RidgeRunner 2

Initiation
March 4, 1993
2:00 PM
Central Conference Room

Distribution:
Chris Downend
Peter Lipson
Bruce Rogers
Lyle Rains
Don Diekneite
Mr. Animator
John Moore
Minh Nguyen
Jerry Momoda

Hide Nakajima
Mike Taylor
Mary Fujihara
Rich Moore
Pete Takaichi
John Ray

Rick Moncrief
Ed Logg
Kelly Turner
Gary Stark
Dennis Harper
Mike Hally
Mark Pierce
Pat McCarthy

Basic Description

This is a two-player fighting game with a dual first-person POV on one screen. The screen is split horizontally with an independent view for each player. Players can select true first-person or slot view at the press of the "zoom-in/zoom-out" button.

Moment-to-moment gameplay consists of flying, shooting, and picking up fuel and weapons. You pit your skill against another playert in a duel-to-the-death. You manage not only your craft, but also a small number of remote 'bots' and mines.

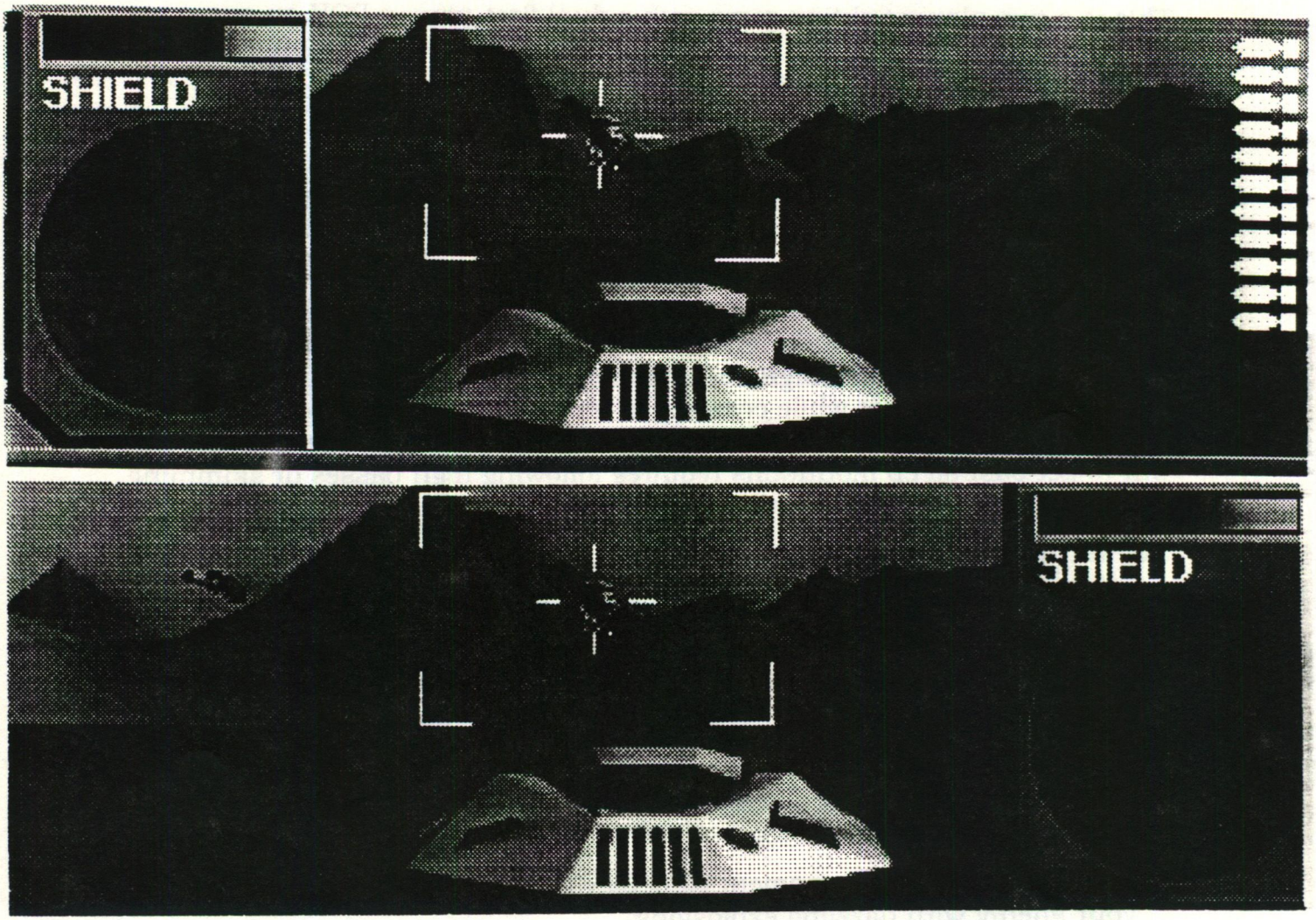
In Ridge Runner, you serve as the pilot on a levitated tactical fighter called a SlagRammer. This terrain hugging craft uses magnetic levitation to fly just above the ground. Your SlagRammer accelerates quickly, and allows you to spin sideways to shoot while coasting in another direction. The terrain layout is an important aspect of the game. Your SlagRammer can climb gentle rises, but to get past steep mountains requires following high passes or skimming through twisty canyons guarded by inimical forces.

