MOD Making

Populous

Starting from zero

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Before we start

This manual is written by sulivandhi (popre id: Sulivan), who is a hardcore player of Populous game and MOD maker. The MODs made by the author include: Journey to be Continued (JC), Populous Anniversary 15: The Beginning patch 1.06-1.07 (new TB) as well as Path of the Godchosen (POTG). However, the author is going to quit MOD making for Populous because of many reasons. This manual is aimed at providing essential help for those who are interested in MOD making. Starting from zero, this manual will teach you the detailed procedure of MOD making for Populous game step by step. Even though you know nothing about program coding or MOD making, I believe you'll learn something after you have carefully read this manuall. OK, now let's begin!

Basic conception

MOD is for modification. MOD of a game are unofficial extension of the game, usually made by players and fans of that game (official extension is often called DLC, downloadable contents). A MOD will be based on the general framework the game, keeping the basic structure of the game, modifying the interal data only, in aim of changing the balance, AI, visual effects, difficulty, etc.

Tools to be used

- PopWorldEditor
- Wildman Scripter (Optional)
- PopLanguageEditor
- PopEdit1.3.1(Optional)
- PopSymmetryTool (Optional)
- DMKP-ScriptCreator (Optional)
- Notepad++(Recommended) or Ultraedit

The first six can be downloaded from:

- http://blacksheeppp.ys168.com ("Stone head", Blacksheep's online drive, Chinese)
- https://onedrive.live.com/?cid=ACBEBA59877CBCDD&id=ACBEBA59877CBCDD%21153 (Skydrive of the author)

Notepad++ of Ultraedit can be downloaded from official site:

- http://notepad-plus-plus.org/
- http://www.ultraedit.com/

Level making

Open the 'Levels' folder in Populous directory. You'll see the following contents:

- constants.dat (Constants for balance)
- complete.txt (Records for levels making progress of Bullfrog)
- cpatr0xx.dat (Attribute files for scripts)
- cpscr0xx.dat (Script files)
- levl2xxx.dat (Map files)
- levl2xxx.hdr (Header files for maps)
- levl2xxx.inf (Info files for maps)
- levl2xxx.ver (version files for maps)

We'll focus on the underlined items.

Banlance constants file: constants.dat

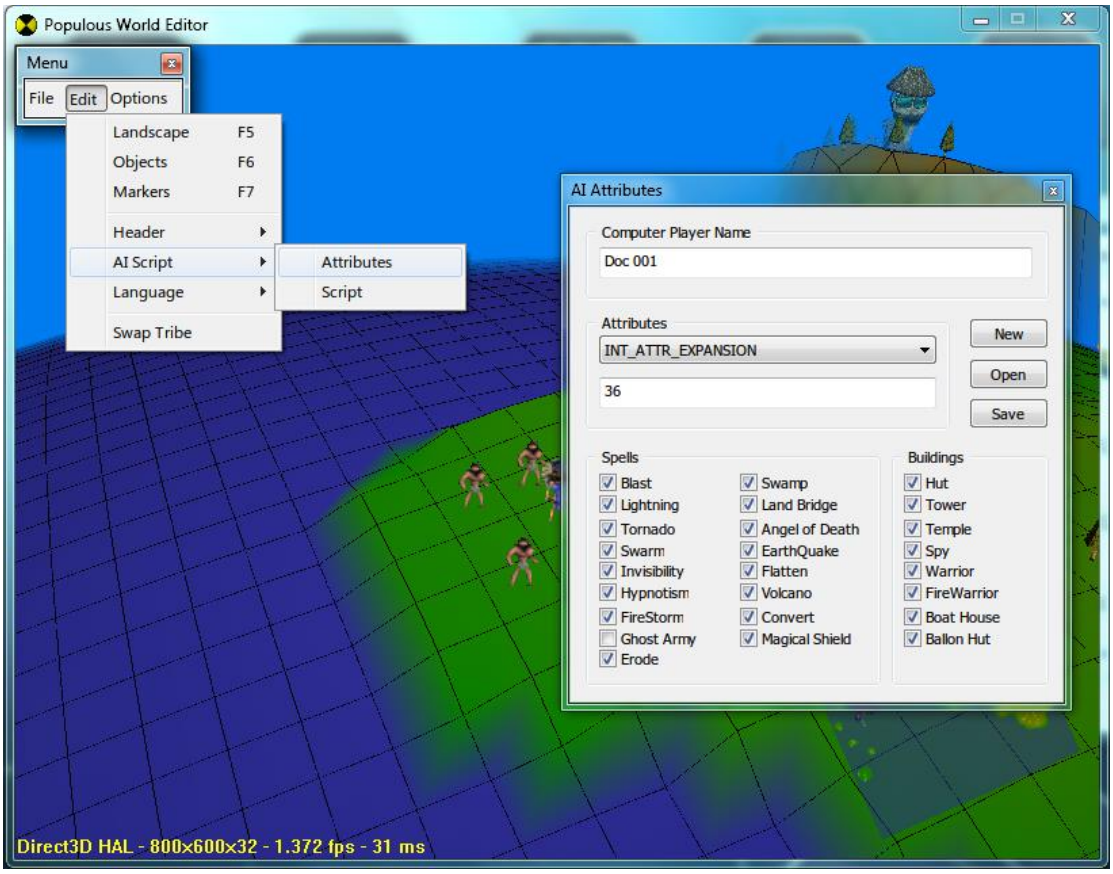
This file includes A PART OF (not everything!) constants affecting the balance of the game. The original is unreadable due to encoding reason. The version provided from the following sites is readable and can be changed, functioning in the game without any problem.

- http://blacksheeppp.ys168.com ("Stone head", Blacksheep's online drive, Chinese)
- https://onedrive.live.com/?cid=ACBEBA59877CBCDD&id=ACBEBA59877CBCDD%21153 (Onedrive of the author)

You can open and edit the file with Ultraeditor or Notepad++. See Appendix 1: Contents of the balance constants file (309 lines in the origin, more lines here due to Annotations) for details.

Script attributes file: cpatr0xx.dat

These files are 1 to 1 corresponded to script files. Each script file needs an attributes file with the name matched, say, cpscr001.dat corresponds to cpatr001.dat. An attributes file defines the basic constants that will be used in the script. These constants can be further changed in the script file. Sometimes you'll find that, you have written codes in the script file to make the AI build vehicles and train troops, but the AI just doesn't do that. This is surely caused by the attributes file. The easiest way to solve this is to rename another attributes file without such problem to replace it. Attributes files can be edited by PopWorldEditor.



Computer Player Name: Doc 001

Attributes: INT_ATTR_EXPANSION

36

Spells

☑ Blast
☑ Lightning
☑ Tornado
☑ Swarm
☑ Invisibility
☑ Hypnotism
☑ FireStorm
☐ Ghost Army
☑ Erode
☑ Swamp
☑ Land Bridge
☑ Angel of Death
☑ EarthQuake
☑ Flatten
☑ Volcano
☑ Convert
☑ Magical Shield

Buildings

☑ Hut
☑ Tower
☑ Temple
☑ Spy
☑ Warrior
☑ FireWarrior
☑ Boat House
☑ Ballon Hut

Figure 1 Interface of editing an attributes file using PopWorldEditor

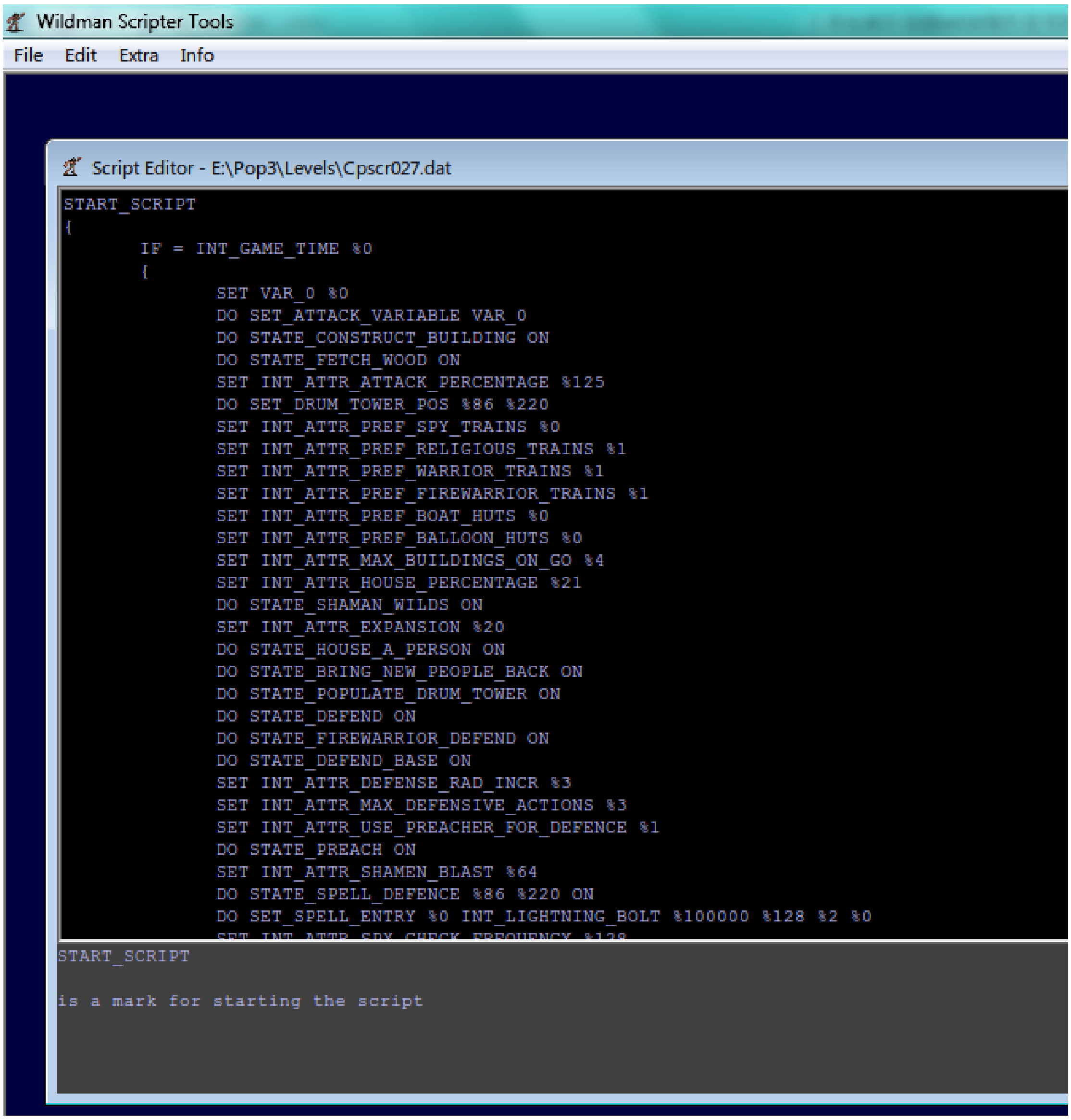
The items that can be edited by PopWorldEditor are:

- Name of the AI player (Unimportant)
- Available buildings and spells (Note that this is for AI player rather than human; it is recommended to click all of them to avoid problems. You can edit the detailed usage in the script file)
- Value of each attribute variable

The meanings of the attribute variables are listed in details in Appendix 2 Format of scripts, Section Internal attribute variables.

Script files: cpscr0xx.dat

Now we'll deal with the main body of script files, which is the most important part to determine the powerfulness of AI players and difficulty of levels. Script files can be directly edited by Wildman Scripter; or alternatively, editing txt files using Notepad++/Ultraedit (I recommend these programs for their features that the build-in text editor in Windows doesn't have), and compiled further by PopWorldEditor. Existing script files can also be decompiled by PopWorldEditor into txt format to look into their contents.

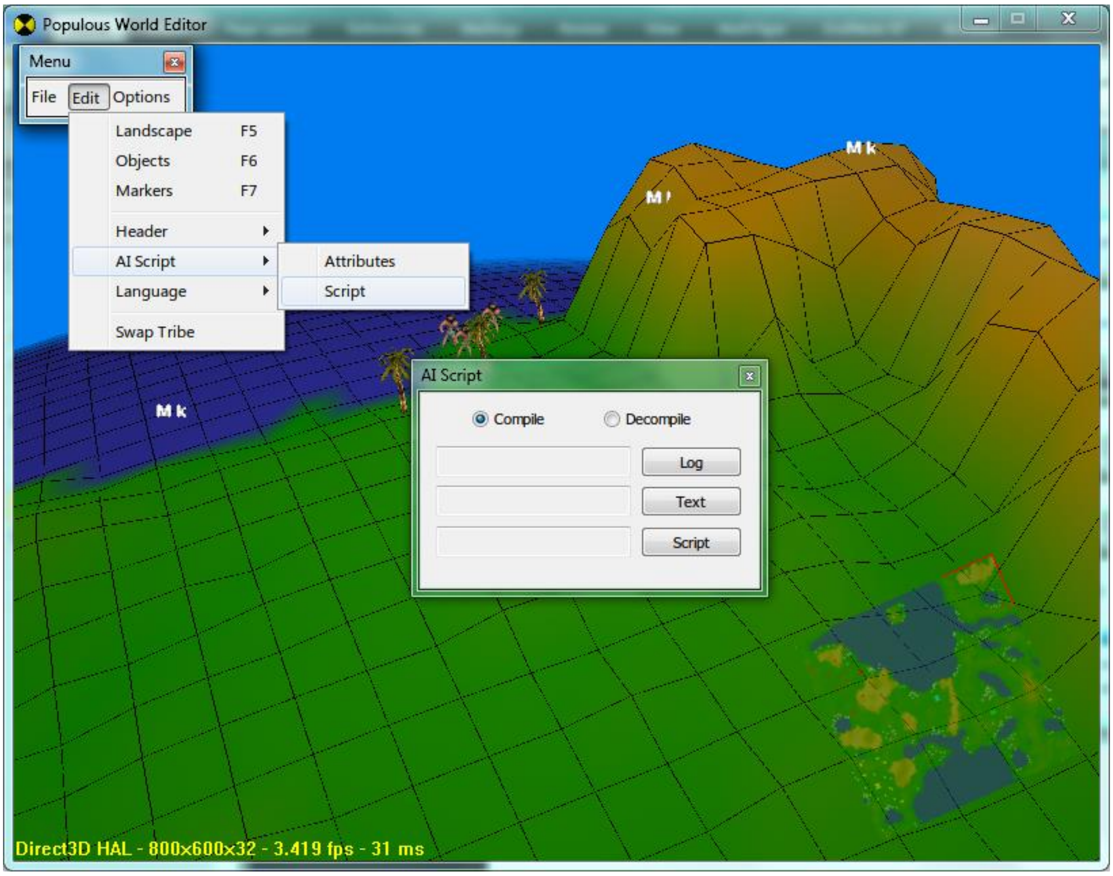


```
START_SCRIPT
{
        IF = INT_GAME_TIME %0
        {
                SET VAR_0 %0
                DO SET_ATTACK_VARIABLE VAR_0
                DO STATE_CONSTRUCT_BUILDING ON
                DO STATE_FETCH_WOOD ON
                SET INT_ATTR_ATTACK_PERCENTAGE %125
                DO SET_DRUM_TOWER_POS %86 %220
                SET INT_ATTR_PREF_SPY_TRAINS %0
                SET INT_ATTR_PREF_RELIGIOUS_TRAINS %1
                SET INT_ATTR_PREF_WARRIOR_TRAINS %1
                SET INT_ATTR_PREF_FIREWARRIOR_TRAINS %1
                SET INT_ATTR_PREF_BOAT_HUTS %0
                SET INT_ATTR_PREF_BALLOON_HUTS %0
                SET INT_ATTR_MAX_BUILDINGS_ON_GO %4
                SET INT_ATTR_HOUSE_PERCENTAGE %21
                DO STATE_SHAMAN_WILDS ON
                SET INT_ATTR_EXPANSION %20
                DO STATE_HOUSE_A_PERSON ON
                DO STATE_BRING_NEW_PEOPLE_BACK ON
                DO STATE_POPULATE_DRUM_TOWER ON
                DO STATE_DEFEND ON
                DO STATE_FIREWARRIOR_DEFEND ON
                DO STATE_DEFEND_BASE ON
                SET INT_ATTR_DEFENSE_RAD_INCR %3
                SET INT_ATTR_MAX_DEFENSIVE_ACTIONS %3
                SET INT_ATTR_USE_PREACHER_FOR_DEFENCE %1
                DO STATE_PREACH ON
                SET INT_ATTR_SHAMEN_BLAST %64
                DO STATE_SPELL_DEFENCE %86 %220 ON
                DO SET_SPELL_ENTRY %0 INT_LIGHTNING_BOLT %100000 %128 %2 %0
                SET INT_ATTR_SPY_CHECK_FREQUENCY %128
```

```
START_SCRIPT

is a mark for starting the script
```

Figure 2 Script editing using Wildman Scripter

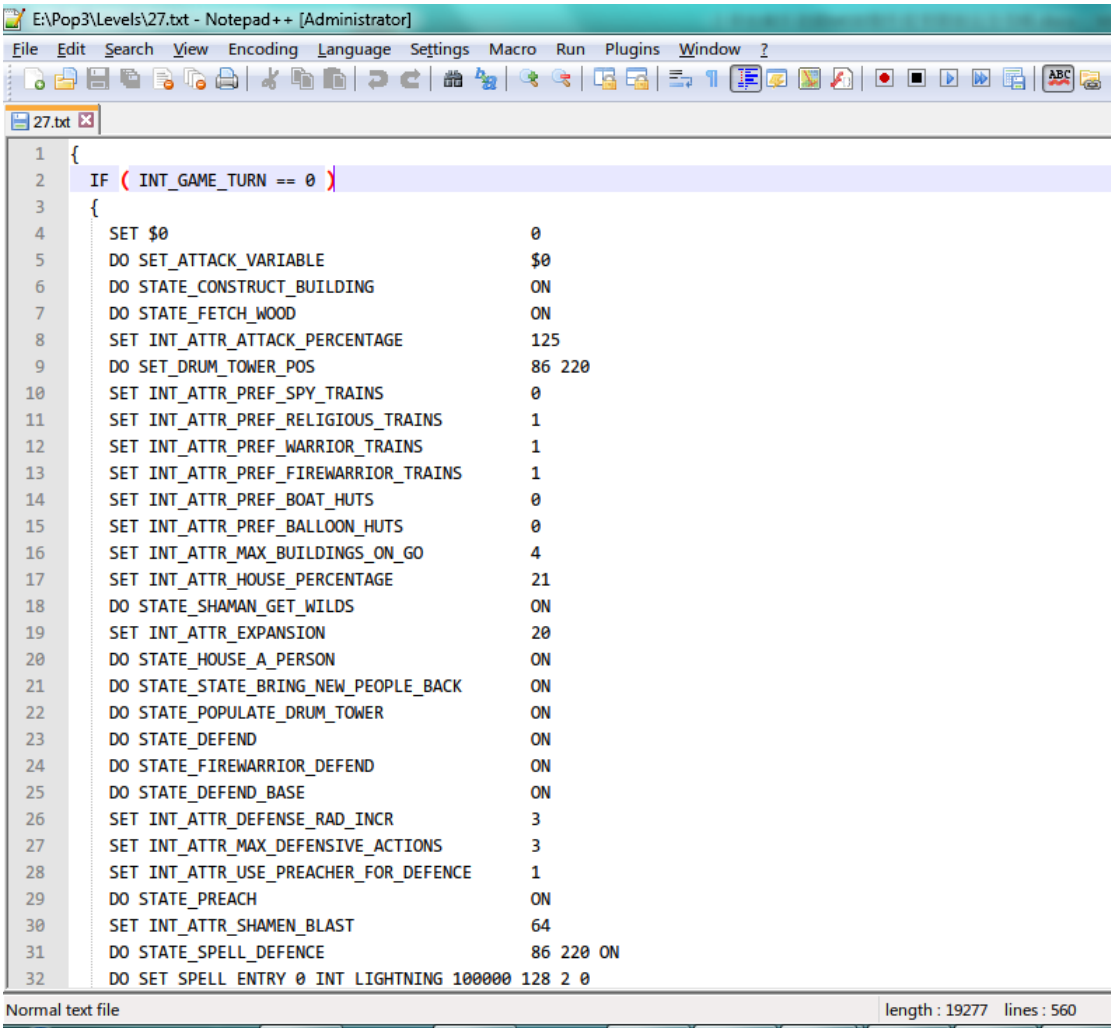


Direct3D HAL - 800x600x32 - 3.419 fps - 31 ms

Figure 3 Script compiling and decompiling using PopWorldEditor

How to compile (.txt -> cpscr0xx.dat) and decompile (cpscr0xx.dat -> .txt) by PopreWorldEditor:

- *Compile*: choose 'Compile'; click 'Log' to choose a directory to save the log file (You can choose any name and any directory you want); click 'Text' to choose the edited txt file; click 'Script' at last to save the script file. If there are errors in you txt file, then compling will fail and the errors will be recorded in the log file for your reference, the 'cpscr0xx.dat' will not be generated; if there is no error, then a dialog 'Compiled successful!' will be displayed and 'cpscr0xx.dat' will be generated in your chosen directory.
- *Decompile*: choose 'Decompile''; click 'Script' to choose an existing 'cpscr0xx.dat'; click 'Text' to to save a decompiled txt file in any directory you want with any name. Decompling will 100 percent succeed without generating a log file.


