

# Gauntlet Postmortem

**Ed Logg**

Super Duper Game Guy

# Preface

- I will try to get you a feel for the industry and the challenges Gauntlet faced
- It has been 26 years since I worked on Gauntlet
- And I left all my notes behind
- Anything wrong or omitted is probably unintentional

# Atari

- I joined in February 1978 after getting in trouble with all my previous employers
- Atari was located in Sunnyvale for several years before moving to Milpitas
- I did many games at Atari (Super Breakout, Video Pinball, Asteroids, Centipede, Millipede, Xybots, Space Lords, Steel Talons, etc.)
- I also did VCS Othello on the side

# Atari (cont.)

- I left around 1992 to join EA for 18 months before returning to do consumer games including Wayne Gretzky Hockey, SF Rush, Rush2 for the N64, and Rush 2049 for the N64 and Dreamcast, and Dr. Muto
- I was the last Atari Engineer out the door when Atari Games closed down in Milpitas

# Coin-Operated Industry

- We get a game complete enough we field test it
- Coin drop is the pure test of a game
- Most games did not succeed – probably 50-66%
- Many of mine did not succeed either but in some cases I killed them before field test and some I couldn't
- Less than 10% really were successful

# Coin-Operated Sales

- Atari sold to distributors - generally only 1 or 2 per geographic area
- The distributors sell to operators
- Operators collected all the money
- Neither Atari nor I would get any of the coin drop from our games
- Distributors would finance and support operators

# Game Industry 1978-1985

- 1978 sales numbers
- 1979 Asteroids and Space Invaders
- 1981 Centipede, Pac Man
- 1983 collapse of Atari (consumer)
- 1984 split Atari into Atari and Atari Games
- 1984 layoffs in coin-op
- 1985 sale to Namco of Atari Games

# Arcades versus Street Locations

- In 1978 most of the business was in arcades
- By 1983 most of the business was in street locations (including doctors offices, etc.)
- By 1985 almost all games were sold to arcades
- Street locations would get used games
- BTW Street locations split the earnings between operators and location owners



# Game Ideas

- Brainstorming meetings (Centipede)
- Managers had ideas (Asteroids)
- Programmers had their own ideas
- Gauntlet was one of the games created by an idea that came from the programmers

# How did Gauntlet come about?

- My son loved DND
- He was after me for over 1 year to do a DND game
- I played Dandy on an Atari 800 in 1983
- Our first design started around Sept. 30, 1983

# Dandy Screen Shot

- Players were used 1, 2, 3, 4
- Monster generators
- \$ for treasure
- Red cross for food
- Doors and keys



## DUNGEONS

COMPANY PRIVATE

Game Initiation: October 18, 1983

Last Revision :

File : [ziegler.dandylinet.mac

January 4, 1984

Prepared by:

Robin E. Ziegler  
Ed Logg  
Chris Downend

Suggested Project Team:

Team Leader	= Chris Downend
Project Leader	= Ed Logg
Game Design	= Ed Logg/Robin Ziegler
Programmers	= Robin Ziegler/Ed Logg
Engineer	= Gary Stempler
Technician	= Rich McCoy
Illustrator	= ? Debbie Hayes ?

## Brief Storyline:

The noble knights and magicians of the realm must rid the Castle Mordan-nima of the evil demons and monsters and restore it to its original glory.

1-4 players act and react in a multi-level maze/dungeon/castle. Fast action, real-time adventure game with players cooperating with each other to stay alive. Players must navigate the maze, kill the nasties, eat food, collect treasures, open doors and find their way deeper into the dungeon. Until they reach The Hall of Death. This is the final resting place of lost goodies. They will then grab as much treasure as they want and try to escape back to daylight, thus ending the game. ( Or possibly the player could start another trip at this point.. )

## Brief Character Description:

Player characters will be player selectable. Eight different starting characters will be available for the player to choose from. The characters will all be somewhat different but yet be relatively equal. Some would have good short-range abilities but lack some long-range power or speed of another. They would be dressed and/or color coded to distinguish them as to player ownership. The player-pawns would move around the maze controlled by the player. They will need to find keys, food, treasure and assorted other items while trying to kill opponents.

