



Parts and Operating Manual



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PROFESSOR PAC-MAN

GAME OPERATION

PROFESSOR PAC-MAN is a one or a two player game with a color T.V. monitor. The game gives a display which has all the parts shown in Figure 1-1

The game has five possible modes of operation: **ATTRACT**, **READY-TO-PLAY**, **PLAY**, **HIGH SCORE/INITIAL**, and **SELF-TEST**.

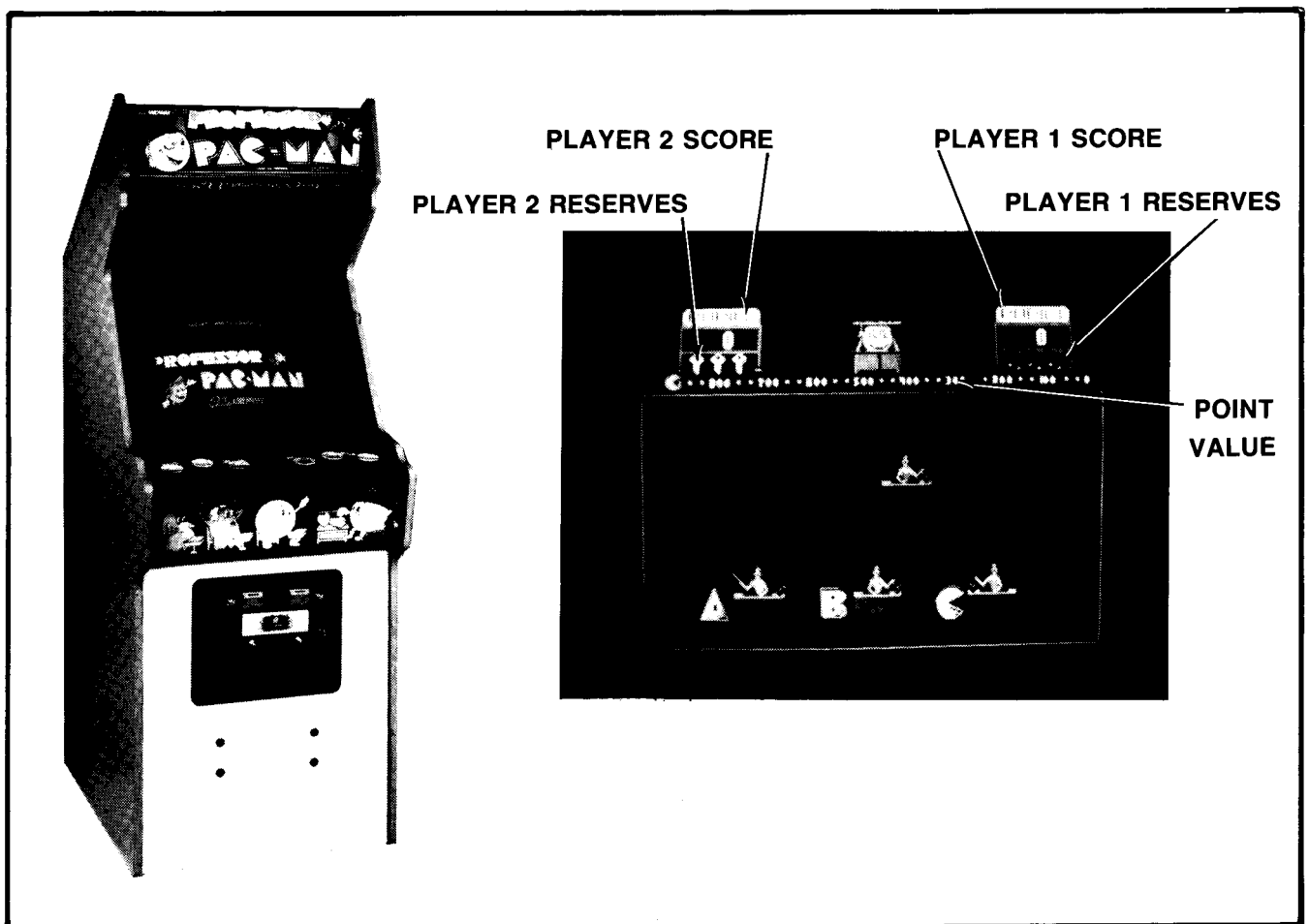


Figure 1-1 On Screen Graphics During Play

SELF-TEST MODE

The Self-Test mode is a special mode for checking the game switches and computer functions. It is the easiest and best way to check for proper operation of the entire game.

