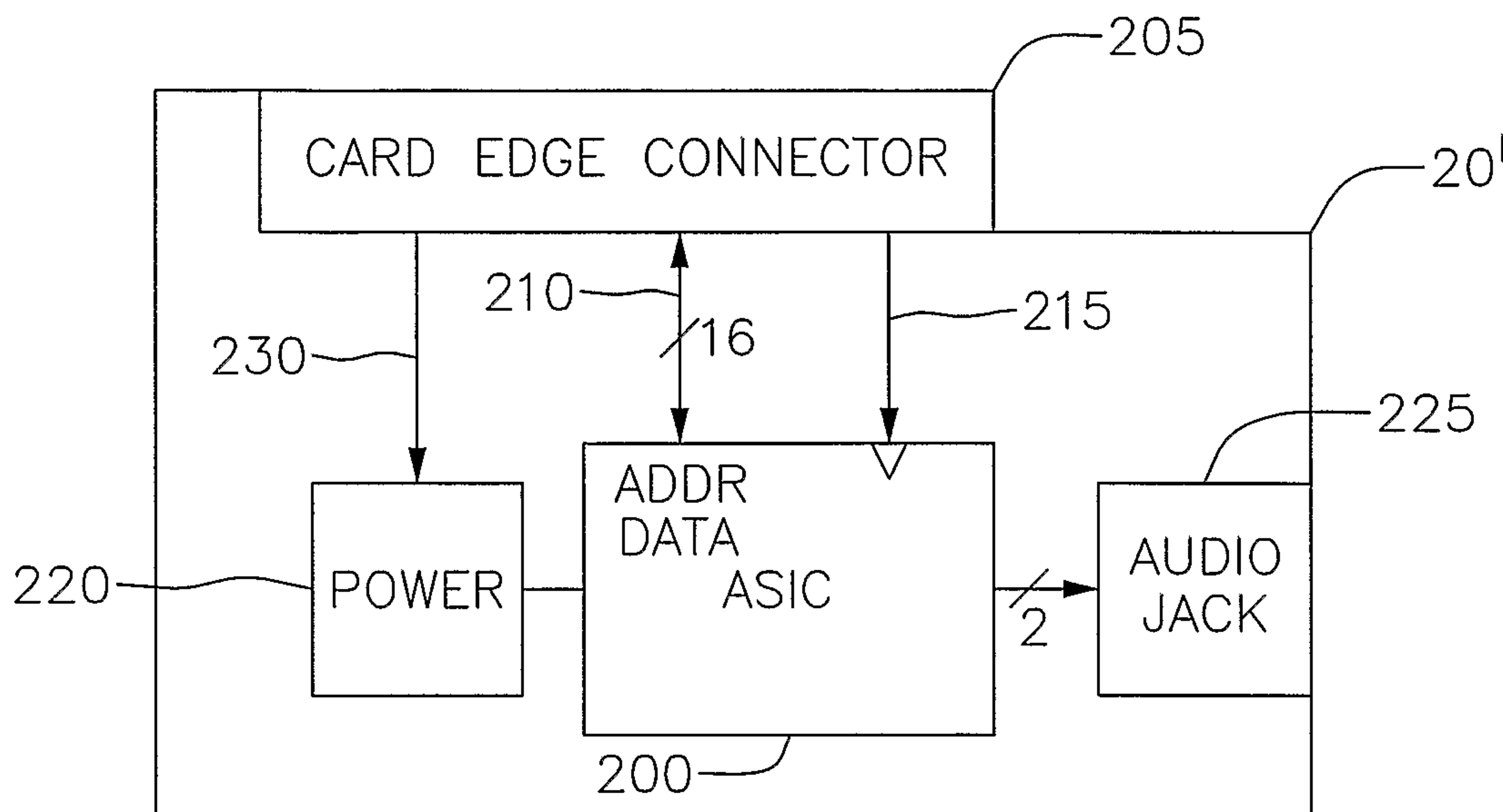




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(54) Titre : SYSTEME ET PROCEDE DE CARTOUCHE DE SUPPORTS NUMERIQUES
 (54) Title: DIGITAL MEDIA CARTRIDGE SYSTEM AND METHOD



(57) **Abrégé/Abstract:**

A digital media cartridge contains both a controller and memory where the memory stores a digital representation of video and sound in compressed, encrypted form. In one embodiment, the controller reads the digital representation, decompresses and decrypts it, converts it into analog video and audio and outputs the analog video and audio to a host device into which the cartridge is inserted. The analog video and audio output are displayed on the screen of the host device and reproduced by speakers or headphones of the host device, respectively, without further processing of the video and audio signals being necessary by the host device. Besides video and audio, the digital media cartridge can also store and execute games that use the user input and display screen of the host device

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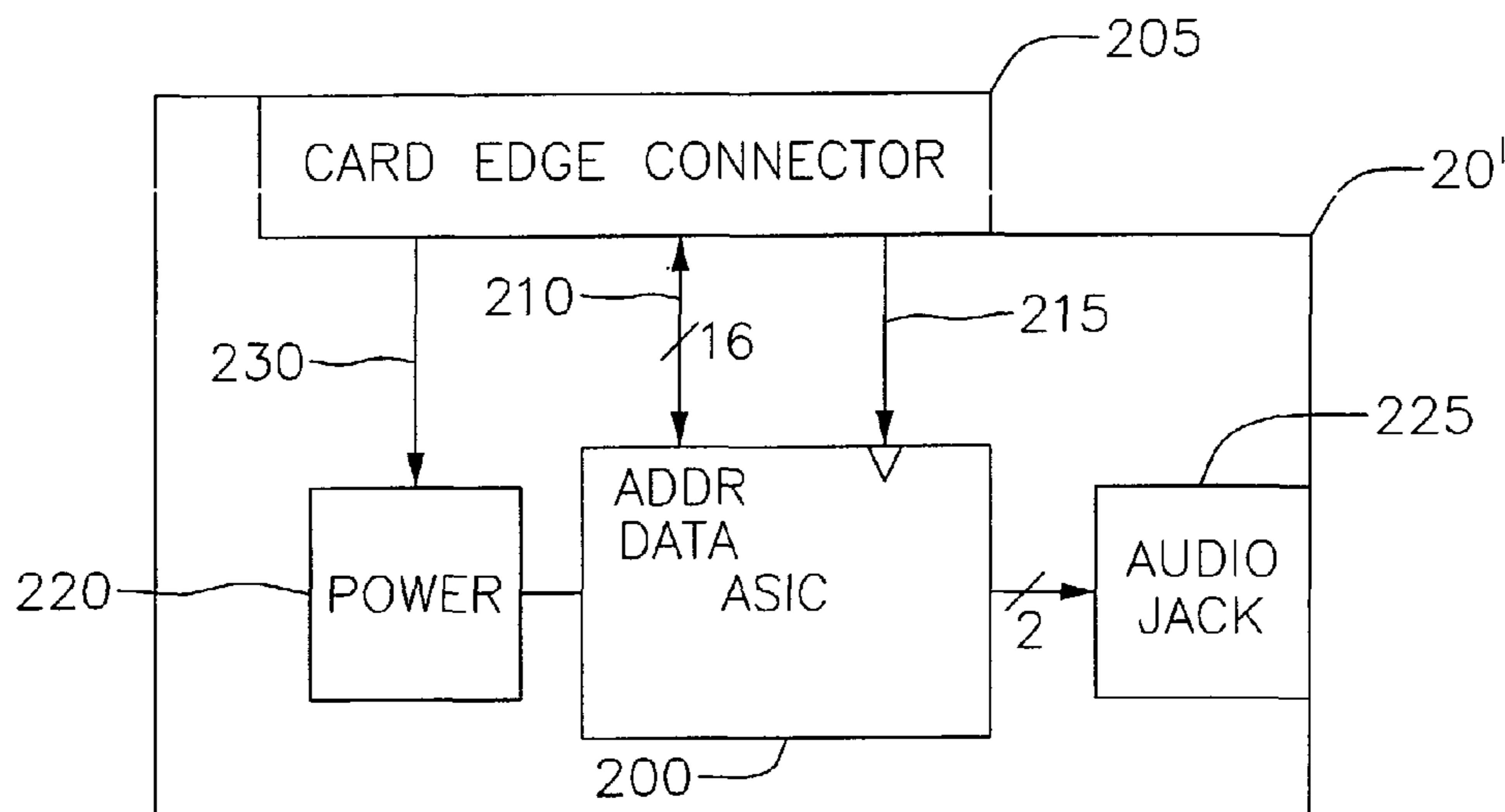
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(54) Title: DIGITAL MEDIA CARTRIDGE SYSTEM AND METHOD



