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1. Concept

ReVolt is a fast paced arcade racing game featuring radio controlled cars racing over real world environments. It offers a new twist on the age old racing formula by removing the need for fixed race tracks and allowing the player to race in familiar surroundings.

The game is based on the PSX, N64, PC game of the same name and as such needs no further introduction.

2. Scope of Document

This document is the game design for the development of the Gameboy Color version of ReVolt. The game is a conversion of the PC/PSX/N64 version and as such this document does not cover the original design. It does however cover in detail all aspects specific to the Gameboy Color version.

Please note that due to the timescales involved this document is a working design document for programmers and artists, rather than a sales or marketing document. As such the document covers the actual development specifications of the game without padding. The intention of this document is to provide development guidelines for programmers and artists at Digital Creations Studios, and clear guidelines to Acclaim on what will be produced in the final game. This differs from a normal game design document which is produced in 3 months before the programming commences, and which fulfils a different purpose.

This document also contains the true milestone schedule which will apply for the duration of the game development.

Due to the short timescale available to develop ReVolt for the Gameboy Color, any changes that are required to the specifications (other than bugs, and minor alterations) that fall outside what is contained within this document must be agreed in writing by Digital Creations Studios.

3. Game Specifications

The game is essentially a conversion of the PC/PSX/N64 versions of ReVolt. It features all the cars, tracks, weapons and gameplay of its console predecessors, but is playable only as a one player game. It is the intention of DC Studios to make the game also a two player game on two machines connected by link cable, however this is not in the game specification due to the time constraints required. DC Studios will provide this if there is time to do so, without risking the delivery date..

ReVolt is a fast-paced and visually attractive racing game that employs the added dynamic of small R/C cars racing in a comparatively oversized real world environment.

Whilst it is possible to create true 3D graphics on the Gameboy Color it is not possible to use them in a game of this style, especially given that the cars in ReVolt have complete 360 degree movement around the game environment. The Gameboy version will therefore use a pseudo-3D environment viewed from a top-down perspective.

The cars themselves will be modelled on real physics and will give a superior racing experience, with jumps, crashes, friction, power slides, skidding etc. all enabled in this model.

ReVolt is a highly colourful and visually very impressive game, with great music and sound effects.

*The Gameboy Color version of ReVolt will feature 4 cars instead of 8. This is for many reasons but the biggest being playability. There is not the room on the screen for 8, the processing time for 8 is much larger, the graphical overhead for 8 would be far greater and the tracks would be very difficult to negotiate in places with too many cars. We are using 24*24 pixel cars to give better definition and to have 8 would just ruin the game.*

The game will also not feature mirrored tracks due to the requirement to store a complete new set of graphics to do this. We will however allow the player to play a track in reverse order.

3.1 Tracks

- 14 tracks built from 7 different environments (2 per environment except 1 Botanical Gardens and 1 Stunt Arena). Each track will be built in a pseudo 3D environment allowing the cars to go over bridges or kerbs, go under bridges or through tunnels. When passing through a tunnel a pulsing outline of the car will show over the tunnel to guide the player.

The tracks will all be viewed as a pseudo-3D environment by using a similar graphical look to Micro Machines 1 & 2 albeit with a more 3D angle to the background. The Gameboy's small viewing area will partially compensate for the loss of the dynamic that the 3D versions of the game enjoyed, (i.e. an inability to see around corners... which is obviously possible in 2D). At speeds approaching 60 frames gameplay will be fast enough to recreate the hectic feeling of the 3D version.

There are a total of 7 environments to be experienced in the game:

Toy World, Toytanic, Museum, Neighbourhood, Supermarket, Botanical Gardens, Ghost Town

and each environment is comprised of 2 levels.

A full tracklist, and the object and weaponry instances for each, follows:

Toys In The Hood 1

Length: 747 metres

Difficulty: Easy

Objects :

Strobe (coloured yellow, down tunnel)

Sprinkler

Sprinkler Hose

Basketball

Cone

Pick-Ups

Local Sounds (dog bark linked to certain houses, sprinkler noise)

Secret Star



Map Key: Pickups=yellow, cones=red, basketball & hoop=purple, car=blue, sprinkler & hose=green, ramp jump=orange

Secret Star=the pickup above ramp that is propped on car

Collision characters:

Pavement Kerb Ramp

Pavement Kerbstone Block (lines road at level 0, allows transition from level 1 to level 0 only)

Plank of Wood (allows transition over car, possible Secret Star, and lands on level 1 pavement, plank cannot be driven under)

Tunnel Entrance (allows transition from level 0 to tunnel)

Tunnel Exit (allows transition from tunnel to level 0)

Earthworks High Up (transition from tunnel to level 1)

Earthworks End (transition from tunnel to level 0)

Earthworks Down (transition from level 1 to level 0)

Roadworks Barrier Horizontal (This is driven under at level 0 and level 1)

Roadworks Barrier Vertical Support

JCB Bucket

JCB Bucket Arm (This is driven under)

Fence (lines both road at level 0 and pavement at level 1)

Basketball

Car Tyre

Level 0 characters:

Road

Manhole cover

Traffic Cone

Car Parked half on road half on pavement (can be driven under on level 0)

Level 1 character:

Pavement

Grass

Driveway

Skateboard propped up on end

Earthworks

Brick verandah floor

Trash Bin

Basketball Hoop (attached to front of house above garage door, driven under on level 1)

House Doorway

House Window

Car Parked half on road half on pavement (can be driven under on level 1)

Water tap

Garden Hose

Water Sprinkler

Car Parked Side-On on Driveway

Tree Trunk

Tree Braches/Leaves

Brick Wall of House

Supermarket 2

Length: 301 metres

Difficulty: Easy

Objects:

Bottle

Packet

Pick-Ups

Local Sound

Secret Star



Map Key: Pickups=yellow, Secret Star=red

Collision Characters

Shelving with products

Stairs Leading Up

Internal Automatic Sliding Doors

Cardboard Product Packing Boxes

Hanging Meat Carcasses (can drive under)

Air conditioning ducts (can drive under)

Air conditioning fans (can drive under)

Air conditioning tunnels (can drive under)

Ladders leading to high shelves

Cardboard boxes of freezer products

Big Heavy Thick Freezer Doors

No Entry Sign Check Out Barriers (can be driven under)

Conveyer Belt Ramp (transition up from level 0 shiny tile floor to level 1 conveyer belt)

Conveyer Belt End (drops down in a jump (so jump physics apply) from conveyer belt level 1 to shiny tile floor level 0)
Supermarket Trolleys on Wheels
External Automatic Sliding Doors
Giant Helicopter Children's Toy Ride

Level 0 Characters

Giant Freezer Cabinets (Vertical) With Glass Fronts
Shiny Tiled Supermarket Floor
Icy Freezer Room Floor
Ventilation grilles in walls
Delicatessen Food Counter
Fruit & Confectionary Shelves (with overhang that can be driven under)
Check Out Aisles & Tills
Asphalt Walkway Exit and Entrance Path
Low External Brick Wall By Car Park
Steps up and middle metal pole railing
Empty Shelving facing left
Empty Shelving facing right
Empty Shelving facing up
Empty Shelving facing down
Sparsely Stocked Shelving facing left
Sparsely Stocked Shelving facing right
Sparsely Stocked Shelving facing up
Sparsely Stocked Shelving facing down
Fully Stocked Shelving facing left
Fully Stocked Shelving facing right
Fully Stocked Shelving facing up
Fully Stocked Shelving facing down
Rounded End Shelving Unit facing left
Rounded End Shelving Unit facing right
Rounded End Shelving Unit facing up
Rounded End Shelving Unit facing down

Level 1 characters

Conveyer Belt by check out

Museum 2

Length: 600 metres

Difficulty: Easy

Objects:

Spinning Barrel

Planets

Strobe

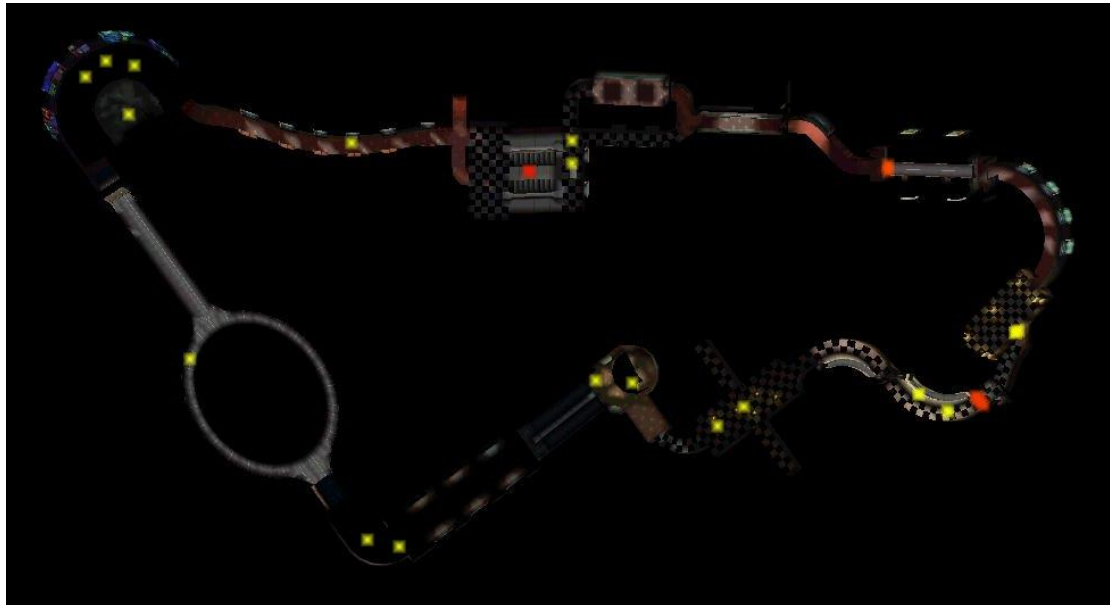
Spaceman

Laser

Pick-Ups

Local Sound

Secret Star



Map Key: Pickups=yellow, Secret Star=red

Collision Characters

Start Sign - in the style of a museum sign - 'Revolt Museum START'

