MARBLE MADNESS

_..ICHRON

GAME PLAY

_No Mo(...)_
_O(...)_

_Da.._

THEME: OMNICHRON IS A REAL PHYSICAL GAME PLAYED BY 27TH CENTURY HUMANS USING THEIR ABILITY OF PSYCHOKINESIS.

PLAYER PIECE: THE PLAYER CONTROLS A TINTED GLASS SPHERE WITH FLECKS OF COLOR IN IT. HE IS OPPOSED BY COMPUTER-CONTROLLED MIRROR COATED SPHERES WHICH REPRESENT THE OPPOSING TEAM - STEELIES.

CONTROLS: THE PLAYER USES A TRAK-BALL EQUIPPED WITH DRIVE SHAFTS TO MOVE HIS MARBLE. THE MTB (MOTORIZED TRAK BALL) TRIES TO ROLL IN THE DIRECTION THAT THE PLAYER'S MARBLE IS ROLLING ON THE SCREEN. THUS THE PLAYER MAY BRAKE HIS MARBLE BY APPLYING FRICTION TO THE MTB, OR SPEED IT UP BY ROLLING THE MTB IN THE DIRECTION HE WISHES THE MARBLE TO MOVE. WHEN THE MARBLE ROLLS UP A HILL AND REACTS TO GRAVITY, THE MTB WILL STOP AND THEN START ROLLING THE OTHER DIRECTION, JUST AS THE MARBLE DOES.

THE MTB WILL RESIST THE PLAYER'S MOTIONS IF THE MARBLE IS ON SAND AND PROVIDE POSITIVE REINFORCEMENT IF THE MARBLE IS ON ICE, CAUSING THE BALL TO BECOME NEAR INERTIALESS.

_E GOALS: THE PLAYER TRIES TO GET HIS MARBLE TO THE GOAL BEFORE THE OPPOSING TEAM CAN GET THEIR STEELIE THROUGH THE GOAL. HE CAN DO THIS BY DESTROYING THE STEELIE AND THEN TAKING HIS TIME TO AVOID PLAYFIELD TRAPS OR BY AVOIDING THE STEELIE AND GOING AT MAXIMUM SPEED.

BASIC PLAYFIELD: THE PLAYFIELD IS A 3-D SURFACE WITH VALLEYS, HILLS, HOLES, RAMPS, WITH PATCHES OF OTHER TEXTURES AS WELL AS FENCES, PIPES AND MISCELLANEOUS MECHANICAL GADGETS. THE BASIC DISPLAY IS AN ISOMETRIC PERSPECTIVE WHICH MEANS:

> PLAYFIELD IS TILTED (SO THAT OBJECTS FARTHER AWAY ARE HIGHER UP IN THE DISPLAY.

> THE OBJECTS DO NOT DECREASE IN SIZE AS THEY GET FARTHER AWAY.

> THE BASIC PLAYFIELD IS DEFINED BY PARALLELS IN TWO DIRECTIONS WHICH FORM A GRID. THIS PROVIDES CURVATURE.

> THE DISPLAY IS HIGH RESOLUTION RASTER, ALLOWING BOTH NON-BLOCKY LINES AND SHADING ON THE PLAYFIELD TO PROVIDE MORE CURVATURE INFORMATION. THE PLAYFIELD IS LONGER THAN THE SCREEN AND WILL SCROLL VERTICALLY TO KEEP THE MARBLE THAT IS IN THE LEAD ON THE SCREEN.

ALIENS: THERE ARE ALIENS ON THE PLAYFIELD THAT MAY ATTACK THE PLAYER OR THE STEELIE INDISCRIMINATELY. THESE ARE PARTS OF THE PLAY-FIELD WHICH DETACH THEMSELVES TO ATTACK.

GAME STRUCTURE FOR ONE PLAYER PLAY

WAVE 1: PRACTICE WAVE

THE PLAYER STARTS AT THE TOP OF THE SCREEN AND TRIES TO REACH
THE SUBGOAL AT THE BOTTOM OF THE SCREEN. THE PLAYFIELD WILL
SCROLL UP AS HE GOES DOWN TO REVEAL THE NEXT SUBGOAL, AFTER
WHICH IS THE FINAL GOAL. SUBGOALS ARE RINGS WHICH SPAN THE
ONLY ACCESS TO THE PLAYFIELD BELOW THEM, AND PROVIDE THE PLAYER
WITH A VISIBLE GOAL AT ALL TIMES. THE PLAYER MAY DIE BY:

> FALLING OFF A CLIFF AND BEING SMASHED WHEN
> HE HITS THE PLAYFIELD BELOW IT.
>
> FALLING DOWN A HOLE (HE HEARS A TOC-TOC-TOC-
> SPLASH).
>
> HITTING A WALL TOO HARD AND BEING SMASHED
> (HITTING IT SLOWER CAUSES HIM TO BE STUNNED).
>
> GETTING STUCK IN SAND OR SOME OTHER RESISTIVE
> MATERIAL.
>
> BEING SMASHED OR BURIED BY AN ALIEN.

IF HE DIES, HE STARTS OFF AGAIN AT THE LAST SUBGOAL HE PASSED
SUCCESSFULLY. THIS WAVE SHOULD LAST LESS THAN 30 SECONDS IF
THE PLAYER DOES NOT DIE ON IT.

WAVE 2: BEGINNER COMPETITION

WE NOW REVEAL THE GAME'S LARGER STRUCTURE. THE PLAYER IS IN AN
OMNICHRON COMPETITION AND IS PLAYING OPPOSING TEAMS OF EVER
INCREASING ABILITY. THE PLAYER NOW HAS A "RATING", WHICH IS
CURRENTLY LISTED AS BEGINNER, SINCE HE HAS NEVER BEEN IN A
COMPETITION BEFORE. HE IS UP AGAINST A COMPUTER CONTROLLED
STEELIE WHICH IS HIS BEGINNER-RATED OPPONENT. THE PLAYER MUST
REACH THE GOAL BEFORE THE STEELIE DOES, SO THERE ARE SOME NEW
STRATEGIES AND SOME NEW WAYS TO DIE:

> HE MAY BUMP THE STEELIE. THIS STUNS BOTH
> PLAYER AND OPPONENT, SO IF ONE HITS A WALL
> IT IS SMASHED, AND IF IT IS BUMPED TOWARD
> A CLIFF, THERE IS NO WAY OF AVOIDING IT IN
> ITS STUNNED STATE.

ADVANTAGES:

> IF HE CAN ELIMINATE THE STEELIE, HE HAS ONLY
> PLAYFIELD OBSTACLES BETWEEN HIM AND THE GOAL.

DISADVANTAGES:

> THE STEELIE CAN KILL THE PLAYER USING THIS SAME
> STRATEGY.

THE STEELIE MAY BEAT HIM TO THE GOAL. THIS RESULTS IN LOSS OF
A PLAYER LIFE AND ANY LOSS OF A LIFE MEANS HE MUST ~~REPEAT THIS~~
~~WAVE AND REMAIN RATED A BEGINNER.~~ IF HE BEATS THE STEELIE TO
THE GOAL, HE GETS AN INTERMEDIATE RATING AND ADVANCES TO THE
INTERMEDIATE ROUND.

GIN THIS
RUB OVER AGAIN
WITH THE SAME RATING

THE SCREEN SCROLLS WITH THE FRONT RUNNER IN THE RACE. IF THE
PLAYER MANAGES TO BE SO FAR AHEAD OF THE STEELIE THAT IT
SCROLLS OFF THE TOP OF THE SCREEN (THIS IS CALLED "LAPPING")
HE GETS MEGA POINTS AND ADVANCES TO WAVE 3, THE INTERMEDIATE
COMPETITION, WITH AN INTERMEDIATE RATING. IF THE STEELIE LAPS
THE PLAYER HE LOSES A LIFE AND GOES BACK TO THE PRACTICE ROUND.
IT IS AN ADVANTAGE TO BE SLIGHTLY BEHIND YOUR OPPONENT:

> ALIENS REACT EQUALLY TOWARD BOTH PLAYERS AND
> WILL TEND TO START OUT AFTER THE FRONT RUNNER.
>
> YOU CAN BRAKE LESS AND BUMP INTO HIM AT HIGH
> SPEED SENDING HIM CAREENING OFF A CLIFF.

WAVE 3   INTERMEDIATE COMPETITION

MORE OF THE SAME. PLAYERS COMPETE FOR THE ADVANCED TITLE
WITH COMPUTER DRIVEN STEELIES, THAT IS REACHING THE GOAL FIRST
AWARDS HIM AN ADVANCED TITLE AND ADVANCES HIM TO THE
ADVANCED COMPETITION.

BEING LAPPED BY THE STEELIE DEMOTES THE PLAYER TO THE BEGINNER
RATING AND BEGINNER COMPETITION (BACK ONE LEVEL).

BEING SMASHED OR BEING BEATEN TO THE GOAL KEEPS HIM ON THIS
ROUND.

WAVE 4   ADVANCED COMPETION FOR EXPERT TITLE AND SO ON . . . .

GAME STRUCTURE FOR TWO PLAYER PLAY

PLAYERS PLAY SIMULTANEOUSLY AND HAVE COMBINED LIVES AND
RATINGS BUT SEPARATE SCORES.

WAVE 1   PRACTICE ROUND

A LIFE IS LOST IF NEITHER PLAYER MAKES IT TO THE GOAL, NO
LIFE BEING LOST IF ONLY ONE PLAYER MAKES IT TO THE GOAL.

POINTS ARE AWARDED FOR KILLING ONE'S PARTNER, SO HEALTHY
COMPETITION IS ENCOURAGED. IN THIS VEIN, POINTS ARE AWARDED
TO THE FIRST PLAYER TO REACH THE GOAL OR THE SUBGOALS.

PLAYFIELD SCROLLS WITH THE FRONT RUNNER. IF THE BEHIND PLAYER
SCROLLS OFF THE SCREEN, HE IS OUT FOR THE ROUND.

E 2   BEGINNER COMPETITION

THE PLAYERS ARE PITTED AGAINST A BEGINNER TEAM OF TWO
STEELIES. THE COMPETITION IS AWARDED TO THE TEAM OF THE MARBLE
THAT REACHES THE GOAL FIRST, EVEN IF THE OTHER MARBLE OF THIS
TEAM HAS BEEN DESTROYED.

THE TWO PLAYERS MAY GANG UP ON AND DESTROY A STEELIE. ONE
PLAYER CAN COLLIDE WITH THE STEELIE, STUNNING IT AND HIM.
WHILE STUNNED, ANY COLLISION WILL SMASH THE STEELIE, THUS THE
OTHER PLAYER RUNS INTO THE STEELIE AND SMASHES IT. IF THE
PLAYER RUNS INTO HIS PARTNER, HIS PARTNER WILL BE SMASHED AS
WELL.

TWO PLAYERS TOGETHER HAVE AN ADVANTAGE OVER A LONE PLAYER WHEN
FACING TERRAIN OBSTACLES. THUS THEY WILL SOON CATCH UP WITH
THE LONE REMAINING STEELIE, AND MAYBE SMASH IT TOO.

THE SCREEN SCROLLS WITH THE FRONT RUNNING MARBLE. THUS THE
STEELIES MAY SCROLL THE PLAYERS OFF THE SCREEN IF THEY ARE NOT
FAST ENOUGH, OR A PLAYER CAN SCROLL HIS PARTNER OFF THE SCREEN,
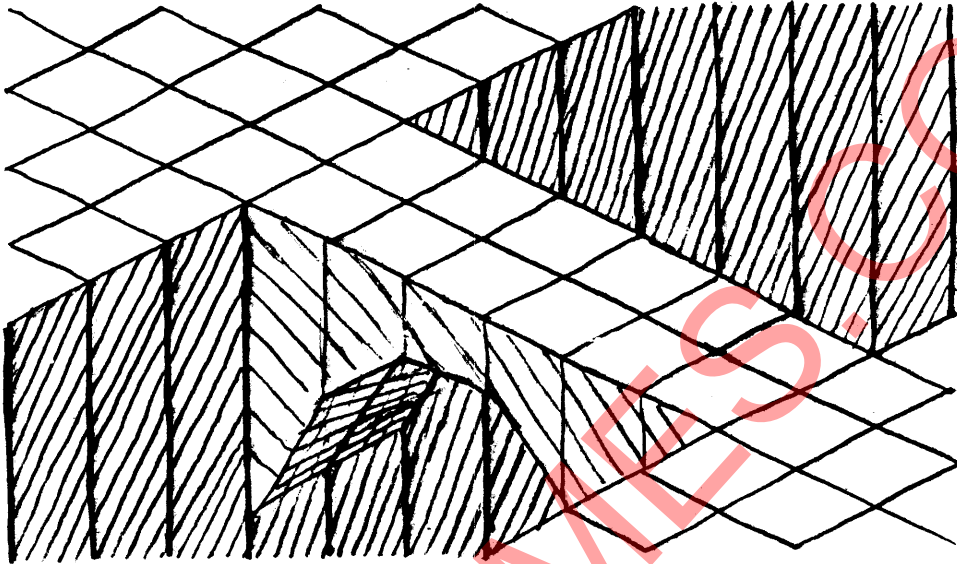ETC.

