, saw-tooth or square waves, or a SAMPLE/HOLD waveform. The LFO waveform can be used to apply vibrato, tremolo or " wow" effects to the voices. The amount of LFO modulation applied can be controlled using the modulation wheel, foot controller, breath 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.



TRIANGL : (Triangular wave)
SAW DWN : (Number 1 sawtooth waveform)
SAW UP : (Number 2 sawtooth waveform)
SQUARE : Square wave
SINE : Sine wave
S/HOLD : Sample and hold



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.

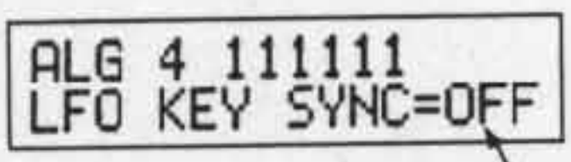
AMD (Amplitude Modulation Depth):

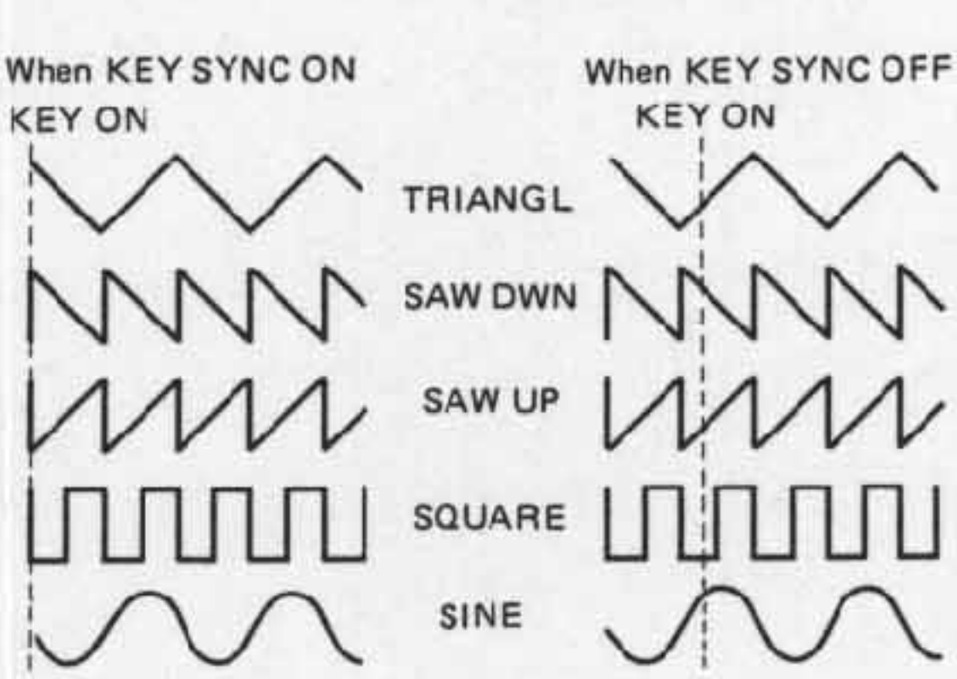
Varies, over a 0 to 99 range, the depth of LFO modulation applied to amplitude. A 0 setting produces no amplitude modulation, and a setting of 99 produces maximum modulation.

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 beings 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)

MOD SENSITIVITY

PITCH	AMPLITUDE
15 E	16 F

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.

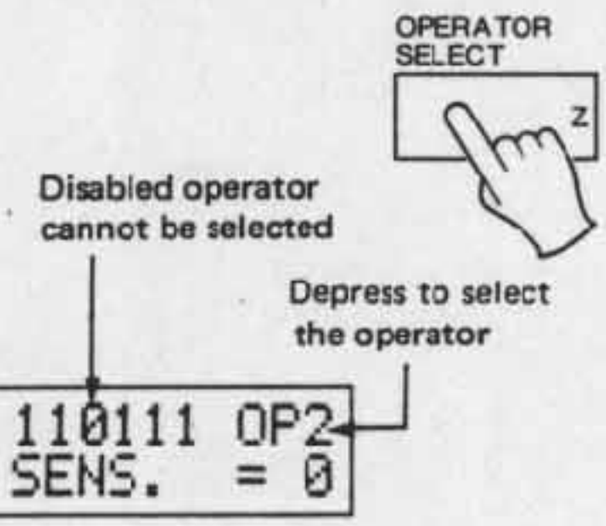
```
ALG 4 111111          ALG 4 111111 OP2
P MOD SENS.  = 1      A MOD SENS.  = 0
```

This display will change

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.

Operators are selected using the OPERATOR SELECT key. Pressing the OPERATOR SELECT key successively selects the operators in order from 1 to 6. The number of the selected operator is displayed in the upper right hand corner of the display panel. Operators that are turned OFF will be "skipped" and the number of the next active operator will be displayed.



- OSCILLATOR

OSCILLATOR

MODE/ SYNC	FREQUENCY COARSE	FREQUENCY FINE	DETUNE
17 G	18 H	19 I	20 J

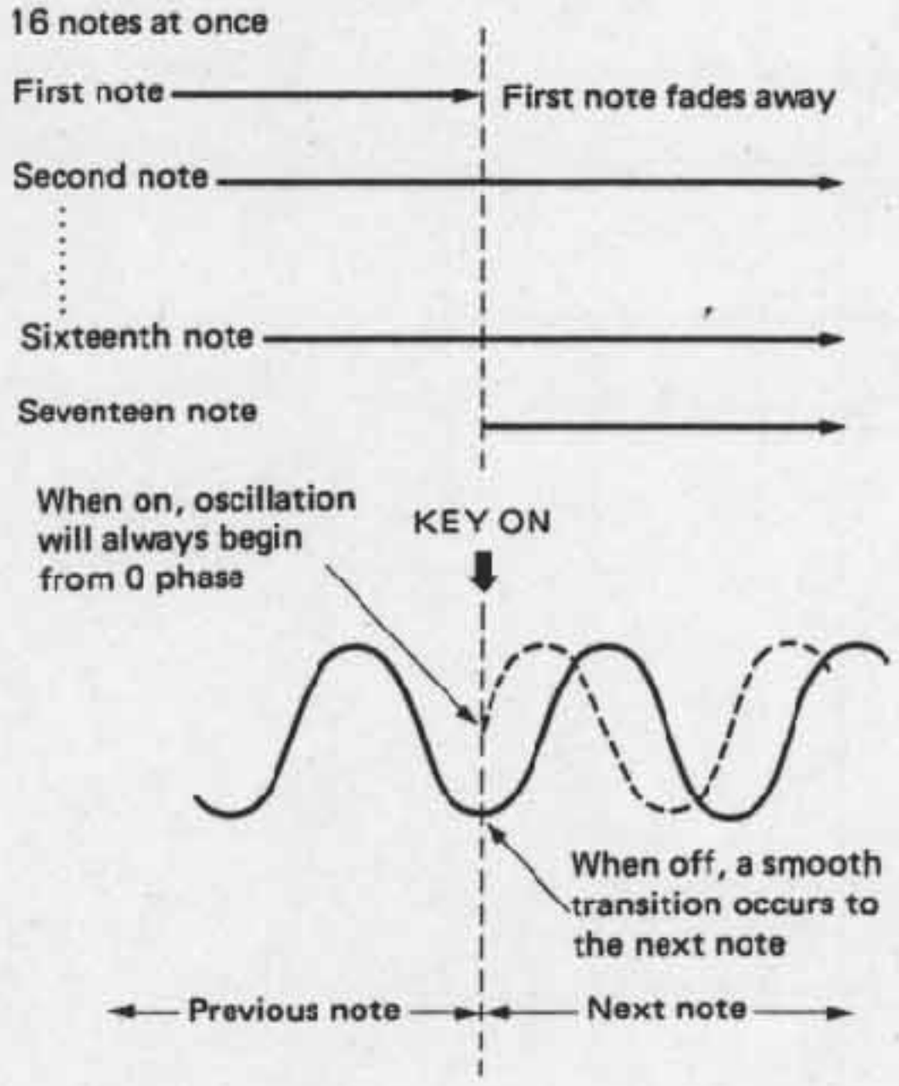
These keys set the pitch data for each operator.

```
ALG 4 111111 OP2      ALG 4 111111 OP2
FREQUENCY(RATIO)      FIXED FREQ.(Hz)
```

MODE/SYNC:
Pressing this key alternately switches to MODE and SYNC.

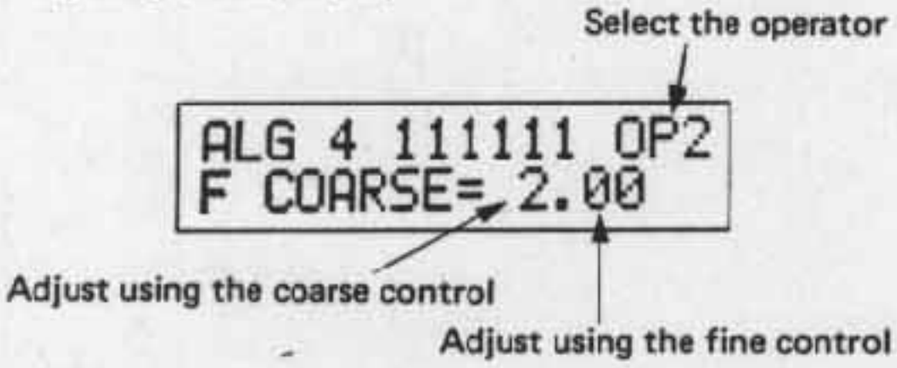
MODE:
Pressing the DATA ENTRY [−1] key sets the operators to the FREQUENCY (RATIO) mode, in which operator pitch is scaled to the keyboard as normal. Pressing the [+1] key sets the FIXED FREQ (HZ) mode in which a fixed frequency is produced no matter what key is pressed. The frequency is set using the [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.

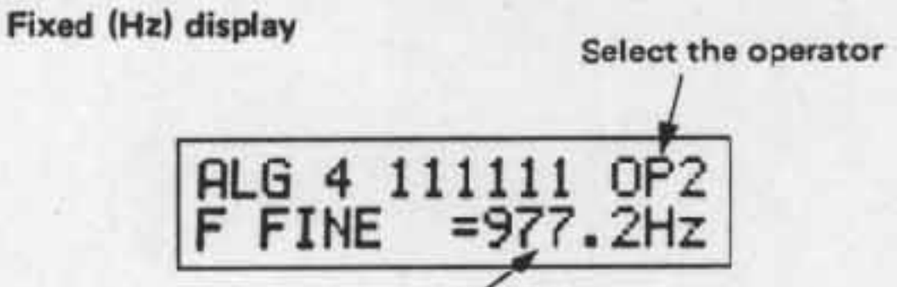


FREQUENCY COARSE/FREQUENCY FINE:
If MODE is set to FREQUENCY (RATIO) the operators are set to a standard frequency of 1.00 (8 feet) when the PITCH COARSE key is pressed. The frequency can then be varied from by one half (0.5 times) to 32 times. FINE adjustment is possible over a range of from 1 to 1.99 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.

