Sonic the Hedgehog
Game Design Document

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1.0 General

1.1 Product Specifications

Platform: LeapFrog Didj™ Handheld Game Device
Genre: 2D Scrolling Platformer / Edutainment
Target Market: Gender neutral (leaning toward boys), aged 7-10
Production Timeline: June 2007 - February 2008

1.2 Product Aim

Sonic the Hedgehog is an Educational Game title designed for 7-10 year olds (Second Grade through Fourth Grade) that teaches a core spelling curriculum. This title features the ever-popular Sonic character in a game designed specifically for LeapFrog's Didj platform.

1.3 Curricular Gadgets

As an edutainment title, this product will make use of concise, targeted teaching mini-games, called Curricular Gadgets. Curricular Gadgets will lead players through Spelling tasks, the mechanics of which are kept in the style of the Sonic universe. The Gadgets will take the form of a unique puzzle, which must be solved to advance the game.

1.4 Sonic the Hedgehog™ Universe

The classic character Sonic the Hedgehog lives in a world all his own with unique dynamic environments and bizarre creatures. The main emphasis in the world of Sonic is speed. To facilitate this feeling of speed, the environment provides mechanisms to boost or launch Sonic on his way as well as elements that highlight his speed, such as loop-de-loops, corkscrews and zip lines. Sonic is the most dynamic character in his world, able to perform a wide variety of animated actions. But there are also enemies in his world, each with simple yet unique behaviors and movements that threaten his advancement through each Act. If Sonic defeats an enemy, a small fuzzy animal (who was used as an organic battery for the enemy) is released and bounces off screen. His nemesis, Eggman, will combat Sonic with a variety of mechanical devices at each boss battle stage. Sonic collects golden rings, which can protect him from harm. If Sonic is hit by either a hazardous object or enemy he will loose his rings, which spill out in all directions. If he is hit while not in possession of any rings, he enters a fail state (death) where he falls down the bottom of the screen and is respawned at the last Point Marker in the Act or the beginning of the Act, until he is out of lives and the game ends.

1.5 Game Overview

The single player takes on the role of the popular Sonic the Hedgehog character as they struggle to save the world from Eggman. As Sonic, the players will encounter platforming challenges, curricular puzzle problems and active non-player enemies. Other non-players characters will include little furry animals, which will be released as enemies are defeated. Players will have special moves available to them, including those found in Sonic 2, such as Spin Dash.

The player's goal is to advance through all four Zones to reach the final boss battle against Eggman and defeat him in order to save the world.

1.6 Story Synopsis

As Sonic, the player must evade traps and dodge crazed robots dashing through three hazardous Zones using hand-eye coordination and simple puzzle-solving skills. Eggman has stolen the Chaos Emeralds and it is Sonic's job to retrieve them by completing all of the Acts, challenges and boss battles that face Sonic along the way.

1.7 Camera Behavior

In game, the camera behaves as a traditional 2D side-scrolling camera would, but with layered parallax to give more of a three-dimensional look and feel. (See Metrics: Game Metrics, Display Layers) During Curricular Gadgets, the camera is locked off in a full-screen view of the subject. (See Curricular Gadget Mechanics)

Unless the player has reached an Act edge, the camera will always follow Sonic's horizontal location within a 64 pixel range. If an Act edge is reached and/or Sonic is directed to approach that edge, the camera will hold at that location. The camera will follow Sonic if his vertical location if above the top 1/5 of the screen height or below the bottom 1/3 of the screen height. If Sonic has reached the lowest ground/track altitude, the camera will display Sonic at the bottom 1/8 of the screen height.

1.8 Transitions between Gameplay and Curriculum

During gameplay, at various predetermined points within the Act, the player reaches a Teleport Ring and normal gameplay pauses while the screen fades to black and fades from black, now playing within a Curricular Gadget. One or more questions are posed within the gadget before returning to the normal game loop, via fades to and from black. During each curriculum exercise, the gameplay timer will be paused. The player returns to the paused location within the Act and gameplay resumes as normal.

2.0 Asset Definitions

2.1 Player Character

- Sonic the Hedgehog

This is a very fast blue hedgehog with white gloves and red sneakers.

2.2 Animal Non-Player Characters

- Becky

This is a bear. This animal is released when a Zone One Badnik is defeated.

- Flicky

This is a bird. This flying animal is released when a Zone One Badnik is defeated.

- Churps (a.k.a. Kucky)

This is a chicken. This flying animal is released when a Zone One Badnik is defeated.

- Locky

This is a bald eagle. This flying animal is released when a Zone One Badnik is defeated.

- Mouse (Micromod unlockable)

This is a mouse. This animal is released when a Zone Two Badnik is defeated.

- Tux (a.k.a. Pecky) (Micromod unlockable)

This is a penguin. This animal is released when a Zone Two Badnik is defeated.

- Porker Lewis (a.k.a. Picky)

This is a pig. This animal is released when a Zone Two Badnik is defeated.

- Sally Acorn (a.k.a. Ricky)

This is a squirrel. This animal is released when a Zone Two Badnik is defeated.

- Rocky (a.k.a. Joe Sushi, a.k.a. Joe Rotor) (Micromod unlockable)

This is a walrus. This animal is released when a Zone Three Badnik is defeated.

- Tocky

This is a turtle. This animal is released when a Zone Three Badnik is defeated.

- Wocky (Micromod unlockable)

This is a monkey. This animal is released when a Zone Three Badnik is defeated.

- Johnny Lightfoot (a.k.a. Pocky)

This is a rabbit. This animal is released when a Zone Three Badnik is defeated.

2.3 Enemy Non-Player Characters (a.k.a. Badniks)

- Bubbles (a.k.a. Harisenbo)

This is a porcupine fish-bot that floats in the air.

- Masher (a.k.a. Gauccho)

This is a robot fish with sharp teeth and an ability to jump high in the air.

- Buzzer (a.k.a. Stinger)

 This is a wasp bot able to patrol a small area and fire projectiles.

- Coconuts (a.k.a. Aiai)

This is a monkey bot that hangs on a tree and lobs coconut grenades to the ground.

- Sandworm (a.k.a. Nal)

This is a worm bot that can burrow in sand.

- Corkey (a.k.a. Rock'n)

This is a bot disguised as a rock. This bot can push Sonic and even crush him against walls.

- Skorp (a.k.a. Scorp)

This is a scorpion bot able to patrol a small area and attack with its tail.

- Grabber

This is a spider bot able to grab Sonic, lift up and self-destruct.

- Spiny (a.k.a. Lander)

 This is a slow-moving bot that patrol a small area and fires projectiles.

- Grounder (a.k.a. Handrill)

This is a mole bot able to burrow and patrol a small area.

2.4 Boss Non-Player Characters (a.k.a. "Eggman")

- Drill Eggman

 This is a wheeled vehicle with a large drill mounted on the front. Eggman tries to run down Sonic and fire the Drill piece like a missile at Sonic. This boss first appeared in Sonic the Hedgehog 2, Jade Island Zone.

- Water Eggman
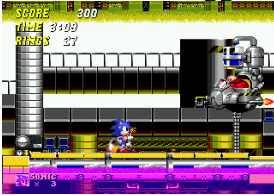
 This is a vehicle that uses water. It floats around gathering poison water to dump on Sonic. This boss first appeared in Sonic the Hedgehog 2, Brickopolis Zone.

- Graviton Mobile

 This is another flying vehicle that uses gravity manipulation. It tries to crush Sonic with a large heavy ball and uses its gravity-manipulation power to draw him closer. This boss first appeared in Sonic the Hedgehog 3, Mecha Gadget Zone.

- Eggman Mech
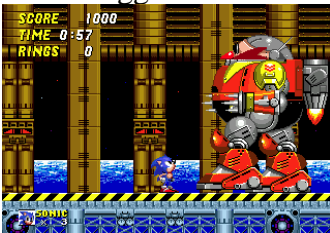
 This is a large mech vehicle. Eggman tries to crush Sonic underfoot, shoot spiked fists at him or launch "egg bombs" from a backpack. This boss first appeared in Sonic and Knuckles, Space Egg Zone.

2.5 Miscellaneous Dynamic Game Objects

- Star Post (a.k.a. Lamp Post, a.k.a. Point Marker)

  This object provides a save point for Sonic. Once this marker is reached, it allows the player to respawn at that point in the Act, instead of starting from the beginning. The Star Post animates and a sound effect is played when the Star Post is passed.

- Spikes
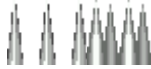
  A hazard. If touched from the side with the points of the spikes, it will hurt Sonic.

- Switch

  This is a small platform big enough for Sonic to stand on and press down. If pressed, this causes some other dynamic object to be activated/deactivated.

- Spring

  If touched from the side with the "pad", Sonic is instantly launched as if running very fast. A sound effect is played as Sonic is launched. This object can either be oriented vertically and horizontally. (See also Angled Spring in Special Zone Object Definitions)

- Catapult

  Like the Spring, if run on top of, the Catapult will launch Sonic upward, like a diving board. A sound effect is played as Sonic is launched.

- End Act Sign

  This is the marker signaling the end of the Act. When passed, the sign will spin and come to a stop with a different picture on it. (It begins as Eggman, but ends as Sonic) A sound effect is played when the End Act Sign is passed.

- Teleport Ring

  This is a special Golden Ring (See also Collectables), which appears about four times the size of a normal Ring. If touched, the Teleport Ring will disappear, as if collected, and Sonic will be transported to a Curricular Gadget. Once the Curricular Gadget session is completed, Sonic will return to the placed location of the Teleport Ring. (See Transitions between Gameplay and Curriculum)

- Special Zone Objects (poison water, pneumatic tube, etc) (See Special Zone Object Definitions)
- Ambient Game Effects (flashing light, smoke, dust)
- Special Game Effects (explosion, spark, camera shake)

- Power-Ups

   TV Monitors are available for Sonic to jump on (with Spin Attack) and activate. Once activated, the monitor smashes open and the image on the monitor (indicating which Power Up it contains) floats upwards for one second. After activation, the monitor appears broken. (See also Power-Ups below)
- Collectables

   Gold Rings are available throughout the Zones for Sonic to collect. A cheery ringing sound and a sparkle animation is used to signal their collection. If dropped because of a hit by an enemy or hazardous object, Rings are launched in an even radial pattern from Sonic. They will bounce off ground/track and come to a rest according to normal gravity and pseudo-friction. (See also Collectibles and Game Metrics)

2.6 Power-Ups

- TV Monitor: One-Up (a.k.a. Sonicmon)

   This gives the player an extra life.
- TV Monitor: Super Ring (a.k.a. Ringmon)

   This gives the player a 10 Ring bonus. A standard Ring collection sound used.
- TV Monitor: Shield (a.k.a. Shieldmon)

   This gives the player a one-hit shield. Sonic will display with a shield overlay. A sound effect signals the power up and another signals the shield power down.
- TV Monitor: Super Sneakers (a.k.a. Shoemon)

   This gives the player temporary super speed. The normal music is doubled in tempo during the time this power up is in play.
- TV Monitor: Invincible (a.k.a. Invmon)

   This gives the player temporary invincibility. Sonic will display with a sparkle overlay. The music changes to Invincibility music.

2.7 Collectables

- Rings (a.k.a. Gold Rings)

   Rings are available throughout the Zones for Sonic to collect. If hit while in possession of Rings, Sonic looses all the Rings he has as they spill out in all directions, but he is able to continue and even try to collect some of those Rings again. If enough Rings are collected (100 and 200 in one Act), the player is given an extra life.

2.8 Badges and Bitz

- Overview
  Badges and Bitz are part of the overall Lightning reward system of acknowledging and rewarding a player's game skills and curricular achievements. An achievement is called the Badge while the relative value or degree of achievement is measured in Bitz. Badges are given out to enhance and supplement the existing inherent reward system of a game, not as the primary reward system. A list of the player's potential and completed Badges, and their cumulative Bitz score if achieved, are displayed on the player's Achievement Screen from the Options Menu. All of a player's Badges and Bitz are stored and displayed on the LeapFrog website, as components of the player's gamer profile. Bitz are spent, like currency, at the LeapFrog website in order to either unlock or download content upgrades for various titles, including this one. (See also Customizable Game Components)
- Badge Achievement Display
  A simple HUD overlay icon is displayed with an accompanying sound cue. A simple description of the Badge event is displayed alongside the icon. This display will travel in from off screen left and disappear off screen left after three seconds.
- Badge Achievement Awards

Badge Achievement Event	Bitz Value
Complete Zone X, Act X in less than 3 minutes	5x6 Acts = 30
Complete Zone X, Act X in less than 2 minutes	10x6 Acts = 60
Collect 100 Rings in Zone X, Act X	5x6 Acts = 30
Collect 200 Rings in Zone X, Act X	10x6 Acts = 60
Collect the Green Emerald Collected (Zone One Boss)	20
Collect the Yellow Emerald Collected (Zone Two Boss)	20
Collect the Purple Emerald Collected (Zone Three Boss)	20
Collect the Master Emerald Collected (Zone Four Boss)	20
Get 5 Gadget Questions Correct in a row	20
Get 10 Gadget Questions Correct in a row	20
Find all Gadgets in an Act	25 x6 = 150
Find every Curricular Ring in the game	50
Potential Bitz Total	**500**

2.9 Customizable Game Components (a.k.a. Micromods)

Micromod components can be activated by spending achieved Bitz points. Once activated, the player can choose to enable or disable each component individually.

