

## Chapter 13

# Miscellaneous Topics and Final Thoughts

**In this chapter, you'll learn about:**

- ♦ **Game level backgrounds**
- ♦ **Sources of inspiration**

## Game Level Backgrounds

As mentioned back in Chapter 1, most types of arcade games can support multiple game levels or screens. Game levels are rendered in one of two ways: using *full-size backgrounds* and using *background tiles*.

Full-size backgrounds are just what their name implies—full-size graphic screens. Full-size backgrounds are completely self-contained images that include all of the graphical elements required to effectively represent a game level. We used a full-size background for *Fish Dish*, the game described in the previous chapter.

Background tiles are small modular graphic elements that represent a variety of different game elements. They can be arranged in a mosaic tile-like fashion to display a unique game level.

Full-size backgrounds are popular with game developers because they are relatively easy to design and integrate into a game. However, they are also notoriously inefficient. Full-size backgrounds tend to dramatically increase the overall size of the game, even with compression. The problem is compounded as the game grows in size. The more game levels, the larger the game. For example, say the average full-size background screen consumes 10 KB of space. For a five-level game this increases the size of the game by 50 K (10 x 5), which is acceptable. Yet, for a game with 100 levels, the game will increase by over 1,000 KB (10 x 100), which is not acceptable.

Background tiles, on the other hand, offer game developers a powerful alternative to the limitations imposed by full-size background screens. Because they consist of small graphic pieces, they take up far less space and memory than full-size background screens. In addition, their modularity makes them very flexible as many background tiles can be reused to represent a variety of different game levels and scenes.

Table 13-1 summarizes and compares both arcade game background techniques.

TABLE 13-1: Comparison of Full-Size Backgrounds and Background Tiles

| Game Level Background Technique | Advantages  | Disadvantages   |
|---------------------------------|---|---|
| Full-size backgrounds           | <ul style="list-style-type: none"><li>■ Easy to design and create.</li><li>■ Easy to integrate into a game.</li></ul> | <ul style="list-style-type: none"><li>■ Can consume large amounts of memory and disk space making their use prohibitive for anything but small games.</li></ul> |

| Game Level Background Technique | Advantages  | Disadvantages   |
|---------------------------------|---|---|
| Background tiles                | <ul style="list-style-type: none"> <li>■ Extremely efficient in terms of disk and memory space. Can be used to create hundreds of game levels in the same amount of space that a single full-size background might require.</li> <li>■ Very flexible. Can be used to render many distinct game levels by mixing and matching individual tile elements.</li> </ul> | <ul style="list-style-type: none"> <li>■ Difficult to design. Background tiles require a high degree of precision to create.</li> <li>■ Require significant design time. Background tiles need more design time in order to ensure that they are created properly.</li> </ul> |

Background tiles can trace their origin to the earliest days of arcade games and home video game systems when memory (RAM and ROM) was a precious commodity and it was simply impossible to store full-size backgrounds due to space limitations. Therefore, programmers developed an ingenious system of breaking game backgrounds into their core components, or tiles. They discovered that they could create effective background screens and levels by simply arranging these tiles in a specific way. For example, such classic arcade games as *Super Mario Land*<sup>TM</sup> and *Flying Shark*<sup>TM</sup> would not be possible without background tiles.

Since that time, background tiles have seen widespread use in arcade games, and virtually every video game console and programming tool supports their use. Background tiles are especially useful for online games and other instances where small file sizes and flexibility are of paramount importance.

Figure 13-1 shows a typical set of background tiles.

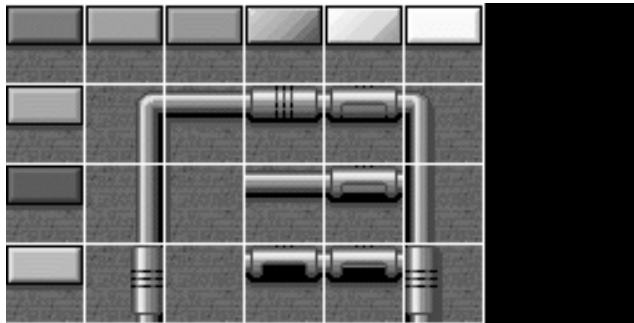


FIGURE 13-1: Arcade Game Background Tile Set

When creatively arranged, these tiles can be used to construct an almost unlimited number of game level screens like the one depicted in Figure 13-2. At the

same time, background tiles make this possible while using much less memory and disk space than a full-size background screen.