Key features of the game include:

- True 3D polygon-rendered playfield displaying a rich visual experience at a competitive price point.
- 2-players on one screen for increased earnings potential. Each Player controls his own craft and has his own view window.
- A unique flying/driving/skimming experience featuring a vehicle that follows the terrain, accelerates quickly, and allows you to spin sideways while coasting forward.
- A popular moment-to-moment gameplay involving shooting and destroying your enemy with dazzling explosions.
- New CAGE audio PCB for realistic sampled sound effects and dramatic audio accompaniment.

Screen Image of Gameplay

The on-screen visuals are dominated by polygons. The terrain and most of the vehicles and objects have the blocky angular look dictated by polygon rendering. In exchange, the player gets a true 3D world to explore. With an on-screen capacity to display 500 polygons per 30 Hz frame, the look is more robust than Hard Drivin' and less robust than Virtua Racing. The hardware can display over 1000 8x16 triangles per 30 Hz frame at maximum throughput so 500 polygons represents the sustainable output in actual gameplay. We want to appeal to the mainstream player as much as possible and we are adding graphic embellishments where possible.


SHIELD
SHIELD

Storyline

The year is 2332. The exploration and exploitation of the galaxy has continued at an increasing rate since the development of the warp engine in 2102. On the lawless fringes of the galaxy, the Slaggers are 22nd century gladiators involved in a deadly hi-tech sport. Our player joins the scene as an ace SlagRammer pilot competing against others for the best battle record. We plan to explore the option of hiring a professional writer to fully develop a storyline, script, and characters as an aid and inspiration for game development and graphic treatment.

The POV, The Characters and Their Vehicles

The first-person POV gives limited ability to develop actual characters which is a weakness of this type of game. This is addressed with a player-selectable option of first-person or slot view which allows the player to see his craft by moving the camera behind the craft. Slot view is beneficial for novice players; first-person is a more exciting viewpoint.

Additionally, the characters are embellished and developed through video attract and side panel graphics treatments that describe and illustrate the SlagRammer fighter itself as well as show illustrations of the Slaggers. The Slaggers dress in battle gear reminiscent of scenes of the rebel forces in the Star Wars trilogy or our troops as shown in the Desert Storm Conflict.

The players choose from one of twelve pilots and their customized crafts. Eight of the twelve are presented in detail below. Each craft will have a pre-selected balance of speed, friction, armor and firepower. A dozen unique choices adds an element of depth and the potential of high repeat play, as the experienced players experiment to find the "best" ship. Street Fighter II Champ edition offers the player 12 characters to choose from. As time permits, we will embellish and add character development similar to Street Fighter II.

The characters have personality profiles and temperaments that fit the technical capabilities of the craft where possible. We will embellish the personality aspect of the game as secondary to developing the game itself. If the game is fun, then character development can help play appeal, but it is not out primary focus.

Character Fantasy/Emotional aspects

As a player, you are the pilot of a *MagSlammer* -- a Magnetic Anti-Gravity Surface Levitation Armored Multiple Mission Expendable Raider. You operate the most sophisticated and deadly vehicle on the terrestrial battlefield. It


MAGSLAMMER
Pilot Commander
LIPSON
LR4 "RAINS"
SPEED: 120
FRICTION: .8
SHIELD: 0
FIREPOWER: 695
Lieutenant
ROGERS
Select Crew/Vehicle

travels freely over water, sand, snow, and swamp. In battle, it hugs the ground taking advantage of the terrain for defense much like a traditional tank, yet it flies and maneuvers more like a jet-powered helicopter. It has opened a new chapter in battlefield strategy and tactics.

Pilots are trained in a unique combination of air and land tactical maneuvers and only a few really master the unearthly flight characteristics of the MagSlammer. Even with computer-assisted control systems, a loaded MagSlammer is a challenge to fly. Pilots have nicknamed their fighters ***SlagRammers***, referring to the unpleasant results of the high speed ground impact that occurs when the levitation system momentarily fails. The dangers are great but so are the rewards. Some say that the MagSlammer, in the hands of a gifted *Slagger*, becomes invincible. The craft itself is commonly referred to as a *Rammer* for short.

Sample Crew Characterizations

CREW #1: Pilot Commander Stone: Stone is a squared-jawed Independent SOB that no one would want to meet in a dark alley. He is ex-military but resigned his commission to go where the action is, rather than enjoy peace-time service. Motto: "Damn the torpedoes, full speed ahead".

CREW #2: Pilot Commander Fernandez: Fernandez is a loner; He figures he can make the galaxy a better place to die. He has a 6th sense when it comes to flying SlagRammers making him the best pilot in the quadrant. Motto: "Eat my shorts".

Character/Craft Technical Gameplay Aspects

The technical differences between the 12 different craft/pilot selections focus on the capabilities of the Rammers. They vary in speed, friction, shield strength, gun firepower and special weapon capability. Refer to chart for craft configuration details.

- SPEED VARIATIONS: This attribute determines top speed; more speed is better since it allows you to escape bad situations.
- FRICTION VARIATIONS: more friction allows quick, precise turning and prompt deceleration; less friction allows the "turn and shoot sideways while sliding forward" maneuver.
- SHIELD VARIATIONS: more shield is better since it reduces the damage caused by enemy hit on the Rammer.

- GUN FIREPOWER: 4 variations; 2 laser gun options and 2 cannon options; guns vary in the amount of damage a shot delivers, the rate at which it fires, and the size of the collision window (a big collision window is better). Gun weapons have infinite supplies of ammunition.