E:\Pop3\Levels\27.txt - Notepad++ [Administrator]
File Edit Search View Encoding Language Settings Macro Run Plugins Window ?
27.txt
Normal text file
length : 19277 lines : 560

```
{
  IF ( INT_GAME_TURN == 0 )
  {
    SET $0                                    0
    DO SET_ATTACK_VARIABLE                    $0
    DO STATE_CONSTRUCT_BUILDING               ON
    DO STATE_FETCH_WOOD                       ON
    SET INT_ATTR_ATTACK_PERCENTAGE            125
    DO SET_DRUM_TOWER_POS                     86 220
    SET INT_ATTR_PREF_SPY_TRAINS              0
    SET INT_ATTR_PREF_RELIGIOUS_TRAINS        1
    SET INT_ATTR_PREF_WARRIOR_TRAINS          1
    SET INT_ATTR_PREF_FIREWARRIOR_TRAINS      1
    SET INT_ATTR_PREF_BOAT_HUTS               0
    SET INT_ATTR_PREF_BALLOON_HUTS            0
    SET INT_ATTR_MAX_BUILDINGS_ON_GO          4
    SET INT_ATTR_HOUSE_PERCENTAGE             21
    DO STATE_SHAMAN_GET_WILDS                 ON
    SET INT_ATTR_EXPANSION                    20
    DO STATE_HOUSE_A_PERSON                   ON
    DO STATE_STATE_BRING_NEW_PEOPLE_BACK      ON
    DO STATE_POPULATE_DRUM_TOWER              ON
    DO STATE_DEFEND                           ON
    DO STATE_FIREWARRIOR_DEFEND               ON
    DO STATE_DEFEND_BASE                      ON
    SET INT_ATTR_DEFENSE_RAD_INCR             3
    SET INT_ATTR_MAX_DEFENSIVE_ACTIONS        3
    SET INT_ATTR_USE_PREACHER_FOR_DEFENCE     1
    DO STATE_PREACH                           ON
    SET INT_ATTR_SHAMEN_BLAST                 64
    DO STATE_SPELL_DEFENCE                    86 220 ON
    DO SET_SPELL_ENTRY 0 INT_LIGHTNING 100000 128 2 0
```

Figure 4 Editing decompiled txt script file using Notepad++

I recommend you to use PopWorldEditor together with Notepad++ for scripting work. Many bugs are known in Wildman Scripter, whose coding format and rules are rather out of date. The build-in debugging function is rather unreliable: sometimes it shows warnings but there is no error in the script actually; sometimes you can save a script file with errors without any warning, leading to crashing or freezing in the game. In comparison, a successfully compiled script by PopWorldEditor usually doesn't cause any problem in the game.

The differences between decompiled txt scripts and Wildman Scripte's scripts are listed below:

Description	Example	
	Decompiled txt scripts	Wildman Scripter's scripts
Constants	1	%1
Varible	$1	VAR_1
IF	IF ($1 > 0)	IF > VAR_1 %0
"and"	IF ($1 > 0 && $2 > 0)	IF BOTH > VAR_1 %0 > VAR_2 %0
"or"	IF ($1 > 0 || $2 > 0)	IF || > VAR_1 %0 > VAR_2 %0 [註]
Names of some spells	INT_SWARM	INT_INSECT_PLAGUE
	INT_LIGHTNING	INT_LIGHTNING_BOLT
	INT_TORNADO	INT_WHIRLWIND

Names of vehicles	INT_M_VEHICLE_BOAT	INT_M_VEHICLE_BOAT_1
	INT_M_VEHICLE_AIRSHIP	INT_M_VEHICLE_AIRSHIP_1
Multiple conditions	IF (cond 1 && cond 2 && … && cond n)	IF BOTH cond1 BOTH cond2 … BOTH cond n-1 cond n*
After EVERY	EVERY 2048 (2^n)	EVERY %2047 (2^n-1)
These statements are known to be unrecognizable in Wildman. There might be other such statements. (See Appendix 2 for details of statements)	DO SET_SPECIAL_NO_BLDG_PANEL ON	DO A404 ON*
	DO SET_MSG_ID 0	DO C204 %0*
	DO SEND_BLUE_PEOPL_TO_MARKER 0	DO 7104 %0*
	DO GET_MSG_ID $10	DO C304 VAR_10*
	DO KILL_ALL_MSG_ID 0	DO C404 %0*
	DO FLYBY_SET_MESSAGE 10 1	DO BF04 %10 %1*
	DO CREATE_MSG_OBJECTIVE 10	DO 9704 %10*
	DO GUARD_AT_MARKER 4 5 0 0 0 GUARD_WITH_GHOSTS	DO 3B04 %4 %5 %0 %0 %0 4004*
	DO SET_MSG_OK_SAVE_EXIT_DLG	DO A504*

*: Wildman's debuging fuction (F5) will report warning, however can be saved and run without any problem.

We will subject to the format in txt script files further in this manual.

Normal scripts

Taken the script of Matak in TB 16 as an example (cpscr027.dat). The decompiled txt file has 559 lines in total. Here we discuss by blocks.

Now look at the basic format of the script:

```
{
  IF ( INT_GAME_TURN == 0 )
  {
    …
  }
  ELSE
  {
    //Several such blocks
    EVERY XXX (YYY)
    {

    }
  }
  ENDIF
}
SCRIPT_END
```

Generally all scripts in Pop3 have such appearance. It doesn't matter you use upper or lower case of letters (upper case in default), all contents are included in a block { … }SCRIPT_END, devided by an IF statement into two parts.

IF Statement

IF statement is to judge by condition using the format as follows:

```
IF (condition)
{
  //Code block 1
}
ENDIF
```

or

```
IF (condition)
{
  //Code block 1
}
ELSE
{
  //Code block 2
}
ENDIF
```

The function is, if the condition(s) is met, execute Code block 1, other wise execute Code block 2 (if there is). Note that you need to wrap in the end of an IF code block with "ENDIF" added, or compling will fail without doing so. Besides this, any format or grammatical error will cause the compling to fail. If you're using Wildman, you can often save the script file with format or grammatical errors, but usage of such script file will cause the game to crash or freeze. Please pay attention.

Condition 'INT_GAME_TURN == 0' indicates that theses are things to do right at the beginning of the game; the codes in ELSE blocks are things to do after the game has begun.

EVERY statement

EVERY statement, is the loop function, using the format:

```
EVERY const1
{
  //code block
}
```

or

```
EVERY const1 const2
{
  //code block
}
```

The first parameter after EVERY, const1 indicates the codes are executed every const1 turns in the game (12 turns = 1 second); the second parameter const2 (if there is) indicate the offset for the first time of execution. For example:

```
EVERY 1024
{
  …
}
```

Then the codes will be executed at 1024, 2048, 3072 … turns in the game; if written as follows:

```
EVERY 1024 477
{
  …
```

```
    }
```

Then the first execuction will be at 1024-477=547 turns of the game, after then still executed every 1024 turns of the game. In other words, the codes will be executed at， 547, 1571, 2095 … turns of the

Note that the first parameter must be an index of 2 (2/4/8/16/32/64 …) ; or 2^n - 1 in Wildman (%1/%3/%7/%15/%31/%63 … , you need do add % before a constant in Wildman).

When the game begins …

```
SET $0                       0
DO SET_ATTACK_VARIABLE      $0
```

The meaning of these two lines is: set the value of the variable $0 to 0; set the ‘attack variable’ to $0. The ‘attack variable’ here is an internal variable of the game, which increases every time the AI launches an attack. The increased value is the number of people attending in the attack (exclude the preachers) by the AI tribe. Let’s study the statements first:

SET statement

Format:

```
SET var/attr(variable or attribute) param1 (variable or constant)
```

Function: Set the value of a variable or an internal attribute to the value of param1, which can be constant or another variable

DO statement

Format:

```
DO command param … (one or multiple parameters)
```

or

```
DO STATE_command (a state) param (ON/OFF)
```

Function: do something. The number of parameters depends on invidual statement. Alternatively, turn on/off some specific action.

These codes have defined the basic behavior sof the AI:

```
//Build automatically
DO STATE_CONSTRUCT_BUILDING              ON
//Collect wood automatically
DO STATE_FETCH_WOOD                      ON
//Attack percentage? (TO BE CONFIRMED)
SET INT_ATTR_ATTACK_PERCENTAGE           125
//Set the coordinates of the main tower
DO SET_DRUM_TOWER_POS                    86 220
//Set the number of each type building
SET INT_ATTR_PREF_SPY_TRAINS             0
SET INT_ATTR_PREF_RELIGIOUS_TRAINS       1
SET INT_ATTR_PREF_WARRIOR_TRAINS         1
SET INT_ATTR_PREF_FIREWARRIOR_TRAINS     1
SET INT_ATTR_PREF_BOAT_HUTS                0
SET INT_ATTR_PREF_BALLOON_HUTS             0
//Set the number of building that can be under construction simultaneously
SET INT_ATTR_MAX_BUILDINGS_ON_GO           4
//Set the house percentage
SET INT_ATTR_HOUSE_PERCENTAGE              21
//Automatically convert wilds
DO STATE_SHAMAN_GET_WILDS                  ON
//Expand rate? (TO BE CONFIRMED)
SET INT_ATTR_EXPANSION                     20
//Automatically send people into huts
DO STATE_HOUSE_A_PERSON                    ON
//Automatically send new people (converted wilds or preached enemies) back to the base
DO STATE_STATE_BRING_NEW_PEOPLE_BACK       ON
//Automatically send people into empty towers
DO STATE_POPULATE_DRUM_TOWER               ON
//Use warriors to patrol by circles
DO STATE_DEFEND                            ON
//Use firewarriors to patrol by circles
DO STATE_FIREWARRIOR_DEFEND                ON
//Whether or not to do action of assembling lots of war/fws to defend the base when under attack
DO STATE_DEFEND_BASE                       ON
//Expand rate of defense radius? (TO BE CONFIRMED)
SET INT_ATTR_DEFENSE_RAD_INCR              3
//Maximum defensive action? (TO BE CONFIRMED)
SET INT_ATTR_MAX_DEFENSIVE_ACTIONS         3
//Whether or not assemble preachers as well when defend
SET INT_ATTR_USE_PREACHER_FOR_DEFENCE      1
//Spread preachers around the base; otherwise they will only stay at the temple
DO STATE_PREACH                            ON
//Rate of using blast of AI shaman (larger value less frequent)
SET INT_ATTR_SHAMEN_BLAST                  64
//The place where AI shaman stay (Note that this is the same to the position of the main tower, this means that she will stay in the tower she has no other business)
DO STATE_SPELL_DEFENCE                     86 220 ON
//Use lightning spell automatically
DO SET_SPELL_ENTRY 0 INT_LIGHTNING 100000 128 2 0
//Spy check frequency
SET INT_ATTR_SPY_CHECK_FREQUENCY           128
//Spy discover chande
SET INT_ATTR_SPY_DISCOVER_CHANCE           20
//Something related to spies? (TO BE CONFIRMED)
SET INT_ATTR_ENEMY_SPY_MAX_STAND           128
//Retreat when the size of troops has fallen to this percentage in an attack
SET INT_ATTR_RETREAT_VALUE                 10
//Facing of buildings? (TO BE CONFIRMED)
SET INT_ATTR_RANDOM_BUILD_SIDE             0
//Automatically build vehicles
DO STATE_BUILD_VEHICLE                     ON
//Use vehicles to send people back to base if they cannot go back by land
DO STATE_FETCH_LOST_PEOPLE                 ON
//Do not automatically take empty vehicles
DO STATE_FETCH_LOST_VEHICLE                OFF
```

```
//Automatically drive far vehicles close (For boats, automatically drive
them to the shore; for balloons, drive them near the main tower; must be ON
if using boats, otherwise they cannot be used because the people cannot get
loaded)
DO STATE_FETCH_FAR_VEHICLE                 ON
//This and the following line deside the number of balloons to be used. The
mechanism of the values is unknown.
SET INT_ATTR_PEOPLE_PER_BALLOON            8
SET INT_ATTR_PREF_BALLOON_DRIVERS          5
//Do not automatically train people (Note that this is temporary)
DO STATE_TRAIN_PEOPLE                      OFF
//Set the percentage of each type of followers
SET INT_ATTR_PREF_SPY_PEOPLE               0
SET INT_ATTR_PREF_RELIGIOUS_PEOPLE         20
SET INT_ATTR_PREF_WARRIOR_PEOPLE           20
SET INT_ATTR_PREF_FIREWARRIOR_PEOPLE       20
```

You can see many statements like `SET INT_ATTR_XXXX  XXX`, these are the attributes defined in the attribute files. As stated before, the values can be changed in the script file.

Spells automatically casted

Note this line in the script above

```
DO SET_SPELL_ENTRY 0 INT_LIGHTNING 100000 128 2 0
```

This is to set the spells that can be automatically used by the AI shaman (lightning here). This will directly affect the powerfulness of the AI. The format for such statement is:

```
DO SET_SPELL_ENTRY idx spell mana_cost freq min_ppl bas
```

Parameters:

- idx – Numbering. Range 0~7, at most 8 spells can be set automatically used. Exceedings will have not be used and may lead to weird problems in the game (For example, using index 12 will make the blast spell of the AI replaced by ‘burn’, which is a discarded spell. A flame will appear when cast, but no damage at all).
- spell – spell to be used. INT_XXX (name), such as INT_SWARM, INT_TORNADO, etc.
- mana_cost – Mana cost to use the spell. Can be set to any value. Ususally set to the normal cost of the corresponding spell. For example, INT_M_SPELL_LIGHTNING_COST for lightning, the value of which is 80000 (see the constants in Appendix 1). Here it is set 100000 which is a little larger than the normal cost, indicating weakening the AI. Of cource, in order to strengthen the AI, you can use a value smaller than the normal value, such that the AI has more chance to cast this spell.
- freq – Frequency. Set to 2^n, usually 64~512. 64 the most frequent, 512 the least.
- min_ppl – Minimum number of enemy people. AI shaman will only cast the spell if there are at least such number of enemies in her cast range.

- bas – Inside/outside the base. Set to 0 or 1. If set to 0, AI shaman will only cast the spell when she is outside the range of the base; if set to 1, she will only cast the spell when she is inside the range of the base. To explain the 'range of the base', we need to introduce two statements which have not appeared before:

```
//Set the marker of the base
DO SET_BASE_MARKER marker
//Set the radius of the base
DO SET_BASE_RADIUS rad
```

Where marker are special objects in PopWorldEditor to indicate specific places. There can be at most 256 markers in a map (numbering 0~255). Refer to the value of coordinates for the value of radius.

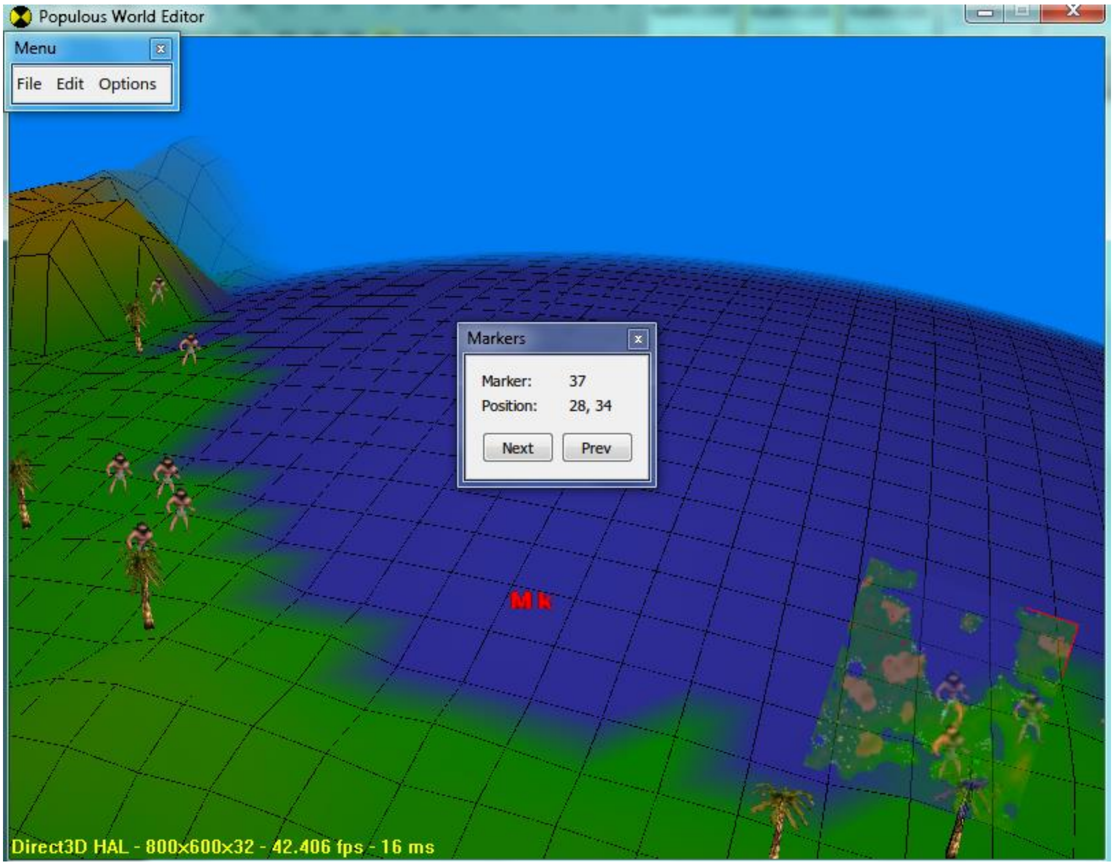


Figure 5 A marker in TB 16

The original script for Matak tribe in TB 16 has only one automatically used spell, lightning. Hence the AI is rather weak in actual. How can we make it more powerful?

