Encyclopedia of Video Games: The Culture, Technology, and Art of Gaming
By: Mark J. P. Wolf, Editor

cartridges
A cartridge is a sealed box that contains a read-only memory (ROM) chip, usually consisting of the data of only one game (or set of variations on a game) designed for a specific **console**. One part of the box contains a connector, which has to be connected in the circuits of the corresponding console through a slot. When the cartridge is inserted in this slot, the console can be powered on, and the game is ready to be played.
In 1974, Alpex Computer Corporation patented the main principle of game cartridges: data stored on ROM chips, allowing players to switch easily from one game to another. Their home console system, the **Fairchild Channel F**, released in 1976, was the first to introduce real cartridges. The **Magnavox Odyssey**, released in 1972, already employed a similar mechanism; a user had to physically change a plastic part of the console to play a chosen game. However, technically, every game was already embedded in the Odyssey: the cartridge only contained wires to connect existing circuits, thus selecting which properties were needed to play the game. Instead of being embedded in the cartridge as read-only memory, the game was generated by properties already programmed in the console circuits.
All consoles in the first half of the 1970s were "dedicated" consoles, which means they offered a small number of playable games, directly hardwired into their circuitry. With the introduction of cartridges, customers would no longer have to buy a new console for each new game they wanted to play; they could buy new games in cartridge form and play them on the same console system. Although cartridges were all initially read-only, some **Nintendo Entertainment System (NES)** cartridges, using a new technology, could write basic data such as game states. Even though Alpex Computer Corporation undertook legal actions to receive monetary compensation following the proliferation of their patented mechanism, cartridges became a standard in the industry and remained

the principal home video game format for approximately 20 years.
The introduction of cartridges had a major impact on the industry. Cartridges allowed the production of games by third-party developers: they could develop games on an existing system instead of creating their own, reducing the cost of the game itself and minimizing the risk of a commercial failure. The **Atari VCS 2600** console took advantage of this third-party contribution with its large number of games available, but it ultimately led to the video game **industry crash of 1983**; too many bad games glutted the market. When Nintendo introduced the NES, they still allowed third-party developers to release games for their console, but they maintained a tighter control over licensing than **Atari** had.
Cartridges would soon be replaced by **CD-ROM** technology. The first CD-ROM drive for a home console system was NEC's CD-ROM drive for the **NEC PC-Engine/Turbografx-16**

released in 1989, and the first home computer game to appear on CD-ROM was **Cyan**'s *The Manhole* (1987). The late 1980s and early 1990s were a period of coexistence of both formats: the **SEGA CD** and the **3DO Interactive Multiplayer** consoles used CD-ROMs, whereas the **Super Nintendo Entertainment System (SNES)** and **SEGA Mega Drive** were cartridge-based systems.

Nintendo still used cartridges for its **Nintendo 64** released in 1996, although this would be the last major home console to do so. At the time, even though the CD-ROM seemed to be the next generation support medium—carrying approximately 320 times more data—cartridges had technological advantages that couldn't be ignored. First, CD-ROM games were slowed by a loading time in between gaming sequences, whereas cartridges were significantly faster than discs and games were ready to play as soon as they were plugged into the console. Cartridges were designed to work with only one system, which raised the cost of each unit produced but allowed the Nintendo 64 to be protected from the piracy problem that the **Sony PlayStation** console was experiencing. Furthermore, because the cartridge is directly connected to the internal wires, cartridge-based consoles do not use internal memory to load data, reducing the cost of the machine itself. Additional hardware elements could be added that way to adapt to specific demands of a game: for example, *Star Fox* (Nintendo EAD and Argonaut Software, 1993), for the SNES, included a co-processor in the cartridge to support three-dimensional **graphics**. The invention of the cartridge separated game and console development in the industry, leading to an increase in game offerings. It also made user-friendly game-switching hardware a widespread phenomenon that is still the main game selection system today with home consoles.

Simon Dor

Further Reading

Kent, Steven L. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. New York: Three Rivers Press, 2001.

Sheff, David. *Game Over: How Nintendo Zapped an American Industry, Captured Your Dollars, and Enslaved Your Children.* New York: Random House, 1993.

Wolf, Mark J. P., ed. *The Video Game Explosion: A History from PONG to PlayStation and Beyond.* Westport, CT: Greenwood Press, 2007.