  Machine Gun: fastest fire rate, light damage, small collision window

  Laser Ray: fast fire rate, medium damage, medium collision window

  Plasma Ray: medium fire rate, heavy damage, big collision window

  Photon Cannon: slow rate, extra heavy damage, extra big collision window

  SPECIAL WEAPONS: 6--12 variations;

  Smart missile (SM): Fire and forget; goes to cursor location at instant the trigger is pulled. A "lock on" the target is indicated by a cursor color change.

  Nuke missile (NM): Travels to point where the cursor is (steerable), and explodes doing damage to all objects over a wide area. Some objects are completely destroyed and some only partially destroyed depending on the hit-points required to destroy.

  Photon torpedo (PT): Same operation as Nuke Missile, but with smaller radius and more intense damage within radius.

  Electro-blind/stun missile (EM): Instantaneous blast that disable all enemy shooting capability for "x" seconds over a wide range.

  Cluster missile (CM): Travels to cursor (steerable) and explodes into multiple smart warhead that seek a nearby target and destroy it.

  Cloak device (CD): Instantaneous invisibility to enemies for "x" seconds; player can shoot all weapons while cloaked.

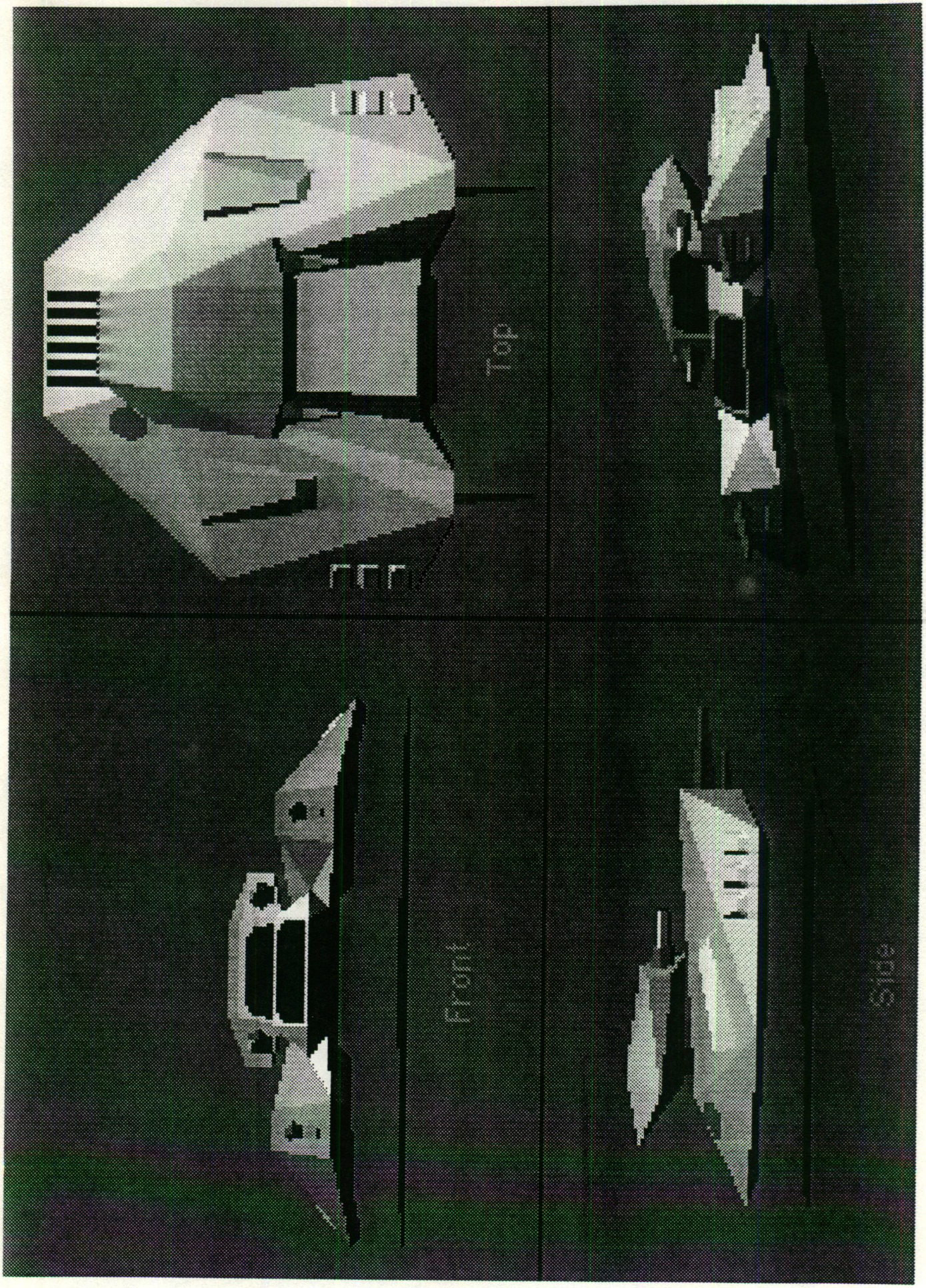
  Stasis Shield (SS): Instantaneous invulnerability to enemies for "x" seconds; player cannot shoot while Super shield is up.

  Turbo boost (TB): Instantaneous burst of speed for "x" seconds.

  Super hop (SH): Instantaneous vertical rise out of reach of enemy shots and over any obstacle for a short distance in the direction of travel. Disrupts and immobilizes any object it lands on for "x" seconds.

  Forcefield (FF): Drops a forcefield in any direction from craft and plants itself in front of the enemy.

  Demon Device (DD): Create a holographic image of your ship next to you and replicates your actions including shooting.


