ProGammon

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ProGammon

1.1   ProGammon Documentation

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                              ProGammon

                            Version 2.4

                          4th January 1998

                              FREEWARE

                  The Ultimate Amiga Backgammon Game

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1.2   introduction

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Introduction:
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Have you tried playing computer backgammon before? Were you a little
disappointed at the poor game play?

I think you will find that this program generally plays a very intelligent
game of backgammon.

Any player can get lucky and win a handful of games in a row. Don't get
too over confident! If you play a couple of hundred games, you will have
to be playing at the top of your game to break even.

This program will keep track of your wins and losses so you can see how
good you or the Amiga really is.

It's operating system friendly and is very cpu efficient so your 3-D
rendering work will barely slow down while you play a game or 3. :)

1.3   requirements

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Requirements:
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This program should work on any Amiga with kickstart 2.04 or greater.

With an AGA Amiga, you can play this game in a 640 x 480 multiscan
productivity screen, if available.

1.4   What's New

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What's New:
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        -added an Undo function so you can start your move over again if
         you need to.

        -fixed a bug in v2.3 where occasionally the program would prevent
         you from making a valid move.

        -removed the debug_hunks which significantly reduced the size of
         the program.

 Thanks to Nils Goers for all of the above suggestions and improvements.

        -finally got around to putting the documentation in AmigaGuide
         format.

        -made another slight improvement or two in game play.

1.5 The Basics

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The Basics:
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```

The game begins with the following board setup:

```
        ********************************************        Direction of
        *  24 23 22 21 20 19    18 17 16 15 14 13  *         Movement:
        *   v  v  v  v  v  v     v  v  v  v  v  v   *
        *   X              O           O        X  *        --->
        *   X              O           O        X  *
        *                  O           O        X  *           |
        *                  O                    X  *           |
        *                  O                    X  *           |
        *                                          *           V
        *                      3 5                 *
        *                                          *           |
        *                  X                    O  *           |
        *                  X                    O  *           |
        *                  X           X        O  *           V
        *   O              X           X        O  *
        *   O              X           X        O  *        <---
        *   ^  ^  ^  ^  ^  ^     ^  ^  ^  ^  ^  ^   *
        *   1  2  3  4  5  6     7  8  9 10 11 12  *
        ********************************************

          ^  ^  ^  ^  ^  ^
          Your  HOME  area is positions 1 to 6.
```

There are 24 positions on the board and each player begins with 15 stones.
'X' represents your stones and the 'O' represents the Amiga's stones. In
the diagram above you have 2 stones on position 24, 3 stones on position
8 and 5 stones each on positions 6 and 13. The 3 and the 5 in the center
of the board represent the dice.

Each player takes turns rolling the dice and moving their stones an amount
equal to whatever was rolled.

The object of the game is to move your stones in a clockwise direction
into your home area. When all 15 stones are home you can remove them from
the board depending on what you roll. The first player who removes all of
their stones from the board wins the game.

The game starts with each player rolling one die to determine which player
gets to go first. For example, if the Amiga rolled a 3 and you rolled a
5 then you would start by using this combination for your first move.
Here is one possibility:

```
              ********************************************
              *  24 23 22 21 20 19    18 17 16 15 14 13  *
```

```
                    *   v  v  v  v  v  v     v  v  v  v  v  v   *
         MOVE 1--> X         X     O         O              X  *
                    *                  O         O              X  *
   Using the 3  *                  O         O              X  *
                    *                  O                        X  *
                    *                  O                          <---MOVE 2
                    *                                          *
                    *                      _ _                 *  Using the 5
                    *                                          *
                    *                  X                     O  *
                    *                  X         X           O  *
                    *                  X         X           O  *
                    *   O             X         X           O  *
                    *   O             X         X           O  *
                    *   ^  ^  ^  ^  ^  ^     ^  ^  ^  ^  ^  ^   *
                    *   1  2  3  4  5  6     7  8  9 10 11 12   *
                    ******************************************
                                              ^
```

With the 3 I moved one stone from position 24 to position 21. For the
second move I moved a stone from position 13 to position 8. After the
opening move each player alternates rolling the dice.

