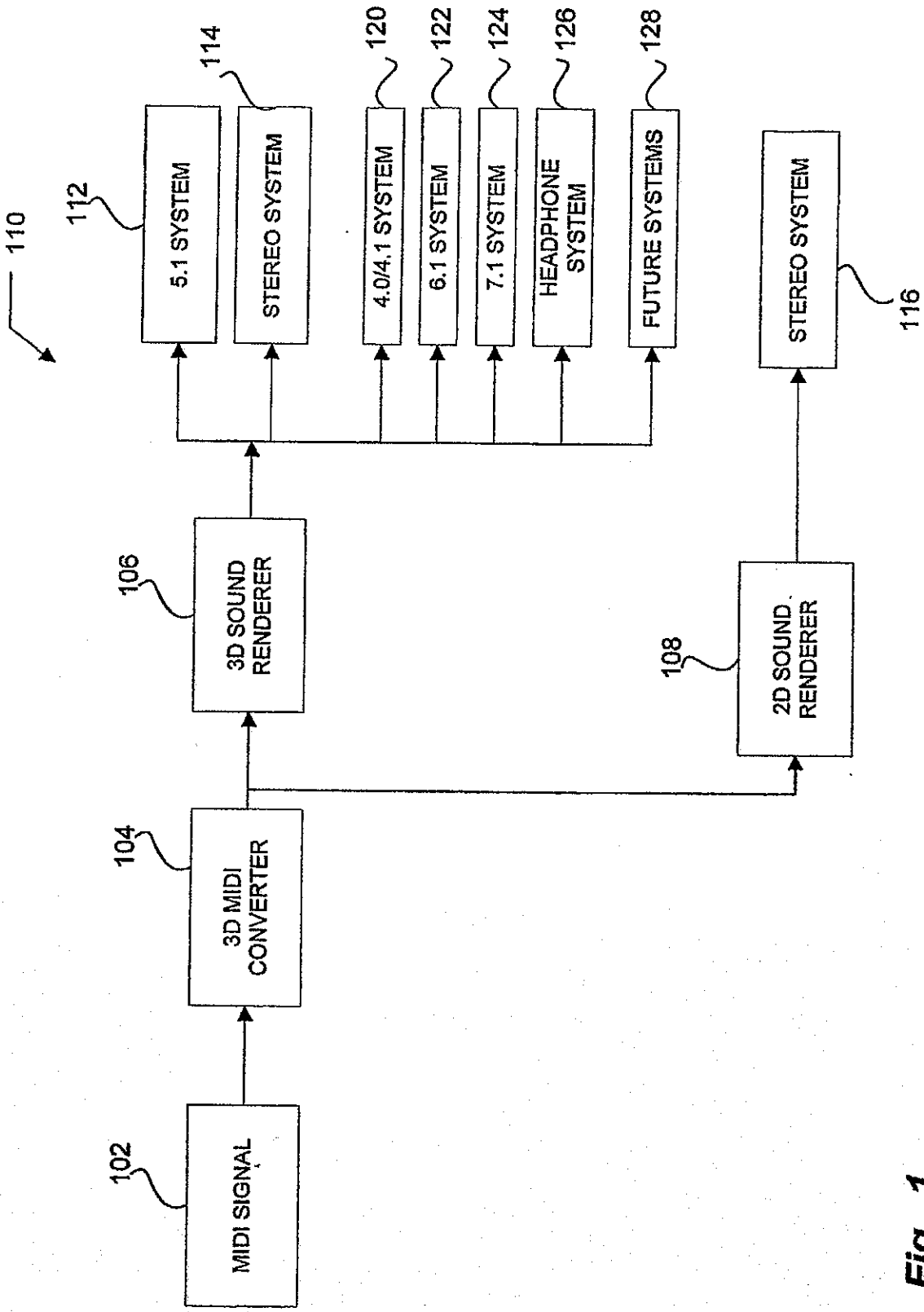

110
112
5.1 SYSTEM
114
STEREO SYSTEM
120
4.0/4.1 SYSTEM
122
6.1 SYSTEM
124
7.1 SYSTEM
126
HEADPHONE SYSTEM
128
FUTURE SYSTEMS
106
3D SOUND RENDERER
104
3D MIDI CONVERTER
102
MIDI SIGNAL
108
2D SOUND RENDERER
116
STEREO SYSTEM