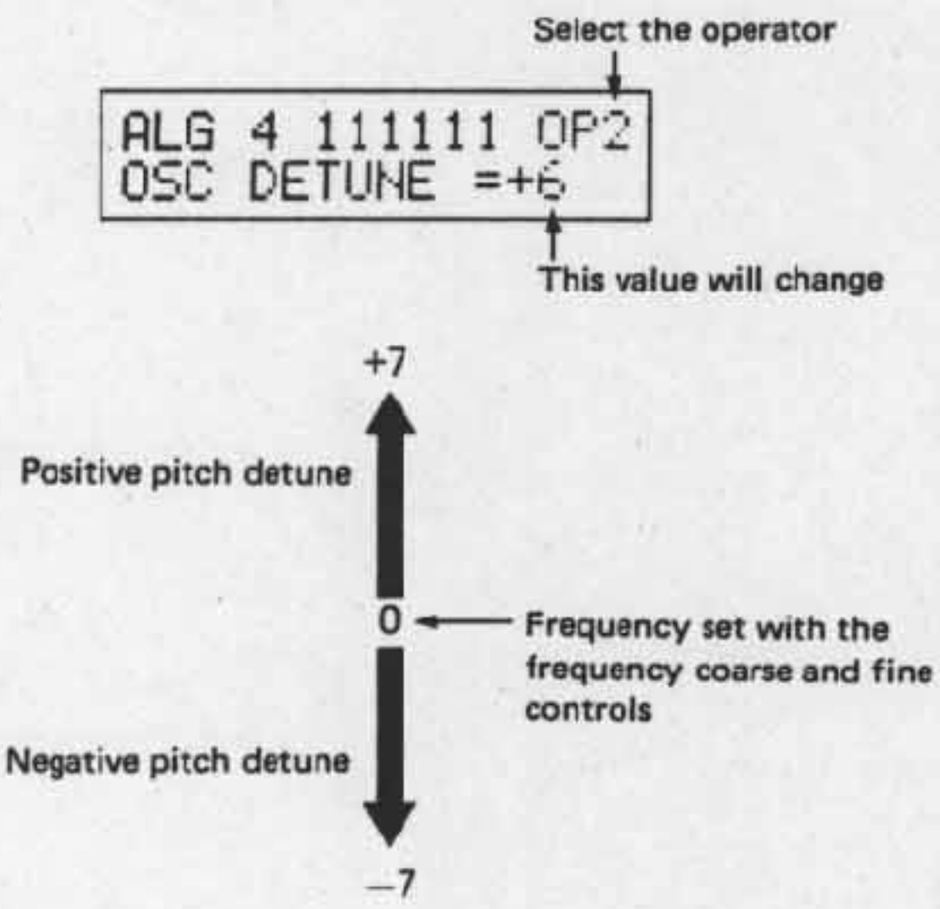
Frequency (ratio) display



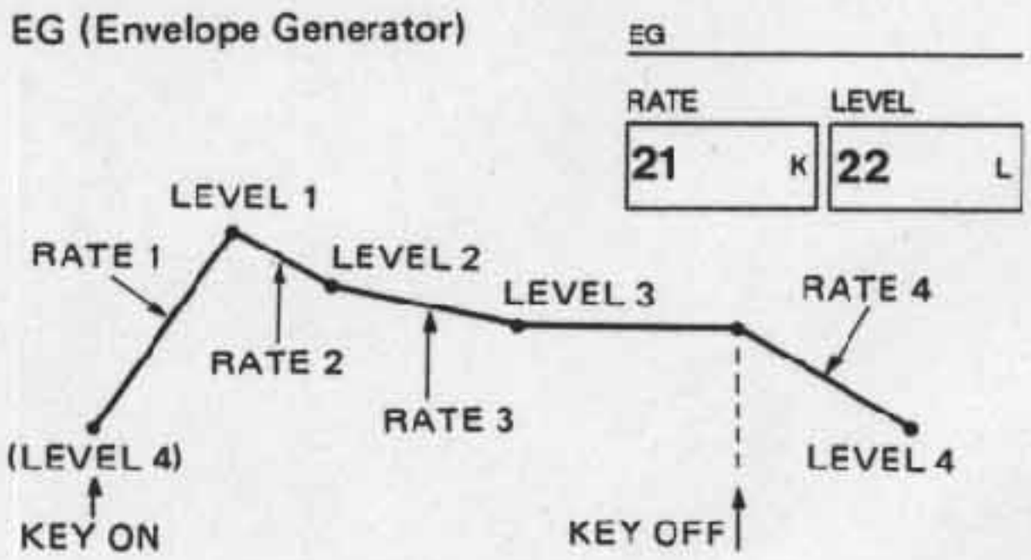
Fixed (Hz) display



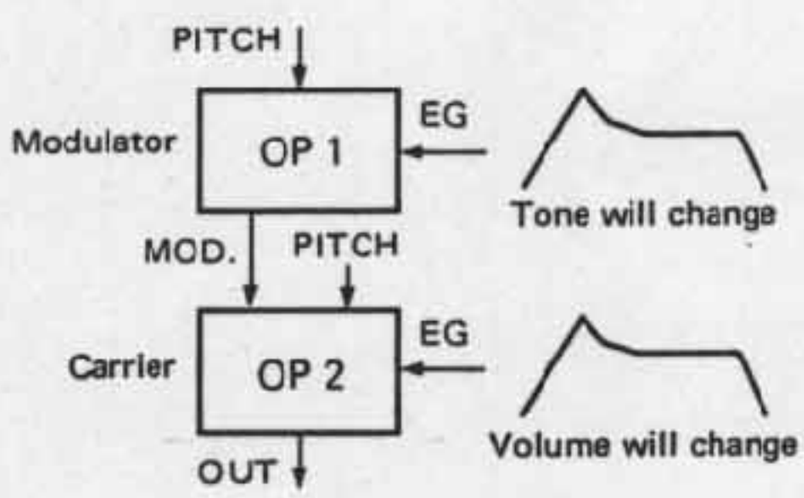
DETUNE:
The operator frequencies as determined by the FREQUENCY COARSE and FREQUENCY FINE controls can be detuned over a −7 to +7 range.

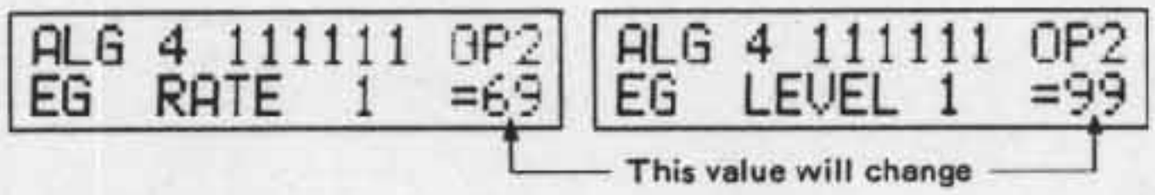


- **EG (Envelope Generator)**



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.





RATE:
Pressing the [RATE] key successively selects RATE parameters 1 through 4. Each RATE parameters 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.

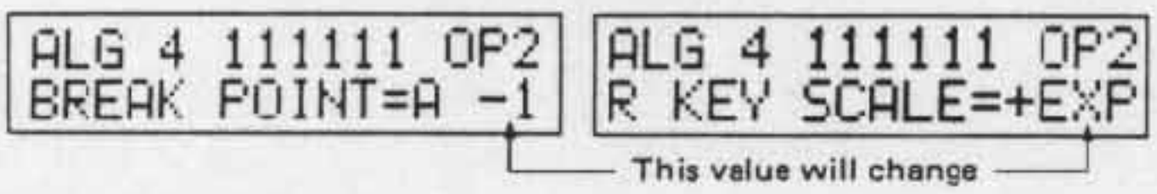
- Normally LEVEL 4 will be set at "0". In this case LEVEL 1 should be greater than "50" to ensure proper EG operation.

• KEYBOARD LEVEL SCALING

KEYBOARD LEVEL SCALING

BREAK POINT	CURVE	DEPTH
23 M	24 N	25 O

Permits raising or lowering the EG levels for keys to the left and right of any key specified as the "Break Point". This is basically a highly advanced version of the keyboard follower function found on some conventional synthesizers, permitting much finer scaling control.



BREAK POINT:

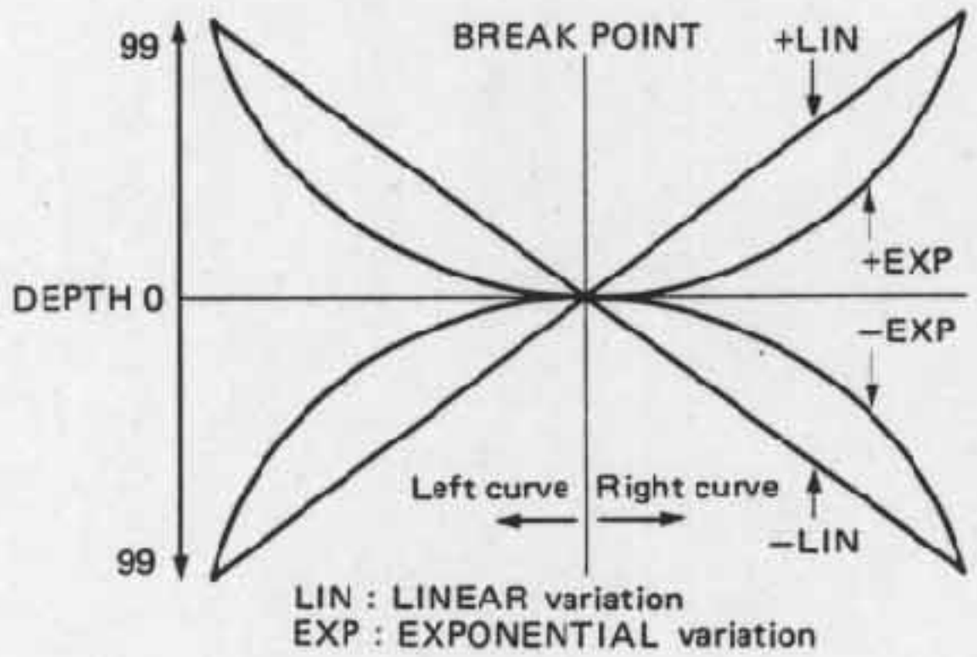
The [BREAK POINT] key—the reference key for the scaling function—can be specified anywhere between A-1 and C8.

CURVE:

Permits variation of the scaling curve to the left and right of the BREAK POINT key. Pressing the [CURVE] key alternates between R KEY SCALING and 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.