WAVE 3   INTERMEDIATE COMPETITION

MORE OF THE SAME. ADVANCED RATING AWARDED TO THE PLAYERS
IF THEY WIN

BEHIND TEST:

BRIDGE: A NARROW STRIP OF PLAYFIELD ACROSS A HOLE. IT IS FATAL
TO FALL OFF THE BRIDGE(SOUND AFFECTS OF TOC-TOC-TOC-
SPLASH AS HE FALLS)

TRAVERSE: A SECTION OF PLAYFIELD AT A TILT WITH A CLIFF BENEATH IT. IT
IT IS ACCESSIBLE FROM ABOVE AND HAS AN EXIT TO THE LEFT(OR
RIGHT). THE PLAYER MUST TRAVERSE IT BY ALWAYS PUSHING THE
MTB UP AND TO THE LEFT TO COUNTER GRAVITY. THE MARBLE BEHIND
CAN BUMP THE ONE IN FRONT OFF THE CLIFF AT THE BOTTOM OR
BUMP HIM DOWN THE TRAVERSE AT HIGH SPEED.
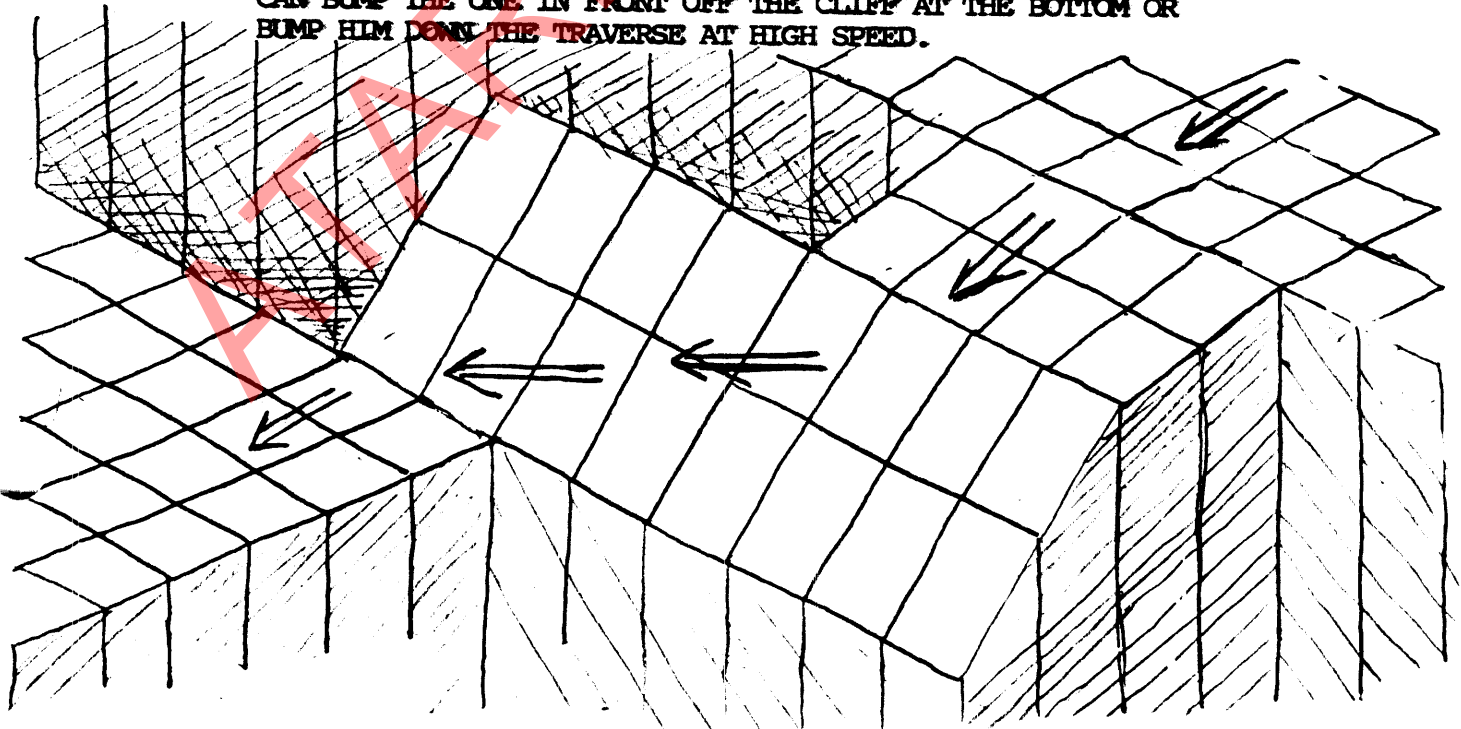
2-PLAYER TEST:

ELASTIC BARRICADE: THIS BLOCKS THE QUICKEST PATH DOWN THE SLOPE. IF STRUCK BY
ONE PLAYER, IT SLOWS HIM DOWN AND SHOOTS HIM THE OTHER WAY,
IRRESPECTIVE OF HIS SPEED. TWO PLAYERS AT HIGH SPEED CAN
BREAK THROUGH THE BARRICADE BY VIRTUE OF THE INCREASED FORCE.
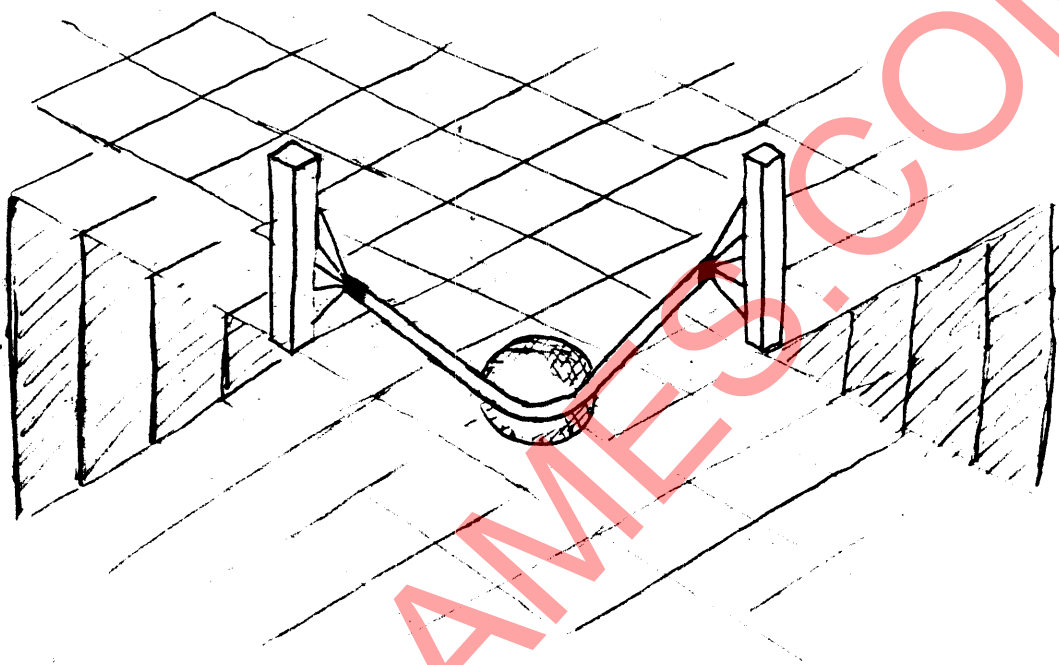
ICE BLOCK: THIS IS A SECTION OF DIFFERENTLY COLORED PLAYFIELD THAT ACTS
AS IF IT WERE A BLOCK OF UNSTEADY ICE FLOATING IN WATER. IF
ONE PLAYER ATTEMPTS TO CROSS IT THE BLOCK WILL TILT AND CAST
HIM OFF UNLESS CROSSES IT AT ITS EXACT CENTER(TILT IS RE-
STRICTED TO ONE DIRECTION). IF TWO PLAYERS CROSS ON OPPOSING
EDGES THEY CAN DO SO AT ANY DESIRED SPEED.
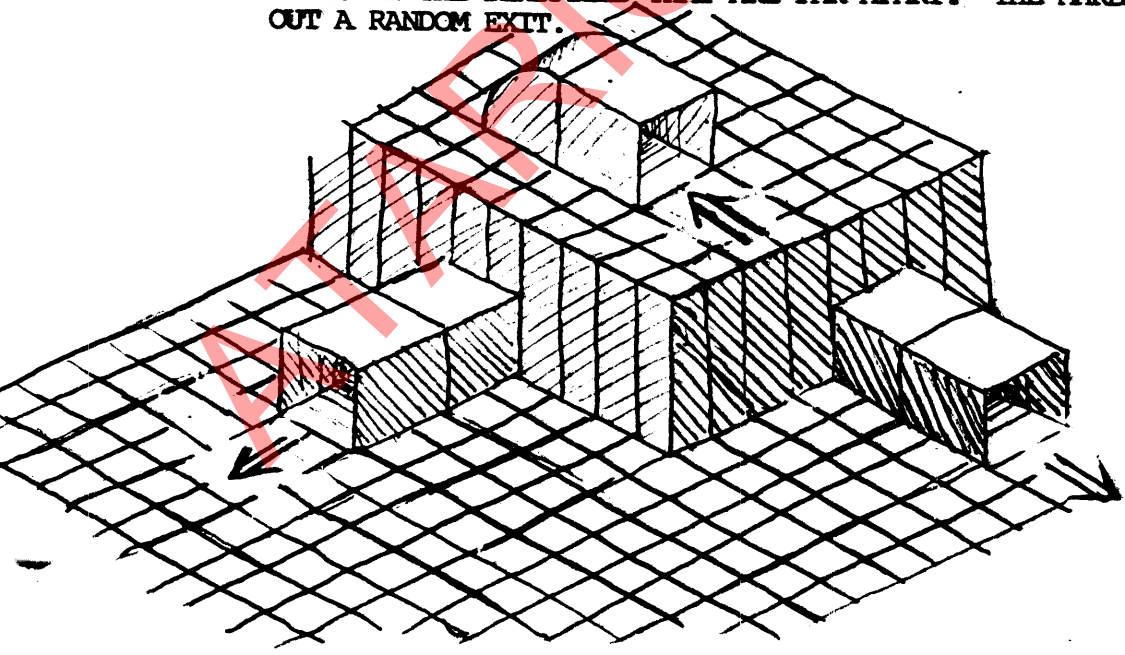

must exit on this side
since tilted
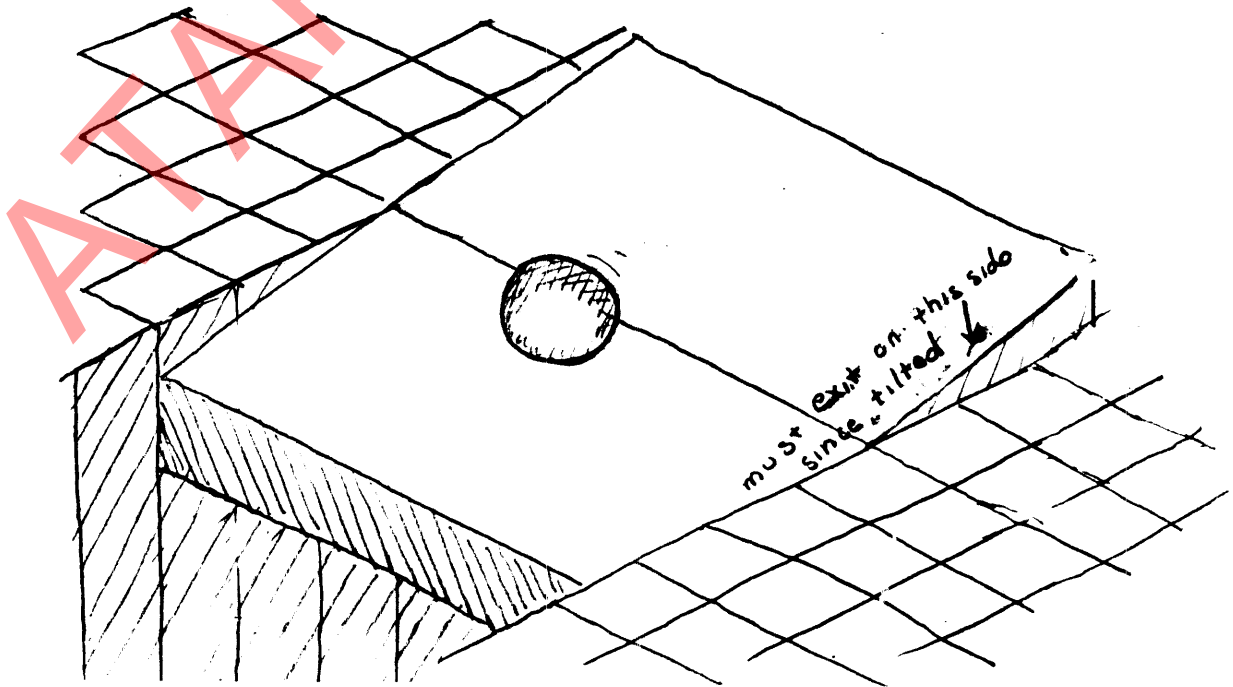
SEPARATOR:

GRAVITATIONAL FUNNEL:THIS IS A DEPRESSION IN THE PLAYFIELD THAT RESEMBLES
    THE GRAVITATIONAL WELL CREATED BY A BLACK HOLE. TWO PATHS
    CLOSE TOGETHER ARE WILDLY DIVERGENT AFTER THEY PASS CLOSE BY,
    AS THE HOLE CAN SWING A MARBLE AROUND 90 DEGREES QUITE
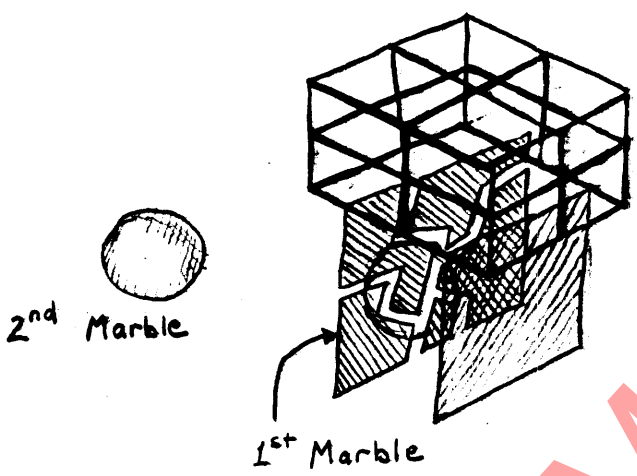   READILY.
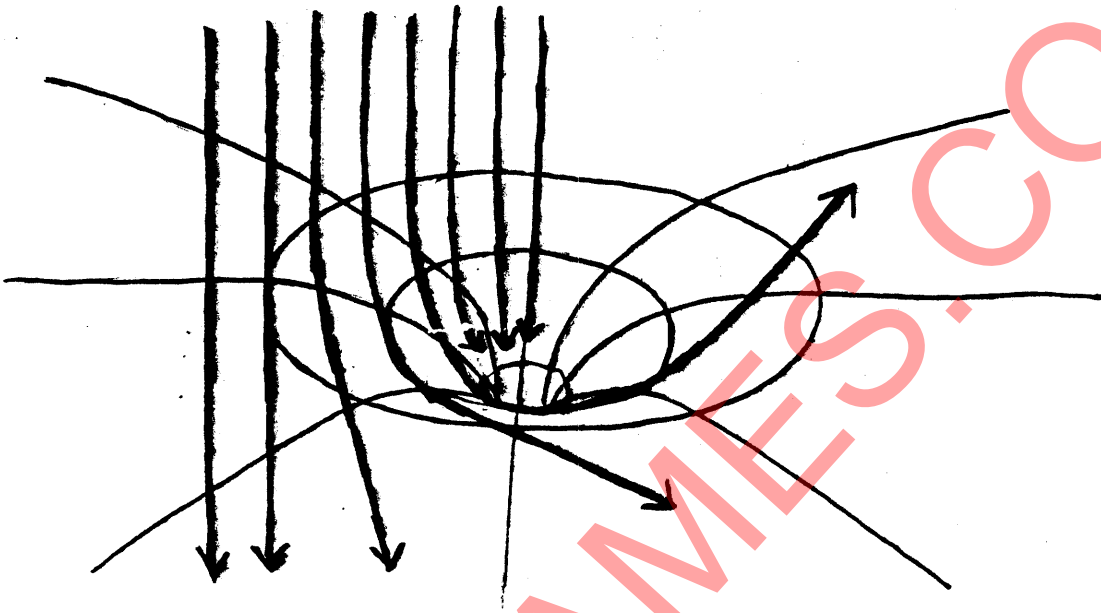
TWO EXIT TUBES: THESE ARE TUBES WITH ONE ENTRANCE AND TWO EXITS, PLACED AT
    SPOTS ON THE PLAYFIELD THAT ARE FAR APART. THE MARBLES COME
   OUT A RANDOM EXIT.

RAT TRAP: THIS IS A CAGE PLACED ON TOP OF TWO FRAGILE SUPPORTS. AFTER ONE MARBLE PASSES UNDER IT AND SMASHES THE SUPPORTS, IT WILL FALL. HOPEFULLY IT TRAPS THE FOLLOWING MARBLE.

2nd Marble

1st Marble

TEETER TOTTER: A TEETER-TOTTER IS PLACED AS THE ONLY CONVENIENT MEANS OF EXIT FROM A PLATEAU. WHEN A MARBLE ROLLS ONTO IT THE END SINKS DOWN TO THE LOWER LEVEL, TRAPPING THE FOLLOWING MARBLE ON THE PLATEAU. THE TEETER-TOTTER THEN SLOWLY RETURNS TO ITS INITIAL STATE, HAVING CAUSED CONSIDERABLE DELAY.
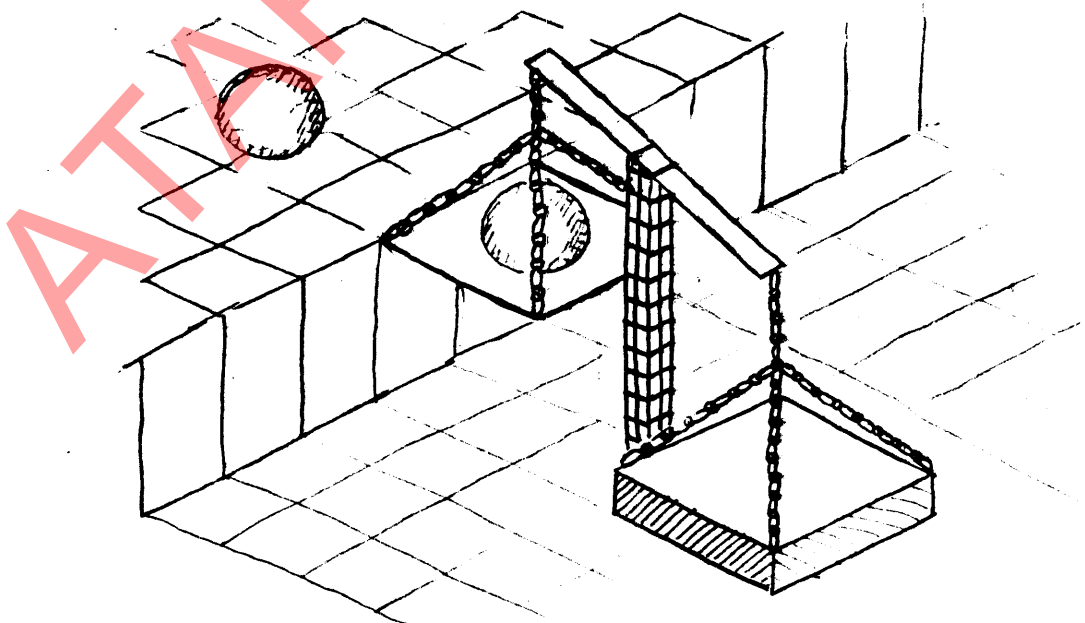
NEUTRAL DEADLY:

INVERSE WHAC-A-MOLE:THERE IS A METALLIC AREA OF THE PLAYFIELD WITH CIRCULAR
MARKINGS IN IT IN A REGULAR PATTERN. THESE ARE THE GAPS
BETWEEN CYLINDRICAL HOLES AND THE CYLINDERS WHICH OCCUPY THEM.
ONE OF THE CYLINDERS IS ALWAYS POPPING UP AND ONE GOING DOWN,
RANDOMLY. COLLISION WITH A CYLINDER IS DEADLY.
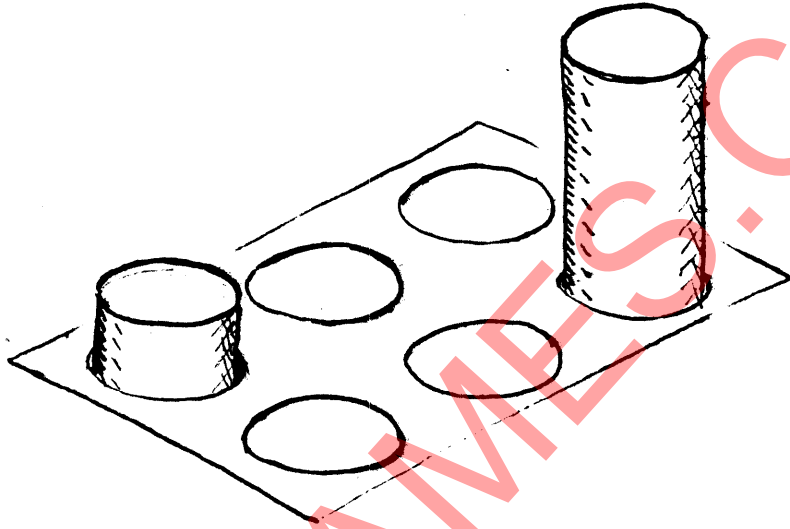
BRIDGE: THIS IS A MINIATURE-GOLF CONTRAPTION. TWO BLOCKS OF PLAYFIELD
MATERIAL EXTEND TO BRIDGE A CHASM, JOIN TO FORM A FLAT BRIDGE,
THEN PULL APART SEVERAL SECONDS LATER IN A CYCLICAL PROCESS.
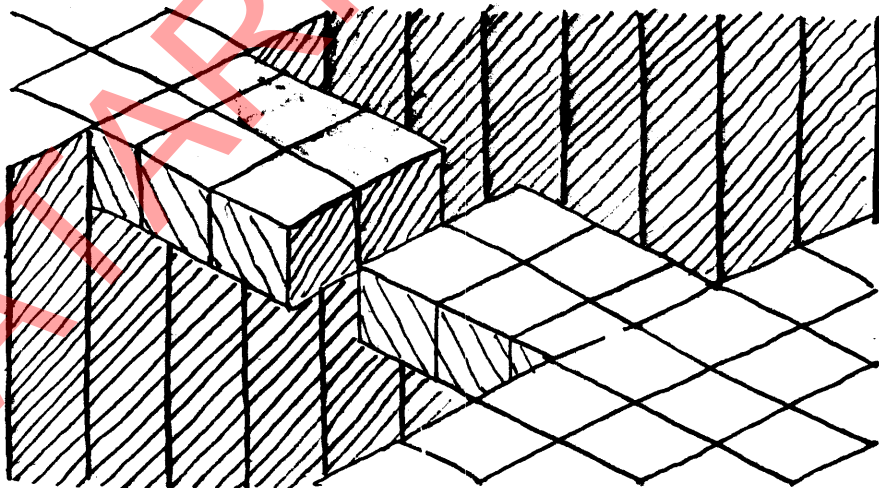
ACTIVE DEADLY:

THE WAVE: THIS IS A RIPPLE IN THE PLAYFIELD MATERIAL ITSELF. IT MOVES
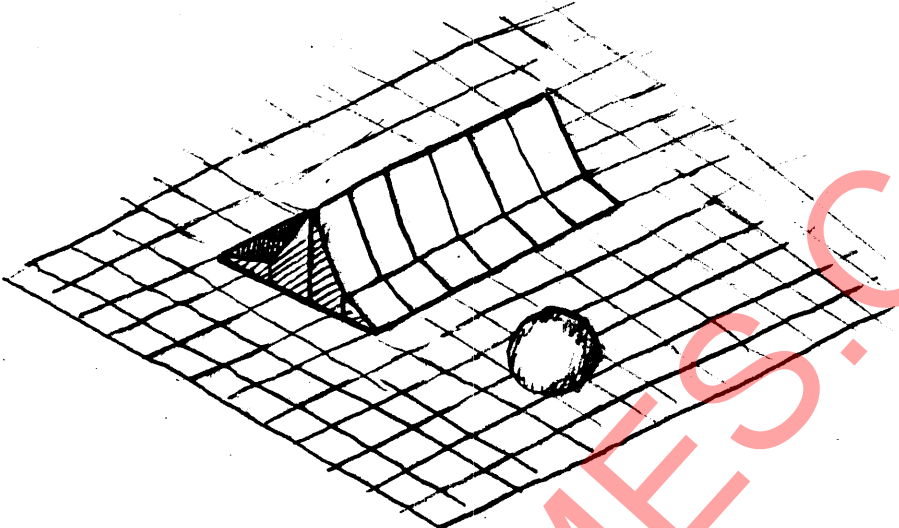   AROUND THE PLAYFIELD, REFLECTING OFF OF WALLS AND DEFLECTING
             THE MARBLES.   IF CAN CREST OVER AND ATTEMPT TO BURY THE MARBLES
             IN PLAYFIELD MATERIAL.