They would have three offensive capabilities.

1. Long-range : Some missile weapon (arrows, fireballs, rocks...whatever) does damage to opponents ( similar to Centipede )
2. Short-range: Sword or other close in weapon does damage to opponents ( similar to Joust, Ultimall, Ali Baba ... )
3. Smart : Smart-bomb would kill all (with exceptions) opponents within screen area. ( similar to Defender and Dandy )

## Brief Playfield Description:

Playfield will consist of walls (brick, rock, steel and other wall materials), doors (single and double), and other castle/dungeon items. These will be laid out to form a large (up to 3x3 screens) maze/level. Levels will be connected via transporter devices. There can/will be many levels (64, 99, 128?). The view will be 3rd person NGTD.

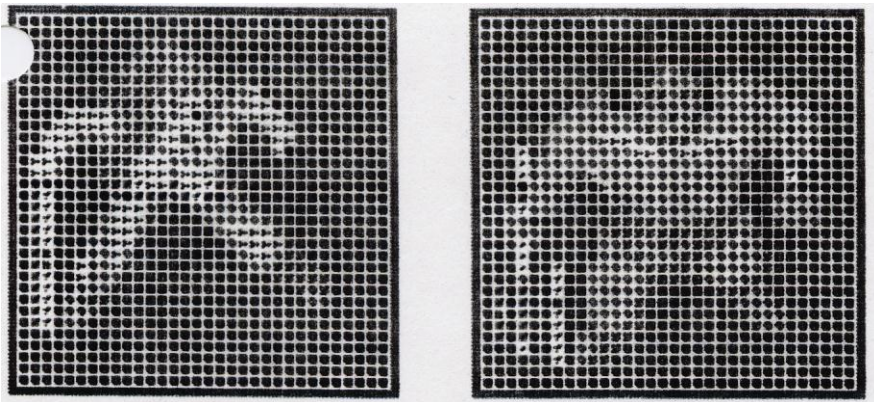
NGTD = Not Quite Top Down.

## Getting started:

Players will start by inserting coins for credit and then selecting his/her player-pawn. The selection is done in the player status window. This action can take place during game play and not affect other players. Once the selection has been made, the player-pawn will be transported to a clear area near the center of the screen. This transportation will use the "Star Trek" sparkle effect.

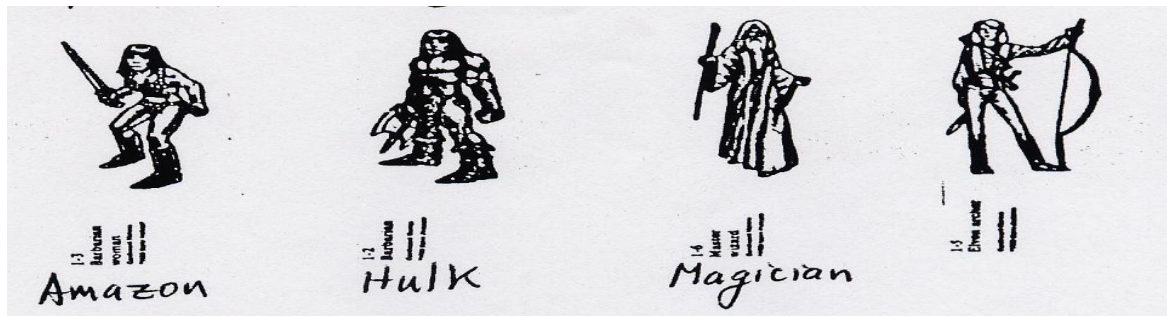
# Player artwork

- Our first player art Jan 12, 1984
- Sample is 32x32 pixels for medium res
- I think the final was 24x24 for normal res
- These were in color but...