• KEYBOARD RATE SCALING

KEYBOARD RATE SCALING

26 P

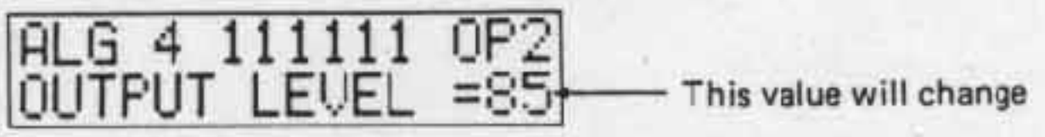
The EG for each operator can be set for a long bass decay and short treble decay—as in an acoustic piano. RATE can be set from 0 to 7.

• OPERATOR

OPERATOR

OUTPUT LEVEL	KEY VELOCITY SENSITIVITY
27 Q	28 R

Permits setting the output level and touch response effect of each operator.



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.

- **Since the 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.

KEY VELOCITY SENSITIVITY:

Permits adjustment of key touch response. That is, how the velocity with which the keys are played affects the sound. Since touch responce 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.

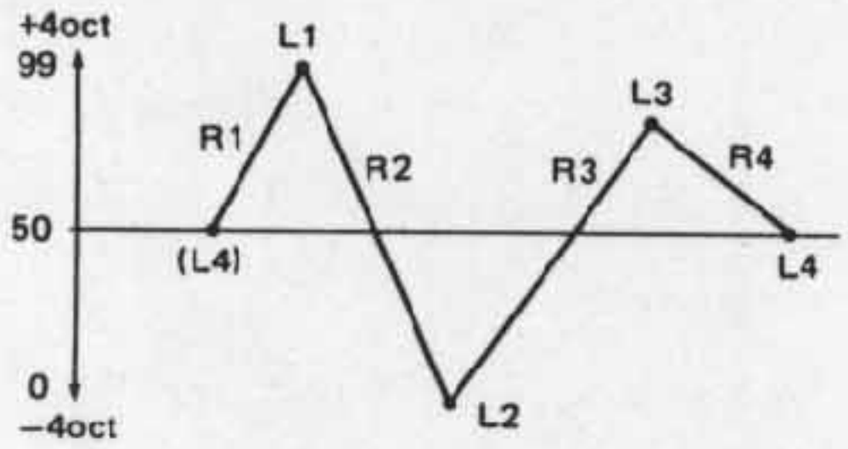
• PITCH EG

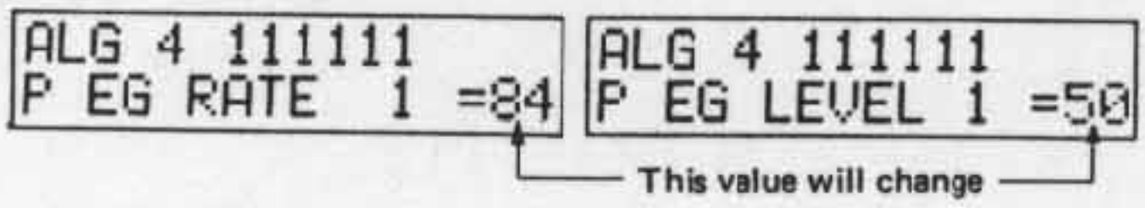
PITCH EG

RATE | LEVEL

29 S | 30 T

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.





RATE:

Pressing the [RATE] key successively selects RATE parameters 1 through 4. Each RATE parameters 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

KEY TRANSPOSE

31 U

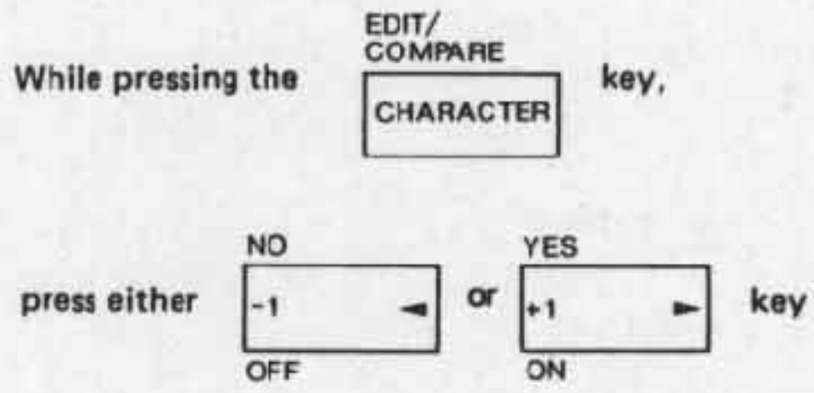
Transposes pitch over a ±2 octave range in semitone steps with C3 as standard. Press the [KEY TRANSPOSE], and then the keyboard key corresponding to the desired amount of transposition according to the illustration on page 18. To transpose up one octave, for example, press the [KEY TRANSPOSE] key and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

• VOICE NAME

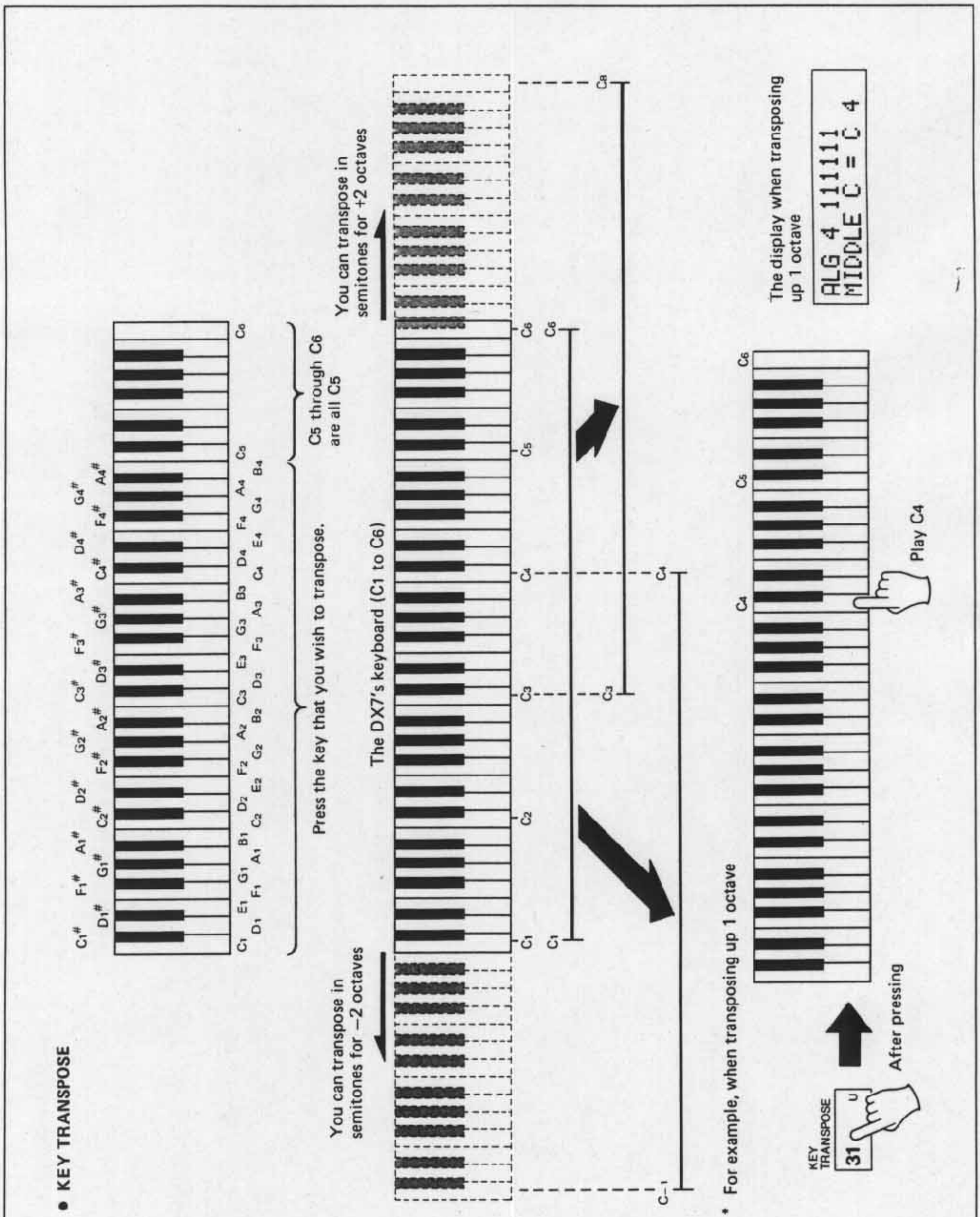
VOICE NAME

32 V

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.



KEY TRANSPOSE



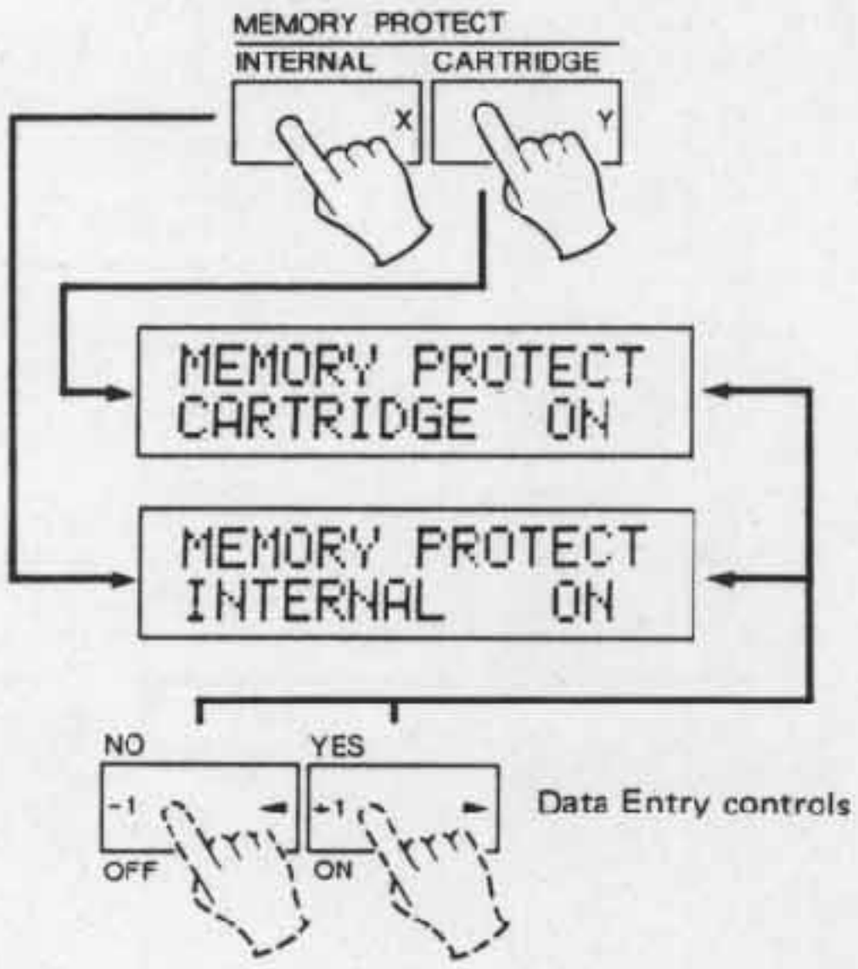
STORE/SAVE/LOAD

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.