GRID GUARDIANS: THESE ARE CREATED TO KEEP THE PLAYER FROM DELAYING THE
             GAME WHEN THE STEELIES ARE NOT PRESENT. THEY ARE SECTIONS
             OF THE GAME GRID WHICH PULL THEMSELVES UP AND FORM INTO
             SPIKED, DEADLY ALIENS. COLLISION WITH THEM IS FATAL.

forms itself

and rolls away
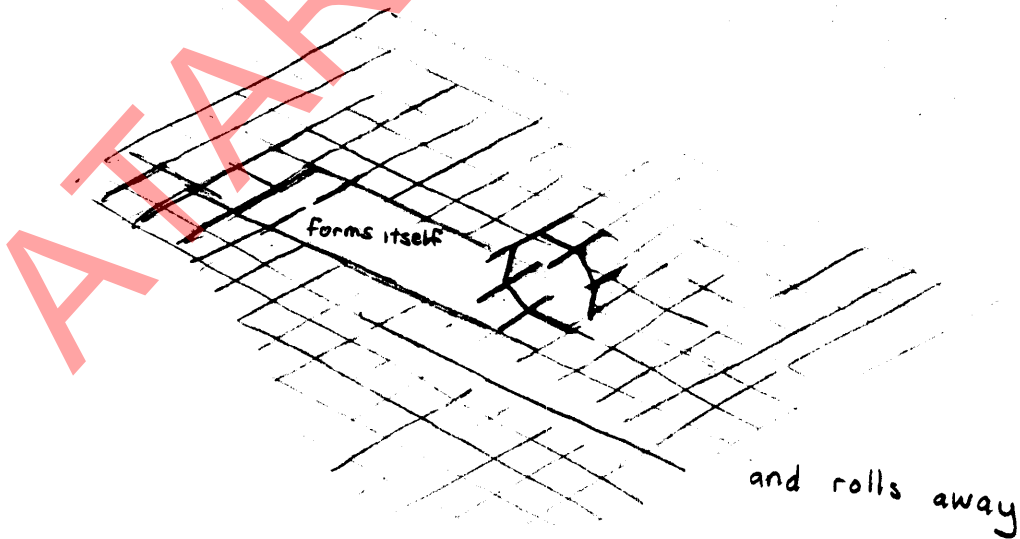
ORNAMENTAL:

WIZARD'S COLUMN: THE BUBBLES TRAVEL UP THE TUBE AND POP AT THE TOP.
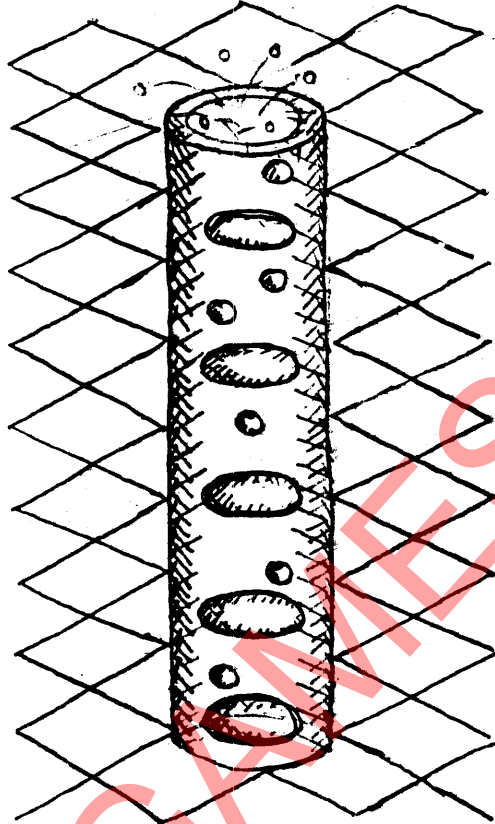
BUBBLE BLOWERS: THESE CONTINUALLY BLOW BUBBLES WHICH RISE UP THE SCREEN AND
POP AT A GIVEN HEIGHT. THE MARBLES BOUNCE OFF THE CONICAL
BASES OF THE BLOWERS.
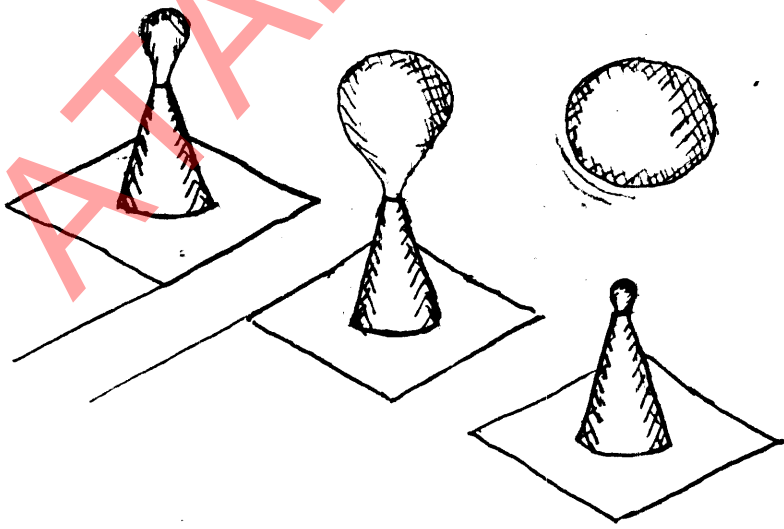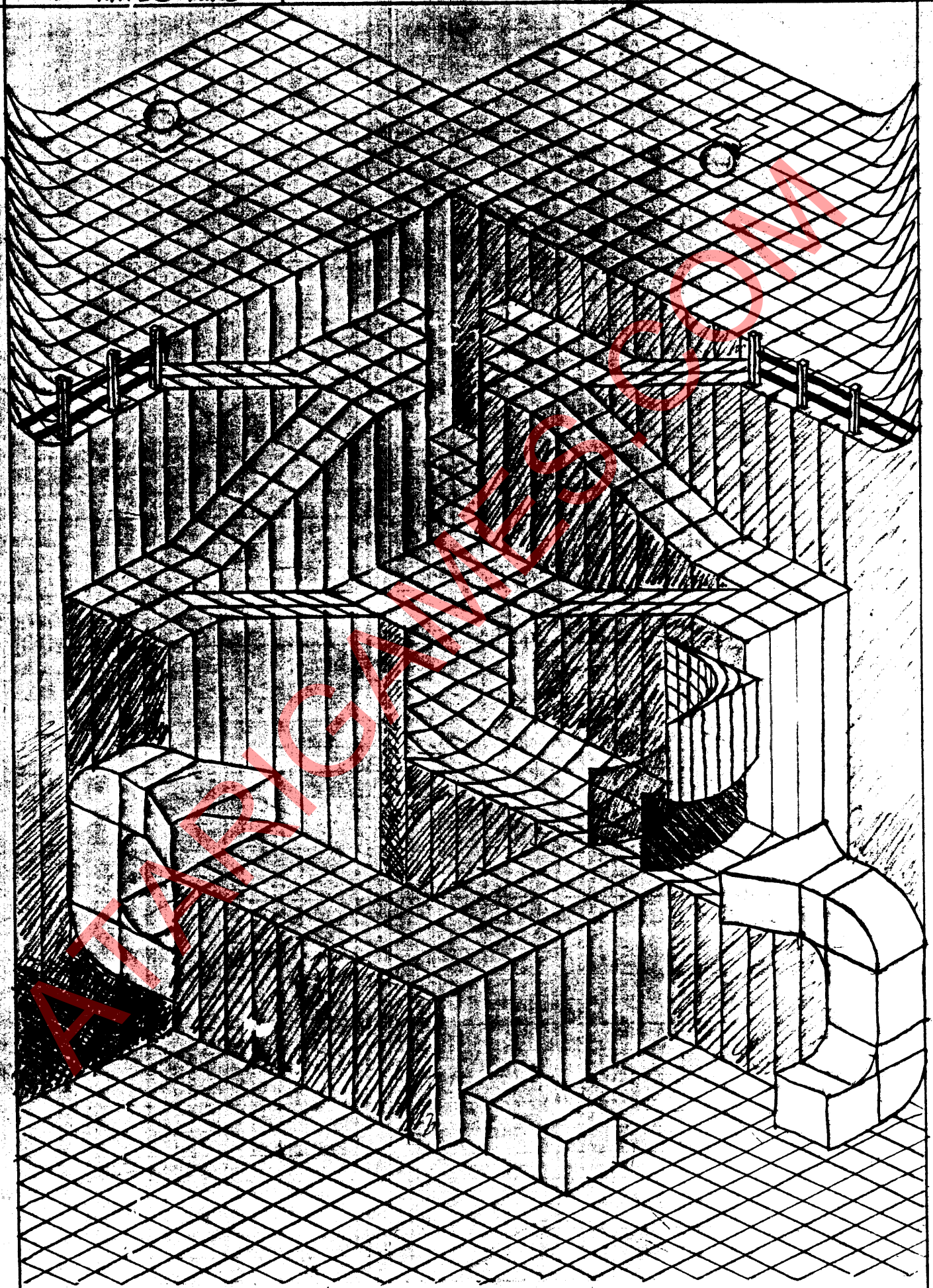
PROJECT INITIATION APPROVAL

NAME OF GAME: Marble Madness

FINAL INITIATION DATE: 4/19/84

TEAM: MANAGER   —Rusty Dawe
         PROJECT LEADER   —Rusty Dawe
         PROGRAMMER(S)   —Mark Cerny/Bob Flanagan
         ENGINEER   —Budget System
         TECHNICIAN   —To Be Announced
         GRAPHICS CONSULTANT —Chuck Swenson (TBA)
         SOUND/SPEECH SUPPORT—Brad Fuller (TBA)

APPROVALS:

J. Ray 4/25/84
JOHN RAY, DIRECTOR OF ELECTRICAL ENGINEERING

                                        *   * lets at least consider the
Dan Van Elderen 4/26/84   use of a "fake" motorized
DAN VAN ELDEREN, SENIOR VICE PRESIDENT   trakball (using some type
                                                  of clutched resistance tech-
M. Fujihara 4/30   nique - cost still critical).
MARY FUJIHARA, DIRECTOR MARKET RESEARCH   DVE

Skip Paul
SKIP PAUL, PRESIDENT COIN-OP DIVISION

IF YOU DO NOT APPROVE OF THE PROJECT AS DESCRIBED IN INITIATION, ATTACH
STATEMENT MEMO.

MARBLE MADNESS

Atari Games Division

Preliminary

Company Private

Date: 4/11/84

Submitted by: MM Development Team

1.0 INTRODUCTION

Omnichron (Marble Madness) is a real physical game played by 27th century humans using their ability of psychokinesis. In our century, we can simulate this ability with a track-ball. The resulting game has attributes of a sports competition, but with several additional strategic elements.

2.0 GAME PLAY

2.1 Basic Game Elements

2.1.1 Player Piece - The player controls a tinted glass sphere with flecks of color in it. He is opposed by computer-controlled mirror coated spheres which represent the opposing team - steelies.

2.1.2 Controls - The player uses a trak-ball to move his/her marble. The MTB (motorized trak-ball) originally conceived for use with this game has been eliminated in order to incorporate this game into the Premier (Budget) System. The console should contain two trak-balls to accommodate two player simultaneous play.

The player uses the trak-ball to control the direction and speed of his marble by rolling the trak-ball in the direction he/she wishes the marble to move. Different terrain features (such as sand, ice or hills) will require the player to roll the trackball faster or to change the direction of rotation in order to overcome the terrain obstacles.

2.1.3 Wave Goals - The player tries to get his/her marble to the goal before the opposing team can get their steelie through the goal. The player can do this by destroying the steelie and then taking his/her time to avoid playfield traps or by avoiding the steelie completely and going at maximum speed.

2.1.4 <u>Basic Playfield</u> - The playfield is a 3-D surface with valleys, hills, holes, ramps, with patches of other textures as well as fences, pipes and miscellaneous mechanical gadgets. The basic display is an isometric perspective which means:

* Playfield is tilted (so that objects farther away are higher up in the display.

* The objects do not decrease in size as they get farther away.

* The basic playfield is defined by parallels in two directions which form a grid. This provides curvature.

* The display grid lines are created from algorithmically pre-computed stamps, allowing both non-blocky lines and shading on the playfield to provide more curvature information. These lines are anti-aliased to provide smooth diagonals. This technique assures maximum utilization of the Premier (Budget) hardware.

* The playfield is longer than the screen and will scroll vertically to keep the marble that is in the lead on the screen.

2.1.5 <u>Aliens</u> - There are aliens on the playfield that may attack the player or the steelie indiscriminately. These are parts of the playfield which detach themselves to attack.

2.2 <u>Game Structure For One Player Play</u>

For one player games, the player is pitted against one lone steelie (computer controlled enemy).

2.2.1 <u>Wave 1 (Practice Wave)</u> - The player starts at the top of the screen and tries to reach the subgoal at the bottom of the screen within a fixed amount of time. The playfield will scroll up as he/she goes down to reveal the next subgoal, after which is the final goal. Subgoals are rings which span the only access to the playfield below them, and provide the player with a visible goal at all times. The player may die by:

* Falling off a cliff and being smashed when he/she hits the playfield below it.

* Falling down a hole (he/she hears a toc-toc-toc- splash).

* Hitting a wall too hard and being smashed (hitting it slower causes him/her to be stunned).

* Getting stuck in sand or some other resistive material. (This does not cause immediate death, but since the player is significantly delayed, causing possible death from running out of time, or by being lapped by opponent in more advanced waves.)

* Being smashed or buried by an alien.

If the player dies, he/she starts off again at the last subgoal he/she passed successfully. This wave should last less than 30 seconds if the player does not die on it.

