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XFig

A cross−number puzzle game
For PalmOS

User Manual

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Content

Introduction

About XFig

XFig puzzle is similar to crossword but with numbers instead of words.

This implementation is inspired by *X−Figure* program for MS Windows developed in mid 90s by *Alan Shaw*.

This release is developed and supported by *Michael Glickman* for *Palmcrust (Australia)*.

Application site:	http://xfig.palmcrust.com
Palmcrust site:	http://www.palmcrust.com
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Terms

Derived and Primitives

There are two types of entries: horizontal (across) and vertical (down), while each entry is provided with a clue. To solve a puzzle you need to find consistent answers to all its clues.

We use term *derived entry* for an entry which value depends on on values of one or two entries, e.g. `"29down plus 2004"`, or `"29down times 2across".`

As opposed to that, a *primitive entry* does not depend on any other entry.

Example of primitives:

```
(4886+16764)/6
A prime number
Digits 123 rearranged
```

You normally start a puzzle by solving primitives getting to a derived entry as the relevant values are known.

Undefined values (ANY)

A clue might contain an undefined value `ANY`, for example

```
25down / ANY
Pence in ANY florins
```

```
207 / ANY * 3
```

ANY may be substituted by any whole number, so that the result is also a whole number, and of course it should be consistent with crossing entries.
Appearance of ANY is optional (see Options) and is limited to provide a small choice of numbers.

Categories of Primitives

The following categories of the primitives are supported:

Arithmetic Expression

Any arithmetic expression, where + − * / are used for addition, subtraction, multiplication and division respectively in the clues.
Slash (/) is also used with common fractions, i.e. 3/4 for "three quarters", while two periods (..) separate integral and fractional parts in a mixed fractions, such as 1..6/7 for "one and six sevenths"
If ANY is used as a divisor, the result of division must be a whole number. For example, in expression 207/ANY*5 , only divisors of 207 (1, 3, 9, 23, 207) can be used for ANY , whereas 5 is inapplicable even though the overall result would be a whole number.

Anagram

An anagram is a rearranged (scrambled) number.

For example, the answer for a clue "Digits 252 rearranged" may be one of the following three: 522, 252, 225, while for digits 123 there are six choices: 123, 132, 213, 231, 312, 321.

You can make your life harder by avoiding repeating digits in anagrams (see Options).

Table Value

A value taken out of a table. Each of the tables can be enabled or disabled for generation (see Options).

Triangular numbers

A triangular number is represented by a triangle, as shown in the following diagram:

```
                                *
                *              * *
   *  1        * *  3         * * *  6
```

Triangular numbers are given by the formula n*(n+1)/2 , where n is a positive integer.

The table of up to 4 digit triangular numbers is given below:

```
   1    3    6   10   15   21   28   36   45   55
  66   78   91  105  120  136  153  171  190  210
 231  253  276  300  325  351  378  406  435  465
 496  528  561  595  630  666  703  741  780  820
 861  903  946  990 1035 1081 1128 1176 1225 1275
1326 1378 1431 1485 1540 1596 1653 1711 1770 1830
1891 1953 2016 2080 2145 2211 2278 2346 2415 2485
2556 2628 2701 2775 2850 2926 3003 3081 3160 3240
3321 3403 3486 3570 3655 3741 3828 3916 4005 4095
4186 4278 4371 4465 4560 4656 4753 4851 4950 5050
5151 5253 5356 5460 5565 5671 5778 5886 5995 6105
6216 6328 6441 6555 6670 6786 6903 7021 7140 7260
7381 7503 7626 7750 7875 8001 8128 8256 8385 8515
8646 8778 8911 9045 9180 9316 9453 9591 9730 9870
```

Square numbers

A square number is represented by a square:

```
                        * * *
            * *         * * *
    *  1    * *  4      * * *  9
```

Square numbers are actually whole squares (`n*n`, where `n` is a positive integer).

