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A DISPLAY SYSTEMField of the Invention

5 This invention relates to a display system and, in particular, to a shelf TV for location in a department store or other retail outlet, and upon which advertising material can be displayed to attract a customer to purchase products offered for sale in proximity to the shelf TV.

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Background of the Invention

Systems for displaying advertising material or like information are known. Usually these systems are expensive and complicated systems which supply advertising material from a remote location to a number of different display units which may be located in a department store or other retail outlet. Typically, advertising material is supplied from the remote location via a communication link which may be a dedicated line to servers which may control one or a group of display units within a department store. The server in turn downloads advertising material for display on the device. Usually, the advertising material runs continuously in a loop.

25 This type of system has a number of disadvantages. The first disadvantage is the cost of the system. Because of the need to provide a remote location and servers for controlling groups of the units, the cost is obviously high.

30

Another disadvantage is that, because the advertising material generally runs in a loop, it forms "background noise" to customers which may not particularly attract a customer's attention to the advertising material.

35 Furtherstill, because the material runs in a loop, a customer may be exposed to the advertising material when

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the advertisement is half completed, and therefore may not obtain the intended message.

Summary of the Invention

- 5 The object of a first invention is to provide a display system which is more likely to attract the attention of a person to view information displayed on the display system.
- 10 The invention provides a display system, comprising:
a data medium for containing data to be displayed by the system;
a display screen for displaying the data;
a proximity sensor for detecting the presence of a
15 person in proximity to the display system, and for activating the system to cause the data to be displayed on the display screen;
at least one speaker for output of audio data; and
a high to low volume controller for changing volume
20 of the audio data from the speaker from a relatively high volume to a relatively low volume over a predetermined period of time to approximate movement of a person towards the display system and maintain a comfortable listening volume as the person approaches the display system.
- 25 Because the proximity sensor detects the presence of a person in proximity to the display system, and the data (such as an advertisement) commences when the person comes into proximity to the system, the person is more likely to
30 be attracted by the display of the data and view the display. Furtherstill, since the display of the data starts when the person comes into proximity, the person is able to view the entire message and therefore obtain the full impact of the data. Thus, when the system is used in
35 relation to advertising of products, the system is more likely to attract the attention of a customer and ensure that the customer receives the entirety of the

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advertisement so the customer is more likely to be attracted to purchasing products offered for sale at the location of the display system.

- 5 Preferably the data medium and the display screen are formed as a television monitor.

Preferably the monitor includes mounting means for mounting the monitor on a shelf of a store.

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In one embodiment the data medium may comprise a compact disc containing the data, a flash memory storage device, magnetic tape or the like.

- 15 In a typical embodiment, the system will also include the conventional control circuitry for reading out data from the data medium and for displaying the data on the screen of the display device.

- 20 Preferably the proximity sensor comprises a light sensor. However, other forms of proximity sensor could also be used, such as motion detectors, radar-type detectors, heat detectors, or the like.

- 25 Most preferably the light sensor is a light sensitive resistor.

- 30 Preferably the sensor operates a switch component to in turn operate a relay to cause power to be supplied to the system for activating the system to display the data.

- In one embodiment the sensor is connected parallel to a power supply for supplying current to a first transistor, a second transistor connected parallel to the power supply and in series to the relay, the first transistor also being connected to the power supply, so that when the sensor receives light, current is supplied to the first
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transistor to switch the transistor on so that current is not supplied to the second transistor, and when the sensor receives less light indicative of the approach of a person to the system, the first transistor is switched off, which
5 in turn supplies current to the second transistor to switch the second transistor on to activate the relay to close a relay switch so power is supplied to the system to cause the data medium to output the data for display on the display screen.

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In one embodiment the system includes a timer circuit for maintaining power to the system to maintain the display for a predetermined time period.

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In one embodiment the volume controller comprises a signal divider, the signal divider being connected to an amplifier input which supplies the audio signal to the at least one speaker, the divider also being connected to a transistor, a charging element being connected to the
20 transistor so that when the charging element charges, the transistor slowly turns on so as to cause the signal divider to reduce the amount of signal which is supplied to the amplifier to in turn reduce the volume of the audio data output from the at least one speaker.