2.2.2 Wave 2 (Beginner Competition) - We now reveal the game's larger structure. The player is in an Omnichron competition and is playing opposing teams of ever increasing ability. The player now has a "rating", which is currently listed as beginner, since he/she has never been in a competition before. He/she is up against a computer controlled steelie which is his/her beginner-rated opponent. The player must reach the goal before the steelie does, so there are some new strategies and some new ways to die:

* The steelie may beat the player to the goal. This results in loss of a player life and any loss of a life means he/she must begin this wave over again with the same rating. If the player beats the steelie to the goal, he/she gets an intermediate rating and advances to the intermediate round.

* The player may be lapped. The screen scrolls with the front runner in the race. If the player manages to be so far ahead of the steelie that it scrolls off the top of the screen (this is called "lapping), he/she gets mega points and advances to wave 3, the intermediate competition, with an intermediate rating. If the steelie laps the player he/she loses a life and goes back to the practice round. It is an advantage to be slightly behind your opponent.

* Aliens react equally toward both players and will tend to start out after the front runner.

* The player may bump the steelie. Bumping causes a transfer of velocities and stuns both player and opponent for a brief fraction of a second; so if one hits a wall it is smashed, or if one is bumped toward a cliff, there is no way of avoiding it in the stunned state.

    Advantages:
        * If the player can eliminate the steelie, there are only playfield obstacles between him/her and the goal.

        * The player can bump an opponent to change his angle to avoid an obstacle and transfer unwieldy velocity to the opponent.

Disadvantages:
* The steelie can kill the player using this same strategy.

* The player is stunned for a brief period during which he has no control.

* You can brake less than the steelie (if he's in front) bumping into him at high speed and sending him careening off a cliff.

2.2.3 Wave 3 (Intermediate Competition) - More of the same. Players compete for the advanced title with computer driven steelies, that is, reaching the goal first awards him an advanced title and advances him to the advanced competition.

Being lapped by the steelie demotes the player to the beginner rating and beginner competition (back one level).

Being smashed or being beaten to the goal keeps him on this round.

2.2.4 Wave 4 (Advanced Competition) - Players compete for expert title and so on...

2.3 Game Structure For Two Player Play

Players play simultaneously and have combined lives and ratings but separate scores.

2.3.1 Wave 1 (Practice Round) - A life is lost if neither player makes it to the goal, no life being lost if only one player makes it to the goal.

Points are awarded for killing one's partner, so healthy competition is encouraged. No loss of combined lives occurs for killing one's partner, however. In this vein, points are awarded to the first player to reach the goal or the sub-goals.

Playfield scrolls with the front runner. If the player who is behind scrolls off the screen, he is out for the round (no loss of combined lives).

2.3.2 <u>Wave 2 (Beginner Competition)</u> - The players are pitted against a beginner team of two steelies. The competition is awarded to the team of the marble that reaches the goal first, even if the other marble of this team has been destroyed.

The two players may gang up on and destroy a steelie. One player can collide with the steelie, stunning it and him. While stunned, any collision will smash the steelie, thus the other player runs into the steelie and smashes it. If the players runs into his partner, his partner will be smashed as well.

Two players together have an advantage over a lone player when facing terrain obstacles. Thus they will soon catch up with the lone remaining steelie, and maybe smash it too.

The screen scrolls with the front running marble. Thus the steelies may scroll the players off the screen if they are not fast enough, or a player can scroll his/her partner off the screen, etc. If both players are lapped by a steelie, a loss of combined lives occurs.
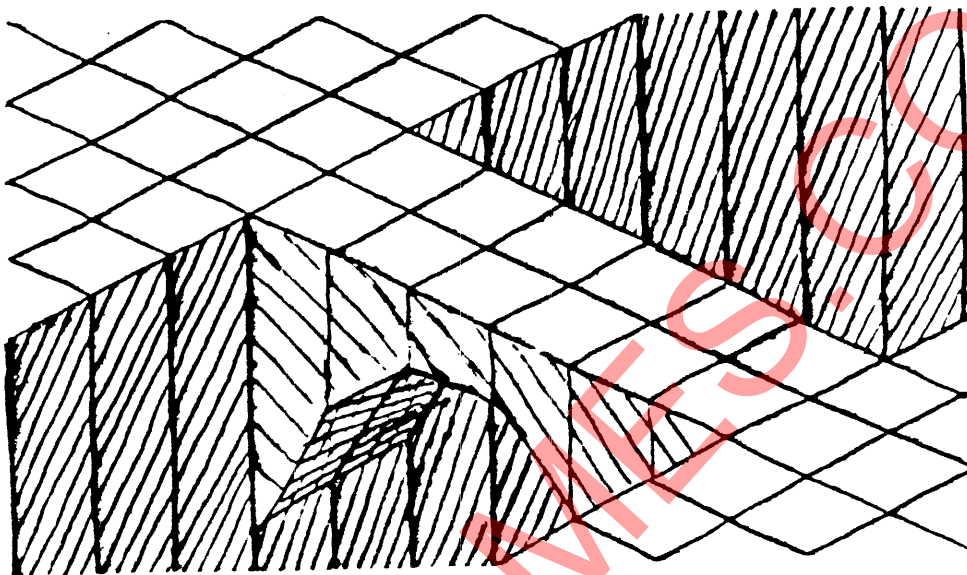
2.3.3 <u>Wave 3 (Intermediate Competition)</u> - More of the same. Advanced rating awarded to the players if they win.
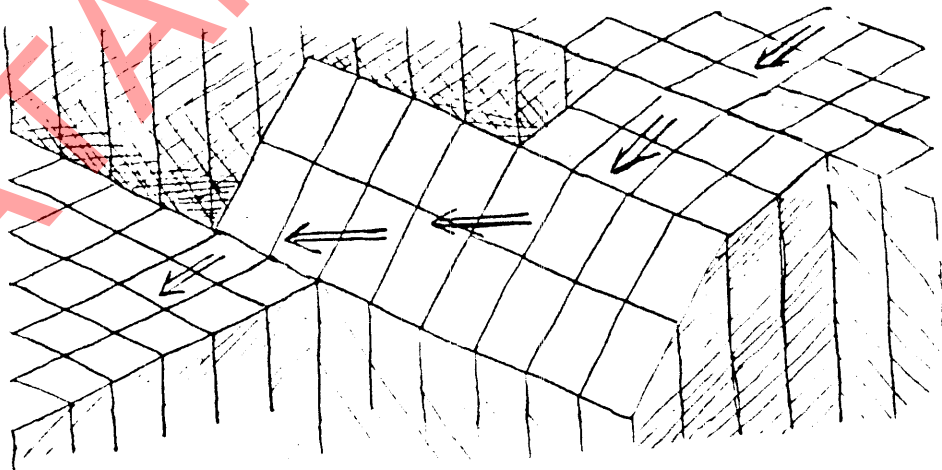
2.4 Sample Playfield Features

The following features appear on the various levels of play. Some are more advanced features which only appear at the upper levels of play.

2.4.1 Bridge (Skill Test - Favors Player Behind) - A narrow strip of playfield across a hole. It is fatal to fall off the bridge (sound affects of toc-toc-toc- splash as he falls)

2.4.2 Traverse (Skill Test - Favors Player Behind) - A section of playfield at a tilt with a cliff beneath it. It is accessible from above and has an exit to the left (or right). The player must traverse it by always pushing the track-ball up and to the left to counter gravity. The marble behind can bump the one in front off the cliff at the bottom or bump him down the traverse at high speed.

2.4.3 Elastic Barricade (Two Player Co-operative) - This blocks the
quickest path down the slope. If struck by one player, it slows
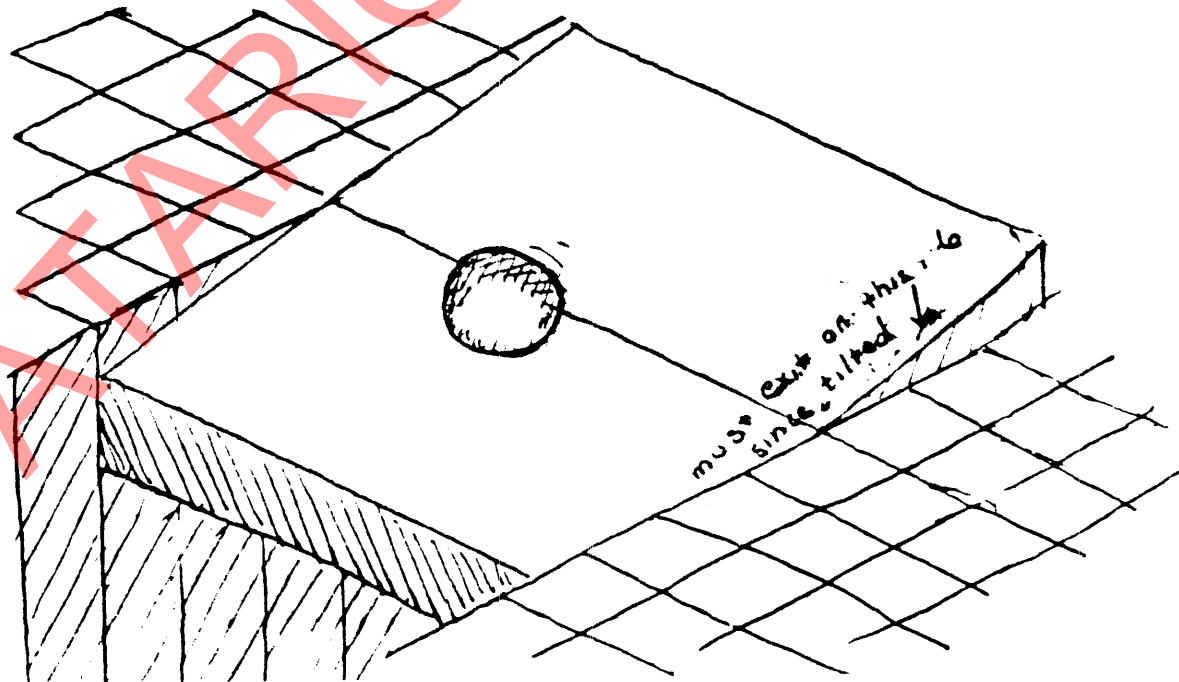him/her down and shoots him the other way, irrespective of his speed
(this could be a possible attack method). Two players at high speed
can break through the barricade by virtue of the increased force.

2.4.4 Ice Block (Two Player Co-operative) - This is a section of
differently colored playfield that acts as if it were a block of
unsteady ice floating in water. If one player attempts to cross it
the block will tilt and cast him off unless he/she crosses it at its
exact center (tilt is restricted to one direction). If two players
cross on opposing edges they can do so at any desired speed.

2.4.5 Counterweight Elevator (Two Player Co-operative) - This is an area that can sink with the weight of two players, but won't budge with only one (or will only proceed downward very, very slowly with only one player) due to the size of the counterweight.

2.4.6 Gravitational Funnel (Player Separator) - This is a depression in the playfield that resembles the gravitational well created by a black hole. Two paths close together are wildly divergent after they pass close by as the hole can swing a marble around 90 degrees quite readily.

2.4.7 Two Exit Tubes (Player Separator) - These are tubes with one entrance and two exits, placed at spots on the playfield that are far apart. The marbles come out a random exit.

2.4.8 <u>Rat Trap</u> (<u>Skill Test</u> – <u>Favors Player Ahead</u>) – This is a cage placed on top of two fragile supports. After one marble passes under it and smashes the supports, it will fall. Hopefully it traps the following marble.

2nd Marble

1st Marble

2.4.9 <u>Teeter Totter</u> (<u>Skill Test</u> – <u>Favors Player Ahead</u>) – A teeter-totter is placed as the only convenient means of exit from a plateau. When a marble rolls onto it the end sinks down to the lower level, trapping the following marble on the plateau. The teeter-totter then slowly returns to its initial state, having caused considerable delay.

2.4.10 Inverse Whac-a-mole (Skill Test - Timing) - There is a metallic area of the playfield with circular markings in it in a regular pattern. These are the gaps between cylindrical holes and the cylinders which occupy them. One of the cylinders is always popping up and one going down, randomly. Collision with a cylinder is deadly.

2.4.11 Moving Bridge (Skill Test - Timing) - This is a miniature-golf contraption. Two blocks of playfield material extend to bridge a chasm, join to form a flat bridge, then pull apart several seconds later in a cyclical process.

2.4.12 The Wave (Living Playfield Hazard) - This is a ripple in the
playfield material itself. It moves around the playfield, reflecting
off of walls and deflecting the marbles.   It can crest over and
attempt to bury the marbles in playfield material.

2.4.13 Grid Guardians (Living Playfield Hazard) - These are created
to keep the player from delaying the game when the steelies are not
present. They are sections of the game grid which pull themselves up
and form into spiked, deadly aliens. Collision with them is fatal.

Forms itself

and rolls away

2.4.14 <u>Wizard's Column</u> (<u>Ornamental Playfield Feature</u>) - The bubbles travel up the tube and pop at the top. This might even be used as an elevator to permit the player to return backwards up the playfield (to help a partner, perhaps).

2.4.15 <u>Bubble Blowers</u> (<u>Ornamental Playfield Feature</u>) - These continually blow bubbles which rise up the screen and pop at a given height. The marbles bounce off the conical bases of the blowers.