Fig._1

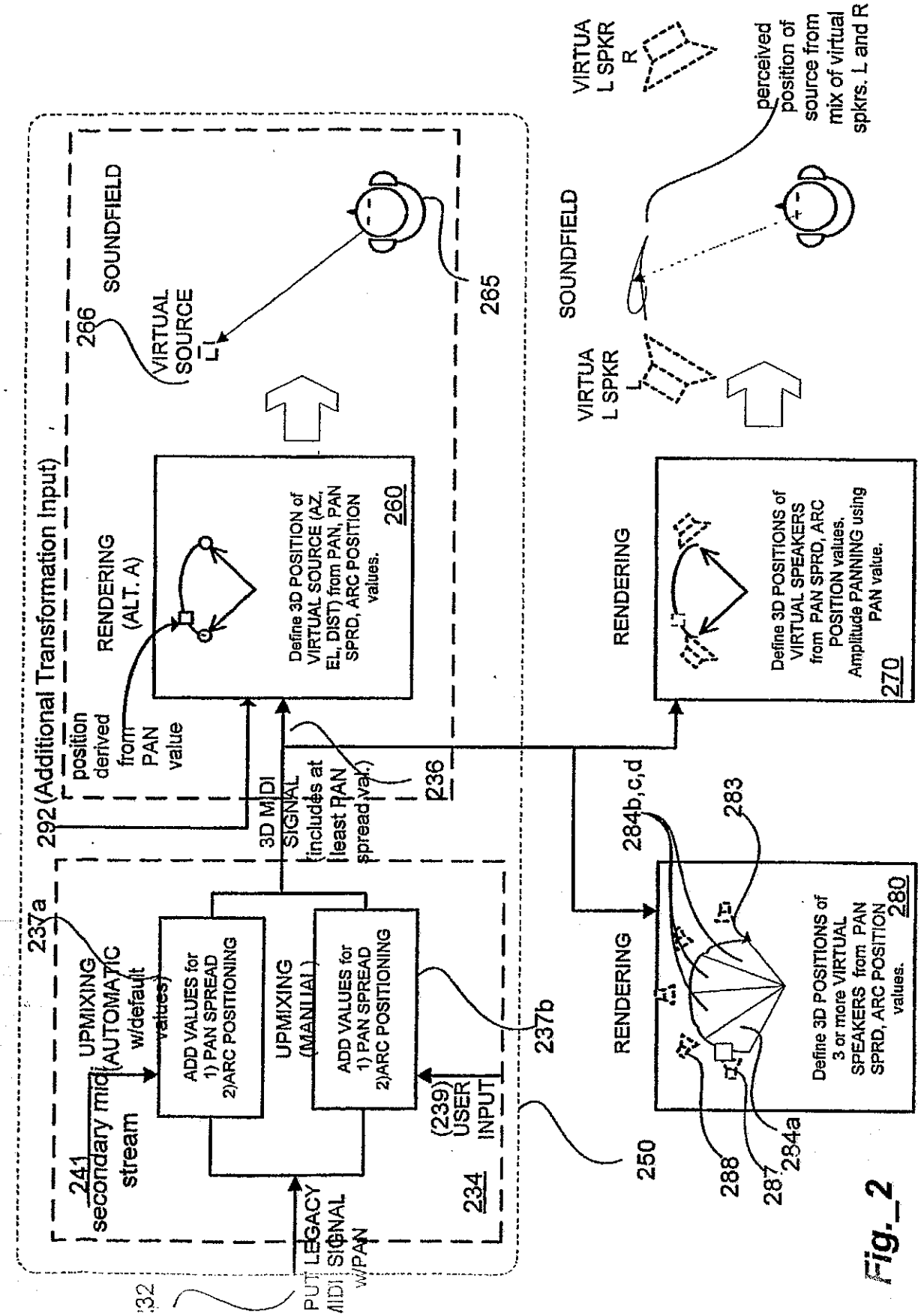

PUT LEGACY MIDI SIGNAL w/PAN
232
234
241 secondary midi stream
237a
UPMIXING (AUTOMATIC w/default values)
ADD VALUES for 1) PAN SPREAD 2)ARC POSITIONING
UPMIXING (MANUAL)
ADD VALUES for 1) PAN SPREAD 2)ARC POSITIONING
237b
(239) USER INPUT
250
3D MIDI SIGNAL (includes at least PAN spread val.)
236
292 (Additional Transformation Input)
position derived from PAN value
RENDERING (ALT. A)
Define 3D POSITION of VIRTUAL SOURCE (AZ, EL, DIST) from PAN, PAN SPRD, ARC POSITION values.
260
SOUNDFIELD
266
VIRTUAL SOURCE L
265
RENDERING
284b,c,d
283
Define 3D POSITIONS of 3 or more VIRTUAL SPEAKERS from PAN SPRD, ARC POSITION values.
280
288
287
284a
RENDERING
Define 3D POSITIONS of VIRTUAL SPEAKERS from PAN SPRD, ARC POSITION values. Amplitude PANNING using PAN value.
270
SOUNDFIELD
VIRTUA L SPKR L
VIRTUA L SPKR R
perceived position of source from mix of virtual spkrs. L and R