(See also 19.0 Micromod Component List)

3.0 Metrics

3.1 Game Metrics

- Act Sizes
  The size of each act will vary in length and height. They also vary in the number of alternate paths to take from beginning to end. The maximum size an Act can fit into is 6144x640 pixels.
- Approximate Game Play Time per Act
  Players can expect to play 8-15 minutes per Act, but gameplay will vary based on Act size, difficulty level, number and difficulty of Curricular Gadgets, etc.
- Display Layers
  The game display will consist of several Display Layers, which scroll independently to represent parallax and a greater feeling of depth. Layers representing the farther background elements move more slowly as a ratio of the game level layer. Foreground layers will move more quickly. Display Layer image sizes will vary depending on the movement ratio.
- Normal Gravity
  If falling, objects will vertically accelerate at a rate of X pixels / second / second, unless underwater where falling rate is ½ normal. Maximum falling speed is X pixels / second, unless underwater where maximum falling speed is ½ normal.

3.2 Player Metrics

- Lives
  This player is given three lives at the start of the game. They are able to earn extra lives through Ring collection or One-Up Power Up collection. (See also Power-Ups and Collectibles) They lose one life when hit by hazards, projectiles, enemies or when crushed or drowned. (See also Metrics: Combat, Death)
- Dimensions
  - Visual
    Depending on the animation displayed, Sonic is roughly 48 pixels high and 32 pixels wide. (On the Lightning's 320x240 screen, this represents 15% of both the height and width relative to the screen size. This is same character/screen proportion as the original Genesis game.)
  - Collision
    Sonic's collision bounds are equivalent to its visual dimensions, as the collision layer will be painted based upon the animation frames' visibility.
- Movement
  - Pseudo-Friction (deceleration)
    If coming to a rest on a level ground/track surface, Sonic will horizontally decelerate at a rate of X pixels / second / second, unless underwater where deceleration rate is 2x normal. Minimum horizontal speed is X pixels / second.

- o Walk and Run

  Sonic accelerates at a horizontal rate of X pixels / second / second, unless underwater where acceleration rate is ½ normal. Sonic decelerates at a rate consistent with pseudo-friction and the angle of the ground/track he is on. Sonic's maximum horizontal running speed (attainable on level ground/track and without help from gravity or launching Game Objects) is X pixels / second. As Sonic walks or runs, his animation changes based on his current speed. At ¼ speed or less, he will Walk, at ¼ to ½ speed he will "slow" Run, at ½ to ¾ he will Run and at ¾ to maximum speed he will "fast" Run.

- o Roll and Spin Dash

  Sonic Spin Dash's at three distinct launch speeds of X, Y and Z pixels / second. Sonic rolls at a decreasing speed, based on current velocity and modified by normal game gravity and pseudo-friction and by the angle of ground/track he is on. As Sonic rolls, his animation changes based on his current speed. If rolling at a horizontal speed of X pixels / second or less, he will Roll instead of Spin Dash. Once horizontal speed has reached the minimum horizontal speed as dictated by Pseudo-friction, Sonic will stop altogether and change animation to an idle.

- o Jump

  Sonic jumps at a vertical launch speed of X pixels / second. The horizontal movement is governed by normal Walk and Run acceleration rules. Sonic's maximum horizontal speed is X pixels / second.

- o Push

  Sonic is able to push moveable objects at a horizontal acceleration of X pixels / second / second and a maximum horizontal speed of X pixels / second.

- o Look Up / Look Down (screen movement)

  Sonic is only able to look up or down while motionless, but the screen moves vertically at a constant speed of ½ screen (120 pixels) per second.

- o Screech / Halt

  Sonic is able to decelerate forcibly at a rate of 2x normal Pseudo-friction.

- Combat
  - o Hit

    Sonic is only able to survive a hit if he is in possession of Rings, a Shield Power Up or an Invincibility Power Up, otherwise he enters a fail state (Death). If only in possession of Rings, he looses all Rings as they are launched in an even radial pattern from Sonic, excluding straight down. If in possession of a Shield Power Up, the Shield is lost. If in possession of an Invincibility Power-Up, Sonic is unaffected by normal hazards and enemies, with few exceptions. (See Invincibility State below) When hit, Sonic is launched at a 45 degree angle up and away from the offending projectile, hazard or enemy while he plays the "hit" animation frame. After being hit, Sonic enters a Safe State. While within a Curricular Gadget, if Sonic is hit, he will not loose rings and cannot be sent to a fail state (Death).

- o Safe State
  After being hit, Sonic enters a temporary Safe State for three seconds where Sonic's image will blink on and off (invisible). During this state, Sonic's collision is disabled against projectiles, hazards and enemies. Afterwards, gameplay continues as normal.
- o Death
  When Sonic has reached a fail state, he plays the "death" animation sequence while he bounces up, than falls down out of frame without any further collision. At that point, the Life Count component in the HUD is decreased by one. If the Life Count is zero, a Game Over HUD component is displayed with an accompanying musical tune and after twelve seconds, the game progress is automatically saved and the player is directed to the Splash Screen
- o Jump Attack (Roll)
  When explicitly jumping or when ducking while in motion, Sonic tucks his body into a Roll, which allows his hedgehog spines to both protect him from harm and deliver an attack to enemies/items. An enemy will receive a hit if touched by Sonic during his Jump Attack or Roll, unless specifically indicated in the enemy's description (see Sandworm as an example of a protected enemy). Sonic will bounce upwards (while maintaining horizontal momentum) after hitting an enemy or item from above.
- o Invincibility State
  While in possession of the Invincibility Power Up, Sonic is able to survive touching any projectile, hazard or enemy, except in the cases of falling off screen or being crushed by a Moving Ledge object. (See also Special Zone Object Definitions) Also any touch from Sonic while in this state delivers a hit to any enemy.

3.3 Animal Non-Player Character Metrics

- Dimensions
  The dimensions for all animals are roughly 24x16 pixels while bouncing or flying, 16x24 while falling.
- Movement
  - o Fall
    All non-flying animal NPCs fall at a rate consistent with the normal game gravity settings.
  - o Bounce
    All non-flying animals will bounce along valid collision ground/track surfaces, accelerating horizontally at a rate of X pixels / second / second. Maximum speed is X pixels / second.
  - o Flying
    Flying animals immediately travel to screen left. The horizontal speed and maximum speed is the same as bouncing animals, but their vertical movement is in a simple sine wave with an amplitude of 64 pixels.

3.4 Enemy Non-Player Character Metrics

- Dimensions
  The dimensions of enemy NPCs varies, based on the animation and shape.
- Movement
  The movement of enemy NPCs varies, based on behavior and AI state, as specified in NPC AI Behavior. Unless otherwise specified, enemy NPCs will accelerate and decelerate at a rate equal to their maximum traveling speed.
- Combat
  All Badniks, unless otherwise specified, are capable of taking only one hit before being destroyed. Each Boss is capable of taking several hits, as specified in NPC AI Behavior, Bosses. Some enemy NPCs are capable to firing projectiles, as specified in NPC AI Behavior.

3.5 Miscellaneous Game Object Metrics

- Dimensions
  The dimension of game objects varies, based on the animation and shape. Collision qualities for gameplay level objects are specified in Miscellaneous Dynamic Game Objects and Special Zone Object Definitions.
- Movement
  If a game object is not static, its movements are specified in Special Zone Object Definitions.
- Damage
  If a game object is damageable, it is specified in Special Zone Object Definitions.

3.6 Power-Ups & Collectables Metrics

- Dimensions
  The dimension of power-ups and collectables varies, based on shape. Collision qualities are defined in the Power-Ups and Collectibles sections.
- Movement / States
  Power-ups and collectibles do not move from their placed locations. Power-up TV monitors (television boxes) will change states from default to "broken" once collected.
- Advantage Attributes
  - Ring
    Each ring touched by Sonic is considered collected and gives the player one ring bonus. If the player has any rings, Sonic is protected from his first hit, but he looses all rings. If the player has collected 100 or 200 rings, they receive an extra life bonus. (See also Collectables, Rings)
  - Power-Up TV monitors (television boxes)
    Each television box power-up is considered collected only after being hit once by Sonic's Spin Attack. The advantage collected is determined by the type of Power-Up and defined in Collectables, Power-Ups.

4.0 Animations

4.1 Player Character Animations
- Idle x2
- Walk
- Run x3
- Roll
- Duck
- Spin Dash
- Look Up
- Hang
- Push
- Flail
- Launch
- Corkscrew
- Screech / Halt
- Hit
- Death
- Celebration

4.2 Animal Non-Player Character Animations
- Movement
  - Fall
  - Bounce

4.3 Enemy Non-Player Character Animations
- Idle
- Movement (run, fly, roll, jump)
- Attack
- Special Attack (bosses)
- Hit / Death

4.4 Power-Up / Collectables Animations
- Idle
- Captured

4.5 Miscellaneous Game Object Animations
- Idle
- Movement
- Destroyed
- Special

5.0 Sounds

5.1 Player Character Sounds
- Jump
- Attack
- Spin Dash x3
- Spin Dash Launch
- Screech / Halt
- Loose Rings
- Invincibility
- Bounce
- Hit
- Death

5.2 Enemy Non-Player Character Sounds
- Attack
- Special Attack (bosses)
- Hit
- Death

5.3 Power-Up / Collectables Sounds
- Captured

5.4 Miscellaneous Game Object Sounds
- Idle
- Destroyed
- Special

5.5 Graphical User Interface (GUI) Sounds
- Click / Select
- Back / Deselect
- Start

5.6 Music

All music loops unless otherwise indicated. Duration indicated in parenthesis in minutes and seconds. All songs are from Sonic 3 (Sonic & Knuckles).

- Splash Screen
    This is the Title Screen song.
- Menu
    This is the Data Select song.
- Zone One
    This is the Angel Island, Act One song.
- Zone Two
    This is the Sandopolis Zone, Act One song.
- Zone Three
    This is the Flying Battery, Act One song.
- Zone Four
    This is the Death Egg Zone, Act One song.
- Act Completed (does not loop)
    This is the Act Completed song.
- Curricular Gadget (Zone One)
    This is the Gumball Bonus song.
- Curricular Gadget (Zone Two)
    This is the Glowball Bonus song.
- Curricular Gadget (Zone Three)
    This is the Special Stage song.
- Curricular Gadget Completed (does not loop)
    This is the Continue song.
- Invincibility (does not loop)
    This is the Invincibility song.
- Boss
    This is the Act 2 Boss song.
- Drowning (does not loop)
    This is the Drowning song.
- Extra Life (does not loop)
    This is the Extra Life song.
- Chaos Emerald (does not loop)
    This is the Chaos Emerald song.
- Game Over (does not loop)
    This is the Game Over song.
- Game End (does not loop)
    This is the Ending song.
- Credits
    This is the second Credits song.

6.0 Mechanics

6.1 Graphical User Interface (GUI)

- Components
  - Splash Screen Sequence
    - <u>SEGA Logo</u>: This is a static logo of the Sega trademark. This logo includes the vocalized Sega jingle. This screen times out after five seconds.
    - <u>Realtime Associates Logo</u>: This is a static logo with no sound. This screen times out after five seconds.
    - <u>Title Screen</u>: After the publisher logos (both the Leapfrog and the Lighting logos will be on the base unit and not on the cartridges), the player will be dropped into the Title Screen "Sonic The Hedgehog". This is an animated title screen with music, based off the original Sonic the Hedgehog title screen. Near the bottom, the user is prompted to press any button to continue to the Main Menu. If no user activity is registered for five seconds after the animation, GUI flow goes to Demonstration.
  - Main Menu
    The main menu allows the user to select from one of the following choices: Start New Game, Zone Selection, Micromods, Badges, Return to Base and Options Menu. If no user activity is registered for ten seconds, GUI flow is directed to Demonstration.
    - <u>Autoload</u>: After the Title Screen, the save file is automatically loaded, restoring game progress in terms of the highest zone reached. If no settings exist, the Zone Select only allows access to Zone one.
  - Demonstration
    If no activity is registered for five seconds from the end of the Title Screen animation or for ten seconds in the Main Menu, the game will demonstrate gameplay in one of three Zones: Grass Hill, Hydropolis or Scrap Plant. The demonstration will last for approximately 20 seconds before being directed back to the Splash Screen Sequence unless the player presses Menu during the demonstration, which sends GUI flow to the Main Menu.
  - Options Menu
    The options menu allows the user to adjust Sound EFX Volume, Music Volume or Credits screens.
  - ~~Controller Map~~
    ~~The Controller Map screen shows the player a graphic representation of the Lightning controls and their currently mapped configuration. The player is able to choose from pre-configured controller layout options.~~
  - Credits
    This is a scrolling text screen with pretty graphics and music in the background. The text details the credits for this product.