The table of up to digit square numbers follows:

```
   1    4    9   16   25   36   49   64   81  100
 121  144  169  196  225  256  289  324  361  400
 441  484  529  576  625  676  729  784  841  900
 961 1024 1089 1156 1225 1296 1369 1444 1521 1600
1681 1764 1849 1936 2025 2116 2209 2304 2401 2500
2601 2704 2809 2916 3025 3136 3249 3364 3481 3600
3721 3844 3969 4096 4225 4356 4489 4624 4761 4900
5041 5184 5329 5476 5625 5776 5929 6084 6241 6400
6561 6724 6889 7056 7225 7396 7569 7744 7921 8100
8281 8464 8649 8836 9025 9216 9409 9604 9801
```

Cube numbers

Cube numbers are whole cubes (`n*n*n`) as given by the following table:

```
   1    8   27   64  125
 216  343  512  729 1000
1331 1728 2197 2744 3375
4096 4913 5832 6859 8000
9261
```

Fibonacci numbers

Fibonacci numbers are given by the following recursive rule:

$a_1 = 1, \quad a_2 = 1,$
$a_n = a_{n-1} + a_{n-2} \quad (n>2)$

i.e. first two Fibonacci numbers are 1s, while each of the following numbers is a sum of the preceding members.

The table of up to digit Fibonacci numbers:

```
    1    2    3    5    8
   13   21   34   55   89
  144  233  377  610  987
 1597 2584 4181 6765
```

Prime numbers

A prime number is a number which has no divisors apart from 1 or itself.

This implementation uses up to digit prime numbers given by the following table:

```
  2    3    5    7   11   13   17   19   23   29   31   37
 41   43   47   53   59   61   67   71   73   79   83   89
 97  101  103  107  109  113  127  131  137  139  149  151
157  163  167  173  179  181  191  193  197  199  211  223
227  229  233  239  241  251  257  263  269  271  277  281
283  293  307  311  313  317  331  337  347  349  353  359
367  373  379  383  389  397  401  409  419  421  431  433
439  443  449  457  461  463  467  479  487  491  499  503
509  521  523  541  547  557  563  569  571  577  587  593
599  601  607  613  617  619  631  641  643  647  653  659
661  673  677  683  691  701  709  719  727  733  739  743
751  757  761  769  773  787  797  809  811  821  823  827
829  839  853  857  859  863  877  881  883  887  907  911
919  929  937  941  947  953  967  971  977  983  991  997
```

Time Conversion

A Time Conversion clue deals with converting seconds, minutes and days to each other, for example:

Hours in 29 days
Seconds in two hours
Minutes in ANY hours
The last clue may appear only if undefined values are enabled.

Calendar

A calendar clue asks to evaluate number of days or week for a particular interval, for example:

```
Days years 1999 up to 2000
Weeks Nov2003 up to Oct2005
Days 12Nov1997 – 10Jan1999
```

Note, that in case period boundaries are years or months (like first two clues in the example above), both years/months are included in the period, while in case period boundaries are particular dates (similar to last clue in the above example), the end date is not contained in the period. Weeks refer to number of full weeks in the period.
An undefined value, if enabled, may stand for a year, e.g.

```
Days  4AprANY to 5Jun1997
```

Imperial units

This category is related to conversion between imperial measuring units of same nature:

```
Sq feet in five sq.yards
Pints in 32 quarts
Rods in ANY acres
```

The relations between imperial units are given by the following table:

Length	1 foot = 12 inches 1 yard = 3 feet 1 chain = 22 yards 1 furlong = 220 yards (or 10 chains) 1 mile = 1760 yards (i.e. 80 chains or 8 furlongs)
Area	1 sq. foot = 144 sq. inches 1 sq.yard = 9 sq. feet (1296 sq. inches) 1sq.chain = 484 sq. yards 1 rod = 1210 sq. yards 1 acre = 4840 sq. yards (i.e. 4 rods or 10 sq. chains)
Volume (solid)	1 pint = 4 gills 1 quart = 2 pints 1 gallon = 4 quarts (or 8 pints) 1 bushel = 8 gallons
Volume (fluid)	1 dram (drachm) = 60 minims 1 ounce = 8 drams 1 pint = 20 ounces 1 gallon = 8 pints
Weight	1 pound = 16 ounces 1 stone = 14 pounds 1 barrel = 14 stones (196 pounds)

Sterling Currency

A challenge for those who are nostalgic for the old monetary system used in UK and some Commonwealth countries before decimalisation.