Fig._2

Fig._3A

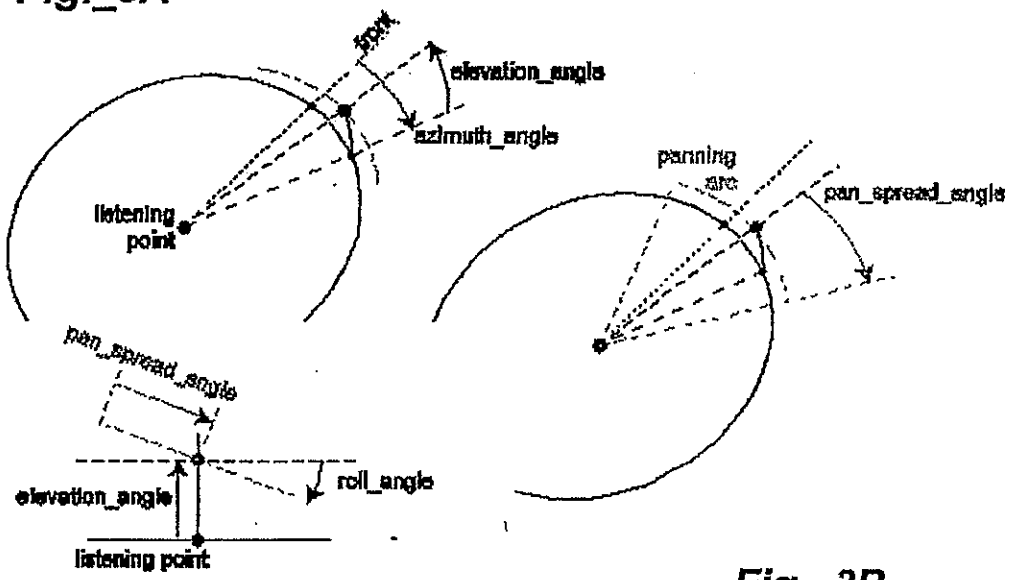


Fig._3B

Fig._3C

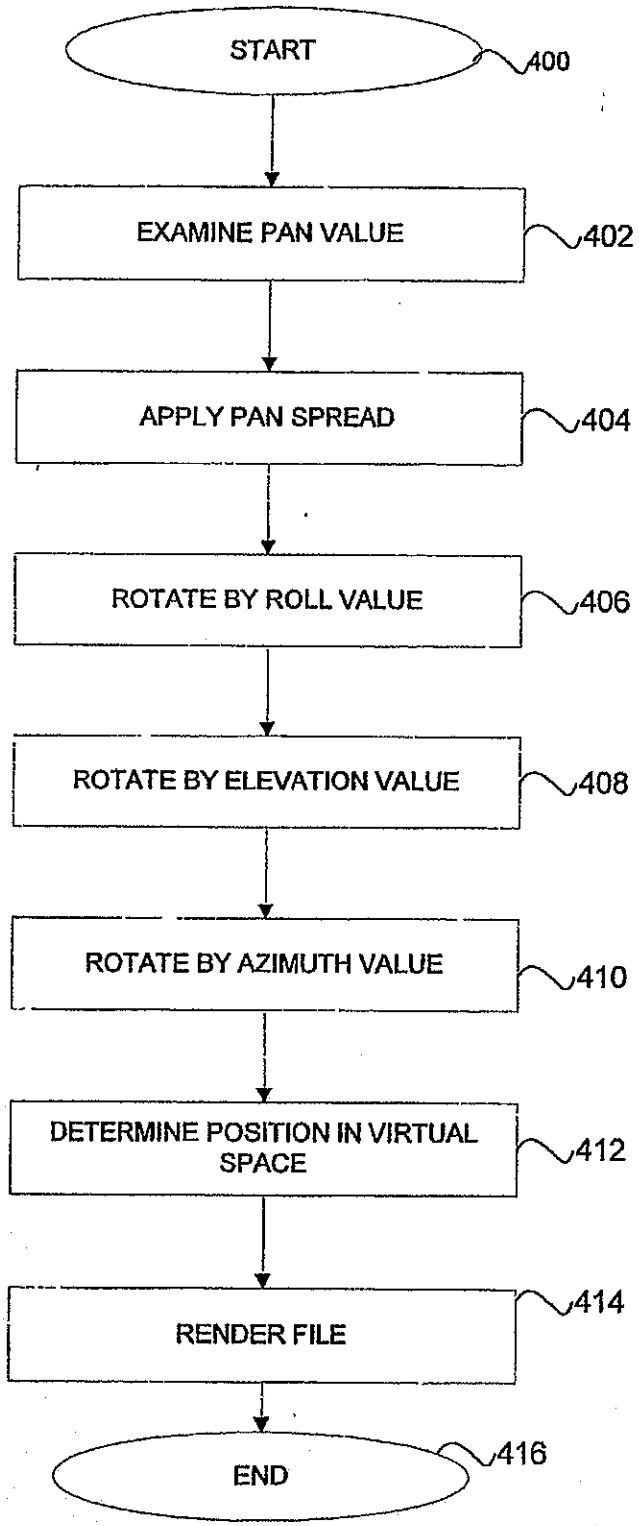

START
400
EXAMINE PAN VALUE
402
APPLY PAN SPREAD
404
ROTATE BY ROLL VALUE
406
ROTATE BY ELEVATION VALUE
408
ROTATE BY AZIMUTH VALUE
410
DETERMINE POSITION IN VIRTUAL SPACE
412
RENDER FILE
414
END
416