(57) **Abstract:** A digital media cartridge contains both a controller and memory where the memory stores a digital representation of video and sound in compressed, encrypted form. In one embodiment, the controller reads the digital representation, decompresses and decrypts it, converts it into analog video and audio and outputs the analog video and audio to a host device into which the cartridge is inserted. The analog video and audio output are displayed on the screen of the host device and reproduced by speakers or headphones of the host device, respectively, without further processing of the video and audio signals being necessary by the host device. Besides video and audio, the digital media cartridge can also store and execute games that use the user input and display screen of the host device

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1 DIGITAL MEDIA CARTRIDGE SYSTEM AND METHOD

SUMMARY OF THE INVENTION

5 A digital media cartridge contains both a controller and memory where the memory stores a digital representation of video and sound in compressed, encrypted form. In one embodiment, the controller reads the digital representation, decompresses and decrypts it, converts it into analog video and audio and outputs the analog video and audio to a host device into which the cartridge is inserted. The analog video and audio output are displayed on the screen of the host device and reproduced by speakers or headphones of the host device, respectively, without further processing of the video and audio signals being necessary by the host device.

10 The new cartridge can be inserted, for example, into a Game Boy Advance unit and bypass the controller in the Game Boy Advance unit and use the Game Boy Advance unit's display and speaker to show the video and audio output by the cartridge. Digital media cartridges can be made in any form factor and with any connectors to allow them to be connected to a variety of devices that have screens and speakers to convert such devices into video playback devices.

15 One advantage of certain embodiments of the digital media cartridge is that because it contains all of the video signal creation hardware and software, new technology can be built into later versions of the cartridge without having to change the socket and/or circuitry on the device with the screen into which the cartridge is plugged. Thus, standard televisions could include a socket to receive digital media cartridges – the socket and associated hardware being very cheap to manufacture. At the beginning it may only be economical to produce standard definition video stored on these cartridges, but as technology advances, including improved compression technology and the cost of memory and other components goes down, it may become economical to produce cartridges that output higher definition video or cheaper to produce standard definition video cartridges. No changes though, would have to be made to the television with the built in socket to take advantage of the new technology as it is all contained in the cartridge, provided the television screen is capable of display a video resolution as good as the video output from the digital media cartridge. Further, should the encryption technique be broken or otherwise compromised, new cartridges can be immediately produced that use completely new encryption techniques so that damage from the breaking of the encryption can be minimized. Additionally, slightly different encryption techniques can be used so that the exact encryption technique is unique to the cartridges that contain a particular video program or movie. Thus, if the encryption is compromised for one particular program or movie, the same decryption technique cannot be utilized for different content stored on the cartridges.

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1 BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a typical known handheld portable game player.

FIG. 2 is a block diagram schematic of an exemplary handheld portable game player.

5 FIG. 3 is a block diagram schematic of a digital media cartridge according to an embodiment of the invention.

FIG. 4 is a block diagram schematic of an ASIC chip of a digital media cartridge according to an embodiment of the invention.

FIG. 5 is a flow chart showing the process of interaction between a game player and a digital media cartridge according to an embodiment of the invention.

10 FIG. 6 is a block diagram schematic of a decryption portion of a digital media cartridge according to an embodiment of the invention.

FIG. 7 is a block diagram schematic of a digital media cartridge with a intermediate sleeve with user input controls according to an embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

15 FIG. 1 shows the overall configuration of an embodiment of the invention. Game player 10 is a portable, battery operated computer device that allows a user to play any of a large number of games that are stored on various different cartridges 20. Game player 10 includes a socket 30 into which a cartridge 20 selected by the user from any of a number of cartridges 20a – 20. The game player 10 includes a screen 40 on which the game player 10
20 displays the game and keys 50 that allow the user to provide inputs into the game to interact and thus “play” the game. Although the invention may apply to any portable game player or other device with a screen, in the preferred embodiment, game player 10 is a Nintendo Game Boy Advance (GBA). Game Boy and Nintendo are trademarks of Nintendo of America Inc.

FIG. 2 shows a more detailed, but general overview of the architecture of a GBA.
25 The GBA has a CPU 100. The processor in the GBA is an ARM processor running at approximately 17 MHz. The CPU includes an LCD controller 105. LCD controller is connected to LCD screen 110 through LCD Drivers 115. In the GBA, the LCD screen 110 is a 240x160 TFT Color LCD capable of 32,768 displayable colors. The LCD Drivers receive an RGB signal from CPU 100. The CPU includes VRAM 120, which is video RAM for
30 storing a digital representation of the screen upon which the RGB output to the LCD driver is based. The CPU also includes CPU Core 125, system ROM 130, CPU Internal WRAM 135. peripheral circuit 140, and prefetch buffer 145. Peripheral circuit 140 connects the CPU to the controller (keypad) 150 and the sound amp 155, which in turn drives speaker 160 and headphone jack 165. Prefetch buffer is a small memory buffer that is used to transfer data
35 between the game cartridge 20 and the CPU 100 through bus 170 that includes the connection between the multi-contact socket in the GBA (not shown) and the multi-contact contacts on the edge connector (not shown) of game cartridge 20. Game cartridge 20 includes memory that typically includes both Masked ROM (not writable) (MROM) and flash memory.

1 Conceptually, the memory is split between General Purpose Bus Memory Space 175 and AD
Bus Memory Space 180 (the later memory space is not contained in Game Boy cartridges for
use with Game Boy versions prior to the GBA.