25

In one embodiment the volume controller includes a timer for setting the time period over which the charging device charges, and therefore the transistor turns on to thereby set the time period over which the volume changes from the
30 relatively high volume to the relatively low volume.

Preferably the charging element is a capacitor.

In another embodiment the proximity sensor is connected to
35 an operational amplifier section which receives an output from the sensor when a person is detected, a window comparator for receiving the output from the amplifier

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section and for producing a control output, a timer circuit for receiving the control output and for providing an actuation output to activate the data medium for causing the display screen to display and play the data,
5 and after a predetermined time delay set by the timer circuit to switch off the data medium to thereby cease displaying and playing of the data on the display screen and the speaker.

10 In this embodiment of the invention the actuation signal from the timer circuit also activates an attenuating timer circuit for attenuating the volume of the audio data over a time period.

15 Preferably the attenuating circuit comprises a capacitor and a mosfet transistor which is coupled to a variable resistor, the variable resistor having an input for receiving the audio data and an output for supply of the audio data to the speaker, and wherein upon charging of
20 the capacitor, the mosfet transistor is slowly turned on so as to ground the variable resistor to thereby cause an attenuation of the audio signal supplied to the output of the variable resistor.

25 Brief Description of the Drawings

Preferred embodiments of the invention will be described, by way of example, with reference to the accompanying drawings in which:

30 Figure 1 is a front view of a display system in the form of a shelf TV according to the preferred embodiment;

Figure 2 is a bottom perspective view of the system of Figure 1;

Figure 3 is a rear view of the system of Figure 1;

35 Figure 4 is a block circuit diagram of the display system according to one embodiment;

Figure 5 is a detailed diagram of part of the block diagram of Figure 4;

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Figure 6 is a detailed diagram of part of the block
diagram of Figure 4;

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Figure 7 is a circuit diagram of another embodiment of the invention; and

Figure 8 is a circuit diagram of the most preferred embodiment.

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Detailed Description of the Preferred Embodiments

Figures 1 to 3 show the preferred form of the invention in the form of a shelf TV, which is in the form of a display monitor having an outer housing 12 which may be of any
10 desired shape, a display screen 14 for the display of video data and speakers 16 for output of audio data. The video data and audio data in the preferred embodiment comprise an advertisement for advertising goods. The housing 12 includes mounting studs 18 on its rear surface,
15 as shown in Figure 3, to enable the system to be mounted on a shelf or otherwise in proximity to the goods offered for sale in a department store, shop or the like.

It should be understood that the studs 18 simply represent
20 one form of attaching the unit to a shelf or the like, and that other forms of brackets, connectors or the like are obviously possible.

The system also includes a proximity detector 20 for
25 detecting the proximity of a person such as a prospective customer to the display system so that the display system can be activated to display an advertising message relating to products located near the display system. The advertising message is intended to attract the attention
30 of a customer and provide information relating to the products so that the customer is more likely to purchase the products.

The proximity sensor 20 which detects the presence of the
35 person in proximity to the system therefore activates the system so that the advertising message is presented by the system both in terms of a visual advertisement on display

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screen 14, and accompanying audio output from the speakers 16. Since the advertisement commences only when the person moves into proximity of the system, the person is more likely to be immediately attracted to the advertisement than if an advertisement is continuously displayed and is therefore less likely to attract the immediate attention of a person. Thus, the person is more likely to take notice of the advertisement. Furthermore, the advertisement is played from the start, and therefore the person has the opportunity to view the entire advertisement so that the full message relating to the products offered for sale is provided, to thereby increase the likelihood that the person will purchase those products.