Fig._4

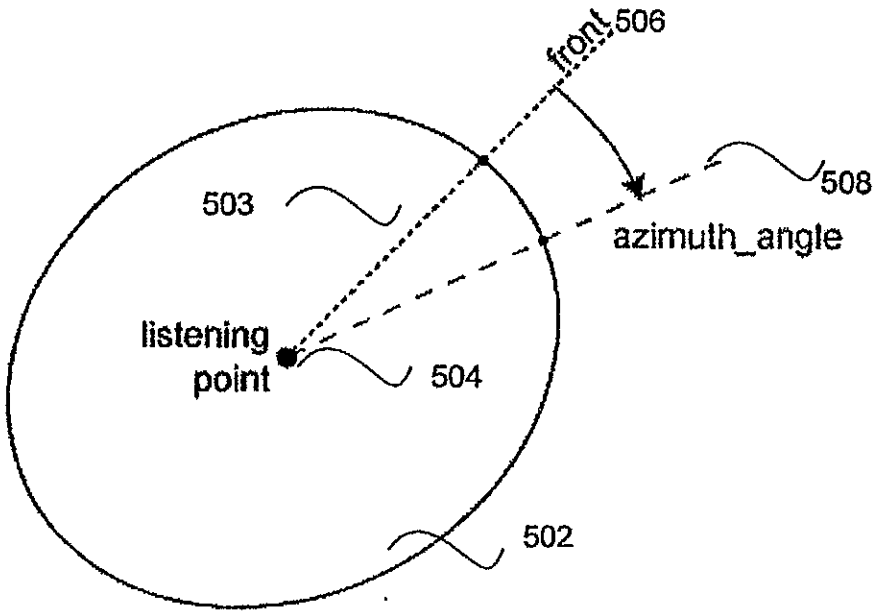

front
506
508
azimuth_angle
503
listening
point
504
502

Fig._5A

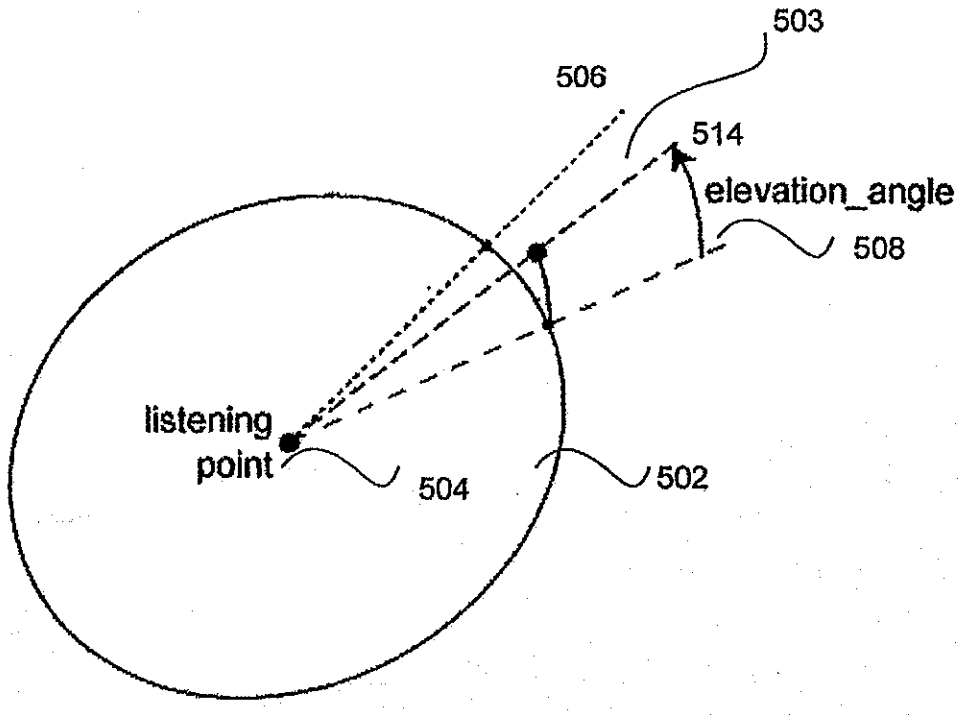

503
506
514
elevation_angle
508
listening
point
504
502

Fig._5B

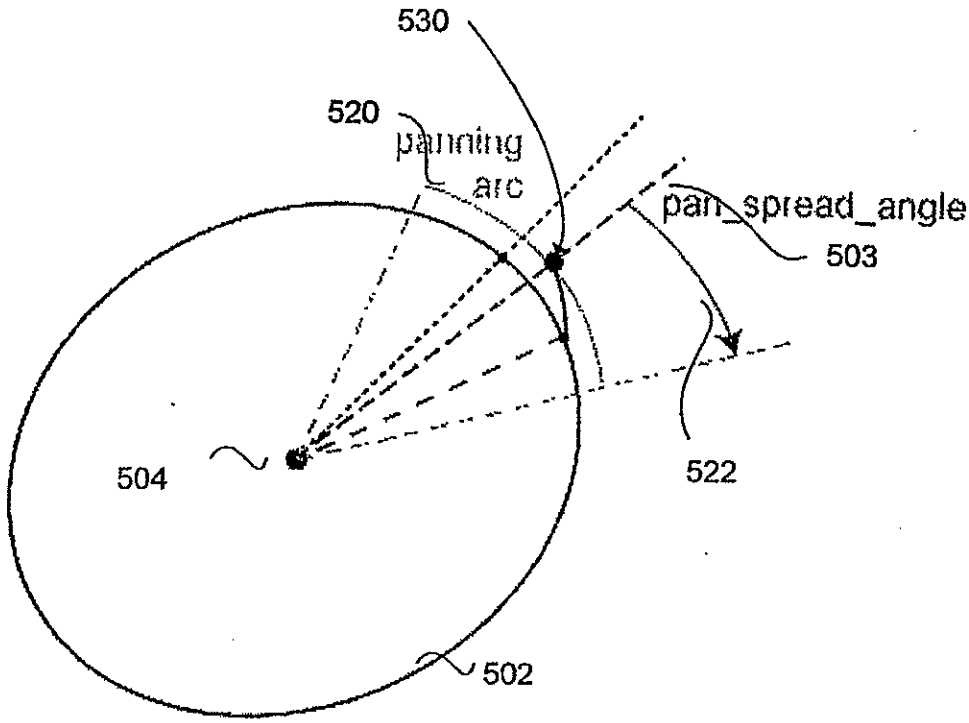

530
520
panning
arc