- o Badges
  This screen retrieves saved information regarding all potential Badges and, the Bitz score if achieved. (See also Badges and Bitz)
- o Micromods
  This menu allows players to enable the Micromods content for this title and upgrade their game. Once enabled, the content item may be toggled active or inactive. If no Micromods have been enabled, the phrase, "Earn Bitz and connect to get upgrades", is displayed.
- o Zone Select Screen
  If the user has any game progress saved, they will be able to choose from any of the completed Zones or to continue on to the next available Zone.
- o Act Intro Screen
  This graphic title screen introduces the player to each Act.
- o Game
  This is the main game loop.
- o Curricular Gadget
  These are the various Curricular Gadgets.
- o Pause Screen
  While the game is paused, an overlay screen allows the player to see a list of scrollable player tips.
- o End Game
  Once the game is complete, a congratulations screen is displayed before moving on to the credits screen and back to the Main Menu.
- o Return to Base
  This option sends GUI control to the Lightning Base UI, exiting the title.
- GUI Flow

GUI Flow
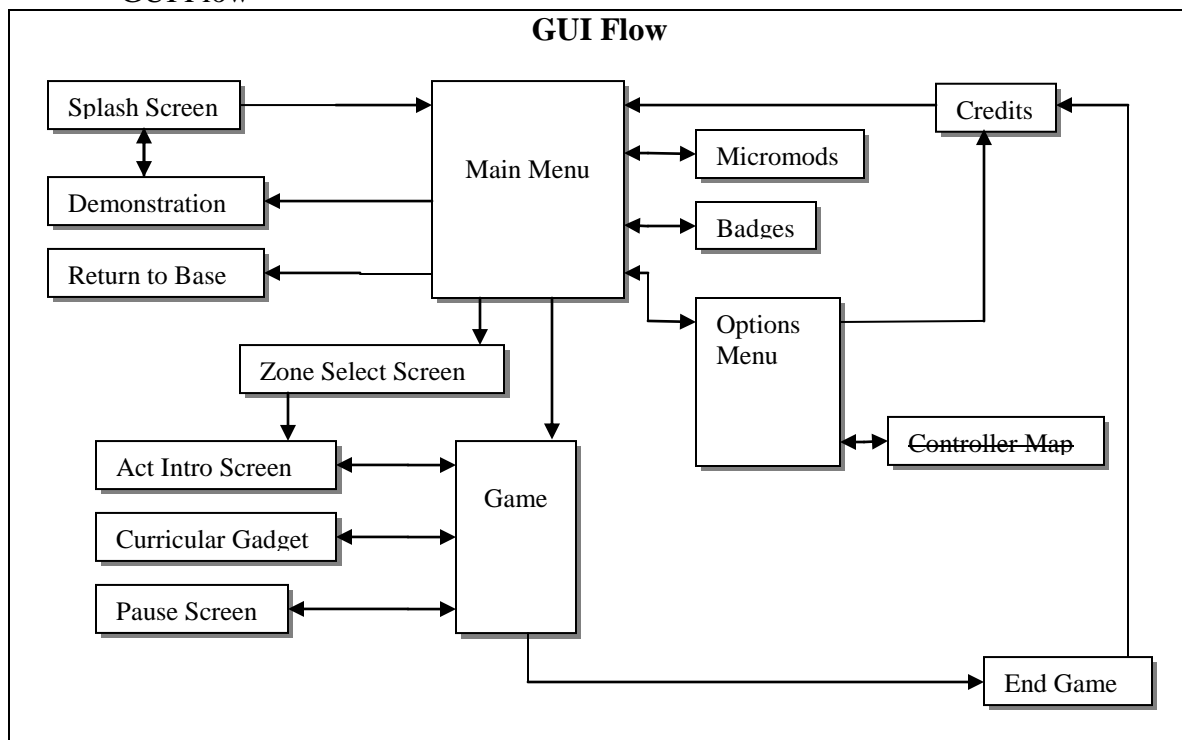
6.2 Act Mechanics

- Components
    - Act Intro Screen
        This is an animated title card announcing the name of the Act to be played. Zone-specific music begins here.
    - Game Loop
        This is the main game loop. If this Act contains a boss, at the end of the Act, a Boss Battle begins.
    - Boss Battle
        The player is restricted to this area of the Act during the Boss Battle. A boss enters and begins to attack. The player must defeat the boss to end the Zone. Boss music begins here.
    - End Act
        At the end of the Act, a HUD component signals to the player that Sonic has completed the current Act. Then, Ring Bonus, Time Bonus and Score are tallied and displayed. After five seconds, the next Zone or Act begins. Act End music begins here.
- Act Flow
    The main Zone structure starts with an Act title card display (Intro Act), followed by the main game loop. Once the end of the Act is reached, either an End Act Sign is available to send the flow to a scoring screen (End Act), or a Boss enters and a Boss Battle commences. Once a Boss is defeated, Act flow continues to a scoring screen as normal (End Act).

Act Flow

| Act Intro. | → | Game Loop | → | … | → | Boss Battle | → | End Act |
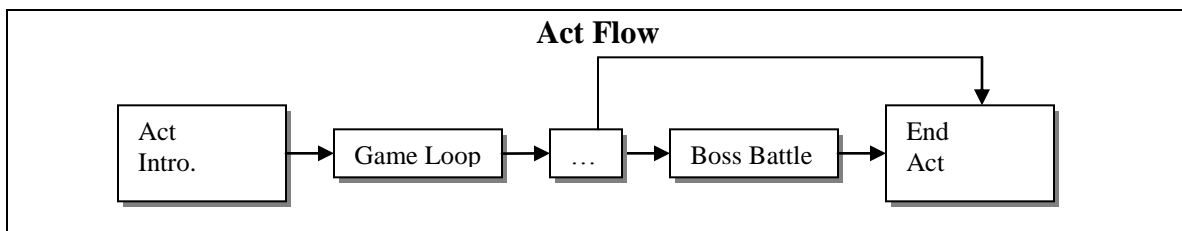
- Gameplay / Curriculum Mix
    The game loop is divided between pure gameplay and a curriculum, offered as Curricular Gadgets, which the player faces at various points throughout the game Zones. Approximately one quarter of the curriculum is optional.

Typical Gameplay / Curriculum Mix

| Pure Gameplay | Curriculum | Pure Gameplay | Curriculum | Pure Gameplay |
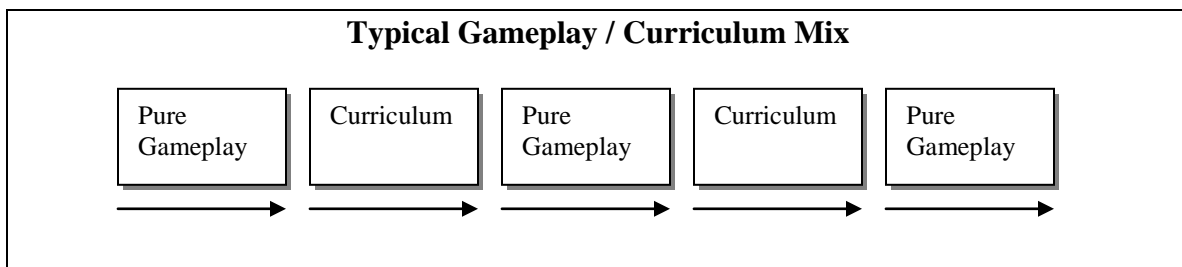
6.3 Heads-Up Display (HUD)

- Components
  - Character Portrait
    This is a small square portrait of Sonic the Hedgehog.
  - Character Name
    This is a caption of the character portrait, "Sonic".
  - Life Count
    This is a numerical display representing the number of lives the player has remaining.
  - Score
    This is a numerical display, with title, representing the current player score.
  - Time
    This is a numerical display, with title, representing the time played in the current Act.
  - Ring Count
    This is a numerical display, with title, representing the rings collected in the current Act. If the Ring Count is zero, the title will flash between yellow and red, indicating that Sonic is vulnerable to any hit.
  - Curricular Gadget Completion
    This is a small icon paired with a fraction showing the Curricular Gadgets played vs. the total Curricular Gadgets available in this Act.
  - Badge Achievement Display
    This is a temporary overlay indicating that the player has achieved a Badge event.
  - Game Over Display
    This is a temporary overlay indicating that the player has run out of lives to continue the game.
  - Act Completed Display
    This is a temporary overlay indicating that the player has completed the current Act. It is used in conjunction with a display and tally of the End Act scoring. (See also Act Mechanics, End Act)
- HUD Layout

This example screen displays the desired layout, including the Act Completed Display with End Act scoring.

6.4 Player Controls

- Components
  - Directional Movement (Up, Down, Left, Right)
    These control components provide basic movement for the player. If idle, holding Up for three seconds will cause Sonic to Look Up and cause the current viewport to scroll up one half screen height to reveal what's above him until Up is released. If Sonic is stationary, pressing Down will cause Sonic to Duck. If in motion and on ground/track, pressing Down will cause Sonic to tuck his body into a Roll. Pressing Left or Right will cause Sonic to begin to Walk in that direction, then Run, then Run Fast, then Run Very Fast. If on uneven ground, Sonic's momentum is altered to reflect the angle of the ground. (See also Player Metrics, Movement)
  - Jump (Spin Attack)
    The Jump button causes Sonic to jump, then tuck his body into a Spin Attack. If Directional Movement Left or Right is also pressed, Sonic will jump in that direction. If standing on uneven ground, Sonic's jump trajectory will be altered to reflect the angle of the ground. If already in motion, Sonic's jump trajectory will be altered to reflect the current momentum. While submerged, pressing the Jump button repeatedly will allow Sonic to surface. If under water, Sonic will jump and fall more slowly with a velocity limit. (See also Player Metrics, Movement)
  - Back
    This is a GUI control allowing the player to easily back up to the previous menu screen, if that option is currently available.
  - Pause
    If in the midst of the main game loop, the Pause button allows the player to pause the game and enter the Pause Screen. Pressing the Pause button again will resume the game.
  - Menu
    The Menu button is a GUI control allowing the player to Return to the game, go to Main Menu (autosave and quit), go to Options, or Exit to system, which autosaves, quits and exits the title, sending the player to the Base UI.
  - Hint
    The Hint button is a Curricular Gadget control allowing the player to repeat the Gadget question on first press. On subsequent presses, the Curricular Gadget tutorial will play.
  - Shoulder Button Left / Shoulder Button Right
    Not used in this title, except where noted in Cheat Combinations below.

- Controller Layout (default)

Controller Layout (default)

Shoulder Left

Shoulder Right

Pause

Hint

Menu

Back

Directional
Movement
(Up, Down,
Left, Right)

Jump
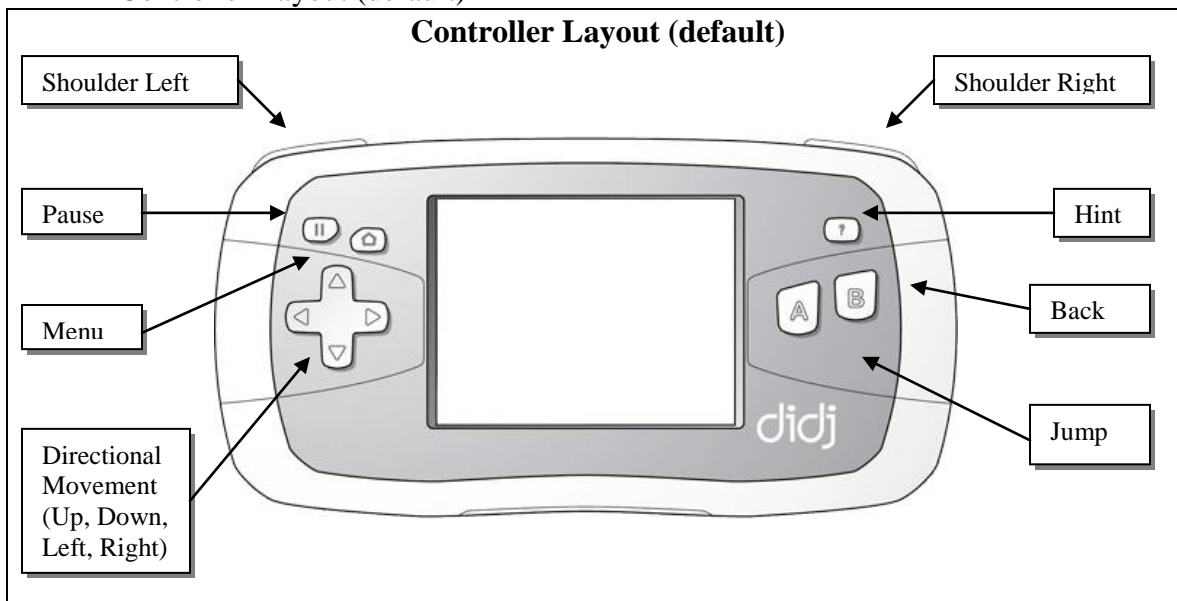
- Special Control Combinations
  - Roll
    While Sonic is walking or running, the player is able to tuck Sonic's body
    into a Roll by pressing D-Pad Down. (See also Player Metrics)
  - Spin Dash
    While Sonic is standing still, the player is able to "charge up" a fast roll
    called a Spin Dash by pressing D-Pad Down and simultaneously pressing the
    Jump Button. Successive Jump button presses increase the "charge" for the
    Spin Dash, up to three times. Sonic will be released from his "charge" and
    dash off when the player releases the D-Pad Down control.
- Cheat Combinations
    To allow for efficient evaluation of quality assurance, a series of cheat modes
    are available.
  - Select Curricular Level and Sublevel
    (Not currently implemented in emulator version)
  - Unlock All Customizable Components
    (Unlocked by default in current emulator version)
  - Select WOW Achievement
    (Not currently implemented in emulator version)
  - Select Any Zone, Act or Sequence (Splash Screen, End Game, etc)
    (All Zones available through the menu system in current emulator version)
  - Disable AutoSave Progress
    (Not currently implemented in emulator version)
  - Display Player's Current Curricular Level and Sublevel.
   This display is toggled on/off with F6 key in current emulator version.
  - Disable Curricular Auto-Leveling
    This functionality is toggled on/off with F5 key in current emulator version.