# Character Names

- Valkyrie was the Amazon
- Hulk became the Warrior
- Why did the names change?



# Coin-Operated Industry

- 25 cents per play
- 90-180 seconds per play
- Large resistance to 50 cent play
- Dollar coin failed
- So how do we get extra earnings?

# Eureka!

- Here was a game where 4 players played at the same time meaning \$1 per 2 minutes
- Players can come and go at any time meaning we could have 4 players all the time
- There was no dead time waiting for players to start
- There was no slow ramp up at game startup
- And players could insert more than 1 coin



# Design Issues

- 1983-1984 design disagreements
- Vertical or Horizontal monitors
- Interlaced video?
- Medium resolution (512x376 vs. 320x240)
- Added cost with medium resolution (\$300+)
- 19" or 25" monitors (\$100 cost)
- Personal Memory Devices

# Programming Environment

- VAX main frame to do compiles, edits...
- VT100s or X terms for terminals
- C programming language (new for mid 1980)
- 68010 was same speed as 6502 at 1 MHz
- Greenhills C post compiler came later

# System 1

- 68010L8 @ 14.31818 MHz
- 320x240 screen size
- 56 motion objects per scan line
- Alphanumeric field 8x8 pixels
- Scrolling playfield of 8x8 stamps
- All colors done using palettes
- All games ran at 60 Hz

# System 1 Audio

- 6502 audio processor 1.789772 MHz
- YM2151 @ 3.579545 MHz – FM Synthesis
- Pokey @ 1.789772 MHz – security and sfx
- TMS5220 @ 650.826 KHz – LPC for speech
- By far the most elaborate audio hardware for Atari

# Gauntlet Hardware

- 68010L8 @ 7.16 MHz
- MOC 56 hardware with some improvements
- Playfield vertical flip bit
- More RAM to store 1024 motion objects
- Need to gang 8x8 pixel motions into one object
- More motion object art space

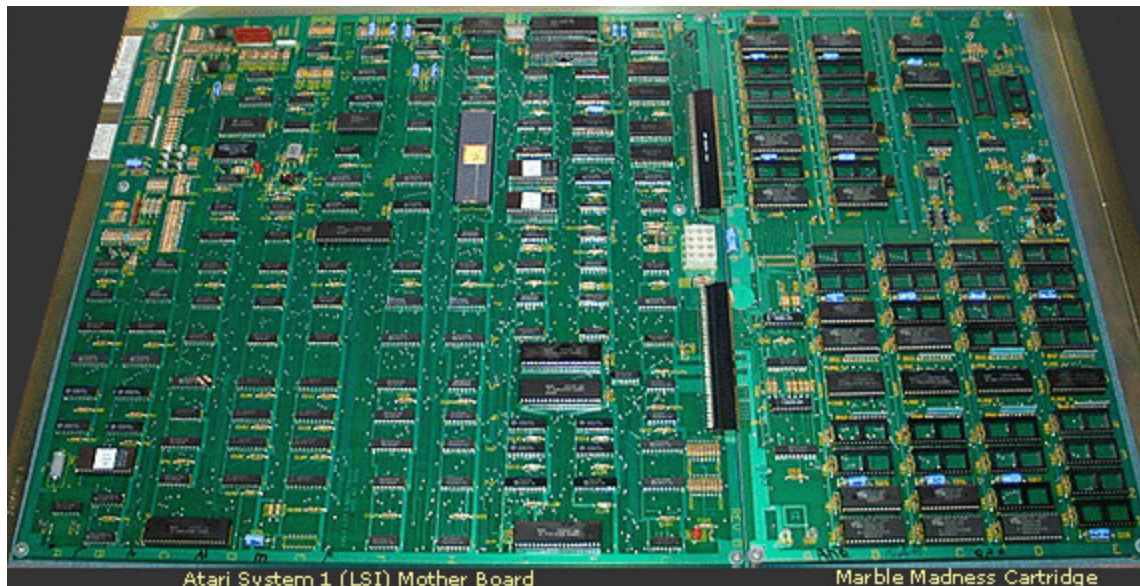
# Gauntlet Hardware Continued

- Motion objects must use universe coordinates
- Starting link pointers 8 scan lines
- Look ahead for allowing more displayed motion objects

