Minecraft® Redstone

FOR DUMMIES®

A Wiley Brand

Portable Edition

by Jacob Cordeiro

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Minecraft® Redstone For Dummies®, Portable Edition

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Introduction

Much of the appeal of Minecraft lies in how much you can do with it — you can move most blocks and entities however you want, and you can build lots of different items to a gigantic scale. However, the power of *redstone* takes this concept further — using this component of Minecraft, you can program, automate, and creatively reconstruct your world. *Minecraft Redstone For Dummies,* Portable Edition, teaches you how to use special blocks and items to devise circuits, programs, machines, and other incredible devices from within this versatile video game. In this book, you can find out about everything from electrical engineering to computer programming in a fun, interesting environment.

Redstone refers to various blocks that can be powered or unpowered with a sort of electric charge — they can be powered by certain sources, and they can power other items in turn. Following concepts from circuitry and electronics, this system lets you hook up devices and mechanisms to simple or complex arrangements for many different results. I also discuss other facets of Minecraft programming, such as pistons and physical machines, customized entities and items, and the versatile command block.

Version 1.8 of Minecraft, the last update covered by this book, makes some fundamental changes to the game in order to make certain parts of redstone engineering more versatile and accessible. Future versions of the game probably won’t change how the content explained in this book works.

About This Book

In this book, you can read about everything from the purpose of redstone to the individual functions of redstone components to the tools for building elaborate computers.

Minecraft players who are new to redstone can use this book to understand this deep but rewarding topic and start using it in the game, and experienced players can use the book as a helpful handbook for recalling techniques and concepts. This book doesn't deal with any Minecraft *mods* (programs that add extra content to the game), but if you read some of the chapters about command blocks, you can see how to use tools that essentially let you program mods from inside the game.

Because many mechanisms that I describe in this book consist of small collections of blocks, they will inevitably resemble those designed by others. Any such resemblance is unintentional — I know I've drawn inspiration from many other users while learning the concepts of redstone myself.

Foolish Assumptions

In this book, I assume that you have at least a basic knowledge of how to play Minecraft, though you don't need to know anything about redstone or programming. I also assume that the following statements about you are true:

- You have a computer, and you know how to use it.
- You have a working copy of Minecraft, and you know how to
    - Move around the world.

- Place, destroy, and manipulate blocks.
- Obtain items in Creative mode.
- Use the Chat menu.

Icons Used in This Book

Certain useful paragraphs in this book are marked with special icons in the margins. The icons and their purposes are described in this section:

This icon points out useful tips that may help you improve your techniques.

I recommend reading the information next to these icons if you're only skimming the book — they call attention to information that you should remember while working with redstone.

Definitely read the paragraphs marked by the Warning icon. This icon warns you about things you should avoid when working with redstone, from common mistakes to total game-crashers.

You can generally skip this type of information, if you want, because it's quite technical. However, you may find it interesting to read and learn about.

Where to Go from Here

If you're inexperienced or completely new to the concept of redstone, you will find the earliest chapters quite helpful, as well as Chapter 7, which is an introduction to the command block. Experienced players can find specific advice by skimming this book, and more advanced concepts are covered in Chapters 5, 8, and 9.

Occasionally, *For Dummies* technology books are updated. If this book has technical updates, they'll be posted at www.dummies.com/go/minecraftredstoneupdates.

Chapter 1

Introducing Redstone

In This Chapter

- Understanding what redstone is and what you use it for
- Exploring the essential concepts of redstone
- Understanding the value and applicability of redstone

The world of the game Minecraft is appealing in its infiniteness. In a game where every piece of the world can be destroyed, modified, and rearranged, the possibilities are limitless for how you can work, construct, and venture to make the world your own. This feature is particularly visible in the study of a few choice blocks and items that can function together to form machines of enormous size and scale. The tools, and the science behind these machines, are referred to as redstone.

This chapter introduces you to the basic structure and possibilities of redstone machines.