When in the Self-Test mode you will see a CURSOR (arrow pointing to the right) at the left edge of the monitor screen. To position the CURSOR, use the right hand (1 PLAYER) "A" — "B" — "C" Control Buttons. The "B" Button is used to select/exit a function indicated by the CURSOR. The "A" Button is used to move the CURSOR up the left hand side of the monitor screen while the "C" Button is used to move the CURSOR down the left hand side of the monitor screen.

To exit the Self-Test mode, turn the Self-Test Switch to the "OFF" position, move the CURSOR to any of the following words: "REPEAT", "RETURN", or "EXIT" (the exact wording depends on the test level you are in), and press the "B" Button.

Displays of test results will generally take one of two forms: 1) a display of colored rectangles, or 2) the words "GOOD", "BAD" or "OK". In the colored rectangle displays, generally **GREEN** means **GOOD** and **RED** means **BAD**. Failures of any of the **CIRCUITRY TESTS** will probably require P.C. Board swapping in the field to determine the defective Board which can then be repaired later.

SPECIAL NOTE

In the ROM TESTS-SUPER GAME CARD, empty EPROM Sockets X10 through X17 (displayed as "K" through "S" in the test) may be indicated to be "EMPTY" or "BAD". Either indication is correct because there is nothing (no electronic parts) in these positions.

The Self-Test mode is fairly self-explanatory. You may begin a Self-Test at any time after the power to the game is on by sliding the Self-Test switch to the "ON" position. Now that the game is in the Self-Test mode, the functions it will perform can best be seen if given in outline form. They will then each be explained individually.

NOTE: Putting the game into Self-Test WILL NOT cause it to erase any CREDITS it has on it from its memory.

I. CIRCUITRY TESTS

- A. 16-COLOR BOARD TESTS
 - 1. WRITE MODES
 - 2. INTERCEPT
- B. RAM TESTS
 - 1. SCREEN RAM
 - 2. SCRATCH PAD
 - 3. WRITE-PROTECT
- C. ROM TESTS
 - 1. SUPER GAME CARD
 - 2. 16K CARD
- D. CONTINUOUS TEST
 - 1. START NEW TEST
 - 2. CONTINUE PREVIOUS TEST

II. VIDEO TEST/ADJUST

- A. CROSS HATCH
- B. COLOR BARS
- C. GREY LEVELS
- D. PURITY

III. AUDIO/MECHANICAL

- A. SOUNDS
- B. SWITCHES
- C. DEVICES
 - 1. COINCTR1
 - 2. COINCRT2
 - 3. LED1
 - 4. LED2
 - 5. LEFT LAMP A
 - 6. LEFT LAMP B
 - 7. LEFT LAMP C
 - 8. RIGHT LAMP A
 - 9. RIGHT LAMP B
 - 10. RIGHT LAMP C

IV. STATISTICS

- A. TIME INDEX 1 PLYR
- B. TIME INDEX 2 PLYR
- C. SCORE INDEX
- D. CLEAR STATISTICS

V. GAME SETTINGS

- A. SHILL SOUNDS
- B. FREE PLAY
- C. DOOR1—CO/CR
- D. DOOR2—C0/CR
- E. #FRUITS
- F. BONUS EVERY
- G. STARTING DIF
- H. INCREMENTAL DIF
- I. DEFAULTS

EXPLANATION OF SELF-TEST FUNCTIONS

I. CIRCUITRY TESTS

THE 16 COLOR BOARD TESTS check the majority of the circuitry on the SCREEN RAM and CPU boards.