Top
Front
Side

Special weapons have a FINITE supply (<10) that is replenished at the beginning of each round and whenever a coin is added.

CONFIGURATION CHART

CRAFT #	1	2	3	4	5	6	7	8
	--	--	--	--	--	--	--	--
Ship attributes								
Speed (S1=slow, S2=fast)	S1	S1	S1	S1	S2	S2	S2	S2
Armor (A1=light, A2=hvy)	A2	A2	A2	A2	A1	A1	A1	A1
Frict (F1=stic, F2=slide)	F1	F1	F2	F2	F1	F1	F2	F2
Guns								
Machine Gun								
Laser Ray			lr		lr		lr	
Plasma Ray	pr					pr		
Photon Cannon		pc		pc				pc
Special Weapon	5SM	5CD	5NM	5CF	5SH	5EM	5PT	5TB

Gameplay

Play Options

You can play two players head-to-head or one player against a smart computer Slagger.

Control Functions

The pilot uses a throttle to adjust the speed and friction. The pilot uses a flight control (or analog joystick) to steer the craft left/right and raise or lower his gun cursor. Trigger buttons operate a machine gun; thumb buttons launch missiles or activate other special weapons. The physical controls will be covered in detail later.

Moment-to-moment Action

The player uses the radar and flying skills to seek and destroy a solo opponent. The enemy is either computer controlled or a second player on the same machine.

Scoring

Each successful hit scores points proportional to the weapon that was used. Most targets require multiple hits from gun weapons. Bonus points are awarded for placing the final shot the completely destroys the target.

Getting Killed

A player is killed when his Rammer takes sufficient hits to kill it. When a player is killed a cinematic view shows the pilot ejecting from the fighter and floating to the ground as the fighter explodes dramatically.

The player craft remains fully functional until completely destroyed. The condition of the craft is shown on an "shield" scale. The shield scale starts at a fixed length and is decremented with each hit. The Shield strength attribute determines the amount of shield lost per hit. When the Shield bar is zero, the craft still flies, but the next hit destroys it. The player gets 1,2 or 3 option-selectable lives per credit. The rest of this discussion assumes the option is set to 1 life per credit. One life yields a new Rammer with full Shields. A timer is running during gameplay, if the player fails to destroy his opponent before the time runs out, the vehicle with the least damage wins. The losing player must coin up to continue play.

Collecting Coins from the Player

Two players both add coins to begin a game. All coins added by both players go into a common pool; there is no "mech-per-player". The shield energy is fully restored at the beginning of each battle whether coins are added or not. Upon completion of a battle, the winner continues for free and the loser coins-up. A fixed timer ends the heat after 60 seconds if there is no kill; a winner is selected based on remaining shields. In a tie, neither player is awarded a win. If the 3-heat match ends with no winner, then both players must coin up.

Intermediate Goals

Intermediate goals center on deploying electronic warfare robots (EWB). These mobile decoy and surveillance robots assist you in destroying your enemy. The player must also avoid or destroy enemy EWB. The player will also search for extra weapons and shield energy to enhance his craft.

The Ultimate Goal

Each player competes to win the best 2-of-3 heats of a match on one playfield. After each match the results are posted and the players have the option on continuing to play another match. Successive matches are recorded and tallied on a score card after each match. There are many playfields that are played sequentially. Players can agree to play a certain number of matches to create tournament situations. The score card facilitates this, but does not enforce it.

Game Progression

In a one-player game against the computer, the computer's abilty will be adjusted upwards if the player plays too long without coining up. It should never be impossible to complete a mission, but the player would need to be both good and lucky to complete every match without a loss.

Video Hardware

Ridge Runner uses a new hardware design with these features:

- ASAP processor - provides security, and high performance at low cost
- General purpose **bit map**, 8 bit deep with 24-bit deep color RAM.
- (3) ASAP processors total: (1) each for the display window math and gameplay logic and a third for the video output processing. We may use TMS320xx processor for math in place of 2 ASAP's.
- X-bus for general purpose re-configuration
- ROMBUS for EPROM/ROM memory parts.

The X-bus concept provides a general purpose bus in the 1MHZ range. As part of an overall plan to reduce re-engineering, those features that must be customized from game to game are removed from the main board and put on reusable X-bus boards. In the extreme case, video, control I/O, JAMMA, Audio, and ARCNET functions could all be on separate X-bus boards. Pat McCarthy has more details on the X-bus concept.

The ASAP Bit Map (ABM) Board is common to both Beathead and RidgeRunner. Each uses different X-bus, ROMBUS and aux boards.

The main game PCB consists of the main ASAP video output processor, bit map RAM (really pixel map since its 8-bits deep), video output, and bus connectors for other needs:

- ROMBUS: connects to custom ROM/EPROM PCB.
- XBUS: connects to Cage Audio PCB, control I/O PCB, JAMMA interconnect PCB with filters, ARCNET link PCB
- JSAIII BUS: connects to JSAIII audio PCB (as used for Beathead).
- AUX PROCESSOR BUS: connects to math co-processors - either (2) ASAP's or (1) TMS320xx.

Display Technology

Our primary display choice is the 25" standard resolution color CRT from Wells. We will also evaluate larger 33" model for use in the deluxe cabinet.

Audio

Audio Hardware

The CAGE audio PCB will be used. Interface will be the XBUS. ~~Speaker placement on the sitdown is Front/back with one stereo channel to the front and one stereo channel to the rear to accentuate fly-by sound effects.~~ We are considering a bass speaker in the seat area if the perceived value is worth the expense.