# Hardware Issues

- The designed hardware PCB was huge!
- System I was 18"x18" plus 10"x18"
- We needed to add additional circuitry
- PCB needed to mount to the inside of cabinet
- Final PCB was 11.5"x20.75"

# System 1 PCB





# Gauntlet PCB



# 4 layer PCB

- Can we get away from 2 layer to 4 layer PCBs?
- Cost effectiveness of four layer PCB
- CAD issues laying the PCB
- Manufacturing issues with new PCB
- All games afterward were done using 4 layers

# What happened from 1983-1985

- There were layoffs in the Coin-Op Division
- Robin Ziegler was laid off
- Hardware Engineer was not available
- I was doing Road Runner as a Video Disc game while waiting for hardware
- I was asked to convert Road Runner to System I hardware – and refused

# New Start

- Feb. 15, 1985 we started again
- Pat McCarthy was assigned as the engineer
- Bob Flanagan joined as second programmer
- I took over as Project Leader on Mar. 22, 1985

# Development Team

- Programmers – Ed Logg & Bob Flanagan
- Artists – Sam Comstock, Susan McBride, Alan Murphy, Will Noble
- Engineer – Pat McCarthy
- Technician – Cris Drobny
- Audio – Brad Fuller, Hal Canon, Earl Vickers

# Game Name

- The initial design doc called the game Dungeons
- The game was developed in the folder DND
- Dungeons name unavailable April 1985
- Gauntlet came about in May 10, 1985
- I do not have the list of possible names

# Marketing Issues

- Games always have been start 1-2 players at start so they were concerned how we would get them to insert many quarters at once
- Marketing believed I could not get four strangers to play together
- They were concerned about one coin mech per player (they often did not work correctly)
- Would 1-2 players play if 4 were not available

# World layout

- 1024x1024 pixel world size
- 320x240 screen size
- Scroll registers control what part of the playfield and motion objects are shown
- Wraparound I believe was possible
- The game would always force players to be visible and adjust the scrolling accordingly



# Collision Algorithm

- Break the world into 16x16 grid
- Allow characters to be 24x24 so overlaps occur
- Objects change grid entries at the boundaries
- The new grid entry needs to be free first
- To detect a collision in any direction you only needed to check up to 3 grid entries
- Walls are part of the grid system too

# Collisions Algorithm Continued

- Players and enemies would collide and slide if necessary
- Shots can use this grid too
- Some shots can go between diagonal gaps in walls

# SLIPs

- How do we display only the motion objects that will be drawn?
- There are up to 1000 motion objects possible
- Starting Link Points (SLIPs) we created
- Every 8 scan lines we have a linked list
- The collision grid exactly matches the linked list
- The SLIPs were linked to the playfield not TV

# Enemy Movement

- The enemy players would just walk toward the nearest player
- If they get stuck in corners that is fine
- This was deemed strategic
- It would allow other players to pick off enemies

# Controls

- The player needed to move and to shoot
- Rather than use Robotron style controls
- We use a fire button to shoot while the joystick controls direction
- No movement with shooting fit the game
- Magic was an additional button

# Maze Editor

- Maze editor was used to create levels
- All levels were created using this tool
- Other engineers at Atari created levels
- Especially during my 6 week summer sabbatical

# Compressed Levels

- Limited RAM for storage of levels
- Large number of levels (100+)
- I did a simple algorithm to compress the levels
- Orange Elf disassembled the code, reverse engineered the algorithm, and built new levels

# No Ending

- This was a problem for marketing where all games had a game over before Gauntlet
- We considered a final monster but we did not want players coins lost with a game over
- The game did not end and recycled levels using flipping
- Level 8 and beyond was different
- High Scores (per coin?)