Exploring Redstone Basics

Redstone is a dust that you can find underground and use like wiring. Redstone can connect power suppliers (such as levers and buttons) to devices (such as doors and pistons), using the power suppliers to activate the devices from any distance.

You can use redstone to build an automatic door, a light switch, or a trap for the monsters that haunt your Minecraft world. For example, Figure 1-1 shows how a Minecraft player added a redstone circuit to his house so that he can turn on all the lights on the walls with the flip of a lever. Though these tricks are useful for improving your Minecraft experience, the full extent of redstone's possibilities is much more expansive.

Figure 1-1: Designing a simple redstone light switch.

Redstone technology is often used to build *functions* — machines that convert input (such as flipping a lever or tripping a tripwire) into output (such as activating TNT or moving blocks around). Simply connecting the input to the output with redstone dust is sufficient to design a function. However, you can create more complex functions with the tools I introduce in Chapter 2. For example, you may want your output to activate only if two buttons are pressed at the same time.

Essentially, redstone gives you the tools to turn any input into any output. This subject is extremely powerful — after all, the computer on which you play Minecraft is

simply a collection of many, many functions. And people *have* built computers in Minecraft, designed for various features and functions. Chapter 5 describes the study of combining functions into interesting creations.

Understanding How Redstone Works

Redstone functions on the same principles as logic and computer science. The difference is that, rather than have lines of code or wires and resistors, you have physical blocks arranged in a virtual world. The idea behind redstone devices is that they can be either on or off — powered or unpowered — depending on what is happening to them.

Most redstone components, including the ever-present redstone dust, are unpowered until they're charged by other redstone components or inputs such as levers. Throughout this book, the presence of power within a redstone circuit is referred to as a redstone *charge* or redstone *current.* (In real-life circuits, these terms mean different things, but redstone power could pass for either.) Though the basic redstone dust can be used in many ways to link components, other blocks — such as redstone torches, redstone repeaters, and redstone comparators, all described in Chapter 2 — can invert, delay, and modify the current. That's where the real fun happens.

Figure 1-2 shows a redstone *circuit* (an arrangement that produces a specific effect), consisting of many different components. Depending on the position of the levers at the bottom of the figure, the redstone current is passed among the various sections of the machine, working together to perform the function designed by the builder.

Many of the figures throughout this book look like Figure 1-2, with the components of the machine spread out clearly. Others are compact and concise. This book therefore tries to show you designs that are easier to break apart and understand, in addition to the efficient and elegant creations that you may see in your future constructive journeys.

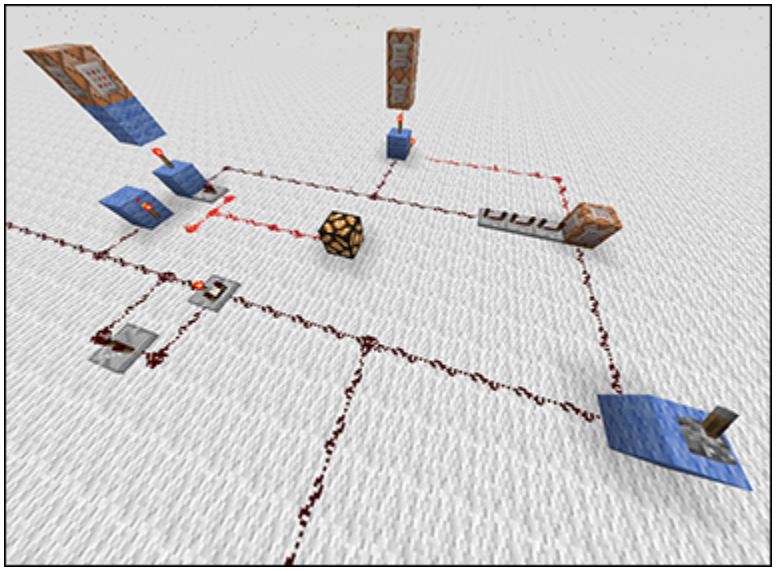

Figure 1-2: A redstone machine in multiple parts.