The main sterling coins were *pound*, *shilling* and *penny* , or LSD for short (Latin coin names: Lib − pound, Solidus − shilling, Denarus − penny), and a price was commonly written as £L/S/D. In LSD notation dash(−) is commonly used for no pence, while L part is omitted with a price less than a pound.

Examples:

£3/14/10	3 pounds, 14 shillings and 10 pence.
£20/15/−	20 pounds and 15 shillings
10/8	10 shillings and 8 pence
12/−	12 shillings

Other coins like *farthing, groat, florin* were used in old days.

Here is the conversion table:

1 penny = 4 farthings
1 groat = 4 pence
1 shilling = 12 pence (or 3 groats)
1 florin = 2 shillings
1 pound = 20 shillings

Therefore £3/14/10 worth (3*20+14)*12+10, or 898 pence.

In this implementation `ANY`, if enabled, may stand for pounds in LSD notation, e.g.

```
Pence in £ANY/14/5
```

How to Play

Keys, Strokes and Buttons

Each Palm or compatible device has six *hard keys* located usually below the screen.

PalmOS assigns system actions to a hard keys (`Hard1` − Date Book, `Hard2` − Address Book, etc), however this application uses the keys for its own purposes, therefore we just number them from left to right: `Hard1`, `Hard2`, `HardUp` , `HardDown` , `Hard3`, `Hard4`.

Strokes `Left`, `Right` , `Up` , `Down`, `Back`, `'x'` , etc refer to corresponding Graffiti strokes, or keys where keypad is available.

Screen Buttons are "soft buttons" provided by the application and accessible with a stylus.

Grid View

A puzzle starts in *Grid View* which shows the puzzle as a grid.

Tapping a grid square highlights corresponding entries, and the relevant clues are shown below the grid. In case *Highlight References* option is enabled, the referred entries for each derived entry are also highlighted. Tap same grid square again to select a particular entry, horizontal (across) or vertical (down). To avoid multiple taps you can simply drag the stylus horizontally or vertically to select the direction.

More ways to select a specific direction:

- hold Hard1 (or Hard4) key and tap two grid squares for the entry you wish to choose;
- tap a clue for the direction you wish to select, tap a blank clue for reverting to double selection.

To *enter a digit* for selected position either tap a screen button for this digit, or enter the digit as a stroke. In case a single entry is selected entering a value advances selection to the next position.

You can *move the selected position* using hard buttons or stroke:

`Hard2` or `Left`	−	Selection Left
`Hard3` or `Right`	−	Selection Right
`HardUp` or `Up`	−	Selection Up
`HardDown` or `Down`	−	Selection Down

The clues may appear with *Validation Marks* to show the consistency of entered value with the clue:


Entered value is consistent with the clue. A consistent clue is not necessary a solution, because of possible interference with some other entries.


Entered value is inconsistent with the clue.


Consistency cannot be evaluated: non all digits are entered, or some referred values are undefined.