Musical Theme

Too enhance the gritty mercenary fantasy and appeal to our core playerbase of teenaged males, the musical theme will have a rock n' roll flavor. Full compositions are needed for attract, game start and high score screens. Musical bridges will occur during gameplay in both Missions and Head-to-Head to accentuate impending doom as the player approaches deadly situations.

Sound Effects

The engine sound is a combination of a turbine whine similar to Stun Runner This is combined with some deep rumbly roars particularly on acceleration and deceleration. The volume balance between engine versus SFX and music will tip toward the engine during accelerations and decellerations and tip the other way when the craft is traveling at a steady speed.

Shots are percussive with some high-tech reverb as appropriate to the type of weapon. Hits and explosions are good old-fashioned gratifying earth explosions.

Voice

The 12 different player craft have unique personalities reflected in the voice of the onboard computer. Voice phrases punctuate the action giving clues on approaching danger as well as making humorous or insulting remarks about player performance.

Cabinet

Two cabinet configurations are proposed: a Deluxe sit-down unit with two monitors and seating accommodating two players side-by-side; and a standard Family cabinet upright accommodating 2-players in a side-by-side sharing a single screen.

The dual monitor Deluxe sit-down is a large more expensive unit that appeals to the larger arcades desiring large attraction pieces and premium earnings. We would use the Atari flight controls to enhance the player fantasy. Both monitors will be driven by a single PCB to keep costs down.

The Standard Upright uses a Family Cabinet and less expensive controls with two players standing side-by-side. The goal is cost reduction: we want to achieve an exciting under $3000 distributor price point and maximize sales to arcades and street locations. Every aspect of the Upright cabinet will be scrutinized for cost versus perceived value to the player.

