

Magic Missile

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AGD-1 Game and Watch

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Introduction

Magic Missile is a single player Game & Watch game, similar in functionality to the original Nintendo Game & Watch games. It uses a segmented Liquid Crystal Display (LCD) and the game has been designed around the functions and limitations of this technology.

Due to the refresh rate of an LCD, the time increments of all mechanics are mentioned in cycles as the refresh rate of the display depends on the quality and generation of LCD used. It is therefore only an indication until the game can be prototyped on the intended hardware. Furthermore the game uses a timing system that is made apparent to the player through audio feedback. In each cycle the player is able to execute a number of commands equal to the amount of high pitch beeps in the cycle, performing one command at each beep, followed by a low pitch beep when the cycle ends and the non-interactive game-play elements update. As the game progresses the amount of high pitch beep decreases to a minimum of one per cycle, increasing the difficulty of the game, but also increasing the speed the player has to input his commands by making the interval of beeps shorter. This prevents potential issues with very high input speed from the player compared to slow refresh rates on potential hardware.

1.0 Overview

In Magic Missile, the player plays as one of the rival wizards. The wizards are at war and fight for control over the land, and have to defend their towers while at the same time, attack their rivals. The player can move on a vertical line and has the ability to fire magic missiles. In addition to these basic actions the player can activate a shield and fire a fireball. The controls on the device have been marked with the in-game visuals to illustrate the player what each button does.



Illustration 1: Game Type 1 - Fireball in flight and shields activated on both wizards and all castles are intact.

2.0 Game-play and Objectives

The following explains the rules and interactions that apply to both game types, in 2.1 and 2.2 the specific and alterations of these rules will be explained per game type.

- The player plays on the left side of the screen.
- The goal of the player is to defend his castles.
- If the player has 0 castles left the game is over.
- Castles are destroyed whenever a projectile passes the players wizard, changing the castle image to a broken ruin.
- The player can move over the vertical line in front of his castles.
- The player can cast a magic missile by pressing the large action button.
- The player can cast a fireball by pressing the right button on the d-pad.
- The player can cast a shield by pressing the left button on the d-pad.
- The player can have 3 magic missiles, 1 fireball and 1 shield active at the same time, this does not

include reflected projectiles.

- The player can destroy an incoming magic missile by firing a magic missile at it.
- The player can reflect a magic missile by activating his shield when it is near the player.
- A fireball counts as 2 magic missiles but can be reflected normally.
- A reflected fireball turns into a normal magic missile.
- Reflected projectiles start flashing on their way back to indicate to the player that it does not count towards its maximum amount of missiles in play.
- If the players wizard is hit at any point in the game by a projectile the player loses the game.

2.1 Game Type 1

In this game type the player is challenged to defeat 9 rounds of game-play by beating increasing levels of difficulty. The player starts in round one and in this mode the opponent has 4 castles. In order to win the round the player has to protect his own castles while trying to destroy his opponents castles. If the player beats the round but has lost any castles these losses are carried over to the next round. The first round has 4 high pitch beeps followed by the standard low pitch beep. On each high pitch beep the player can perform one action, followed by a low pitch beep at the end of the cycle, moving all in-game projectiles and updating the potentially reflected projectiles and destroying castles that are in contact with unblocked projectiles. As the player progresses through the rounds the amount of high pitch beeps reduces and requires the player to respond faster, allowing for fewer mistakes and requiring the player to optimize his game-play. Even further in the game as the player only has one high pitch beep left per cycle, the rate of which the beeps play increases, further increasing the pressure of play.

In this game type the player is introduced slowly to the game-play, due to the timing mechanic in cycles players have a fairly easy time figuring out the controls and the different actions the player can take. In each round the amount of beeps is reduced slowly increasing the difficulty up till round

5 where only 1 beep remains after which the difficulty ramps up a lot more as it comes down to being faster with input instead of thinking about optimal play. Due to the round based system and the constant speed per round a player will only beat the round once the player has mastered the pacing of that round, making the difficulty of the next round only slightly harder because the player had to master the previous pacing in the round before.



Illustration 2: Game Type 1 - Initial game state, round 1, all castles intact



Illustration 3: Game Type 1 - Player attempting to reflect a projectile in the third row, a fireball threatening his top row castle and an explosion of 2 projectiles on the bottom row.