Advanced Race

Typical Generated Playfield

3.0 PROJECT ELEMENTS

3.1 Project Team Composition

Project Leader: Russell Dawe
Programmers: Mark Cerny, Bob Flanagan
Engineer: Budget System
Tech: TBD
Graphics Consultant: Chuck Swenson (TBD)
Sound/Speech support: Brad Fuller (TBD)

3.2 Hardware Description

Processor: 68010 @ 7.16 MHz
  Program ROM: 128k words maximum (64k words for use with MM)
  Program RAM: 2k words

Graphics: Macho 56
  Display: 320 x 240 pixels - raster
  Motion Objects: 56 - 8 pixels wide x 8n pixels high. 1 to 8
                  planes deep (4 planes deep expected for use
                  with MM).
  Playfield: 40 stamps wide x 30 stamps tall. Stamps are 8 x 8
             pixels of 1 to 8 planes deep (5 or 6 planes deep
             expected for use with MM).
  RAM Based Motion Object: Single 64 x 64 or double 32 wide x 64
                           high motion object. (Highly desirable
                           for use with MM.)
  Graphics Storage: Playfield has minimum of 2048 objects. (4096
                    expected for use with MM.) Motion objects
                    have a minimum of 2048 8 x 8 objects. (2048
                    expected for use with MM.)

3.3 Hardware Cost Estimate

The following estimate is for the Marble Madness cartridge PC
board. Also included is an estimate for the delta cost incurred
in using the dual trackball control configuration.

Catridge PC Board Cost:

```
* ROMS............................................. $92.00
  Misc. logic......................................  10.00
  PC Board (4 layer 11.5 x 8)......................  40.00
                                                    --------
                                          Total    $142.00
```

*ROMS Breakdown:

```
   4    23256   Motion Object ROMs (4096 8x8x4 bits)
   4    23128   Playfield Object ROMs (2048 8x8x6 bits)
   1    23256   Sound Program ROM
   2    23128   Game Program ROMs
   2    23256   Game Program ROMs

   7    23256 @ 8.00 = $56
   8    23128 @ 4.50 =  36
                       ---
                       $92
```

Delta Control Panel Cost:

```
  Dual Trackball Controlers (no buttons).............. $58.00
  Standard Control Panel (1 analog joystick, 2 btns)  < 22.00>
                                                      --------
                                         Delta Cost   $36.00
```

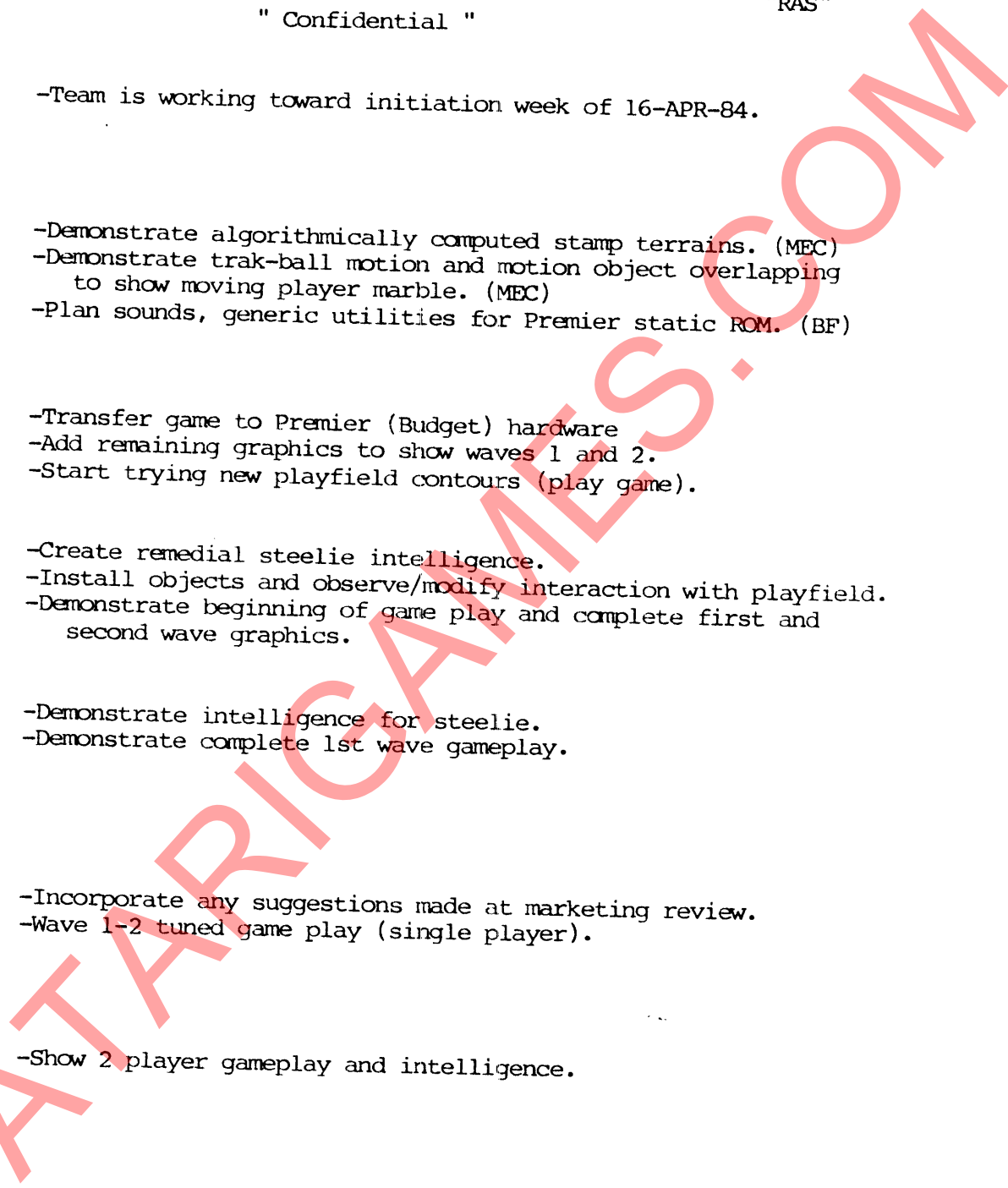## 3.4 Development Schedule

```
                        PROJECT DEVELOPMENT STATUS      MARBLE MADNESS
DATE: 9-APR-84          PROJECT LEADER: DAWE      PROJECT START:  16-APR-84
LAB : TBD                       EXT:  7416        PROJECT #:  XXX
                                                            "RAS"
                                " Confidential "
   16-APR-84
------------
:  PROJECT  :     -Team is working toward initiation week of 16-APR-84.
:   START   :
------------
     :
   28-MAY-84
------------      -Demonstrate algorithmically computed stamp terrains. (MEC)
:   1ST     :     -Demonstrate trak-ball motion and motion object overlapping
: ENG. REV. :        to show moving player marble. (MEC)
------------      -Plan sounds, generic utilities for Premier static ROM. (BF)
     :
   1-JUN-84
------------
: HARDWARE  :     -Transfer game to Premier (Budget) hardware
: ARRIVES   :     -Add remaining graphics to show waves 1 and 2.
------------      -Start trying new playfield contours (play game).
     :
   9-JUL-84
------------      -Create remedial steelie intelligence.
:   2ND     :     -Install objects and observe/modify interaction with playfield.
:  IG. REV. :     -Demonstrate beginning of game play and complete first and
------------         second wave graphics.
     :
   6-AUG-84
------------      -Demonstrate intelligence for steelie.
:   1ST     :     -Demonstrate complete 1st wave gameplay.
: MKTG. REV.:
------------
     :
   13-AUG-84
------------
:  FOCUS    :     -Incorporate any suggestions made at marketing review.
:  GROUP    :     -Wave 1-2 tuned game play (single player).
------------
     :
   17-SEP-84
------------
:   2ND     :     -Show 2 player gameplay and intelligence.
: MKTG. REV.:
------------
     :
   ??-SEP-84
------------
:  FIELD    :     -Incorporate suggestions made at second marketing review.
:  TEST     :     -Tune all waves.
  ----------
     :
   ??-OCT-84
------------
: PROD. REL.:
:           :
------------
```

MARBLE MADNESS

Atari Games Division

Preliminary

Company Private

Date: 4/11/84

Submitted by: MM Development Team

1.0   INTRODUCTION

Omnichron (Marble Madness) is a real physical game played by 27th century humans using their ability of psychokinesis. In our century, we can simulate this ability with a track-ball. The resulting game has attributes of a sports competition, but with several additional strategic elements.

2.0   GAME PLAY

2.1   Basic Game Elements

2.1.1   Player Piece – The player controls a tinted glass sphere with flecks of color in it. He is opposed by computer-controlled mirror coated spheres which represent the opposing team – steelies.

2.1.2   Controls – The player uses a trak-ball to move his/her marble. The MTB (motorized trak-ball) originally conceived for use with this game has been eliminated in order to incorporate this game into the Premier (Budget) System. The console should contain two trak-balls to accommodate two player simultaneous play.

The player uses the trak-ball to control the direction and speed of his marble by rolling the trak-ball in the direction he/she wishes the marble to move. Different terrain features (such as sand, ice or hills) will require the player to roll the trackball faster or to change the direction of rotation in order to overcome the terrain obstacles.

2.1.3 Wave Goals – The player tries to get his/her marble to the goal before the opposing team can get their steelie through the goal. The player can do this by destroying the steelie and then taking his/her time to avoid playfield traps or by avoiding the steelie completely and going at maximum speed.

2.1.4 Basic Playfield - The playfield is a 3-D surface with valleys, hills, holes, ramps, with patches of other textures as well as fences, pipes and miscellaneous mechanical gadgets. The basic display is an isometric perspective which means:

* Playfield is tilted (so that objects farther away are higher up in the display.

* The objects do not decrease in size as they get farther away.

* The basic playfield is defined by parallels in two directions which form a grid. This provides curvature.

* The display grid lines are created from algorithmically pre-computed stamps, allowing both non-blocky lines and shading on the playfield to provide more curvature information. These lines are anti-aliased to provide smooth diagonals. This technique assures maximum utilization of the Premier (Budget) hardware.

* The playfield is longer than the screen and will scroll vertically to keep the marble that is in the lead on the screen.

2.1.5 Aliens - There are aliens on the playfield that may attack the player or the steelie indiscriminately. These are parts of the playfield which detach themselves to attack.

2.2 Game Structure For One Player Play

For one player games, the player is pitted against one lone steelie (computer controlled enemy).

2.2.1 Wave 1 (Practice Wave) - The player starts at the top of the screen and tries to reach the subgoal at the bottom of the screen within a fixed amount of time. The playfield will scroll up as he/she goes down to reveal the next subgoal, after which is the final goal. Subgoals are rings which span the only access to the playfield below them, and provide the player with a visible goal at all times. The player may die by:

* Falling off a cliff and being smashed when he/she hits the playfield below it.

* Falling down a hole (he/she hears a toc-toc-toc- splash).

* Hitting a wall too hard and being smashed (hitting it slower causes him/her to be stunned).

* Getting stuck in sand or some other resistive material. (This does not cause immediate death, but since the player is significantly delayed, causing possible death from running out of time, or by being lapped by opponent in more advanced waves.)

* Being smashed or buried by an alien.

If the player dies, he/she starts off again at the last subgoal he/she passed successfully. This wave should last less than 30 seconds if the player does not die on it.

2.2.2 Wave 2 (Beginner Competition) - We now reveal the game's larger structure. The player is in an Omnichron competition and is playing opposing teams of ever increasing ability. The player now has a "rating", which is currently listed as beginner, since he/she has never been in a competition before. He/she is up against a computer controlled steelie which is his/her beginner-rated opponent. The player must reach the goal before the steelie does, so there are some new strategies and some new ways to die:

* The steelie may beat the player to the goal. This results in loss of a player life and any loss of a life means he/she must begin this wave over again with the same rating. If the player beats the steelie to the goal, he/she gets an intermediate rating and advances to the intermediate round.

* The player may be lapped. The screen scrolls with the front runner in the race. If the player manages to be so far ahead of the steelie that it scrolls off the top of the screen (this is called "lapping), he/she gets mega points and advances to wave 3, the intermediate competition, with an intermediate rating. If the steelie laps the player he/she loses a life and goes back to the practice round. It is an advantage to be slightly behind your opponent.

* Aliens react equally toward both players and will tend to start out after the front runner.

* The player may bump the steelie. Bumping causes a transfer of velocities and stuns both player and opponent for a brief fraction of a second; so if one hits a wall it is smashed, or if one is bumped toward a cliff, there is no way of avoiding it in the stunned state.

   Advantages:
   * If the player can eliminate the steelie, there are only playfield obstacles between him/her and the goal.

   * The player can bump an opponent to change his angle to avoid an obstacle and transfer unwieldy velocity to the opponent.

Disadvantages:
* The steelie can kill the player using this same strategy.

* The player is stunned for a brief period during which he has no control.

* You can brake less than the steelie (if he's in front) bumping into him at high speed and sending him careening off a cliff.

2.2.3 <u>Wave</u> <u>3</u> (Intermediate Competition) - More of the same. Players compete for the advanced title with computer driven steelies, that is, reaching the goal first awards him an advanced title and advances him to the advanced competition.