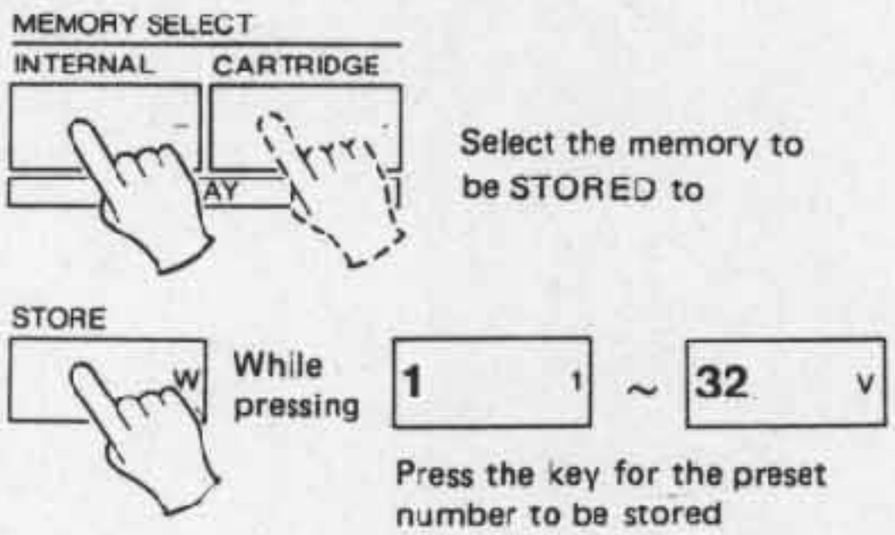
1. Memory Protect . . . . Protecting Your Work

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.



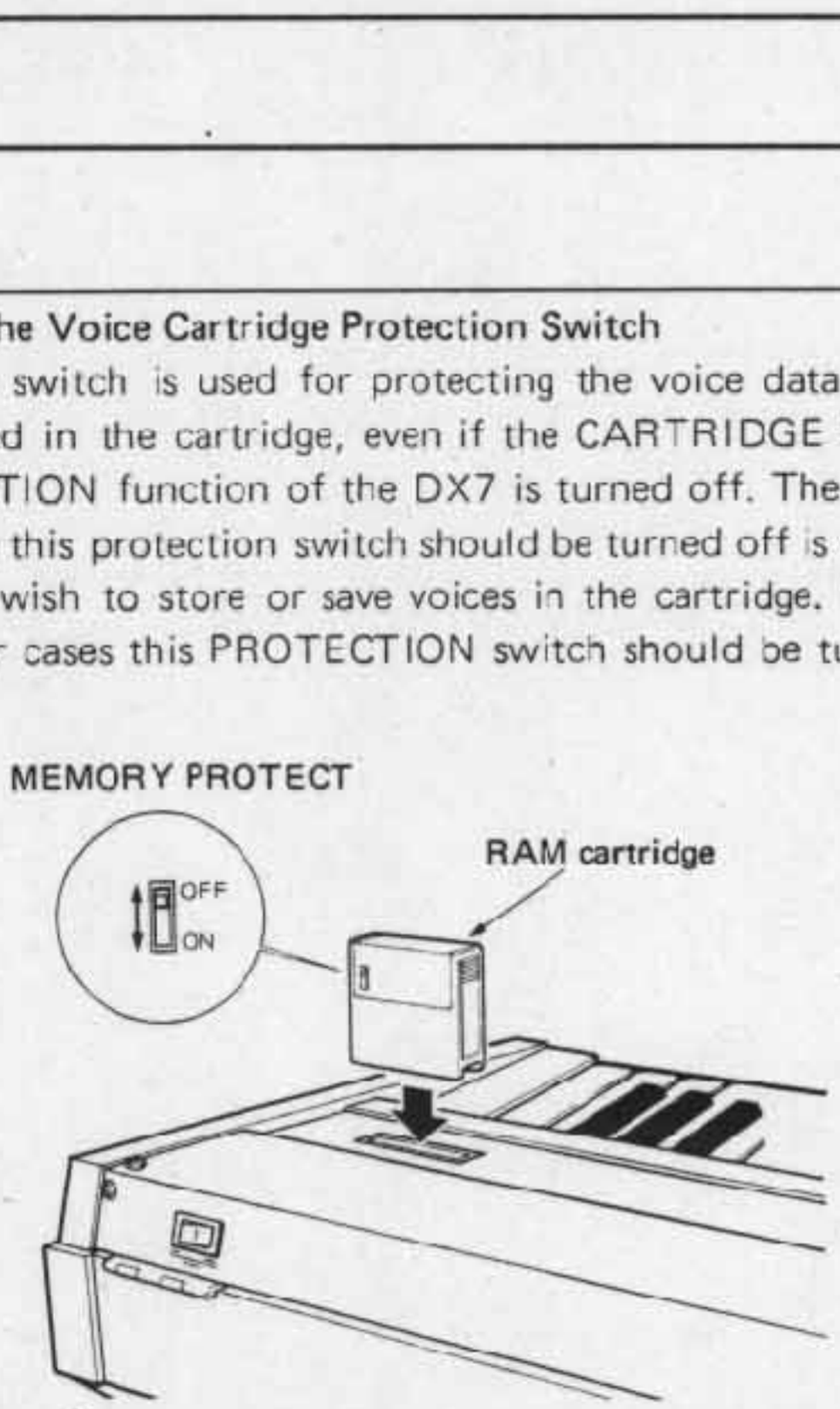
2. Storing Newly Created Voices

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**

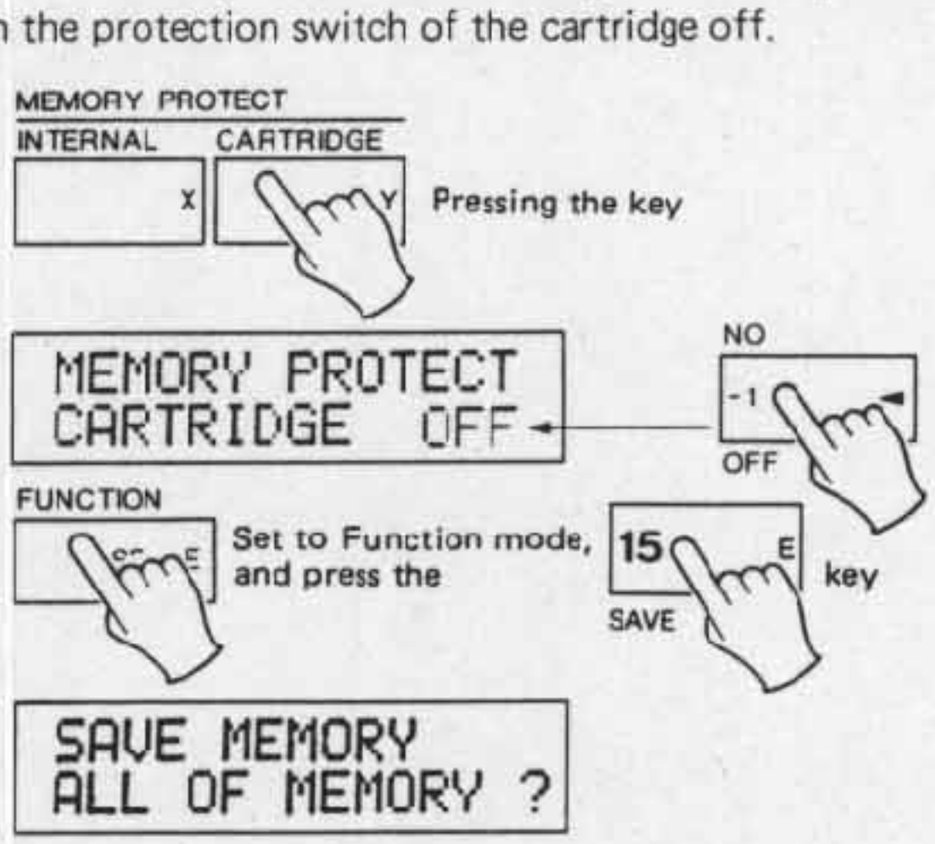
This switch is used for protecting the voice data contained in the cartridge, even if the CARTRIDGE PROTECTION function of the DX7 is turned off. The only time this protection switch should be turned off is when you wish to store or save voices in the cartridge. In all other cases this PROTECTION switch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



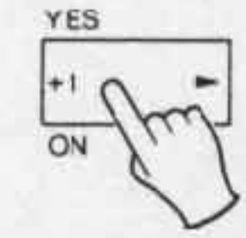
Note: If you save contents of the DX7's internal memory or newly-created sounds in a cartridge that is already full, the previous cartridge contents of that particular preset number will be erased from the memory and the new voice data will replace it. Be sure to save new voice data in preset numbers 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.



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).

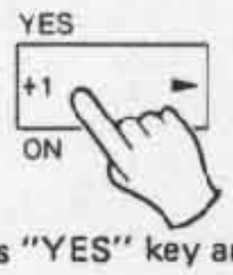


Press "YES" key and

```
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" massage 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.

This display appears when SAVE is finished.

```
SAVE MEMORY
COMPLETED
```

Note: If a "FOARMAT 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 formatted. For details, please refer to the Cartridge Formatting section on page 7.

4. Loading Cartridge Data

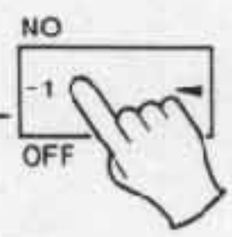
You can load all the contents of a cartridge into the internal memory of the DX7. First, insert the cartridge that contains the voice data that you wish to load.

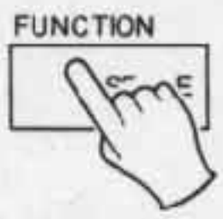
Turn the protection switch of the internal memory off.



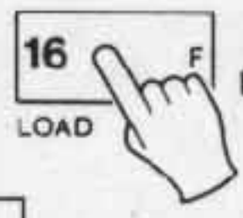
Pressing the key

```
MEMORY PROTECT
INTERNAL   OFF
```





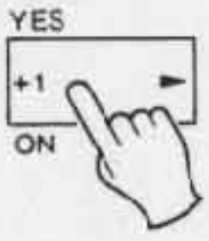
Set to Function mode, and press the



key.

```
LOAD MEMORY
ALL OF MEMORY ?
```

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).

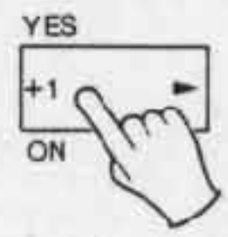


Press "YES" key and

```
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

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.

- **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.