pan_spread_angle
503
504
522
502

Fig._5C

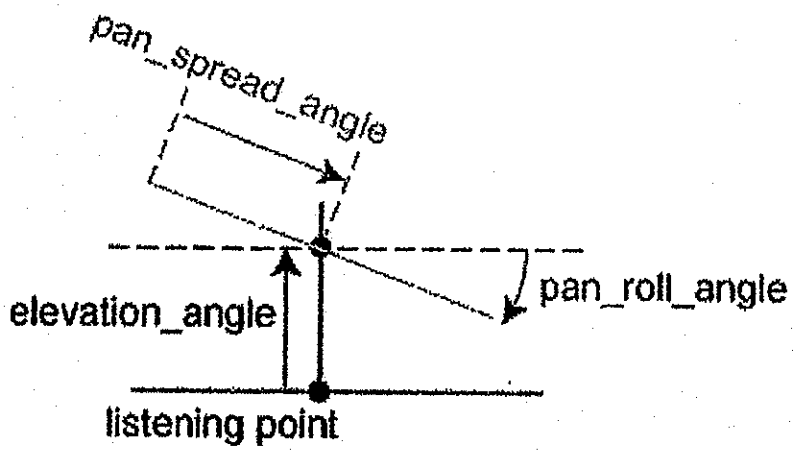

pan_spread_angle
pan_roll_angle
elevation_angle
listening point

Fig._5D

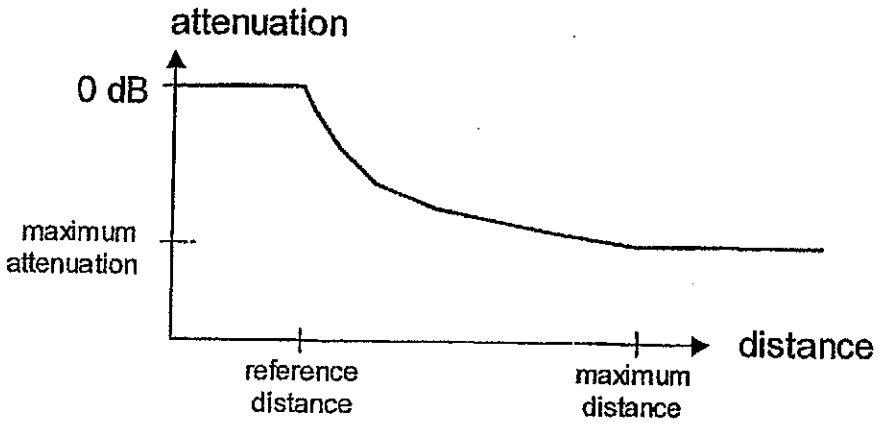

attenuation
0 dB
maximum
attenuation
distance
reference
distance
maximum
distance