5 One embodiment of the invention includes a digital media cartridge (DMC) 20' for
use with the GBA. Referring to FIG. 3, the central component of DMC 20' is ASIC 200. As
is discussed in more detail below, ASIC (Applications Specific Integrated Circuit) 200 is a
custom made chip that includes, among other things, a processor and memory. ASIC 200 is
connected to multiple contacts on edge connector 205. These contacts connect to the
10 combined address/data bus 210 and the control line(s) 215 of the ASIC. The edge connector
also includes a power source connection 230 from the GBA. The power goes through power
circuitry 220. In one embodiment, the DMC 20' also includes its own audio headphone jack
225.

A more detail block diagram of the architecture of ASIC 200 is shown in FIG.4.
Unlike conventional game cartridges, ASIC 200 includes a processor 230. In one
15 embodiment, the processor 230 is a RISC (Reduced Instruction Set Computer) processor.
Processor 230 is connected to a memory controller 235 which interfaces between the
processor 230 and the read only Mask ROM (MROM) 240 and writeable Local Memory 245.
Digital media content is store on MROM 240. Digital media content can be any type of
audio/visual, text or graphics media content, but in a preferred embodiment, the digital media
20 content is full motion video with accompanying audio. In order to be able to store a
sufficient quantity of sufficiently quality video in the relatively small memory that is
typically found in game cartridges for space and economic reasons, both the audio and video
are stored digitally in a compressed format. In one embodiment, H.264 compression is used.
While it is possible to real-time decompress video data compressed using H.264 using
25 software and the general purpose processor 230, this generally takes more processor power
than it would generally economically and size feasible for a game cartridge at the time of the
invention. Accordingly, in a further embodiment, ASIC 200 includes circuitry for real-time
hardware H.264 decoding (H.264 accelerator 250). Similarly, in one embodiment, audio is
compressed using MPEG-4 AAC encoding and in an alternative embodiment, ASIC includes
30 hardware MPEG-4 AAC decoding circuitry 255. AAC decoding circuitry is connected to a
buffer amp 265 that drive headphones 270 through DAC (digital to analog converter) 260.
DAC 260 includes volume adjusting circuitry that is used rather than the volume control on
the host GBA. During audio and/or video playback, decompressed audio/video data is
transferred to the GBA through FIFO buffer 275. However, during boot, of the GBA, data is
35 delivered to the GBA from MROM 240. This is because MROM 240, besides storing the
digital media data, stores a boot program that runs on the GBA processor to allow the RISC
processor 230 on the DMC to directly control the screen and audio outputs of the GBA.

In one embodiment, the ASIC includes the MROM containing all of the digital

1 audio/video data (all-in-one embodiment).

In another embodiment, the ASIC contains a much smaller MROM, that stores the boot program, but not the digital audio/video data. In this embodiment, DMC has a second connector, besides the connector to the GBA, that connects the ASIC 200 to digital media data stored in an MROM in a sub-cartridge that is removable from the main DMC that includes the processor (sub-cartridge embodiment). In one embodiment of the sub-cartridge embodiment, the connector is a MultiMedia Card (MMC) socket that is connected to MMC Interface 285. Alternatively, the sub-cartridge can be in any existing form factor and their respective connectors, such as, PCMCIA cards, smart cards, Secure Digital (SD), SmartMedia, Compact Flash or Memory Stick. Additionally, sub-cartridges can be made in form factors and connectors that are less common or have not yet been developed.

One possible advantage of the sub-cartridge embodiment is that the cost of the sub-cartridge may be lower than the price an all-in-one DMC that includes both the processor and the memory with the digital audio/video data. On the other hand, an advantage of the embodiment, in which the digital audio/video data is stored directly in MROM on the same ASIC as the processor, is that there are no exposed leads directly from the MROM containing digital media that may allow someone to more easily try to reverse engineer the system and try to copy off the raw compressed digital audio/video data directly from the MROM. Further, it prevents the use of Game Boy emulators or other hardware devices to electronically download the data in the memory because they must go through the ASIC's processor to get to the memory, which blocks such access. Another advantage of the single chip ASIC system is that, unlike a cartridge (adapter) and sub-cartridge system, the hardware (e.g., processor, audio and/or video decoders) can be changed between different versions of the chip without affecting the operation of DMCs produced prior to this invention. Accordingly, better compression that requires less memory for the same length of video may be employed in later DMCs, saving cost on the size of MROM that must be included in the ASIC. Similarly, new technology may become available, such as high-definition television, in which changes to the processor, video decoder, etc. can be made to produce DMCs that produce higher resolution video, without affecting prior cartridges in any way.

30 The ASIC uses the system PLL from the host GBA as a clock. However, during initial boot of the GBA, the GBA does not supply such a clock to the cartridge in the Game Boy's cartridge slot. Accordingly, the memory controller in the ASIC must be capable of getting through the GBA boot sequence without an external clock.

FIG. 5 shows the process used by the DMC in interacting with the GBA to accomplish displaying video on the LCD screen of the GBA. In step 300, with the DMC 20' connected to the cartridge socket in the GBA, the GBA is powered on and the GBA goes through its standard boot sequence. This boot sequence includes, in step 310, authentication of the DMC as a legitimate GBA cartridge. In step 320, the DMC loads a GBA program

1 stored in the MROM of the DMC via bus 170 into the working memory of the GBA. In step
330, the GBA then runs the uploaded program from the DMC. This program causes the GBA
processor to pass data presented with the correct command(s) on bus 170 directly to the
VRAM 120 of the GBA without any processing, and thus delay, by the GBA processor. The
5 program also causes the GBA to pass any user inputs received from controller 150 directly to
the DMC processor 230 without taking any action on the user inputs. The DMC processor
230 then processes the user inputs and performs the programmed response to such user
inputs, such as play, pause, fast forward, rewind, menu, select and cursor control.

Turning to FIG. 6, in an alternate embodiment, encryption is used. FIG. 6 shows a
10 block diagram of DMC 20', the ASIC 200 and MROM 240 that is shown as part of ASIC
200. As discussed above, though, MROM 240 can be implemented on a separate chip or
even a separate sub-cartridge from ASIC 200. The MROM includes encrypted digital media
data (encrypted content) 400 and the program that is loaded onto the GBA and run by the
GBA CPU 100, the GBA application 410. The GBA application includes a decryption key
15 420. The ASIC includes a hard coded decoding processor 430 that is passed the decryption
key 420 by the GBA CPU 100 running the GBA application 410. Alternatively, the decoding
processor is implemented with the RISC processor running either software (stored in
MROM) or firmware (e.g., microcode). The GBA application does not contain any
information about the decryption algorithm built into decoding processor 430, and thus the
20 key alone does not help a hacker in decrypting the encrypted content 400. Alternatively, the
key is not passed to the GBA as part of the GBA application, but rather stored separately,
either in the MROM 240, firmware or hardwired in the ASIC and supplied directly to the
decoding processor without ever being exposed to the GBA bus 170.

