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# Fax Cover Page

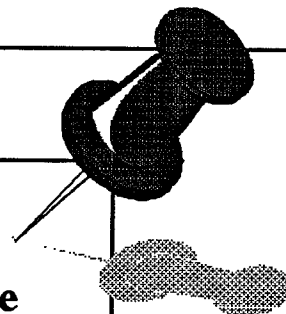
## SUBJECT:

Mary,

Attached is a preliminary, working memo, analyzing the claims of the Korg patent. The page that is probably most interesting are the page listing all the features covered by the claims, and the following page showing that even the older of the references discloses almost all of those features and that the several other references disclose the other features.

This memo is a working document, not a formal analysis, but I thought I'd give you what I have so far. See you Thursday at 2:00.

Regards,  
Gary



To: Watanabe, Mary

From : Gary S. Williams

For Information Call: (415) 494-8700

At: Flehr Hohbach Test et al.

Pages: 11

My Fax Number : (415) 494-8771

I-62408/GSW

Claim Chart for U.S. Patent 5,331,111

1. Apparatus for generating sound:  
user input;  
graphical programming engine, produces graphical model representative of a sound generating program;  
a display for displaying the graphical model;  
a translation engine that translates the graphical model into a sound generating program; and  
a processor.
2. d1  
The translation engine includes synchronous and asynchronous resources to produce:  
routines synchronous with the output data (i.e, for generating the output data on a continuing basis), and  
routines asynchronous with the output data (e.g., for responding to MIDI commands).
3. d2  
The processor includes  
a first processor synchronized with the output data, and  
a second processor asynchronous with the first processor for executing the asynchronous routines.
4. d1  
The translation engine produces  
synchronous routines;  
asynchronous routines; and  
links between the asynchronous routines and the synchronous routines.
5. d1  
User input includes one port (a keyboard and mouse port) for supplying data to the graphical programming engine and another port (e.g., a MIDI port) for supplying input data to the processor.
6. d1  
The user input includes an alphanumeric keyboard and a port for a position indicating means (such as a slider).
7. d1  
Supply MIDI data to the processor.  
(The claim uses term "processor means" which has no antecedent.)
8. d1

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Analysis of U.S. Patent 5,331,111

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The graphical programming engine includes a set of function symbols;  
the translation engine includes:  
    function code segments;  
    a preprocessor that selects the function code segments and establishes  
        data connections between them; and  
    a compiler.

9.     d1  
       A converter that converts the output data into sound.
10.    d1  
       The graphic symbols in the graphical programming engine include:  
       a set of function symbols;  
       at least one external data source symbol.
11.    d10  
       The graphic symbols in the graphical programming engine further include:  
       at least one controllable data source symbol;  
       the graphical programming engine includes means for manipulating the  
           controllable data source symbol to select a parameter for the sound  
           generating program (e.g., a graphical slider can be used to set a  
           program parameter).
12.    d10  
       The graphical programming engine includes:  
       means for editing parameters of the function code block corresponding to a  
           graphic symbol.
13.    d1  
       The graphical programming engine includes:  
       means for indicating an order of execution in association with the graphical  
           symbols.
14.    d1  
       The processor includes a host data processor and a DSP.
15.    d14  
       The sound generating program includes modules executed by the DSP and  
       modules executed by the host data processor.
16.    d11  
       The graphical programming engine includes:  
       means for displaying a graphical representation of a control panel including  
           icons for controllable data source symbols included in the graphical  
           model.

17. Apparatus for generating sound:
  - user input;
  - host data processor;
  - graphical programming engine, coupled to the host data processor, produces graphical model representative of a sound generating program;
  - a display, coupled to the host data processor, for displaying the graphical model;
  - a signal processor, coupled with the host data processor;
  - a translation engine that translates the graphical model into a sound generating program for execution by a combination of the signal processor and the host data processor; and
  - an execution engine that causes real time execution by the signal processor and the host data processor of the sound generating program.
18. d17 (same as claim 4)  
The translation engine produces
  - synchronous routines;
  - asynchronous routines; and
  - links between the asynchronous routines and the synchronous routines.
19. d17 (same as claim 5)  
User input includes one port (a keyboard and mouse port) for supplying data to the graphical programming engine and another port (e.g., a MIDI port) for supplying input data to the processor.
20. d17 (same as claim 6)  
The user input includes an alphanumeric keyboard and a port for a position indicating means (such as a slider).
21. d17 (same as claim 7)  
Supply MIDI data to the processor.  
(The claim uses term "processor means" which has no antecedent.)
22. d17 (same as claim 8)  
The graphical programming engine includes a set of function symbols;  
the translation engine includes:
  - function code segments;
  - a preprocessor that selects the function code segments and establishes data connections between them; and
  - a compiler.
23. d17 (same as claim 9)  
A converter that converts the output data into sound.
24. d17 (same as claim 10)  
The graphic symbols in the graphical programming engine include:

- a set of function symbols;  
at least one external data source symbol.
25. d24 (same as claim 11)  
The graphic symbols in the graphical programming engine further include:  
at least one controllable data source symbol;  
the graphical programming engine includes means for manipulating the  
controllable data source symbol to select a parameter for the sound  
generating program (e.g., a graphical slider can be used to set a  
program parameter).
26. d25 (same as claim 12)  
The graphical programming engine includes:  
means for editing parameters of the function code block corresponding to a  
graphic symbol.
27. d17 (same as claim 13)  
The graphical programming engine includes:  
means for indicating an order of execution in association with the graphical  
symbols.
28. d25 (same as claim 16)  
The graphical programming engine includes:  
means for displaying a graphical representation of a control panel including  
icons for controllable data source symbols included in the graphical  
model.
29. Apparatus for generating sound:  
user input;  
graphical programming engine, coupled to the host data processor, produces  
graphical model representative of a sound generating program, including  
a symbol for a real time output function and a symbol for a real time  
input function;  
a display, coupled to the host data processor, for displaying the graphical  
model;  
translation resources that translate the graphical model into an ordered list of  
object names with associated parameters specifying a sound generating  
program
30. d29  
means for producing synchronous routines, and asynchronous routines.
31. d30  
a signal processor for executing the synchronous routines; and  
host data processor, coupled with the signal processor.

32. d29 (similar to claim 4)  
means for producing  
synchronous routines;  
asynchronous routines; and  
links between the asynchronous routines and the synchronous routines.
33. d29 (similar to claims 8 and 9)  
function code segments;  
a preprocessor that selects the function code segments and establishes data  
connections between them;  
a compiler to compile an executable sound generation program;  
a real time processor to execute the compiled sound generating program; and  
a converter that converts the output data into sound.
34. Apparatus for generating sound:  
user input;  
host data processor;  
graphical programming engine, coupled to the host data processor, produces  
graphical model representative of a sound generating program;  
a display, coupled to the host data processor, for displaying the graphical  
model;  
a signal processor, coupled with the host data processor;  
a translation engine that translates the graphical model into a list of object  
names with associated parameters for specifying a sound generating  
program;  
function code segments corresponding to the object names;  
a compiler to compile an executable sound generation program; and  
an execution engine that causes real time execution by the signal processor of  
a synchronous portion of the sound generation program and execution  
by the host data processor of an asynchronous portion of the sound  
generating program.
35. d34 (similar to claim 12)  
The graphical programming engine includes:  
means for editing parameters of the function code block corresponding to a  
graphic symbol.
36. d34 (similar to claim 13)  
The graphical programming engine includes:  
means for indicating an order of execution in association with the graphical  
symbols.
37. d34 (similar to claim 5)  
User input includes a first instrument (a keyboard and mouse port) for supplying  
data to the graphical programming engine and another instrument (e.g., a MIDI  
port) for supplying input data to the processor.

38. d34 (similar to claim 6)  
The user input includes an alphanumeric keyboard and a port for a position indicating means (such as a slider).
39. d34 (similar to claim 7)  
Supply MIDI data to the processor.  
(The claim uses term "processor means" which has no antecedent.)
40. d34  
The graphics symbols include at least one external data source symbol representing a source of input data.
41. d34 (similar to claim 11)  
The graphic symbols in the graphical programming engine further include:  
at least one controllable data source symbol;  
the graphical programming engine includes means for manipulating the  
controllable data source symbol to select a parameter for the sound  
generating program (e.g., a graphical slider can be used to set a  
program parameter).
42. d41 (similar to claim 16)  
The graphical programming engine includes a graphical representation of a control panel including controllable data source symbols.
43. A method for developing a model for a sound generating program:  
selecting first and second graphical symbols;  
positioning the graphical symbols  
connecting an output of the first graphical symbol to an input of the second  
graphical symbol;  
assigning an order of execution to the graphical symbols;  
generating a computer program for generating sound;  
executing the computer program to generate sound.
44. A method for developing a model for a sound generating program:  
providing a set of object names with associated parameters, some objects  
representing synchronous functions and others representing  
asynchronous functions to be executed asynchronously with respect to  
audio output data;  
selecting a subset of objects for executing by the sound generating program,  
including an object representing a real time audio output function;  
specifying connections among the objects in the subset to identify sources and  
destinations of data to be generated by the associated functions;  
specifying an order of execution; and  
setting parameters to establish an instantiation of the sound generating  
program.