Consider that in a practical game, we often use these spells for defense: blast, swarm, lightning, hypnotism and swamp (exclude ghost army in MP games). For blast, we need only this statement:

```
SET INT_ATTR_SHAMEN_BLAST                    64
```

to make the AI use it automatically. Hense we don't have leave it a place in SPELL_ENTRY. The 8 places are for the rest four spells:

```
DO SET_SPELL_ENTRY 0 INT_SWARM INT_M_SPELL_SWARM_COST 128 2 0
DO SET_SPELL_ENTRY 1 INT_SWARM INT_M_SPELL_SWARM_COST 128 2 1
DO SET_SPELL_ENTRY 2 INT_LIGHTNING INT_M_SPELL_LIGHTNING_COST 128 3 0
DO SET_SPELL_ENTRY 3 INT_LIGHTNING INT_M_SPELL_LIGHTNING_COST 128 3 1
DO SET_SPELL_ENTRY 4 INT_HYPNOTISM INT_M_SPELL_HYPNOTISM_COST 128 4 0
DO SET_SPELL_ENTRY 5 INT_HYPNOTISM INT_M_SPELL_HYPNOTISM_COST 128 4 1
DO SET_SPELL_ENTRY 6 INT_SWAMP INT_M_SPELL_SWAMP_COST 128 8 0
DO SET_SPELL_ENTRY 7 INT_SWAMP INT_M_SPELL_SWAMP_COST 128 8 1
```

This will make the computer automatically cast these spells no matter defensively or offensively. Note that we use a rather high threshold of number of enemies for the swamp spell. If you do not wish the AI to kill its own people with swamp, you'd better not use a low threshold, for the AI not intelligent enough to check if the spell will kill its own people.

Then how about other spells? Don't worry, we have a solution. We can also make the AI auto cast tornado, earthquake, firestorm and AOD in an attack, as long as well correctly use a marker in PopWorldEditor to indicate its radius of base, for example:

```
DO SET_BASE_MARKER 1
DO SET_BASE_RADIUS 30
```

Then we add following scripts:

```
EVERY 2
{
  //Check if the AI shaman is in the circle area with the specific marker
as the center and specific value of radius, and restore this information
with a variable; if she is, set the value to 1, otherwise set it to 0, take
Matak as an example here
  DO IS_SHAMAN_IN_AREA GREEN 1 30 $1
  //If the AI shaman is not in the base, replace the defensive spells with
offensive spells
  IF ( $1 == 0 )
  {
    DO SET_SPELL_ENTRY 1 INT_TORNADO INT_M_SPELL_TORNADO_COST 128 4 0
    DO SET_SPELL_ENTRY 3 INT_EARTHQUAKE INT_M_SPELL_EARTHQUAKE_COST 128 5 0
    DO SET_SPELL_ENTRY 5 INT_FIRESTORM INT_M_SPELL_FIRESTORM_COST 128 6 0
    DO SET_SPELL_ENTRY 7 INT_ANGEL_OF_DEATH INT_M_SPELL_ANGEL_OF_DEATH
_COST 128 2 0
  }
  //Otherwise reset to the original settings
  ELSE
  {
    DO SET_SPELL_ENTRY 1 INT_SWARM INT_M_SPELL_SWARM_COST 128 2 1
    DO SET_SPELL_ENTRY 3 INT_LIGHTNING INT_M_SPELL_LIGHTNING_COST 128 3 1
    DO SET_SPELL_ENTRY 5 INT_HYPNOTISM INT_M_SPELL_HYPNOTISM_COST 128 4 1
    DO SET_SPELL_ENTRY 7 INT_SWAMP INT_M_SPELL_SWAMP_COST 128 8 1
  }
  ENDIF
}
```

Usually the AI shaman will only cast tornado on buildings, rarely does she cast it to kill people (except that you use tornado as a defensive spell). As for the usage of LB, flatten and erosion, since they are not directy desctructive spells and the AI cannot smartly judge the landscape, they are unlikely to reach expected effects when used in SPELL_ENTRY. Volcano is too powerful a spell to kill people which should be used in the center of a base to reach its maximum effect, if used in SPELL_ENTRY, the AI will not wisely use it. Invisibility, shield and bloodlast, which are cast on people without showing a dialog to notify other players, should be used togerther with Triggers in the author's recommendation. We will discuss these in later sections.

Focus on you and light you up!

You might have notices that in some specific levels such as TB14 and TB20, AI shaman will try her best to kill your shaman. If you enter her cast range without caution, you might be lighted at every moment. However, they do not have such behaviour in other levels like TB16. This is because that the following statement is used:

```
DO TARGET_BLUE_SHAMAN             //No parmeter
```

This statement will function no matter where the AI shaman is. The following statements function similarly:

```
DO DONT_TARGET_BLUE_SHAMAN        //Do the opposite thing
DO TARGET_BLUE_DRUM_TOWERS        //Destroy towers in prior
DO DONT_TARGET_BLUE_DRUM_TOWERS   //Do the opposite thing of the above
DO TARGET_FIREWARRIORS            //Kill fws in prior
DO DONT_TARGET_FIREWARRIORS       //Do the opposite thing of the above
```

Patroling troops

Lets' continue looking at TB16 Matak's script:

```
DO SET_MARKER_ENTRY                                 1 21 22 0 4 3 2
DO SET_MARKER_ENTRY                                 2 23 24 0 2 3 2
DO SET_MARKER_ENTRY                                 3 25 26 0 2 2 1
DO SET_MARKER_ENTRY                                 4 27 -1 0 0 0 1
DO SET_MARKER_ENTRY                                 5 28 -1 0 0 0 1
DO SET_MARKER_ENTRY                                 6 29 -1 0 0 0 1
DO SET_MARKER_ENTRY                                 7 89 90 0 3 2 1
DO SET_MARKER_ENTRY                                 8 91 -1 0 1 2 0
```

These statements defined the patrolling places of the AI tribe (exclude the automatical circling patrol), using the format

```
DO SET_MARKER_ENTRY idx marker1 marker2 brv_num warr_num fwarr_num rlg_num
```

Parameters:

- idx – Numbering. Different from SPELL_ENTRY, starting from 1, maximum value unknown. The author has tried using 20 without any problem.
- marker1, marker2 – index of markers. If both >=0, AI will patrol between two markers; if the value for marker2 is -1, the AI will do circle patrolling at marker1 (preachers will only stand there).
- brv_num, warr_num, fwarr_num, rlg_num – number of each type of followers. Braves, warriors, firewarriors, preachers respectively. By the author's observation, the AI will not necessarily use exacty such numbers of people patrolling, they just use them as a reference; the total number

however, usually meets the setting. When patrolling between two place, AI often use preachers instead of other followers.

Note that the above statements only set the places, to do real patrolling, you need the following statements.

```
//Do at most 3 patrolling entries; set index to -1 if unused.
DO MARKER_ENTRIES idx1 idx2 idx3 -1
```

Alternatively, the following statements can also be used for patrolling:

```
//Patroling between markers. ‘option’ can be GUARD_NORMAL or
GUARD_WITH_GHOSTS, the latter will use ghost army for patroling
DO GUARD_BETWEEN_MARKERS marker1 marker2 brv_num warr_num fwarr_num
rlg_num option
//Circle patrolling at a marker
DO GUARD_AT_MARKER marker brv_num warr_num fwarr_num rlg_num option
//For preachers only
DO PREACH_AT_MARKER marker
```

Using vehicles when patrolling (Used in cpscr043.dat of TB20):

```
//Pass through marker1,2,3,4 sequencially using vehicle. Using fws only.
AI will only do such patrol once for each of such statement. To be
included in EVERY block for multiple execution.
DO VEHICLE_PATROL num_ppl marker1 marker2 marker3 marker4 vehicle
```

Other statements include:

```
//This statement makes other types of followers stand at the place just
like preachers
DO ONLY_STAND_AT_MARKERS
//Cancel at most 3 patrolling entries, set index to -1 if unused
DO CLEAR GUARDING FROM idx1 idx2 idx3 -1
```

Attacking attributes

The following scripts are:

```
SET INT_ATTR_MAX_TRAIN_AT_ONCE             5
SET INT_ATTR_GROUP_OPTION                  0
DO STATE_AUTO_ATTACK                       ON
SET INT_ATTR_COUNT_PREACH_DAMAGE           1
SET INT_ATTR_MAX_ATTACKS                   3
SET INT_ATTR_AWAY_BRAVE                    0
SET INT_ATTR_AWAY_WARRIOR                  40
SET INT_ATTR_AWAY_RELIGIOUS                25
SET INT_ATTR_AWAY_SPY                      0
SET INT_ATTR_AWAY_FIREWARRIOR              35
SET INT_ATTR_AWAY_SHAMAN                   100
SET INT_ATTR_BASE_UNDER_ATTACK_RETREAT     1
```

The meanings are explained in Script attributes file (cpatr0xx.dat). Remember to set DO STATE_AUTO_ATTACK ON if you don’t want the AI to stay at home. The percentage of each type of followers usded in an attack can be immediately changes right before the attack.

Initialisation of variables

```
SET $1                                     0
SET $2                                     0
SET $3                                     0
SET $4                                     0
SET $5                                     0
SET $6                                     0
SET $7                                     0
SET $8                                     0
SET $9                                     0
SET $10                                    0
SET $11                                    0
SET $12                                    0
SET $13                                    0
SET $14                                    0
SET $15                                    0
SET $16                                    0
SET $17                                    0
SET $18                                    0
SET $19                                    0
SET $20                                    0
SET $21                                    0
SET $22                                    0
```

This part iniailize the variables to be used in the scripted. If not initialised, the default value is 0. You might ask that as long as the default value is 0, then those variables which are designed to be 0 will need no initialisation, is that true? The answer is, NO. This is because, if you choose to restart the level in the game, the value of variables will not change unless you reset them at the beginning of the script. For example, if the initial value of $1 is 0, then it becomes 1 later in the game because of some reason. Now you restart the level. If you don’t set $1 to 0 at the beginning of the script, you will start the level with $1 equals to 1, leading to the plot different from that of the first time you enter the level. Therefore, always remember to initialise all variables you are going to use, even though you wish them to be the default value 0.

Besides, the maximum number of variable available in a script is 64 ($0~$63). $0 is usually used as the ‘attack variable’, so you can acutually use 63 variables, which I think is far beyond enough.

Others

Still 2 lines remaining:

```
//Give Matak some initial mana
DO GIVE_MANA_TO_PLAYER GREEN               10000
//The effect of this attribute is unknown
SET INT_ATTR_FIGHT_STOP_DISTANCE           24
```

In addition, there are two important statements which have not appeared here:

```
//Set the information dialog appear at the beginning of the level’idx’
see Appendix 3 Index and line numbers of dialogs in the language file
DO SET_MSG_NARRATIVE idx
//Set this dialog automatically shown
DO SET MSG AUTO OPEN DLG
```

You'll find such statement in scripts files of every level of TB, some are set at the beginning, some are set slightly after the beginning. If there are multiple AI players, such statement only appears in one the scripts, otherwise you'll see multiple information dialogs in the game.

During the game

Now we study the codes executed during the games, which is the main part of a script. In most scrips, these codes are included in multiple EVERY blocks (Of cource, you can use IF statement outside EVERY blocks, see No.8 and No.10 scripts of Devil Worlds MOD, http://www.populous-online.co.uk/single-player-challenge/); If you put an IF statement outside EVERY blocks, they will actually be executed every turn in the game.

In the author's opinion, there should not be too many EVERY blocks in a script to avoid interference. You should be clear at the purpose of each EVERY block. Codes with similar purpose should be put into the same EVERY block.

Continue looking at the main body of TB16 Matak' script:

Give up and sulk

```
EVERY 64
{
  IF ( INT_MY_NUM_PEOPLE < 8 && INT_MY_NUM_KILLED_BY_HUMAN > 10 )
  {
    IF ( INT_M_BUILDING_MEDIUM_HUT < 1 && INT_M_BUILDING_LARGE_HUT < 1 )
    {
      IF ( INT_M_BUILDING_SMALL_HUT < 1 )
      {
        DO GIVE_UP_AND_SULK                    ON
      }
      ENDIF
    }
    ENDIF
  }
  ENDIF
}
```

When you have almost destroyed an AI tribe, you'll often find all their people including the shaman trying to reach your shaman and fight her. The purpose is to end the level quickly when the AI has little chance to recover. This is the function of the statement: DO GIVE_UP_AND_SULK ON. The conditions here are: my total population (include the shaman) is less than 8, my people killed by the human player is larger than 10, the number of my small, medium and large huts all smaller than 1 (no hut at all).

I'm just pretending to be not cheating

```
EVERY 256 133
{
  IF ( INT_MY_MANA < 500000 )
  {
    DO GIVE_MANA_TO_PLAYER GREEN 7500
  }
  ENDIF
  IF ( INT_MY_NUM_PEOPLE < 73 )
  {
    DO SET_BUCKET_USAGE                      ON
```

```
      DO SET_BUCKET_COUNT_FOR_SPELL INT_BLAST                 8
      DO SET_BUCKET_COUNT_FOR_SPELL INT_CONVERT               8
      DO SET_BUCKET_COUNT_FOR_SPELL INT_SWARM                 32
      DO SET_BUCKET_COUNT_FOR_SPELL INT_INVISIBILITY          40
      DO SET_BUCKET_COUNT_FOR_SPELL INT_SHIELD                48
      DO SET_BUCKET_COUNT_FOR_SPELL INT_LAND_BRIDGE           66
      DO SET_BUCKET_COUNT_FOR_SPELL INT_LIGHTNING             64
      DO SET_BUCKET_COUNT_FOR_SPELL INT_HYPNOTISM             70
      DO SET_BUCKET_COUNT_FOR_SPELL INT_TORNADO               72
      DO SET_BUCKET_COUNT_FOR_SPELL INT_SWAMP                 80
      DO SET_BUCKET_COUNT_FOR_SPELL INT_FLATTEN               100
      DO SET_BUCKET_COUNT_FOR_SPELL INT_EARTHQUAKE            140
      DO SET_BUCKET_COUNT_FOR_SPELL INT_EROSION               168
      DO SET_BUCKET_COUNT_FOR_SPELL INT_FIRESTORM             320
      DO SET_BUCKET_COUNT_FOR_SPELL INT_ANGEL_OF_DEATH        408
      DO SET_BUCKET_COUNT_FOR_SPELL INT_VOLCANO               640
    }
    ELSE
    {
      DO SET_BUCKET_USAGE                      ON
      DO SET_BUCKET_COUNT_FOR_SPELL INT_BLAST                 4
      DO SET_BUCKET_COUNT_FOR_SPELL INT_CONVERT               4
      DO SET_BUCKET_COUNT_FOR_SPELL INT_SWARM                 16
      DO SET_BUCKET_COUNT_FOR_SPELL INT_INVISIBILITY          20
      DO SET_BUCKET_COUNT_FOR_SPELL INT_SHIELD                24
      DO SET_BUCKET_COUNT_FOR_SPELL INT_LAND_BRIDGE           33
      DO SET_BUCKET_COUNT_FOR_SPELL INT_LIGHTNING             32
      DO SET_BUCKET_COUNT_FOR_SPELL INT_HYPNOTISM             35
      DO SET_BUCKET_COUNT_FOR_SPELL INT_TORNADO               36
      DO SET_BUCKET_COUNT_FOR_SPELL INT_SWAMP                 40
      DO SET_BUCKET_COUNT_FOR_SPELL INT_FLATTEN               50
      DO SET_BUCKET_COUNT_FOR_SPELL INT_EARTHQUAKE            70
      DO SET_BUCKET_COUNT_FOR_SPELL INT_EROSION               84
      DO SET_BUCKET_COUNT_FOR_SPELL INT_FIRESTORM             180
      DO SET_BUCKET_COUNT_FOR_SPELL INT_ANGEL_OF_DEATH        204
      DO SET_BUCKET_COUNT_FOR_SPELL INT_VOLCANO               320
    }
    ENDIF
  }
```

The meaning of these codes are:

Every 256 turns (approx. 21 seconds), if my mana is less than 500000, give extra 7500 mana to the Matak tribe (the AI itself).

The following codes are to simulate the maximum shots or each spell. Actually, the usage of spells of an AI player is totally different from that of a human player. Whether or not a spell can be cast, depend only on if the AI has enough mana (or, if it has one or more extra shots of the spell, something like the red bullet of spells granted by stonehead). The only purpose of these codes, are to make the AI "looks like" following the rule for the human player that, 'A spell can be used for only a limited number of times, during a certain time period' (For example, lightning has a maximum of 4 shots; after you used them out, you have to wait a while for another shot to be charged). Otherwise you might see the AI casting 5 lightings, 4 eqs and 3 volcanoes in a row and can't help shout abuse 'WTF! The AI is cheating! Unfair!' (What? TB10? Ignore it ...). The values in the statements, are the number of SECONDS that an AI player needs to "recharge" a spell (Note, SECONDS here instead of turns), different by the population of the AI tribe. For example, when the AI has more than 73 population, after the AI shaman has cast firestorm for twice, she'll have to wait 3 minutes for another shot. Based on my test, for a human player, firestorm takes less than a minute to charge for one shot when you reach 199 population. Mercy!

However, such setting will also lead to some problem. For example, TB20 Dakini's scripts used DO SPELL_ATTACK statement to make the AI cast AOD at a marker. After she has cast once, she will go to that marker and standing there like a fool doing nothing. She cannot do anything until enough time has passed to cast another time. During the period, even though she has more mana than the cost of AOD, or she is given an extra shot of AOD, the spell is not available due to DO SET_BUCKET_USAGE ON statement.

In summary, if you want the AI to be more powerful, use smaller values for the parameter; if you just want the AI to cast AOD in times, then use an especially small value for the AOD spell; if you just don't want to win the game, use DO SET_BUCKET_USAGE OFF (see TB10 script cpscr059.dat).