Fig._6A

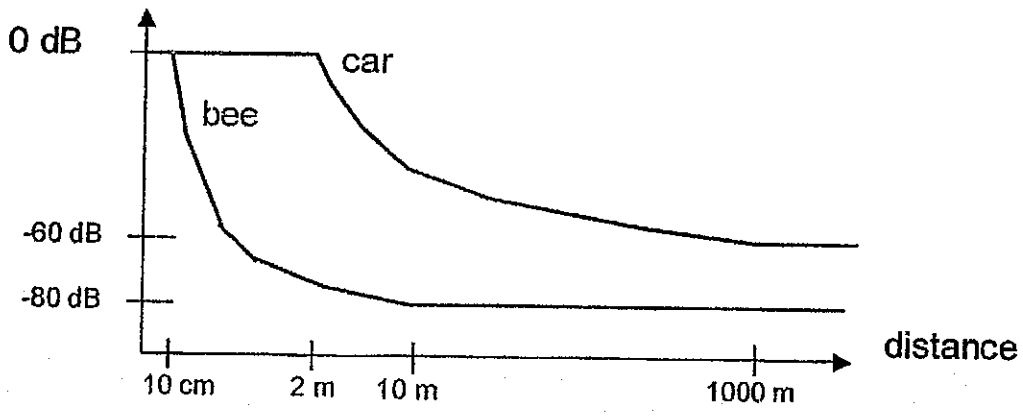

0 dB
car
bee
-60 dB
-80 dB
distance
10 cm
2 m
10 m
1000 m

Fig._6B

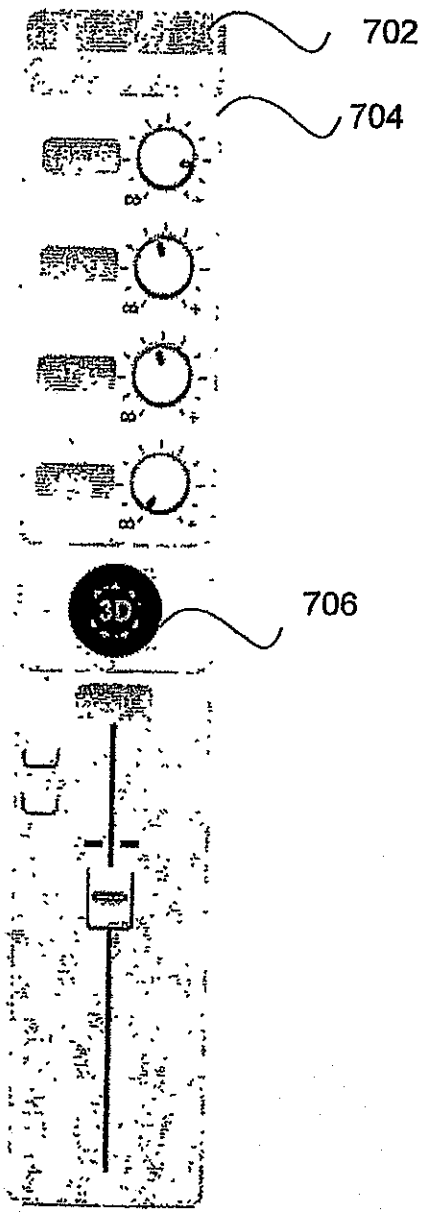

702
704
3D
706

Fig._7A

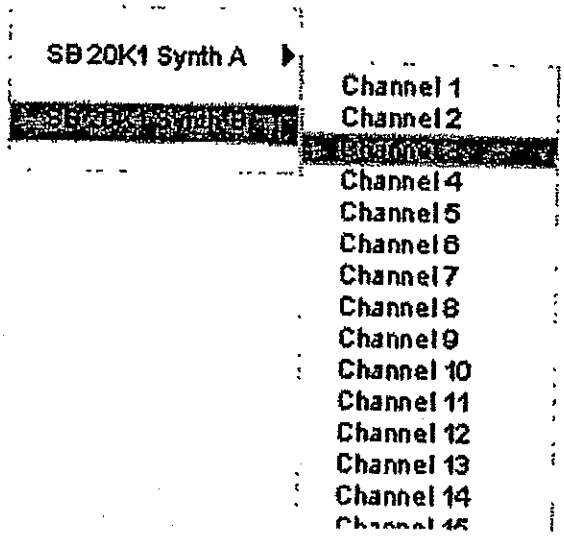

SB 20K1 Synth A
Channel 1
Channel 2
Channel 4
Channel 5
Channel 6
Channel 7
Channel 8
Channel 9
Channel 10
Channel 11
Channel 12
Channel 13
Channel 14