Discovering the Applications of Redstone

Using redstone allows for plenty of possibilities, but can it do anything other than use items to activate other items? Fortunately, Minecraft provides a wealth of challenges and opportunities to which you can apply the concepts from this book:

- **Combination locks:** This is a popular first project for redstone engineers who are transitioning from the

basics of design to the theory of it. A combination lock activates the output only when a collection of levers is set to a particular arrangement.

- **Automatic machines:** By using pistons, dispensers, and other devices, you can build machines that harvest crops, brew potions, manage minecarts, or perform basic tasks for you. By having machines do some of your work, you can design a more efficient Minecraft world, gathering more resources faster.
- **Dynamic structures:** Use pistons to raise bridges, move walls, or push arrangements together. Create waterfalls that can be controlled with floodgates, automatic doors, or elaborate lighting systems — anything in your world can be manipulated with redstone. Take advantage of it!
- **Traps and choreographed events:** Many players enjoy first building adventure-style worlds run by redstone and then sending the worlds to other players for them to try out. Whether you're building a challenge for another player or you want a brilliant, new way to punish trespassers, you can use redstone to guide the people in your world.
- **World management:** Redstone can control the form and function of the world, especially with the cheats-only command block. You can set the rules of the world, manage a scoreboard, fill huge areas with blocks, copy buildings, or summon giant slimes riding bats across the sky, for example. See Chapter 7 for more on the command block.
- **Minigames:** Games follow input-output structures as well — Minecraft players have designed many excellent redstone-powered games for other players to try. See Chapter 10 for more on this topic.

- **Theoretical machines:** Sometimes a machine doesn’t have a purpose — an interesting algorithm or component can have value in itself. Many players use Creative mode just to build elegant, innovative, and aesthetic machines.

You can apply redstone in many more ways in either Survival mode or Creative mode. You can find some of them by reading further in this book or by innovating on your own.

Chapter 2

Getting Started with Redstone Programming

In This Chapter

- Obtaining redstone dust
- Arranging redstone dust to create circuits
- Crafting special redstone items: torches, repeaters, and comparators
- Powering blocks

Understanding how redstone works can be difficult because few games allow you to program whatever you want from raw ingredients. This chapter helps you program your first basic machines (from linking levers and doors to building simple locks) with the power of redstone dust. I also describe the fundamentals of using redstone throughout Chapters 3 and 4, but this chapter is a good starting point for new players.

Gathering Redstone Dust

In Creative mode in Minecraft, redstone supplies are freely available. However, if you're playing Minecraft in Survival mode, you need to gather the materials necessary to build your circuit. The most fundamental tool you need is the *redstone dust* item. Redstone dust can be not only used raw as a simple machine but also crafted into many other redstone-based devices.

To get redstone dust, you need to mine *redstone ore.* In Figure 2-1, redstone ore is the stone with little chunks of red material embedded in the side.

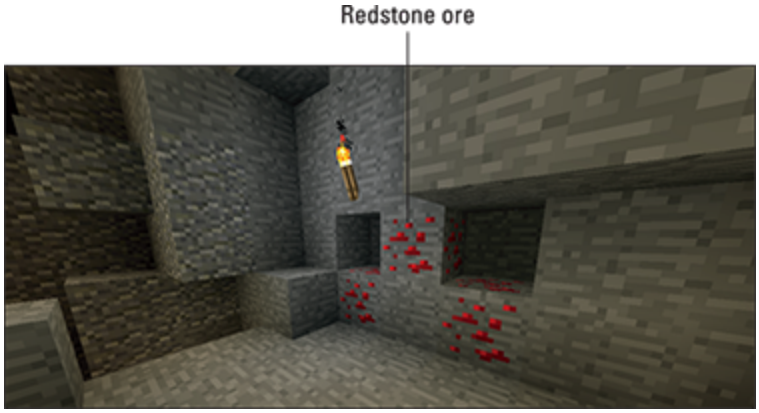

Figure 2-1: Finding a vein of redstone ore.

