A system for automatically generating, displaying and animating two-dimensional figures comprising straight line segments, animations of the figures including gross size, gross position, shape and rotational animation sequences. Means are also provided for maintaining the figure closed through any animation sequence and establishing boundary conditions for the figure.
An oscillator for generating a triangular waveform by alternately switching positive and negative DC signals to the input of an integrator in response to output signals from a flip-flop, the flip-flop being responsive to selective peak values of the integrator output, and means for synchronizing the oscillator to begin oscillating in response to a sync pulse in any one of several phases.

11 Claims, 2 Drawing Figures
This invention relates to a system for automatically producing an animation sequence and includes an analog portion for generating output signals representing one or more sections of a raster on which images viewed by a video camera can be produced. Analog inputs to the analog portion define the parameters of the raster sections to effectively define the shape of each part of the viewed image produced thereon. The analog inputs to the analog portion are digitally controlled by signals from a digital computer portion which establishes these digital control signals from information fed to it from a director or a recording means.

41 Claims, 13 Drawing Figures
FIG. 1.
FIG. 2.

Background artwork holder 70

NTSC color camera 69

Background inputs (TV format) 69

Video effects 68

NTSC color output, image & background 67

Color network 67

Video 66

Microwave link 75

Transmission link 74

Video tape recorder 74

Color monitor 273

NTSC color output, image & background 67

Video tape recorder 72

Video tape recorder 71

Conventional film chain 71

FIG. 3.

R.G.B. color encoder 77

Red 78

X-Y monitor 79

Red encoded B & W film 84

Blue 80

X-Y monitor 81

Blue encoded B & W film 85

Green 82

X-Y monitor 83

Green encoded B & W film 86

Output of analog computer 26

FROM INTERFACE NETWORK 24

FROM VIDEO GATE 38 60

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THEIR ATTORNEYS
FIG. 4A.
This invention comprises a system for producing a color representation on either video tape or a color display device of a static or dynamic scene, each color being independently selective and variable. Signals are generated for representing the scene in discrete shades of gray, which signals are used to generate further signals representing the red, green and blue components of a color assigned to each gray shade. These red, green and blue component signals are used to produce the color representation. The system further includes means for selecting the colors assigned to the various gray shades, and exclusive logic means allowing independent selection and variation of each color. Means are also provided for animating the scene to produce a fully animated color representation.

37 Claims, 14 Drawing Figures
FIG. 1.

VIDEO TAPE OR COLOR DISPLAY

NTSC COLOR ENCODER

RGB COLOR ENCODER

DIGITAL GRAY ENCODER

FIG. 2.

FIG. 3.

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FIG. 8.

ANIMATION DEFLECTION

FIG. 12.

OUTPUT ACTIVELY WHEN INPUT CONDITION

302 E4 < EV

303 E2 < EV < E4 OR E6 < EV

304 E1 < EV < E2 OR E3 < EV < E4 OR E5 < EV < E6 OR E7 < EV
FIG. 7.

<table>
<thead>
<tr>
<th>OUTPUT</th>
<th>ACTIVE ONLY WHEN</th>
<th>INPUTCONDITION</th>
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<tbody>
<tr>
<td>C5</td>
<td>E4 &lt; Ev</td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>E3 &lt; Ev &lt; E4</td>
<td></td>
</tr>
<tr>
<td>C3</td>
<td>E2 &lt; Ev &lt; E3</td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>E1 &lt; Ev &lt; E2</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Ev &lt; E1</td>
<td></td>
</tr>
</tbody>
</table>

FIG. 11.

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AT ORNEYs
![Diagram of animation deflection network](image)

**Table: Output Condition**

<table>
<thead>
<tr>
<th>Output</th>
<th>Active Only When</th>
<th>Input Condition from Scan Converters</th>
<th>Input Condition from Video Camera 12</th>
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</thead>
<tbody>
<tr>
<td>C8</td>
<td>306, 307 &amp; 308 Active</td>
<td>E7 &lt; EV</td>
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</tr>
<tr>
<td>C7</td>
<td>306 &amp; 307 Active, 308 Not Active</td>
<td>E6 &lt; EV &lt; E7</td>
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<tr>
<td>C6</td>
<td>306 &amp; 308 Active, 307 Not Active</td>
<td>E5 &lt; EV &lt; E6</td>
<td></td>
</tr>
<tr>
<td>C5</td>
<td>306 Active, 307 &amp; 308 Not Active</td>
<td>E4 &lt; EV &lt; E5</td>
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<tr>
<td>C4</td>
<td>307 &amp; 308 Active, 306 Not Active</td>
<td>E3 &lt; EV &lt; E4</td>
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<tr>
<td>C3</td>
<td>307 Active, 306 &amp; 308 Not Active</td>
<td>E2 &lt; EV &lt; E3</td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>308 Active, 306 &amp; 307 Not Active</td>
<td>E1 &lt; EV &lt; E2</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>306, 307 &amp; 308 Not Active</td>
<td>EV &lt; E1</td>
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</tbody>
</table>