2.2 Game Type 2

In this game type the goal for the player is to obtain as many points while the game continuously increases in speed. The opposing wizard does not have castles and can not be defeated. This mode is an endless mode where the game continues until the player has lost all his castles. The player can accumulate points to achieve a high score; points can be obtained in the following ways:

- Destroying an incoming magic missile, awarding 10 points.
- Destroying an incoming fireball, awarding 30 points.
- Reflecting a magic missile, awarding 20 points.
- Reflecting a fireball, awarding 50 points.
- Passing the opposing wizard with any projectile, awarding 10 points.
- Hitting the opposing wizard, awarding 50 points.

This game type is more for hardcore players that have mastered the mechanics of the game in game type 1,

as the pacing of the game continuously increases without a round reset and without warning. Also the player can not “win” as he is effectively playing as long as he can last and does not get the gratification of completing a round.



Illustration 4: Game Type 2 - Initial game state, all player castles intact



Illustration 5: Game Type 2 - Player is about to reflect a fireball in the top row, multiple missiles going towards rival wizard, about to score points from both fireball reflect and passing missile

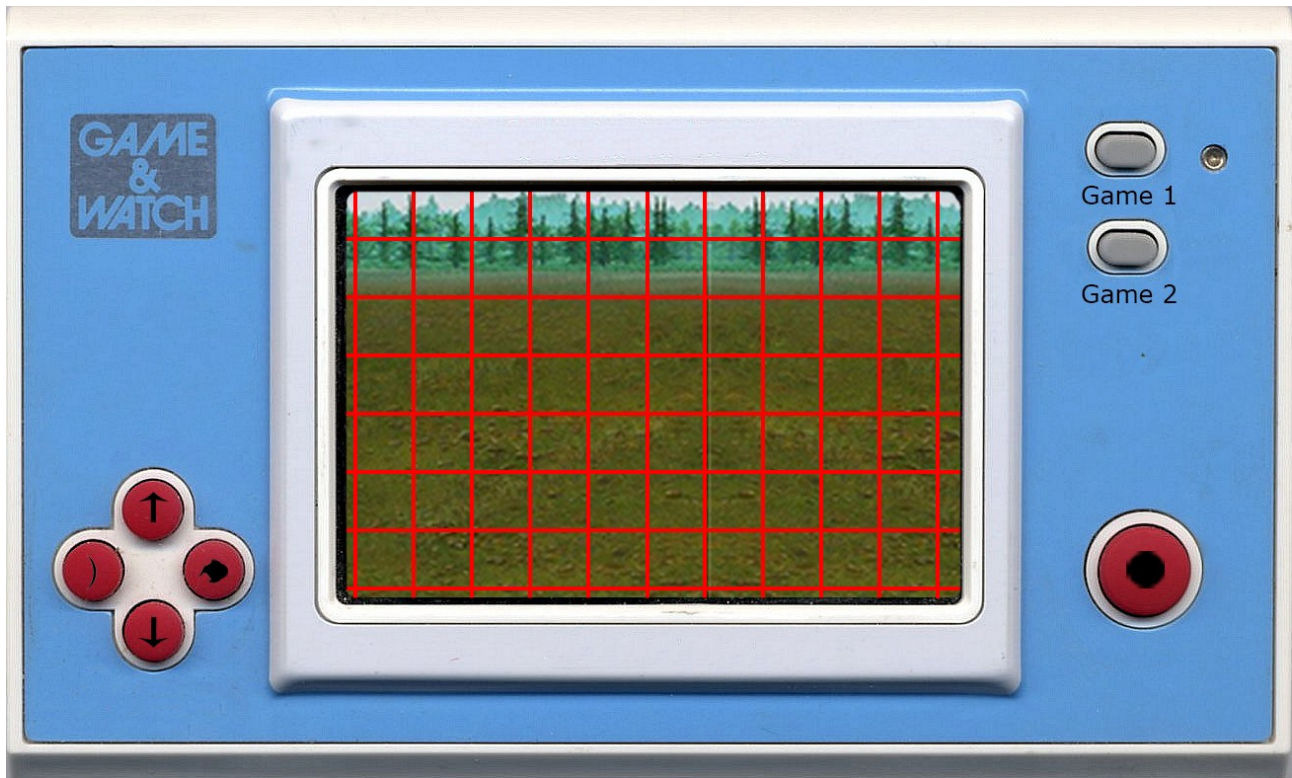


Illustration 6: Segmented Screen Overview

3.0 Game Components and Description

3.1 Game Screen

The game screen is divided in 70 segments, distributed in a 7x10 layout. Every segment that holds projectiles, towers or shields has multiple uses. (Illustration 6)