You have to mine deep to find redstone ore blocks — 16 blocks from the bottom of the world. In other words, your character's y-coordinate must be 16 at most, which you can check by pressing F3. However, at the correct depth, redstone ore is relatively common. In addition, every time you mine this item, you obtain at least four piles of redstone dust (as long as you use a pickaxe made from iron or diamond). With some concentrated effort, you can have mounds of redstone in no time.

Laying Out Redstone Dust

Redstone dust is the item used to craft most other redstone devices, and it's often the most useful tool you can have when designing machines. To place a lump of redstone dust, right-click the ground to place it there (or press the Use Item button if you changed it from the default). When you place redstone dust in a trail along

the ground, it acts like a wire. In its default state, the redstone wire is uncharged.

A device such as a lever, tripwire, button, or pressure plate can *power* the redstone. The powder then begins to glow red and transmit power, activating connected devices such as electric lamps or explosives. Figure 2-2 shows a simple redstone device, in which a pressure plate is connected to three lamps with a cross of redstone dust. The redstone is activated in the figure because a player is standing on the pressure plate. (See Chapter 3 for more on pressure plates.)

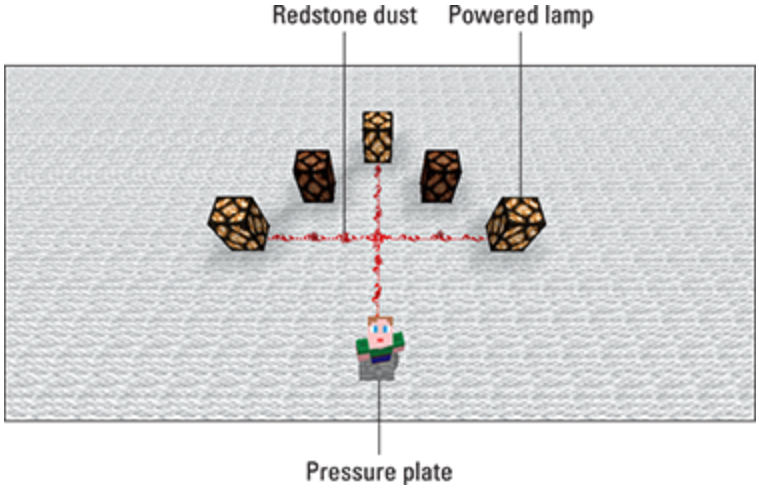

Figure 2-2: The two darkened redstone lamps aren’t turned on, because they aren’t adjacent to a powered object.

As you can see in the figure, redstone dust can bend, split, and travel in all directions. It does these things automatically when you place it: When you put redstone dust in multiple adjacent squares, the pieces of dust connect to each other. To create the arrangement shown in the figure, place redstone dust on each square of the cross.

You cannot place most redstone items on transparent blocks such as glass, or on blocks that are a different shape than the standard meter cube (such as fences, beds, or slabs). Some mechanical items, such as pressure plates, can be placed on fences and the like, but usually for the sake of creating pretty furniture.

In the following sections, I explain the different properties of redstone dust.

Carrying a charge

Redstone dust can travel in all the intuitive ways, but current can also be transferred in some interesting ways. Figure 2-3 shows an interesting property of redstone dust: It can run up and down the sides of blocks. If one piece of redstone, therefore, is one block higher or lower than another, adjacent piece of redstone, they still connect.

Redstone cannot travel up more than one block at a time, as shown in the redstone trail on the left side of the figure.