Being lapped by the steelie demotes the player to the beginner rating and beginner competition (back one level).

Being smashed or being beaten to the goal keeps him on this round.

2.2.4 <u>Wave</u> <u>4</u> (Advanced Competition) - Players compete for expert title and so on...

2.3 <u>Game Structure For Two Player Play</u>

Players play simultaneously and have combined lives and ratings but separate scores.

2.3.1 <u>Wave</u> <u>1</u> (Practice Round) - A life is lost if neither player makes it to the goal, no life being lost if only one player makes it to the goal.

Points are awarded for killing one's partner, so healthy competition is encouraged. No loss of combined lives occurs for killing one's partner, however. In this vein, points are awarded to the first player to reach the goal or the sub-goals.

Playfield scrolls with the front runner. If the player who is behind scrolls off the screen, he is out for the round (no loss of combined lives).

2.3.2 <u>Wave 2 (Beginner Competition)</u> - The players are pitted against
a beginner team of two steelies. The competition is awarded to the
team of the marble that reaches the goal first, even if the other
marble of this team has been destroyed.

The two players may gang up on and destroy a steelie. One player can
collide with the steelie, stunning it and him. While stunned, any
collision will smash the steelie, thus the other player runs into the
steelie and smashes it. If the players runs into his partner, his
partner will be smashed as well.

Two players together have an advantage over a lone player when facing
terrain obstacles. Thus they will soon catch up with the lone
remaining steelie, and maybe smash it too.
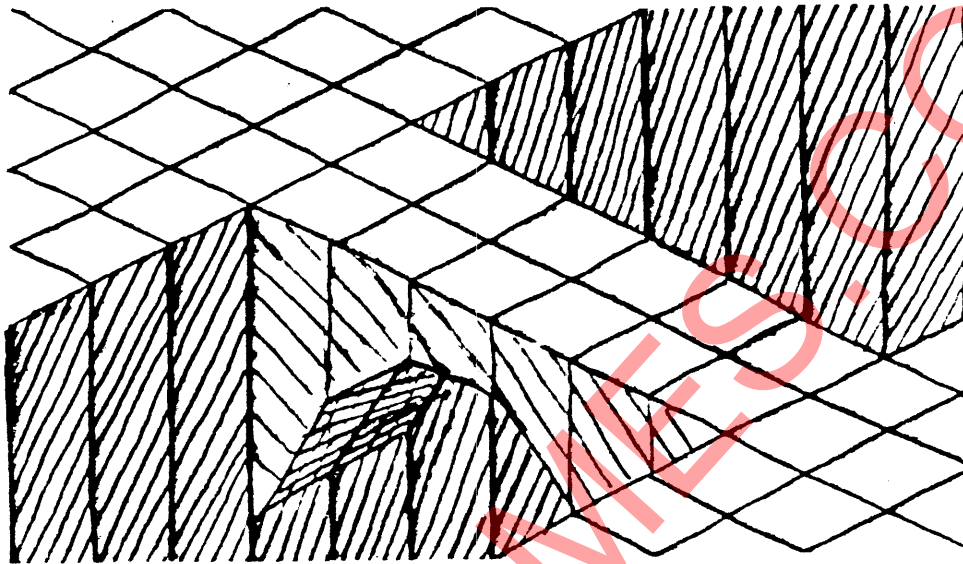
The screen scrolls with the front running marble. Thus the steelies
may scroll the players off the screen if they are not fast enough, or
a player can scroll his/her partner off the screen, etc. If both
players are lapped by a steelie, a loss of combined lives occurs.

2.3.3 <u>Wave 3 (Intermediate Competition)</u> - More of the same.
Advanced rating awarded to the players if they win.

2.4 Sample Playfield Features

The following features appear on the various levels of play. Some are
more advanced features which only appear at the upper levels of play.

2.4.1 Bridge (Skill Test - Favors Player Behind) - A narrow strip of
playfield across a hole. It is fatal to fall off the bridge (sound
affects of toc-toc-toc- splash as he falls)

2.4.2 Traverse (Skill Test - Favors Player Behind) - A section of
playfield at a tilt with a cliff beneath it. It is accessible from
above and has an exit to the left (or right). The player must
traverse it by always pushing the track-ball up and to the left to
counter gravity. The marble behind can bump the one in front off the
cliff at the bottom or bump him down the traverse at high speed.

2.4.3 Elastic Barricade (Two Player Co-operative) - This blocks the
quickest path down the slope.   If struck by one player, it slows
him/her down and shoots him the other way, irrespective of his speed
(this could be a possible attack method).   Two players at high speed
can break through the barricade by virtue of the increased force.

2.4.4 Ice Block (Two Player Co-operative) - This is a section of
differently colored playfield that. acts as if it were a block of
unsteady ice floating in water.   If one player attempts to cross it
the block will tilt and cast him off unless he/she crosses it at its
exact center (tilt is restricted to one direction).   If two players
cross on opposing edges they can do so at any desired speed.

2.4.5 <u>Counterweight Elevator (Two Player Co-operative)</u> - This is an area that can sink with the weight of two players, but won't budge with only one (or will only proceed downward very, very slowly with only one player) due to the size of the counterweight.

2.4.6 <u>Gravitational Funnel</u> (<u>Player Separator</u>) - This is a depression in the playfield that resembles the gravitational well created by a black hole. Two paths close together are wildly divergent after they pass close by as the hole can swing a marble around 90 degrees quite readily.

2.4.7 <u>Two Exit Tubes</u> (<u>Player Separator</u>) - These are tubes with one entrance and two exits, placed at spots on the playfield that are far apart. The marbles come out a random exit.

2.4.8 <u>Rat Trap</u> <u>(Skill Test</u> – <u>Favors Player Ahead)</u> – This is a cage placed on top of two fragile supports. After one marble passes under it and smashes the supports, it will fall. Hopefully it traps the following marble.

2nd Marble

1st Marble

2.4.9 <u>Teeter Totter (Skill Test</u> – <u>Favors Player Ahead)</u> – A teeter-totter is placed as the only convenient means of exit from a plateau. When a marble rolls onto it the end sinks down to the lower level, trapping the following marble on the plateau. The teeter-totter then slowly returns to its initial state, having caused considerable delay.

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2.4.11 <u>Moving</u> <u>Bridge</u> (Skill Test - Timing) - This is a miniature-golf contraption. Two blocks of playfield material extend to bridge a chasm, join to form a flat bridge, then pull apart several seconds later in a cyclical process.

2.4.12 The Wave (Living Playfield Hazard) - This is a ripple in the
playfield material itself. It moves around the playfield, reflecting
off of walls and deflecting the marbles.   It can crest over and
attempt to bury the marbles in playfield material.

2.4.13 Grid Guardians (Living Playfield Hazard) - These are created
to keep the player from delaying the game when the steelies are not
present. They are sections of the game grid which pull themselves up
and form into spiked, deadly aliens. Collision with them is fatal.

2.4.14 Wizard's Column (Ornamental Playfield Feature) - The bubbles travel up the tube and pop at the top. This might even be used as an elevator to permit the player to return backwards up the playfield (to help a partner, perhaps).

2.4.15 Bubble Blowers (Ornamental Playfield Feature) - These continually blow bubbles which rise up the screen and pop at a given height. The marbles bounce off the conical bases of the blowers.

Advanced Race

Typical Generated Playfield

3.0 PROJECT ELEMENTS

3.1 Project Team Composition

Project Leader: Russell Dawe
Programmers: Mark Cerny, Bob Flanagan
Engineer: Budget System
Tech: TBD
Graphics Consultant: Chuck Swenson (TBD)
Sound/Speech support: Brad Fuller (TBD)

3.2 Hardware Description

Processor: 68010 @ 7.16 MHz
    Program ROM: 128k words maximum (64k words for use with MM)
    Program RAM: 2k words

Graphics: Macho 56
    Display: 320 x 240 pixels - raster
    Motion Objects: 56 - 8 pixels wide x 8n pixels high. 1 to 8
                    planes deep (4 planes deep expected for use
                     with MM).
    Playfield: 40 stamps wide x 30 stamps tall. Stamps are 8 x 8
             pixels of 1 to 8 planes deep (5 or 6 planes deep
             expected for use with MM).
    RAM Based Motion Object: Single 64 x 64 or double 32 wide x 64
                         high motion object. (Highly desirable
                         for use with MM.)
    Graphics Storage: Playfield has minimum of 2048 objects. (4096
                 expected for use with MM.) Motion objects
                 have a minimum of 2048 8 x 8 objects. (2048
                 expected for use with MM.)

3.3 Hardware Cost Estimate

The following estimate is for the Marble Madness cartridge PC board. Also included is an estimate for the delta cost incurred in using the dual trackball control configuration.

Catridge PC Board Cost:

```
*  ROMS........................................... $92.00
   Misc. logic....................................   10.00
   PC Board (4 layer 11.5 x 8).....................   40.00
                                                     -------
                                      Total         $142.00
```

*ROMS Breakdown:

```
    4    23256   Motion Object ROMs (4096 8x8x4 bits)
    4    23128   Playfield Object ROMs (2048 8x8x6 bits)
    1    23256   Sound Program ROM
    2    23128   Game Program ROMs
    2    23256   Game Program ROMs

    7    23256 @ 8.00 = $56
    8    23128 @ 4.50 =  36
                        ---
                        $92
```

Delta Control Panel Cost:

```
    Dual Trackball Controlers (no buttons).............. $58.00
    Standard Control Panel (1 analog joystick, 2 btns)  < 22.00>
                                                        -------
                                      Delta Cost         $36.00
```

3.4 Development Schedule

```
                    PROJECT DEVELOPMENT STATUS      MARBLE MADNESS
DATE: 9-APR-84      PROJECT LEADER: DAWE      PROJECT START:  16-APR-84
LAB : TBD                   EXT:  7416        PROJECT #:  XXX
                                                          "RAS"
                          " Confidential "

   16-APR-84
------------
:  PROJECT  :    -Team is working toward initiation week of 16-APR-84.
:   START   :
------------
      :
   28-MAY-84
------------     -Demonstrate algorithmically computed stamp terrains. (MEC)
:   1ST    :     -Demonstrate trak-ball motion and motion object overlapping
: ENG. REV. :       to show moving player marble. (MEC)
------------     -Plan sounds, generic utilities for Premier static ROM. (BF)
      :
   1-JUN-84
------------
: HARDWARE  :    -Transfer game to Premier (Budget) hardware
: ARRIVES   :    -Add remaining graphics to show waves 1 and 2.
------------     -Start trying new playfield contours (play game).
      :
   9-JUL-84
------------     -Create remedial steelie intelligence.
   2ND     :     -Install objects and observe/modify interaction with playfield.
: ENG. REV. :    -Demonstrate beginning of game play and complete first and
------------        second wave graphics.
      :
   6-AUG-84
------------     -Demonstrate intelligence for steelie.
:   1ST    :     -Demonstrate complete 1st wave gameplay.
: MKTG. REV.:
------------
      :
   13-AUG-84
------------
:   FOCUS   :    -Incorporate any suggestions made at marketing review.
:   GROUP   :    -Wave 1-2 tuned game play (single player).
------------
      :
   17-SEP-84
------------
:   2ND     :    -Show 2 player gameplay and intelligence.
: MKTG. REV.:
------------
      :
   ??-SEP-84
------------
    FIELD   :    -Incorporate suggestions made at second marketing review.
    TEST    :    -Tune all waves.
------------
      :
   ??-OCT-84
------------
: PROD. REL.:
:           :
------------
```