Fig._7B

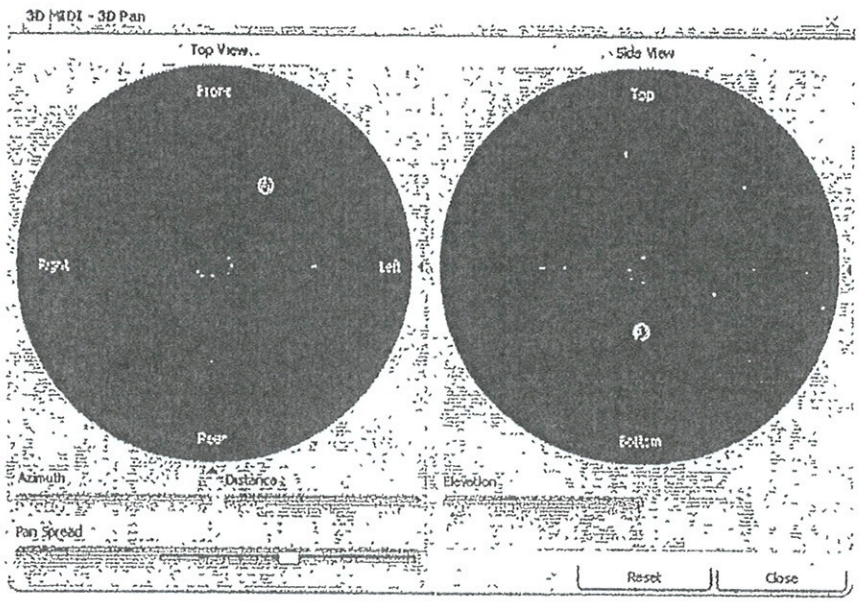

3D MIDI - 3D Pan
Top View
Front
Right
Left
Rear
Azimuth
Distance
Pan Spread
Side View
Top
Bottom
Elevation
Reset
Close

Fig._7C

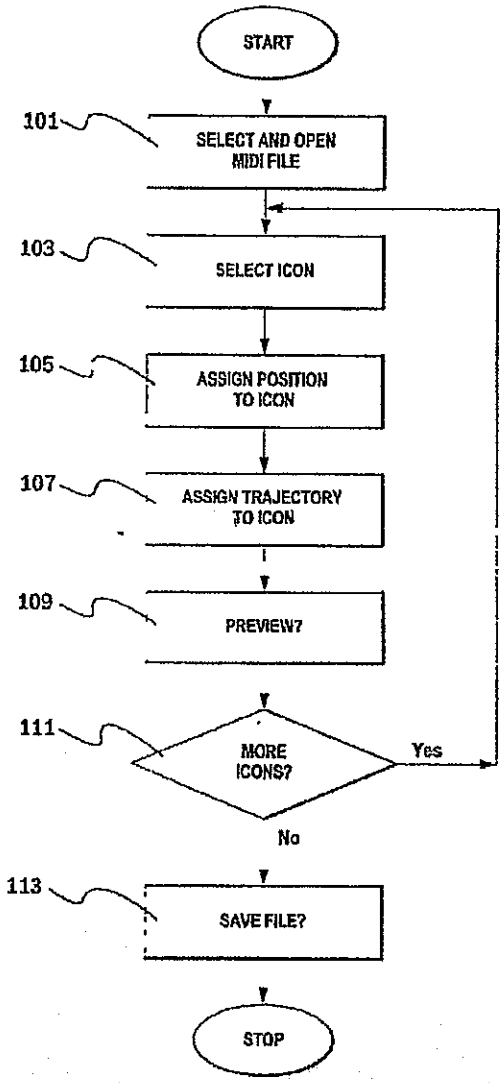

START
101
SELECT AND OPEN MIDI FILE
103
SELECT ICON
105
ASSIGN POSITION TO ICON
107
ASSIGN TRAJECTORY TO ICON
109
PREVIEW?
111
MORE ICONS?
Yes
No
113
SAVE FILE?
STOP