THE RAM TESTS check the SCREEN RAM on the SCREEN RAM BOARD and the STATIC RAMS on the SUPER GAME MEMORY BOARD.

THE ROM TEST display will vary depending on the position of Setting Switch #5 on the GAME I/O BOARD. Initially, the game is manufactured using EPROM's and the required memory is split between the SUPER GAME MEMORY BOARD and the 640K EPROM BOARD. Later production will have ROM's. The position of the Setting Switch **WILL NOT** affect the operation of the game, only the manner in which the ROM TESTS are displayed. To properly display the ROM TEST for the BOARDS that you have in your games card rack, make sure Setting Switch #5 is set properly. (See DIP SWITCH SETTINGS under "**SWITCHES**" heading.)

THE CONTINUOUS TEST is generally used to test a game over night for heat related problems. Two options are available: 1) START NEW TEST resets the pass counter, error counter and reset counter, and 2) CONTINUE PREVIOUS TEST causes previous test to be continued without resetting the above mentioned counters. After each complete cycle of the CONTINUOUS TEST, the results are displayed. Also, by depressing and holding down the SELECT ONE PLAYER GAME BUTTON during a **CONTINUOUS TEST**, an almost immediate display can be obtained (the individual test that is running **MUST** be complete). Releasing the Button causes the **CONTINUOUS TEST** to proceed.

II. VIDEO TEST/ADJUST

These displays are used for adjusting the monitor in the game. Use the CROSS HATCH to adjust horizontal and vertical linearity, horizontal and vertical size, and convergence. Use COLOR BARS to verify that all three color guns are functioning. Use the GREY LEVELS to adjust overall brightness. Block 0 should be BLACK and block 15 should be WHITE. Each block from 0 to 15 should be progressively brighter.

III. AUDIO/MECHANICAL

These tests are designed to check all cabinet input and output devices for proper operation.

SOUNDS: Three tones are generated in each Audio Channel at the SAME time. Both channels should be at the SAME volume if the Volume Control Pots are set the same.

SWITCHES: This test is to verify that all Switches are functioning. Each rectangle represents a different Switch. The color of the rectangle should change from RED (for OFF) to GREEN (for ON) as each switch is actuated. Each Switch in the game is identified above its respective rectangle. The designation table follows.

- c1 - Coin Switch #1 (Left)
- c2 - Coin Switch #2 (Right)
- ts - Test Switch
- sl - Slam Switch (Tilt)
- 1p - Select 1 Player Game
- 2p - Select 2 Player Game
- la - Left Player A Button
- lb - Left Player B Button
- lc - Left Player C Button
- ra - Right Player A Button
- rb - Right Player B Button
- rc - Right Player C Button

DIP SWITCH SETTINGS: The designation table for the 8 position DIP SWITCH PACK located on the game I/O BOARD in the CARD RACK follows.

- ct - Cocktail Table
 - Switch Position #1 to "ON" = Cocktail Table Game
 - Switch Position #1 to "OFF" = Upright Game
- rs - Reset
 - Switch Position #2 to "ON" = Clears ALL Data (Score Index, Time Index, High Scores and Programmable Options whenever Game is turned "OFF" and then back "ON" again
 - Switch Position #2 to "OFF" = Does NOT reset data whenever Game is turned "OFF" and then back "ON" again
- lk - Lockup
 - Switch Position #3 to "ON" = Halt on error during CONTINUOUS TEST
 - Switch Position #3 to "OFF" = Does NOT halt on error, CONTINUOUS TEST goes on
- bp - Beep
 - Switch Position #4 to "ON" = Game gives audio response to test results—a HIGH pitched beep means good or OK and a LOW pitched beep means bad or error
 - Switch Position #4 to "OFF" = No audio response to test results
- rm - ROM
 - Switch Position #5 to "ON" = game uses 32K ROM's and displays test results accordingly
 - Switch Position #5 to "OFF" = game uses 8K and 16K ROM's and displays test results accordingly
- s6 - Switch Position #6 NOT USED
- s7 - Switch Position #7 NOT USED
- s8 - Switch Position #8 NOT USED