6.5 Curricular Gadget Mechanics

- Gadget Type and Content Selection
  Curricular Gadgets are selected at random (randomly exhaustive) from a list of gadget types, defined below. The pool of available gadgets is checked against the current sublevel as not all sublevels work with Select & Insert (Letter Cannon gadget). The content for the gadget is selected from a pre-defined list based on the current player's curricular level of achievement. The spelling content and available answers are case sensitive.
- Gadget Distribution
  Curricular Gadgets are distributed in all Zones except Zone Four. Teleport Rings are placed throughout each Zone, which will pause the game and teleport Sonic to a Curricular Gadget to work on before returning to gameplay.
- Curricular Auto-Leveling
  If the last 10 answers given are more than 80% correct, the player's current curricular level is raised a sublevel and if they are less than 60% correct, the current curricular level is lowered a sublevel. Additionally, in the first questions of a 10 question assessment block, five 5 sequential correct answers raise it a sublevel and 4 sequential incorrect answers lower it a sublevel.
- Curricular Tutorials
  Curriculum tutorials are activated when the player presses the Hint button twice during a Curricular Gadget.   A single button press will repeat the current Gadget question. These tutorials explain curriculum concepts using the existing problem in a step-by-step example. Curricular tutorials will be available while paused during a Gadget. The Back button control will cancel Tutorial mode and return to normal gadget play.
- Gadget Controls
  While the main game loop requires skillful control of Sonic to avoid enemies and hazards, the Curricular Gadget should have a much simpler control scheme, using selection or simple timing.
- Gadget Components
  - Task Introduction
    The gadget is introduced with an appropriate title and brief text and spoken instructions on how to operate. A visual/auditory signal is given to begin, usually the Gadget question or problem to solve.
  - Gadget Loop
    This is the main gadget loop.
  - Completion Report
    Upon completion of the gadget, a simple report is given on the player's performance: a simple visual/auditory summary announcement. (i.e., *"Good work!"*)
  - Hint
    If the Hint button is pressed the first time, the initial problem or Gadget question is repeated. A second press will launch the Tutorial Mode.

- o Tutorial
  The Tutorials offer general help related to the basic curricular problem at hand.
- Gadget Flow

Gadget Flow

```
Task Intro.  ──────►  Gadget Loop  ──────────►  Completion
                        ▲    │                    Report
                        │    ▼
                      Hint ──►  Tutorial Mode
```
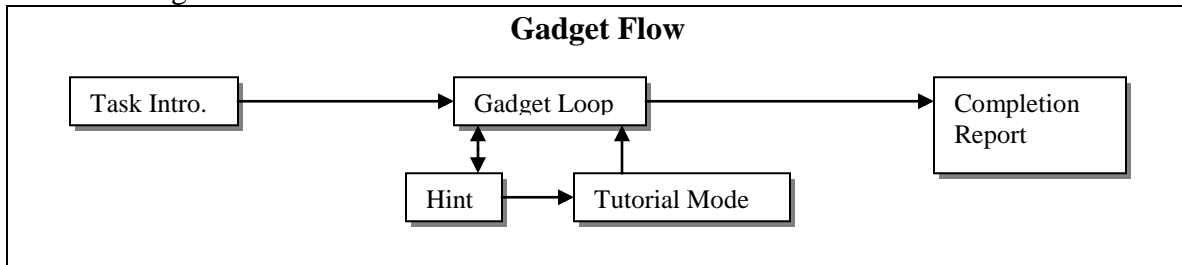
- Gadget Layout Components
  - o Gadget Title
    This is a brief, but descriptive label for the gadget, providing a way to remember the curricular lesson and gadget mechanics.
  - o Gadget Hint
    This area allows for display of simple hints for completing the curriculum.
  - o Gadget Display
    This is the main gadget display. The components of each gadget should be clear and simple, allowing for ease of gadget operation and making the curriculum the main focus.
- Gadget Layout
  The follow image represents an example Curricular Gadget layout.

6.6 Curricular Gadget Type Definitions

Gadget #1: Scrambled Station
  o Description
    Sonic is teleported to a place where space for a word is presented. A series of
    power-up monitors display one letter each. The total number of monitors
    equals the number of letters in the question. Sonic must jump (Jump Attack)
    on the monitors to release the letters in order and spell the word.
  o Layout

  o Goal
    Spell the word.
  o Mechanic
    Jump on the power up monitors to release letters in order.
  o Controls
    Controls are as normal gameplay.
  o Results
    Results are determined each time Sonic jumps (Jump Attack) on a monitor to
    release the next letter. An incorrect answer results in Sonic being "hit"
    without loosing rings and not sent to a Fail State (death). The player is given
    3 attempts to answer correctly. After 3 incorrect answers, the correct answer
    is revealed for four seconds. If the whole word is spelled correctly, 10 bonus
    Rings appear along the bottom of the playing field for Sonic to collect.
    Regardless of the results (either 3 incorrect answers or whole word spelled
    correctly), the screen will fade to black. If all the questions have been
    completed for this Gadget, Sonic is teleported back to the main game loop
    after five seconds and Sonic's celebration animation will play. Otherwise the
    screen will fade back up with the Gadget reset for a new question.

- Gadget #2: Letter Cannon
  - Description

    Sonic is teleported to a location with a cannon (from Carnival Nights, Sonic 2) placed in the center of the floor. Four Bubbles float back and forth across the screen. Sonic must aim the cannon at the Bubbles with the correct letter combination in order to fill in the incomplete word.
  - Layout

  - Goal

    Fill in the missing letters.
  - Mechanic

    Use the directional movement controls to aim the cannon at the appropriate Bubbles and press the Jump button to fire the cannon and launch Sonic toward the Bubbles. If Sonic missed all Bubbles, he will automatically land, run and jump back into the cannon for the next attempt.
  - Controls

    Directional movement Left and Right will rotate the cannon to aim it. Jump button will fire the cannon and launch Sonic. Sonic is able to enter an answer when a Bubbles is hit.
  - Results

    Results are determined as soon as a Bubbles is hit by Sonic. A correct answer results in an even radial pattern of 10 Rings launched from the Bubbles for Sonic to collect. An incorrect answer results in the Bubbles' spikes protruding and Sonic being "hit" without loosing rings and not sent to a Fail State (death). The Bubbles will remain on screen for the remainder of the gadget in this case. The player is given 3 attempts to answer correctly. After 3 incorrect answers, the correct answer is revealed for three seconds. Regardless of the results, the screen will fade to black. If all the questions have been completed for this Gadget, Sonic is teleported back to the main game loop after five seconds and Sonic's celebration animation will play. Otherwise the screen will fade back up with the Gadget reset for a new question.

- Gadget #3: Word Wheel
    - Description

       Sonic is teleported to a place with a large wheel and a mechanical lever. On the wheel, there are a series of letters that Sonic can cycle through by running left or right to spin the wheel. The letters on the wheel can be capitalized pressing Up, or made lower case by pressing Down. The center letter is highlighted yellow as the current selection. Sonic can then jump to the lever and pull to submit the answer.
    - Layout

    - Goal

       Spell the word.
    - Mechanic

       As Sonic runs left or right on a wheel, the letter array will cycle to the next or previous letter. The case of all the letters on the wheel can be capitalized pressing Up, or made lower case by pressing Down. To submit the answer, the Jump button is pressed.
    - Controls

       Sonic is able to run in place using the Left or Right directional movement controls, which will spin the wheel and align the next letter selection. The case of the letters can be capitalized pressing Up, or made lower case by pressing Down. Sonic is able to Jump straight up to reach and pull the lever. If the entire word is spelled correctly, the controls return as normal gameplay and Sonic is able to freely maneuver through the space.
    - Results

       Results are determined at the time that Sonic jumps to the lever. An incorrect answer results in Sonic being "hit" without loosing rings and not sent to a Fail State (death). The player is given 3 attempts to answer correctly. After 3 incorrect answers, the correct answer is revealed for three seconds. If the entire word is spelled correctly, 10 Rings fall from off screen for Sonic to collect. Regardless of the results (either 3 incorrect answers or whole word spelled correctly), the screen will fade to black. If all the questions have been completed for this Gadget, Sonic is teleported back to the main game loop after five seconds and Sonic's celebration animation will play. Otherwise the screen will fade back up with the Gadget reset for a new question.

6.7 Curricular Gadget #1 Walkthrough

As Sonic, the player reaches a Teleport Ring in the main game loop and begins the Curricular Gadget. The game loop is paused as the screen fades to black, then fades up again to reveal Sonic in a location that appears as the Zone he was just in. (If in Grass Hill, the ground has grass on it, etc.) The camera is locked off and centered on an area with several TV Monitor objects, each with a letter visible on its screen. A series of blank spaces are displayed at the top of the screen, one space for each letter of a word the player is asked to spell. Sonic stands on the floor.

After Sonic has arrived at this Curricular Gadget and the Tutorial instructions / demonstration have been played for this Gadget, the Gadget problem is posed to the player. In this case, a verbal cue is called out. "Spell the word, *'church'*." The player now has control over Sonic as normal. As Sonic is directed to explore the TV Monitor objects in the area and find the appropriate letter to insert next. Once the player has decided on the letter they'd like to select, they jump (Jump Attack) on the TV Monitor object to release the letter. This action enters the selected letter as their answer and results are immediately determined.

Letter by letter results are determined. If the next letter entered is correct, that letter is simply displayed in the letter space at top of the screen. A correctly completed word gives a congratulatory verbal phrase and an accompanying musically triumphant sound effect, while a line of Rings appear along the floors of the area for Sonic to collect within the next five seconds before the end of the Curricular Gadget. If an incorrect answer is submitted, Sonic is immediately thrown back, a verbal phrase indicates that this was not the correct answer, and the question is repeated. If three incorrect answers are submitted, the player is shown the correct answer for the next four seconds before the end of the question.

Regardless of the outcome, if this is the last word to spell in this Gadget, Sonic appears back at the original location of the Teleport Ring. The game loop is un-paused and gameplay resumes as normal. However, if there are more words to spell, the Gadget components simply reset and the new Gadget problem is posed.

6.8 Zone Overview

- Zone One: Grass Hill
  - Act One
    This Act emulates the Jade Island Zone (Act 1) from Sonic the Hedgehog.
  - Act Two
    This Act emulates the Green Emerald Zone (Act 2) from Sonic the Hedgehog 2.
  - Act Three
    At the end of Act Two, Drill Eggman (boss) enters and a Boss Battle is fought.
- Zone Two: Hydropolis
  - Act One
    This Act emulates the Sandopolis Zone (Act 1) from Sonic and Knuckles.
  - Act Two
    This Act emulates the Hydrocity Zone (Act 2) from Sonic the Hedgehog 3.
  - Act Three
    At the end of Act Two, Water Eggman (boss) enters and a Boss Battle is fought.
- Zone Three: Scrap Plant
  - Act One
    This Act emulates the Scrap Brain Zone (Act 1) from Sonic the Hedgehog.
  - Act Two
    This Act emulates the Chemical Plant Zone (Act 2) from Sonic the Hedgehog 2.
  - Act Three
    At the end of Act Two, Graviton Mobile (boss) enters and a Boss Battle is fought.
- Zone Four: Space Egg
  - Act One
    This Act emulates the end of Space Egg Zone (Act 1) from Sonic the Hedgehog 2, where Eggman Mech (boss) enters and a Boss Battle is fought.