# Audio

- I don't know who suggested the Dungeon Master for comic relief
- Hal Canon did the music and first SFX
- Brad Fuller did some music and SFX and all of Gauntlet II and the Gauntlet Promo
- Earl Vickers did the voice synthesis
- Voice of Ernie Fosselius of Hardware Wars, etc.

# Security

- Games are often copied as was Gauntlet
- We had several security chips (Slapstick, Pokey)
- Slapstick was our game specific security
- In previous games I was called in to rebut expert witnesses (for example on Centipede)
- We put in software security in the past (remember Tempest)

# Cabinet Issues

- 19" vs. 25" monitor
- No front attract Plexiglas
- Two coin doors for four coin slots, one for each player
- No overhead attract area
- Easy access control panel
- Front access to PCB

# Patents

- There were 5 patents issued for Gauntlet
- One for the multi player cooperative play
- One for the collision algorithm
- One for look ahead motion objects
- One for the SLIPs
- These were my first patents

# Focus Groups

- I do not find them very useful, for example:
  - The focus group findings indicate mixed overall reaction to the ASTEROID game. General confusion was observed in game play, although this will most likely diminish with repeat play. The primary confusion area was relating to the use of the thrust feature.
  - It is clear that the game was considerably more favorable to the younger age group. This may or may not be indicative of its market potential.
  - We would highly recommend field testing this game at a game center location to observe player reaction and competitive collections prior to final product development and production decisions.
- Asteroids was rated the same as Lunar Lander and less than Starship

# Gauntlet Focus Group

- Results came back very positive
- Close in ranking to their favorite game (the one thing I look at in a Focus Group)
- One marketing suggestion was implemented
- Easier starting levels

# Player Survey

- Not done often
- Gauntlet had one at our first field test
- 19 Gauntlet players interviewed
- Player ratings were almost as high as possible
- Players admitted using \$50 in one session
- Players in Focus groups are not Gauntlet players

# Field Tests

- We have an agreement with an operator
- They will keep our test game secret
- We get information on the game earnings
- As well as earning for other top games
- They keep all the earnings of course



# Gauntlet Field Test Results

- First field test for 1 week in June 1985 because I had to pull it due to Sega presence (secret?)
- Normal field tests just steal earnings from other games but not for Gauntlet
- Other field tests were outstanding including \$15,000 in 16 weeks in San Mateo
- Best earning came from Canadian operator would earned \$4500 in 9 days in Oct. 1985