3.2 Wizard

At all times during the game there will be 2 wizards on screen, one controlled by the player and one controlled by the AI. All input from the player and all secondary actions (shields, fireball) originate from the player at his current position and move from that point in a horizontal line towards the right side of the screen. If the wizard is hit the player loses the game. If the player hits the opponent's wizard he either destroys the castle behind the wizard or gains points depending on the game type being played. The wizard can only move along



the vertical row he is on and can not move off the playing field, the player can move the wizard using the up and down button on the controller. If the wizard is hit, his icon will flash and the player will be temporarily be invulnerable.

3.3 Castle

Castles are the players main priority, if the player loses all his castles he loses the game, likewise he has to destroy the opponents castles to win the round if in Game Type 1. If a castle is destroyed the image will change to the second version of the castle, representing a ruined castle. A castle is destroyed in a single hit, regardless of the projectile type. See 3.5 Fireball for an explanation on how the different states are made, and seem to look like they are a single image when joined together.



3.4 Magic Missile

Magic Missiles are the basic projectile fired by wizards, 3 of them can be in play per wizard at any given time, they are fired by pressing the action button on the device. They destroy castles if they pass the wizards vertical row and can be destroyed by firing a magic missile at it. Once a magic missile comes into contact with anything the explosion marker is shown to give feedback to the player that it as been removed from play and the explosion sound is played. If the player or rival wizard has his shield activated at the time it would move past the wizard the projectile turns around and starts blinking. A blinking magic missile does not count towards the players maximum amount of missiles in play.



3.5 Fireball

The fireball functions in the same manner as a magic missile except for its allowed amount in play, which is a maximum of 1 per player, its strength to



remove from play, which requires 2 magic missiles and that it turns into a standard magic missile if it is hit once by a magic missile or reflected by a shield. The player can fire a fireball by pressing the right button on the controller, along with the action button. Audio feedback will be given whenever a fireball enters play on either side of the board, warning the player.

3.5.1 Image LCD specifics

Fireballs are created on screen by using the magic missile image and adding a flame image next to it corresponding with its direction, there needs to be a 1 pixel border between these images, however due to the drawback of LCD screens this can be done, as single pixels can not be lit on a passive matrix they blend surrounding pixels, this turns the LCD disadvantage into a feature as it will blend the one pixel line grey making it seem like the fireball is a single shape, this also applies to the Castle as it uses this same line to create its 2 visible states.

3.6 Shield

Shields are used by wizards to protect themselves and their castles. A shield is always in front of the player and moves with the player character if the wizard moves on the vertical row. A shield will reflect any projectile, sending it in the opposite direction. If a projectile is reflected it will start flashing to indicate it does not count towards the players maximum amount of projectiles. The player can only have a shield active for 1 beep per cycle and has to time it properly in order to reflect an incoming projectile. Effectively this allows the player to only have 1 shield active at a time as it will be removed one beep after it has been cast. The player can cast a shield by pressing the left button on the controller.



3.7 Explosions

Explosions function as a feedback system for the player, whenever projectiles collide and are removed an explosion image is shown, this requires 2 segment borders to



activate and form a 4 cornered explosion image.

3.8 Game-state Information

Basic game state information is displayed using the standard 7 and 14 segment LCD matrix display technology for round indication and score listing.