Development

```
    EVERY 128
    {
      IF ( INT_GAME_TURN > 8000 )             //After a while of the game
      {
        DO STATE_TRAIN_PEOPLE              ON //Start training, this is why
we say “Do not train” at the beginning is temporary
      }
      ENDIF
      IF ( INT_M_BUILDING_LARGE_HUT > 2 )     //If I have more than 2 large
huts
      {
        SET INT_ATTR_HOUSE_PERCENTAGE      90 //Build massive huts!
        SET INT_ATTR_PREF_BALLOON_HUTS     1  //Build a balloon hut
      }
      ENDIF
    }
```

The purpose of this is part is to make the AI tribe develop progressively. TB16 is a typical example of a level with insufficient trees, so building as fast as possible is an unwise choice to expand the population, saving woods and upgrading existing huts first is a better way to develop.

In addition, building vehicles has lower priority if the TO-DO list of AI than building and upgrading huts. Thus if you set a larger value for INT_ATTR_HOUSE_PERCENTAGE, you may often see that the AI builds a balloon hut but does not build any balloon; they just keep building huts until they are satisfied with the size of their base. Because they have no vehicles, they do not attack. When they start building vehicles and launch an attack, the human player has aready grown up with an unbeatable settlement, making the level disappointingly easy. To solve this problem, use the scripts like below:

```
   EVERY 128
    {
      IF (INT_M_VEHICLE_AIRHIP < 3 )
      {
        SET INT_ATTR_HOUSE_PERCENTAGE      30
      }
      ELSE
      {
        IF (INT_M_VEHICLE_AIRHIP < 6 )
       {
          SET INT_ATTR_HOUSE_PERCENTAGE      60
        }
        ELSE
        {
          SET INT_ATTR_HOUSE_PERCENTAGE      90
        }
        ENDIF
      }
      ENDIF
    }
```

These codes make the AI build vehicles in early game and launch attacks in early game.

When INT_ATTR_HOUSE_PERCENTAGE is set 100, the AI tribe will actually NOT reach maximum population (see details in Appendix 2). If you want the AI tribe to reach the maximum population, you need a value larger than 100. In addition, the higher value is used, the more efficient AI will use the land. For example, if at most 15 huts can be built on an island by a human player, the AI will most likely to build only 11 or 12 huts with the value set to 50; hoever, if you use a larger value like 80, then the AI will use the land more wisely, building 13, 14 or even 15 huts on the island.

Defensive construtions

```
    EVERY 256
    {
      //The meaning of the following codes is, as long as I have one large
hut or more, start building towers at different places
      IF ( INT_M_BUILDING_LARGE_HUT > 0 && $13 < 6 )
      {
        IF ( $13 == 0 && INT_CP_FREE_ENTRIES > 1 )
        {
          DO BUILD_DRUM_TOWER                     108 224
          SET $13                                 1
        }
        ELSE
        {
          IF ( $13 == 1 && INT_CP_FREE_ENTRIES > 1 )
          {
            DO BUILD_DRUM_TOWER                    108 234
            SET $13                                2
          }
          ELSE
          {
            IF ( $13 == 2 && INT_MY_NUM_PEOPLE > 40 )
            {
              IF ( INT_CP_FREE_ENTRIES > 1 )
              {
                DO BUILD_DRUM_TOWER                  80 200
                SET $13                              3
              }
              ENDIF
            }
            ELSE
            {
              IF ( $13 == 3 && INT_MY_NUM_PEOPLE > 45 )
              {
                IF ( INT_CP_FREE_ENTRIES > 1 )
                {
                  DO BUILD_DRUM_TOWER                 64 240
                  SET $13                             4
                }
                ENDIF
              }
              ELSE
              {
                IF ( $13 == 4 && INT_MY_NUM_PEOPLE > 50 )
                {
                  IF ( INT_CP_FREE_ENTRIES > 1 )
                  {
                    DO BUILD_DRUM_TOWER                76 10
                    SET $13                            5
                  }
                  ELSE
                  {
                    IF ( $13 == 5 && INT_MY_NUM_PEOPLE > 55 )
                    {
                      IF ( INT_CP_FREE_ENTRIES > 1 )
                      {
                        DO BUILD_DRUM_TOWER              92 10
                        SET $13                          6
                      }
                      ENDIF
                    }
                    ENDIF
                  }
                  ENDIF
                }
                ENDIF
              }
              ENDIF
            }
            ENDIF
          }
          ENDIF
        }
        ENDIF
      }
      ENDIF
      //If I have more than 29 people, stop auto converting wilds
      IF ( INT_MY_NUM_PEOPLE > 29 )
      {
        DO STATE_SHAMAN_GET_WILDS                OFF
      }
      ELSE
      {
      //If I have less than 20 people, start auto converting wilds again
         IF ( INT_MY_NUM_PEOPLE < 20 )
        {
          DO STATE_SHAMAN_GET_WILDS               ON
```

```
        }
        ENDIF
      }
      ENDIF
      //Unknown, suppose to be making expansion faster and faster
      IF ( INT_ATTR_EXPANSION < 40 )
      {
        INCREMENT INT_ATTR_EXPANSION 1
      }
      ENDIF
    }
    EVERY 256 128
    {
      //When the number of fws reaches specific values, starting sending
fws into towers
      IF ( INT_M_PERSON_FIREWARRIOR > 1 )
      {
        DO PUT_PERSON_IN_DT INT_FIREWARRIOR 108 224
        DO PUT_PERSON_IN_DT INT_FIREWARRIOR 108 234
        DO PUT_PERSON_IN_DT INT_FIREWARRIOR 80 200
      }
      ENDIF
      IF ( INT_M_PERSON_FIREWARRIOR > 3 )
      {
        DO PUT_PERSON_IN_DT INT_FIREWARRIOR 64 240
        DO PUT_PERSON_IN_DT INT_FIREWARRIOR 76 10
        DO PUT_PERSON_IN_DT INT_FIREWARRIOR 92 10
      }
      ENDIF
      //When the number of warriors and preachers reach specific values,
start patroling
      IF ( INT_M_PERSON_WARRIOR > 3 )
      {
        DO MARKER_ENTRIES                        1 2 3 -1
      }
      ENDIF
      IF ( INT_M_PERSON_RELIGIOUS > 2 )
      {
        DO MARKER_ENTRIES                        4 5 6 -1
      }
      ENDIF
      //Check the number of blue people in some area
      DO COUNT_PEOPLE_IN_MARKER BLUE 30 8 $2
      //If there are more than 8 blue people and I have very low population
      IF ( $2 > 8 && INT_MY_NUM_PEOPLE < 25 )
      {
        //Train people right now
        DO STATE_TRAIN_PEOPLE                    ON
        DO TRAIN_PEOPLE_NOW 2 INT_WARRIOR
        //Send 4 people to protect shaman (circling around her)
        DO DEFEND_SHAMEN                         4
      }
      ELSE
      {
        //If I have larger population
        IF ( $2 > 8 )
        {
          //Send 5 people to protect shaman
          DO DEFEND_SHAMEN                        5
        }
        ELSE
        {
          //If there is no blue people in the area, and I have more than 7
people
          IF ( $2 == 0 && INT_MY_NUM_PEOPLE > 7 )
          {
            //Dismiss shaman defenders
            DO SEND_SHAMEN_DEFENDERS_HOME
          }
          ENDIF
        }
        ENDIF
      }
      ENDIF
      //These codes are easy to understand: protect shaman with all people
if I have very low population
      IF ( INT_MY_NUM_PEOPLE > 20 && $22 == 0 )
      {
        SET $22                                  1
      }
      ENDIF
      IF ( INT_MY_NUM_PEOPLE < 8 && $22 == 1 )
      {
        DO DEFEND_SHAMEN                         INT_MY_NUM_PEOPLE
      }
      ELSE
      {
        IF ( $2 == 0 )
        {
          DO SEND_SHAMEN_DEFENDERS_HOME
        }
        ENDIF
      }
      ENDIF
      //What is varialbe $21 for? Pay attention to this variable in our
further discussion
      IF ( $21 == 1 )
      {
        DO MARKER_ENTRIES                        7 8 -1 -1
        DO PUT_PERSON_IN_DT INT_FIREWARRIOR 98 56
      }
      ENDIF
    }
```

Worshipping relics

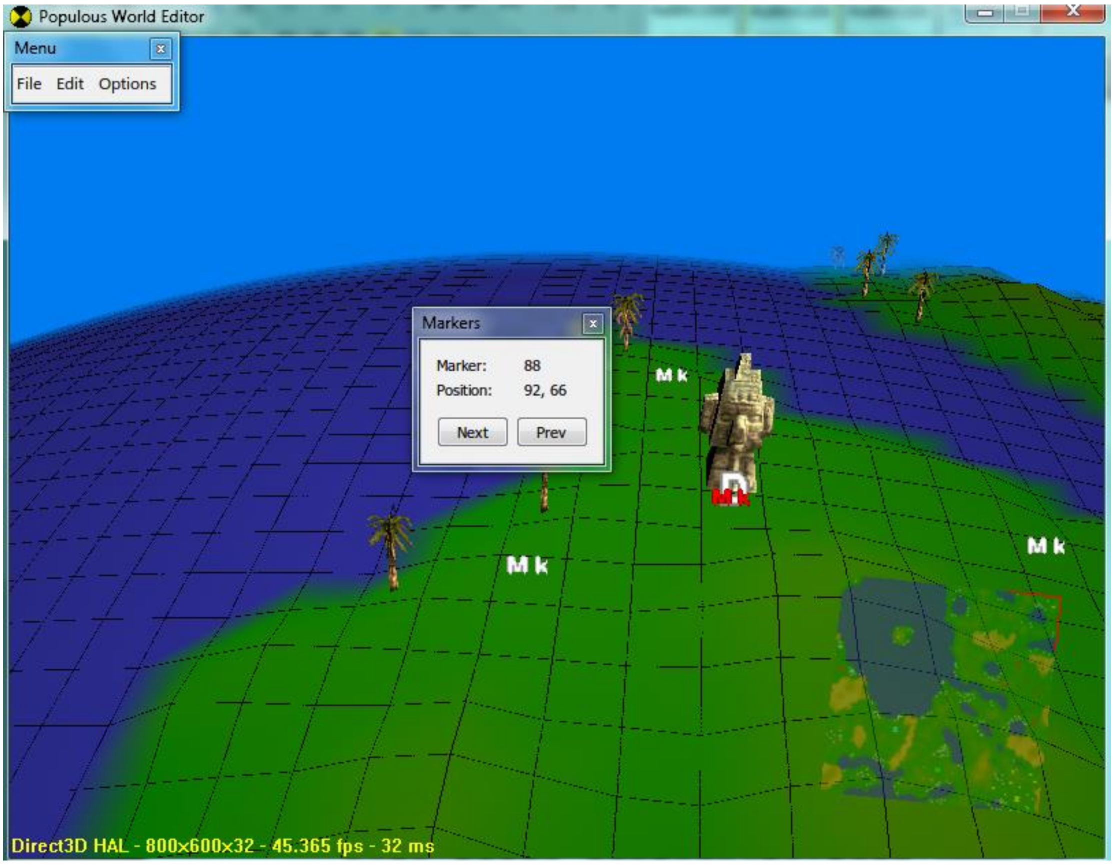
```
        EVERY 2048
        {
          //This is to check the number people of each tribe at the
bloodlust stonehead. Check the TB16 map with PopWorldEditor you’ll see that
marker88 is right before the bloodlust stone head.
          DO COUNT_PEOPLE_IN_MARKER BLUE 88 8 $17
          DO COUNT_PEOPLE_IN_MARKER RED 88 8 $18
          DO COUNT_PEOPLE_IN_MARKER YELLOW 88 8 $19
          DO COUNT_PEOPLE_IN_MARKER GREEN 88 8 $20
          //Use $14 to record the tribe with the largest number of people
at the stonehead to make it the target to
attack.0=BLUE,1=RED,2=YELLOW,3=GREEN
```

```
          IF ( $17 > $18 )
          {
            IF ( $17 > $19 )
            {
              SET $14                                 0
            }
            ELSE
            {
              SET $14                                 2
            }
            ENDIF
          }
          ELSE
          {
            IF ( $18 > $19 )
            {
              SET $14                                 1
            }
            ELSE
            {
              SET $14                                 2
            }
            ENDIF
          }
          ENDIF
          //Set $16 the sum of the number of people of the three enemy
tribes
          SET $16                                   $17
          INCREMENT $16 $18
          INCREMENT $16 $19
          //If $16 is larger than 0 and the following conditions are met,
send the same number of troops to attack, until all enemies are killed. Use
3 shots of lightning spell in the attack, attack by land
          IF ( $16 > 0 && INT_CP_FREE_ENTRIES > 2 )
          {
            IF ( INT_MY_NUM_PEOPLE > 45 && INT_M_PERSON_RELIGIOUS > 2 )
            {
              IF ( INT_M_PERSON_WARRIOR > 2 && INT_MY_MANA > 100000 )
              {
                DO ATTACK $14 $16 ATTACK_MARKER 88 $16 INT_LIGHTNING
INT_LIGHTNING INT_LIGHTNING ATTACK_NORMAL 0 -1 -1 -1
              }
              ENDIF
            }
            ENDIF
          }
          ENDIF
          //If there are less enemies than my people($20 is the number of
green people at the stonehead), and I have more than 50 people
          IF ( $16 <= $20 && INT_MY_NUM_PEOPLE > 50 )
          {
            //Send 6 people to worship the stonehead
            DO PRAY_AT_HEAD                          6 88
            //If I have some defensive forces
            IF ( INT_M_PERSON_WARRIOR > 3 && INT_M_PERSON_RELIGIOUS > 3 )
            {
              IF ( INT_M_PERSON_FIREWARRIOR > 3 && INT_CP_FREE_ENTRIES > 0 )
              {
                //Patrol near the stonehead. Attention! Here appears $21
                SET $21                                1
                DO MARKER_ENTRIES                      7 8 -1 -1
                //Check if there is a tower of mine near the stonehead. If
there isn’t build one and send an fw into it
                DO PUT_PERSON_IN_DT INT_FIREWARRIOR 98 56
                DO IS_BUILDING_NEAR INT_DRUM_TOWER 98 56 GREEN 6 $15
                IF ( $15 == 0 )
                {
                  DO BUILD_DRUM_TOWER                  98 56
                }
                ENDIF
              }
              ENDIF
            }
            ENDIF
          }
          //If conditons are not met (my defensive force is not strong
enough), then do not send forces to defend the stonehead
          ELSE
          {
            SET $21                                  0
          }
          ENDIF
        }
```

We need to pay attention to the following two statements:

```
DO ATTACK $14 $16 ATTACK_MARKER 88 $16 INT_LIGHTNING INT_LIGHTNING
INT_LIGHTNING ATTACK_NORMAL 0 -1 -1 -1
```

This is the commonly used attack command in scripts. The details are explained in the next section. Here we note that, when the target is set to a marker, the marker must be at a reachable place. Besides, it cannot be covered by objects like stoneheads or totems. See that marker 88 is beside the face of the stonehead rather beneath it. If the marker is beneath the stonehead, the attack cannot be launched.



Marker: 88
Position: 92, 66

Figure 6 Marker88 in TB16, beside the face of the stonehead rather than covered by it

```
 DO PRAY_AT_HEAD                         6 88
```

This command is rather simple, what is the point? The thing is, numbers of each type of people sent to worship the stonehead are distributed according to the percentage used for attack. If the value for shaman is 1, then it's very likely that the AI shaman will go to worship the head as well. This is no good for the AI tribe. So when worship stoneheads or totems, do not use the codes above, use these:

```
SET INT_ATTR_AWAY_SHAMAN                0
DO PRAY_AT_HEAD                         6 88
SET INT_ATTR_AWAY_SHAMAN                1
```

which makes the shaman absent of worshipping. Oppositely, if the object to be worshipped is an obelisk or a statue of AOD, then you should use value 1 for shaman and 0 for other followers.

Besides, you should know that if the maximum time of worshipping of the object is set to infinite (By setting 'Occurences' of Trigger to 0 in the PopWorldEditor), then those people sent will keep worshipping until killed; if the shaman is sent to worship an obelisk with infinite occurences, she will keep worshipping it ignoring any other commands given to her, even though she is reborn after killed.

Attack!