In the all-in-one embodiment that includes the RISC processor and MROM in the
25 same DMC, the ASIC for each title of video content contains slightly different decrypting
algorithms built into the decoding processor. Thus, even if one decoding processor is reverse
engineered, the knowledge gained will not be useful in using the key for any other title to
decrypt the other title. Further, as new encryption technology or techniques are developed,
these can be implemented in future titles releases because, being an all-in-one cartridge, the
30 DMC does not have to be backward compatible with any old decryption hardware, unlike
technologies like DVDs where the decryption scheme cannot be changed without rendering
new DVDs unplayable on old DVD players.

The DMC is not limited to outputting audio and video. In an alternate embodiment,
the MROM of the DMC contains software that is executable by RISC processor 230, such as
35 games. One instance where this embodiment may be desirable is if the processor or other
hardware in the GBA is not capable of some function or is not fast enough to run certain
game software that can, though use the screen 110 and the control keys 150 of the GBA. As
with the audio/video embodiment described above, the DMC takes control of the GBA screen

1 by directly loading data into the GBA VRAM and is passed all GBA control key presses.

In another alternate embodiment, the MROM of the DMC contains game system emulation software. When this is run by the RISC processor 230, the DMC then acts like another game system entirely. For example, the game system emulation software may emulate the original Nintendo Entertainment System (NES), which is a cartridge based game system first introduced in 1985 that is not portable and does not contain its own screen, but is connected to a television and uses an external power supply. When the RISC processor is running the NES emulation software, the DMC with the GBA operates exactly the same as the original NES system, using the GBA's screen 110 and controller 250. The MROM also contains software of one or more original or new NES games. The GBA/DMC then allows a user to play a true NES game as they would on an NES system.

In a sub-cartridge alternate embodiment, the DMC includes a socket that accepts other cartridges that contain NES system games. As with the sub-cartridge embodiment described above, the sub-cartridge can be of any form factor and use any type of connector, such as, for example, a socket connected to MMC interface 285. Another sub-cartridge example is a socket, connected to the DMC by a cable or wireless link because of the socket's size, that accepts the original cartridges for the game system being emulated by the DMC. Thus, if someone still owns original NES cartridges, they could be connected and played on an NES emulator DMC cartridge plugged into a GBA.

While the above embodiments have been discussed in relation to portable game players, the system is not so limited. Rather, for video content, the system can be applied to any system that already has a screen, a user input and a connector that allows access by the DMC to the screen and the user input. Similarly, for audio only content, the system can be applied to any system that already has a speaker, a user input and a connector that allows access by the DMC to the speaker and the user input.

For example, it would be inexpensive to have television built with a socket through which a DMC could be connected to provide video directly to the screen of the television. Typically, no or very little additional circuitry would be required. In such a system, a DVD player or video tape player would not be needed to view prerecorded video content. However, unlike DVD and video tape, which must work with the technology as it was essentially when the product first came to the market, DMCs, because they include all of the video generation electronics, the quality and technology level of a particular DMC is based on the technology available and the economics available at the time the DMC was produced, even many years after introduction of DMCs. For example, because of memory costs, compression technology and other factors, it is likely not presently economical to produce a DMC that produces high-definition (HD) quality video. (High Definition television is presently defined in the United States as having either 1080 vertical lines of resolution, interlaced (1080i) or 720 vertical lines of resolution, progressive scanned (720p)). Thus, an

1 HD-capable television with a socket to accept DMCs would show the video at whatever
quality (resolution and frame rate) that is produced by that particular issue of DMC. When
memory costs and technology advances to the point where producing a DMC that outputs
true HD quality video signals, The same HD-capable television would show the video
5 produced by the new DMC in HD quality. The only limitation would be the quality of video
that the television is capable of reproducing. Alternatively, DMC sockets can be provided in
any other consumer device, including, but not limited to, VCRs, DVD players, DVD
recorders, digital video recorders or cable or satellite set top boxes.

One difference between the GBA embodiment and, for example, the television
10 embodiment, is the format of the video output by the DMC. As described above, in the GBA
embodiment, the video is output in digital form across bus 170 to VRAM 120, which drives
the LCD screen 110. In the case of a television or similar device, the DMC may include a
digital to analog converter (D/A converter) (not shown) that converts the digital video
15 generated by the processor and/or the H.264 Accelerator into an analog video signal, such as
NTSC baseband video and output the analog video through the DMC's connector. Indeed,
many television and other home entertainment components include (mostly analog) inputs on
the front of the device. It is an inexpensive manufacturing also include a jack that included
the same analog video connectors as well as power, user input passthroughs and, in some
embodiments, a clock signal.

20 Besides cost issues, another reason to have the DMC output analog video rather than
digital video is to guard against piracy. Using existing home recording technology, recording
of analog signals degrades the quality of the video, at least slightly and in some cases
dramatically. Digital video being output by the DMC runs the risk of being sniffed or
intercepted at the connection between the DMC and the television to achieve a perfect copy
25 of the video output by the DMC. Further, existing VCRs and DVD recorders include
circuitry and/or software that can detect modifications to the analog video signal that are
intentionally placed in prerecorded video tapes, DVDs and some broadcast television
programs that prevent effective recording of the video signal. In one embodiment, the DMC
inserts these modifications to the video signal as part of the D/A process.

30 Other embodiments other than game players and televisions that can be equipped with
DMC sockets include, but are not limited to: personal digital assistants (PDAs), such as Palm
or PocketPC operating system devices, e-books, mobile phones, wireless email devices,
desktop and laptop computers, automobile video systems, display projectors, video
camcoders, digital still cameras, video game consoles and any other current or future product
35 that includes a screen and an user input device.

When used with devices like mobile phones or other devices that either have ID
numbers or are connected to wide area networks, the decryption process can be more robust.
As in the embodiment discussed in FIG. 6, a key is passed to the host device, for example, a

1 mobile phone, rather than a GBA. However, since the mobile phone is connected to a wide
area network, authentication with an authentication server on the network and/or distribution
of secondary keys from an authentication server is done, allowing many types of known
encryption to be used, including, but not limited to, public key, private key encryption
5 methods. In one alternate, the operation of the DMC or the output of the DMC is altered
based upon the ID in the host device and/or the key(s) returned from the network. For
example, video or audio output can be watermarked. A watermark can be used to determine
if, how and to what devices the video or audio output can be copied. If a watermarked video
or audio is copied and distributed improperly, the host device used originally can be
10 determined.

In an alternate embodiment, DMC 20' includes both MROM 240 and flash memory
(not shown). This embodiment allows the downloading and storage (after the DMC is
removed from the host device) of any data that otherwise has been described as being stored
in MROM 240, such as, for example, audio/video content, games, game system emulation
15 software, or other software. It can further store patches and updates to any operating or
system software run by the RISC processor 230. When used with the sub-cartridge
embodiment, audio and/or video content, games or any other data or software can be
downloaded from the sub-cartridge to the flash memory, allowing this content to be enjoyed
after the sub-cartridge is removed from the DMC. When used with the embodiment where
20 the host device is connected to a wide area network, audio and/or video content, games or any
other data or software can be downloaded over the wide area network and stored in the flash
memory. When used with a host device that has an input/output (I/O) port, such as a USB or
1394 port, audio and/or video content, games or any other data or software can be
downloaded from a device connected to the host device's I/O port and stored in the flash
25 memory.