4.0 Advanced Game-play

As the player masters the mechanics he will need to learn about optimal play and proper timing of actions. This relates to when to fire a magic missile, the optimal use of the fireball and the timing of shields. During any game the resources available to the player are equal for those of the rival wizard, the only limitation the rival wizard has is that he will respond directly to any incoming projectiles. The optimal play however is a risk reward system where the player has an advantage if he waits as long as possible to counter an incoming projectile. Furthermore, by using the shield to reflect projectiles the player can create more projectiles, by doing this mainly on fireballs the player can get a resources advantage by both delaying his counters to projectiles and attempting to reflect fireballs as it creates a 2-for-1 scenario that the rival wizard will not focus on. Once this deeper understanding has been reached the game-play comes down to the speed of input and mastering quick decision making, while observing the current game state. Another level of difficulty is reached as the game speeds up as the magic missiles are without a source indication in which they are travelling, which increases the potential for the player to miss his optimal play, as the game speed increases this becomes harder to manage and requires increasing levels of skill. Optimal play scenario's include a combination of reflecting an incoming fireball at the last moment, preventing the rival wizard of recasting it early, then responding with a fireball directly after the reflected missile, covering it up and making it less likely to be reflected.

5.0 All Blackened Screen

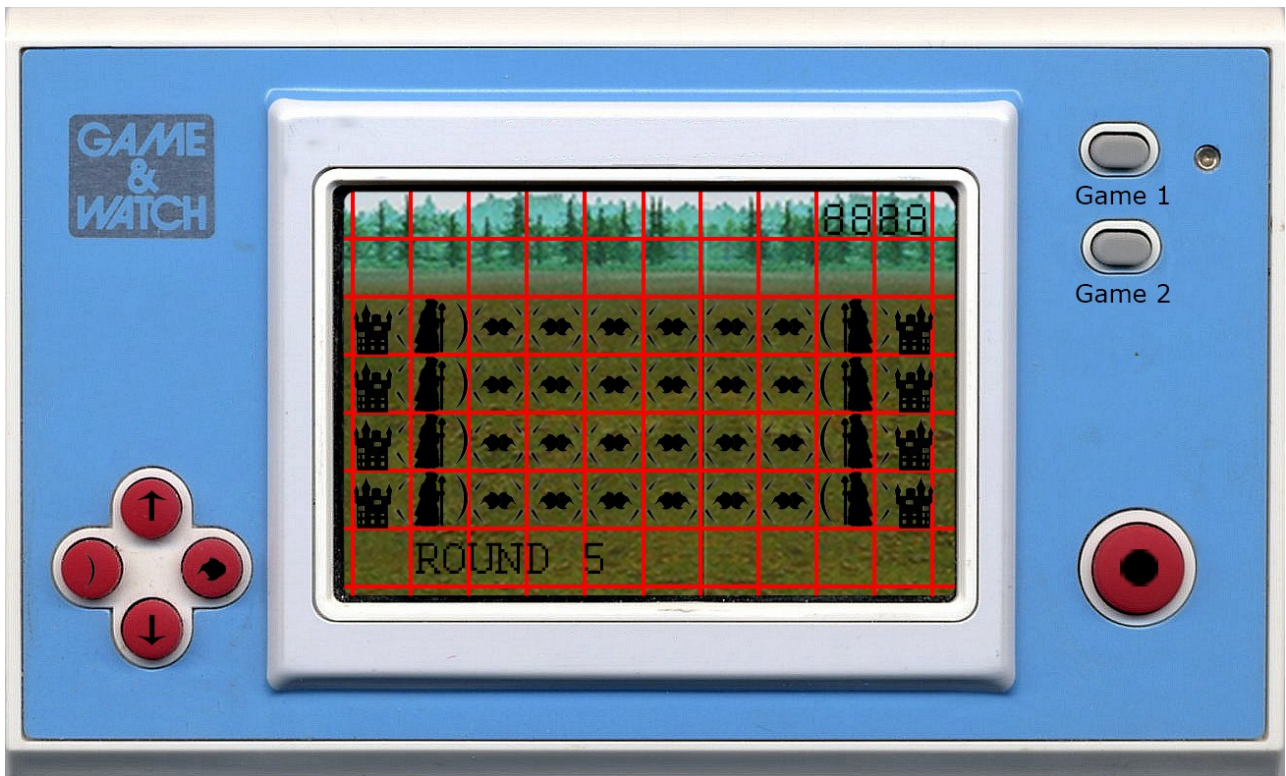


Illustration 7: All Blackened Screen