The following codes are executed when the AI is launching an attack:

```
EVERY 1024 64
```

```
    {
      //Choose the tribe with the largest population as the target
      IF ( INT_BLUE_PEOPLE > INT_RED_PEOPLE )
      {
        IF ( INT_BLUE_PEOPLE > INT_YELLOW_PEOPLE )
        {
          SET $12                                 0
        }
        ELSE
        {
          SET $12                                 2
        }
        ENDIF
      }
      ELSE
      {
        IF ( INT_RED_PEOPLE > INT_YELLOW_PEOPLE )
        {
          SET $12                                 1
        }
        ELSE
        {
          SET $12                                 2
        }
        ENDIF
      }
      ENDIF
      //Use loops for further attacks
      IF ( $1 == 4 && INT_CP_FREE_ENTRIES > 1 )
      {
       //Send 24 people to attack the tribe with the largest population,
using lightning, shield and swarm spells
      IF ( $11 == 0 && INT_M_PERSON_WARRIOR > 4 )
        {
          SET $10                                 INT_M_SPELL_SHIELD_COST
          INCREMENT $10 INT_M_SPELL_SWARM_COST
          INCREMENT $10 INT_M_SPELL_LIGHTNING_COST
          IF ( INT_MY_MANA > $10 && INT_M_PERSON_RELIGIOUS > 4 )
          {
            IF ( INT_M_PERSON_FIREWARRIOR > 4 )
            {
              DO ATTACK $12 24 ATTACK_BUILDING INT_NO_SPECIFIC_BUILDING 989
INT_LIGHTNING INT_SHIELD INT_SWARM ATTACK_NORMAL 0 -1 -1 -1
              SET $11                               1
            }
            ENDIF
          }
          ENDIF
        }
        ELSE
        {
           //or send 15 people to attack the tribe with the largest
population, using earthquake, tornado and lightning spells
          IF ( $11 == 1 && INT_M_PERSON_WARRIOR > 4 )
          {
            SET $8
INT_M_SPELL_EARTHQUAKE_COST
            INCREMENT $8 INT_M_SPELL_LIGHTNING_COST
            INCREMENT $8 INT_M_SPELL_TORNADO_COST
            IF ( INT_MY_MANA > $8 && INT_M_PERSON_RELIGIOUS > 4 )
            {
              IF ( INT_M_PERSON_FIREWARRIOR > 4 )
              {
                DO ATTACK $12 15 ATTACK_BUILDING INT_NO_SPECIFIC_BUILDING
999 INT_EARTHQUAKE INT_TORNADO INT_LIGHTNING ATTACK_NORMAL 0 -1 -1 -1
                SET $11                              0
              }
              ENDIF
            }
            ENDIF
          }
          ENDIF
        }
        ENDIF
      }
      ENDIF
      //The 4th attack with 24 people, targeting the blue tribe, attack a
random building, fight until death, casting erosion on the northern part of
mountain between two tribes, cast lightning and tornado after then
       IF ( $1 == 3 && INT_CP_FREE_ENTRIES > 1 )
      {
        IF ( INT_M_PERSON_WARRIOR > 5 && INT_M_PERSON_RELIGIOUS > 4 )
        {
          SET $8                                  INT_M_SPELL_EROSION_COST
          INCREMENT $8 INT_M_SPELL_LIGHTNING_COST
          INCREMENT $8 INT_M_SPELL_TORNADO_COST
          IF ( INT_M_PERSON_FIREWARRIOR > 4 && INT_MY_MANA > $8 )
          {
            DO ATTACK BLUE 24 ATTACK_BUILDING INT_NO_SPECIFIC_BUILDING 999
INT_EROSION INT_LIGHTNING INT_TORNADO ATTACK_NORMAL 0 76 77 0
            SET $1                                 4
          }
          ENDIF
        }
        ENDIF
      }
      ENDIF
      //The 3rd attack with 24 people, targeting the tribe with the largest
population, attack a random building, fight until death, casting swarm and
2 shots of tornado
      IF ( $1 == 2 && INT_CP_FREE_ENTRIES > 1 )
      {
        SET $9                                   INT_M_SPELL_SWARM_COST
        INCREMENT $9 INT_M_SPELL_TORNADO_COST
        INCREMENT $9 INT_M_SPELL_TORNADO_COST
        IF ( INT_MY_MANA > $9 && INT_MY_NUM_PEOPLE > 30 )
        {
          IF ( INT_M_PERSON_WARRIOR > 5 && INT_M_PERSON_RELIGIOUS > 4 )
          {
            IF ( INT_M_PERSON_FIREWARRIOR > 4 )
            {
              DO ATTACK $12 24 ATTACK_BUILDING INT_NO_SPECIFIC_BUILDING 999
INT_SWARM INT_TORNADO INT_TORNADO ATTACK_NORMAL 0 -1 -1 -1
              SET $1                                 3
            }
            ENDIF
          }
          ENDIF
```

```
    }
    ENDIF
   }
   ENDIF
   //The 2nd attack with 20 people, targeting the tribe with the largest
population, attack a random building, fight until death, casting earthquake
and 2 shots of lightning

   IF ( $1 == 1 && INT_CP_FREE_ENTRIES > 1 )
   {
    SET $4
INT_M_SPELL_EARTHQUAKE_COST
    INCREMENT $4 INT_M_SPELL_LIGHTNING_COST
    INCREMENT $4 INT_M_SPELL_LIGHTNING_COST
    IF ( INT_MY_MANA > $4 && INT_M_PERSON_WARRIOR > 5 )
    {
     IF ( INT_M_PERSON_RELIGIOUS > 4 && INT_M_PERSON_FIREWARRIOR > 5 )
     {
      DO ATTACK $12 20 ATTACK_BUILDING INT_NO_SPECIFIC_BUILDING 999
INT_EARTHQUAKE INT_LIGHTNING INT_LIGHTNING ATTACK_NORMAL 0 -1 -1 -1
      SET $1                              2
     }
     ENDIF
    }
    ENDIF
   }
   ENDIF
   //If conditions are met, launch the 1st attack targeting the blue
tribe with 20 people, attack a random building, fight until death, casting
erosion on the southern part of mountain between two tribes, cast lightning
after then
   IF ( $1 == 0 && INT_CP_FREE_ENTRIES > 1 )
   {
    SET $3                                   INT_M_SPELL_LIGHTNING_COST
    INCREMENT $3 INT_M_SPELL_EROSION_COST
    IF ( INT_MY_MANA > $3 && INT_M_PERSON_WARRIOR > 6 )
    {
     IF ( INT_M_PERSON_RELIGIOUS > 4 && INT_M_PERSON_FIREWARRIOR > 5 )
     {
      DO ATTACK BLUE 20 ATTACK_BUILDING INT_NO_SPECIFIC_BUILDING 999
INT_EROSION INT_LIGHTNING INT_NO_SPECIFIC_SPELL ATTACK_NORMAL 0 27 31 0
      SET $1                              1
     }
     ENDIF
    }
    ENDIF
   }
   ENDIF
  }
 }
 ENDIF
```

Note that these scripts should be read from bottom to top. Since the script is executed line by line sequencially, if the script is written in the following format:

```
EVERY 1024
{
  IF($1 == 4)
  {
    //code block 5
    SET $1 0
  }
  ENDIF
  IF($1 == 3)
  {
    //code block 4
    SET $1 4
  }
  ENDIF
  IF($1 == 2)
  {
    //code block 3
    SET $1 3
  }
  ENDIF
  IF($1 == 1)
  {
    //code block 2
    SET $1 2
  }
  ENDIF
  IF($1 == 0)
  {
    //code block 1
    SET $1 1
  }
  ENDIF
}
```

When the $1 is initialised to 0, code block 5, 4, 3 and 2 will pass through without execution, while code block 1 will be excuted, then $1 is changed to 1; for the next time, code block 5, 4, 3 will pass through and code block 2 is executed, set $1 to 2, passing through code block 1 ... At last, the code blocks are executed in sequence 1, 2, 3, 4, 5 in five loops.

What if you write the blocks reversely, IF($1 == 0) first, then IF($1 == 1) ... ? In such order, $1 will be set to 1 after the execution of code block 1, meeting the condition of code block 2, then code block 2 will be executed ... The result is, 5 code blocks are all executed in only one loop. If you rather prefer ($1 == 0) at first, then ($1 == 1) ... ($1 == 4) at last, you should write like this:

```
EVERY 1024
{
  IF($1 == 0)
  {
    //code block 1
    SET $1 1
  }
  ELSE
  {
    IF($1 == 1)
    {
      //code block 2
      SET $1 2
    }
    ELSE
    {
      IF($1 == 2)
      {
        //code block 3
        SET $1 3
      }
      ELSE
      {
        IF($1 == 3)
        {
          //code block 4
          SET $1 4
        }
        ELSE
        {
          IF($1 == 4)
          {
            //code block 5
            SET $1 5
          }
          ENDIF
        }
        ENDIF
      }
      ENDIF
    }
    ENDIF
  }
  ENDIF
```

That is, including each IF statement into the ELSE part of the last. The execution result will be the same (see tower building codes in Defensive construction section). I recommend the first format which looks clearer.

Now we study the most complicated command, DO ATTACK command in detail:

Format:

```
DO ATTACK team num_ppl attack_model target damage spell1 spell2 spell3
attack_type bring_back_vehicles marker1 marker2 marker3
```

Parameters:

- team – The target tribe. Can be numbers or texts, 0/1/2/3 = BLUE/RED/YELLOW/GREEN. If the target is the AI tribe itself or an ally, the AI will only assemble troops but not attack.
- num_ppl – Basis of number of people involved in the attack. Note that this value is not necessarily equal to the total number sent in an attack. The actual number of each type of follower = this number* INT_ATTR_ATTACK_PERCENTAGE*INT_ATTR_AWAY_XXX (follower type). For example, when this number is set to 24, the the AI will send 24*100%*40% = 9.6 wrrirors, 24*100%*35% = 8.4 firewarriors and 24*100%*25%=6.0 preachers, while the decimal part is rounded downward. The actual number sent is 9+8+6=23. If there is not enough number of the specific type of followers, the AI will send braves instead (Some times even if the number is enough but they are busy doing other works, AI will also send braves instead).
- attack_model – Can be set to ATTACK_PERSON, ATTACK_BUILDING or ATTACK_MARKER, affecting the value of the next parameter.
- target – Attack target with the highest priority. When the previous parameter is set to ATTACK_PERSON, this parameter should be something like INT_BRAVE，INT_WARRIOR etc. Note that you should use INT_TARGET_SHAMAN for shaman; when the previous is ATTACK_BUILDING, this parameter should be something like INT_SMALL_HUT，INT_TEMPLE，INT_AIRSHIP_HUT, or INT_NO_SPECIFIC_BUILDING (to attack a random building); when the previous is ATTACK_MARKER, this parameter should be a the index of the marker.
- damage – This is one of the conditions for the AI to retreat. When one or more of the following conditions is met, the AI will retreat: 1) INT_ATTR_BASE_UNDER_ATTACK_RETREAT = 1, and the base is under attack; 2) the number of people in the attack force <=num_ppl*INT_ATTR_RETREAT_VALUE; 3) Enough damage has been made to the target tribe, which is measured by this parameter. If this parameter is set to 1, the AI will retreat right after a battle starts; if set to 999, they will fight until death (unless the other two conditions are met).
- spell1, spell2, spell3 – spells to be cast in the attack. When the AI shaman takes part in an attack and one of the following conditions is met, the three spells will be sequentially cast in the attack: 1) the current mana is enough for the cost of the spell; 2) one or more extra shots of the spell has been given to the AI tribe. Note that if the AI shaman is involved into a fight by an enemy in the attack, she will cast all these spells to the person who attacks her. If one or more of these spells is invisibility or magical shield, the AI will cast when they assemble at the main tower.
- attack_type – Can be set to ATTACK_NORMAL (by land), ATTACK_BY_BOAT or ATTACK_BY_BALLON. If attacking by land or balloon, the AI will usually assemble at the main tower before the attack (if there is no statement: SET INT_ATTR_DONT_GROUP_AT_DT 1), while attacking by boat they usually won't assemble. They will directly get onto the boats and set off. (Exception: if there is invisibility or magical shield in the spells specified before, they will assemble at the tower to cast these spells before getting on the boats.)

- bring_back_vehicle – Whether or not bring the vehicles back to base after attack. If the previous is ATTACK_NORMAL, set this to 0; if the previous is ATTACK_BY_BOAT or ATTACK_BY_BALLOON, this can be set to 0 (don’t bring) or 1 (bring back). When set to 0, the AI will discard the vehicle after arrival at the desination (Exception: fws or shaman will not get off from balloons); when set to 1, the AI will send a brave for each vehicle as the driver to take the troops to the desination, and drive back the vehicle after then. In such situation, a boat can actually load tranport 4 people, while a ballon can only transport 1. Value 1 is recommended for using boats, while 0 is recommended for balloons.
- marker1 – Assemble place before attack. If this parameter >= 0, the AI will assemble another time at the chosen place before the attack.
- marker2 – The place to cast spell1. If both marker1 and marker2 >= 0, the AI will cast spells1 to marker2 right when they assemble at marker1. This is usually used when you need to cast lb or erosion to reach the destination in an attack. The markers will be placed in the PopWorldEditor to support the usage in the script.
- marker3 – Unknown, always set to -1.

Now we have finished the analysis of the script of Matak in TB16. I’m sure you’re ready to write something yourself. In general, most scripts for normal levels can be written in a similar way.

Advanced discussion

By reading the above content, you are already able to create a script with basic functions that can be used in the game. However, to make your levels more playable and challenging, we need further discussions on scripting work.

Frequency of attack

The frequency of attack is an important factor that affecting the difficulty of the level. In scripts of TB series. The attack statements are usually included in an EVERY block with parameter 1024 (approx. 1’25”) or 2048 (approx. 2’51”). The attack does not 100 percent happen each time the EVERY block is executed.

What if you want to use other frequency other than two? Scripts of attack in TB17, TB24 and TB25 is the answer to our question. These scripts have a feature that, the frequency of attack can ajust automatically as the game progresses.

(TB17:cpscr076,077,078.dat; TB24:053,054,055; TB25:033,034,035)

Take the script of Dakini in TB24 (cpscr053.dat) as an example for the discussion of frequency of attack:

```
EVERY 64
{
  IF ( $17 < $16 )
  {
    SET $19                                  $18
    SET $17                                  $16
  }
  ENDIF
}
IF ( $19 > 0 )
```

```
{
  DECREMENT $19 1
  IF ( $19 == 0 )
  {
    //attack commands
    …
    INCREMENT $18 600
    INCREMENT $16 1
  }
  ENDIF
}
ENDIF
```

$16, $17, $18, $19 are initialised to 1, 0, 650, 0 respectively. So that, at the 64th turn of the game, $17 will be set to 1 and $19 will be set to 650; then, after 650 turns, the first attack will be launched, after which $16 will be increased by 1, $18 will be increased by 600 (become 1250); this leads the inequality between $16 and $17, thus the values of $17 and $19 will be set to 1 and 1250 respectively, the next attack will therefore be after 1250 turns … In such as way, after each attack, the interval will be longer. This is why you feel the AI attack less and less in a late stage of TB 24.

In general, this is the way to realize changeable frequency of attack. Another example is given below, changing the frequency according to the population.

```
//The larger the population is, the higher frequency will be used
EVERY 64
{
  IF ( $1 > 0 )
  {
    DECREMENT $1 INT_MY_NUM_PEOPLE
  }
  ELSE
  {
    //attack commands
    …
    SET $1 1000
  }
  ENDIF
}
ENDIF
```

With these techniques, scripts with unpredictable variations can be created. Release your imagination.

Tips on usage of spells

Spells in the attack statement

As discussed, the AI shaman can be very tough by appropriate configuration of SPELL_ENTRY (refer to sections: Spells automatically cast, I'm just pretending to be not cheating). Here we discuss the three spells to be used in an attack statement. The three spells are determined as follows in the script of Dakini in TB24:

```
EVERY 512 15
{
  IF ( INT_MY_MANA > INT_M_SPELL_VOLCANO_COST )
```

```
      {
        SET $8                                   INT_VOLCANO
        SET $9                                   INT_M_SPELL_VOLCANO_COST
      }
      ELSE
      {
        IF ( INT_MY_MANA > INT_M_SPELL_FIRESTORM_COST )
        {
          SET $8                                  INT_FIRESTORM
          SET $9
INT_M_SPELL_FIRESTORM_COST
        }
        ELSE
        {
          IF ( INT_MY_MANA > INT_M_SPELL_TORNADO_COST )
          {
            SET $8                                 INT_TORNADO
            SET $9                                 INT_M_SPELL_TORNADO_COST
          }
          ELSE
          {
            IF ( INT_MY_MANA > INT_M_SPELL_LIGHTNING_COST )
            {
              SET $32                               INT_LIGHTNING
              SET $9
INT_M_SPELL_LIGHTNING_COST
            }
            ELSE
            {
              IF ( INT_MY_MANA > INT_M_SPELL_SHIELD_COST )
              {
                SET $8                               INT_SHIELD
                SET $9
INT_M_SPELL_SHIELD_COST
              }
              ELSE
              {
                IF ( INT_MY_MANA > INT_M_SPELL_INVISIBILITY_COST )
                {
                  SET $8                              INT_INVISIBILITY
                  SET $9
INT_M_SPELL_INVISIBILITY_COST
                }
                ELSE
                {
                  SET $32                             INT_BLAST
                  SET $9
INT_M_SPELL_BLAST_COST
                }
                ENDIF
              }
              ENDIF
            }
            ENDIF
          }
          ENDIF
        }
        ENDIF
      }
      ENDIF
    }
    EVERY 512 59
    {
      SET $13                                   INT_MY_MANA
      DECREMENT $13 $9
      IF ( $13 > 0 )
      {
        IF ( $13 > INT_M_SPELL_FIRESTORM_COST )
        {
          SET $10                                 INT_FIRESTORM
          SET $33
INT_M_SPELL_FIRESTORM_COST
        }
        ELSE
        {
          IF ( $13 > INT_M_SPELL_EARTHQUAKE_COST )
          {
            SET $10                                INT_EARTHQUAKE
            SET $33
INT_M_SPELL_EARTHQUAKE_COST
          }
          ELSE
          {
            IF ( $13 > INT_M_SPELL_TORNADO_COST )
            {
              SET $10                               INT_TORNADO
              SET $33
INT_M_SPELL_TORNADO_COST
            }
            ELSE
            {
              IF ( $13 > INT_M_SPELL_HYPNOTISM_COST )
              {
                SET $10                              INT_HYPNOTISM
                SET $33
INT_M_SPELL_HYPNOTISM_COST
              }
              ELSE
              {
                IF ( $13 > INT_M_SPELL_LIGHTNING_COST )
                {
                  SET $10                             INT_LIGHTNING
                  SET $33
INT_M_SPELL_LIGHTNING_COST
                }
                ELSE
                {
                  IF ( $13 > INT_M_SPELL_SWARM_COST )
                  {
                    SET $10                            INT_SWARM
                    SET $33
INT_M_SPELL_SWARM_COST
                  }
                  ELSE
                  {
                    SET $34                            INT_BLAST
                    SET $33
INT_M_SPELL_BLAST_COST
```

```
              }
              ENDIF
            }
            ENDIF
          }
          ENDIF
        }
        ENDIF
      }
      ENDIF
    }
    ENDIF
  }
  ENDIF
}
EVERY 512 97
{
  SET $14                                   INT_MY_MANA
  DECREMENT $14 $9
  DECREMENT $14 $33
  IF ( $14 > 0 )
  {
    IF ( $14 > INT_M_SPELL_EARTHQUAKE_COST )
    {
      SET $12                                 INT_EARTHQUAKE
    }
    ELSE
    {
      IF ( $14 > INT_M_SPELL_TORNADO_COST )
      {
        SET $12                                INT_TORNADO
      }
      ELSE
      {
        IF ( $14 > INT_M_SPELL_HYPNOTISM_COST )
        {
          SET $12                               INT_HYPNOTISM
        }
        ELSE
        {
          IF ( $14 > INT_M_SPELL_LIGHTNING_COST )
          {
            SET $12                              INT_LIGHTNING
          }
          ELSE
          {
            IF ( $14 > INT_M_SPELL_SWARM_COST )
            {
              SET $12                             INT_SWARM
            }
            ELSE
            {
              SET $12                             INT_BLAST
            }
            ENDIF
          }
          ENDIF
        }
        ENDIF
      }
      ENDIF
    }
    ENDIF
  }
  ENDIF
}
```

The meaning is, with enough mana, the AI will use volcano -> firestorm -> tornado -> lightning -> magical shield -> invisibility -> blast in priority for the first spell, choosing the one highest affordable; firestorm -> earthquake -> tornado -> hypnotism -> lightning -> swarm -> blast for the second spell; earthquake -> tornado -> hypnotism -> lightning -> swarm -> blast for the third spell.

If you pay attention in the TB24, you'll find that in the later game, the spells cast by an AI shaman are always a volcano plus an earthquake, after then, she will not use spells other than blast; in the middle game, the combination might be firestorm + earthquake + tornado. Here we give explanation:

AI player has a maximum limit of mana with the value 1,000,000. When the mana reaches its maximum which is affordable for the volcano spell, the AI will surely choose volcano as the first spell; the volcano costs 800,000 mana, remaining 200,000, which is unaffordable for firestorm (400,000), thus earthquake with 175,000 cost is chosen for the second spell; the remaining 25,000 mana is unaffordable for any spell other than blast or convert, thus the last spell can only be blast. In what situation does the combination firestorm + earthquake + tornado appear? When the mana is not enough for a volcano spell, e.g. 700,000 mana, then firestorm will be chosen as the first spell; the remaining 300,000 will be used for a second spell earthquake with 175,000 cost and a third spell tornado with 90,000 cost.