6.9 Zone One Preview

- Act One
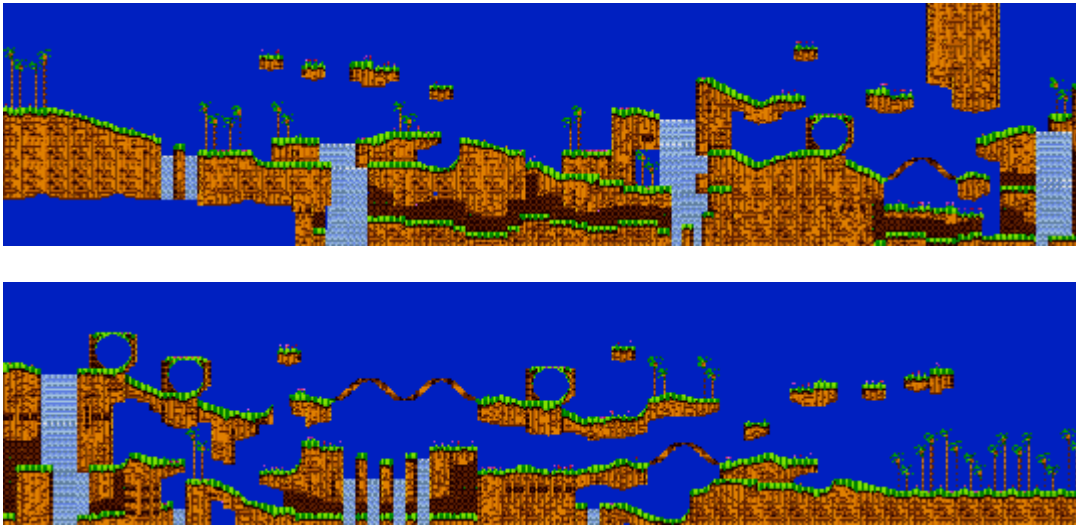
Grass Hill Zone, Act One, starts simply by leading the player to run down a grassy slope and over two waterfall gorges via rope log bridges. Soon after, the player is faced with alternate routes to take, both up on a higher ridge and high in the sky on floating platforms. Almost immediately afterwards, another lower route leads through an underground tunnel. These three to four different routes cross over and interconnect throughout the Act before pairing back down to a single location at the end, where the End Act Sign will allow the player to end the Act. These alternate routes promote repeated play of the Act and encourage exploration. The means to reach the upper routes include Spring objects and ground/track ramps that Sonic can launch from at high speeds. Lower routes are easier to reach by falling and serve as a catch all for players who fall from upper routes.

The hazards in this Act include the waterfalls that drop off the bottom of the gameplay area and the Badniks placed here. Masher, Coconuts and Buzzer Badniks are placed throughout the Act. One or more Mashers jump up and down at log bridges. Single Coconuts hang out on some palm trees. Buzzers fly above other areas of the Act, alone at the beginning of the Act, but in pairs towards the end. Other hazards and more aggressive use of Badniks will be used in later Acts and Zones, but as the introductory Act for this title, the difficulty level is kept at a minimum here.

Five Power Ups (TV Monitors) are available at various points in the Act. Some are in plain sight, but on alternate platforms, others near the end are hidden in palm trees. Invincibility is offered early in the Act and in plain sight, just before a series of Badniks. Super Sneakers is available in the highest upper route, just before a series of Loop-de-Loops, ramps and a double Corkscrew. One-Up is available near the end of the Act, hidden in a palm tree. Other Power Ups are in remote, out-of-the-way locations.

There are 200 Rings available to collect in this Act. They are scattered throughout the Act, but organized in lines or clusters. Lines of Rings are placed along straight-aways and other speedy sections, while clusters of Rings are located either in out-of-the-way locations underground or floating high in the sky under a Spring object or ground/track ramp.

12 Teleport Rings are placed throughout the Act, three or four per route. Their size necessitates that they are placed in more open locations, but they are placed so that players are forced to touch them in order to continue along their current route. They are not placed in the middle of sections that are supposed to emphasize speed. These Teleport Rings transport Sonic to a Curricular Gadget. (See also Curricular Gadget Mechanics)

- Act Two

Grass Hill Zone, Act Two, uses a number of devices to quickly offer three or four routes that persist, interconnect and eventually join to the end of the Act where an End Act Sign awaits the player. The first obstacle the player faces is a large waterfall gorge with a ramp leading to it. The ramp allows the player to jump from Falling Grassy Ground piece to Falling Grassy Ground piece and choose between an upper route with a Breakaway Ground Ledge piece, a normal grassy ground section or deeper in the gorge another Falling Grassy Ground piece that leads to tunnels representing a more hidden route.

The hazards in this Act add to those found in Act One with Floating Grassy Ground, Falling Grassy Ground, Breakaway Grassy Ledge, Up-Down Oscillating Grassy Pillar and Spikes. Buzzer Badniks are found in pairs throughout this level, along with Mashers and Coconuts. Some elements are made less forgiving than in Act One. For example, a horizontal Spring begins a fast-moving straight-away section, but a depression with a row of Spikes spans a middle section where the player is forced to halt or be hit for sure.

Five Power Ups (TV Monitors) are placed at various points throughout this level. Unlike Act One, no Power Ups are in plain sight unless they're placed in an out-of-the-way location, such as within a tunnel hidden with a Breakaway Rock. Of all the Power Ups available in this Act, Super Ring is the easiest to find hidden in a palm tree near the beginning. The One-Up Power Up is hardest to locate, high in a remote floating section above the highest route.

There are 200 Rings available for collection in this Act. Unlike Act One, some of the lines of Rings are hidden from view, located within a tunnel in a lower route. Also unlike Act One, the Rings are placed away from Badnik locations, raising the difficulty level by making it less likely a player has Rings in possession when a Badnik is confronted.

12 Teleport Rings are place at various points in this Act, three per route. Unlike Act One, one of the Rings is not "blocking" passage through a route, but instead is more hidden. It is placed high in the air and reachable only by a Spring object hidden in a palm tree. This makes reaching each of the Teleport Ring points more difficult for the player, which is an incentive in terms of Lightning's WOWs. (See also WOWs and Lightning Bolts)

- Act Three: Drill Eggman (boss)

At the end of Grass Hill, Act Two, the player area is locked off for the boss battle against Eggman. The Drill Eggman chassis enters screen right on the ground while Eggman pilots a helicopter-like egg-shaped craft from above screen right. The chassis comes to a rest as the helicopter craft lands inside the chassis and becomes the Drill Eggman boss.

Eggman immediately begins his pattern of driving off screen left, then from off screen left to off screen right and back. The player must use Sonic's Spin Attack to jump on top of the egg-shaped craft portion of the Drill Eggman in order to score a hit on this boss. At the same time, the player must avoid being hit by the Drill Eggman. After seven hits are delivered to the Drill Eggman, Eggman is set to fire the front-mounted drill bit at Sonic on the next pass. The drill bit will fire horizontally and travel at a constant rate off screen.

On the eighth hit, the Drill Eggman is destroyed and the egg-shaped helicopter craft separates from the wrecked Drill Eggman chassis and flies up and off screen right. After three seconds, the Act ends with the Act Completed Display and End Act scoring before continuing to on Zone Two. (See also Heads Up Display and Act Mechanics)

7.0 Scoring

7.1 In-Game Display

When the player scores points from objects in-game, the point value appears as an icon that floats upward from the enemy or item for one second before disappearing.

7.2 Enemies Defeated
- Badnik defeat = 100 Points
- Boss defeat = 1000 Points
- Multiple enemy at one time Bonus = 600 to 3, 600 more for each enemy over three. (A cumulative score is stored from any Badnik defeat and this extra bonus is applied as double that cumulative score as long as the number of enemies defeated is more than three, less than 18 and the time since the last defeat is less than one second)

The following scoring elements are only tallied at the End Act phase and are not reflected in the HUD during normal gameplay. (See also Act Mechanics, End Act)

7.3 Power Ups
- Collect a TV Monitor (Power Up) = 200 Points

7.4 Rings
- Collected a Ring during the Act = 100 points each

7.5 Time Bonus
- Complete the Act in 1:00 or less = 10,000 points
- Complete the Act in 1:00 to 1:30 = 8,000 points
- Complete the Act in 1:30 to 2:00 = 6,000 points
- Complete the Act in 2:00 to 2:30 = 4,000 points
- Complete the Act in 2:30 to 3:00 = 2,000 points
- Complete the Act in 3:00 to 3:30 = 1,000 points

8.0 NPC AI Behavior

8.1 Animals

Once freed from their Badnik captors, the little furry animals will fall to the ground and then bounce off screen left, unless they are specified as flying animals, in which case, they will immediately fly off screen left in a simple sine wave. (See also Animal Non-Player Character Metrics)

8.2 Enemies (a.k.a. Badniks)

- Bubbles (a.k.a. Harisenbo)
  Bubbles flies in a slow horizontal figure 8-shape, turning to face the direction he is traveling. While traveling downward, his spikes are deployed and he is invulnerable. If Sonic attempts to use his Jump Attack while Bubbles' spikes are deployed, Sonic is hit. While Bubbles is traveling upward, his spikes retract and Sonic is able to hit him.
- Masher (a.k.a. Gauccho)
  Chopper bounces straight up and falls straight down. While near his apex, he bites quickly several times.
- Buzzer (a.k.a. Stinger)
  Buzzer flies slowly back and forth horizontally between two patrol points. If Sonic is near and Buzzer is facing Sonic, he stops and points his tail down at Sonic. A moment later, a firey projectile is launched from his tail at a 45° angle down toward Sonic, which slowly travels off screen with no bounce.
- Coconuts (a.k.a. Aiai)
  Coconuts will remain in his placed tree and alternates between climbing up and climbing down the trunk, before stopping momentarily. He will turn to face Sonic. If Sonic is close, he will lob a coconut projectile at a 45° angle down toward Sonic, which falls off screen with no bounce.
- Sandworm (a.k.a. Nal)
  Sandworm will patrol an area of quicksand. He moves under the sand most of the time, causing a small ripple in the sand. Then, Sandworm will jump out of the sand and arc back into it as part of his patrol back and forth between two patrol points. Sandworm does not alter this behavior.
- Corkey (a.k.a. Rock'n)
  Corkey will immediately stand up from his placed spot, revealing he is not a rock, when Sonic touches him. He will slowly walk towards Sonic, pushing him either off a ledge or crushing him against a wall. Once Sonic has left the area, Corkey will walk back to his placed spot and sit down, again looking like a rock.
- Skorp (a.k.a. Scorp)
  Skorp will slowly travel back and forth horizontally between two patrol points. If Sonic is close and Skorp is facing him, Skorp will stop and wag its tail. A moment later, the tail will lash forward and stretch (the tail is made up of circular linked objects) out to reach about twice the length of Skorp. The tail will then spring back.

- Grabber
  Grabber will slowly travel back and forth horizontally between two points on a ceiling. (He appears to glide upright, not crawl on the ceiling) If Sonic is near, Grabber will stop and begin to travel up and down fairly quickly along its web line. If Sonic is under Grabber at his lowest point, he will grab Sonic, pull him up to the top of the line and hold him there. At that time, Grabber's stripes blink for three seconds before Grabber self-destructs, hurting Sonic.
- Spiny (a.k.a. Lander)
  Spiny will crawl slowly back and forth either horizontally or vertically (depending on placed orientation) between two patrol points. If Sonic is near, Spiny will stop and open a hatch on his head. A moment later, a firey projectile is launched through the top of his head and toward Sonic, which arcs and falls off screen with no bounce. His projectile is aimed at Sonic from the time that Spiny stops.
- Grounder (a.k.a. Handrill)
  Grounder will slowly travel back and forth horizontally between two patrol points, stopping momentarily before turning to go the other way. Occasionally, Grounder will be placed behind bricks that blend into the background objects and remain stationary. When Sonic is close, he will burst out of the bricks and then begin his patrol as normal.

8.3 Bosses

- Drill Eggman
  Eggman will drive this vehicle left to right off screen, then right-to-left off screen (repeat). If Sonic touches the front of the vehicle at all or anywhere else on the vehicle without being in Spin Attack mode, he will be hurt. If hit seven times, Eggman will fire the drill at Sonic, which can also hurt him. The Drill Eggman takes eight hits from Sonic's Spin Attack to be defeated.
- Water Eggman
  Eggman will pilot a hovering craft that will "bob" up and down in a sine wave that lasts three seconds, at a height where only the lower half of the sine wave can touch and damage Sonic. The craft has a suction tube, which draws poison water from a reservoir and collects it in a beaker over a period of five seconds, during which time the craft will remain at either the left or right end of the screen width, facing Sonic. Once the beaker is full, the tube will retract and a mechanical arm holding the beaker will extend horizontally toward Sonic. The mechanical arm can only extend so far, and Eggman will fly the craft horizontally (continuing to "bob") towards the other side of the screen in order to aim the beaker directly above Sonic. Once the beaker is directly above Sonic, the craft will pause (but continue to "bob") and the mechanical arm will begin to dump the beaker contents. The beaker water will begin to fall after one second and will hurt Sonic if it hits him. After dumping the beaker contents, Eggman will pilot the craft to the other side of the screen, turn around and lower the tube to begin the pattern again.

- Graviton Mobile

  Eggman pilots an egg-shaped floating machine with four electrodes along its perimeter and a large dark green ball held in its underbelly. The machine will float in from off-screen right and Eggman will attempt to aim toward Sonic. At a short distance away, the dark green ball will drop, bounce and come to a rest within four seconds. At that point, the machine will approach the dark green ball and hover above it. Then the four electrodes will start to spin, slow at first. After three seconds, the four electrodes will activate, showing large electrical bolts that lead to the ground around the dark green ball. During this time, Sonic will be drawn toward the ball at a force inversely proportional to the distance to the ball. After five seconds, the electrodes will deactivate and slow their spinning.   After three seconds, the machine will lower to the dark green ball on the ground and pick it up as it again rises to the altitude it entered at before this pattern repeats.   If Sonic touches either the dark green ball or the electrodes he is hit. The machine can only take eight hits before it is destroyed.