- **Connecting the MIDI Cable**

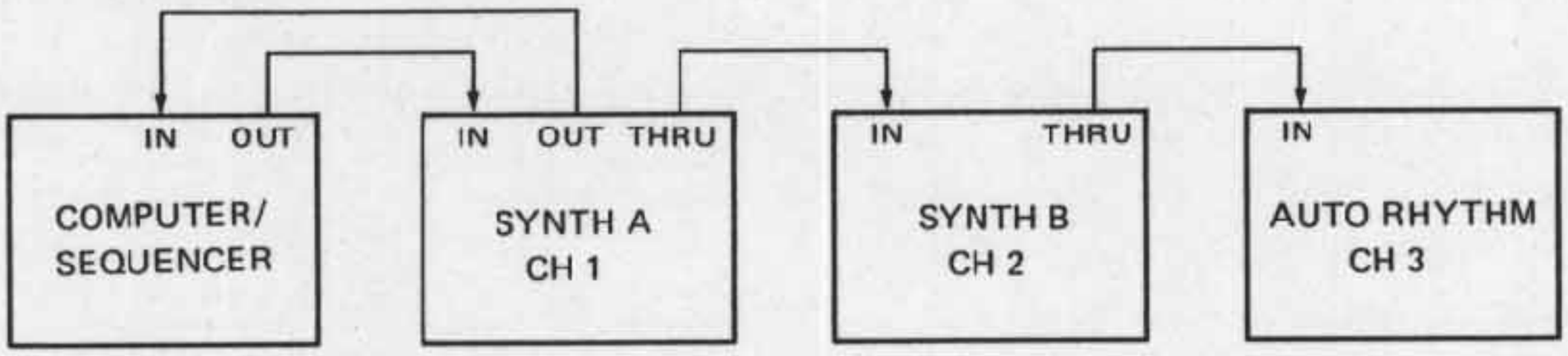


Fig. 1

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.

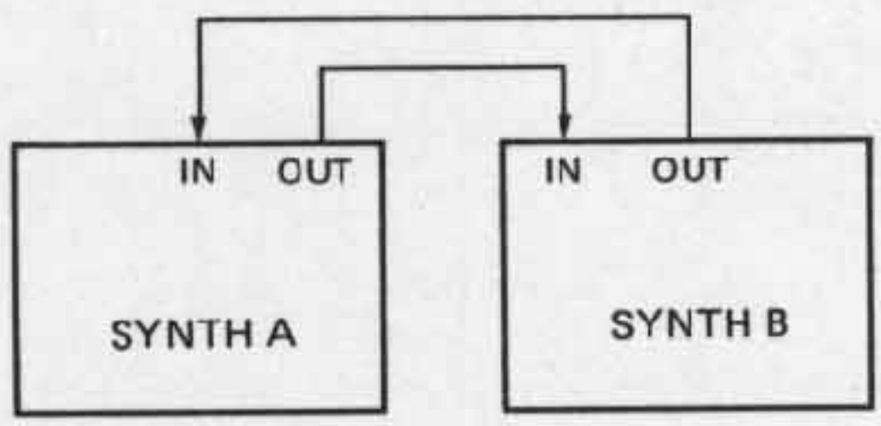
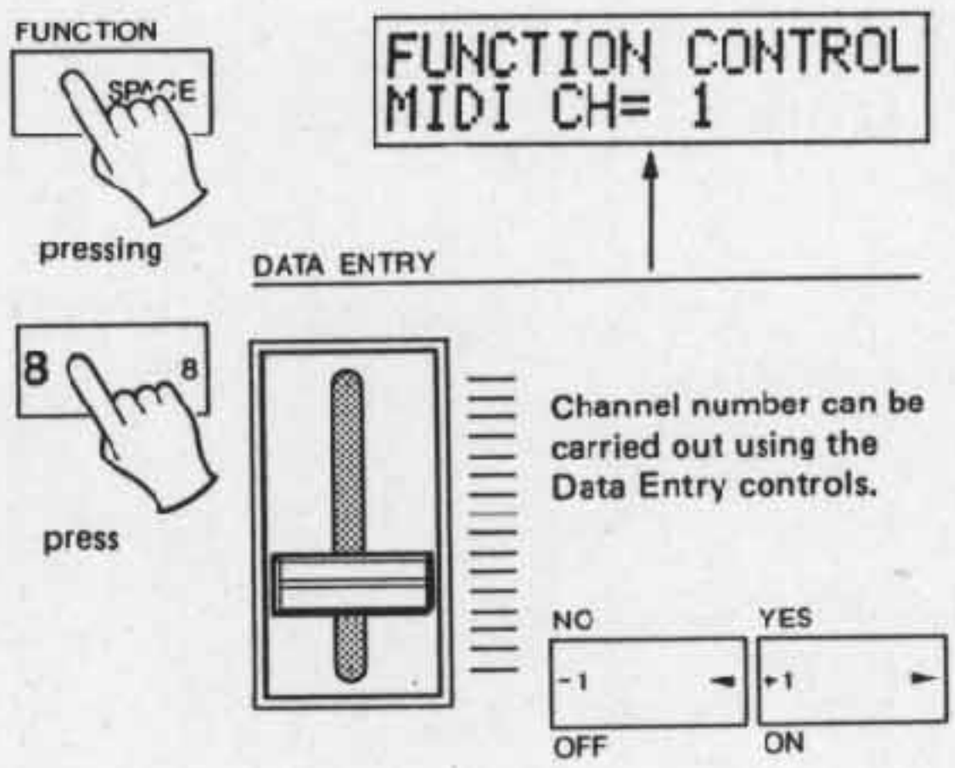


Fig. 2

- **Selecting the Receiving Channel**

While the unit is in the FUNCTION mode, pressing [8 ▫] 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 [8 ▫] again will produce the display "SYS INFO UNAVAIL". Press [-1 +1] to change this to "AVAIL", and the instrument will enter the system information transmit/receive mode.

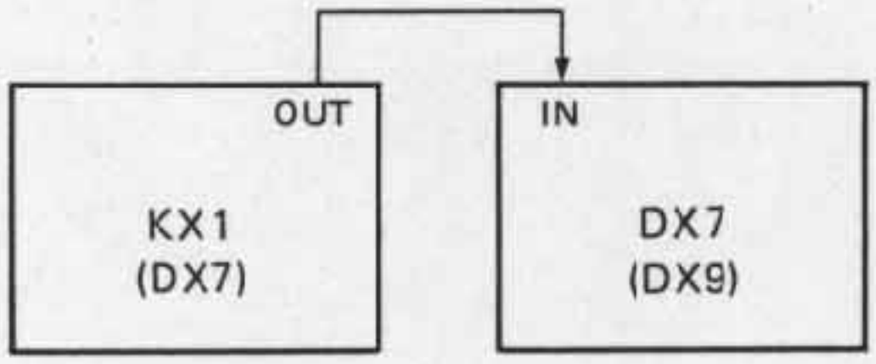


USING MIDI.

- **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.

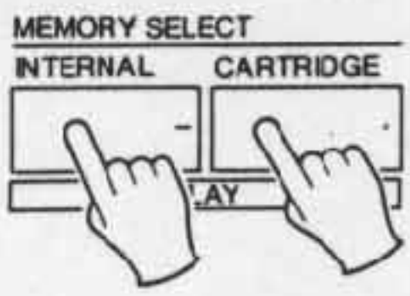


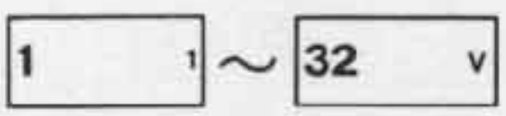
- **Transmit System Information**

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.



in this condition





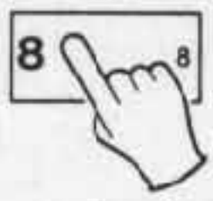
Press the voice number key for the voice you wish to send.

2. Transmit Voice Data for All 32 Voices
   Press [8 ▪] 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 [▪ ►] will cause the voice data for all 32 voices to be output from MIDI OUT.



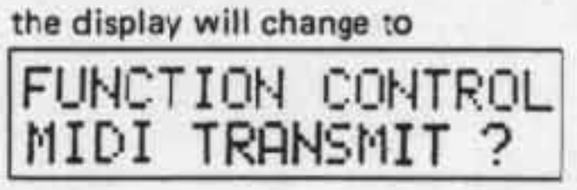
in this condition

Pressing the

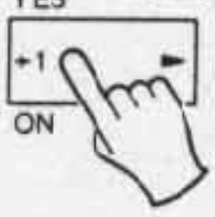


key

the display will change to



Pressing the



key, the voice data for all 32 voices to be output from ch.1.

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**

Select the same number for both the receive and the transmit channels. When the display reads "SYS INFO AVAIL", the instrument will be ready to receive 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.

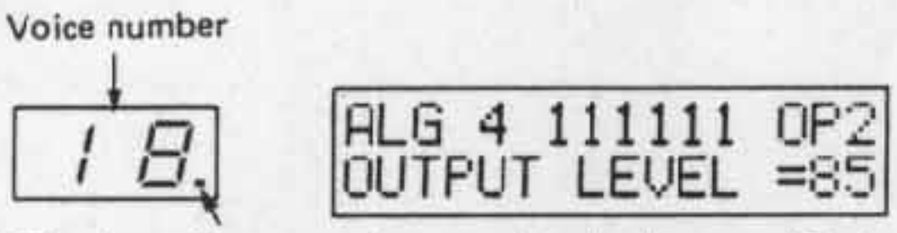
LET'S ACTUALLY CREATE A VOICE

EDIT OPERATION

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

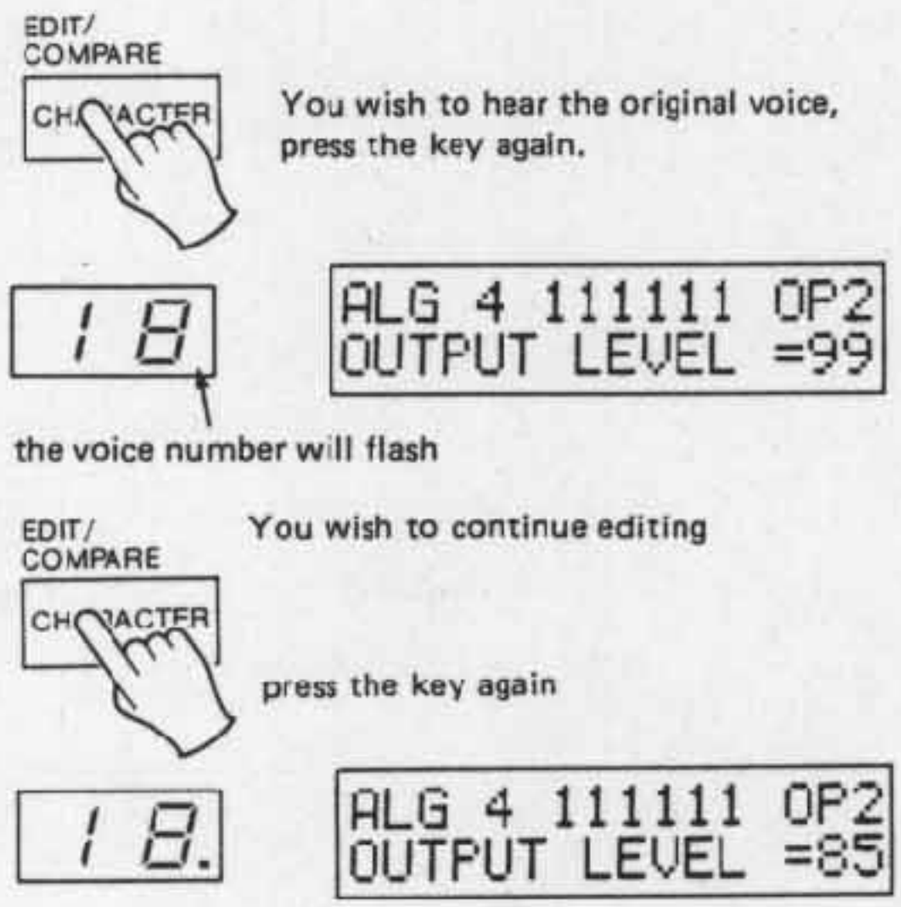
1. Modifying a pre-programmed voice

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.