Then, is there any situation that the AI will cast two firestorm spells? Negative. Because two firestorm spells will cost 800,000, the value of mana for the AI to choose volcano as the first spell. How about two earthquake spells? Possible. When the mana is between 750,000 and 800,000, after the cast of the first spell firestorm, the remaining 350,000~400,000 is enough for the cost of two earthquake spells, thus the AI will choose earthquake for both the second and the third spell.

The purpose of these discussions is to show the limitation of the original scripts of TB. In order to look like a human player, the AI should be able to cast 1 volcano, 1 AOD, 2 firestorms and 2 earthquakes etc. in an attack. The thing is, the sum of mana cost of a volcano and an AOD, 800,000+510,000=1,310,000, already exceeds the maximum limit of mana. Is this possible?

The answer is, yes. As stated, only one condition is required to be met for the spell cast or the AI. First, enough mana, which we cannot meet without changing the constants of balance. Then we focus on the other condition: extra shot of spells, which is quite easy to done by the following statement:

```
//Give an extra shot of a specified spell to a player
DO GIVE_ONE_SHOT spell team
```

When the target tribe is the human player (BLUE), you will get a blue bullet of the spell by this statement (rather than red bullets from grants of stoneheads). If you have already learned this spell, the shot will be directly added; if not, the background will be gray to indicate that this is a temporary spell you cannot charge.

Therefore if you give the AI extra spells before an attack, like this:

```
DO GIVE_ONE_SHOT INT_VOLCANO RED
DO GIVE_ONE_SHOT INT_FIRESTORM RED
DO GIVE_ONE_SHOT INT_ANGEL_OF_DEATH RED
DO ATTACK BLUE 20 ATTACK_BUILDING INT_NO_SPECIFIC_BUILDING 999
INT_FIRESTORM INT_ANGEL_OF_DEATH INT_VOLCANO ATTACK_NORMAL 0 -1 -1 -1
```

Then the AI will cast a volcano, an AOD and a firestorm in an attack.

How about two firestorms? No problem, replace INT_ANGEL_OF_DEATH with INT_FIRESTORM in both positions, the AI will cast a volcano and two firestorms.

What if you set all three spell to firestorm? Unfortunately, the AI will only cast two, due to the limitation of DO_SET_BUCKET_USAGE ON statement, unless you have statement DO_SET_BUCKET_USAGE OFF, or an especially small value for the firestorm spell. In all situations, DO SET_BUCKET_USAGE ON will prevent the AI from using more shots of spells than the maximum limit of shots, even with enough mana and extra shots of the spell given.

Whether an AI player will only cast there spells in an attack? Theoretically, if there is no SPELL_ENTRY setting, the answer is yes, only these three spells plus some blasts will be used. With SPELL_ENTRY settings, the AI will automatically cast the included spells.

Recall the usage of SPELL_ENTRY. In you have the settings of SPELL_ENTRY below:

```
DO SET_SPELL_ENTRY 1 INT_TORNADO INT_M_SPELL_TORNADO_COST 128 4 0
DO SET_SPELL_ENTRY 3 INT_EARTHQUAKE INT_M_SPELL_EARTHQUAKE_COST 128 5 0
DO SET_SPELL_ENTRY 5 INT_FIRESTORM INT_M_SPELL_FIRESTORM_COST 128 6 0
DO SET_SPELL_ENTRY 7 INT_ANGEL_OF_DEATH INT_M_SPELL_ANGEL_OF_DEATH
```

Then, the AI will auto cast these spells. In addition, the costs of these spells can be arbitrarily determined! You can even set the cost of auto casting firestrom spell to be equal to INT_M_SPELL_BLAST_COST, then only the cost of blast will be taken as the AI auto cast a firestorm spell.

You have to put the spells which are not included in the SPELL_ENTRY into the attack statement. Imagine your setting of the three spells is, volcano and two shots of erosion, then, it is possible that you will watch an AI cast a volcano, an AOD, two firestorms, two earthquakes, two erosions and three tornadoes, isn't this amazing!

For the erosion spell, we have to notice that, it is not a directly destructive spell, which should be cast at some specific places to reach it maximum effect. I suggest you to use it when the attack type is ATTACK_MARKER.

DO SPELL_ATTACK statement

Besides the above, there is another statement can be used to make the AI shaman directly cast a spell at a specified place:

```
DO SPELL_ATTACK spell marker direction
```

The parameter direction has no known effect, usually set to 0. This statement is often used for summoning AOD (see cpscr043.dat of TB20). Besides, this statement should also be involved for the usage of the flatten spell.

The flatten spell requests even more strictly on casting places than the erosion spell. It’s almost useless when casted on wrong places. For the usage of this spell, something interesting can be found in the script of Matak in TB 14, cpscr037.dat:

```
EVERY 2048
{
  IF ( INT_MY_MANA > INT_M_SPELL_FLATTEN_COST && $2 < 36 )
  {
    DO COUNT_PEOPLE_IN_MARKER BLUE 6 10 $4
    IF ( $4 > 12 && $2 > 29 )
    {
      DO GET_HEIGHT_AT_POS                    $2 $14
      IF ( $14 > 500 )
      {
        DO SPELL_ATTACK INT_FLATTEN $2 0
        DECREMENT $2 1
      }
      ELSE
      {
        INCREMENT $2 1
      }
      ENDIF
    }
    ENDIF
  }
  ENDIF
}
EVERY 2048 200
{
  IF ( INT_MY_MANA > INT_M_SPELL_FLATTEN_COST && $3 < 42 )
  {
    DO COUNT_PEOPLE_IN_MARKER BLUE 7 8 $5
    IF ( $5 > 12 && $3 > 35 )
    {
      DO GET_HEIGHT_AT_POS                    $3 $15
      IF ( $15 > 500 )
      {
        DO SPELL_ATTACK INT_FLATTEN $3 0
        DECREMENT $3 1
      }
      ELSE
      {
        INCREMENT $3 1
      }
      ENDIF
    }
    ENDIF
  }
  ENDIF
}
```

The initial values of $2, $3 are 32, 38 respectively. We can see that when the value of $2 is from 29 to 35, or the value of $3 is from 36 to 41, the AI will cast flatten spell on specific places when the condition is met. Check the places of these markers:

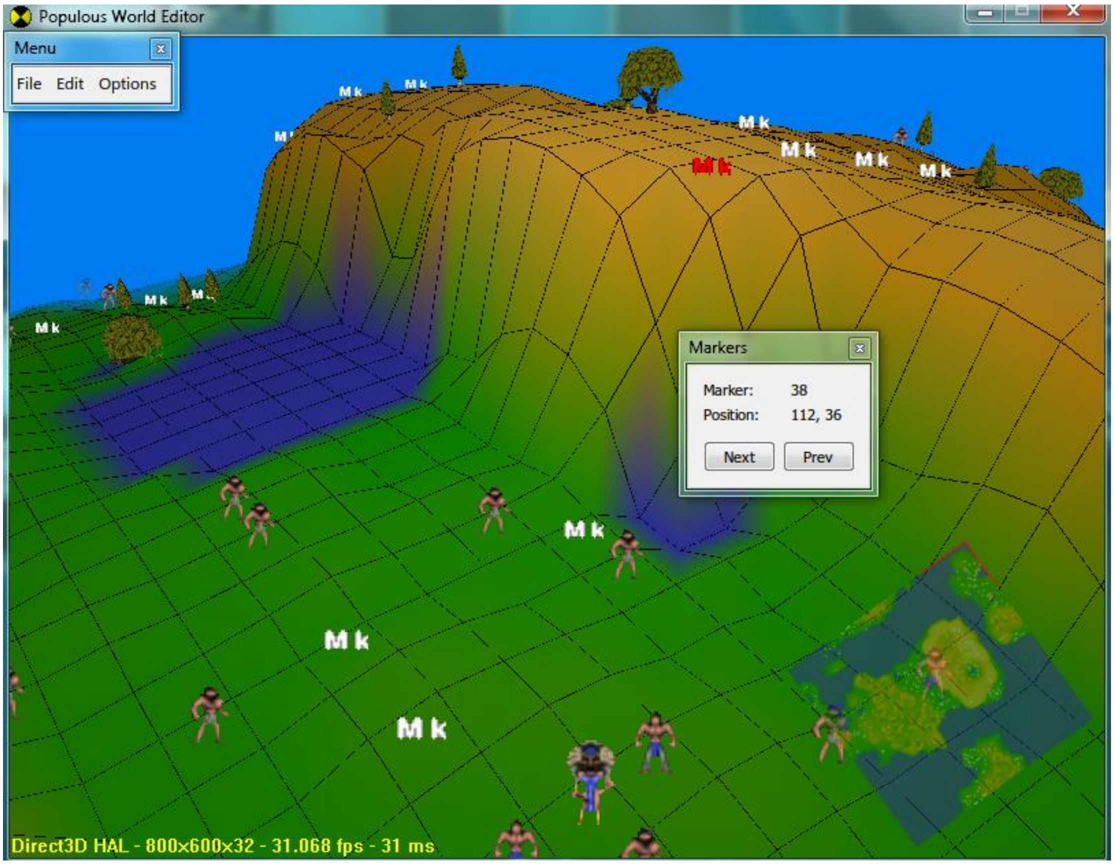


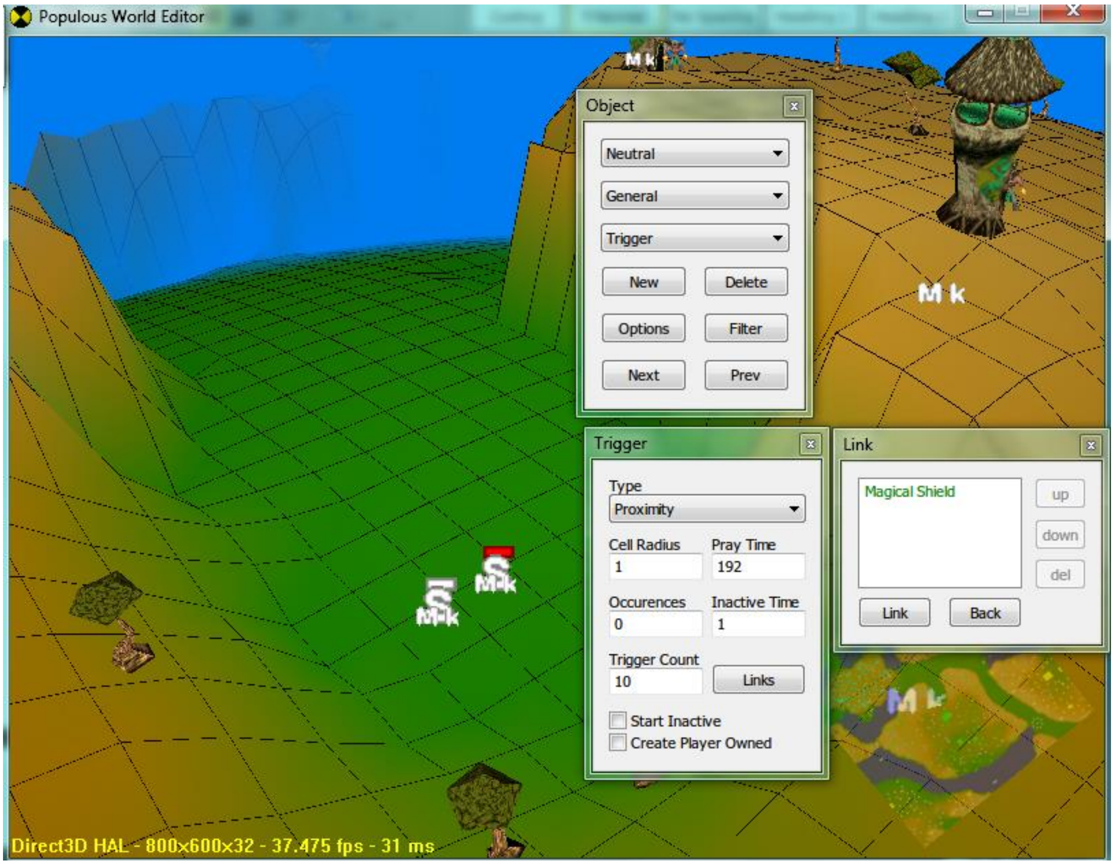
Figure 7 The places of some markers in TB 14

See? Known the places of markers, it's easy to understand that these codes make Matak use flatten spell to crush the buildings of the player and shrink your base. Unfortunately, this is the only method to makes the AI use the flatten spell effectively, that is, together with arbitrarily placed markers. The AI is not smart enough to find places near the cliffs to cast the spell.

Spell objects with Triggers in PopWorldEditor

Finally let's dicussed the invisibility, shield and bloodlust spells. They have one thing in common: must be casted on follower. The first two can be places in the DO ATTACK command, which will be used on assembling before the attack; the bloodlust, however, will not be used this way even if the AI has extra shots of the spell. I don't recommend this method, since the spell places in the DO ATTACK command will be taken. By the way, the GUEST SPELLs, i.e., bloodlust, teleport and Armageddon, can only be obtained via worshiping stoneheads. They are not possible to be given by DO GIVE_ONE_SHOT command.

I have frequently used the following trick in my series, new TB and POTG, that is, place the Spell objects connected with Triggers in PopWorldEditor:



Object: Neutral; General; Trigger

Trigger

Type: Proximity

Cell Radius: 1

Pray Time: 192

Occurences: 0

Inactive Time: 1

Trigger Count: 10

□ Start Inactive

□ Create Player Owned

Link: Magical Shield

Figure 8 Place Spell and Trigger objects for the use of some spells

Then you add the following codes in the script:

```
    //Check if the AI shaman is close to the marker, if there are enough
number of people around the marker. If so, the Trigger is activated
(effecting in AI shaman casting the spell placed by the Spell object). The
Occurences is set to 0, meaning that it can activated for unlimited number
of times.
    EVERY 64
    {
      DO IS_SHAMAN_IN_AREA GREEN 21 3 $9
      DO COUNT_PEOPLE_IN_MARKER GREEN 21 3 $10
      IF ($9 > 0 && $10 > 4 && $8 > 0)
      {
        DO TRIGGER_THING 21
        DECREMENT $8 1
      }
      ENDIF
    }

    //Usually when the AI assemble their armies, they will not be assembled
exactly at the point specified, but around. Hence for each assembling place,
you may need 2 or more pairs of Trigger and Spell object to ensure the
spell is effectively cast on most of their armies.
    EVERY 64 32
    {
      DO IS_SHAMAN_IN_AREA GREEN 21 3 $9
      DO COUNT_PEOPLE_IN_MARKER GREEN 21 3 $10
      IF ($9 > 0 && $10 > 4 && $8 > 0)
      {
        DO TRIGGER_THING 32
        DECREMENT $8 1
      }
      ENDIF
    }
    //Using the variable $8 to control the maximum time of activating the
trigger during a specific period of time, to simulate the fact that the
maximum number of shots of invisibility and magic shield is 4.
    EVERY 512
    {
      IF ( $8 < 4 )
      {
        INCREMENT $8 1
      }
      ENDIF
    }
```

By this method you can make the AI cast any spell including GUEST SPELLs such as bloodlust. Besides, other normal spells can also be casted this way (especially flatten, erosion which need to be casted at specific places). However, keep in mind that: 1) The range of these spells is unlimited. Once you activate the trigger, as long as the AI shaman is not dead, you will see her casting the spell even from the other side of the planet; 2) All SPELL objects whose corresponding spell is alerted to the player when casted in game, will result in messages boxes at the beginning of the level, as shown in the figure below.

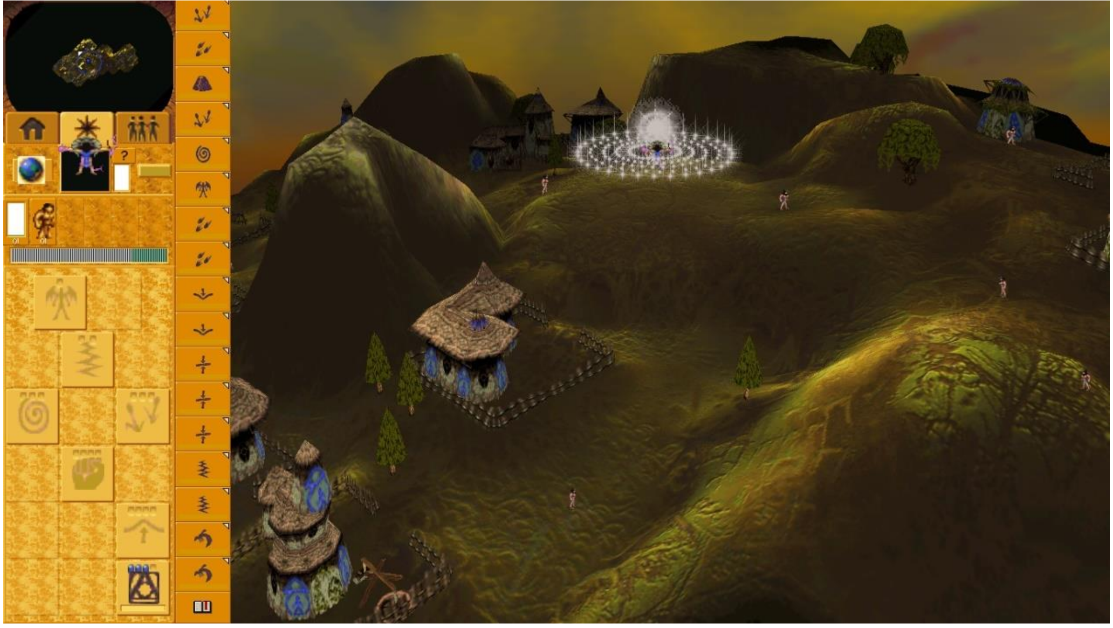


Figure 9 Massive message boxes at the beginning of level due to usage of Spell objects without proper handling

To resolve this, adde the following commands in pairs at the beginning of the script (INT_GAME_TURN==0) whose number equal to the number of SPELL objects in the map:

```
DO SET_MSG_ID id                //Set the message id
DO KILL_ALL_MSG_ID id           //Delete the message by id
```

For example, if you placed 3 SPELL objects which will make message boxes, you need to add the following codes to the scripts at the beginning of the level:

```
DO SET_MSG_ID 0
DO KILL_ALL_MSG_ID 0
DO SET_MSG_ID 1
DO KILL_ALL_MSG_ID 1
DO SET_MSG_ID 2
DO KILL_ALL_MSG_ID 2
```

And you get rid of the message boxes.

About reincarnation circle

Normally, shamans of all tribes will automatically create her reincarnation circle at the beginning of the level. If the plot needs a shaman not to do this, use the following command:

```
DO SET_REINCARNATION OFF
```

The AI tribe using this script will not create the shaman's reincarnation circle. Examples are TB1, TB2, TB10, TB15 etc. Without such command, the default is DO SET_REINCARNATION ON.

If you want the player's shaman not to create the reincarnation circle, adding the following command to the script of any AI tribe:

```
DO SET_NO_BLUE_REINC
```

Be aware that if the shaman is placed in a prison, you need to add the above commands, otherwise the shaman in the prison will reborn at the place of the prison even if the reincarnation circle is not created.