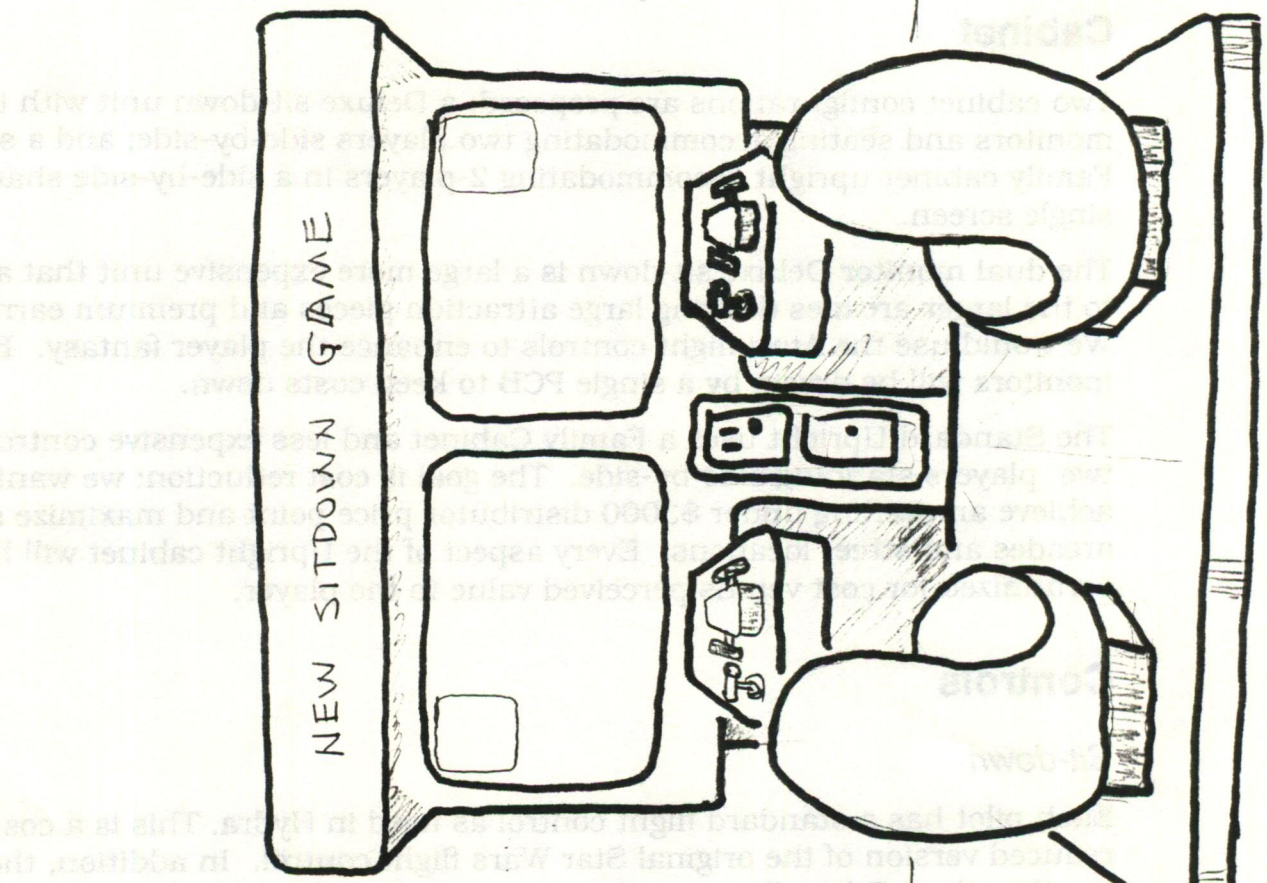
Controls

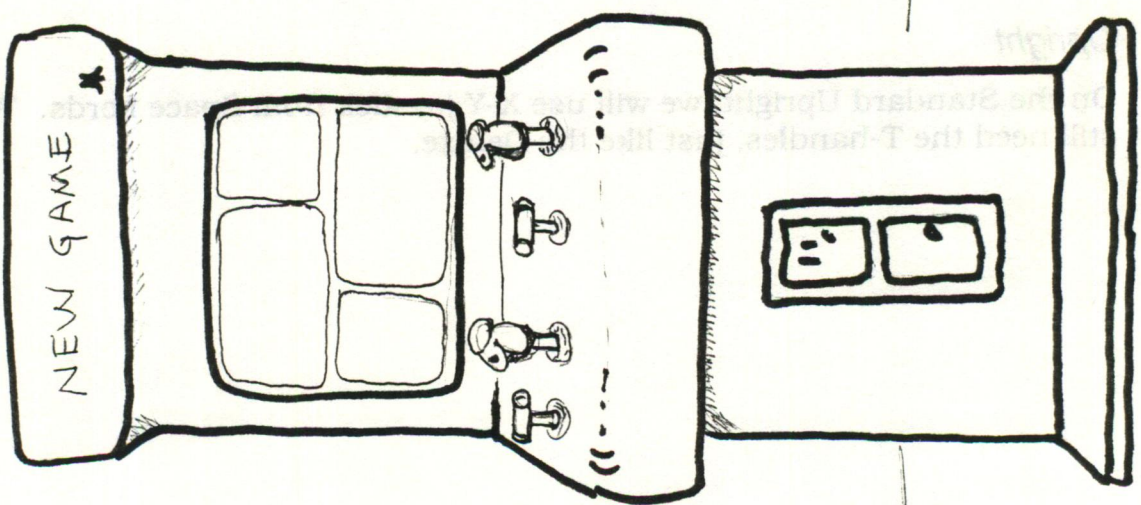
Sit-down

Each pilot has a standard flight control as used in Hydra. This is a cost reduced version of the original Star Wars flight control. In addition, they have the throttle: a T-handle controlling a pot for continuous speed adjustment. It holds in any position. The T-handle may be difficult to incorporate into the control panel area. As an alternative, we will consider a foot pedal with a forward and backward action from a neutral center position.

Upright

On the Standard Upright, we will use X-Y joystick from Space Lords. We will still need the T-handles, just like the Deluxe.