- Eggman Mech

  Eggman drives a large mech robot that walks and flies. The mech rises up from a hole in the floor then it begins a repeatable set of behaviors. The mech walks forward four steps then it takes a half step back to a normal standing position. The camera shakes upon each footfall. The mech then uses its jet pack to fly straight up and off screen. After three seconds, a small reticule appears over Sonic, indicating that Eggman is targeting him. The reticule is able to follow Sonic closely, but can't move at Sonic's top speed. The reticule blinks faster until at four seconds, when it flashes red and stays in place, indicating that Eggman has acquired a target lock. Three seconds later, the mech drops from the sky off screen and lands at the reticule location, facing the center of the Boss Battle area. The camera shakes upon the mech landing. If Sonic is in front of the mech, it will bend down so that its arms are a Sonic's height. The mech's arm, tipped with spikes, will shoot horizontally toward Sonic to a distance of one screen width and then return. The mech will then fire its other arm before standing up and again using its jet pack to fly upwards off screen to target Sonic again. If Sonic is in front of the mech, but is more than one screen width away, the mech will walk forward four steps, take one half-step back and fly upwards off screen to target Sonic again. If Sonic is behind the mech when it lands, it will remain standing while two "egg bombs" are ejected from a backpack, shot upward so they arc, land and bounce twice in Sonic's direction. Two seconds after coming to a rest, the "egg bonbs" explode, hurting Sonic if he is standing next to it. After the first two "egg bombs" are destroyed, two more will shoot out and land in a slightly different location. After the last two "egg bombs" are destroyed, the mech uses its jet pack to fly upwards and off screen to target Sonic again. Touching any part of the mech, its arms or the "egg bombs" will hurt Sonic. (Fact check how to defeat)

9.0 Design Considerations

9.1 Zone Design Considerations
- Place Badniks, Animals and Special Zone Objects of the current Zone only.
- Place between 4 and 6 Teleport Rings in the Act, leading to Curricular Gadgets. Don't put two Teleport Rings together.
- Make sure the layout contains at least four branching routes to the end.
- No dead ends. Always have a way for Sonic to reach another route.
- Accentuate Sonic's speedy nature by placing Game Objects that either boost or highlight speed, such as horizontal Springs, inclines and Loop-de-Loops.

9.2 Curricular Gadget Design Considerations
- Of the Sonic universe
- Curriculum is King
- Scalable to quiz short words and long words (between 3-12 letters long)
- Use of guides or "funnels" to help minimize accidental wrong answers
- Controls more knowledge-based than skill-based
- More than one question per Gadget session

10.0 Player Help

10.1 Sonic's Survival Tips
- Grab all the Rings you can. They will provide protection from Badniks and obstacles and help you earn extra lives.
- Earning 100 Rings will earn you one extra life.
- When you lose Rings, rush to grab them again (as long as it's safe!).
- Use Sonic's Spin Dash to climb up steep hills.
- Watch the traps to see how they move. Once you know what they do, you'll have a better chance of fighting or dodging them. You might even try to burrow through them.
- Look for way to get to places that seem impossible to reach. Jump on levers, hang from vines and use Sonic's Super Spin Attack to discover hidden items and secret paths. Look for different patterns in the walls.
- Remember, there's a Time Bonus, so race through the Act as fast as you can.
- Beware of Badniks that shoot energy weapons. Even if you keep your distance from the Badnik, their weapon can reach you and cause you to loose a life. If you must get past a series of Badniks, spend a few moments watching them and learn how they move. Be sure to time your attack perfectly.
- Destroy enemies in succession for extra bonus points!
- You can only fight Eggman with the Super Spin Attack. Keep Sonic safe by dodging away when Eggman attacks.
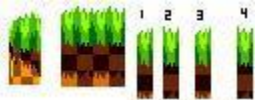
10.2 Curricular Gadget Hints

- Listen to the instructions at the start of the gadget.
- Press the Hint button once to hear the instructions repeated. Press Hint again to hear a tutorial for the type of question asked.
- Collect your bonus Rings as reward for a job well done.

11.0 Special Zone Object Definitions

11.1 Zone One Objects

- Grassy ground pieces (various angles)

  This is a static ground piece where collision is only detected if velocity is downward.

- Waterfall ground

  This is a static piece of flat ground using the waterfall animated textures.

- Floating grassy ground (horizontal / vertical oscillation)

  This is a dynamic piece of track/ground where collision is only detected if velocity is downward. This will not crush Sonic against other collision objects.

- Falling grassy ground

This is a dynamic piece that will lower slightly on collision, but then fall off screen after one second. (For a visual example, see floating grassy ground)

- Breakaway ground ledge

This is a multi-component dynamic piece that will breakaway in pieces, beginning from the edge and "crumbling" to the ledge, after a one second delay from the time of collision.

- Up-Down oscillating grassy pillar

  This is a dynamic piece of track/ground that vertically oscillates in a regular interval.

- Cliff faces

This is a static gameplay level object offering collision only in one horizontal direction.

- Rocks

  This is a static collision gameplay level object.

- Breakaway rocks

either a Roll or (if fast enough) a Spin Dash animation. Velocity and gravity work as normal while on the path.

- Angled spring

This is a static piece of that gives Sonic a velocity boost in a defined direction, just as the normal Spring, but at a 45 degree angle.

- Corkscrew track

This is a static piece of ground/track that allows Sonic to only travel along a defined path, unless his velocity drops below a limit. While on this path, Sonic will be forced into a "corkscrew run" animation. Velocity and gravity work as normal while on this path.

- Tunnel and tunnel window

This is a static piece of ground/track that visually appears as a solid cliff face or a face with a hole cut in it. "Behind" it is a normal flat ground piece.

11.2 Zone Two Objects

- Sandy ground pieces (various angles)

This is a static piece of ground offering collision only if the velocity is downward.

- Sandy dune

This is a static piece of ground offering collision only if the velocity is downward.

- Stone flooring (various angles)

This is a static piece of ground offering collision only if the velocity is downward.

- Breakaway brick ledge

This is a dynamic multi-component piece of ground offering collision only if the velocity is downward. On collision, the piece will break away and fall off screen, starting at the edge and ending at the ledge.

- Vertical Sandflow

This is a static piece of "track" that appears as an animated waterfall of sand. This piece offers no collision, however if Sonic is within it, he moves downward at half speed, so he is able to jump again and again to move up the flow all the way to the origin of the flow.

- Automatic Sandflow

This is a static piece of "track" that appears as an animated flow of sand. This piece offers no collision, but will carry Sonic along a defined path at a defined speed. While within this piece, Sonic is sent into a "sliding" or "falling" animation automatically.

- Sand slide

This is a static piece of "track" that appears as an animated flow of sand. This piece offers no collision, but will carry Sonic along a defined path. While within this piece, Sonic is sent into a "sliding" or "falling" animation automatically. While on this piece, gravity and velocity work as normal.

- Breakaway rock (sandy)

This is the brick/sand version of the breakaway grassy ground ledge from Jade Island. This is a multi-component dynamic piece that breaks away on collision.

- Conveyor belt
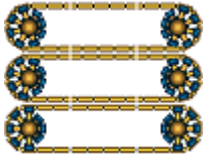
 This is a static piece of ground/track that offers collision only if the velocity is downward. It also will also cause colliding objects to travel along a defined path at a defined speed.

- Up-Down oscillating stone column

This is a dynamic piece that offers collision on all sides. This piece can crush and hurt Sonic, if pushed against another collision surface.

- Sliding Left-Right oscillating stone column

This is a dynamic piece that offers collision on all sides. This piece can crush and hurt Sonic, if pushed against another collision surface.
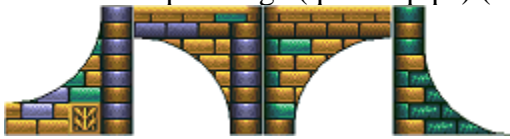
- Quicksand

This is a static piece of ground/track that offers collision as normal ground. However, it will also draw Sonic downward at half-speed (as compared to falling) after one second from collision.

- Loop-de-Loop track (sandy)

This is the sand/brick version of the grassy Loop-de-Loop.

- J-shaped ledge (quarter pipe) (brick)

 This is a static piece of ground/track similar to the grassy J-shaped.

- Water surface

This is a dynamic multi-component piece, which visually defines the current water level. Below which, the underwater color palette is used and velocity is reduced by half. This water surface will rise and fall at defined speeds and times.

- Breakaway brick floor

This is similar to the breakaway ledges defined earlier. This is a dynamic multi-component piece that offers collision only if the velocity is downward. One second after collision, the floor breaks and falls away as separate components.

- Water wake

This is a dynamic piece that visually represents the wake of water Sonic leaves behind as he Spin Dash's over the water surface. This piece offers no collision.

- Upward fans

 This is a dynamic multi-component piece, which appears as one or more whirling fans that push Sonic upwards in mid air. These pieces will slide horizontally from a wall within one second, showing only the brick portion. After it has slid out, the whirling fans will appear to rise from within the brick and they will be fully

extended after one second. The upward force is only on when the fans are out and the amount of force is directly proportional to the distance Sonic is to the fan altitude. All rules of gravity and velocity are still in play within this upwards force.

- Waterslide tubes (various angles)
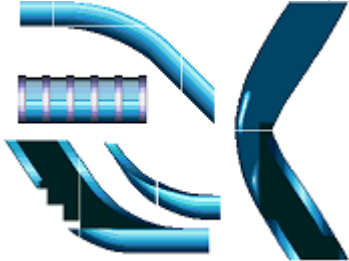
These are static ground/track pieces that represent a waterslide tube. They will send Sonic along a defined path and add some velocity in a defined direction, although rules of gravity and velocity still apply within this piece.

- Corkscrew waterslide tubes
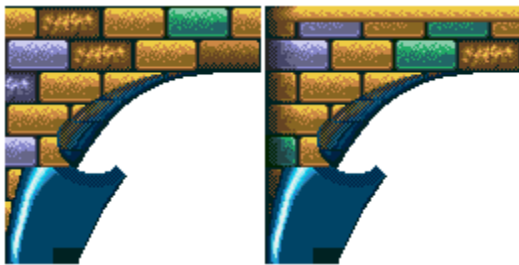
This is the brick/waterslide version of the grassy Loop-de-Loop pieces.

- Rotating Up-Down oscillating stone column
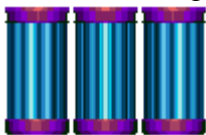
This is a dynamic piece which offers collision only if Sonic's velocity is downward. This piece will rise and lower in a defined path and rate.

- Glove on a stick
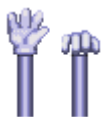
This is a multi-component dynamic piece, which grabs and holds Sonic. While held, a conveyor belt rises from the floor under Sonic, spinning rapidly. After three seconds, the hand lets go of Sonic and he is launched in a defined direction and speed.

11.3 Zone Three Objects

- Metal platform (various angles)

This is a metallic version of the standard ground/track pieces from other Zones.

- Dropping platform

This is a dynamic piece that offers collision only if the velocity is downward. It appears as a normal metal platform. At a defined rate and speed, it will rotate from horizontally

oriented to vertically oriented, hinging on an axis like a trap door. It will remain at the down and up positions for a defined length of time and repeat.

- Flame jet

This is a dynamic multi-component piece that represents a blast of fire from a small hole in a pipe. At a defined interval, the flame jet will grow at a defined rate to its full height. It will remain full for a defined time before retreating back to nothing. While on, the flame components can hurt Sonic.

- Electrical emitter

This is a dynamic multi-component piece. It appears as a static electrical conduit. Every three seconds, the conduit emits stationary horizontal bolts of electricity both to the left and right. These bolts remain for two seconds. If Sonic touches the electric bolts or the conduit, he is hurt.

- Appearing/disappearing platform

 This is a dynamic piece that offers collision only if the velocity is downward. At defined intervals, the piece will appear and disappear. Instead of simply turning visibility on/off, this piece is "pinch wiped", meaning that at first only the smallest sliver of the center is visible, and the reveal widens until the edges are also visible. It disappears in the same way, where at first the edges disappear, then gradually wiped until the center sliver is all that's left before total disappearance.

- Conveyor belt with platforms

This is a dynamic multi-component piece that only offers collision on the platforms and only if the velocity is downward, however as the platform reaches the end point on the belt, it flips over and doesn't offer collision until it reaches the start point on the belt. This piece appears as a conveyor belt, similar to earlier version, and a series of platforms that follow the belt. A unique aspect of this piece is that the belt can be lead through more than two cylinders, and go in more than just one horizontal or vertical direction.

- Autodoor
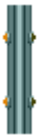
 This is a dynamic piece that offers horizontal collision just as any wall piece. This piece does not appear until Sonic has reached a defined point. At that time, this piece drops down quickly to close off a passage.

- Circular saw blade

 This is a dynamic multi-component piece that either oscillates along a defined path and at a defined rate, or waits until Sonic has reached a defined point before it appears to follow a defined path at a defined speed. If Sonic touches any part of this piece, he is hurt.