What if you want the reincarnation circle to be already there at the beginning, while the shaman is elsewhere? DW5 is a good example:

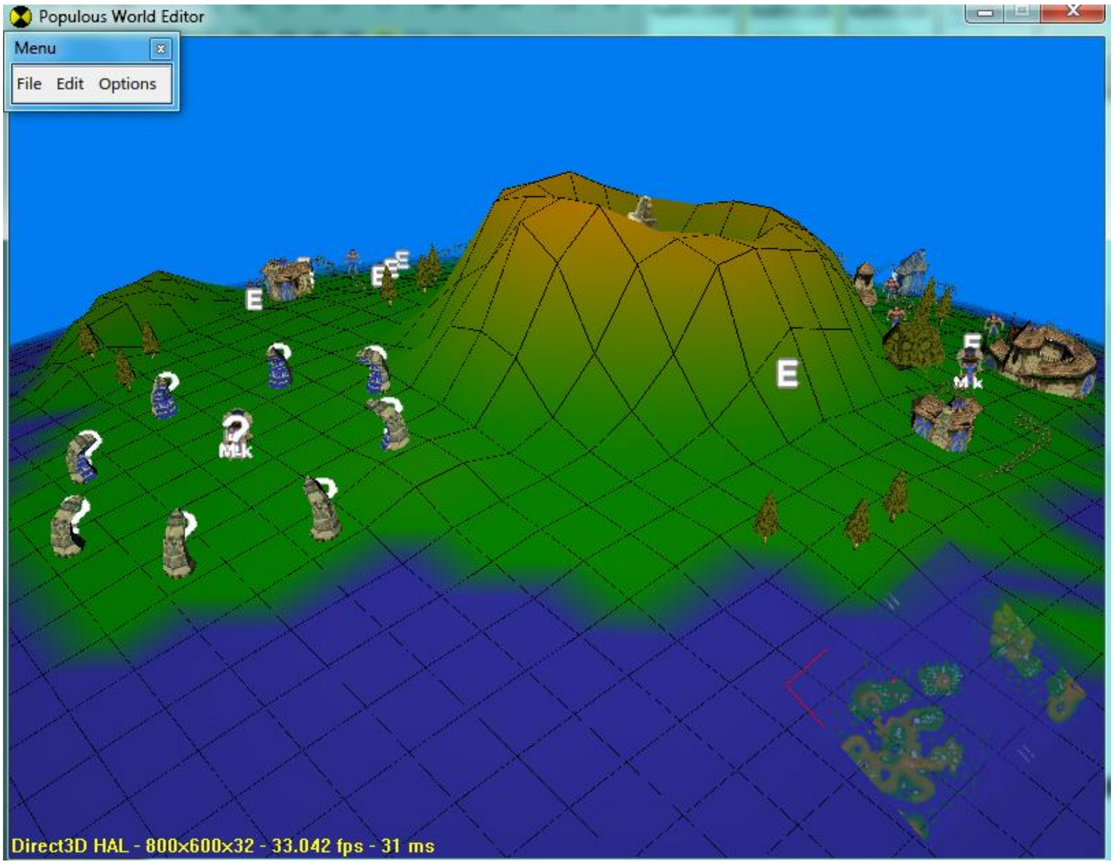


Figure 10 The player's island at the beginning of DW5, from which 2 shamans can be seen

Yes, you can see two blue shamans in the map, whereas you only have one in the game. This is because that the shaman in the center of the reincarnation circle is linked to a Trigger (refer to Usage of worshippable objects and triggers). At the beginning you will have the other shaman only, while the one in the center of the reincarnation is purposed on simulation of shaman reincarnation. The reincarnation circle you see is actually made by placing Scenery objects named RS Pillar in PopWorldEditor.

In such case, you still need the DO SET_NO_BLUE_REINC command (DO SET_REINCARNATION OFF for other tribes) such that the other shaman will not automatically create a second reincarnation circle.

This is not enough. When the shaman is dead, she will not reborn from the artificially placed reincarnation circle. You deed the following codes to simulate the event of shaman reincarnation:

```
EVERY 16 4
{
  //If the population is larger than 0, which is a necessary
  IF ( INT_BLUE_PEOPLE > 0 )
  {
    //If number of blue shamn is less than 1 (dead), as well as $5 is 0
    IF ( INT_B_PERSON_SHAMAN < 1 && $5 == 0 )
    {
      //Set the value of $5 to the current turn + 480, making the
shaman reborn after 480 turns (40 seconds)
      SET $5                                        INT_GAME_TURN
      INCREMENT $5 480
```

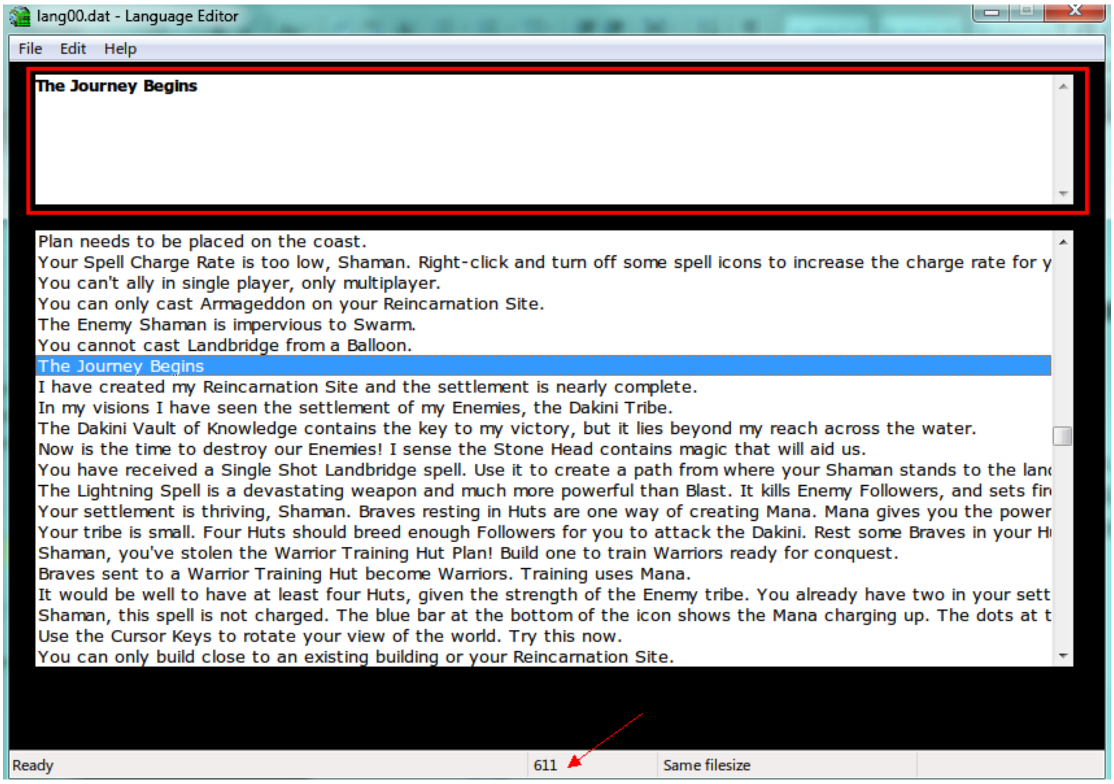
```
        }
        ENDIF
        //This is to teleport the shaman to a specific place due to the
plot of DW5, which is not relevant to this topic
        IF ( $5 == 1 )
        {
          DO TRIGGER_THING                        2
          SET $5                                  0
        }
        ENDIF
         //The the game turn reaches $5, reborn the shaman. The condition
$5 > 260 prevents the shaman from reborning again and again
        IF ( INT_GAME_TURN > $5 && $5 > 260 )
        {
          DO TRIGGER_THING                        16
          SET $5                                  1
        }
        ENDIF
      }
      ENDIF
      //The following are irrelevant to our topic
      IF ( $3 == 1 )
      {
        DO SET_SPECIAL_NO_BLDG_PANEL             OFF
        DO CREATE_MSG_NARRATIVE                  8
        DO SET_MSG_ID 2
        DO SET_MSG_AUTO_OPEN_DLG
        SET $3                                   2
      }
      ENDIF
    }
```

From the PopWorldEditor, you can see the trigger placed at marker16 is connected to the shaman as well as an Effect object Flatten, which is placed to simulate the flatten effect during the reincarnation of shaman. However, other effects including converting the wildies, hurting and expelling enemy followers, burning wood piles, removing swamps, etc. cannot be simulated at the moment.

Besides, you'll need Specific objects unknown to PopWorldEditor (question marks in the) to preventing building from being built inside the reincarnation circle.

Languages

All messages of TB levels are located in the lang00.dat file (in English) in the language folder in your installation directory. lang01.dat, lang02.dat are for other language versions. We take the English version as the example in this tutorial. You can edit the lang00.dat file with PopLanguageEditor, which is as follows when opened:



The Journey Begins

```
Plan needs to be placed on the coast.
Your Spell Charge Rate is too low, Shaman. Right-click and turn off some spell icons to increase the charge rate for y
You can't ally in single player, only multiplayer.
You can only cast Armageddon on your Reincarnation Site.
The Enemy Shaman is impervious to Swarm.
You cannot cast Landbridge from a Balloon.
The Journey Begins
I have created my Reincarnation Site and the settlement is nearly complete.
In my visions I have seen the settlement of my Enemies, the Dakini Tribe.
The Dakini Vault of Knowledge contains the key to my victory, but it lies beyond my reach across the water.
Now is the time to destroy our Enemies! I sense the Stone Head contains magic that will aid us.
You have received a Single Shot Landbridge spell. Use it to create a path from where your Shaman stands to the lan
The Lightning Spell is a devastating weapon and much more powerful than Blast. It kills Enemy Followers, and sets fir
Your settlement is thriving, Shaman. Braves resting in Huts are one way of creating Mana. Mana gives you the power
Your tribe is small. Four Huts should breed enough Followers for you to attack the Dakini. Rest some Braves in your H
Shaman, you've stolen the Warrior Training Hut Plan! Build one to train Warriors ready for conquest.
Braves sent to a Warrior Training Hut become Warriors. Training uses Mana.
It would be well to have at least four Huts, given the strength of the Enemy tribe. You already have two in your sett
Shaman, this spell is not charged. The blue bar at the bottom of the icon shows the Mana charging up. The dots at t
Use the Cursor Keys to rotate your view of the world. Try this now.
You can only build close to an existing building or your Reincarnation Site.
```

Figure 11 Editing lang00.dat file with PopLanguageEditor

The file has 1318 lines. The number pointed by the red arrow shows the line number of the current message, which can be edited in the rectangle area above. Find the message at line 611 "The Journey Begins", which is the name of TB level 1. If you modify it and save, you'll find the name of level 1 changed in the game. Similarly, you can search the name of other levels as well as messages in game and modify them.

The commands related to messages in the script are listed as follows:

```
DO SET_MSG_ID id                 //We have already explained these two.
DO KILL_ALL_MSG_ID id

DO CLEAR_ALL_MSG                 //Clear all messages.

DO CREATE_MSG_INFORMATION idx    //This and the followings three are all
messages shown in the game. This one shows a green “i” icon, which is
most frequently used.

DO CREATE_MSG_NARRATIVE idx      //This one shows an opened book icon,
usually used at the beginning of the level.

DO CREATE_MSG_OBJECTIVE idx      //This one shows a blue flag icon,
unused in TB series, used in DW series.

DO CREATE_MSG_INFORMATION_ZOOM idx x z zoom    //This one shows a green
“i” icon with a small triangle at the top right corner. It will move the
camera to a place speficed by the x,z coordinates when clicking the
message.

DO SET_MSG_AUTO_OPEN_DLG          //Set the last created message.
automatically open

DO SET_MSG_DELETE_ON_OK           //Set the last created message
automatically deleted after the player clicks OK button.

DO SET_MSG_TIME_OUT timeout       //Set the last created message
automatically deleted if not open within ‘timeout’ number of turns.

DO SET_MSG_OK_SAVE_EXIT_DLG       //Set the last created message with
three bottons: OK, SAVE, EXIT. When clicking OK the message is closed;
when clicking SAVE, the game progress will be saved to the quicksave
profile; when clicking EXIT the game menu is shown (same as pressing ESC
in game).
```

Where the idx parameter (index) corresponds to the line and contents in the file lang00.dat. However idx is not equivalent to line number. The relationship is rather messy. Some messages are organized in Appendix 3, including most messages used in the tutorial and normal levels (index from 1 to 155).

A message in TB2 (cpscr074.dat) is given as an example:

```
//Check the number of blue people around the stonehead of tornado spell.
EVERY 32 15
{
  //To control the number of times to show the message.
  IF ( $13 == 0 )
  {
    DO COUNT_PEOPLE_IN_MARKER BLUE 8 3 $12
    //If there is only one person, create the message after 32 turns.
    IF ( $12 == 1 )
    {
      SET $14                                 32
    }
    ENDIF
  }
```

```
      ENDIF
    }
    IF ( $14 > 0 )
    {
      DECREMENT $14 1
      //After 32 turns the value of $14 becomes 0
      IF ( $14 == 0 )
      {
        //Show the message with index 68. If the player clicks the message
the camera will zoom to the stonehead. The content is “Shaman, this Stone
Head will aid you faster if you command two of your Followers to worship
there.”
        IF ( $9 == 0 )
        {
          SET $9                                1
          DO CREATE_MSG_INFORMATION_ZOOM         68 204 96 308
          DO SET_MSG_DELETE_ON_OK
         //Due to the change of $13, the message will be shown only once.
          SET $13                               1
          SET $9                                0
        }
        ENDIF
      }
      ENDIF
```

Parameter setting of DO CREATE_MSG_INFORMATION_ZOOM: idx – same as other commands; x, z – coordinates of the place to zoom the camera, able to seen in PopWorldEditor; zoom – the direction of the camera range in 0~1999. 0=NORTH (direction to increase z value), 500=EAST (direction to increase x value). 1000=SOUTH (direction to decrease z value), 1500=WEST (direction to decreas x value).

No that the command DO_SET_MSG_AUTO_OPEN_DLG cannot be used together with DO CREATE_MSG_INFORMATION_ZOOM, otherwise the camera will not zoom to the specified place after the message is automatically opened.

What if you need the camera to zoom to the specified place as well as the message to be automatically opened? Use DO ZOOM_TO command:

```
DO ZOOM_TO x z zoom      //Directly zoom the camera to the place
DO CREATE_MSG_INFORMATION idx
DO SET_MSG_AUTO_OPEN_DLG
```

This will do it.

Making Flyby

Command relevant to Flyby are listed as follows:

```
DO ZOOM_TO x z zoom                 //Already explained

DO CAMERA_ROTATION speed            //Set the camera rotate with
      specified speed until the player operates

DO FLYBY_CREATE_NEW                 //Create a new Flyby

DO FLYBY_SET_EVENT_POS x z start duration           //Set the place of
the Flyby event

DO FLYBY_SET_EVENT_TOOLTIP x z obj start duration   //Set the
instruction displayed on objects during the Flyby event, where x, z are
coordinates of the object, parameter obj is 1 for worshippable objects
and 0 for other objects

DO FLYBY_SET_EVENT_ANGLE angle start duration       //Set the angle of
the camera during the Flyby event

DO FLYBY_SET_EVENT_ZOOM zoom start duration         //Set the camera
zoom during the Flyby even, 0 is normal, positive values for zoom closer
and negative values for zoom further

DO FLYBY_SET_END_TARGET x z angle zoom              //Set the place for
the camera to returm to when the Flyby is interrupted

DO FLYBY_SET_MESSAGE code start        //Set the message displayed
during the Flyby, which are also from lang00.dat. Note that the ‘code’
here is different from ‘idx’ in DO CREATE_MSG_INFORMATION. Here ‘code’
equal to line number-1. For example if ‘code’ is set to 79, “LEFT” will
in line 80 will be displayed

DO FLYBY_ALLOW_INTERRUPT on/off        //Set if the Flyby can be
interrupted by player

DO FLYBY_START                         //Set the Flyby start

DO FLYBY_STOP                          //Set the Flyby stop
```

The following rules must be followed for the set of the start and duration of each Flyby even: start + duration of each Flyby, should be appoximatly equal to the start of the next Flyby event, in order to keep the consistency of the entire Flyby event. The Flyby in TB1 is given as an example (cpscr010.dat):

```
EVERY 8
{
  IF ( INT_GAME_TURN > 70 )
  {
    //Set Flyby event only occur once
    IF ( $57 == 0 )
    {
      DO CREATE_MSG_INFORMATION             78
      DO SET_MSG_AUTO_OPEN_DLG
      DO SET_MSG_DELETE_ON_OK
      DO ENABLE_USER_INPUTS
      SET $57                               1
      DO FLYBY_CREATE_NEW
      DO FLYBY_ALLOW_INTERRUPT                ON
      DO FLYBY_SET_EVENT_POS                  8 28 4 80
      DO FLYBY_SET_EVENT_POS                  2 28 81 44
      DO FLYBY_SET_EVENT_POS                  252 254 126 45
      DO FLYBY_SET_EVENT_POS                  12 238 181 30
      DO FLYBY_SET_EVENT_POS                  20 216 221 45
      DO FLYBY_SET_EVENT_ANGLE                0 5 35
      DO FLYBY_SET_EVENT_ANGLE                1072 46 40
      DO FLYBY_SET_EVENT_ANGLE                681 87 45
      DO FLYBY_SET_EVENT_ANGLE                744 134 35
      DO FLYBY_SET_EVENT_ANGLE                54 170 48
      DO FLYBY_SET_EVENT_ANGLE                1438 219 45
      DO FLYBY_SET_EVENT_ZOOM                 -100 10 35
      DO FLYBY_SET_EVENT_ZOOM                 10 67 25
      DO FLYBY_SET_EVENT_ZOOM                 80 165 36
      DO FLYBY_SET_EVENT_ZOOM                 0 202 63
      DO FLYBY_SET_EVENT_TOOLTIP              12 26 1 60 71
      DO FLYBY_SET_EVENT_TOOLTIP              2 250 1 132 60
      DO FLYBY_SET_EVENT_TOOLTIP              18 246 0 193 60
      DO FLYBY_SET_END_TARGET                 20 216 1438 0
      DO FLYBY_START
    }
    ENDIF
  }
  ENDIF
}
```

Here we have finished the plot making part.

Map files: levl2xxx.dat

The landscape, objects informaction etc. are kept in these files. They can be directed edited with 3D interface in PopWorldEditor, which is quite convenient. Many tutorials can be found from the popre forum, the built-in help file is also rather comorehensive. Hence we skip the basics on how to use this software here. I only discuss some key points and share my experience.

Landscape of the AI’s base

If you don’t want the AI to frequently cancel and replace building plans, make their land smooth. Try several times. The landscape as follows is not recommended, it will dramatically lower the efficiency of the AI’s construction.