DEVICES: These tests check all Output Devices. When a particular test is chosen by positioning the cursor in front of the desired DEVICE to be tested and the Right Hand Player's "B" Button is pressed, the cursor disappears and the chosen DEVICE pulse "ON" and "OFF" at a rate of about once per second. Depressing the above mentioned "B" Button again causes the cursor to re-appear and the selected DEVICE should be in the "OFF" state. Games are shipped with only one Coin Counter. However, driver circuitry is provided for an OPTIONAL second Coin Counter. Therefore, on standard games, this test provides **NO** visual or audible output unless the Operator has installed the second Coin Counter.

IV. STATISTICS

These displays provide the Operator with information concerning playing times and scoring levels. This should prove useful in determining optimum Difficulty and Bonus Level Settings. The game keeps track of time and score for each game played and at the end of each game it updates the information used to create each of these displays.

TIME INDEX—1 PLR: In 90 second increments, displays the number of one player games played that fall into each category as well as the total number of one player games played.

TIME INDEX—2 PLR: In 180 second increments, displays the number of two player games played that fall into each category as well as the total number of two player games played.

SCORE INDEX: In 5000 point increments, displays the number of players that have achieved a final score that falls into each category. For example: if a two player game is played and one player finished with a score of 3456 and the second player finishes with a score of 2345, the number in the range of "0—5K" will increase by two. However, if player two had finished with a score of 6789, then the number in the range of "0—5K" will only increase by one and the number in the range of "5K—10K" will also increase by one.

CLEAR STATISTICS: This allows the Operator to clear the Time and Score Indexes individually. All-time high scores and initials **CAN NOT** be cleared using this routine.

V. GAME SETTINGS

SHILL SOUNDS: When the game is not being played and this feature is "ON", at the beginning of the attract sequence a musical tune is played to attract attention to the game. If this feature is not desired in quiet locations, it may be turned "OFF".

The "B" Button is used to select/exit this function and the "C" Button may be used to turn it "OFF" (The "A" Button is used to turn it "ON".)

FREE PLAY: When this feature is "ON", no coins are required to play the game and the monitor screen displays this message "**FREE PLAY, SO HIT THE BUTTON**". The "B" Button is used to select/exit this function and the "C" Button may be used to turn it "OFF". (The "A" Button is used to turn it "ON".)

DOOR1—CO/CR // DOOR2—CO/CR: This allows the Operator to set the numbers of coins required for a given number of credits. It is totally adjustable for any combination from 1 coin for 1 credit to 1 coin for 9 credits. The reverse is also true. The game can be set up to require as many as 9 coins to give 1 credit or 2 credits, etc. Any combination of numbers is possible with a little experimentation. For example: if the game were set for 3/3 it would be the same as 1/1. Also, if the game were set for 2/3, one credit would be issued for the first coin and two credits would be issued for the second coin. **HOWEVER**, if a game were played and completed **BETWEEN** when the first and second coins were inserted, the second coin would only give one credit and a third coin would be required to get the next additional two credits. The game keeps track of fractions of a coin but clears the fraction at the end of the game.

The "B" Button is used to select/exit this function. The 2 PLAYER Button selects the COINS half of the option (the number to the left of the "/") and the 1 PLAYER Button selects the CREDITS half of the option (the number to the right of the "/"). The "A" Button may be used to make the number go higher in value while the "C" Button may be used to make the number go lower in value.

FRUITS: The number of FRUITS is the number of wrong answers a player is allowed at the start of a game. The "B" Button is used to select/exit this function. The "A" Button may be used to make the number go higher in value while the "C" Button may be used to make the number go lower in value.

BONUS EVERY: A BONUS question is given to a player every so often for answering a certain number of questions without a wrong answer (and without being interrupted by a correct answer provided by the other player in a TWO PLAYER game). It should also be noted that to increase the difficulty level of the game automatically, after the number of questions asked and answered is 30, the game adds two to the programmed number of questions that must be answered correctly without a wrong answer before the player will get another BONUS question.