Grecian Urn Style Stone Balcony Rails

Stone Balcony Barrier (can drive under)

Laser Alarm Beam Emitters

Laser Alarm Beams that trigger alarm ring when broken, car actually stops beam

Triple Level Laser Alarm Beam Emitters

Triple Level Laser Alarm Beams that trigger alarm ring when broken, car actually stops beam

Marble incline (up to Egyptian exhibits on Level 1)

Dinosaur Legs

Dinosaur Body (can drive under)

Up Escalator

Down Escalator

Metal Catwalk Fencing Gap (can drive under high bar, leads to Lunar Surface

Flooring Level 1)

Slippery Floor Sign (angled so that it acts as Jump into the air with normal landing physics back onto Shiny parquet flooring)

Mop in Bucket

Slipper Floor Sign (not a jump)

Stairs (can go down but not up)

Stone Disabled Ramps (can go up and down)

Level 0 Characters

Plain Carpeted Floor

Transparent Glass Floor Walkway

Transparent Glass Floor Walkway Tray Sides

Stone Clad Walls

Stained Glass Windows

Shiny Parquet Flooring

Museum Exhibits

Guide Rail Posts

Guide Rail Ropes (can drive under)

Wooden Bench

Fire Extinguisher in alcove

Floor Lights

Fossil of Snail Patterned Carpeted Floor

Tall Ashtray/Bin

Rocket Models

Robot on Pedestal

Illuminated Space theme exhibits on walls

Metal and Glass Transparent Sci-Fi Walkway Around 3D Planetarium

Large Glowing Sun

Other Solar System planets

Revolving Space Station Tunnel

Illuminated Astronomy Wall Screens

Metal Catwalk Fencing

Wooden Panelling Walls

Exhibit Alcoves in Wooden Panelling walls exhibiting (Anubis, Shield, Dinosaur Skull etc basically objects repeated from elsewhere in museum)

Level 1 Characters

Marble Raised Section Behind Glass for Egyptian Exhibits right hand side

Anubis on right

Sarcophagus on right

Egyptian Urn on right

Scarab Beetle on right

Marble Raised Section Behind Glass for Egyptian Exhibits left hand side

Anubis on left

Swords on left

Round Shield on left

Kite Shield on left

Lunar Surface sandy/dusty flooring

Apollo Lunar Lander Exhibit

Botanical Garden

Length: 323 metres

Difficulty: Easy

Objects:

Sprinkler

Sprinkler Hose

Stream

Water Ripples

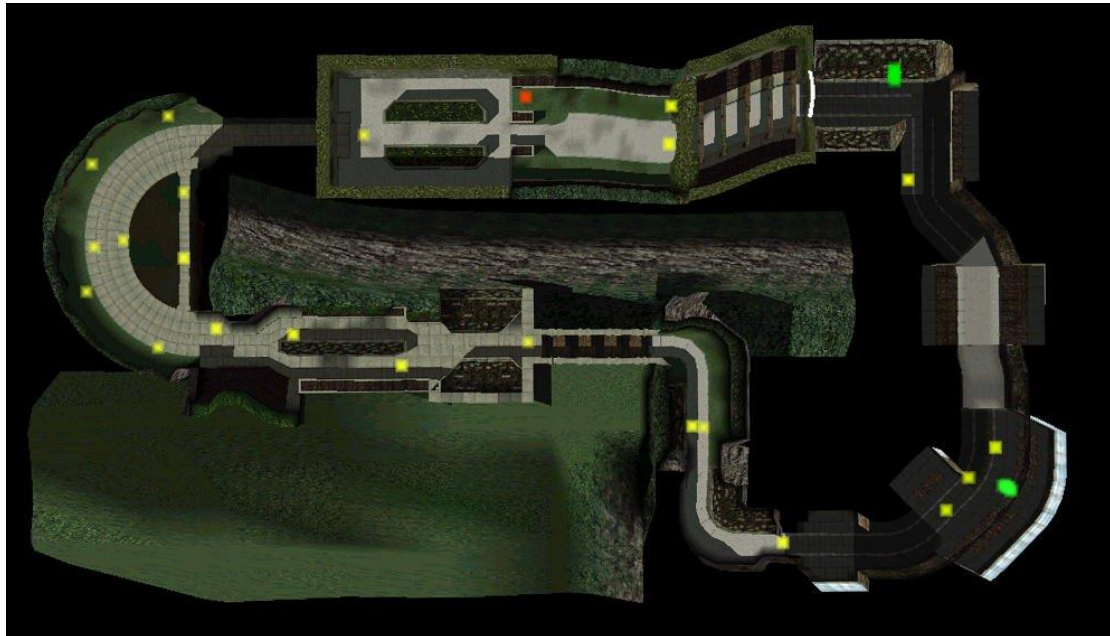
Dolphin

Garden Fog

Pick-Ups

Local Sound

Secret Star



Map Key: Pickups=yellow, Secret Star=red, Sprinklers=green

Collision Characters

Plant fronds (can drive under)

Tree Branches & Leaves (can drive under)

Shallow ramp for leaving water

Dolphin

Stone Ballustrade ramp (can use to make jump)

Gravel incline

Stone crossbeams (can drive under)

Stone archway (can drive under)

'Side Gate' stonewall feature

Wayer sprinkler

Stone support pillars

Level 0 Characters

Tight Packed Gravel Floor
Shiny Marble Floor
Drainage Grille Floor
Grass
Topiary hedge

Level 1 Characters

Stone pathway raised around water feature
Raised feature between twin water feature

Toy World 1

Length: 354 metres

Difficulty: Medium

Objects:

Beach Ball

Plane

Copter

Dragon

Water

Boat

Radar

Balloon

Horse

Carbox

ABC Block

Water Box

Pick-Ups

Local Sound

Secret Star



Map Key: Pickups=yellow, Secret Star=red,

Collision Characters

Arnco style crash barriers

Carpeted steps

Piano chicane

Dinosaur (can drive under)
Dinosaur feet

Level 0 Characters

Shiny polished wooden floor
Rubberised playmat floor 'town' play area
Carpet
Soccer pitch floor
Stadium crowd

Level 1 Characters

'Cliff edge' road

Ghost Town 1

Length: 324 metres

Difficulty: Medium

Objects:

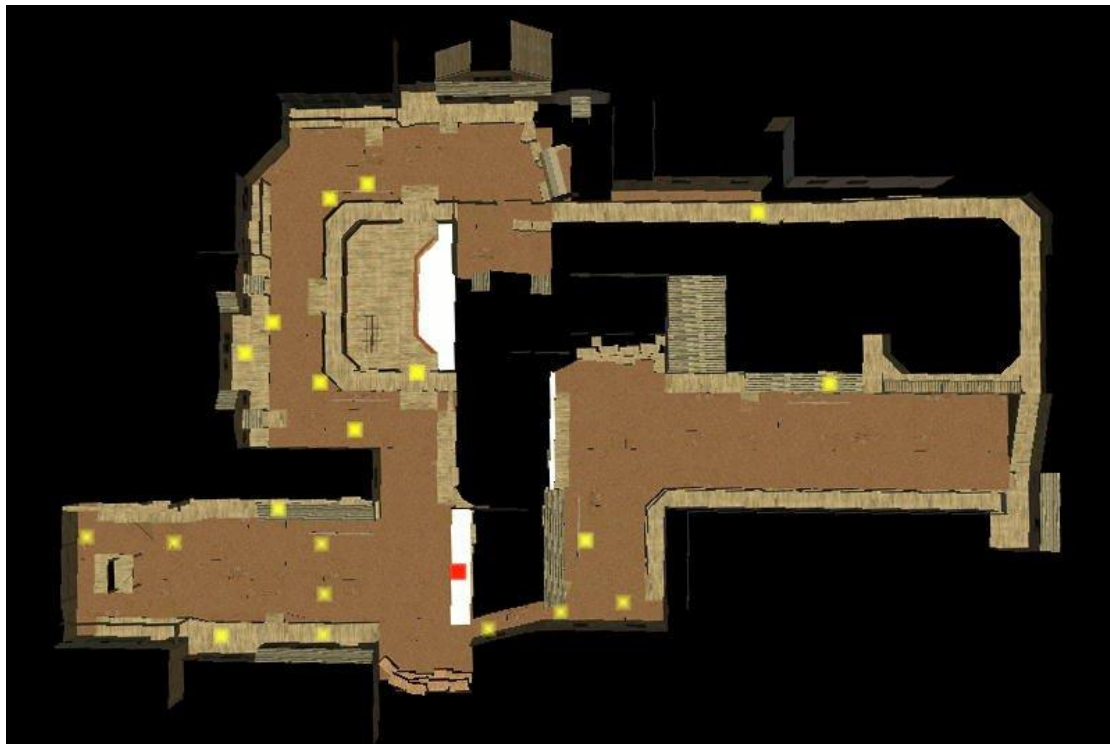
Tumbleweed

Gari Flag

Pick-Ups

Local Sound (ringing bell, coyote howl, shrill bird)

Secret Star



Map Key: Pickups=yellow, Secret Star=red

Collision Characters

Wooden ramp up

Earth incline up

Saloon chair

Saloon table

Doorway

Closed door

Covered walkways (can drive under)

Saloon sign (can drive under)

Wooden barrel

Explosives crates

Pennants on string

Start sign on gibbet

US Flags on poles outside Sheriff's (can drive under)

Rocking chair

Level 0 Characters

Dirt earth
Wooden floor
Horse tie rail
Gibbet (can drive under)
Wanted poster
Covered wagon
High wooden fencing

Level 1 Characters

Wooden Roof
Balcony
Balcony railing

Toy World 2

Length: 444 metres

Difficulty: Medium

Objects:

Beach Ball

Train

Carbox

Pick-Ups

Local Sound

Secret Star



Map Key: Pickups=yellow, Secret Star=red, Beachball=blue

Collision Characters

Train (can drive under)

Jump ramps (carry car over other track to same level 1, or deposit car on level 0)