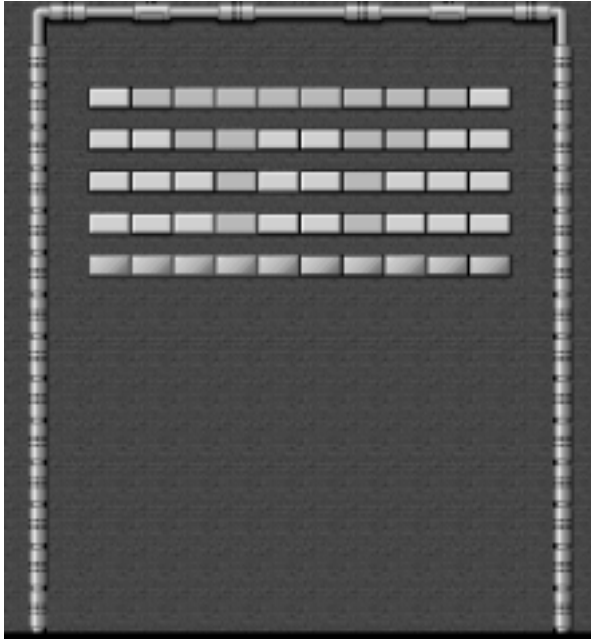


FIGURE 13-2: Example of Background Tile Arrangement

Background tiles are created using many of the same techniques that one uses to create sprites. In most cases, you can even use the same grid squares. Unfortunately, creating background tiles is not an easy process. Extreme care must be taken when designing them since each tile element must fit together perfectly with its neighbors. This can be difficult to do and can increase the design time required for any game that uses them quite substantially. Still, considering the flexibility they offer this is a relatively small price to pay.

To ensure that your background tiles are consistent and fit together properly, use your painting program's Grid tool to plot and test each grid tile in the context of how it is to be used in your game. You may also find using a specialized program such as *Map Editor* helpful in this task. Two examples of these programs can be found on the CD-ROM included with this book.



**NOTE:** The best way to learn how to create effective background tiles is to study how they are created. Therefore, it is recommended that you study the background tiles supplied on the book's accompanying CD-ROM. Please refer to Appendix B for more information.

Table 13-2 shows the suitability of using these game level backgrounds in different arcade games.

TABLE 13-2: Summary of Game Level Backgrounds in Arcade Games

| Arcade Game Sub-genre | Full-size Backgrounds | Background Tiles | Comments   |
|-----------------------|-----------------------|------------------|--|
| Maze/chase            | ✓                     | ✓                | Background tiles are recommended for maze/chase games with more than five unique game levels.                  |
| Pong games            |                       | ✓                | Background tiles should always be used in Pong games.  |
| Puzzlers              | ✓                     | ✓                | Puzzlers with more than ten unique levels should use background tiles instead of full-size background screens. |
| Shooters              | ✓                     | ✓                | Background tiles are recommended for shooter games with more than five unique game levels.                     |
| Platformers           |                       | ✓                | Background tiles should always be used in platformers.   |

It is extremely important that you understand that all of the same rules that apply to other game elements will also apply to game level backgrounds. This includes color selection, resolution limitations, and design styles.

## Sources of Inspiration

Over the course of this book, we have talked a great deal about the techniques and potential problems that can occur when creating arcade game graphics. However, almost nothing has been said about sources of inspiration that you can study in order to improve your skills.