For example, the default value is three. **AFTER** answering 3 questions in a row correctly, the player gets a **BONUS** question. After the 30th question is asked, the player **WILL NOT** get any **BONUS** questions until he answers 5 questions in a row correctly. **AFTER** the next 30 questions are asked he would have to answer 7 questions in a row correctly to get a **BONUS** question—and so on.

A player **DOES NOT** lose a **FRUIT** if he answers a **BONUS** question incorrectly. If he answers it correctly, he is awarded double the score of the question and is given an additional **FRUIT**.

The "B" Button is used to select/exit this function. The "A" Button may be used to make the number go higher in value while the "C" Button may be used to make the number go lower in value. For this option, **ONLY** the values 2, 3, 4, 5, and 6 are allowed as initial settings.

STARTING DIFF: The difficulty level of the game is controlled in several ways. Certain questions are inherently more difficult than others i.e. sequences of six objects are more difficult than sequences of four objects. Also, as the degree of difficulty increases, the Pac-Man that eats the score value dots across the top of the screen increases his speed so that there is less time to answer.

On a scale of 1 to 9, 1 is the **EASIEST** and 9 is the **MOST DIFFICULT** level of play. The setting of this option only sets the degree of difficulty the game **STARTS** at. The "B" Button is used to select/exit this function. The "A" Button may be used to make the number go higher in value while the "C" Button may be used to make the number go lower in value.

INCREMENTAL DIFF: How **quickly** the game gets more difficult is controlled by this setting. A setting of 1 would cause the game to take a **longer** time to get to the next level of difficulty while a setting of 9 would cause the game to take a **shorter** time to get to the next level of difficulty. The "B" Button is used to select/exit this function. The "A" Button may be used to make the number go higher in value while the "C" Button may be used to make the number go lower in value.

DEFAULT: The games **DEFAULT** settings are the factory recommended settings and are as follows:

SHILL SOUNDS are OFF
FREE PLAY is OFF
DOOR1—CO/CR is 1/1
DOOR2—CO/CR is 1/1
FRUITS is 3
BONUS EVERY 3 QUESTIONS
STARTING DIFF is 3
INCREMENTAL DIFF is 3

Depressing the "B" Button while "**DEFAULTS**" is selected will change the display to the above settings. The word "**SET**" will also be displayed to the right of the word "**DEFAULTS**" for about *two seconds* to alert the operator that the settings have been changed.

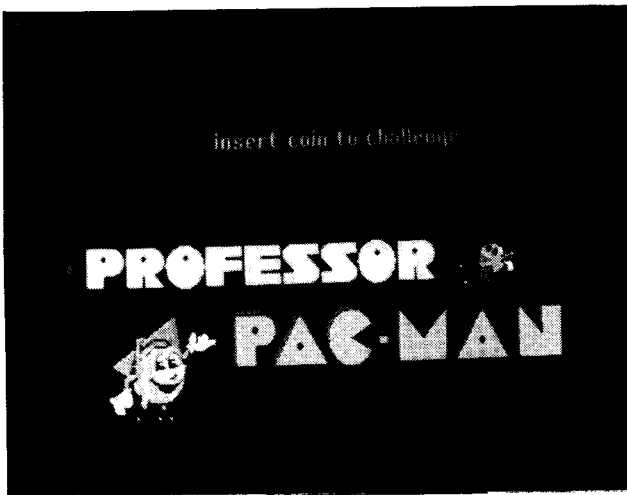
When finished with the Self-Test mode, slide the Self-Test switch back to the "OFF" position. To exit the Self-Test mode after the Self-Test Switch is in the "OFF" position, move the **CURSOR** to any of the following words: "**REPEAT**", "**RETURN**", or "**EXIT**" (the exact wording depends on the test level you are in), and press the "B" Button.

Normal game functions will now return to the monitor screen.