Figure 4 is an overall block diagram of the system. Figures 5 and 6 show various parts of the block diagram of Figure 4 at a larger scale simply for clarity. The system has a detector section 30, a high to low volume controller 40, a video and audio control section 50 and a video display and audio output section 60. The section 60 is basically made up of the display 14 and speakers 16 previously described, together with their usual conventional control circuitry which will not be described in any detail herein. The audio and video control section 50 includes the medium upon which the advertising material is stored, such as a flash card, CD, tape or any other suitable storage medium, together with the control circuitry for reading that data and supplying the data as a video signal and audio signal to the section 60. Once again, those details are conventional and will not be described in any further detail herein.

The section 30 activates the sections 50 and 60 in response to the proximity of a person to the system and comprises a power supply 70 for supply of power, such as 12 volt supply power to the section 30. A light sensitive

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resistor 71 is connected in parallel to the power supply 70 and a variable resistor 72 is connected in series with the resistor 71 to adjust the sensitivity of the resistor 71. A transistor 73 is connected between the variable
5 resistor 72 and the resistor 71. The collector of the resistor 73 is connected to line 74 and also the power supply 70 via resistor 79. The line 74 contains diode 75 and also a second variable resistor 76. A capacitor 77 is connected to the resistor 76 and a further resistor 78 is
10 also connected to the capacitor 77 and resistor 76. The resistor 78 connects to a second transistor 80 which has its collector connected via line 81 to a relay 90. The relay 90 is connected to the power supply 70 and includes diode 91 and a switch 92. The switch 92, when closed,
15 supplies power from the power supply 70 to the section 50 to activate and operate the section 50.

When a continuous intensity of light falls on the resistor 71, current can flow through the resistor 71 along line
20 91, dependent on the setting and the variable resistor 72. Thus, the transistor 73 is switched on and current flows through line 92. This in turn results in the transistor 80 being switched off so no current flows through the relay 90. Thus, the relay switch 92 remains open.

25 However, if the light shining on the resistor 71 is blocked, for example by a person coming into proximity to the system, from a distance of, for example, 2 metres, the resistor 71 does not conduct and the transistor 73 is not
30 biased and will turn off. The transistor 80 will then be forward biased via diode 75, variable resistor 76 and resistor 78 so that current flows through the relay 90 and the relay switch 92 will close. Thus, power is supplied through the switch 92 and to the section 50 via the line
35 93 to thereby activate the section 50 and cause the video and audio information stored in the section 60 to be read out and displayed by the section 60.

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The second variable resistor 76 sets the time to hold the relay 90 on. When the light beam again shines on the resistor 71, for example, when a person has moved away
5 from the system, the relay R2 will be de-energised and the power will be shut off to the section 50.

As is shown in Figure 4, the section 50 has video output line 100 connected directly to the section 60. The audio
10 output line 101 from the section 50 connects to the section 40 for volume adjustment depending on the distance the person is from the system.

As is apparent from Figure 4, line 101 is connected to a
15 variable resistor 102 and the variable resistor 102 is connected to an amplifier signal input 103, which in turn is connected to the display section 60. Thus, the audio signal passes through the section 40 to the amplifier 103, and then to the section 60 for output via the speakers 16
20 previously described.

When the power is first supplied to the section 50, as described above, the transistor 73 is in an off state and point A of the section 40 is floating and audio from the
25 section 50 goes straight to the amplifier 103 via the variable resistor 102. Capacitor 103a slowly charges up, with the time of charging being set by variable resistor 104 which is connected to the transistor 107 via diode 105 and the resistance 106. Mosfet transistor 107 will slowly
30 turn on, effectively bringing point A of the variable resistor 102 to ground. Thus, some of the signal passes through line 109 to ground rather than to the amplifier 103, thereby reducing the signal and therefore the volume. The final desired audio level can be set by the variable
35 resistor 102.

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When the power to the section 50 is turned off and then turned on again, the above cycle repeats. Thus, when the power is switched on, full audio signal is supplied to the section 60, and thereafter over a time period, reduced
5 audio volume is supplied to the section 60 to thereby reduce the volume level of the audio signal output from the speakers 16. The relay 90 includes relay switches 95 and 96, which discharge the capacitor 103 via lines 111 and 112 when no power is applied. This therefore ensures
10 repeatable time delay when power is again supplied to the section 50.