Arnco style crash barriers

Carpeted steps

Brightly coloured ramp

Level 0 Characters

Shiny glass floor

Shiny polished Wooden floor

Very Shiny Bowling Alley style floor

Soccer pitch 'felt' floor

Stone floor

*Rubberised playmat floor 'town' play area
Carpet
Stadium crowd*

Level 1 Characters

Toys In The Hood 2

Length: 592 metres

Difficulty: Hard

Objects:

Sprinkler

Sprinkler Hose

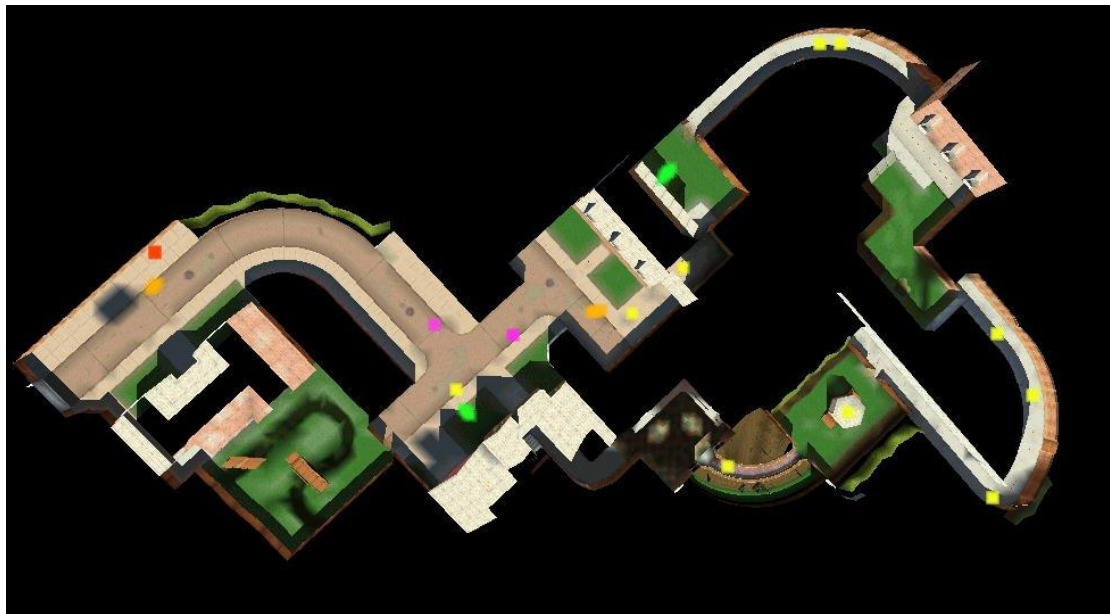
Stream

Cone

Pick-Ups

Local Sound

Secret Star



Map Key: Pickups=yellow, Secret Star=red, Cones=purple, Sprinklers=green, ramp jumps=orange

Collision Characters

Start Sign – Underpants reading 'Start' on washing line over road level 0 (can drive under)

Start Sign Posts – Red Circular Traffic Sign Posts with 'Start Line' on them

Pavement Ramp

Open Doorway of House

Indoor Stairs Going up

Skateboard Propped up on end

Ramp out of Kitchen to Garden Path (transition from level 1 shiny kitchen floor to level 0 brick garden path)

Ramp up to summerhouse in garden (transition from level 0 grass up to level 1 wooden floor)

Ramp down out of summerhouse in garden (transition from level 1 wooden floor to level 0 grass)

Trash Bin

Trash Bin Lid

Sunflowers

Tree Trunk

Concrete Ramp Up to Concrete Alleyway

Level 0 Characters

Road
Manhole Cover
Brick Garden Path in back garden out of kitchen
Grass in back garden
Concrete Back Alley
Wooden Garden Fence
Bent Wooden Garden Fence Panel
Wooden Gate in Wooden Garden Fence
Depression in Ground in Garden
Flower Beds around Sunflowers
Water Tap
Garden Hose
Water Sprinkler
Stream bed in back garden
Topiary hedge in gardens

Level 1 Characters

Path to Door
Brick entry floor area outside front door
Internal Doors of house (closed)
Shiny Kitchen Floor
Kitchen Cabinets & Cupboards
Stools
Kitchen Table
French Doors out of Kitchen
Wooden Floor inside summerhouse in garden
Water Tap
Garden Hose
Water Sprinkler
Closed External House Door
Arched wooden bridge in garden over stream
Flat wooden plank bridge over stream in garden
Dog bowls (water & food) in kitchen

Toytnic 1

Length: 742 metres

Difficulty: Hard

Objects:

Beach Ball

Water

Stream

Lantern

Lilo

Ship Light

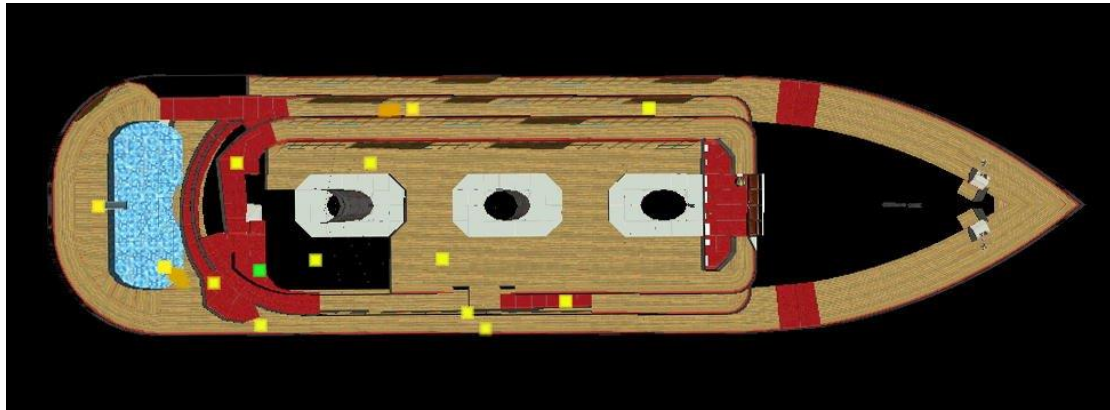
Water Box (Ocean)

Water Ripples

Pick-Ups

Local Sound (Seagulls, Engine noise)

Secret Star



Map Key: Pickups=yellow, Secret Star=green, jump ramps=orange

Collision Characters

SS Toytnic safety ring (can drive under)

Suspended lifeboats (can drive under)

Covered passageway in front of cabins (can drive under)

Access points to covered passageway in front of cabins

Low wooden lounging recliners

Wooden jump ramp by pool

Ramp up to diving board

Pool water

Studded grip Metal ramp

Captain's Bridge (can drive inside)

Anchor Chains

Bulwarks

Level 0 Characters

Wooden deck floor

Studded grip metal floor

Closed Wooden doors

Closed metal doors

Ventilation funnels
Smokestack funnels
Captain's Bridge Dials

Level 1 Characters

Diving board

Museum 1

Length: 668 metres

Difficulty: Hard

Objects:

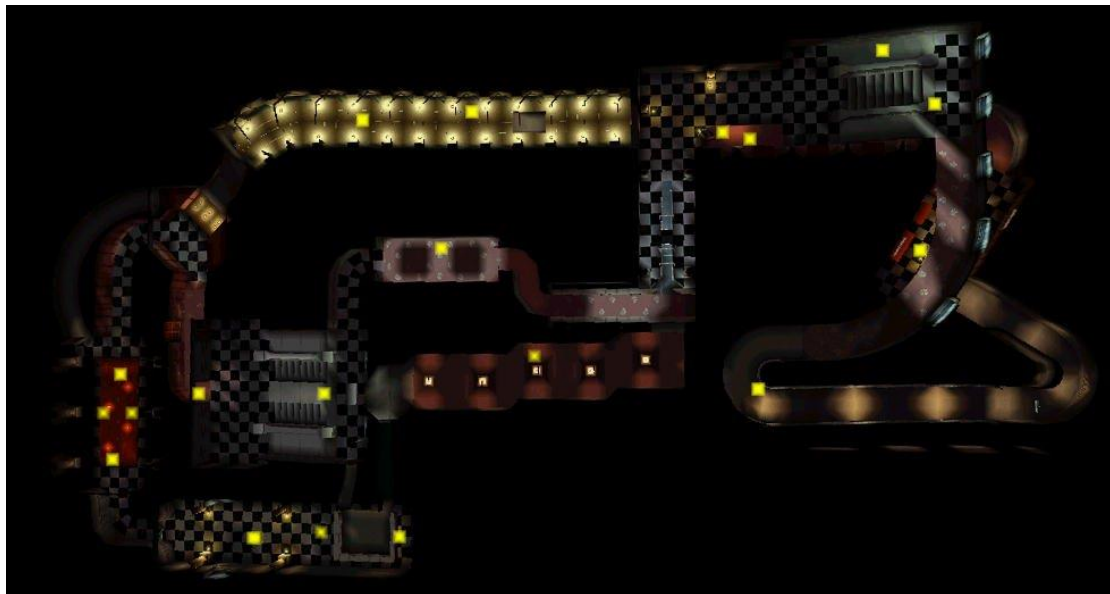
Strobe

Spark Generator

Pick-Ups

Local Sound

Secret Star



Map Key: Pickups=yellow, Secret Star=red

Collision Characters

Start Sign - in the style of a museum sign - 'Revolt Museum START'

Grecian Urn Style Stone Balcony Rails

Stone Balcony Barrier (can drive under)

Dinosaur Legs

Dinosaur Body (can drive under)

Baggage handling conveyor belt jump

Metal Catwalk Fencing Gap (can drive under high bar, leads to Lunar Surface

Flooring Level 1)

Slippery Floor Sign (angled so that it acts as Jump into the air with normal landing physics back onto Shiny parquet flooring)

Mop in Bucket

Slipper Floor Sign (not a jump)

Stairs (can go down but not up)

Stone Disabled Ramps (can go up and down)

Level 0 Characters

Plain Carpeted Floor

Transparent Glass Floor Walkway

Transparent Glass Floor Walkway Tray Sides
Stone Clad Walls
Stained Glass Windows
Shiny Parquet Flooring
Museum Exhibits
U-turn sign
Guide Rail Posts
Guide Rail Ropes (can drive under)
Wooden Bench
Fire Extinguisher in alcove
Floor Lights
Fossil of Snail Patterned Carpeted Floor
Tall Ashtray/Bin
Metal Catwalk Fencing
Wooden Panelling Walls