ATTRACT MODE

1. The Attract mode starts:

- Just after power has been turned on to the game. (Self-Test switch is in the "OFF" position.)
- After a Self-Test has been completed. (Performing a Self-Test **DOES NOT** set the credits in the games memory to zero "0".)
- After a play has been finished, the score was not high enough to put the game into the High Score/Initial mode, and there are no more credits left in the games memory.
- After the High Score/Initial mode when there are no more credits left in its memory.
- In the Attract mode, the game will give the following displays *centered* on the monitor screen:



Attract Mode Display 1

READY-TO-PLAY MODE

1. The Ready-To-Play mode starts when enough coins have been accepted for a 1 or a 2 player game.
2. The Ready-To-Play mode ends when either the "1 PLAYER" or the "2 PLAYER" push button is pressed.
3. In the Ready-To-Play mode, the game will give the above displays *centered* on the monitor screen.
4. If no START button is pressed, the displays will remain indefinitely as shown above.

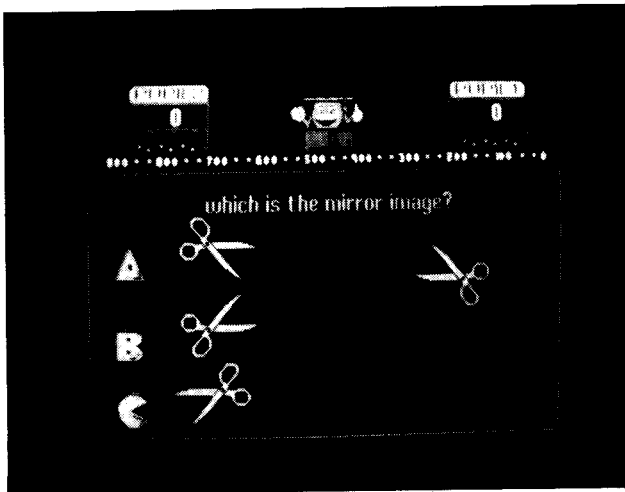
PLAY MODE

PROFESSOR PAC-MAN is a game of observation skill designed for either 1 or 2 players. After a question is displayed the player must answer correctly to receive a score. A player's score is shown within the blackboard assigned to him. Player 1's blackboard is in the upper right hand corner of the monitor screen and player 2's blackboard is in the upper left hand corner of the monitor screen. A FRUIT symbol and a number are displayed next to each player's blackboard. The number indicates the quantity of incorrect answers a player has left **BEFORE** the game is over for that particular player. The FRUIT symbol indicates the level of difficulty that that particular player has achieved at any point in the game.

Professor Pac-Man is seated at the desk in the top center of the monitor screen and he displays the number of questions that have been asked so far this game (including BONUS QUESTIONS). Below Professor Pac-Man is a row of dots representing the score for the current question and indirectly the time remaining to answer the current question.

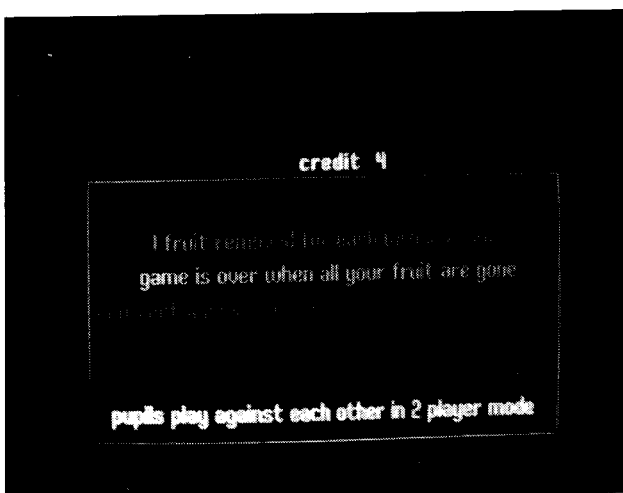
After the current question is asked, a Pac-Man starts eating the dots from left to right. When the question is answered, the Pac-Man stops eating the dots and his position is relative to the score that is awarded if the question is answered correctly. If the question was answered incorrectly, Pac-Man will continue eating dots until the question is answered correctly (you are allowed 2 tries) or until he eats the last dot—which is equal to zero points and is the "time up point".