Screen buttons located to the right from the grid are:

 to	Used to enter value for selected position
	Restore previous value for current position. `Backspace` or 'b' strokes do same thing
	Clear content at selected position. Same with '`x`' stroke
 	Enable / disable Validation Marks for the clues
 	Enable / disable Highlight References for selected entries
	Switch to list view , show 'across' clues. Same with 'a' stroke
	Switch to list view , show 'down' clues. Same with 'd' stroke
	Save puzzle. 's' stroke does same
	Additional actions (same with 'z'): **Give Up** — terminate and show one of possible solutions **Save and Exit** — save puzzle and exit; when application restarts, the puzzle will be and resumed; tapping Application Launcher soft button does same thing. **Restart** — clear all entered values and reset puzzle time **Pause** — switch to Out of Game view; this suspends game timer and allows to load another game **Continue** — just ignore, go back to puzzle

List View

In *List View* the clues for horizontal, or vertical entries are listed. The direction of listed entries is indicated by the header that shows either "`Across`" or "`Down`". Tap the header to change direction of clues to the opposite.

You will find List View useful especially at start where you may list only primitives, while a derived entry appears as soon as its referred entries are solved.

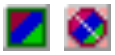
Top left field contains entered value for selected entry and can be used for editing the puzzle. Blank places are marked as □ if any value is accepted, or ▯ if zero is not accepted (this applies to most significant entry digits). Tap a digit to increment its value. When Hard1 (or Hard4) is pressed while tapping a digit, its value decrements. You can also enter a value for current (underlined) digit using Graffiti or keypad if available. Entering 'x' clears the content of current position.

The following hard keys or strokes are used for navigation:

`Hard2` or `Left`	Move to previous position in selected entry
`Hard3` or `Right`	Move to next position in selected entry.
`HardUp` or `Up`	Move to previous entry in the list. The list is scrolled if necessary.

`HardDown` or `Down` Move to next entry in the list. The list is scrolled if necessary.

The bottom screen buttons specify view options:

	Enable or disable Validation Marks for listed entries (Validation Marks are discussed with Grid View
	Enable or disable validation for selected value. In order to increase space for clues you may disable validation marks in the list, but have validation for selected list value: **green** − consistent value, **red** − inconsistent value, **blue** − consistency cannot be evaluated. If validation for selected value is disabled, each entry is show in blue colour.
	Show or hide clues for solved entries. In "hide solved" mode, a clue is removed from the list when a consistent value is entered for it.
The following option specifies which derived entries are listed:	
	Show all derived entries
	Show only derived entries referring to consistent entries (recommended)
	Hide all derived entries

And finally:

 Return to Grid View

Out of Game View

The application switched to Out of Game View after puzzle terminates (solved or Give Up), or when Pause is selected from Additional Actions menu.

While Out of Game the timer stops and values cannot be entered. However you can still view puzzle grid or lists.

The following buttons are shown in Out of Game View:

New	Start a new puzzle
Load	Load previously saved puzzle.
Optns	Show Options form
Help	Show instructions
About	Show application release notes
Resme	Resume a paused application
Exit	Exit to Application Launcher

Maintenance

Save/Load/Delete a Puzzle.

To *save a puzzle* tap  screen button in Grid View . This will bring up Gave Game form.

Save Game form lists saved puzzles. Select a puzzle in the list to overwrite it. To create a new entry select the last item in the list labelled `..New Entry..` You need to enter a name for the new entry in **Name** field. This field can be also used to change name for an existing entry. Tap `Save` button to save the puzzle. Tap `Close` button to return to game without saving a puzzle.

To *load a puzzle* tap Load screen button in Out of Game View to activate Load Game form.

Load Game form lists saved puzzles. The list might include `..Default..` line for a puzzle saved automatically on Exit to Application Launcher (e.g. by selecting 'Save and Exit' from Additional Actions menu). Information, such as date, size, elapsed time etc is shown for each saved puzzle. Select a puzzle and tap `Load` button to load selected puzzle. Tap `Close` button to return without loading a puzzle.

To *delete a saved puzzle* bring up either Save Game or Load Game form, select a puzzle in the list and tap `Delete` button. Deleting must be confirmed.

Options

Options form allows to specify difficulty of generated puzzle and playing conditions. To activate Options form tap **Optns** screen button from Out of Game View .

