

to examine the processing power. The calculation is repeatedly done in steps Sa15 to Sa17 for m cycles, and the time required for the m sample calculation is measured by the timer operation to set the sampling frequency fs suitable for the processing power of the CPU in step Sa21. Similarly in the waveform memory readout mode, the readout operation of the wave data is the bottle neck of the sound synthesizing, so that the wave data at each sample point is read out to examine the accessing speed. The readout process is done in steps Sa15 to Sa17 for m samples, and the time required for the m sample calculation is measured by the timer operation to set the sampling frequency fs suitable for the processing power of the CPU in step Sa21.

[0043] The synthesizing by the selected hardware, which is executed in the above-described step Sa34 (Figure 11), is explained hereunder. This synthesizing process is effected unless voices of all the channels are synthesized by the CPU synthesizing mode alone. This process is executed to control the sound source device used for synthesizing the waveform according to the allocation mode. First of all in this procedure, event detection is carried out in step Se1 of Figure 15. The event includes a key-on event issued in response to keyboard information KBD or MIDI information, and includes other events not only associated to the CPU synthesizing mode, but also associated to the sound source device mode. Upon detecting the key-on event, the apparatus initiates the synthesizing process. In step Se2, it is tested whether the current operating mode designates the sound source synthesizing mode or not. If the detection result is "No", the procedure branches to step Se11. Otherwise, the procedure goes forward to following step Se3, if the detection result is "Yes". In step Se3, it is tested whether the current synthesizing operation status of the sound source devices and the performance information corresponding to the event comply with a "condition" for synthesis of waveform by the sound source device. In the present embodiment, one condition is whether the number of voices (timbres) to be synthesized currently is within a maximum number of voices which can be synthesized simultaneously by the hardware device specified in the sound source synthesizing mode. More particularly, in step Se3, the number of channels currently being in active status and being allocated for the sound source device is less than or equal to the full number of the channels which can be used for simultaneous synthesis of voices by the device. The "condition" may include other factors listed hereunder: (1) Whether a "pitch" or a "touch" specified by the detected event is higher (or lower) than a predetermined value. (2) Whether a value relevant to "timbre" specified by the detected event is higher (or lower) than a predetermined value. (3) Whether a value relevant to a number of "parts" in the performance information specified by the detected event is higher (or lower) than a predetermined value. (4) Whether a detected MIDI-CH value (number of channels) relevant to the detected

event is higher (or lower) than a predetermined value. As shown above, the criteria for the "condition" may be generalized as whether a certain value specified by the performance information is higher (or lower) than a predetermined value. It is possible to implement a particular "condition" to issue a negative result if some unique timbre is specified to be synthesized in the FM mode or the harmonics synthesizing mode using the sound source device. This implementation will be described later in another embodiment. If the "condition" is fulfilled, channel assignment process is conducted in step Se4 such that a channel to synthesize a voice for the key-on event is allocated out of vacant channels in the sound source device, which are currently not used for synthesizing the sound. In step Se5, the sound generation is executed using the specified sound source hardware, in which the actual synthesizing of the waveform is done for the issued event in the allocated channel.

[0044] If the "condition" is not fulfilled in step Se3, it is tested whether the flag ENBLFLG is "1" or not in step Se6. In this stage, the value "1" of the flag ENBLFLG indicates that the steps Sa13 to Sa25 have been executed already, and indicates that the sampling frequency fs for the CPU synthesizing mode is already set up. Thus, the CPU synthesizing mode is available. Therefore, if the test result of step Se6 is "Yes" because of value "1" of the flag ENBLFLG, voice allocation procedure to the CPU synthesizing mode is executed in step Se7 so that the synthesizing of the waveform relevant to the event which does not comply with the condition for synthesizing by the sound source device is carried out by the CPU synthesizing mode. Particularly, an allocation command is issued to calculate sample values of the waveform relevant to the event in this CPU synthesizing allocation procedure. The command includes designation of computation mode to be executed by the CPU 10 (any mode out of the CPU synthesizing modes), and designation of the timbre, pitch, touch, volume and channel assignment. Further, the command includes note commands such as key-on or key-off. During the allocation command is valid, the computation devices including the CPU 10 execute the waveform synthesizing computation process in order to generate the sample values relevant to the event in step Se10. The allocation command also includes information about the start and end of interrupts, if the waveform is generated with the interrupt process. On the other hand, if the value "0" of flag ENBLFLG is detected in step Se6, the CPU synthesizing mode is not available. In this case, truncating process is carried out to turn off sound reproduction operation of a channel which is the oldest in step Se8, to make a vacant channel forcibly. This truncating process may be included in the allocation process executed in step Se4. In step Se4, the relevant event is allocated to the vacant channel made by the forcible note-off, and the synthesizing of the waveform relevant to the event is carried out by the allocated channel in step Se4. If multiple sound source