Level 1 Characters

Baggage handler conveyor belt
Transparent Glass Cabinet Roof
Red Carpeted Dias that dinosaur stands on

Supermarket 1

Length: 502 metres

Difficulty: Extreme

Objects:

Trolley

Slider

Packet

Fog Box (atmosphere)

Pick-Ups

Local Sound

Secret Star



Map Key: Pickups=yellow, Secret Star=red

Collision Characters

Shelving with products

Stairs Leading Up

Internal Automatic Sliding Doors

Cardboard Product Packing Boxes
Hanging Meat Carcasses (can drive under)
Air conditioning ducts (can drive under)
Air conditioning fans (can drive under)
Air conditioning tunnels (can drive under)
Ladders leading to high shelves
Cardboard boxes of freezer products
Big Heavy Thick Freezer Doors
No Entry Sign Check Out Barriers (can be driven under)
Conveyer Belt Ramp (transition up from level 0 shiny tile floor to level 1 conveyer belt)
Conveyer Belt End (drops down in a jump (so jump physics apply) from conveyer belt level 1 to shiny tile floor level 0)
Supermarket Trolleys on Wheels
Joby's Hot Mince Packets
Bottle
Ventilator Grille
Almost lowered Steel Shutters

Level 0 Characters

Giant Freezer Cabinets (Vertical) With Glass Fronts
Shiny Tiled Supermarket Floor
Icy Freezer Room Floor
Ventilation grilles in walls
Delicatessen Food Counter
Fruit & Confectionary Shelves (with overhang that can be driven under)
Check Out Aisles & Tills
Asphalt Walkway Exit and Entrance Path
Low External Brick Wall By Car Park
Steps up and middle metal pole railing
Empty Shelving facing left
Empty Shelving facing right
Empty Shelving facing up
Empty Shelving facing down
Sparsely Stocked Shelving facing left
Sparsely Stocked Shelving facing right
Sparsely Stocked Shelving facing up
Sparsely Stocked Shelving facing down
Fully Stocked Shelving facing left
Fully Stocked Shelving facing right
Fully Stocked Shelving facing up
Fully Stocked Shelving facing down
Rounded End Shelving Unit facing left
Rounded End Shelving Unit facing right
Rounded End Shelving Unit facing up
Rounded End Shelving Unit facing down

Level 1 characters

Conveyer Belt by check out
Packing Area Walkway

Ghost Town 2

Length: 490 metres

Difficulty: Extreme

Objects:

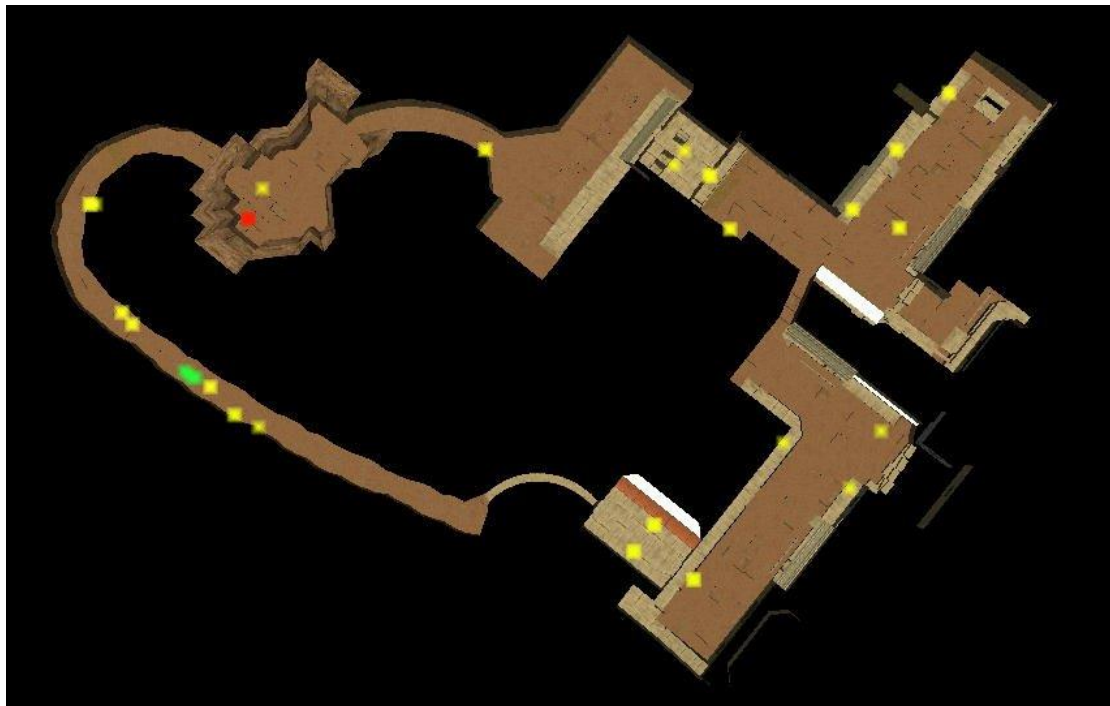
Tumbleweed

Gari Flag

Pick-Ups

Local Sound (Rattlesnake, Dripping Water in Mine, Shrill Bird, Howling Coyote)

Secret Star



Map Key: Pickups=yellow, Secret Star=red, Ramp jumps=green

Collision Characters

Wooden ramp up

Earth incline up

Saloon chair

Saloon table

Doorway

Closed door

Covered walkways (can drive under)

Saloon sign (can drive under)

Wooden barrel

Explosives crates

Pennants on string

Start sign on gibbet

US Flags on poles outside Sheriff's (can drive under)

Rocking chair

Mine shaft supports

Railway Sleepers

Metal Rails
Mining Wagons
Mine tunnel (best to leave this exposed not covered)

Level 0 Characters

Dirt earth
Wooden floor
Horse tie rail
Gibbet (can drive under)
Wanted poster
Covered wagon
High wooden fencing
Mine floor

Level 1 Characters

Wooden Roof
Balcony
Balcony railing

Toytanic 2

Length: 742 metres

Difficulty: Extreme

Objects:

Beach Ball

Water

Stream

Lantern

Lilo

Rain

Lightning

Ship Light

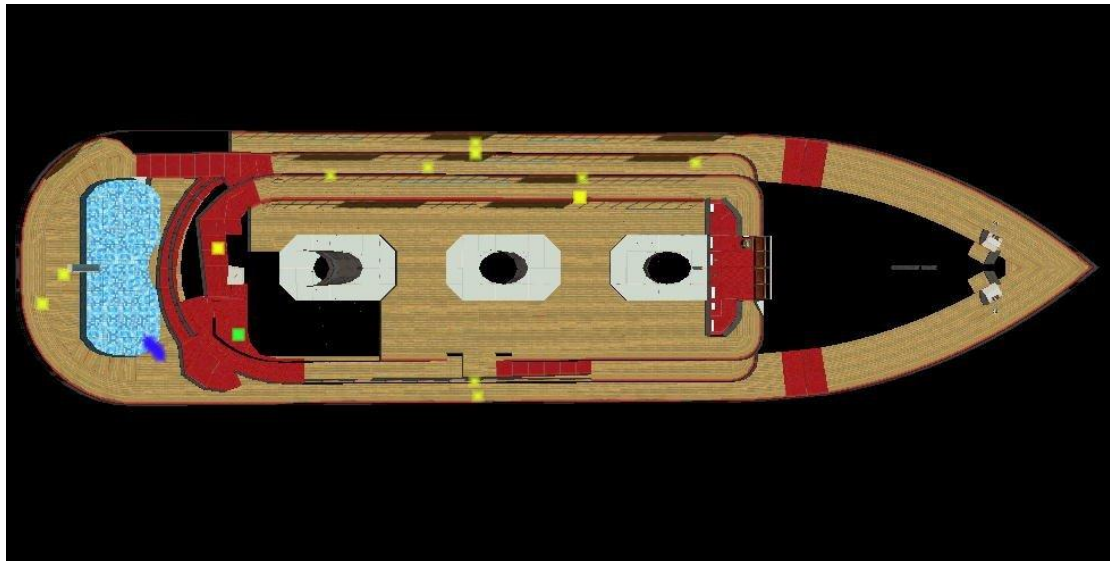
Water Box (Ocean)

Water Ripples

Pick-Ups

Local Sound

Secret Star



Map Key: Pickups=yellow, Secret Star=green, ramp jumps=blue

Collision Characters

SS Toytanic safety ring (can drive under)

Suspended lifeboats (can drive under)

Covered passageway in front of cabins (can drive under)

Access points to covered passageway in front of cabins

Low wooden lounging recliners

Wooden jump ramp by pool

Ramp up to diving board

Pool water

Studded grip Metal ramp

Captain's Bridge (can drive inside)

Anchor Chains

Bulwarks

Level 0 Characters

*Wooden deck floor
Studded grip metal floor
Closed Wooden doors
Closed metal doors
Ventilation funnels
Smokestack funnels
Captain's Bridge Dials*

Level 1 Characters

Diving board

There will also be a Stunt Arena and some skill tests to accumulate stars to unlock secrets and hidden objects. The Stunt Arena tests the player's ability to make high jumps with high angle ramps, long jumps with lower angled ramps, difficult jumps with curved approach ramps, treats the player to a skateboard/BMX style 'bowl' to perform tricks in and flick up off the highest point of the turn and get a secret star, and a loop-the-loop as the ultimate test.

Reversed tracks are also available to the player. After he finds the secret star on each level the reversed track becomes available. Winning a track makes the reversed track available. Tracks revealed in this way become actively selectable from the Select Track menu just like any other track except they have R after the track name to indicate Reversed.

3.2 Maps

One of the notable features of the Gameboy version of ReVolt is that in order to maintain the size ratio of the R/C cars to the real world environment, the maps will be very large in comparison to the size of the car.