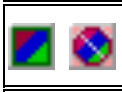
Options Form consists of several panes **View**, **Rules**, **Categories** and **Details**. Current pane name is shown at the top right corner of the screen. Tapping pane name shows a popup list where you can select another pane to display.

The panes are discussed below.

View Pane

This pane specifies View options.

Startup Settings. Specify startup values for view properties that can be changed during the game in Grid View or List View .

Icons	Property	Description	Applies to
	**Show Validation Marks**	Show validation marks with clues	Grid View List View
	**Highlight References**	Highlight references for selected entries	Grid View
	**Validate list Selection**	Use colours to indicate the consistency of current list item.	List View
	**List Solved Clue s**	Don't remove consistent clues from the list	List View
List Derived:			List View

	None	Don't list derived entries	
	Ref to Solved	List only derived entries referring to consistent entries; this is the default	
	All	List all derived entries	

Appearance**.** View properties that remain same during a game.

Property	**Description**
Persistent labels	For a puzzle with big grid size (number of rows and/or columns exceeds 8), the cells are small in size, therefore entry numbers (labels) are shown only for blank cells. When property is on, labels are never hidden.
Highlight header cells	If enabled, a different border colour is used for each header cell, i.e. a cell containing most significant digit for and entry; header cells don't accept zero .
Backup grid image	By default grid image is backed up with every switch from Grid View to List View so that the image doesn't need to be rebuilt when returning to Grid View. With some buggy systems you might need to disable grid image backup.

Rules Pane

Specifies general generation rules, and playing conditions.

Grid size. Number of columns and rows, default 12.

Puzzle Shape. Specifies how puzzle shape is generated.

Predefined	select randomly one of predefined shape templates
Random	don't use a template: generate a random shape

Random option is the only choice for a puzzle with different number of rows and columns.

Time Limit. Limit puzzle solving time to a particular interval, default − No Limit

Solving time is limited to 10 minutes for an unregistered copy!

Share. Percentage of particular entry types. Specified separately for horizontal (across) and vertical (down) entries.

Primitives	percentage of primitives
Derived 2 arg	percentage of derived entries with values depending on two entries (arguments)
Undefined (ANY)	there should be no more that specified percentage of entries containing undefined values

Default:

	Across	Down
Primitives	10	10
Derived 2 arg	10	10
Undefined (ANY)	0	0

This means that at either direction there will be 10% primitives, 80% one argument derived entries, 10% two−argument derived entries, and no undefined values are used by default

Categories Pane

Specifies which categories of primitives are used in puzzle generation. Categories are discussed in Categories of Primitives sections.

For each used category you may *limit entry length* to particular number of digits. For example you may change Max length to 3 to avoid using 4−digit numbers for a particular category, or on the contrary, set both Min and Max to 4 to use only 4−digit numbers for a category.

Details Pane

Defined details related to selected categories.

Anagram repeated digits. Whether or not numbers with repeating digits (like 1123) can be used for anagrams (See Anagram section for more)

Table values.
Which tables can be used for table value generation. See Table Value section for the description of tables.

Multiplication and Division.
Allows/denies use of multiplication and division with arithmetic and derived entries (one and two arguments).

Use undefined (ANY) with.
Limits use of undefined values to particular categories: `Arith.` − arithmetic, `Time` − time conversion, `Calend.` − calendar , `Sterling` − Sterling currency, `Derv1` − derived one argument, `Derv2` − derived 2 arguments.

Registration

Advantages of a registered copy:

- no Registration Form at start
- no forced time limit on puzzle solving
- "Licensed to: <user name>" and "Registration date : <date>" at the bottom of About screen, instead of UNREGISTERED.

To register your copy you need to pay a small fee to one of XFig distributors:

http://www.handango.com
http://www.palmgear.com
http://www.mobile2day.de
http://www.pdassi.de

You need to quote your User Name which will be used to generate the registration code. Once you received the registration code by email, enter it in the Registration Form and tap Register screen button. You have to restart the application in order to activate your registration.