Figure 7 shows another embodiment of the invention.

15 With reference to Figure 7, a pyrol-electric infrared motion sensor 150 is provided to detect the proximity of a person. When a person walks passed the sensor 150, heat generated by the person's body is detected by the sensor 150 and the sensor 150 generates a low frequency signal of
20 around 8 hertz. This causes a video display to begin. The output of the sensor 150 is fed to the non-inverting input of amplifier 151 by line 152. The amplifier 151 is also connected to a band pass filter formed by capacitor 153, resistor 154, capacitor 155 and resistor 156. The
25 band pass filter has a bandwidth of around 8 hertz. The amplifier 151 provides about 30 db of gain. The output of the amplifier 151 is coupled to an amplifier 160 via capacitor 161 and resistor 162. A band pass filter 164 is formed in a similar manner to the previously mentioned
30 band pass filter and the amplifier 160 provides another 30 db of gain.

The output of the amplifier 160 is connected to capacitor 167 which in turn feeds the signal from the amplifier 160
35 to a window comparator circuit 168 formed of comparators 169 and 170. The window voltage of the window comparator

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168 is set at about 3 volts for the inverting input 171 and about 1.7 volts for the non-inverting input 172.

When heat of a person's body is detected, the amplifier
5 160 will produce a voltage output which is supplied to the capacitor 167. Any voltage swing outside this voltage window will cause output 173 of comparator 169 to go low, which will trigger a timer circuit 180 via line 181. The line 181 is connected between diodes 182 and 183 so that
10 the outputs from the comparators 169 and 170 are isolated from one another. The delay time of the timer 180 is set by variable resistance 185 and capacitance 186. The delay timing may, for example, be about one minute. The delay timing can be adjusted by adjusting the variable resistor
15 185. When the timer 180 is triggered by the signal on line 181, output 187 goes high, which activates relay 188. This causes contact 189 to close so that power is supplied from power supply 191 to line 192, and then to the multimedia board described with reference to Figure 4 via
20 output 193. The contact 190 opens, and this enables capacitor 195 to charge up via resistors 196 and 197. The resistor 196 sets the time for mosfet 198 to turn on. Before mosfet 198 turns on, the audio signal is supplied to variable resistance 199 from audio input 200 and exits
25 through slider contact 201 to be supplied to the audio input in the same manner as the audio input is supplied from signal amplifier 103 in the previous embodiment.

When the capacitor 195 charges to a potential high enough
30 to slowly turn on mosfet 198, variable resistor 199 is effectively grounded and the audio signal will be attenuated. Thus, the initial audio signal which is created upon detection of a person is set by the variable resistor 199, and as the capacitor C9 charges, the audio
35 signal is attenuated on the assumption that the person will be approaching the television, and the sound volume should be attenuated as the person comes closer so that a

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comfortable volume is produced as the person approaches the television 12 (shown in Figure 1).

When the timer 180 times out, the relay 188 is deactivated
5 so that contact 189 is opened. This therefore cuts off power to the multimedia board from line 191, ending the video display cycle. Contact 190 is closed, and this will enable the capacitor 195 to discharge through line 202 to thereby ready the audio level control for the next cycle.

10

Power supply circuit 205 receives the 12 volt input supply and converts that supply to a 5 volt output on line 206 for supply via line 207 to control the timer 180 and also provide a voltage supply for the variable resistance 185.

15 The 5 volt supply is also provided on line 208 for operating the sensor 150 and the comparators 169 and 170 via resistor 209 and capacitor 210, and lines 211 including resistors 212, 213 and 214, and line 215 including resistors 216 and 217.

20

Figure 8 shows a still further embodiment of the invention in which like reference numerals indicate like parts to those described with reference to Figure 7.