By far, the best sources of inspiration for a burgeoning arcade game artist are the classic arcade games such as *Pac-Man*<sup>™</sup>, *Galaxian*<sup>™</sup>, and the like. Studying these games is akin to an art student studying the great Renaissance masters. These games and their designers were the pioneers of an industry. Their designers faced many unknowns and developed numerous techniques for dealing with them. They developed methods for rendering character shapes and styles, as well as animating them. You can learn a great deal about every aspect of arcade game graphics by taking a long, hard look at how the “early” video game masters created the various elements in these games.

Classic arcade games should be analyzed in four major areas: *color use*, *design style*, *animation technique*, and *usability*. By studying how classic arcade games addressed these areas, you can gain extremely valuable knowledge for your own arcade game projects. In some cases, you can discover what not to do, while in

others you may pick up a useful technique or two. In any case, you should ask yourself these questions:

- **Color use**—How many colors are used? What is the color palette? How effectively do they use color? How do they handle light and shadow? Are any special color effects used (i.e., color cycling, dithering)?
- **Design style**—What design style do they employ? Is this design style rendered convincingly and appropriately?
- **Animation techniques**—What animation primitives are used? How effective are the animations?
- **Usability**—Are the different game objects well differentiated? How intuitive are the menu screens? How legible are the scoring, lives, and level indicators? How readable is the on-screen text and game-related messages?

Table 13-3 provides some examples of classic arcade games to analyze and study.

TABLE 13-3: Recommended Classic Arcade Games to Study

| <i>Arcade Game Sub-genre</i> | <i>Classic Arcade Game</i>  |
|------------------------------|---|
| Maze/chase                   | <i>Tank Force</i> <sup>TM</sup> , <i>Pac Man</i> <sup>TM</sup> , <i>Pengo</i> <sup>TM</sup>   |
| Pong games                   | <i>Arkanoid</i>   |
| Puzzlers                     | <i>Tetris</i> <sup>TM</sup> , <i>Klax</i> <sup>TM</sup>   |
| Shooters                     | <i>R-Type</i> <sup>TM</sup> , <i>Raiden</i> <sup>TM</sup> , <i>Robotron 2084</i> <sup>TM</sup>  |
| Platformers                  | <i>Sonic the Hedgehog</i> <sup>TM</sup> , <i>Super Mario Land</i> <sup>TM</sup> ,<br><i>Megaman</i> <sup>TM</sup> , <i>Burgertime</i> <sup>TM</sup> |

Until recently, many classic arcade games were not commonly available. However, today's powerful personal computers have spurred a generation of arcade game emulators. These emulators make it possible to run long-forgotten but classic arcade games. For the best in arcade game emulation, check out *MAME* at <http://www.mame.org>. *MAME* is available for virtually every computer platform including DOS, Windows, the Macintosh, and Linux systems.

While you're at it, you should also look at classic PC-based arcade games, as their designers also had to contend with many limitations over the years. A good source for locating these games is Moby Games at <http://www.mobygames.com>.

## **Final Comments**

Don't consider this part of the book the end, but rather the beginning. The past 12 chapters have introduced you to the wonderful world of arcade game graphics. You have learned how to design for different display modes, how to use and apply color, how to evaluate tools, how animation works, and how to design the artwork and animation for an actual arcade game. Yet despite this, this book only scratched the surface of the topic. There is still much for you to learn and you can only learn by doing. Hopefully, this book will be successful enough to justify future editions that will expand and elaborate on the topics and concepts discussed here. Finally, before leaving, please consider this simple but practical advice:

- Practice constantly, as this is the only way to gain experience and sharpen your skills. Remember the adage, Practice makes perfect.
- Be patient! It takes time to develop and refine your skills.
- Don't be afraid to experiment with the techniques discussed in the book and in other sources.
- Don't be afraid to borrow elements (i.e., colors, style, poses, etc.) from the work of others but never steal someone else's artwork. Copying may be the highest form of flattery, but passing off someone else's designs as your own is just plain theft.
- Don't be afraid to innovate or to develop your own style and techniques. Doing this will make your work stand out and become uniquely yours.

With that being said, I wish you good luck in your future arcade game endeavors!

Ari Feldman, 2000