- Retracting platform

This is a dynamic piece similar to other moving platforms. This piece will start out as a static piece of track/ground and then horizontally retract into a wall in one half second

when Sonic reaches a defined location. This piece offers collision only if the velocity is downward.

- Spinning platform

This is a dynamic piece similar to other platforms in that collision is available only if the velocity is downward. However, every two seconds, the piece will spin (rotate) and no collision is offered. After two seconds, the platform will spin back to the default state.

- Wavy blue ramps

 This is a static piece of ground/track similar to previous ground/track pieces in other Zones.

- Angle blue ramps

These are straight versions of ground/track that have the same visual style as the Wavy blue ramps.

- Break away tube cover

 This is dynamic multi-component piece that offers horizontal and vertical collision. This piece also reacts if Sonic performs a Spin Attack, by breaking apart into four squares, which fall off screen. This piece is coupled with Pneumatic tubes, acting as the entrance to the tube.

- Pneumatic tubes

 These are static multi-component pieces that don't offer direct collision. If Sonic enters a tube (falling, spinning into one), he is led through the tube length at a defined speed all the way to the end. While Sonic is in the tube, he is forced into a "Rolling" animation.

- Spring tube cover

 This is a dynamic piece that marks the end a pneumatic tube. At the end of the tube, Sonic is sent out through this piece, which appears to close behind him like a hatch. On the surface of this hatch is a normal Spring. So, the effect is that Sonic is launched from the tube upwards. When he falls back down, he bounces on the spring.

- "Flip over" platforms

This is a dynamic piece that can only offer collision if the velocity is downward, however like the spinning platforms described above, these platforms will appear to spin and disappear, offering no collision at all. After three seconds, the platform will appear to spin along the horizontal axis (not rotate, just animation) and then disappear. After

another three seconds, the platform will appear and visually spin again into the default state.

- Water surface and underwater

This is the "chemical plant" version of the water surface/underwater piece. This water is unique in that it instantly hurts Sonic.

11.4 Special Zone Object Notes

- All dynamic objects will reset if more than 1 ½ screens away from Sonic.

12.0 Boss Components

12.1 Drill Eggman
- Eggman
- Flying Egg Craft
- Drill Eggman Chassis
- Wheels x 4
- Drill
- Explosion EFX
- Debris Components

12.2 Water Eggman
- Eggman
- Water Eggman Chassis
- Suction Tube
- Beaker
- Mechanical Arm
- Poured Liquid
- Explosion EFX
- Debris Components

12.3 Graviton Mobile
- Eggman
- Graviton Mobile Chassis
- Dark Green Ball
- Electrodes x 4
- Electical Bolts x 4
- Explosion EFX
- Debris Components

12.4 Eggman Mech
- Mech Torso with Head and Jetpack
- Mech Shoulder
- Mech Arm
- Mech Forearm with Spikes
- Mech Leg
- Mech Foot
- Jetpack Fire EFX
- "Egg Bomb"
- "Egg Bomb" Fuse EFX
- "Egg Bomb" Explosion EFX
- Reticule
- Explosion EFX
- Debris Components

12.5 Boss Component Notes

- Use linked sprite objects for the various components.
- Explosion EFX may be reused for all Bosses.
- Eggman escapes in Flying Egg Craft after each defeat.
- Emerald appears after defeat.

13.0 Asset Lists

13.1 Character Animation

- ANIM_SONIC_IDLE1
- ANIM_SONIC_IDLE2
- ANIM_SONIC_RUN1
- ANIM_SONIC_RUN2
- ANIM_SONIC_45RUN1
- ANIM_SONIC_45RUN2
- ANIM_SONIC_ROLL
- ANIM_SONIC_DUCK
- ANIM_SONIC_SPIN_DASH
- ANIM_SONIC_LOOKUP
- ANIM_SONIC_HANG
- ANIM_SONIC_PUSH
- ANIM_SONIC_FLAIL
- ANIM_SONIC_LAUNCH
- ANIM_SONIC_CORKSCREW
- ANIM_SONIC_SCREECHHALT
- ANIM_SONIC_HIT
- ANIM_SONIC_DEATH
- ANIM_SONIC_CELEBRATION
- ANIM_SONIC_END_GAME

- ANIM_BECKY_FALL
- ANIM_BECKY_BOUNCE
- ANIM_FLICKY_FALL
- ANIM_FLICKY_FLY
- ANIM_CHURPS_FALL
- ANIM_CHURPS_FLY
- ANIM_LOCKY_FALL
- ANIM_LOCKY_FLY
- ANIM_MOUSE_FALL
- ANIM_MOUSE_BOUNCE
- ANIM_TUX_FALL
- ANIM_TUX_BOUNCE
- ANIM_PORKER_FALL

- ANIM_PORKER_BOUNCE
- ANIM_SALLY_FALL
- ANIM_SALLY_BOUNCE
- ANIM_ROCKY_FALL
- ANIM_ROCKY_BOUNCE
- ANIM_TOCKY_FALL
- ANIM_TOCKY_BOUNCE
- ANIM_WOCKY_FALL
- ANIM_WOCKY_BOUNCE
- ANIM_JOHNNY_FALL
- ANIM_JOHNNY_BOUNCE

- ANIM_BUBBLES_IDLE
- ANIM_BUBBLES_ATTACK
- ANIM_MASHER_JUMP
- ANIM_MASHER_ATTACK
- ANIM_BUZZER_IDLE
- ANIM_BUZZER_FLY
- ANIM_BUZZER_ATTACK
- ANIM_COCONUTS_IDLE
- ANIM_COCONUTS_CLIMB
- ANIM_COCONUTS_ATTACK
- ANIM_SANDWORM_JUMP
- ANIM_CORKEY_IDLE
- ANIM_CORKEY_WALK
- ANIM_SKORP_IDLE
- ANIM_SKORP_CRAWL
- ANIM_SKORP_ATTACK
- ANIM_GRABBER_IDLE
- ANIM_GRABBER_REPEL
- ANIM_GRABBER_GRAB
- ANIM_GRABBER_FLASH
- ANIM_GRABBER_EXPLODE
- ANIM_SPINY_IDLE
- ANIM_SPINY_CRAWL
- ANIM_SPINY_ATTACK
- ANIM_GROUNDER_IDLE
- ANIM_GROUNDER_ROLL

- ANIM_DRILL_EGGMAN_COPTER_FLY
- ANIM_DRILL_EGGMAN_COPTER_RETRACT
- ANIM_DRILL_EGGMAN_DRIVE
- ANIM_DRILL_EGGMAN_ATTACK
- ANIM_DRILL_EGGMAN_HIT

- ANIM_DRILL_EGGMAN_DEATH
- ANIM_DRILL_EGGMAN_COPTER_ESCAPE
- ANIM_DRILL_EGGMAN_WHEEL
- ANIM_DRILL_EGGMAN_WHEEL_DEATH
- ANIM_DRILL_EGGMAN_CHASSIS_DEATH
- ANIM_H20_EGGMAN_IDLE
- ANIM_H20_EGGMAN_FLY
- ANIM_H20_EGGMAN_LOWER_TUBE
- ANIM_H20_EGGMAN_RAISE_TUBE
- ANIM_H20_EGGMAN_FILL_GLASS
- ANIM_H20_EGGMAN_DUMP_GLASS
- ANIM_H20_EGGMAN_HIT
- ANIM_H20_EGGMAN_DEATH
- ANIM_H20_EGGMAN_ROCKET_FIRE
- ANIM_GRAVITON_EGGMAN_IDLE
- ANIM_GRAVITON_EGGMAN_FLY
- ANIM_GRAVITON_EGGMAN_DROP
- ANIM_GRAVITON_EGGMAN_SPIN_FAST
- ANIM_GRAVITON_EGGMAN_LIFT
- ANIM_GRAVITON_EGGMAN_HIT
- ANIM_GRAVITON_EGGMAN_DEATH
- ANIM_GRAVITON_EGGMAN_ELECTRIC
- ANIM_MECH_EGGMAN_RISE
- ANIM_MECH_EGGMAN_IDLE
- ANIM_MECH_EGGMAN_STEP_FORWARD_L
- ANIM_MECH_EGGMAN_STEP_FORWARD_R
- ANIM_MECH_EGGMAN_STEP_BACK_L
- ANIM_MECH_EGGMAN_JUMP
- ANIM_MECH_EGGMAN_ARM_ATTACK
- ANIM_MECH_EGGMAN_BOMB_ATTACK
- ANIM_MECH_EGGMAN_HIT
- ANIM_MECH_EGGMAN_DEATH
- ANIM_MECH_EGGMAN_BOMB_IDLE
- ANIM_MECH_EGGMAN_BOMB_SPARKLEY
- ANIM_MECH_EGGMAN_BOMB_EXPLODE
- ANIM_MECH_EGGMAN_ROCKET_FIRE

13.2 Object Animation
- ANIM_TV_MONITOR_ONEUP_IDLE
- ANIM_TV_MONITOR_SUPERRING_IDLE
- ANIM_TV_MONITOR_SHIELD_IDLE
- ANIM_TV_MONITOR_SNEAKERS_IDLE
- ANIM_TV_MONITOR_INVINCIBLE_IDLE
- ANIM_TV_MONITOR_CAPTURED

- ANIM_RINGS_IDLE

- ANIM_STAR_POST_IDLE
- ANIM_STAR_POST_IDLE2
- ANIM_STAR_POST_MOVEMENT
- ANIM_SPIKES_IDLE
- ANIM_SWITCH_IDLE
- ANIM_SWITCH_MOVEMENT
- ANIM_SPRING_IDLE
- ANIM_SPRING_MOVEMENT
- ANIM_CATAPULT_IDLE
- ANIM_CATAPULT_MOVEMENT
- ANIM_END_ACT_SIGN_IDLE_EGGMAN
- ANIM_END_ACT_SIGN_IDLE_SONIC
- ANIM_END_ACT_SIGN_MOVEMENT
- ANIM_TELEPORT_RING_IDLE
- ANIM_TELEPORT_RING_COLLECTED

- ANIM_FLOWER1
- ANIM_FLOWER2
- ANIM_FLOWER3
- ANIM_WATERFALL_DISTANT
- ANIM_WATERFALL
- ANIM_WATERFALL_TRANSPARENT
- ANIM_WATER_DISTANT
- ANIM_SAND_FLOW_VERTICAL
- ANIM_SAND_FLOW_HORIZONTAL
- ANIM_SAND_FLOW_DIAGONAL
- ANIM_SAND_CONVEYOR_WHEEL
- ANIM_SAND_FALL
- ANIM_WATER_SURFACE
- ANIM_SCRAP_BRAIN_BG_LIGHTS
- ANIM_DOOR_CLOSE
- ANIM_CONVEYOR_CHAIN_VERTICAL
- ANIM_CONVEYOR_CHAIN_DIAGONAL
- ANIM_CONVEYOR_CHAIN_HORIZONTAL
- ANIM_CHEM_PLANT_BG_LIGHTS
- ANIM_DEATH_EGG_BG_LIGHTS

- ANIM_BREAKAWAY_ROCK
- ANIM_BREAKAWAY_GRASSY_LEDGE
- ANIM_ROPE_LOG_BRIDGE
- ANIM_VERTICAL_OSCILLATING_GRASSY_PILLAR
- ANIM_BREAKAWAY_BRICK_LEDGE

- ANIM_BREAKAWAY_SANDY_ROCK
- ANIM_VERTICAL_OSCILLATING_STONE_COLUMN
- ANIM_HORIZONTAL_OSCILLATING_STONE_COLUMN
- ANIM_COLUMN_WITH_BUBBLES_PURPLE
- ANIM_COLUMN_WITH_BUBBLES_TAN
- ANIM_NARROW_WATERFALL
- ANIM_NARROW_WATERFALL_SOURCE
- ANIM_NARROW_WATERFALL_SPLASH
- ANIM_WATER_WAKE
- ANIM_UPWARD_FANS
- ANIM_ROTATING_OSCILLATING_STONE_COLUMN
- ANIM_GLOVE_ON_A_STICK
- ANIM_FLAME _JET
- ANIM_DISAPPEARING_PLATFORM
- ANIM_CONVEYOR_WHEEL_METAL
- ANIM_CONVEYOR_BELT_METAL
- ANIM_CIRCULAR_SAW_BLADE
- ANIM_RETRACTING_PLATFORM
- ANIM_SPINNING_PLATFORM
- ANIM_BREAKAWAY_TUBE_COVER
- ANIM_SPRING_TUBE COVER
- ANIM_CHEMICAL_WATER_SURFACE

13.3 EFX Animation
- ANIM_EXPLOSION_SMALL
- ANIM_EXPLOSION_LARGE
- ANIM_PWRUP_SHIELD
- ANIM_PWRUP_INVINCIBLE
- ANIM_SPARKLE1
- ANIM_SPARKLE2
- ANIM_FIREY_PROJECTILE1
- ANIM_FIREY_PROJECTILE2
- ANIM_SPIN_DASH_DUST
- ANIM_SAND_PUFF
- ANIM_SAND_ROCK_CRUMBLE
- ANIM_SAND_ZIP_LINE_SWING
- ANIM_SAND_WORM_BULGE
- ANIM_SAND_SPLASH
- ANIM_BUBBLE_SINGLE
- ANIM_BUBBLE_SOURCE
- ANIM_FAN_BUBBLES
- ANIM_SPLASH
- ANIM_FIRE_BALL
- ANIM_ELECTRIC_BOLT_HORIZONTAL