NEW SITDOWN GAME


NEW GAME

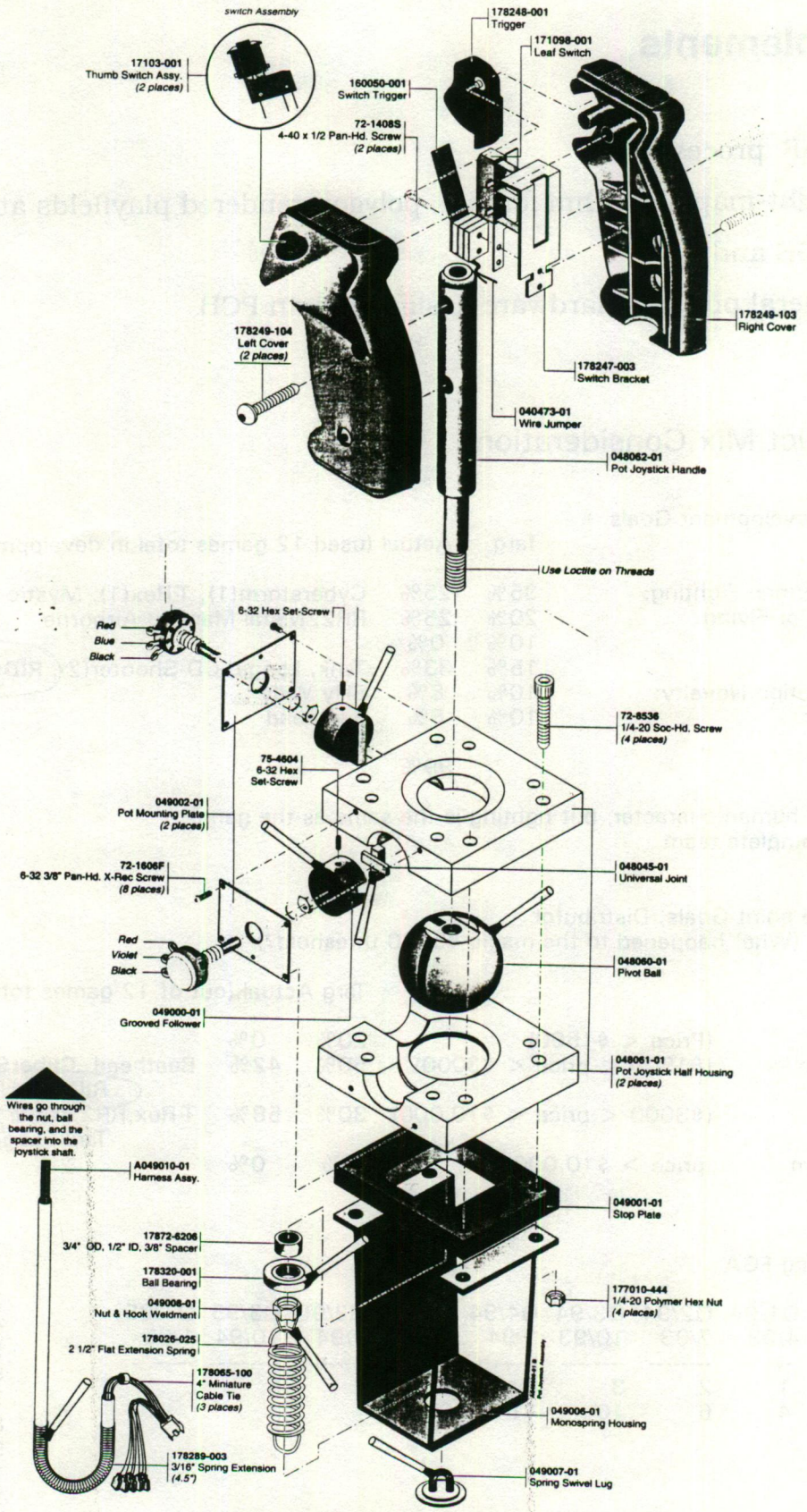


Figure 4-4 Pot Joystick Assembly
A049009-01 B

Enablements

- ASAP processor
- Height-map algorithm for fast, polygon rendered playfields at a low cost.
- CAGE audio
- General purpose hardware design of main PCB

Product Mix Considerations

1. In-Development Goals

	Targ	Actual	(used 12 games total in development)
B&G Human Fighting:	35%	25%	Cyberstorm(1), T-Rex(1), Mystic Mutants(2)
Driving or Flying	20%	25%	RR2, Metal Maniax, Airborne
Sports:	10%	0%	
Other	15%	33%	Tank, Loggs, CD-Shooter(2), **RIDGERUNNER**
Redemption/Novelty:	10%	8%	Silly Willy
Abstract	10%	8%	Beathead
		99%	

(1) Not human character, but fighting is the same as the genre
(2) incomplete team

2. Price point Goals, Distributor
(What happened to the magic $5000 threshold?)

		Targ	Actual (out of 12 games total)	
Low	(Price < $1500)	20%	0%	
Medium	($1500 < price < $3000)	50%	42%	Beathead, CyberStorm, Mystic, RIDGRUNNER, Silly Willy
High	($3000 < price < $10,000)	30%	58%	T-Rex, RR2, Metal Maniax, Airborne, Tank, Logg, CD-shooter
Premium	(price > $10,000)	0%	0%	

3. Timing FGA

Q1/94 4/93	Q2/94 7/93	Q3/94 10/93	Q4/94 1/94	Q1/95 4/94	Q2/95 7/94	Q3/95 10/94	Q4/95 1/95
1	2	3	8	12	7	5	
4	6	10	11	9			

1. Airborne
2. Beathead
3. CyberStorm
4. Silly Willy
5. Mystic
6. RR2
7. T-Rex
8. Tank
9. CD-shooter
10. Metal Maniax
11. Logg
12. RidgeRunner

RidgeRunner

item	unit cost	Family Cabinet qty	extended	EPROM	ROM	SIT-DOWN qty	extended	EPROM	ROM
Game Electronics				**350.00**	**350.00**			**350.00**	**350.00**
ASAP Bit Map (ABM) PCB	270.00	1	270.00			1	270.00		
Audio CAGE PCB	80.00	1	80.00			1	80.00		
EPROM & ROM				**136.00**	**99.80**			**136.00**	**99.80**
PF, Enemies, BLITS (4M EPRO	8.50	8		68.00		8		68.00	
PF, Enemies, BLITS (8M ROM)	7.95	4			31.80	4			31.80
Program (4M EPROM)	8.50	4	34.00			4	34.00		
Audio (4 x 4M)	8.50	4	34.00			4	34.00		
Electrical Subassembly				**414.68**	**414.68**			**802.65**	**802.65**
Power supply	61.05	1	61.05			1	61.05		
Extra Isolation Xfrmr	15.00	0	0.00			1	15.00		
Main harness	18.77	1	18.77			1	60.00		
Video power harness	13.74	1	13.74			2	27.48		
25" color monitor	318.00	1	318.00			2	636.00		
Test switch bracket	3.12	1	3.12			1	3.12		
Ground plane & hat	20.80	0	0.00			0	0.00		
Cabinet				**311.66**	**311.66**			**676.52**	**676.52**
Wooden cabinet w/ vendor kit	207.30	1	207.30			1	410.00	side decal	
Coin door assy	53.84	1	53.84			1	53.84		
Additional decals	5.30	1	5.30			4	20.00		
Speaker panel	10.10	1	10.10			3	22.50		
Flourescent light assy	12.06	1	12.06			1	12.06		
Retainers (upper, lower, glass)	11.25	1	11.25			2	22.50		
Shields (display and attract)	9.51	1	9.51			2	13.12		
Formed Parts			0.00				120.00		
Bezel		1	2.30	black	black	1	2.50	black	
Control Panel Assy				**233.52**	**233.52**			**335.23**	**335.23**
Panel	14.10	1	14.10			0	0.00		
Decal		1	4.00	small	small	1	6.40		
Harness	11.79	1	11.79			2	23.58		
Cover		1	7.13	die-cut	die-cut	0	4.75	uncut	
Mounting hardware	2.50	1	2.50			1	2.50		
Pilot control		2	150.00	Happ		2	254.00	Atari flight (Hydra)	
T-handle / Pedal		2	40.00			2	40.00		
Buttons	1.00	4	4.00			4	4.00		
Other				**41.29**	**41.29**			**125.65**	**125.65**
Shipping container		1	20.64			1	100.00	sitdown	
Manuals & labels	5.65	1	5.65			1	5.65		
Misc hardware			5.00				10.00		
Reserve			10.00				10.00		
Total Cost of Material				**1,487.15**	**1,450.95**			**2,426.05**	**2,389.85**
Labor & Overhead				**31.87**	**31.87**			**40.70**	**40.70**
PCB labor	8.57	2	17.14			2	17.14		
Video labor	5.89	2.5	14.73			4	23.56		
Mat'l and direct labor				**1,519.01**	**1,482.81**			**2,466.75**	**2,430.55**
Overhead	0.21			**318.99**	**311.39**			**518.02**	**510.42**
Total Cost of Goods				**1,838.00**	**1,794.20**			**2,984.77**	**2,940.97**
Distributor Price		**45% margin**		**3,341.82**	**3,262.18**	**45% margin**		**5,426.85**	**5,347.21**
		40% margin		**3,063.34**	**2,990.34**	**40% margin**		**4,974.61**	**4,901.61**
		35% margin		**2,827.70**	**2,760.31**	**35% margin**		**4,591.95**	**4,524.56**