One of the notable features of the Gameboy version of ReVolt is that in order to maintain the size ratio of the R/C cars to the real world environment, the maps will be very large in comparison to the size of the car.

The original 3D versions of Re-Volt placed a lot of emphasis on exploring the worlds in order to conquer the game. By using the 3D perspective to conceal oncoming track and hazards etc and by this 3D view also being so low down in the game world (remote control cars in a real life world) the original design possessed a novel and exhilarating twist to the race game genre. When converting such a game to Gameboy, where the 3D perspective is converted to effectively 2D, and this feature is partly lost, the conversion must provide something else extra. The track maps therefore include some hidden features to discover, increased numbers of shortcuts, more multiple options during the race etc.

Multiple Options - there are an increased number of game elements for the player to be engaged with to keep him busy now that the view is no longer 3D. The idea of multiple options is to provide the player with dilemma and challenges. Examples are:

- *weapons pick ups available shortly before a bottleneck that will force cars close together in a high risk situation*
- *a predetermined speed up pick up next to a weapon pick up but arranged so that only one can be picked up, so that two cars arriving at the same spot have decisions to make - speed up to get away and risk the guy behind getting the weapon and shooting you, or go for the weapon and risk the other guy getting the speed up and you missing with the weapon and him getting away from you*
- *a shortcut with hazards offering a big reward in return for high risk taking, and in order to be really effective, the AI cars need their paths to take them down these shortcuts reasonably often to make the player need to do the same to stay in contention sometimes*
- *normal bottlenecks*
- *unavoidable array of hazards, arranged so that you have to suffer one of them, but some cars will have pick ups that will let them shrug off the effects more easily, giving the player something to think about*

Collision Detection Routines

The collision detection routine will use techniques to speed up the determination of which character has been hit.

The character set will be split into sections to allow the collision routine to only test for a range saving substantial time. If the answer to that test is yes only then will the code test any further. This will allow detailed collision checking but without a time penalty. Only full checking will happen when a collision has actually happened.

As the game has technically a multi-level playing field, something that we cannot implement readily we will simulate this in the character data. The character data will be split into level 0 data and level 1 data. This allows the code to know whether it is to jump down to level 0 or up to level 1 when a collision character that means level intersection is hit.

Example -

*Chars 0-50 are level 0 collision characters
Chars 51-300 are level 0 non-collision characters
Chars 301-450 are level 1 non-collision characters
Chars 451-511 are level 1 collision chars.*

This would need careful map design around the boundaries. We would not allow the player to drive under an object that he could go over such as the plank over the car. He could drive over it or under the car but not under the plank itself. This would stop us having to use complex priority checking which would ruin the game by slowing it down.

3.3 Cars

There are the 28 cars plus 6 hidden cars as in the original.

Cars Initially Available At Game Start

There are 10 cars initially available at game start:

RC Bandit
Dust Mite
Phat Slug
Col Moss
Harvester
Dr Grudge
Volken Turbo
Sprinter XL
RC San
Candy Pebbles

Cars Available During Game

A further 24 cars become available during the remainder of the game:

Genghis Kar
Aquasonic
Mouse
Evil Weasel
Panga TC
R6 Turbo
NY 54
Bertha Ballistics
Pest Control
Adeon
Pole Poz
Zipper
Rotor
Cougar
Humma
Toyeca
AMW
Panga

These last six only being available through cheat codes:

Clockwork
Clockwork Too
Clockwork Tree
Clockwork
Probe UFO
Mystery

Car Sprites

The full list of cars, their instances and their parameters, will follow here:

RC Bandit



Class: Electric
Rating: Rookie
Speed: XXXXXX
Acc: XXXXXXXXXXXX
Weight: XXXX
Trans: 4WD

Dust Mite



Class: Electric
Rating: Rookie
Speed: XXXXX
Acc: XXXXXXXXXXXX

Weight:XXXX
Trans: 4WD

Phat Slug



Class: Electric
Rating: Rookie
Speed:XXXXX
Acc: XXX
Weight:XXXXXXXXXXXX
Trans: FWD

Col Moss



Class: Electric
Rating: Rookie
Speed:XXXXX
Acc: XXXXXXXX
Weight:XXXXX
Trans: 4WD

Harvester



Class: Electric
Rating: Rookie
Speed: XXX
Acc: XXXXXXXXXXXX
Weight: XXXXXX
Trans: 4WD

Dr Grudge



Class: Electric
Rating: Rookie
Speed: XXXX
Acc: XXXXXXXXXXXX
Weight: XXXX
Trans: 4WD

Volken Turbo

Class: Electric
Rating: Rookie
Speed: XXX
Acc: XXXXXXXXXXXX
Weight: XXXXX
Trans: RWD

Sprinter XL



Class: Electric
Rating: Rookie
Speed: XXXX
Acc: XXXXXXXXXXXXX
Weight: XX
Trans: 4WD

RC San



Class: Electric

Rating: Amateur
Speed: XXXXX
Acc: XXXXXXXXXXXX
Weight: XX
Trans: 4WD

Candy Pebbles



Class: Electric
Rating: Amateur
Speed: XXXXXX
Acc: XXXXX
Weight: XXX
Trans: FWD

Genghis Kar



Class: Electric
Rating: Amateur
Speed: XXXXXXXX

Acc: XXXX
Weight:XXXXXXXXXX
Trans: 4WD

Aquasonic



Class: Glow
Rating: Amateur
Speed: XXXXXXXX
Acc: XXXXXXXXXXXX
Weight: XXXXXX
Trans: FWD

Mouse



Class: Electric
Rating: Amateur
Speed: XXXXXX
Acc: XXXXXXXXXXXX
Weight: XXXXXXXXXXXX
Trans: 4WD

Evil Weasel



Class: Electric
Rating: Advanced
Speed: XXXXXXXXX
Acc: XXXXX
Weight: XXXX
Trans: 4WD

Panga TC



Class: Glow
Rating: Advanced
Speed: XXXXXXXXX
Acc: XXXXXX
Weight: XXXXXXXX
Trans: FWD

R6 Turbo



Class: Glow
Rating: Advanced
Speed: XXXXXXXXX
Acc: XXXXXXXXX
Weight: X
Trans: RWD

NY 54



Class: Glow
Rating: Advanced
Speed: XXXXXXX
Acc: XXX
Weight: XXXXX
Trans: FWD

Bertha Ballistics



Class: Electric
Rating: Advanced
Speed: XXXXXX
Acc: XXXXXXX
Weight: XXXXXXXXXXXXXXXX
Trans: 4WD

Pest Control



Class: Glow
Rating: Semi-Pro
Speed: XXXXXXXXXXXXXXXX
Acc: X
Weight: XXXXXXXX
Trans: FWD

Adeon



Class: Glow
Rating: Semi-Pro
Speed: XXXXXXXX
Acc: XXXXXXXXXX
Weight: XXX
Trans: 4WD

Pole Poz



Class: Electric
Rating: Semi-Pro
Speed: XXXXXXXX
Acc: XXXXXXXX
Weight: XXXXX
Trans: 4WD

Zipper



Class: Glow
Rating: Semi-Pro
Speed: XXXXXXXXX
Acc: XXXXXXXXX
Weight: XXXX
Trans: 4WD

Rotor



Class: Electric
Rating: Semi-Pro
Speed: XXXXXXXXXXXX
Acc: XXXX
Weight: XXXXXXXXXXXXX
Trans: 4WD

Cougar



Class: Glow
Rating: Pro
Speed:XXXXXXXXXX
Acc: XXXXX
Weight:XXXXXX
Trans: RWD

Humma



Class: Glow
Rating: Pro
Speed:XXXXXXXXXX
Acc: XXXXXXXXXXXX
Weight:XXXXXX
Trans: 4WD

Toyeca



Class: Glow
Rating: Pro
Speed: XXXXXXXXXXXX
Acc: XXXXXXXXXXXX
Weight: XXXXXXXX
Trans: 4WD

AMW



Class: Glow
Rating: Pro
Speed: XXXXXXXXXXXXXXXX
Acc: XXXXXXXXXXXX
Weight: XX
Trans: FWD

Panga



Class: Glow

Rating: Pro

Speed: ???

Acc: ???

Weight: ???

Trans: 4WD

Clockwork

Class: Electric

Rating: Pro

Speed: ???

Acc: ???

Weight: ???

Trans: 4WD

Clockwork Too

Class: Electric

Rating: Pro

Speed: ???

Acc: ???

Weight: ???

Trans: 4WD

Clockwork Tree

Class: Electric

Rating: Pro

Speed: ???

Acc: ???

Weight: ???

Trans: 4WD

Clockwork

Class: Electric

Rating: Pro
Speed: ???
Acc: ???
Weight: ???
Trans: 4WD
Probe UFO

Class: Special
Rating: Pro
Speed: ???
Acc: ???
Weight: ???
Trans: 4WD

Mystery

Class: Electric
Rating: Amateur
Speed: ???
Acc: ???
Weight: ???
Trans: FWD

3.4 Weaponry

All weapons are available to the player in the form of pick-ups which are scattered around each of the tracks. Pick ups take the shape of a red and yellow spinning lightning bolt. Once collected, all the available weapons cycle round in the top-left corner of the screen until finally stopping randomly on the active weapon. Note that you can only carry one pick up at a time; you must use it before you will be able to pick up another one.

There are 10 different types of weapons available in the game.

All weapons are activated by the player, except for the bomb (see below) which is active instantly when collected.

Pick ups can be disabled from the front end. (see above for details).

A full list of weapons, their instances and their parameters, is as follows:

Shockwave

Description: A blue ball of electricity shoots from the front of the car, sending any cars in it's path flipping into the air.

Colours: Blue, White, Silver

Animation: Yes (trail, spark explosion)

Firework

Description: Fires a single rocket ahead of the car, continuing until it hits a wall or an opponent.

Colours: Red, Yellow, Black

Animation: Yes (exhaust, explosion)

Firework Pack of 3

Description: A pack of three rockets, which individually work as a Firework.

Colours: Red, Yellow, Black

Animation: Yes (exhaust, explosion)

Electro pulse

Description: An electric current hums over the car. When another car is in close proximity, a bolt connects the two and the victims' power is temporarily cut.