13.4 GUI / HUD Graphics

- ART_GUI_TITLE_SCREEN
- ART_GUI_MAIN_MENU
- ART_GUI_OPTIONS_MENU
- ART_GUI_CONTROLLER_MAP
- ART_GUI_CREDITS
- ART_GUI_ACHIEVEMENT_SCREEN
- ART_GUI_MICROMODS_SCREEN
- ART_GUI_ZONE_SELECT_SCREEN
- ART_GUI_ACT_INTRO_SCREEN
- ART_GUI_PAUSE_SCREEN

13.5 Sound EFX

- SFX_SONIC_JUMP
- SFX_SONIC_SPIN_DASH1
- SFX_SONIC_SPIN_DASH2
- SFX_SONIC_SPIN_DASH3
- SFX_SONIC_SPIN_DASH_LAUNCH
- SFX_SONIC_SCREECH_HALT
- SFX_SONIC_LOOSE_RINGS
- SFX_SONIC_INVINCIBILITY
- SFX_SONIC_SHIELD
- SFX_SONIC_LOOSE_SHIELD
- SFX_SONIC_BOUNCE
- SFX_SONIC_HIT
- SFX_SONIC_DEATH

- SFX_ENEMY_NPC_DEFEAT
- SFX_BOSS_HIT

- SFX_TV_MONITOR_COLLECT
- SFX_RING_COLLECT

- SFX_STAR_POST_ACTIVATE
- SFX_SWITCH_ ACTIVATE
- SFX_SPRING_ ACTIVATE
- SFX_CATAPULT_ ACTIVATE
- SFX_END_ACT_SIGN_ ACTIVATE
- SFX_TELEPORT_RING_ ACTIVATE

- SFX_GUI_CLICK_SELECT
- SFX_GUI_BACK_DESELECT
- SFX_GUI_START

- SFX_SINGLE_RING_COUNT
- SFX_END_ACT_SCORING_COMPLETE
- SFX_ACHIEVEMENT_DITTY
- SFX_WARNING_BUZZ

- SFX_ROCK_BREAK
- SFX_WATERFALL_CONTINUOUS
- SFX_BREAKAWAY_CRASH
- SFX_S_SHAPE_TUBE_DASH
- SFX_RUMBLE_SCRAPE
- SFX_SPLASH_SMALL
- SFX_SPLASH_LARGE
- SFX_EXPLOSION_SMALL
- SFX_EXPLOSION_LARGE

- SFX_SEGA_JINGLE

13.6 Music

- MUS_SPLASH_SCREEN
- MUS_MENU
- MUS_ZONE_ONE
- MUS_ZONE_TWO
- MUS_ZONE_THREE
- MUS_ZONE_FOUR
- MUS_ACT_COMPLETE
- MUS_CUR_GADGET_Z1
- MUS_CUR_GADGET_Z2
- MUS_CUR_GADGET_Z3
- MUS_CUR_GADGET_COMPLETE
- MUS_INVINCIBILITY
- MUS_DROWNING
- MUS_EXTRA_LIFE
- MUS_CHAOS_EMERALD
- MUS_GAME_OVER
- MUS_GAME_END
- MUS_CREDITS
- MUS_BOSS

14.0 Appendix A (Change Log)

8-20-07 GS: Integrated LeapFrog Comments from M3.
- Section 14.0 Change Log Appendix added to track changes beyond Milestone 3.
- Boss character origins specified in asset definitions.
- Miscellaneous spelling corrections ("cue")
- WOWs Achievement Chart revised.
- Customizable Game Components (MDL) chart truncated to TBD.
- Look Down Player Metric defined.
- Combat, Hit Player Metric appended to define Hit during Curricular Gadgets.
- Content Upgrade and Achievement Screen combined.
- Achievement and Upgrade Screen link moved from Options Menu to Main Menu.
- Credits link moved from Main Menu to Options Menu.
- Menu Button Player Control redefined.
- Hint Button Player Control redefined.
- Section 15.0 Choose Your Own (CYO) Appendix added with initial information.
- Curricular Gadget Fast-Track Calibration and Curricular Leveling redefined.
- Curricular Gadget Hint and Tutorial components redefined.
- Curricular Gadget Type Definitions #1-3 clarified: Cannot loose rings if Hit.
- Section 16.0 Bad Word List Filter (BWLF) Appendix added.
- Section 17.0 Logging Appendix added with initial information.
- Section 18.0 Localization Appendix added.
- Sonic End Game Animation added to asset list.
- Boss Music added to asset list.
- Version number updated to vM3_02.

9-5-07 GS: Integrated LeapFrog Comments post M3.
- Return to Base option added to Main Menu GUI.
- MDL activation / enable / disable states defined.
- Fast-Track Calibration cut from Curricular Auto-Leveling.
- Subsection 13.4 GUI / HUD Graphic assets added to Asset List.
- Section 19.0 Micro Download Component List added with initial information.
- Version number updated to vM3_03.

9-21-07 GS: Integrated LeapFrog Comments for M4.
- Achievements and Upgrades screen split into two GUI components: Microdownloads and Achievements, with Achievements stemming from Options.
- WOWs and Bolts Achievement Chart updated for grammar.
- Music asset definitions revised to reflect available Sonic & Knuckles songs.
- Cheat Combination added for displaying current player curricular sublevel.
- Localization summary updated.
- Version number updated to vM4_01.

10-3-07 GS: Integrated LeapFrog Comments post M4.
- Spelling Curriculum now case sensitive. Updated Gadget Overviews.
- Curricular Gadget Definitions (Types 1-3) revised.
- Curricular Gadget #1 Walkthrough revised.
- WOWs, Bolts and MicroDownloads now Badges, Bitz and Micromods respectively.
- Version number updated to vM4_02.

11-7-07 GS: Integrated LeapFrog Comments post M5.
- Title name changed from Sonic the Hedgehog to Sonic Zone.
- Hardware name from Lightning to Didj.
- Animal NPCs Mouse, Tux, Rocky and Wocky identified as Micromods.
- Badge Achievement Event chart updated.
- Autosave feature described as only saving highest Zone reached.
- Zone Selection described as always having Zone one enabled.
- Controller Setup GUI screen and mechanic cut.
- Pause Screen mechanics updated.
- Gameplay / Curriculum Mix changed to offer optional curriculum.
- Menu Button Control redefined.
- Gadget Type and Content Selection redefined.
- Curricular Auto-Leveling redefined.
- Zone names changed from Jade Island, Sandopolis, Scrap Brain and Death Egg to Jade Hill, Hydropolis, Scrap Plant and Space Egg, respectively.
- Bad Word List Filter (Section 16.0) updated to reflect LeapFrog documentation.
- Micromod Component List (Section 19.0) updated to reflect latest additions.
- Version number updated to vM6_03.

12-7-07 GS: Integrated LeapFrog Comments post M6.
- Title name changed from Sonic Zone to Sonic the Hedgehog.
- Modified target market from Males to Gender neutral (leaning toward boys).
- Renamed Micromod groups.
- Potential Music Remix Micromods listed.
- Several TBD items addressed with currently available information.
- Version number updated to vM7_04.

12-12-07 GS: Integrated LeapFrog Comments post M7.
- Badjes name changed to Badges.
- Version number updated to vM8_05.

12-20-07 GS: Integrated LeapFrog Comments for M8.
- Scoring (Section 7.0) clarified to define Rings and Powerups as applying to Score only after the End Act Tally.
- Splash Screen Sequence (Section 6.1) redefined Sega logo and Realtime logo as static images.
- Special Zone Object list (Section 11.0) updated to reflect asset cuts.
- Hint and Tutorial Gadget (Section 6.5) component redefined.
- Curricular Gadget #1 Walkthrough (Section 6.7) revised to reflect current gadget mechanics.
- Zone Overview (Section 6.8) and Zone One Preview (Section 6.9) corrected to name Grass Hill as the name of Zone One.
- Zone Design Consideration (Section 9.1) item redefined to indicate that 4 to 6 Teleport Rings should be placed in the Act.
- Version number updated to vM8_06.

1-3-08 GS: Integrated LeapFrog Comments post M8.
- Removed estimated time lengths from Music song list.
- Mention of Spinning Log Bridge with Spikes removed from Zone Preview, Section 6.9
- Version number updated to vM9_07

15.0 Appendix B (Choose Your Own: CYO)

15.1 CYO Summary
Choose your own curriculum is a Lightning-only feature that allows some level of customization over the curriculum the user's child is exposed to via configuration on the PC / Web. This offering is not considered part of "Learning Path".

15.2 CYO Mechanics
(Please refer to LeapFrog document: Lightning CYO Concept V5 Final)

15.3 CYO Data Types
- Log Header: The user id/name is saved in the log file's header.
- UserLogIn: The user logged in.
- UserLogOut: The user logged out. The method of logout is captured.
- TitleStart: A game started. The game ID is captured.
- TitleExit: The game exited. The method of exit captured.
- NavAreaStart: A menu screen or area was entered. The ID is captured.
- NavAreaExit:
- ActivityStart: An activity started. The activity ID is captured.
- ActivityExit: The activity exited. The exit method is captured.
- LevelUp: This indicates the curricular difficulty has been increased. The new level ID is saved.
- LevelDown: This indicates the curricular difficulty has been decreased. The new level ID is saved.
- RewardEarned: This specifies the type and amount of an administered reward.
- HintRequest: The user pressed the hint button to play tutorial.
- HelpRequest: The user requested game-specific gameplay help.
- Pause/Unpause:
- CorrectAnswer: The QuestionID and question-specific parameter string are provided.
- WrongAnswer: The QuestionID and question-specific parameter string are provided.
- SemiCorrectAnswer: The QuestionID and question-specific parameter string are provided.
- LowBatteryWarning: The user was presented with a low-battery warning.

16.0 Appendix C (Bad Word List Filter: BWLF)

16.1 BWLF Summary
(Please refer to LeapFrog document Lightning "Bad Word" Filter Policy)

16.2 BWLF Mechanics

- User-entered login names are not filtered.
  - Some names legitimately include words or portions of words that would be filtered, meaning that if we filtered, some kids wouldn't be able to enter their real names.
  - Parents will see user-entered names when reviewing profiles on the Web, so they can monitor.
- Additional user-entered content is filtered on a per-title basis.
- When the user enters spelling words on a letter-by-letter basis, with verification after each letter, no filter needs to be used.
- When the user is asked to complete a word, we should filter combinations that are offered to exclude words on the list attached, which is based on the Fly filtered word list (Lightning Blipped Words v1.doc).
- LeapFrog-generated random fixed words/letter combinations (as in scrambles) should be filtered (left to right, and up and down; NOT right to left and down to up) to exclude words on the list attached.
- Random switchable and random moving letters should be filtered if combinations can appear regularly onscreen for more than 3 seconds.

17.0 Appendix D (Logging)

17.1 Logging Summary

A variety of Leapfrog connected devices perform logging. As the user interacts with the device, the application logs certain events. Later, when the user connects their device to the PC, these files are uploaded to the PC Application. Log files are also uploaded to the Leapfrog website. The logged information is used to provide critical information for Learning Path, as well as to provide a rich data set for marketing and efficacy research.

17.2 Logging Mechanics

(Please refer to LeapFrog documentation: Logging Overview)

18.0 Appendix E (Localization)

18.1 Localization Summary
For spelling titles, localization consists of preventing certain words from being presented to the player.

18.2 Localization Mechanics
After checking the country code, if the code is set to US English, there is no need to filter for localization. If the code is set to UK English, the filter will be used.

(Refer to the Lightning Base Components TDD document)

Each time a word is selected to be presented to the user, check the UK English Phrase Description column in the dataset table. If the word is flagged "((Do Not Use))", remove it from the selection list and pick again.

(Refer to the title Gadget_MediaScript.doc for a list of dataset tables)

19.0 Micromod Component List

19.1 Summary

Micromod components can be activated by spending achieved Bitz points. Once activated, the player can choose to enable or disable each component individually.

For Lightning Year-One titles, all Micromod components will actually be "unlockable" items that already reside on the cart. From the LeapFrog website, what is downloaded is simply a key to unlock the component and make it active for the title.

19.2 Component List

- Music Remixes
  - Grass Hill Remix
  - Hydropololis Remix
  - Scrap Plant Remix
- Animals Friends to be released upon Badnik defeat
  - Mouse
  - Tux
  - Rocky
  - Wocky
- Sonic Idle Poses
  - News Pose (reading)
  - In the Shade Pose (umbrella)
  - Yo Yo Pose
- Sonic Celebrations
  - Backflip
  - Breakdance
  - Moonwalk

19.3 Component Priorities

Due to limitations of memory space for this title, a priority is associated with each Micromod component to address what is included and excluded from the final product. If a priority listing is not provided by LeapFrog and memory limitations present a situation whereby not all components can fit on the title, Realtime Associates has been granted authority by LeapFrog to cut elements from the design as necessary, while still providing the title with the maximum value in overall Micromod content.