45. d44 (basic graphical feature)  
providing a set of graphical symbols representing the objects;  
selecting graphical symbols from the set of graphical symbols.
46. d45 (basic graphical feature)  
connecting an output of one graphical symbol to the input of another using tools  
for drawing connections on the display.
47. d44 (basic graphical feature)  
generating a computer program in response to the selected objects and  
connections and assigned order;  
executing the computer program to generate sound using the audio output  
function.
48. d44 (similar to claim 4)  
includes an object representing a real time input function;  
generating a computer program in response to the selected objects and  
connections and assigned order;  
executing the computer program in response to data supplied by the real time  
input function.
49. d44 (similar to claim 4, narrower version of claim 48)  
includes an object representing a real time input function for processing input  
data supplied by a user asynchronously with respect to the audio output  
data;  
generating a computer program in response to the selected objects and  
connections and assigned order;  
executing the computer program in response to data supplied to a synchronous  
function by the real time input function.



Features found in various ones of the claims:

1. Graphical Interface Features:

- A. set of objects, graphical symbols for same
- B. objects include
  - B1. objects representing synchronous functions and
  - B2. a real time output function object
  - B3. objects representing asynchronous functions
  - B4. a real time input function object
- C. object parameters
- D. a parameter editor for editing function or object parameters
- E. draw lines between objects to represent data flow connections
- H. a display
- I. graphical control panel

2. Program Features

- A. synchronous portion of program, synchronous functions
- B. asynchronous portion of program, asynchronous functions
- C. links between asynchronous and synchronous program portions
- D. real time execution
- E. user can specify order of execution of program portions or functions
- F. translation engine generate program from graphical representation
- G. a compiler
- H. execution engine

3. System Features

- A. user input
  - A1. keyboard port
  - A2. MIDI port / slider port
- B. two processors: host processor and DSP
- C. speaker: audio signal converter

## Analysis of Prior Art References:

1. E, Favreau et al., "Software Developments for the 4X Real-time System," ICMC 1986 Proceedings, pp. 369-373.

Y/N

- |           |     |   |
|-----------|-----|---|
| Y         | 1.  | Graphical Interface   |
| Y         | A.  | set of objects, graphical symbols for same                        |
|           | B.  | objects include   |
| Y         | B1. | objects representing synchronous functions and                    |
| Y         | B2. | a real time output function object                                |
| Y         | B3. | objects representing asynchronous functions                       |
| Y         | B4. | a real time input function object                                 |
| Y         | C.  | object parameters   |
| Y         | D.  | a parameter editor for editing function or object parameters      |
| Y         | E.  | draw lines between objects to represent data flow connections     |
| Y         | F.  | a display   |
| ?         | G.  | graphical control panel   |
|           | 2.  | Program Features  |
| Y         | A.  | synchronous portion of program, synchronous functions             |
| Y         | B.  | asynchronous portion of program, asynchronous functions           |
| Y         | C.  | links between asynchronous and synchronous program portions       |
| Y         | D.  | real time execution   |
| N         | E.  | user can specify order of execution of program portions or        |
| functions |     |   |
| Y         | F.  | translation engine generate program from graphical representation |
| Y         | G.  | a compiler  |
| Y         | H.  | execution engine  |
|           | 3.  | System Features   |
| Y         | A.  | user input  |
| Y         | A1. | keyboard port   |
| Y         | A2. | MIDI port / slider port   |
| Y         | B.  | two processors: host processor and DSP                            |
| Y         | C.  | speaker: audio signal converter                                   |

## References showing or describing Order of Execution control:

Michael Minnick ICMC Glasgow 1990 Proceeding pp253-255

Michael Minnick undated 1990 paper, publication data unknown

Music Kit (a non-graphical music synthesis authoring system): references by

Julius O. Smith and David A. Jaffe all describe that Music Kit allowed

explicit user control of order of execution of the building blocks called unit generators.

David A. Jaffe, [daj@ccrma.stanford.edu](mailto:daj@ccrma.stanford.edu)

Michael Minnick,

*need to find Synthedit (5 yrs old)*