Colours: White, Silver, Blue

Animation: Yes (electricity around car, bolt connecting two close cars)

Bomb

Description: When the bomb is collected, the cars' antenna starts fizzing down like a fuse.

If the fuse reaches the bottom, then the car blows up, but if another car is touched before this then the bomb is transferred.

Colours: Black, Red, Yellow

Animation: Yes (fizzing antenna, explosion)

Oil slick

Description: A pool of oil is dropped on the floor directly behind the car. Each tire that is driven through this pool of oil temporarily loses traction.

Colours: Black

Animation: No (leaves oily tracks when driven through)

Water balloon Pack of 3

Description: A water filled balloon is hurled from the car. On impact with the floor (or opponent) it bursts, affecting the grip of all vehicles in the immediate vicinity.

Colours: Blue, White

Animation: Yes (water shower)

Ball Bearing

Description: An extremely heavy ball bearing is fired from the rear of the car, knocking anything in its path out the way.

Colours: Black, Silver

Animation: Yes (ball rolls)

Clone Pick Up

Description: When the clone pick up is activated a lightning bolt identical to a regular pick up is dropped on the floor. If you mistake it for a regular pick up and try to collect it, you'll soon learn of your error when it explodes on contact!

Colours: Red, Yellow

Animation: No (leaves regular yellow lightning bolt pickup behind)

Turbo battery

Description: Gives your car a temporary power boost of 10% to top speed when activated.

Colours: Red, White, Black

Animation: No

Secret Star/Global Pulse

Description: These secret stars are hidden on each track in Practice mode and also in the Stunt Arena. When collected, special things are unlocked in the game. In other race modes, the secret star works as the Global Pulse weapon. The frequency of this pick up occurring is low, but when you pick it up and activate it you rob all other cars of power, making it a great catch up device. You will temporarily gain advantage as the opponents vehicles will lose power.

Colours: Yellow

Animation: Yes (screen colours change during power drain)

Weapon Sprites

3.5 Objects

An objects list in Excel file format accompanies this document, listing game objects, their instances and the tracks they appear on, their parameters, and any associated SFX and animations – all taken from the PC version of the game. This may help coders and artists convert parameters.

Object Effects

Shiny Floors

As found in kitchens, the museum's parquet flooring etc. A very low-friction surface giving little traction to wheels on its surface. When calculating acceleration on shiny floor surfaces, physics code will be favouring heavier cars that generate their own traction or 4WD cars which have more transmission contact than 2WD cars. When cornering on shiny surfaces, physics code will favour the FWD cars that are able to skid around the corner and retain greater control.

Normal Floor

Standard amounts of friction and traction for all cars.

Porous, Fibrous, or High Friction Floors

These floors, such as carpeted floor and stone floor, provide the best friction and traction for R/C cars in ReVolt.

Gravel Floor

This kind of floor provides good friction and traction for acceleration calculations, (although attempting to accelerate too much will cause a loss of control into a skid or fishtail as gravel will 'give' under such pressure), but provide poorer friction and traction for cornering purposes.

Water

Water will occur on tracks either through rainy weather (e.g Toytanic 2) or from water sprinklers (e.g. Toys in the Hood). Its effect is to make the floor surface travelled over by the R/C cars much more slippery and give less friction and traction to the wheels that are in contact with the wet surface. This will lead to greater chance of loss of control and a skid or a fishtail.

Basketball

This object occurs near to the basketball hoop, and will bounce towards the R/C cars from the direction of the hoop after being thrown by the Object Thrower, colliding with any cars that it hits. It will behave with real physics from both these collisions and contact when bouncing on the ground, and gravity.

3.7 AI Pathfinding

The computer-controlled cars will negotiate the maps and obstacles by using pre-plotted paths around each map level, in combination with a certain amount of randomness/AI decision to choose between weighted possibilities at pre-set nodes around the paths.

There should be the most optimum path so that the AI can choose the correct way to navigate each track.

There should also be paths for each of the car ratings (Amateur, Pro etc) so that cars of that ability are more likely to choose that path.

There should also be paths for each of the user-set difficulty levels too, so that the car AI has another way to give the user an easier/harder game in addition to the inclusion/exclusion of physics, and the acceleration/deceleration of game speed and cars in the game.

At each node or several nodes, each car will make a random number check against its ability level + the difficulty level of the game to determine if it will follow a good or bad path.

4. Controls

All joystick controls will be user definable plus there will be three predefined pad choices giving the player the control system he wants for the game. These key choices will be saved with any password that is generated.

Predefined control selections

- 1) ACCELERATE - Up
REVERSE - Down
LEFT - Left
RIGHT - Right
FIRE WEAPON - A
REPOSITION CAR - B
PAUSE - Select, and brings up Options
- 2) ACCELERATE - A
REVERSE - Down
LEFT - Left
RIGHT - Right
FIRE WEAPON - Start
REPOSITION CAR - B
PAUSE - Select, and brings up Options
- 3) ACCELERATE - A
REVERSE - B
LEFT - Left
RIGHT - Right
FIRE WEAPON - Start
REPOSITION CAR - Down and Start
PAUSE - Select, and brings up Options

4.1 Special Moves

Racing Line

For the best times around the tracks, follow the racing line into the apex of every bend, curve and corner. The racing line should be built into the pathfinding nodes of the AI for each car track, along with poorer choices that are slower and less efficient so that the AI cars can make errors and also perform according to their difficulty rating, and the currently chosen difficulty level of the game.

Cornering

Brake in a straight line going into the corner and accelerate through and out of it to maintain best line and speed.

Power Slide

A very difficult manoeuvre which is made only slightly easier by attempting it in a RWD car and almost impossible in a 4WD, the handling characteristics of your car will really make a difference. Lightly tap the decelerate (reverse) direction to set the car sliding, and then turn the wheels in the direction you wish to turn. Then apply acceleration through the slide around the turn, keeping your wheels pointing in the desired direction of travel.

The most difficult but impressive power slide is landing in a power slide from a jump.

Jumps

Jumps are tricky at first but can be mastered with practice. Allow plenty of time to line the car up straight with the jump. The straighter your car is to the jump, the better your chances of taking off correctly and landing cleanly.

When landing from a jump keep your front wheels aligned with the direction you are travelling in until all four wheels have made contact with the floor. This is especially important for larger jumps over greater heights or greater distances.

Failure to align your car correctly in jumps will result in either a flawed take off which could turn your car over in mid-air or cause you to crash or spin out upon landing.

The laws of physics are such that the longer your car is in the air, the less time your engine has to keep you up to speed and your wheels to maintain speed through traction. You will initially travel faster through the air once your wheels have left the ground, but you will soon decelerate in flight with no other source of forward propulsion. Because of this, jumps often disadvantage you more than give you an advantage, so taking the longer but flatter route can be quicker than the shorter route that requires you to negotiate jumps, especially if you are driving a heavy car or one with poor acceleration.

Weaponry

It's there to give you an advantage, but the AI cars will be using it too and lining you up as a target! Clever use of weapons at the right moment can help you gain places or even the lead (especially forward firing weapons), and others will help you maintain it (especially rear-dropping weapons such as oil and the ball bearing).

Transmission Handling Characteristics

Front Wheel Drive

Centre of gravity of FWD cars is further forwards, and this is especially true when going around corners. FWD cars can handle tighter, the best analogy being fast driving around city streets. FWD cars enjoy superior control during skids and power slides on surfaces with little or no friction. It is easy to 'fishtail' the rear of the car (put the back out into the corner), but it is far more difficult to apply power again and retain control until you come out of the corner, so FWD cars are better at shorter corners where the time elapsed before power up again is shortest. As a two-wheel drive, FWD is better at handling loss of control than a 4WD.

Rear Wheel Drive

Centre of gravity of RWD cars is further back, especially going around corners. RWD cars are better at controlled skids on long sustained corners, the best analogy being fast driving around a race track. It is harder to fishtail the back of the car out into the corner as all transmission is coming from the back, but RWD cars are better at power sliding into corners and powering back out of them immediately, with no delay. As a two-wheel drive, RWD is better at handling loss of control than a 4WD.

Four Wheel Drive

4WD cars stick to the ground more, the four wheels driving creating greater traction giving better grip but also causing the car to handle slower. Another trade-off is that whilst gaining better grip it is harder to power slide and fishtail and retain control.

5. Cartridge

The game will be developed using an MBC 5 8 megabit cartridge. The game will use the features of the Gameboy Color to the full and as such the game will not work on the monochrome gameboy.

The game will not require any battery backed ram as saved setups will be provided by passwords.

6. Localisation support

We have been informed by Acclaim that no localisation is required and therefore the specification of the game will be in US English only.

*If this is to change we will need to know very **quickly** as the intention is to draw the menus in graphics, rather than printed text to give a better look.*

If we were to do a multilingual then we would design the menus so that they used printed text, rather than graphical text, so that we could print it through a multi language

7. Development Breakdown

The development process will be broken down into four distinct elements -

- 1. Development of the in game hardware code including all scrolls, sprite routines, masking routines, animation routines, fade routines etc.*
- 2. Development of the game engine including all car code, weapons systems, collision systems etc*
- 3. Artificial intelligence engine for the computer cars including path following code etc*
- 4. Menu routines*

8. Menu Subsystem

The menu code is written to make a modular menu engine allowing additions and changes to be made without major rewrites. This will be developed to use as little of bank 0 as possible to give greater freedom to the game.

The concept behind the Menu system is the 2D representation of the factory or production line where the cars are made. The menus are one large map which menu transitions scroll between.

The structure of the menus is laid out below, subject to approval.

Main Menu

Description: A 2D Toy Store looking down at the electronic stock ordering screen. On the screen there are options to START RACE, BEST TRIAL TIMES, PROGRESS TABLE, OPTIONS, QUIT

Controls: Use D-Pad to move between text options START RACE, BEST TRIAL TIMES, PROGRESS TABLE, OPTIONS, QUIT

Press the A button to select currently highlighted option.

Graphics: An electronic stock ordering screen. Text options for START RACE, BEST TRIAL TIMES, PROGRESS TABLE, OPTIONS, QUIT.

Highlight states for each of the text options.