Either player can move to any position as long as it is not blocked by 2
or more of the opposing players stones. In the above example I would not
have been allowed to use the 5 to move a stone from position 24 to
position 19 because the Amiga has position 19 blocked.

It is possible to move to a position that has only 1 Amiga stone on it.
When this happens, your stone will take possesion of that point and the
Amiga stone will be knocked off onto the center bar. Any stone on the
bar has to enter the board in the opposing players home area. You must
get back on the board, on a point that is not blocked, before any further
moves are allowed. If you cannot make a move just click once on the dice
to give up your turn and resume play.

When all of your stones are home, you can start removing them from the
board. This is called bearing off. If, for example, you rolled a 6 and
a 2, you could remove one stone from position 6 and another one from
position 2. If you rolled a 6 but didn't have any stones on position 6
to remove then you are allowed to take one stone off the next highest
position. It is also legal to move stones within your home area rather
than bearing them off. It might be an advantage to do this if the Amiga
still has some stones in your home area and is trying to knock you off
onto the bar.

The only other rule is that both players must use as much of what they
rolled as possible. If you rolled a 5 and a 3 and it is possible to use
both the 5 and the 3 then you must make both moves. If you can only use
the 5 or the 3 but not both then you are required to use the higher
amount(5). The Amiga plays by these rules and now since version 2.3, you
are forced to play by these rules also.

1.6 Game Play

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Game Play:
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To move a stone just click once on the stone and then once on the spot
where you want it to go. If you did it right then the stone should move
to the new location or else a message will appear to help you out.

If you roll doubles (i.e. two 3's) then instead of getting two moves
of 3 you get four moves of 3. Anytime during a move you can get an
update to how many moves you have left by clicking anywhere outside the
main board area. In the message area will be displayed the dice values
that have not yet been used.

You can also make multiple moves. If, for example, you roll a 3 and
a 4 then you are allowed to make one move of 7 as long as both points
between your present location and your destination are not blocked.

If you are unable to make a move then just click once on the dice to
continue with the game. If you select a stone by mistake then just click
on that same stone to start your move over again.

Once all your stones are in your home area, you can remove them from the
board by double clicking on them.

A gammon will be declared if one player is able to get all his stones off
before the other player has removed one. This is equivalent to winning 2
games. A backgammon occurs when one player gammons the other player plus
he traps at least one of the opposing players stones in his home area.
This is worth 3 wins.

1.7 menus

```
Menus:
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By selecting Colors from the main menu you will be able to adjust both
the board colors as well as the speed of the game.

If you select SAVE in the color adjustment window then your game
preferences will be saved to a 266 byte file called gammon.prefs in the
current directory. The program keeps track of the AMIGA's winning
percentage in this file as well as statistics on the dice. If you want
this feature then remember to click on SAVE before the end of the first
game. Your old version 2.1 gammon.prefs file will automatically be
upgraded to this new version while maintaining your color selections and
your win - loss record.

There is also a version in which all 15 stones start off on the
center bar and you have to get all the stones back on the board before
you can start to move them. Just select BAR in the menus and then
select New Game to play this version.

You can restart your move from the beginning by selecting Undo Move from
the menus. You could also accomplish the same thing by clicking on the
stone and putting it back wherever it came from.

Selecting Stats in the menus will display a table of what you have
rolled so far as well as what your average roll has been. A long term
average roll of 8.167 is ideal. Clicking on the left side of the stats
window will show the statistics for the present series of games and if
you click on the right side the long term statistics in the gammon.prefs
file will be displayed.

1.8   Tool Types

```
Tool Types:
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    MAINFONT=topaz
    FONTSIZE=11
```

These 2 tool types allow you to use any reasonably sized font for your
menus, message display and window title in VGA mode. If the program is
unable to find this font or if your size choice is too large then it will
use topaz 8 as the default.