25 In the embodiment of Figure 8, sensor 300 is a pyroelectric infrared motion sensor integrated circuit. The sensor 300 includes a passive infrared element, an amplifier and a comparator output circuit. When a person walks passed the sensor 300, heat generated by the
30 person's body is detected by the sensor and a low frequency signal is generated which is amplified by the integrated circuit within the sensor 300 and the signal is fed to the comparator circuit within the sensor 300. This causes the comparator circuit to go high and a high output
35 signal is supplied on line 301 to transistor 302 which switches the transistor on so that line 303 is caused to go low. The low signal on 303 triggers the timer 180 via

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line 304. In this embodiment resistor 185 is not variable and the resistor 185 together with capacitor 186 form the delay timing. The timer 180 operates relay 188 in the same manner as in the earlier embodiment so as to supply
5 the outputs at 193, 200 and 201 in the manner previously described.

When a media file starts to play, line 310 from the multimedia card goes high which turns on transistor 311.
10 This maintains pin 312 of integrated circuit 313 low. Upon completion of one media file, line 310 changes state, pulling line 312 high. The active output of the circuit 313 is supplied via dipswitch 314 to transistor 315 which switches transistor 315 on. This in turn results in line
15 316 going low, which shuts off the power supply via line 181 to the timer to reset the timer and shut off power to the media player.

The switch 314 allows a maximum of four media files to be
20 played before shutting down. Capacitor 317 introduces a delay to prevent a false retriggering. When the timer 180 has timed out, the relay changes state and contacts A and B open to shut off power to the media card via line 192, as previously mentioned. This ends the video display.
25 Contacts 190 of the relay close and this will discharge capacitor 195 to ready the audio level control for the next cycle.

The dipswitch 314 enables a single ad to be played, or two
30 ads to be played, or three ads to be played, or four ads to be played. The dipswitch is manually set in one of the positions shown in Figure 8 so that either one, two, three or four advertisements are played, as illustrated by the numbers 1, 2, 3 and 4 in Figure 8. In the position shown
35 in Figure 8, one advertisement is to be played. If the dipswitch 304 is adjusted to position 4 in Figure 8, then all four advertisements are played.

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The on-time of the timer 180 is set by the power supply on line 181 and the R-C circuit formed by the resistor 185 and capacitor 186. For example, the on-time may be set at
5 a maximum of five minutes to accommodate any lengthy ad, such as a product demonstration or the like.

At the end of each advertisement, the circuit 313 outputs a high signal at the corresponding active pin 1 to 4 in
10 Figure 8. Only one of those pins is active at any one time. Thus, through the dipswitch setting, a high output is received at the pin to which the dipswitch 314 is set. This will cause the transistor 315 to conduct and line 306 will go low. The low on line 306 will reset the timer
15 180, thereby releasing relay 188. The system then goes into a standby mode.

When the relay contacts 189 open, power is no longer supplied via line 320 to circuit 321 and then to the
20 medium player input 322.

In the embodiment of Figure 8, the relay 188 is connected in parallel to a resistor 351 and a light emitting diode 352 to show the state of the timer 351, i.e. the light
25 emitting diode is supplied with power from the timer 180 at the same time as the relay so the light emitting diode is illuminated when the timer 180 is supplying power to the relay 188.

30 In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word "comprise", or variations such as "comprises" or "comprising", is used in an inclusive
35 sense, ie. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the invention.

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Since modifications within the spirit and scope of the invention may readily be effected by persons skilled within the art, it is to be understood that this invention
5 is not limited to the particular embodiment described by way of example hereinabove.

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Claims

1. A display system, comprising:
a data medium for containing data to be displayed by
5 the system;
a display screen for displaying the data;
a proximity sensor for detecting the presence of a
person in proximity to the display system, and for
activating the system to cause the data to be displayed on
10 the display screen;
at least one speaker for output of audio data; and
a high to low volume controller for changing volume
of the audio data from the speaker from a relatively high
volume to a relatively low volume over a predetermined
15 period of time to approximate movement of a person towards
the display system and maintain a comfortable listening
volume as the person approaches the display system.
2. The display system of claim 1 wherein the data medium
20 and the display screen are formed as a television monitor.
3. The display system of claim 2 wherein the monitor
includes mounting means for mounting the monitor on a
shelf of a store.
25
4. The display system of claim 1 wherein the data medium
comprises a compact disc containing the data, a flash
memory storage device, or magnetic tape.
- 30 5. The display system of claim 1 wherein the proximity
sensor comprises a light sensor.
6. The display system of claim 5 wherein the light
sensor is a light sensitive resistor.
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7. The display system of claim 1 wherein the sensor
operates a switch component to in turn operate a relay to

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cause power to be supplied to the system for activating the system to display the data.