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.



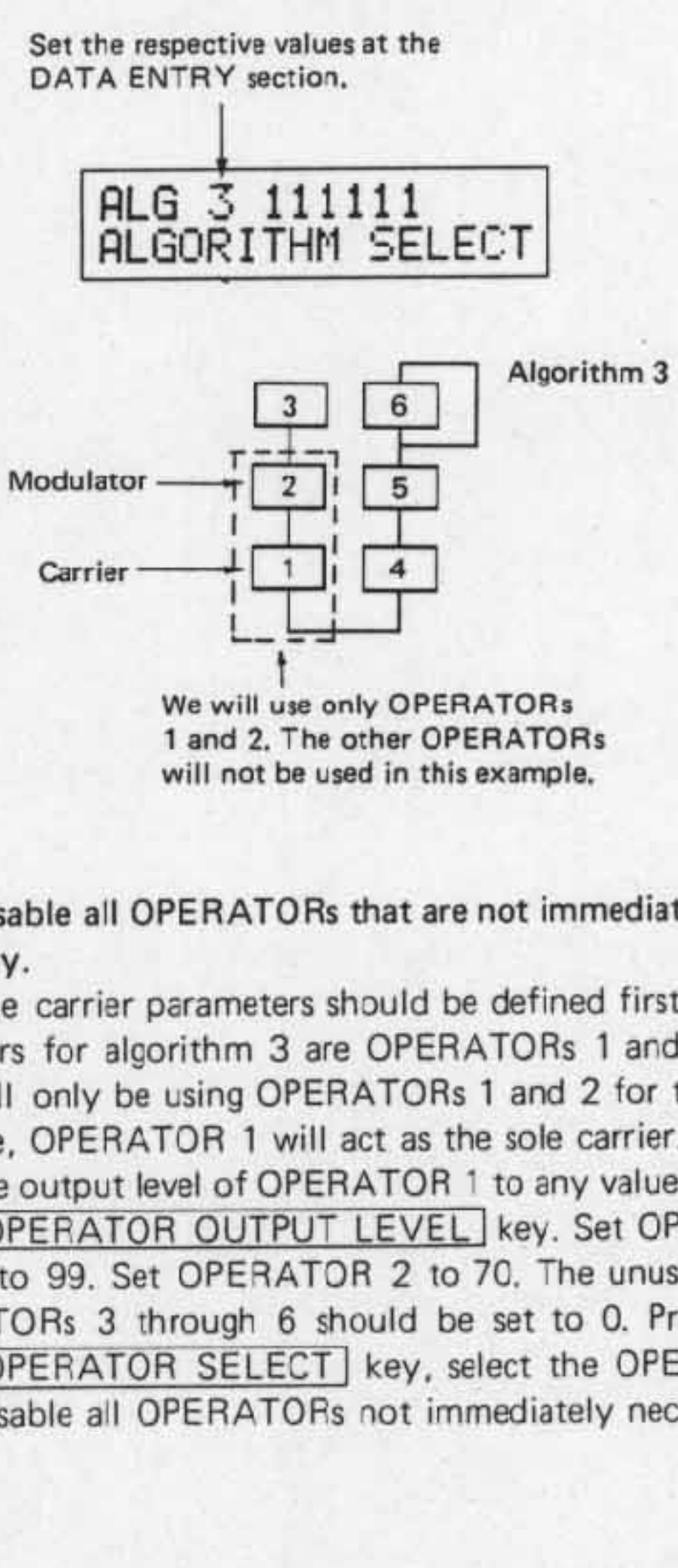
4) Store the edited voice in the internal memory. See the STORE/SAVE/LOAD section on page 19, and carry out the store procedures using it as a reference.

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 feed-back 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.



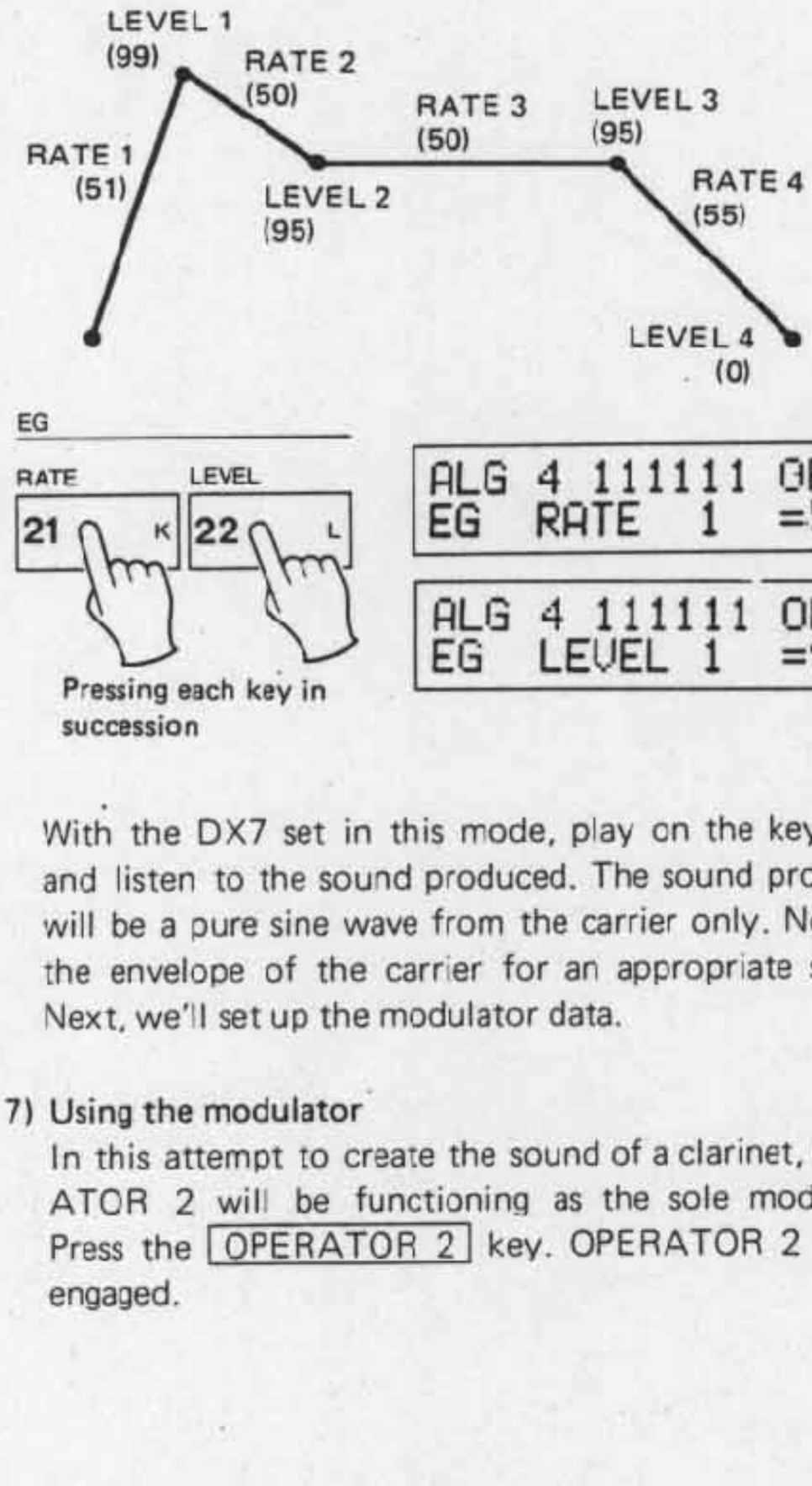
3) **Disable all OPERATORs that are not immediately necessary.**
   The carrier parameters should be defined first. The carriers for algorithm 3 are OPERATORs 1 and 4. As we will only be using OPERATORs 1 and 2 for this example, OPERATOR 1 will act as the sole carrier. First, set the output level of OPERATOR 1 to any value. Press the [OPERATOR OUTPUT LEVEL] key. Set OPERATOR 1 to 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.

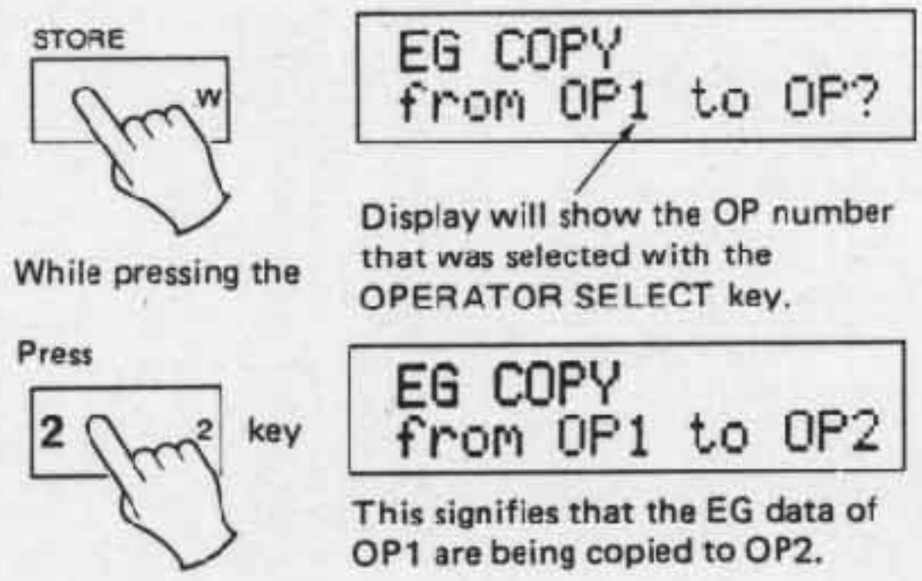


With the DX7 set in this mode, play on the keyboard and listen to the sound produced. The sound produced will be a pure sine wave from the carrier only. Now set the envelope of the carrier for an appropriate sound. Next, we'll set up the modulator data.