Menu title graphic 'Re-Volt'

Animations: No.

Sound Effects: *to go here*

Select Race Menu

Description: *to go here*

Controls: *to go here* SINGLE RACE, CHAMPIONSHIP, MULTI-PLAYER, TIME TRIAL, PRACTICE, STUNT ARENA

Graphics: *to go here* SINGLE RACE, CHAMPIONSHIP, MULTI-PLAYER, TIME TRIAL, PRACTICE, STUNT ARENA

Menu title graphic 'Select Race'

Animations: *to go here*

Sound Effects: *to go here*

Mode Menu

Description: *to go here*

Controls: *to go here* SIMULATION, ARCADE, CONSOLE, JUNIOR RC

Graphics: SIMULATION, ARCADE, CONSOLE, JUNIOR RC

Menu title graphic 'Mode'

Animations: *to go here*

Sound Effects: *to go here*

Enter Name Menu

Description: This is such a logical, well referenced and useful menu object for choosing the letters of your name, entering cheat codes etc. that we simply have to use it. We will use a flattened 2D representation of the letter wheel, the letters referencing the type of writing to be found on F1 car tyres ('Goodyear', 'Bridgestone', etc.) The wheel has all the capitalised letters of the alphabet on it, plus DEL for delete and END. Rotate the giant tire around to select the letters in your name, pressing enter to select the letter you want. When you have entered your name select END from the wheel to progress to the next screen. If you make a mistake, selecting DEL on the wheel will delete the last selected letter.

Controls: D-Pad to rotate left and right; A button to choose a letter, B button to accept name and continue.

Graphics: Large black wheel that has lettering around its outside edge. A calibration marker at the top tells you the letter under it is currently selected. An information box where the letters chosen can appear. (Up to 12 letters can be used for a name).

Animations: Yes. The wheel rotates and all the letters move.

Sound Effects: The tyre will click as it rotates.

Select Car Menu

Description: A 2D shelf with a variety of 28 car product boxes on them. Some boxes are brown to indicate they are still wrapped in brown paper and have yet to be unwrapped by accessing them through victories, cheats etc. No details are visible on these boxes. The remaining boxes are visible as product boxes containing different types of car. The player cycles through the boxes using the D-Pad and chooses his car by pressing A. As each box is highlighted by the D-Pad, some information about that car will appear in an info box on the bottom edge of the screen. Cycle through the boxes with the D-pad. The currently highlighted box will zoom out of the screen, and you will be given some information about the car in the box. Choose your car carefully, they all handle differently and finding the right car for you could be the difference between winning the race and coming nowhere. Press A when you have chosen your car. You will notice that some boxes are covered in brown paper... these can be 'unwrapped' by winning various modes of the game, eventually giving a total of 28 cars.

Controls: D-Pad to cycle through the boxes. Press A to choose the currently selected car.

Graphics: Shelf with 28 different coloured product boxes.

Unavailable boxes are brown paper wrapped.

An information box where the chosen car graphic appears with some text details about the car covering CLASS, RATING, SPEED, ACC(ELERATION), WEIGHT, and TRANS(MISSION).

Menu title graphic 'Select Car'

Animations: No

Sound Effects: A honking horn indicating when the user has successfully inputted a cheat code.

Select Track Menu

Description: Graphical outlines of 14 tracks in 7 different environments. Possibles: 1) Miniature outlines of the tracks, 2) Miniature screenshot of the racetrack on a television screen, 3) Street-map style map of the neighbourhood that locates all the areas and tracks.

Controls: *D-Pad to cycle through the tracks. Press A to choose the currently selected track.*

Graphics:

Menu title graphic 'Select Track'

Animations: *to go here*

Sound Effects: *to go here*

Summary Menu

Description: *A text box showing you the options currently selected covering GAME MODE, TRACK, LENGTH, CAR*

Controls: *to go here*

Graphics: *to go here*

Animations: *to go here*

Sound Effects: *to go here*

Race Options Menu

Description: *After pausing or finishing a single race, the view is the final state of the selected track you just raced on, overlaid with text options to Resume, Restart Race, View Replay or Quit.*

Controls: *D-Pad to move between RESUME, RESTART RACE, VIEW REPLAY or QUIT.*

Graphics: *Text in coloured background box overlaid on the last seen view of the race track. Highlighted states of the text options.*

Animations: *No.*

Sound Effects: *No.*

9. Game Subsystem

The game subsystem will be written with the aim of fast, smooth gameplay in mind. Highly optimised code will be used to run the game in a single frame to achieve the best visuals. In the worst instance where a choice has to be made between speed and visual quality the background scroll can drop to two frames but the game will remain playing in a single frame. This is because the player will be focused on his car and as such is far less likely to notice a 2 frame scroll than his car moving in two frames.

The game subsystem consists of the following modules:

*Background handling
Object handling
Car Physics
Human Interface
Car Shell
Car Collision Shell
Car Prediction Routines
Car Control Code
Car AI
Weapons Module
Weapons Physics
Time Module
Mode Module*

Background Handling Code

The background code module handles multi-directional scrolling, screen update, and animation of map graphics. The background handling code itself is a self-contained module that functions in the background with no main program intervention other than setting pointers and variables. It will utilise a fast pixel scroll to move to any point on the map very rapidly. It basically consists of two routines, setup and ingame:

The setup routine is entered with a map number which copies all relevant background map graphics to video ram, sets up all the animation pointers for the maps animated objects (e.g. Museum's rotating space station tunnel), ready for the ingame routine to function.

The in-game routine is called from the VBL in the game and handles the movement of the map plus all incidental animations of objects on the map. All background display code from whatever source should be handled here. Variables are also set up for starting animations of objects on the map, showing which animation and a flag to say it is completed.

Object Handling Code

The object handling code is used to display all foreground objects regardless of their function. It is a fully dynamic sprite manipulation system including separate physical

and logical sprite systems, including full character data copying and priority manipulation.

The main program code accesses a virtual sprite linked list or look up table when requesting sprites to display. This linked list or look up table will always allow the code to access the same sprite image number no matter what the objects are doing, simplifying the code but allowing better control of sprite priorities.

The objects that will be displayed will consist of the 4 cars and their shadows, animated map objects such as basketballs, weapon pick-ups, and any incidental animations such as rocket trails, smoke, explosions. Overlaid text and numbers in information areas will also be handled by this module.

All image copying for animations will be handled by this object module. The graphic data for each of the four cars displayed on screen will be copied each frame in the vertical blank to allow 16 directions of movement for a smoother look to the game. Certain car animation frames and weapon pick-up animation frames will be permanently stored in video RAM. Space permitting all map object animation frames will also be loaded into video RAM, but in some cases there will need to be copying of frames from RAM or ROM in the vertical blank while the game is in progress.

The animation module will copy the required sprite image number into the sprite list and the object handling module will then copy the required data into the VRAM at the next VBL. This will allow the code to continue playing the game and not slow down due to the display. This can turn into an advantage in 2 player linked mode games as the display routines can be designed like this to cover up transmission delays.

Car Physics Module

The car physics module is without doubt the most important single module in the game. Any deficiencies in its behaviour will directly impact upon gameplay. The car physics code will be written using proper physics in fixed point integers to properly simulate the physical properties of a car in motion. When colliding with other cars the code will take into account both cars' velocity, vector, and other factors such as vehicle weight. When in the air the car code will take into account the effects of gravity on both the ascent and descent. The car code will also take into account static object properties in collision, crash, and roll physics.

Whilst the car will animate in motion and when colliding and crashing, these animations are for visual effect and will have no impact on the car code.

Unlike the 3D versions of the game the cars will not flip over in the Gameboy Color version. This is purely due to the quantity of graphic frames that would be necessary with 34 cars and 16 directions. Instead the cars will spin out of control in a cloud of smoke.

Human Interface

The human interface module is the code linking the human player to the game shell. As it is the point of contact between player and game it must be well defined and easy to use. The Gameboy is really limited to two buttons during fast gameplay, and the Start and Select buttons really only become feasible during pauses or lulls in action. Such lulls naturally occur when the car becomes stuck or flips out.

Car Collision Shell

Covers car/car collisions.

Car Prediction Routines (used for AI collision avoidance)

Predicts where the car thinks it will be ahead of time to try to avoid obstacles & other cars according to its AI.

Car Control Code

Human and AI controlled cars. This is the code that uses the inputs from the computer AI routines and the player input routines and actually drives the cars around the track.

Car AI

This module contains the code that determines how each computer controlled car will behave in the race. In addition to having different handling characteristics, each car will negotiate the track according to a range of node maps that guide the car from point to point around the track, and this module will contain the pathfinding code that car AI will use to do this.

Each car will also use its prediction routine to a varying degree according to its skill level (Amateur, Pro, etc).

Weapons Module

This module controls the possession and use of weapons in the race by each car.

Weapon Physics

Each weapon has different characteristics (flying, exploding, rolling) which are defined here using physics (including particle effects where practical).

Time Module

The code that controls the in-race clock, and records the lap times for each car.

Rules Module

This module governs race start and finish events such as crossing the line, current lap of each car, placement of each car in the race, and facing the correct direction racing around the track. It will include the code that tells the player that he is going the wrong way. We will also incorporate a visual cue to the player to show him the way he should go.

Mode Module

This module governs which mode is being used to play in from the selection of difficulty levels, and uses the appropriate set of altered or normal car physics and gravity. It also governs the use of reversed tracks modes.

10. Game Modes

Modes of Play

- *Multiple Modes of Play -*
 - *Single Race*
 - *Championship*
 - *Time Trial*
 - *Practice*
 - *Stunt track*

Single Race-

A single player can compete in a single race on the available courses and cars of their choice

Time Trial-

Compete against the challenge time around the track and unlock cool reversed tracks.

Championship Mode-

You begin by trying to win the Bronze Cup. If you master that you continue on to the Silver, Gold and Special Cup series. When you win a cup you open up new tracks and new cars! To progress from one race to another in Championship you must finish in the top 3 positions. If you fail to do this then you can try again, but you only get 3 tries. Only by finishing in the top position in the Championship table can you unlock the next cup. (depending on the difficulty of the game we may change this to the top two in each race that go through).