The maximum number of points that can be awarded is "900" and the minimum is "0". As the game progresses in difficulty, the amount of time it takes Pac-Man to eat all the scoring dots gets shorter and shorter until, at the most difficult level of play, he eats them all in about 3 seconds.



Attract Mode Display 2

- No matter where the game is in the Attract mode sequence, it will immediately go to the following display as soon as a game has been paid for.



Ready to Play Mode Display

Bonus questions are awarded if a player answers a given number of questions in a row correctly—no mistakes. The given number of questions that the player must answer before he gets a bonus question is Operator selectable during the Self-Test mode. A correct answer to a bonus question is rewarded by giving the player two times the score value attained plus a BONUS FRUIT. A player is allowed **ONLY 1 CHANCE** to answer a bonus question correctly. However, an incorrect answer to a bonus question **DOES NOT** penalize the player by subtracting a Fruit.

Certain factors differ between 1 and 2 player games so each will be covered by itself later in this text.

ONE PLAYER GAME

In the **ONE PLAYER GAME**, the player is challenging himself to answer correctly and quickly to achieve a high score. As each question is asked, the player is permitted **two** chances to answer correctly. If the player fails to respond to a question, a Fruit is subtracted from the player. The *first time* within a question that a player answers incorrectly, a Fruit is subtracted. If time still remains, the player can try to answer again. However, if he **DOES NOT** try to answer again and time runs out, another Fruit **WILL NOT** be subtracted from him. **BUT--** if the player does have enough time—and tries to answer the question the *second time*—but is still incorrect, **ANOTHER** Fruit **WILL** be subtracted from him.

It is to the players advantage NOT to try to answer ANY question the second time if he is not 100% sure of the answer because he will not be penalized again if he doesn't try. But he will be penalized for another wrong attempt which turns out to be wrong.

TWO PLAYER GAME

In the **TWO PLAYER GAME**, the players are challenging each other to see who can answer correctly *first*. The player that answers correctly *first* receives the score and that player is indicated by the marquee-like pattern moving on the players blackboard.

If a player answers incorrectly, he loses a Fruit and the other player **MUST** try to answer the question correctly in the time remaining. If the other player *fails* to answer or *answers incorrectly*, a Fruit is subtracted from him also.

The game ends for the first player to run out of Fruit. The remaining player then continues to play from that point on just as though it were a single player game (that is—the remaining player is permitted two chances to answer each question).

HIGH SCORE/INITIAL MODE:

Follow the *on-screen instructions* to enter your initials.

PROFESSOR PAC-MAN

OPTION SWITCH SETTINGS

////////////////////////////////////LOCATED ON GAME BOARD////////////////////////////////////								
	SW#1	SW#2	SW#3	SW#4	SW#5	SW#6	SW#7	SW#8
* COCKTAIL TABLE ONLY * UPRIGHT AND MINI	ON OFF					NOT USED	NOT USED	NOT USED
* FULL RESET * NORMAL OPERATION	ON OFF							
* LOCKUP ON ERROR DURING CONTINUOUS TEST			ON					
* NORMAL OPERATION			OFF					
* GAME GIVES AUDIO RE- SPONSE TO TEST RESULTS				ON				
* NO AUDIO RESPONSE				OFF				
* GAME USES 32K ROM'S * GAME USES 8K & 16K ROM'S					ON OFF			
* INDICATES FACTORY RECOMMENDED SETTINGS						PART NO. M051-00573-A007		

THE REMAINDER OF YOUR NEW GAME'S MOST COMMON OPTION SETTINGS ARE CONDUCTED DURING THE THE SELF-TEST MODE AND WILL BE COVERED IN DETAIL IN THAT SECTION OF YOUR MANUAL.