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 presseing 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.



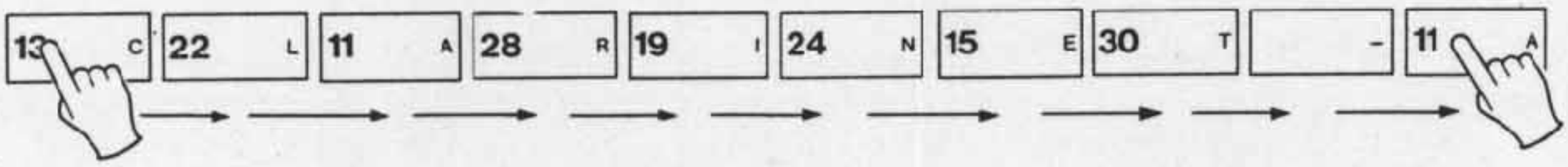
10) **Adjusting Tone**
At this point, listen to the sound. The sound produced will probably be a little harsh. In this case, lower the OUTPUT LEVEL of OPERATOR 2 by pressing on the [OPERATOR SELECT] key. While pressing on the [OPERATOR OUTPUT LEVEL] key, lower the value of the output level using the 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".

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 setting 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.
   Pressing the [AMPLITUDE] key, set the "A MOD SENS" to "0". The settings for both OPERATORs 1 and 2 should be "0".
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.
   Pressing the [AMPLITUDE] key, set the AMPLITUDE to "OFF".
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

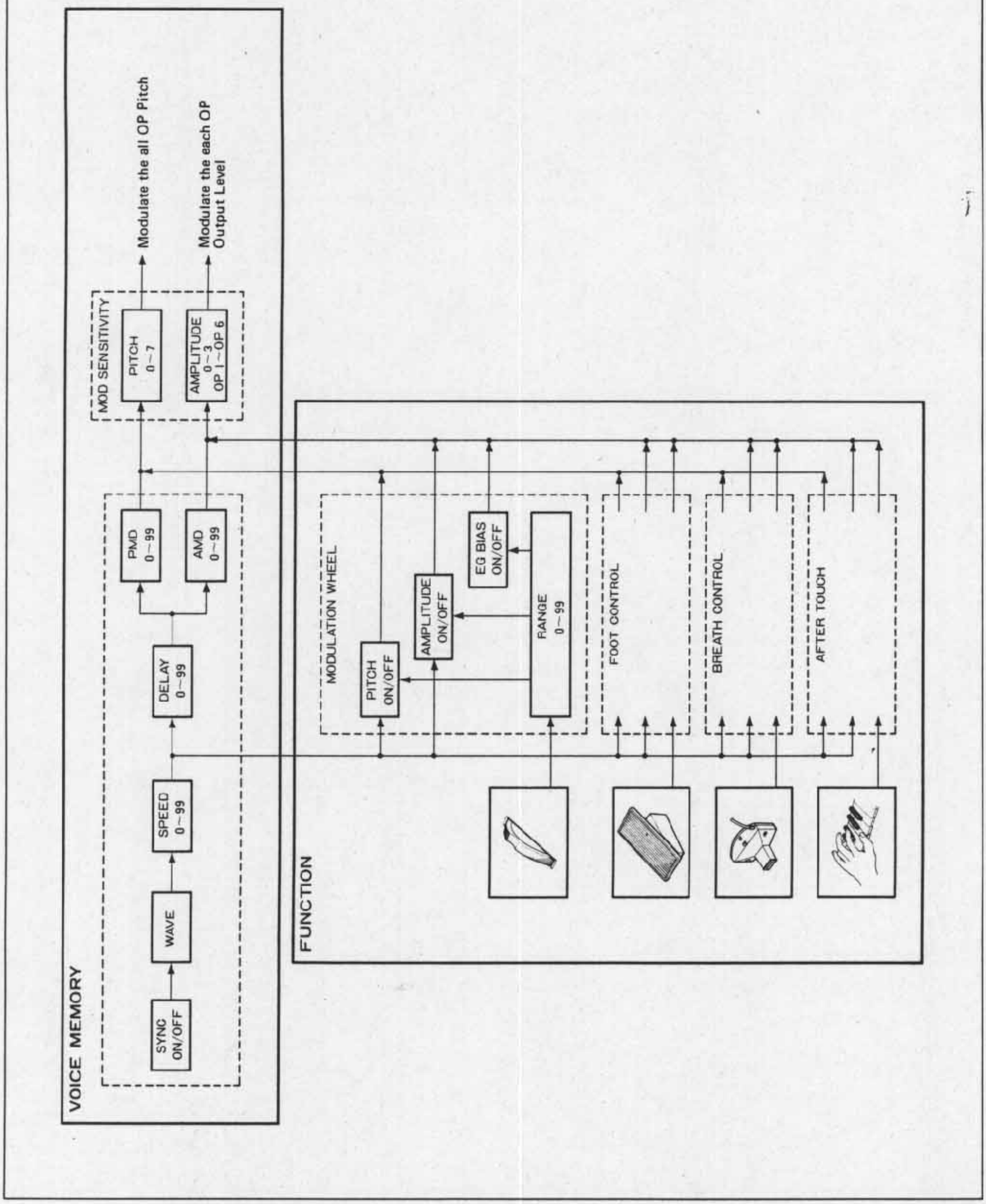
Nearly any name can be given to a VOICE, as long as it is within ten characters in length. As the sound produced here is close to that of an actual clarinet, let us call this VOICE: "CLARINET-A". Pressing the [EDIT/COMPARE] key, set the DX7 back to the EDIT mode. While pressing the [NAME] key, press 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.

LFO BLOCKDIAGRAM



SPECIFICATIONS

Keyboard . . . . . 61 keys, $C_1 \sim C_5$ (Initial & After touch sensitive)
Sound Source . . . . . FM Tone Generator: 6 operators, 32 algorithms
Simultaneous Output Notes . . . . . POLY mode: 16 notes
MONO mode: 1 note
Internal RAM Memory . . . . . 32 Bank (32 Memory)
External ROM Memory . . . . . 32 Bank x 2 (64 Memory)
External RAM Memory . . . . . 32 Bank (32 Memory)
Mode Selectors . . . . . STORE, MEMORY PROTECT (INTERNAL, CARTRIDGE), OPERATOR SELECT, EDIT/COMPARE, PLAY-MEMORY SELECT (INTERNAL, CARTRIDGE), FUNCTION
Controls . . . . . VOLUME, DATA ENTRY [lever, switch: YES (ON)/NO (OFF)], PITCH WHEEL, MODULATION WHEEL, OPERATOR ON-OFF, EG COPY

Voice Parameters

ALGORITHM . . . . . 1 ~ 32
FEED BACK . . . . . 0 ~ 7
LFO WAVE . . . . . ∧ ⊼ ◿ ⊓ ∿ S/H
SPEED . . . . . 0 ~ 99
DELAY . . . . . 0 ~ 99
PITCH MODULATION DEPTH . . . . . 0 ~ 99
AMPLITUDE MODULATION DEPTH . . . . . 0 ~ 99
SYNC . . . . . ON/OFF
PITCH MODULATION SENSITIVITY. . . . . 0 ~ 7
AMPLITUDE MODULATION SENSITIVITY . . . 0 ~ 3
OSCILLATOR MODE . . . . . RATIO/FIXED (HZ)
SYNC . . . . . ON/OFF
FREQUENCY COARSE . . . 0.5 ~ 31
FREQUENCY FINE . . . . . (FREQ COARSE) x 1.0 ~ 1.99
DETUNE . . . . . –7 ~ +7
EG RATE (1 ~ 4) . . . . . 0 ~ 99
LEVEL (1 ~ 4) . . . . . 0 ~ 99
KEYBOARD LEVEL SCALING
BREAK POINT . . . . . A–1 ~ C8
CURVE (L/R) . . . . . ± LIN/± EXP
DEPTH (L/R) . . . . . 0 ~ 99
KEYBOARD RATE SCALING . 0 ~ 7
OPERATOR OUTPUT LEVEL . 0 ~ 99
KEY VELOCITY SENSITIVITY . . . . . 0 ~ 7
PITCH EG RATE (1 ~ 4) . . . . 0 ~ 99
LEVEL (1 ~ 4) . . . 0 ~ 99
KEY TRANSPOSE . . . . . ±2 octaves
VOICE NAME . . . . . within 10 characters

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
Connecting Terminal . . . . . OUTPUT (600 Ω: UNBALANCED)
PHONES (8–150 Ω)
Control Terminal . . . . . FOOT SWITCH (SUSTAIN, PORTAMENTO),
FOOT CONTROL (VOLUME, MODULATION)
BREATH CONTROL
MIDI (IN, OUT, THRU)
Others . . . . . LCD DISPLAY
CARTRIDGE INTERFACE
Dimensions/Weight . . . . . 101.8W x 10.2H x 32.9D cm (40" x 4" x 13")/
14.2 kg (31.2 lbs)
Power Consumption . . . . . 40 W
Accessories . . . . . ROM Cartridge x 2 (64 voices 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

DATE/PRESET No. : /

VOICE NAME : BRASS 1

PROGRAMMER :

ALGORITHM	FEEDBACK	WAVE	SPEED	DELAY	PMD	AMD	SYNC	PITCH	AMPLITUDE	OP
22	7	SINE	37	0	5	0	OFF	3	0	6
									0	5
									0	4
									0	3
									0	2
									0	1
		LFO						MOD. SENSITIVITY		

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

POLY/MONO	PITCH BEND RANGE	PITCH BEND STEP	PORTAMENTO MODE	PORTAMENTO GLISSANDO	PORTAMENTO TIME
POLY	7	0	FOLLOW	OFF	0

OP		OSCILLATOR MODE*/SYNC	FREQ. COARSE	FREQ. FINE	DETUNE	EG RATE 1	EG RATE 2	EG RATE 3	EG RATE 4	EG LEVEL 1	EG LEVEL 2	EG LEVEL 3	EG LEVEL 4	KEYBOARD LEVEL SCALING BREAK POINT	KEYBOARD LEVEL SCALING L CURVE	KEYBOARD LEVEL SCALING R CURVE	KEYBOARD LEVEL SCALING L DEPTH	KEYBOARD LEVEL SCALING R DEPTH	K.BOARD RATE SCALING	OPERATOR OUTPUT LEVEL	OPERATOR VELOCITY SENS.
6	R	ON	1	00	0	49	99	28	68	98	98	91	0	C3	-EXP	-EXP	54	50	4	82	2
5	R		1	00	+1	77	36	41	71	99	98	98	0	C3	+LIN	+LIN	0	0	0	98	2
4	R		1	00	0	77	36	41	71	99	98	98	0	C3	+LIN	+LIN	0	0	0	99	2
3	R		1	00	-2	77	76	82	71	99	98	98	0	C3	+LIN	+LIN	0	0	0	99	2
2	R		0	50	+7	62	51	29	71	82	95	96	0	C2	+LIN	-EXP	0	7	0	86	0
1	R		0	50	+7	72	76	99	71	99	88	96	0	C3	+LIN	+LIN	0	14	0	98	0