Practice-

Lets you try a variety of "Opened" tracks and cars to master the idiosyncrasies of the RC controls without time limits, opponents or the pick ups to distract you. Use the practice mode to unlock new cars by collecting stars in the Bronze, Silver, Gold and Special Cup Courses.

Stunt Arena-

Show off all your RC racing skills, and you'll need plenty of them to collect all of the 20 stars which are hidden about the arena. You'll find that you'll need

some of the faster cars to collect some of the stars, but don't despair: the game keeps track of your progress when you exit or re-enter the Stunt Arena, so keep at it until you grab all 20 stars. Once you do, you'll unlock a very special secret that only the elite racers enjoy.

Multiplayer (Optional)

- *Two player link by cable. This will be put as a droppable feature, which will be implemented if there is time. We can see no reason why it cannot be implemented. All the code will be designed to accommodate this but our experience with the link from the original gameboy shows that the timing can cause big problems. As there is no room for slippage in the schedule we would rather be safe and not guarantee inclusion.*

Progress Table/Password Progression

- *Progress Table. This will be implemented but to save it properly will need battery backup. Failing this we will implement a password system to store the important data such as position, max score etc. This will allow the player to enter a password when he switches on again and restore his progress so that he does not have to play the early levels again if he does not want to.*

Best Trial Times

- *Best trial times - this will also be pass-worded*

11. Music/Sound Track

- *Full musical sound track and effects copied from the original game. Whilst the style of music does not instantly suit the musical capabilities of the gameboy a reasonable approximation will be made.*

12. Sound Effects

- *. We will use a mixture of sampled sounds and chip sounds where appropriate.*

SFX consist of effects linked directly to objects, or ambient SFX that are linked to areas in maps, for example the barking dog in Toys in the Hood 1. They will all be chip generated as samples are obviously too slow during a fast game.

13. Cheat Codes

The following cheat codes are different from the ones released by Acclaim for Re-Volt PC and Re-Volt N64. These codes have already been made public, and so Acclaim will probably wish to withhold the Gameboy cheats until a later date just as they did with the other platform releases. They can be synchronised with PC cheats if necessary, but I have. There was only ever once cheat code on the N64, and there were more cheat codes on the PC than will be on the Gameboy, in particular the cheat codes that pertained to the track editor etc which will not be in the Gameboy version.

Enter these codes as your name in the name wheel:

CARWARS - all cars have a constant supply of replacement weapons

CARNIVALE - gets you access to all cars

TRACKING - gets you access to all tracks

BACKTRACK - reverses all tracks so that you race in the wrong direction esp. in relation to the objects like stairs etc.

REARVIEW - mirrors all tracks to give a new twist

MORPHER - change cars mid-race by pressing a combination of buttons

PRANKSTER - change all opponent cars to your model during the race

14. Features not to be implemented / differences from original

- *Track editor*
- *Internet / Lan Play*
- *Level downloading / saving from internet*
- *Battle Tag (no point with max 2 players)*
- *4 cars instead of 8*
- *cars will spin instead of flip over*
- *No view change*
- *2D rather than 3D*

15. Graphics

15.1 Overall look

The tracks will all be viewed as a pseudo-3D environment by using a similar graphical look to Micro Machines 1 & 2, basically a variation on the 2D view. The limitations of the Gameboy are such that a game like ReVolt, where complete 360 degree movement around objects is an important part of gameplay, would prove impossible, both in terms of the timescale available and the playability of the game.

The Gameboy's small viewing area will partially compensate for the loss of the dynamic that the 3D versions of the game enjoyed, (i.e. an inability to see around corners... which is obviously possible in 2D). At speeds approaching 60 frames gameplay will be fast enough to recreate the hectic feeling of the 3D version.

An extra measure of moving the player's car relative to the centre of the screen will be employed. Thus to simulate faster speeds the car is moved further towards the edge of the screen in the direction travelled, and slower speeds by having the car 'hang back' towards the opposite edge. This will have the added advantage of recreating the inability to see around the next corner that the 3D version of the game had naturally due to the mismatch of R/C car sizes against real world environments.

The scrolling will be multi-directional in all 8 directions. The car controlled by the player will not always stay exactly in the centre. It will move somewhat sound the screen as it accelerates and decelerates almost seeming as if it was connected to the centre of the screen by a weak piece of elastic.

15.2 Background

The background track will be built up out of a composite tile based character map. The basic track size will vary between each map, as will object positions etc. Each map track will be built up out of different images – background images, terrain, scenery and objects that will all need to be loaded in.

Each map will be drawn within its own background character set, with all background animations contained within this set. This ensures that the required space for all objects, and the required processor and DMA time is available to allow the best animations possible.

The backgrounds will use as many of the 32 available colours as possible to reproduce the levels of the 3D original and make the detail as authentic as possible on a Gameboy colour screen.

15.3 Sprites

The sprites will be built up using a sprite routine that dynamically allocates physical sprites to each car and copies the animation frames required from memory into the video buffer. The shadows, and the weapon pick-ups animations will remain in video memory at all times, and space permitting the objects and any overlaid text will do

too. The cars animation frames will however be copied down every VBL. This will help to minimise the amount of data that needs to be copied every vertical blank.

15.4 Animations

The animations fall into two categories – background, and foreground.

Background

In the background there will be some animation, such as the water features on certain levels. These will be created using character switching.

Foreground

The cars will be animated during standard motion so that their aerals are seen to wiggle and vibrate just like R/C cars (where practical given the limitations of the Gameboy display system and the resolution available), to give the illusion of friction on the racing surface. Car shadows will not change in size or animate but will move when the cars jump into the air to give the illusion of height.

The game will allow up to 4 cars on the screen at any one time. Each could in theory have a useable animated weapon which it could release, and there could be other animated objects such as the basketball present. Most of the time cars will just be racing and require little animation, but a pile up or weapon explosion could cause several cars to require animation. As all cars in ReVolt can do different things at any time they will all have their animations copied each frame from ROM into the VRAM. This reduces the limitations on animation quantity and detail to the limits given by the cartridge size, rather than the video memory.

16. Breakdown of Tasks

Whilst in developing the game the programmers must write more routines than are listed below these are the main tasks that are required to be done to complete the game. They are not in an exact order.

- *Full design of code structure including memory management.*
- *Test map for logic testing*
- *First visual of level map and car graphics for approval*
- *Complete animation frames for one car*
- *Implementation of level scroll routines*
- *Implementation of collision routines*
- *Implementation of priority / masking / shadowing routines*
- *Implementation of initial car code*
- *Implementation of initial weapon routines*
- *Implementation of collision on the car including shadowing and masking*
- *Implementation of jumps, crashes and other reactionary parts for the car*
- *Implementation of initial menu system*
- *First build of complete track with complete car code and ability to drive around*
- *Implementation of object place routines within a map including their animation routines*
- *Implementation of collision, collection, reaction to placed objects in the map (such as ball, spark etc)*
- *Implementation of multiple player code (although not yet linked) Cars selected by pressing select) to check that multiple cars can all operate*
- *Implementation of collision routines between cars*
- *Implementation of initial AI for computer controlled cars*
- *implementation of sound routines and initial application*
- *Further development of front end and menu system*
- *Completion of weapon routines*
- *Completion of human controlled car routines*
- *Semi complete computer AI ready for tuning*
- *First build of one player game allowing player to race computer cars*
- *Implementation of all 28 cars (plus the 6 bonus cars) and allowing their choice from the menus*
- *Addition of additional tracks and environments*
- *Finalisation of all backgrounds including incidental object placements*
- *First build of level completely populated and ready to test.*
- *Further implementation of menu system etc*
- *Implementation of Progress Table including password routines*
- *Implementation of Best trial times including password routines*
- *Completion of menu system.*
- *Addition of music and final sound effects*
- *Implementation of all options not so far implemented*
- *Finalisation of player control / feel*
- *Finalisation of computer AI*
- *Finalisation of all in game aspects*
- *Finalisation of menus*
- *Beta delivery, complete and tested for main Acclaim QA testing*
- *Continued testing and tuning*
- *Master delivery*
- *Any Nintendo faults repaired*
- *Nintendo acceptance*

17. Milestone Schedule

The project began on 2 November 1999 with the commencement of the design document, initial graphic work and code groundwork.

Following is the milestone schedule that the development will adhere to. Obviously as with any game development there will be variations in the order of development but in the main things should not deviate much from these milestones.

Milestone 1 – End November 1999

Delivery of Complete Game design Document

Sample Vehicle graphics

Sample level backdrop including test collision data

Sample menu visual

Full screen scroll code (version 1) – no collision, priority, jumping etc with sprites on it

Milestone 2 – End December 1999

Environments completed –

- Toys in the Hood both tracks including collision / priority data / object placements*
- Supermarket both tracks including collision / priority data / object placements*

Cars completed

- 10 cars complete visually*

First car control demo – controllable car including collision, priority and jumping. Animated car

Basic Menu system

In game option menu functioning allowing the player to quit, resume and change between cars(this part will be removed when the later in the development).

Milestone 3 – End January 1999

Environments completed –

- Toytanic both tracks including collision / priority data / object placements*
- Museum both tracks including collision / priority data / object placements*

Cars completed –

- 20 cars drawn with all animations*

Complete Menu system including best trial times and progress tables including password systems.

Completed human car control including particle effects and weapon systems

Initial computer car control (path following)

First music incorporated and sound incorporated

Car / Car collision routines including reactions

Option menu includes sound and music options

Implement 2 player link code

Milestone 4 – End February 1999

Environments completed –

- *Toy World both tracks including collision / priority data / object placements*
- *Ghost town both tracks including collision / priority data / object placements*

30 Cars drawn and complete

Music and sound complete

Completed computer car control

Final tuned human player control

Password system

Menus fully complete

Finalise two player link code

Beta – 15 March 1999

All cars complete

All Environments completed including final one -

- *Botanical Garden both tracks including collision / priority data / object placements*

Master – 7 April 1999

Completed game fully tested by us for final testing by Acclaim

Nintendo Acceptance

Submitted to Nintendo. Any rejections problems repaired asap.

E&oE