3.3 Hardware Cost Estimate

The following estimate is for the Marble Madness cartridge PC
board.   Also included is an estimate for the delta cost incurred
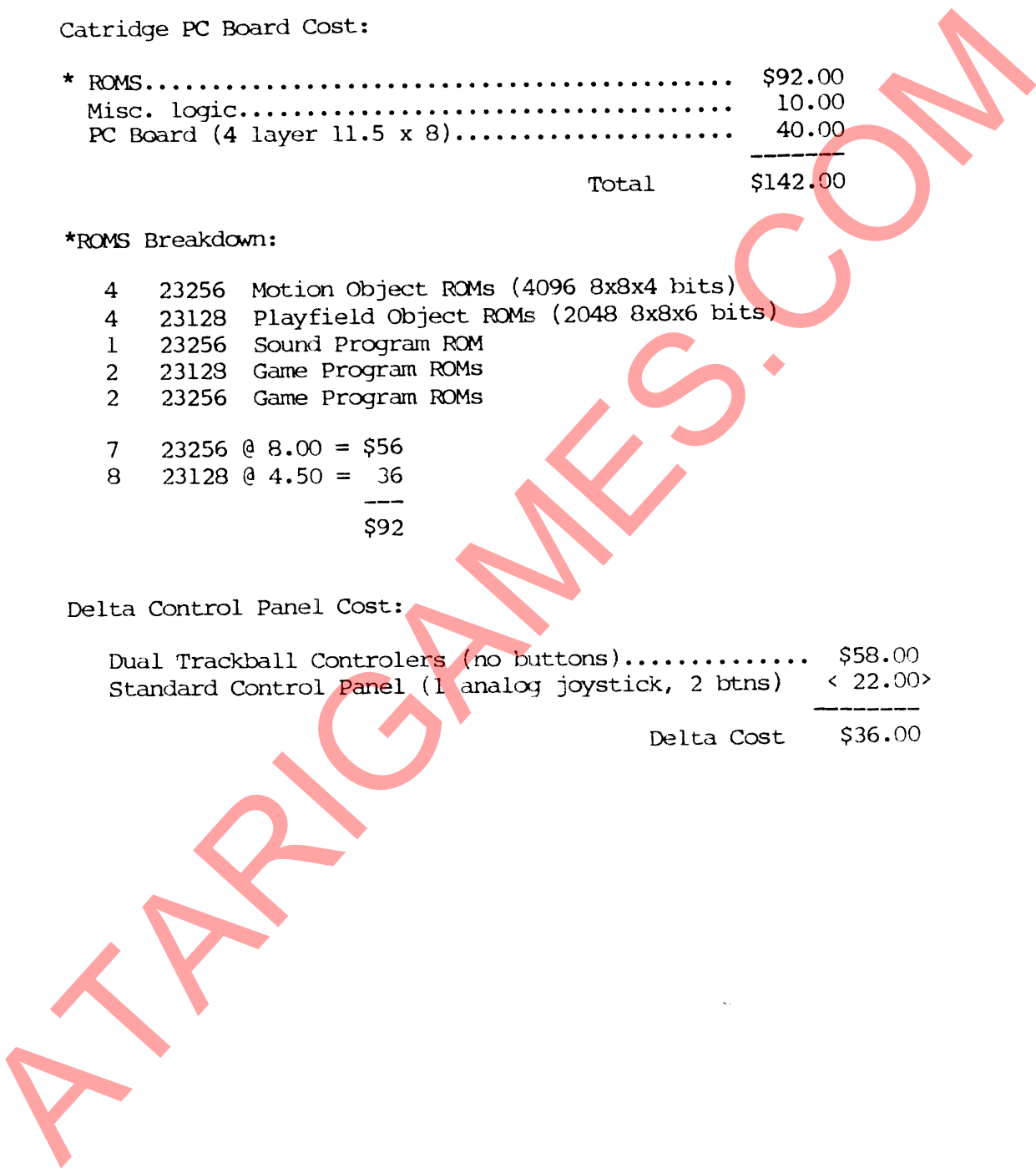in using the dual trackball control configuration.

Catridge PC Board Cost:

```
* ROMS.......................................... $103.50
  Misc. logic....................................   10.00
  PC Board (4 layer 11.5 x 8).....................   40.00
                                                    -------
                                  Total            $142.00
                                                   153.50
```

*ROMS Breakdown:

```
                                         2048
   4   23128   Motion Object ROMs (4096 8x8x4 bits)
   6   23256   Playfield Object ROMs (2048 8x8x6 bits)
   1   23256   Sound Program ROM      4096
   2   23128   Game Program ROMs
   2   23256   Game Program ROMs

   9   23256 @ 8.00 = $72.00
   6   23128 @ 4.50 =  31.50
                     -------
                     $103.50
```

Delta Control Panel Cost:

```
   Dual Trackball Controlers (no buttons)..............   $58.00
   Standard Control Panel (1 analog joystick, 2 btns)   < 22.00>
                                                          --------
                                   Delta Cost            $36.00
```
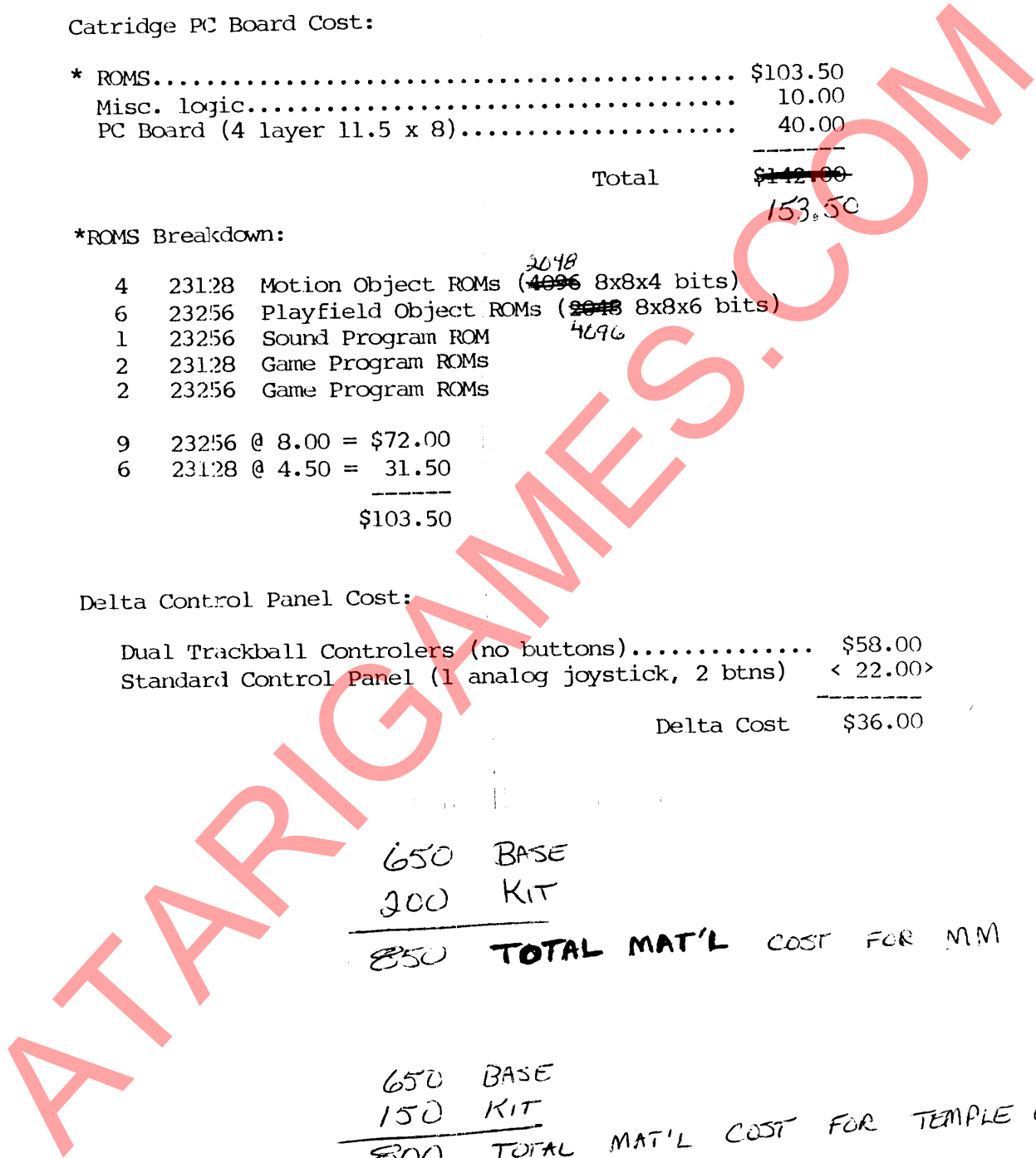
```
   650   BASE
   200   KIT
   -----
   850   TOTAL MAT'L COST FOR MM


   650   BASE
   150   KIT
   -----
   800   TOTAL MAT'L COST FOR TEMPLE OF DOOM
```

SYSTEM I COST SUMMARY
8 NOV 84

CONFIDENTIAL

Marble

FACTORY BUILT GAME WITH KIT INSTALLED

	DECEMBER MARBLE	FEBRUARY MARBLE	MARCH MARBLE	DOOM	PACKRAT
MATERIAL	1123.08	1074.83 1050	975.63	941.93	971.63
LABOR					
PC MFG	30.00	30.00	30.00	30.00	30.00
SUB-ASSY	7.50	7.50	7.50	7.50	7.50
FINAL-ASSY	8.00	8.00 130	8.00	8.00	8.00
OVERHEAD	118.00	118.00	118.00	118.00	118.00
ROYALTY(7%)	-	-	-	125.00	-
FULLY ABSORBED COST	1286.58	1238.33	1139.13	1230.43	1135.13

1230
1150

→ Hayes $190

90 over goal

KIT COST SHIPPED AS A KIT (CUSTOM CART W/ ROM)

	MARBLE	DOOM	PACKRAT
MATERIAL			
STANDARD KIT	179.84	146.14	175.84
MANUAL	2	2	2
SHIPPING BOX	5	5	5
LABOR			
PC MFG.	10.00	10.00	10.00
SUB-ASSY	2.00	2.00	2.00
FINAL-ASSY	2.00	2.00	2.00
OVERHEAD	33.00	33.00	33.00
ROYALTY(10%)		49.50	
FULLY ABSORBED COST	233.84	249.64	229.84

******** see Appendix 2: Labor and Overhead Calculations

[TM=TTL MAIN; TC=TTL CART; CM=CUST. MAIN]

	BASE	December MARBLE EPROM TM/TC	February MARBLE EPROM TM/CC	March MARBLE ROM CM/CC	DOOM ROM	PACKRAT ROM
...ONICS SYSTEM						
Display (1)	145	145	145	145	145	145
Audio/regulator(2)	23	23	23	23	23	23
Power Supply(3)	38	38	38	38	38	38
Game PCB's						
Base, 17.5x17.5 (5)	323	323	323	300	300	300
Pwr. Supply Base plate (7)	1	1	1	1	1	1
RF GROUND PLANE (9) 12.45	7	7	7	7	7	7
Fan/Harness (10) + 11.81 incl. interior grill	9	9	9	9	9	9
Extra Filter Cap(8)	2	2	2	2	2	2
subtotal	548	548	548	525	525	525
COIN SYSTEM						
Coin Door (11) will be $35	41.50	41.50	41.50	41.50	41.50	41.50
Cash Box (12)	2.79	2.79	2.79	2.79	2.79	2.79
Coin Counter (14) will go up when we buy again	2.10	2.10	2.10	2.10	2.10	
subtotal	46.39	46.39	46.39	46.39	46.39	46.39
CABINET SYSTEM						
FABRICATED Wood cabinet (15)	140	140	140	140	140	140
Monitor Shield (16)	6.04	6.04	6.04	6.04	6.04	6.04
Shield retainer (17)	1	1	1	1	1	1
Monitor Bezel (18)	3.95	3.95	3.95	3.95	3.95	3.95
Attract Glass (19)	1.54	1.54	1.54	1.54	1.54	1.54
Attract glass retainer (21) (H-Molding)	2.47	2.47	2.47	2.47	2.47	2.47
Fluorescent light (23)	6.59	6.59	6.59	6.59	6.59	6.59
Speaker Grille (25)	5.63	5.63	5.63	5.63	5.63	5.63
Speakers (26)	4.00	4.00	4.00	4.00	4.00	4.00
Air Vent Grills (27)	1.75	1.75	1.75	1.75	1.75	1.75
Lock (28)	.75	.75	.75	.75	.75	.75
Draw Latches (29)	.68	.68	.68	.68	.68	.68
subtotal	174.40	174.40	174.40	174.40	174.40	174.40
OTHER						
Harnesses (24)	18	18	18	18	18	18
Pwr cord & On/off Sw. (33)	3	3	3	3	3	3
Labels, Manuals (34)	5	5	5	5	5	5
Side panel Decals (30)	13	13	13	13	13	13
Shipping Container (35)	11	11	11	11	11	11
subtotal	50	50	50	50	50	50
KIT, installed						
.PCB, Cart, 17.5x10 w/o Memory (6)	—	99.41	51.16	51.16	51.16	51.16
ROMs or EPROMs	—	147.00	147.00	70.80	71.10	100.90
.Attract Decal (20)	—	1.88	1.88	1.88	1.88	1.88
.Control Panel/Decal (22)	—	10	10	10	10	10
.Controls (31)	—	43	43	43	9	9
.Control Harness (32)	—	3	3	3	3	3
subtotal		304.29	256.04	179.84	146.14	175.
TOTAL MATERIAL COST	818.79	1123.08	1074.83	975.63	941.93	971.

~ 1190.00 12/10/84

3.3 Hardware Cost Estimate

The following estimate is for the Marble Madness cartridge PC
board. Also included is an estimate for the delta cost incurred
in using the dual trackball control configuration.

Catridge PC Board Cost:

```
*  ROMS.......................................... $103.50
   Misc. logic...................................   10.00
   PC Board (4 layer 11.5 x 8)...................   40.00
                                                  --------
                                    Total        $142.00
```
$153.50

*ROMS Breakdown:

```
   4   23128   Motion Object ROMs (4096 8x8x4 bits)
   6   23256   Playfield Object ROMs (2048 8x8x6 bits)
   1   23256   Sound Program ROM
   2   23128   Game Program ROMs
   2   23256   Game Program ROMs

   9   23256 @ 8.00 = $72.00
   6   23128 @ 4.50 =  31.50
                     --------
                      $103.50
```

Delta Control Panel Cost:

```
   Dual Trackball Controlers (no buttons)..............  $58.00
   Standard Control Panel (1 analog joystick, 2 btns)  < 22.00>
                                                       ---------
                                        Delta Cost      $36.00
```

Base add $36 to cost of base for more RAM
on base. (8k words more of parameter RAM)