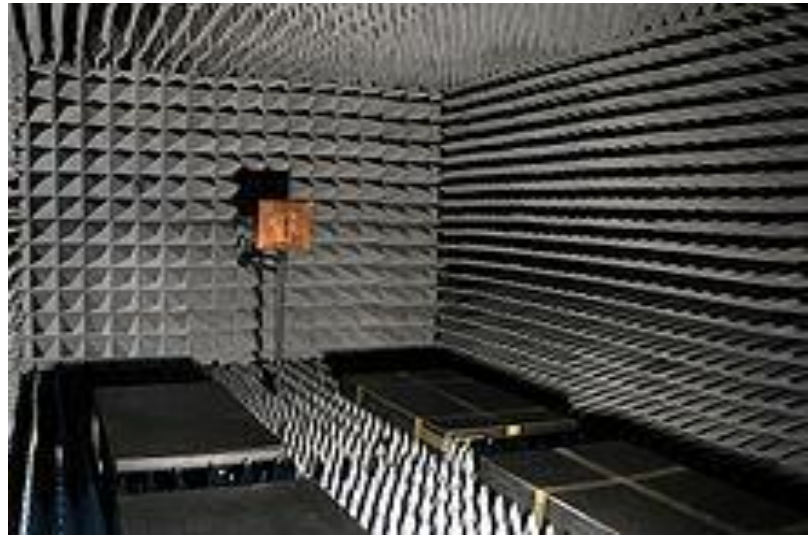
Average time per coin: 2:01

MILPITAS GOLFLAND - TEST 9-25-85 TO PRESENT

	10-23		10-16		10-9		10-2		9-25	
GAUNTLET	887.25	14.89	741.00	14.38	963.25	16.23	1136.75	19.70	0.00	0.00
TEMPLE OF DOOM	216.50	3.63	202.50	3.93	228.00	3.84	186.00	3.22	0.00	0.00
PAPERBOY	173.00	2.90	156.75	3.04	110.00	1.85	166.75	2.89	110.00	2.44
HOGAN'S ALLEY	NA	0.00	127.75	2.48	110.00	1.85	165.75	2.87	0.00	0.00
COMMANDO	129.00	2.16	109.00	2.12	120.00	2.02	157.25	2.72	190.00	4.21
DEMO DERBY	157.00	2.63	122.25	2.37	140.00	2.36	180.00	3.12	205.00	4.54
SPY HUNTER	NA	0.00	114.00	2.21	120.00	2.02	142.25	2.46	180.00	3.99
KUNG FU MASTER	158.25	2.66	136.50	2.65	122.00	2.06	139.50	2.42	180.00	3.99
BUGGY CHALLENGE	137.25	2.30	123.00	2.39	109.00	1.84	133.50	2.31	210.00	4.65
KARATE CHAMP	NA	0.00	106.25	2.06	101.00	1.70	113.50	1.97	150.00	3.32
1942	NA	0.00	0.00	0.00	100.00	1.68	112.75	1.95	0.00	0.00
COMET	139.00	2.33	155.50	3.02	0.00	0.00	0.00	0.00	0.00	0.00
RUSH 'N ATTACK	193.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL GROSS	5958.50		5153.25		5935.75		5771.00		4514.75	

# FCC Certification

- FCC requires our games to meet specific standards
- We test games in an anechoic chamber
- No RF cage for Gauntlet due to 4 layer PCB



# Game Prices

- Normally we sell to a distributor who sells to operators with some financing
- Normal upright games sold for under \$2000
- Distributors wanted \$2000 price (5-10 ratio in expected sales over \$2500 price point)
- Gauntlet sold for \$2295 to distributors
- Operators paid premiums over \$2800

# Release

- We shipped games early Oct. 1985
- We took orders at AMOA late Oct. 1985
- We also released Gauntlet in Japan later 1985
- Sales numbers (7850 domestic, 2250 Ireland, 1500 kits mostly for Japan)
- Compare to Temple of Doom (2800) or Super Sprint (2250)

# Localization

- Normally we release using 4 languages
- English and German were released
- No Spanish or French versions like normal games
- No Japanese localization done

# Documentation

- Manuals used for repair purposes
- Some description of game play
- Self test was described in detail
- Game code may not be documented

# Production Problems

- Bad Slapsticks caused game crashes
- Bad EPROMs
- Generally game bugs are never fixed
- Japanese could play the game indefinitely
- New EPROMS released to fix this
- Operator kit for adding Plexiglas over monitor



# Advertising and Promotions

- Sell Sheets for shows
- Play Meter and Replay magazine ads
- T-shirts but very limited numbers
- Promo video was for theaters (really unusual)
- Radio ad suggested for a field test (unusual)
- “The most fun a quarter can buy!” marketing tag

# Atari Team Perks

- T-shirts
- Field test games were sold to the team
- Bonus Plan
- AMOA show (party!)
- Distributor show (I went to only one in SF)

# Gauntlet Variations

- Gauntlet 2 player released for street locations
- Countertop cabinet was done as a joke
- Gauntlet II released in 1986
- I had nothing to do with consumer versions
- Sega released Quartet in May 1986
- Teenage Ninja Turtles in 1989
- Simpsons in 1991

# Summary

- Stick with your vision if you believe it is right
- Listen to criticism for ideas
- Be prepared to kill your baby if necessary