In an alternate embodiment, DMCs include their own user input device, such as a
keys or some wireless input such as infrared or RF, such as Bluetooth.

Turning to FIG. 7, a similar alternate embodiment includes a host device 500 that has
a display screen 510 and includes any device that can be made to accept DMC 20' as
30 described above. The host device may be a television or any other device with a display
screen that does not include appropriate user inputs. The host device 500 includes a socket
that accepts user input cartridge 520 that includes control keys 530. The user input cartridge
520 also includes a socket that accepts a DMC 540. Other than supply signals alerting DMC
540 identifying control keys presses, user input cartridge generally just passes signals
35 unimpeded between DMC 540 and host device. DMC 540 is generally the same as and
operates the same as DMC 20'. As with DMC 20', DMC 540 can store and output
audio/video programs, in which case the control keys perform such functions as play, pause,
fast forward and reverse and/or run video games or emulate game systems, in which case the

1 control keys perform the function of a game controller.

Audio only DMCs can be used with, for example, MP3 players, audio cassette tape
player, audio CD player, earphone, headphone, an audio amplifier or audio receiver that is
equipped with a DMC socket through which the DMC can directly access the speakers or
5 headphones of the device.

In another alternate embodiment, rather than a physical socket and edge connector as
used by the GBA system, the communication between the DMC and the display or audio
reproduction device is a wireless connection, such as infrared, RF, microwave or any other
wireless communication technology. In an alternative to this embodiment, a wireless adapter
10 could be used to connect a socket based DMC with a display or audio reproduction device
that is equipped to receive DMC output wirelessly.

In another alternate embodiment, the form factor of the DMC is different. Rather than
using a GBA cartridge format and edge connector interface, the DMC is adapted to be
packaged in any existing form factors and their respective connectors, such as, PCMCIA
15 cards, smart cards, MultiMedia Cards (MMC), Secure Digital (SD), SmartMedia,
CompactFlash or Memory Stick. Additionally, DMCs can be made in form factors and
connectors that are less common or have not yet been developed. As with the DMC for use
with the GBA, the DMC implemented in any of these form factors can be an all-in-one
cartridge that includes the decompression and decryption processors or a cartridge and sub-
20 cartridge combination where the cartridge includes the processors and the sub-cartridge
includes the compressed digital audio/video data. In one cartridge – sub-cartridge
implementation, the cartridge is built in a sleeve form so that one end fits into the socket for
the particular form factor and the other end includes a socket for accepting a sub-cartridge of
the same form factor. In one embodiment, the sub-cartridge can be a standard, off the shelf
25 memory card of the chosen form factor with the compressed, encrypted digital video data
stored in the standard way on it. In yet another embodiment, the form factor DMCs include a
small audio output jack, preferably at or near the end away from the connector of the
cartridge. Alternatively, the DMC has a wireless transmitter (infrared or RF, for example) to
transmit the audio signal produced by the DMC and/or the video signal produced by the
30 DMC to wireless equipped display and/or speakers/headphones, respectively.

Various alternate embodiments have been described as well as examples of specific
alternates being combined. However, it is recognized that, for the most part, each of the
alternate embodiments may be combined with one or more of the other embodiments and all
of these combination are contemplated and intended, even each of the enormous number of
35 combinations are not specifically discussed. The present invention has been described and is
illustrated with respect to embodiments thereof, it is to be understood that it is not to be so
limited, since changes and modifications may be made therein which are within the full
intended scope of this invention as hereinafter claimed.

1 WHAT IS CLAIMED IS:

1. A cartridge for use with a host display device that includes a video display and an external electrical connection that is connected to the video display, the cartridge comprising:

- 5 a connector that electrically connects to the external
a memory storing an encrypted compressed digital representation of a video signal and computer code to be executed by the host display device;
a decompression processor connected to the memory;
a decryption processor connected to the memory; and
10 an interface processor connected to the memory, the decompression processor, the decryption processor and the connector;

wherein the interface processor uploads the computer code to the host display device instructing the host display device to pass video signals output via the connector to the video display; and

- 15 wherein the decompression processor, decryption processor and the interface processor convert the encrypted compressed digital representation of a video signal into a video signal that is output to the host display device via the connector.

20 2. The cartridge of claim 1 wherein a single integrated circuit comprises the decompression processor, the decryption processor and the interface processor.

3. The cartridge of claim 1 wherein a single integrated circuit comprises the memory, the decompression processor, the decryption processor and the interface processor.

25 4. The cartridge of claim 1 wherein the memory stores an encryption key used by the decryption processor to decrypt the encrypted compressed digital representation of a video signal.

30 5. The cartridge of claim 4 wherein the decryption processor includes at least a portion of a decryption algorithm.

6. The cartridge of claim 5 wherein the encryption key is only effective if used with the portion of a decryption algorithm included in the decryption processor.

35 7. The cartridge of claim 1 wherein a single processor comprises two or more of the decryption processor, decompression processor and the interface processor.

1 8. The cartridge of claim 1 wherein user inputs received by the host display
device are received by the interface processor through the connector.

5 9. The cartridge of claim 1 further comprising an audio decoder connected to the
memory and the decryption and decompression processors and connected to an audio output
jack.

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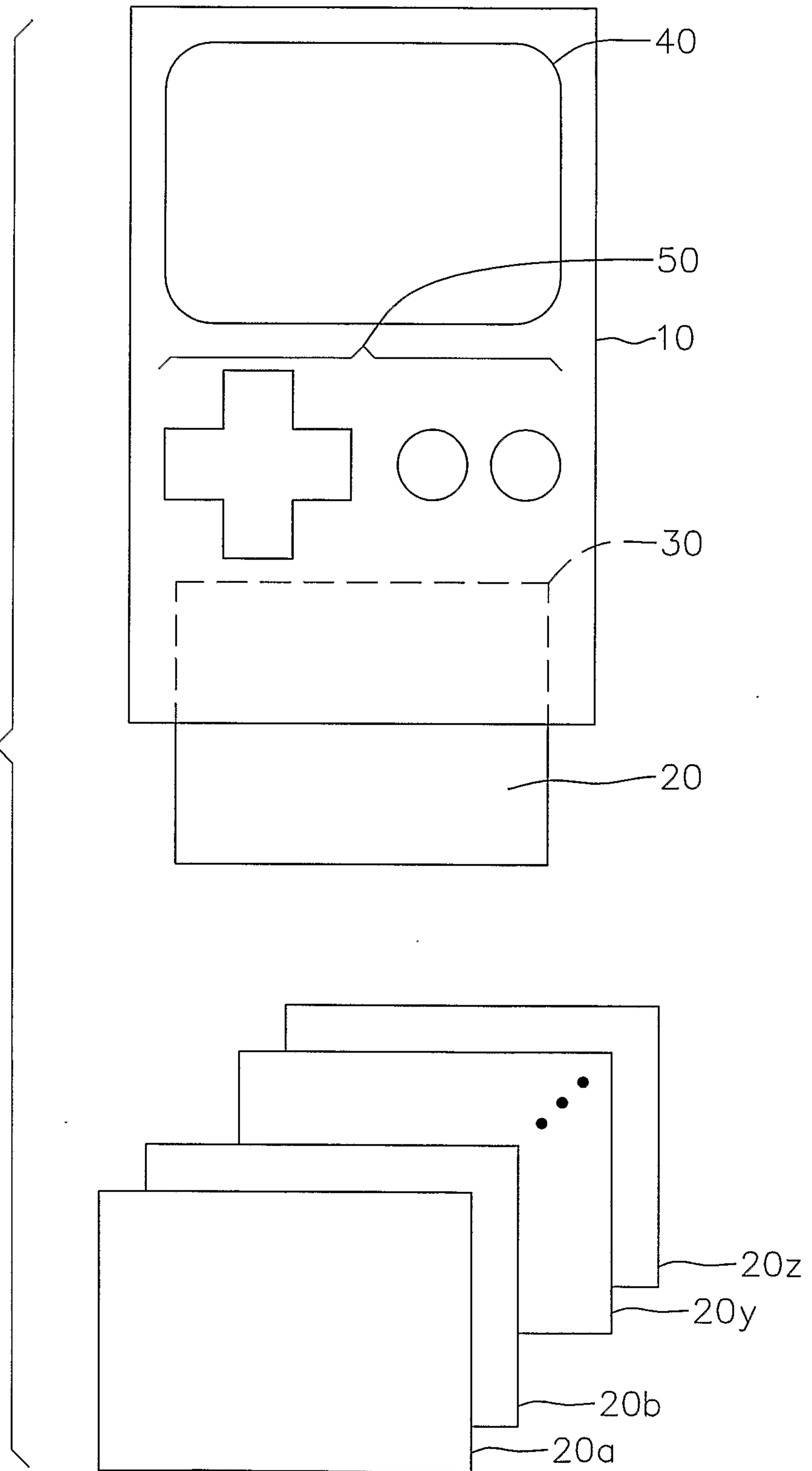
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FIG. 1