Fig._8

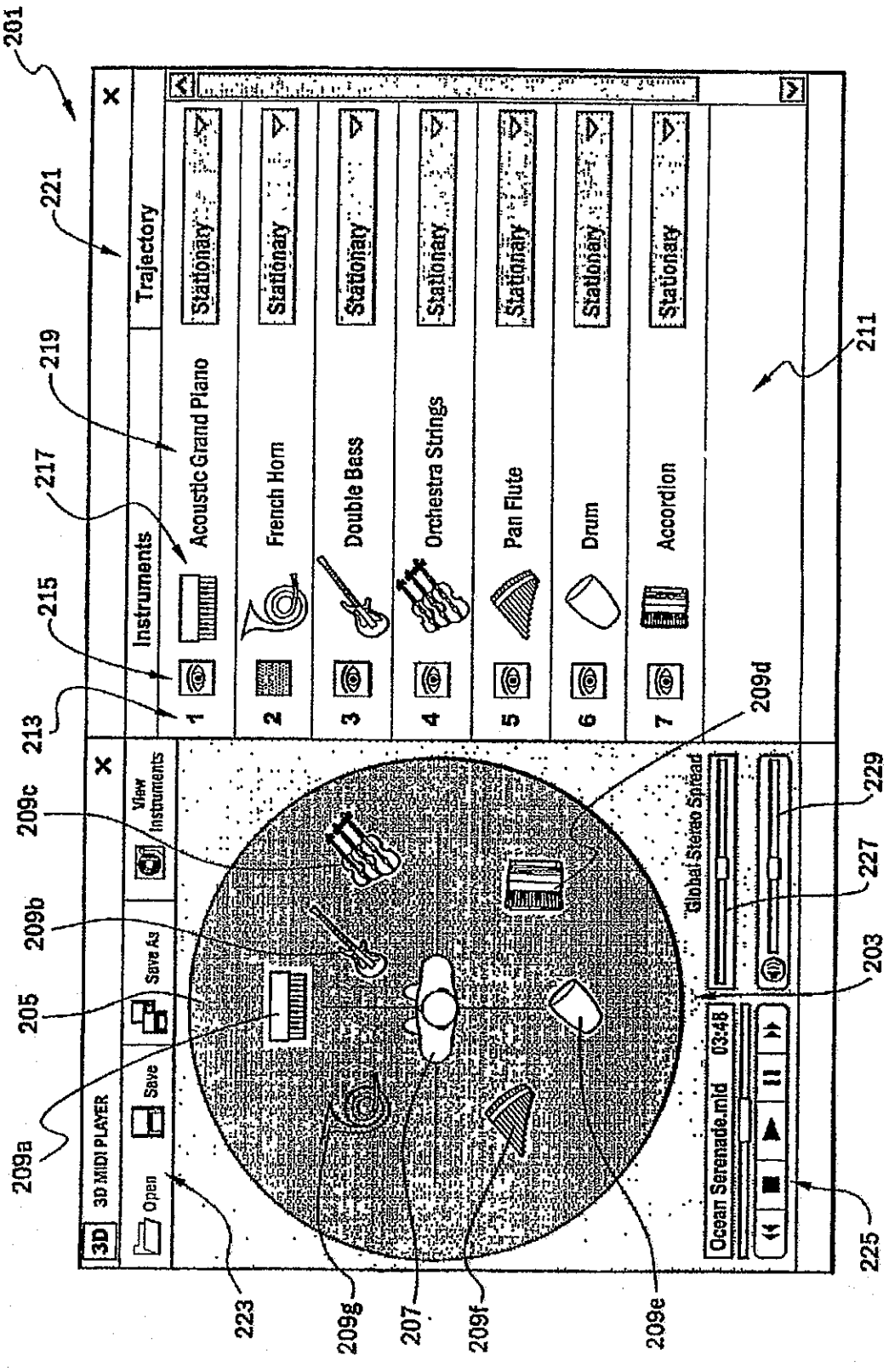

201
3D MIDI PLAYER
Open
Save
Save As
View Instruments
Instruments
Trajectory
1 Acoustic Grand Piano Stationary
2 French Horn Stationary
3 Double Bass Stationary
4 Orchestra Strings Stationary
5 Pan Flute Stationary
6 Drum Stationary
7 Accordion Stationary
Global Stereo Spread
Ocean Serenade.mid 03:48
209a
209b
209c
209d
209e
209f
209g
205
207
211
213
215
217
219
221
223
225
227
229
203

Fig._9