8. The display system of claim 7 wherein the sensor is
5 connected parallel to a power supply for supplying current to a first transistor, a second transistor connected parallel to the power supply and in series to the relay, the first transistor also being connected to the power supply, so that when the sensor receives light, current is
10 supplied to the first transistor to switch the transistor on so that current is not supplied to the second transistor, and when the sensor receives less light indicative of the approach of a person to the system, the first transistor is switched off, which in turn supplies
15 current to the second transistor to switch the second transistor on to activate the relay to close a relay switch so power is supplied to the system to cause the data medium to output the data for display on the display screen.

20

9. The display system of claim 1 wherein the system includes a timer circuit for maintaining power to the system to maintain the display for a predetermined time period.

25

10. The display system of claim 5 wherein the volume controller comprises a signal divider, the signal divider being connected to an amplifier input which supplies the audio signal to the at least one speaker, the divider also
30 being connected to a transistor, a charging element being connected to the transistor so that when the charging element charges, the transistor slowly turns on so as to cause the signal divider to reduce the amount of signal which is supplied to the amplifier to in turn reduce the
35 volume of the audio data output from the at least one speaker.

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11. The display system of claim 10 wherein the volume controller includes a timer for setting the time period over which the charging device charges, and therefore the transistor turns on to thereby set the time period over
5 which the volume changes from the relatively high volume to the relatively low volume.

12. The display system of claim 10 wherein the charging element is a capacitor.

10

13. The display system of claim 1 wherein the proximity sensor is connected to an operational amplifier section which receives an output from the sensor when a person is detected, a window comparator for receiving the output
15 from the amplifier section and for producing a control output, a timer circuit for receiving the control output and for providing an actuation output to activate the data medium for causing the display screen to display and play the data, and after a predetermined time delay set by the
20 timer circuit to switch off the data medium to thereby cease displaying and playing of the data on the display screen and the speaker.

14. The display system of claim 13 wherein the actuation
25 output from the timer circuit also activates an attenuating timer circuit for attenuating the volume of the audio data over a time period.

15. The display system of claim 14 wherein the
30 attenuating circuit comprises a capacitor and a mosfet transistor which is coupled to a variable resistor, the variable resistor having an input for receiving the audio data and an output for supply of the audio data to the speaker, and wherein upon charging of the capacitor, the
35 mosfet transistor is slowly turned on so as to ground the variable resistor to thereby cause an attenuation of the

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audio signal supplied to the output of the variable resistor.

16. The display system according to claim 1 wherein the
5 data further comprises audio data, an attenuating timer
circuit for attenuating the volume of the audio data over
a time period, and a timer circuit for activating the
attenuating timer circuit.

10 17. The display system of claim 16 wherein the data
includes a plurality of separate advertisements, an
advertisement time circuit for outputting a signal
indicative of the number of advertisements to be
15 displayed, a switch for selectively switching to an output
of the advertisement circuit depending on the number of
advertisements which are to be displayed, and for
outputting a signal to shut off the timer, and therefore
the attenuating circuit after the advertisements have been
played.

20 18. The display system of claim 17 wherein the output of
the switch is connected to a transistor which is switched
on by the output from the switch to supply a predetermined
signal to the timer circuit to reset the timer circuit.

25 19. The display system of claim 18 wherein the
attenuating circuit comprises a capacitor and a mosfet
transistor which is coupled to a variable resistor, the
variable resistor having an input for receiving the audio
30 data and an output for supply of the audio data to the
speaker, and wherein upon charging of the capacitor, the
mosfet transistor is slowly turned on so as to ground the
variable resistor to thereby cause an attenuation of the
audio signal supplied to the output of the variable
35 resistor.