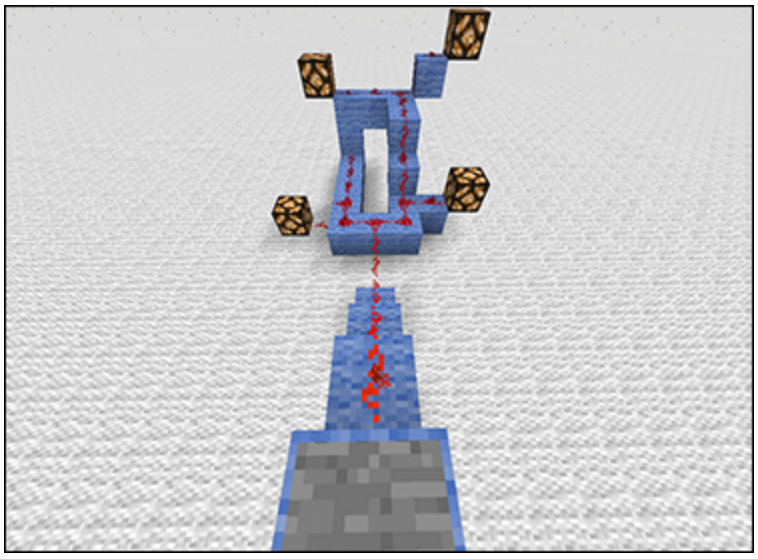

Figure 2-3: The trail of redstone dust snakes up and down to power all lamps.

The connections between adjacent pieces of redstone always form automatically, unless you place a solid block in the way. This feature is useful for making three-dimensional designs — you can build ramps to move your redstone trails up and down.

The concepts of linking up redstone in this section are the basics of using redstone dust, but you can use these principles to accomplish all sorts of tasks. Figure 2-4 shows a few examples of transporting and managing redstone current. Rather than use pressure plates to power the redstone (refer to Figures 2-2 and 2-3), I used the bright red *redstone blocks,* which provide continuous power. (See the section "Redstone blocks," later in this chapter.)

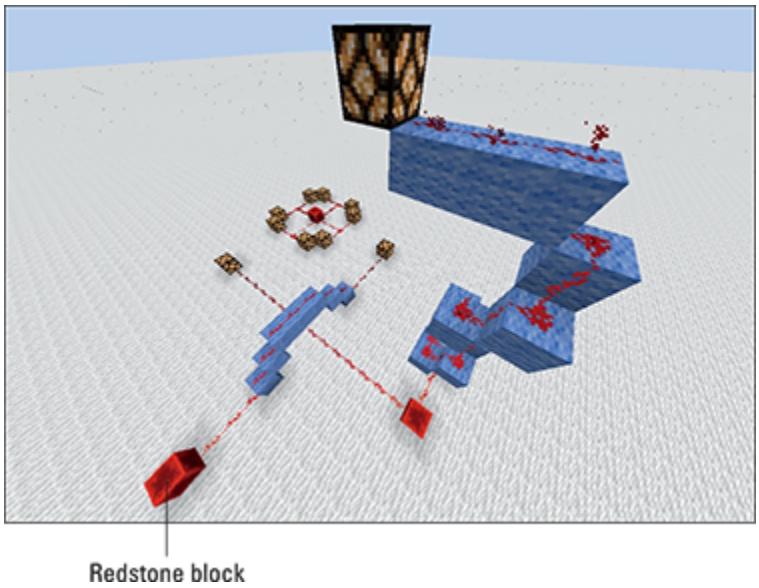

Figure 2-4: Carrying charge from the redstone blocks to the redstone lamps.

Measuring redstone strength

You may have noticed that redstone dust grows dimmer as it gets farther from its power source. The reason is that redstone dust can extend only 15 blocks away from its origin before it dies out, making it unable to power objects.

Redstone dust can take different levels of charge, from 0 (uncharged) to 15 (fully charged). This property obeys the following rules:

- **The charge of a piece of redstone dust is one unit less than the strongest adjacent charge.** For example, if one piece of dust is charged to 9, and another is charged to 6, a piece between them would have a charge of 9 – 1 = 8.
- **All power-producing items other than redstone dust have a charge of 16 when active.** Any dust connected to this charge, therefore, has a charge of 15. Solid, non-redstone blocks and redstone comparators (described in the later sections "Applying powered blocks" and "Redstone comparators") are the