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FIG. 2

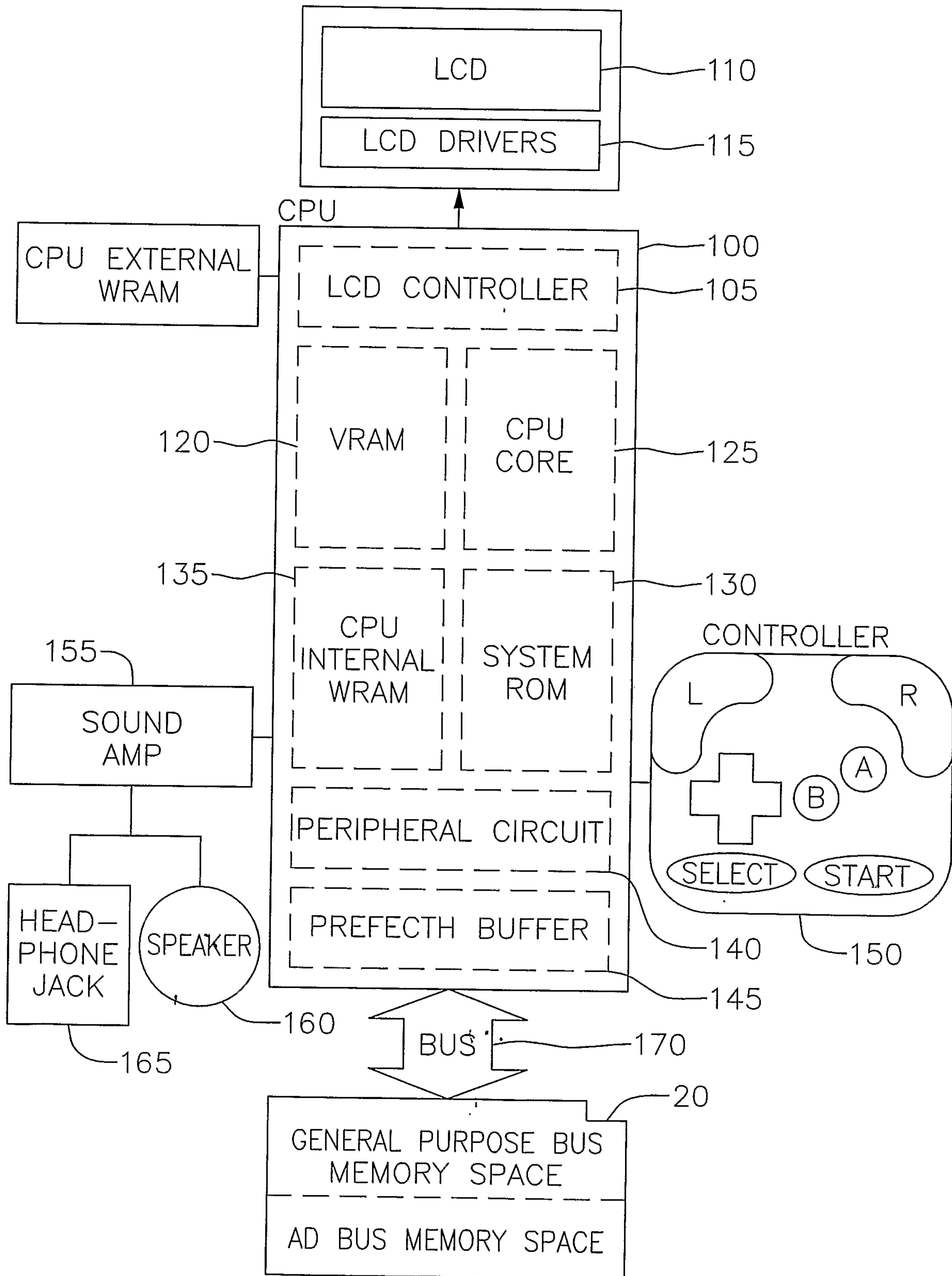