Product Manager Market Analysis

The Ridge Runner project looks to be both innovative and challlenging. In reading Chris' initiation packet and looking at the game in the lab I made the following conclusions.

*I don't total agree that a 3-D polygon-rendered playfield offers a "rich visual experience". Young players do not universally have the same appreciation for 3-D polygon graphics because they don't offer the same polished look offered in some 2-D games. The land and surrounding hills in Ridge Runner really accentuate the blockiness of the graphics. Polygon graphics can't reproduce the look in comic books, cartoons or whats on TV. Exceptions are driving games, Virtua (tons of polygons) or Steel Talons (chopper fantasy warfare and excellent competition). Unless the graphics can be way more robust, I don't think they are appealing enough.

Chris did point out that Nintendo's Super FX is getting a lot of hype and could help pave the way towards player acceptance of polygon graphics. I hope this is the case since Atari has invested so much into it.

*The Slag Rammer is an abstract craft that now is difficult to control. It may be more important for the craft to be easier to control and more rewarding for the player. Unless it's easy to fly/drive, the learning curve may frustrate players into playing other games. Make it drive like a car and build on the strategy and fun of jellyblasting enemies.

*Too many choices - A dozen ships are offered because Street Fighter II has lots of characters to select from. To me it is easier to recall the fighting style of someone like a Dhalsim in Street Fighter II vs. a slight variation of a Slag Rammer. I would suggest offering fewer choices and make skill and strategy the premium vs. what ship you happen to be in.

In Street Fighter, it took three games to build up to a total of twelve. The original SF I think had four characters, SFII had eight, and SFII Champ took it to twelve.

Rather than put depth into twelve characters, offering one or more environments would offer more mileage in the depth department.

*Split-screen - Though I haven't played pilot and co-pilot, when just looking at the screen I feel detachment between the two rather than being in the same craft. I think it's just the bezeled borders, not the split screen.

*Presentation looks dated - Though the polygons give a modern look, the total look of the graphics as a screen image appear dated.

Schedule, Team Members and Goals for First Review

MILESTONE	Schedule	COMMENTS
INITIATION:	3/ 3/93	
First Review:	4/14/93	Basic Gameplay: shots & collisions
Second Review:	6/23/93	1st real playfields, gunner working
Third Review:	9/ 1/93	Smart enemies, multiple weapons
Fourth Review:	11/3/93	50% playfields + ship select
FOCUS GROUP:	11/17/93	
Fifth Review:	12/22/93	75% playfields TUNED, linking
PRELIM FIELD TEST:	1/14/94	2 weeks max: 1 uprt, 1 sitdown?
LONG FIELD TEST:	2/18/94	6 weeks Plus: 4 uprts, 3 sitdowns?
Earliest Sitdwn FGA:	May 1994	12 weeks after beginning Long Test
Earliest Uprt FGA:	June 1994	

1. TEAM MEMBERS:

Project Leader:	Chris Downend	also S/W func. Mgr.
Programmers:	Peter Lipson	
	Bruce Rogers	
Game Design:	Peter Lipson	
	Lyle Rains	also on Beathead
Playfield Design:	_____	
Engineer:	John Moore	also on Beathead & ADS
Technician:	Minh Nguyen	also on Beathead & ADS
Audio Specialist:	Don Diekneite	also on Beathead
Art Direction & Animation:	_____	**NO ONE ON TEAM YET**
Sitdown Cabinet:	Mark Gruber	

concept

2. GOALS FOR FIRST REVIEW, 4/14/93 (6 weeks from now)
   * 2 hardware platforms running using existing Beathead boards
   * X-Y joysticks for controls; simple pot or homebrew throttle
   * Look-see at video on 33" display; decide to pursue or not.
   * Review and select sitdown cabinet concept - verify marketability of the sitdown considering pricepoint, play appeal etc. Discuss tooling costs, and schedule
   * Feedback on controlability,confusion, comphrehension issues
   * Revise schedule if no animator on the project yet.
   * Present Hardware schedule and review X-bus approach, architecture
     - Including Video, ARCNET, & CAGE AUDIO PCB's
   * S/W gameplay:
     - Initial demo w/ shots & collisions
   * S/W tools
     - make progress on playfield editor (complete by June)
   * S/W technical tasks
     - design ship data structures
     - design enemy ship data structures
     - design playfield database
     - design playfield editor
     - Implement overall game control logic, place holder screens
     - Get O.S. installed