PITCH EG RATE 1	PITCH EG RATE 2	PITCH EG RATE 3	PITCH EG RATE 4	PITCH EG LEVEL 1	PITCH EG LEVEL 2	PITCH EG LEVEL 3	PITCH EG LEVEL 4	KEY TRANSPOSE	VOICE NAME
84	95	95	60	50	50	50	50	C3	BRASS1

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
MODULATION WHEEL				FOOT CONTROL				BREATH CONTROL				AFTER TOUCH			
RANGE	PITCH	AMPLITUDE	EG BIAS	RANGE	PITCH	AMPLITUDE	EG BIAS	RANGE	PITCH	AMPLITUDE	EG BIAS	RANGE	PITCH	AMPLITUDE	EG BIAS
60	ON	OFF	OFF	99	OFF	OFF	OFF	99	OFF	OFF	OFF	60	OFF	OFF	OFF

* MODE : R(RATIO), H(Hz)

YAMAHA DX7 VOICE DATA LIST

DATE/PRESET No. : /

VOICE NAME :

PROGRAMMER :

OP	ALGO-RITHM	FEED-BACK	WAVE	SPEED	DELAY	PMD	AMD	SYNC	PITCH	AMPLI-TUDE
			LFO						MOD. SENSITIVITY	
6										
5										
4										
3										
2										
1										
	7	8	9	10	11	12	13	14	15	16

POLY/MONO	PITCH BEND RANGE	PITCH BEND STEP	PORTAMENTO MODE	PORTAMENTO GLISSANDO	PORTAMENTO TIME

OP	MODE/SYNC	FREQ. COARSE	FREQ. FINE	DETUNE	EG RATE 1	EG RATE 2	EG RATE 3	EG RATE 4	EG LEVEL 1	EG LEVEL 2	EG LEVEL 3	EG LEVEL 4	BREAK POINT	L CURVE	R CURVE	L DEPTH	R DEPTH	K.BOARD RATE SCALING	OUTPUT LEVEL	VELOCITY SENS.	PITCH EG RATE 1	PITCH EG RATE 2	PITCH EG RATE 3	PITCH EG RATE 4	PITCH EG LEVEL 1	PITCH EG LEVEL 2	PITCH EG LEVEL 3	PITCH EG LEVEL 4
	OSCILLATOR				EG								KEYBOARD LEVEL SCALING						OPERATOR		PITCH EG							
6																												
5																												
4																												
3																												
2																												
1																												
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32												

MODULATION WHEEL RANGE	MODULATION WHEEL PITCH	MODULATION WHEEL AMPLITUDE	MODULATION WHEEL EG BIAS	FOOT CONTROL RANGE	FOOT CONTROL PITCH	FOOT CONTROL AMPLITUDE	FOOT CONTROL EG BIAS	BREATH CONTROL RANGE	BREATH CONTROL PITCH	BREATH CONTROL AMPLITUDE	BREATH CONTROL EG BIAS	AFTER TOUCH RANGE	AFTER TOUCH PITCH	AFTER TOUCH AMPLITUDE	AFTER TOUCH EG BIAS	KEY TRANSPOSE	VOICE NAME

MIDI DATA FORMAT

1. Transmission Data

1－1. Channel informaton

1001nnnn Key ON & Channel number (n=0; ch1)
0kkkkkkk Key number (k=36; C_1 ～ k=96; C_6)
0vvvvvvv Key velocity (v=0; Key OFF, v=1; ppp ～ v=127; fff)

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

C	Parameter	V
1	Modulation wheel	0 ～ 127
2	Breath controller	0 ～ 127
4	Foot controller	0 ～ 127
6	Data entry knob	0 ～ 127
64	Sustain foot switch	0 ; OFF, 127 ; ON
65	Portamento foot switch	0 ; OFF, 127 ; ON
96	Data entry +1	127 ; ON only
97	Data entry －1	127 ; ON only

1100nnnn Program change & Channel number (n=0 ; ch1) (transmited when it is unavailable)
0ppppppp Program number (p=0:INT1 ～ p=31:INT32, p=32:CRT1 ～ p=63:CRT32)

1101nnnn After touch & Channel number (n=0:ch1)
0vvvvvvv 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)

MS byte	LS byte
0 ～ 64	0
65 ～ 127	2 (MS byte－64)

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).

1－2－2. Bulk data of 1 voice

11110000 Status byte
0iiiiiii Identification number (i=67; YAMAHA)
0sssnnnn Sub status (s=0) & Channel number (n=0 ; ch1)
0fffffff Format number (f=0 ; 1 voice)
0bbbbbbb Byte count MS byte (b=155 ; 1 voice)
0bbbbbbb Byte count LS byte
0ddddddd Data 1st byte
〜 〜
0ddddddd Data 155th byte
0eeeeeee Check Sum (add 155th byte and make the 2's complement)
11110111 EOX

1－2－3. Bulk data of 32 voices

11110000 Status byte
0iiiiiii Identification number (i=67 ; YAMAHA)
0sssnnnn Sub status (s=0) & Channel number (n=0 ; ch1)
0fffffff Format number (f=9 ; 32 voices)
0bbbbbbb Byte count MS byte (b=4096 ; 32 voices)
0bbbbbbb Byte count LS byte
0ddddddd Data 1st byte
〜 〜
0ddddddd Data 4096th byte
0eeeeeee Check Sum (add 4096th byte and make the 2's complement)
11110111 EOX

1－2－4. Parameter change

11110000 Status byte
0iiiiiii Identification number (i=67 ; YAMAHA)
0sssnnnn Sub status (s=1) & Channel number (n=0 ; ch1)
0gggggpp Parameter group number (g=0 ; DX common Voice parameter, g=2 ; DX7 Function parameter)
0ppppppp Parameter number
0ddddddd Data
11110111 EOX

g=0 : DX 共通 Voice parameter

P	Parameter	d
0	OP6 EG RATE 1	0 ~ 99
1	〃 RATE 2	〃
2	〃 RATE 3	〃
3	〃 RATE 4	〃
4	〃 LEVEL 1	〃
5	〃 LEVEL 2	〃
6	〃 LEVEL 3	〃
7	〃 LEVEL 4	〃
8	OP6 KEY BOARD LEVEL SCALE BREAK POINT	〃
9	〃 LEFT DEPTH	〃
10	〃 RIGHT DEPTH	〃
11	〃 LEFT CURVE	0 ~ 3
12	〃 RIGHT CURVE	〃
13	OP6 KEY BOARD RATE SCALLING	0 ~ 7
14	OP6 MOD SENSITIVITY AMPLITUDE	0 ~ 3
15	OP6 OPERATOR KEY VELOCITY SENSITIVITY	0 ~ 7
16	OP6 OPERATOR OUTPUT LEVEL	0 ~ 99
17	OP6 OSCILLATOR MODE	0 ~ 1
18	OP6 OSCILLATOR FREQUENCY COARSE	0 ~ 31
19	〃 FINE	0 ~ 99
20	DETUNE	0 ~ 14
21 ~ 125	OP5 ~ OP1	
126	PITCH EG RATE 1	0 ~ 99
127	〃 RATE 2	〃
128	〃 RATE 3	〃
129	〃 RATE 4	〃
130	〃 LEVEL 1	〃
131	〃 LEVEL 2	〃
132	〃 LEVEL 3	〃
133	〃 LEVEL 4	〃
134	ALGORITHM SELECT	0 ~ 31
135	FEED BACK	0 ~ 7
136	OSCILLATOR SYNC	0 ~ 1
137	LFO SPEED	0 ~ 99
138	〃 DELAY	〃
139	〃 PMD	〃
140	〃 AMD	〃

P	Parameter	d
141	LFO SYNC	0 ~ 1
142	〃 WAVE	0 ~ 4
143	MOD SENSITIVITY PITCH	0 ~ 7
144	TRANSPOSE	0 ~ 48
145 ~ 154	VOICE NAME 1 ~ VOICE NAME 10	ASCII

P	Parameter	D_6	D_5	D_4	D_3	D_2	D_1	D_0
155	OPERATOR ON/OFF							
	0=OFF, 1=ON	0	OP1	OP2	OP3	OP4	OP5	OP6

g=2 ; DX7 Function parameter

P	Parameter	d
64	MONO/POLY MODE CHANGE	0 ~ 1
65	PITCH BEND RANGE	0 ~ 12
66	〃 STEP	0 ~ 12
67	PORTAMENT MODE	0 ~ 1
68	〃 GLISSAND	0 ~ 1
69	〃 TIME	0 ~ 99
70	MODULATION WHEEL RANGE	0 ~ 99
71	〃 ASSIGN	0 ~ 7
72	FOOT CONTROLLER RANGE	0 ~ 99
73	〃 ASSIGN	0 ~ 7
74	BREATH CONTROLLER RANGE	0 ~ 99
75	〃 ASSIGN	0 ~ 7
76	AFTER TOUCH RANGE	0 ~ 99
77	〃 ASSIGN	0 ~ 7

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 ; ch1 ～ n=15 ; ch16)

0kkkkkkk Key number (k=0, 1 ; $C^{\#}_{-2}$ ～ k=127 ; G_8)

0vvvvvvv Key velocity (v : ignored)

1001nnnn Key ON & Channel number
(n=0 ; ch1 ～ n=15 ; ch16)

0kkkkkkk Key number (k=0, 1 ; $C^{\#}_{-2}$ ～ k=127 ; G_8)

0vvvvvvv Key velocity
(v=0 ; Key OFF, v=1 ; ppp ～ v=127 ; fff)

1011nnnn Control change & channel number
(n=0 ; ch1 ～ n=15 ; ch16)

0ccccccc Control number

0vvvvvvv Control value

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

1100nnnn Program change & Channel number
(n=0 ; ch1 ～ n=15 ; ch16)

0ppppppp Program number (p=0:INT1 ～ p=31:INT32
p=32:CRT1 ～ p=63:CRT32)

1110nnnn Pitch bender & Channel number
(n=0 ; ch1 ～ n=15 ; ch16)

0vvvvvvv Pitch bender value LS byte (ignored)

0vvvvvvv Pitch bender value MS byte (0 ～ 64 ～ 127)

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

0iiiiiii Identification number (i=67:YAMAHA)

0sssnnnn Sub status (s=0) & Channel number
(n=0:ch1 ～ n=15:ch16)

0fffffff Format number (f=2:1 performance)

0bbbbbbb Byte count MS byte (b=94:1 performance)

0bbbbbbb Byte count LS byte

0ddddddd Data 1st byte

〃 〃

0ddddddd Data 94th byte

0eeeeeee Check sum (add 94th byte and make the complement on 2)

11110111 EOX

SINCE 1887

YAMAHA

NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

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