FIG. 3

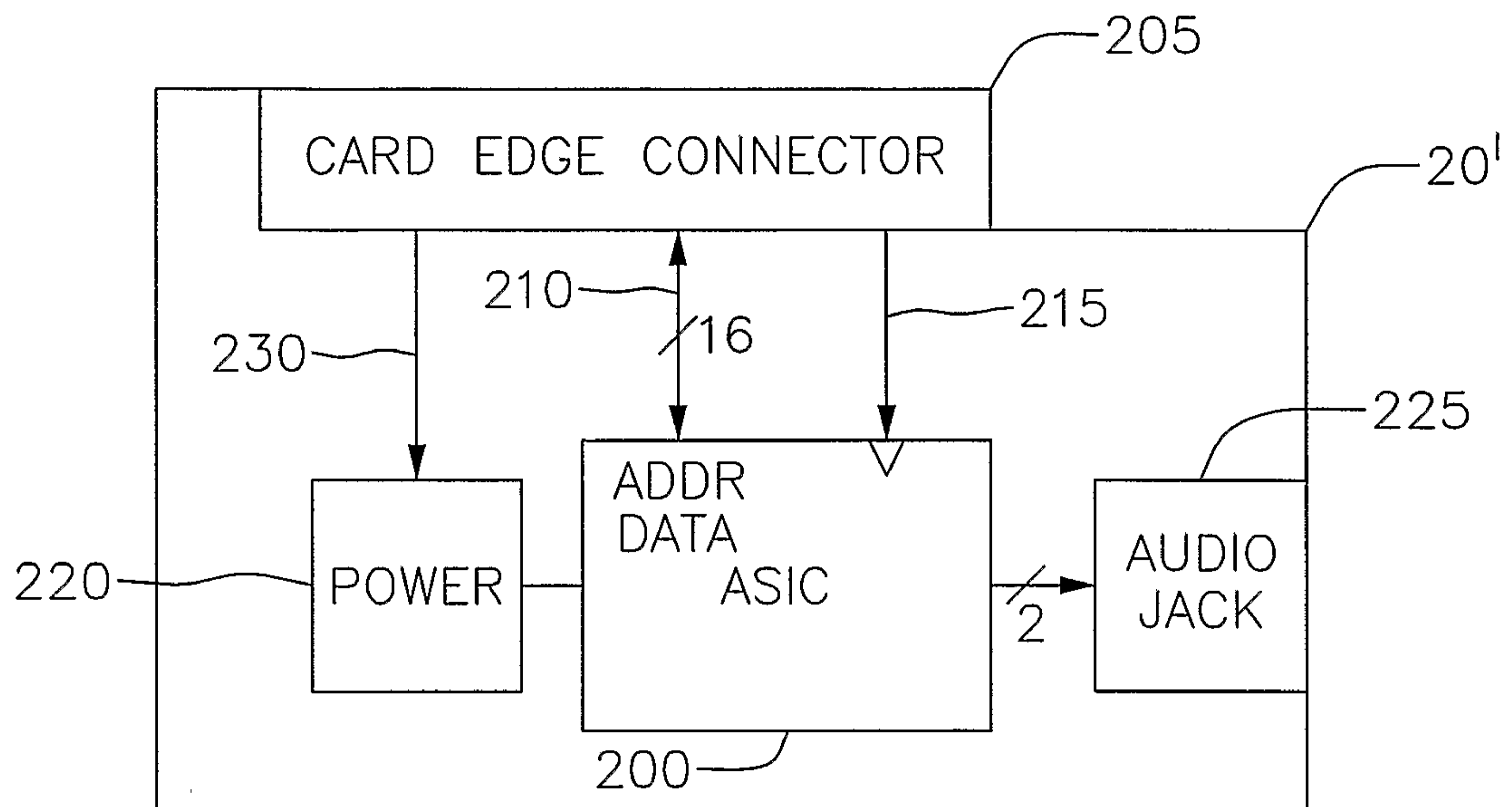


FIG. 4

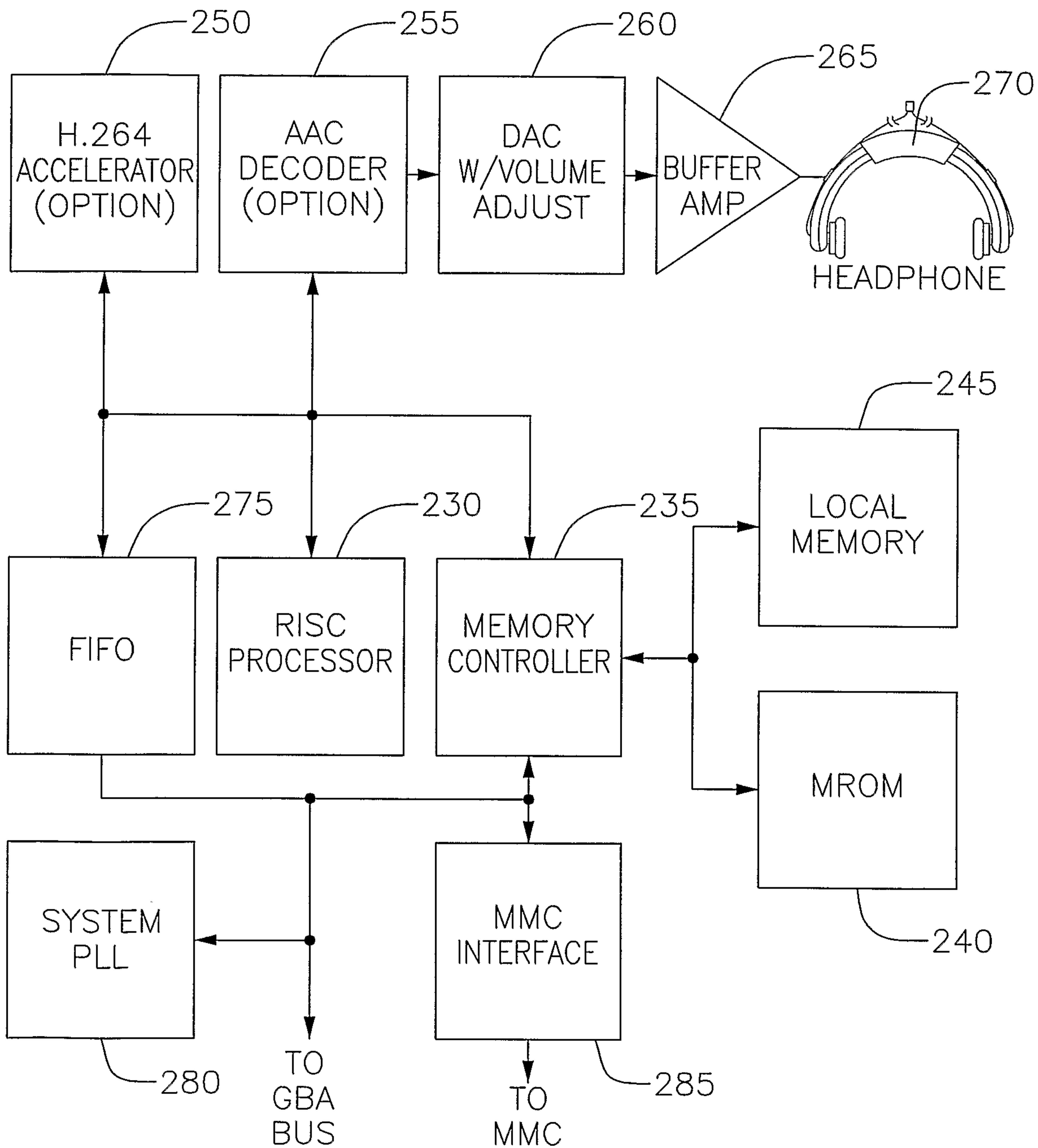