```
    REVERSE
```

I prefer setting up the board so that you move your stones from the
upper left part of the screen to the lower left in a clockwise direction.
If you would prefer that the board was set up so that your stones move
from the upper right part of the board to the lower right in a counter-
clockwise direction then use this tool type.

```
    NTSC
```

This tool will force the program to use a 640x200 NTSC screen or dblNTSC
screen if available.

1.9   Testing the Dice

```
Testing the Dice:
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```

Have you ever noticed while playing ProGammon that sometimes the computer
rolls exactly what it needs? Have you ever thought that the dice are not
truly random or that the program is just plain cheating! To be honest, I
was curious as to whether the dice are random so I wrote a small program
to test them. The dice tests convinced me so now let's see if I can
convince you.

First off, the program uses the UNIX compatible SAS/C random number

generating function called drand48(). It also uses the function
srand48(seed) to set the random number seed. drand48() produces random
numbers between the values of 0.0 and 1.0 but not including 1.0. The
following is how I convert this value into a dice value:

```
dice[ 1 ] = (int)( ceil( drand48() * 6.0 ) );
dice[ 2 ] = (int)( ceil( drand48() * 6.0 ) );
```

These 2 simple lines of C code are what controls the dice. The RollDice()
subroutine has no idea whether it is being called to roll the dice for you
or for the Amiga. It does not check to see who is on the bar or what
points are blocked or whether it's the start of the game or the end. All
it does is just roll the dice. The Amiga is not cheating just because it
rolls a 6 to start the game or rolls doubles to end the game. It has
gotten lucky and if you play enough games I'm sure that you will get lucky
too. If you don't think the dice are random then I guess you should send
your complaints to the people who wrote the drand48() function. Before
you do though, I think you should check out the output from my DiceTest
program. This proved to me that the drand48() function produces random
numbers that are just as random as any set of dice.

```
                    DiceTest
                    --------

   A pair of dice were rolled 108 000 times to check for randomness.
   Each combination should occur 1/36th of the time (i.e. 3000).


              1        2        3        4        5        6

       1    3071     3013     2961     3053     2990     3125
       2    3052     3017     2963     2951     3029     2939
       3    3036     2987     2918     2924     2884     2974
       4    2968     3044     3062     2857     2990     3047
       5    3012     3091     2990     3109     3038     3062
       6    2983     2962     3000     2996     2925     2977


   The same two times in a row. (i.e. 1/36 * 108 000)
       Theory = 3000    Actual = 2992

   Opposite but still the same two times in a row.
       Theory = 3000    Actual = 3025

   The same three times in a row. (i.e. 1/1296 * 108 000)
       Theory = 83    Actual = 81

   Doubles. (i.e. 1/6 of 108 000)
       Theory = 18 000    Actual = 17878

   Total of all rolls including doubles. (i.e. 8.167 * 108 000)
       Theory = 882 000    Actual = 880018   ( avg = 8.148 )
```

I hope that seeing the results of this test will convince you that the
dice used in ProGammon are 100% random. Of course, there are going to be
some people who are willing to agree that these dice are random but the

ones in the game are not. For this reason, ProGammon also compiles
statistics while you play. Both players average dice roll should, in time
approach the theoretical value of 8.167. Hopefully, this will help prove
to you that the Amiga does not cheat and is merely playing a damn good game
of backgammon! Go ahead, see for yourself.

Every roll of the dice are saved in the gammon.prefs file after you
complete at least one game and select Quit in the menus or close the game
screen. During the game you can select Stats in the menus to see the
averages for the games that you are presently playing. By clicking on the
right portion of the statistics screen you can also examine the stats saved
in the gammon.prefs file.

After you play a large number of games you should be convinced that the
dice are 100% legal. Good luck!

1.10   Acknowledgments

Acknowledgments:

Many thanks to the small handful of people that took the time to register.

Special thanks to Nils Goers who showed me the correct way to compile a
program. Without his encouragement this program probably would have died
from apathy.

1.11   author

Freeware:

You will be hard pressed to find a significantly better playing computer
backgammon game on any platform at any price. Questions, comments and
bug reports are most welcome. Long live the AMIGA!

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