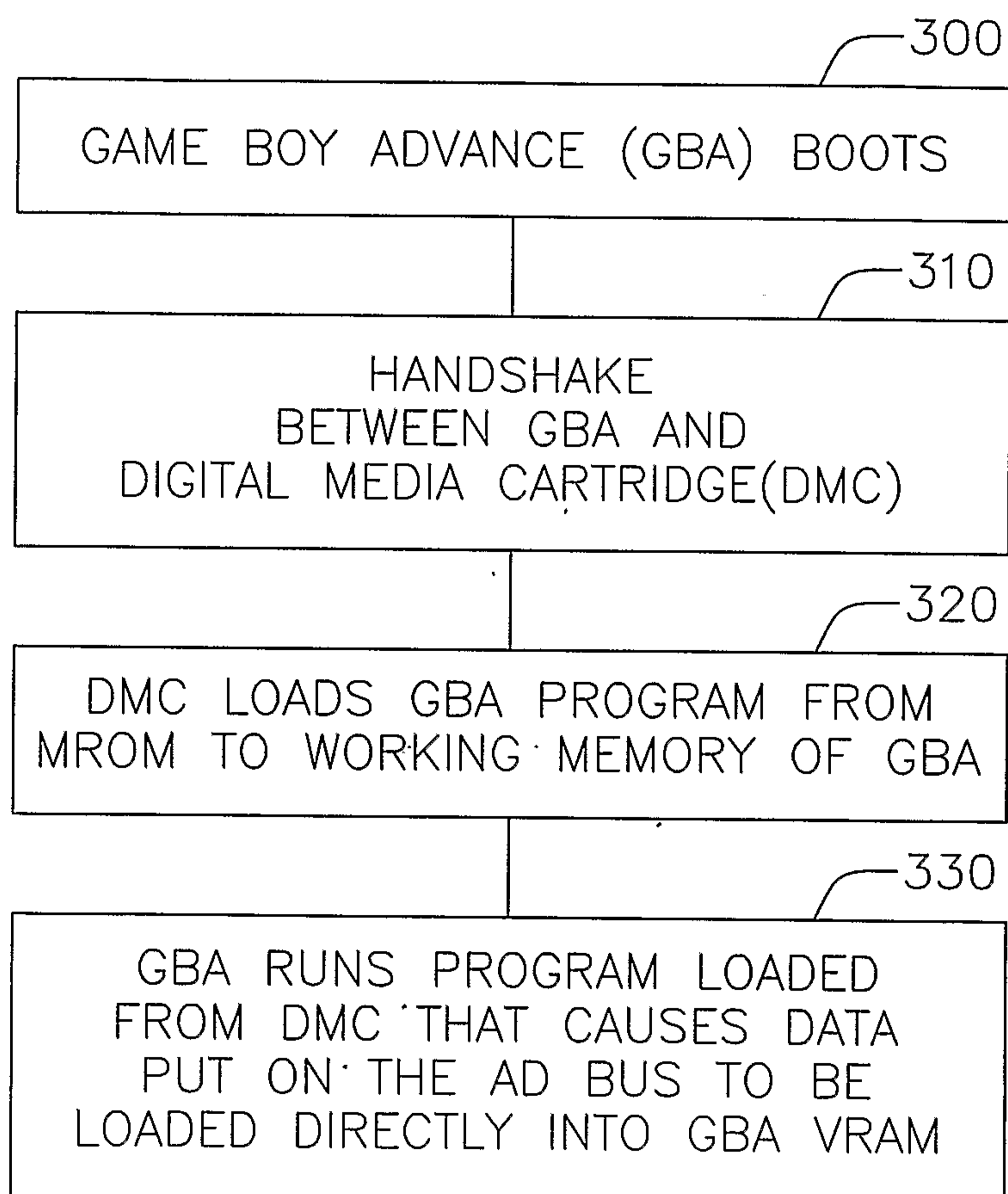
FIG. 5

FIG. 6

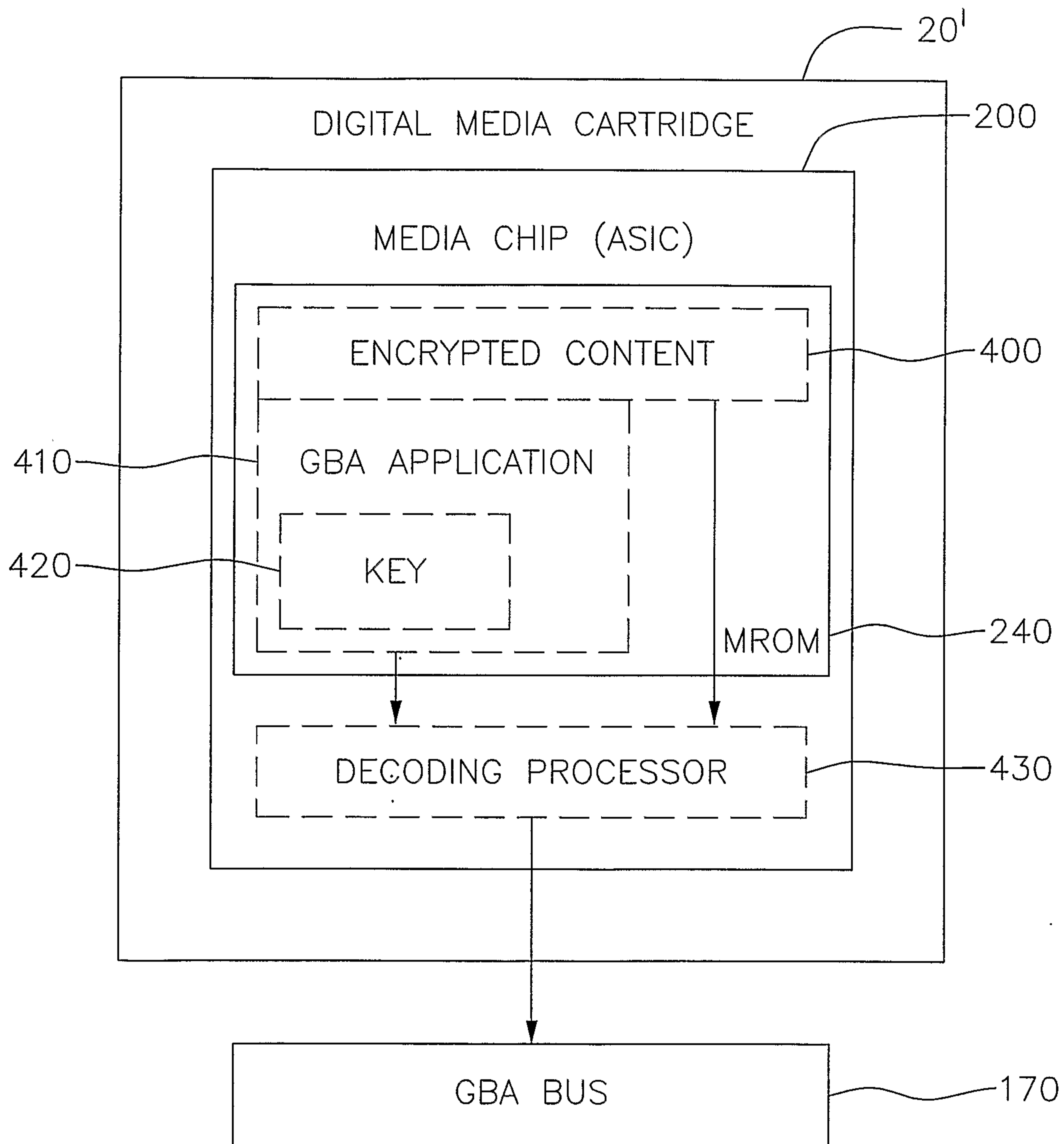


FIG. 7