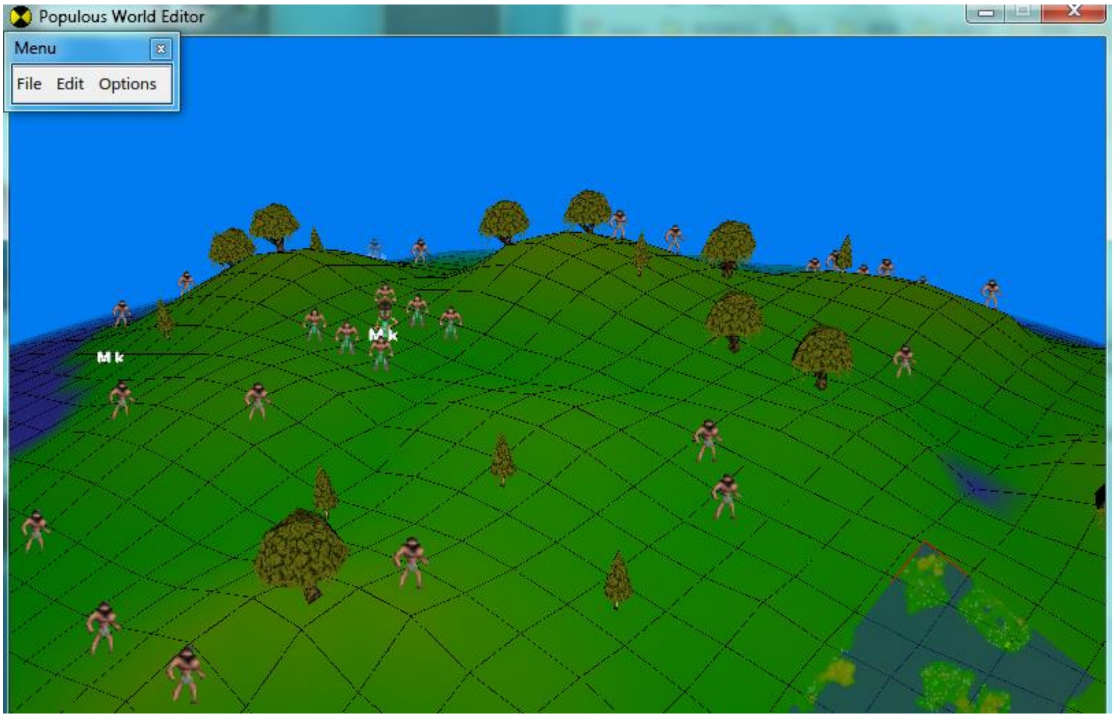
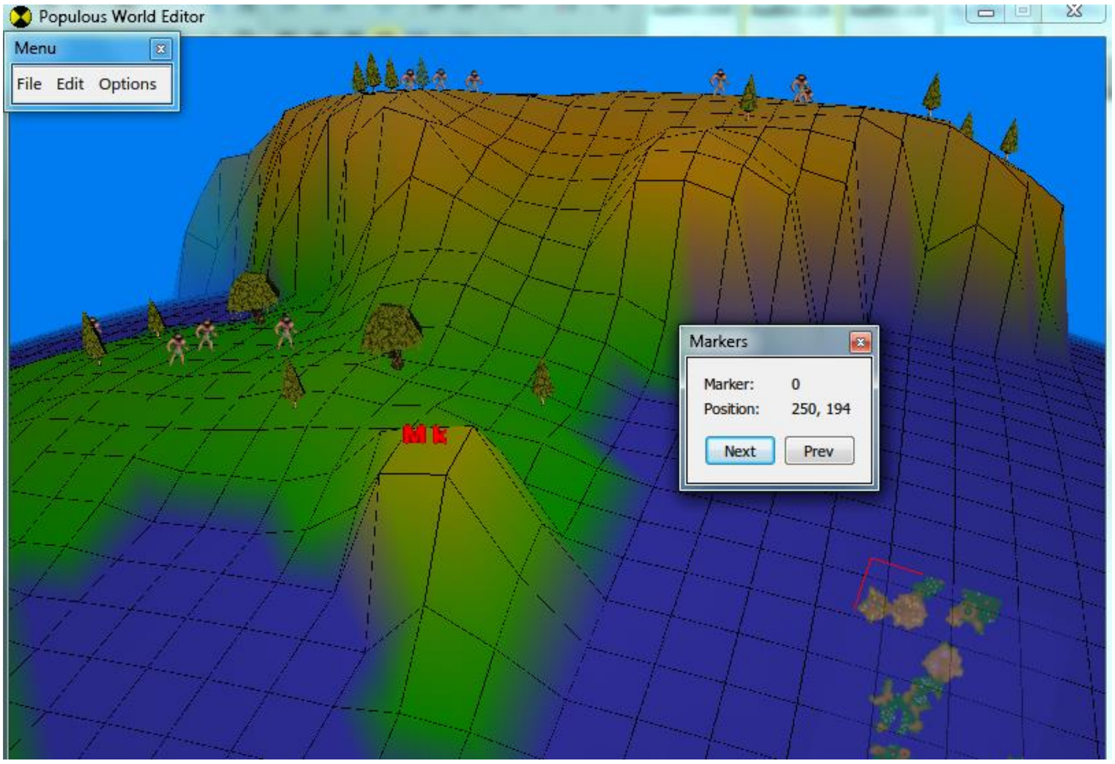


Figure 12 Landscape of Matak’s base in TB11, you can see that they develop rather slow due to frequent cancelling of building plans

We can infer than the AI’s requirement of the landscape for construction is much strict than that of a human player. This is extremely obvious when building drum towers.



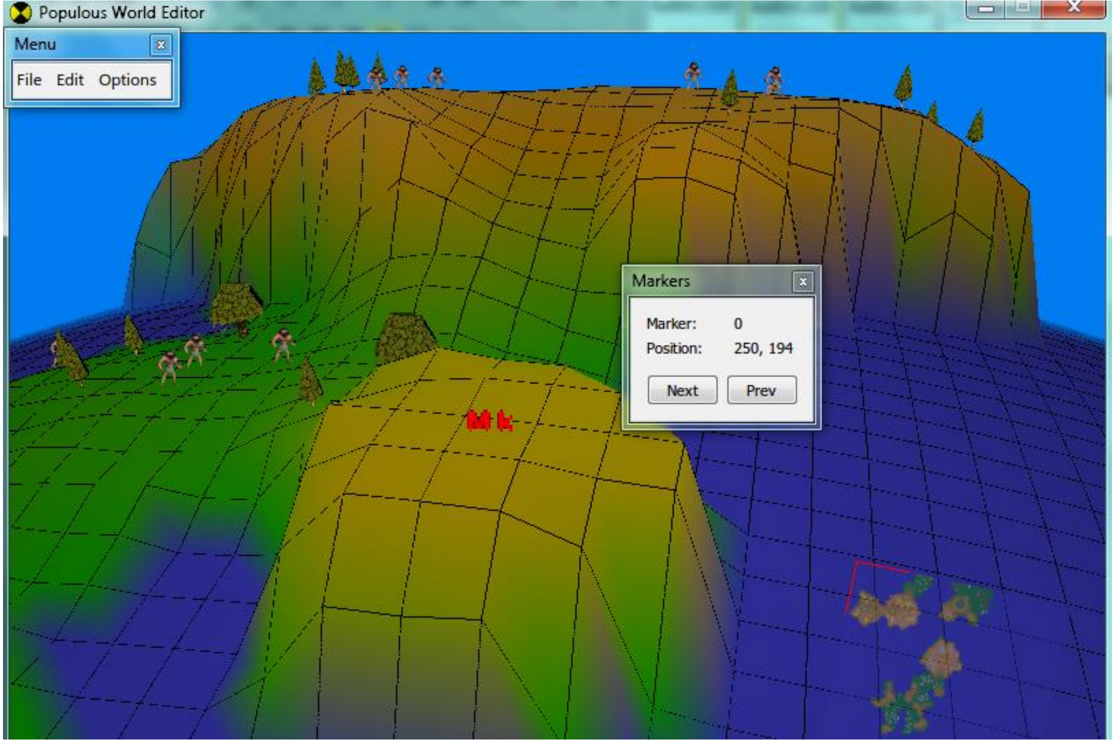
Marker: 0
Position: 250, 194

Figure 13 A hill where the player can place a drum tower in TB19

With the following command,

```
DO BUILD_DRUM_TOWER 250 194
```

You can never expect the AI to build a drum tower on such a hill, even if it is possible for human players. The AI will build a tower on the plain near the hill. If you want the AI to build a tower on high land, the the high land must have such a landscape:



Marker: 0
Position: 250, 194

Figure 14 AI has much more strict requirement of the landscape for construction

Wildies

Wildies are placed at the beginning of level. Based on my observation, the appearance and death of wildies are somehow related to the total population on the planet. In the early game, when the population of AIs and player burst, wildies rapidly disappear. This is often observed in TB24. For comparsion in TB14, the base number of wildies is rather large; also, the AIs will not develop a huge base; besides, most populations are obtained from conversion of wildies rather than born from huts. Therefore, during the development phase, the civilised population on the planet is not growing so fast making the wildies disappearing rapidly as in TB24.

On the contrary, aside the significant decrement of the civilised population on the planet (eliminating enemy tribes, especially after Armageddon), wildies begin to appear around the planet.

Is this the “Reincarnation” topic of the Populous game?

Cliff near the water

If a plateau is directly connectd with the sea, do remove the low shores beneath the cliffs as shown in Figure 15. You all know the reason.

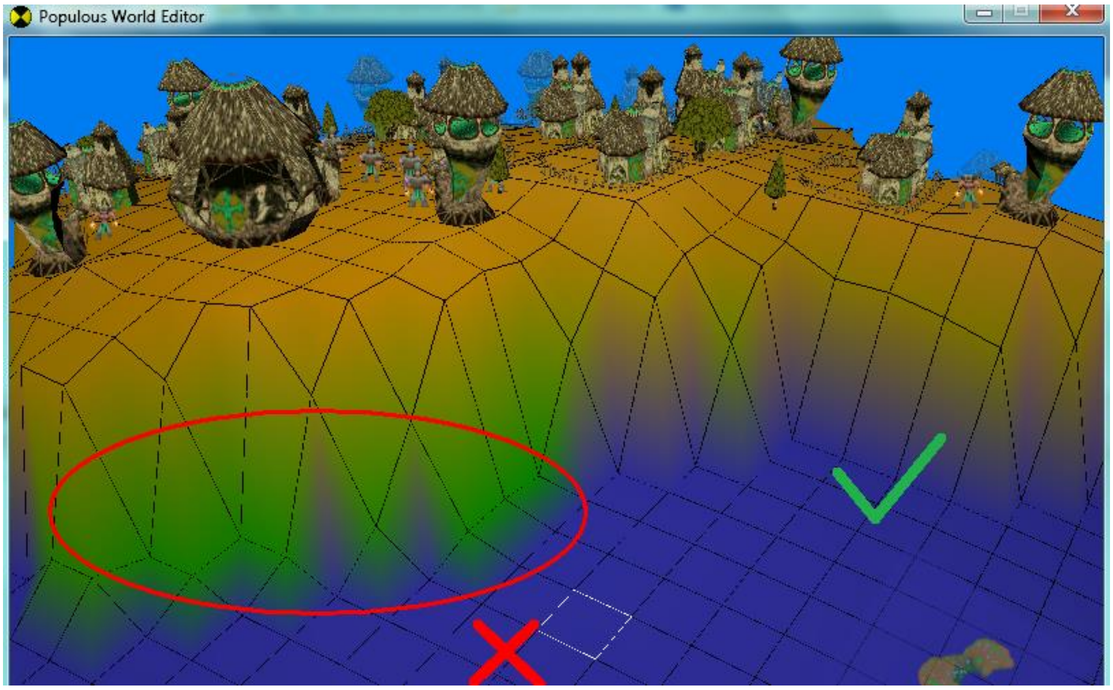


Figure 15 Clear the shores beneath the cliffs

Construction

To make the map elligant, a good map maker will always flatten the land under the building. Even though this can be automatically done in the game, the height of building may look weird without manually flatten.

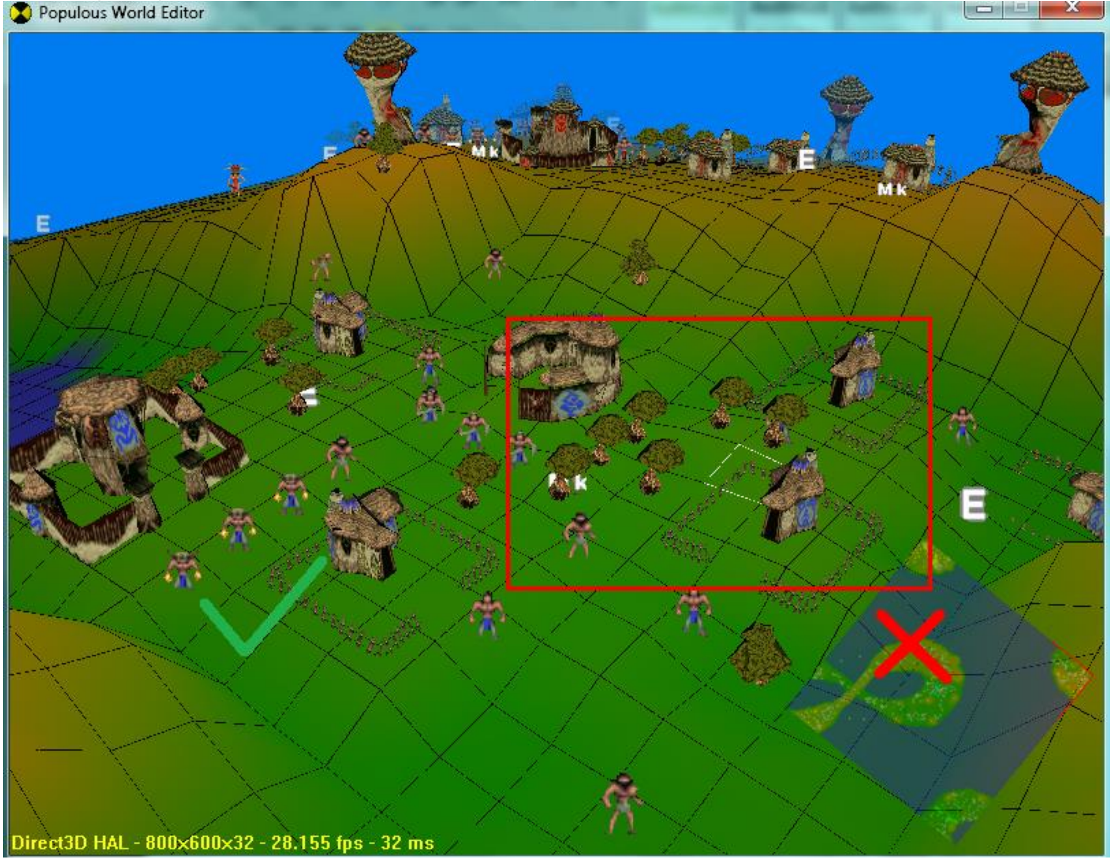


Figure 16 Flatten the land under the buildings

Note that som building have different actrual area in game as displayed in PopWorldEditor, including FW training house (4 by 4 actual, 3 by 3 displayed), spy training house (2 by 2 actual, 1 by 1 displayed) and balloon hut (5 by 3+2 actual, 4 by 3+2 displayed). The offset direction is always the same, as shown below:

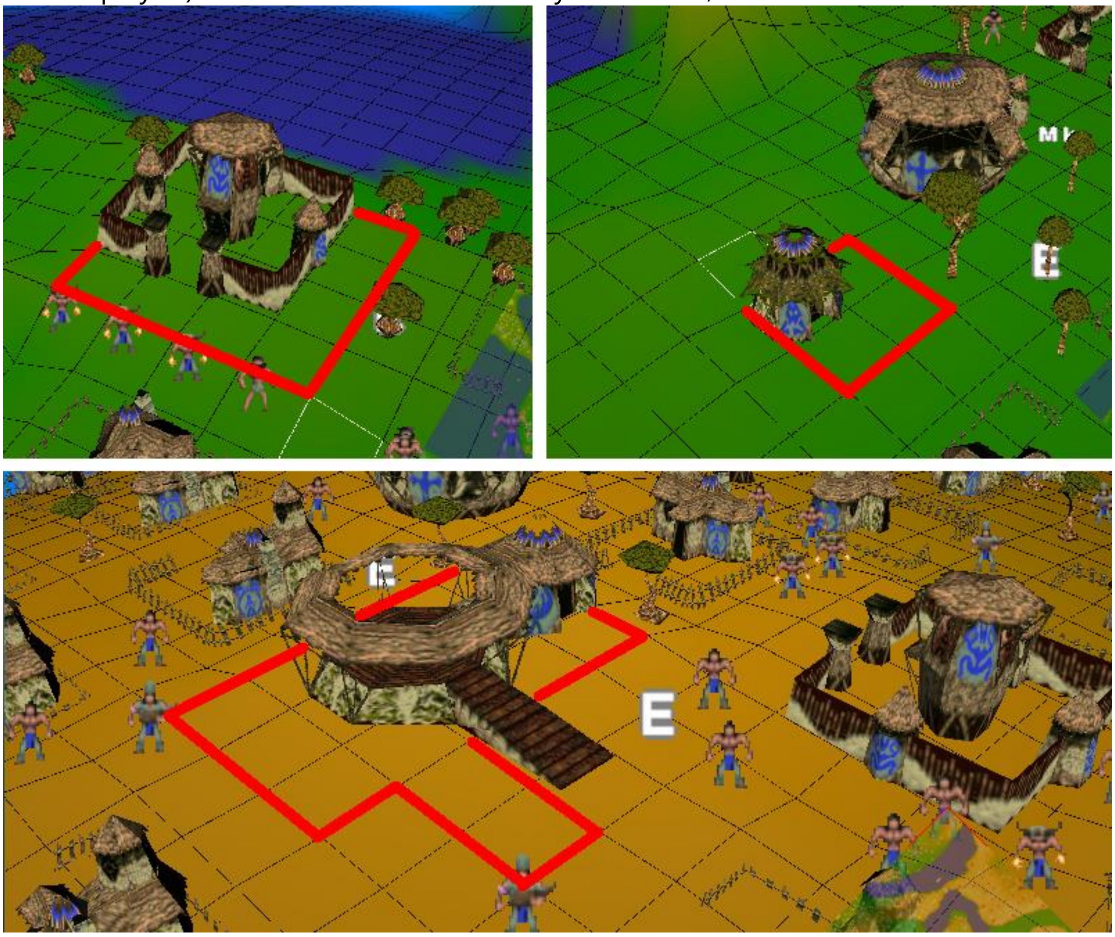


Figure 17 Buildings with different actual are in game and displayed area in PopWorldEditor

Placing of objective

Please follow the rules below for the sake of elegancy:

- Don't make constructions too close to each other;
- Don't make constructions too close to the reincarnation circle;
- Don't make trees and constructions overlapping with each other;
- Don't play people, buildings, trees on water unless required by the plot;
- Don't place trees in the 3 by 3 area around a stone head, or inside the the reincarnation circle. They will burn at the beginning;

Failing to follow the rules will lead to bugs for sure:

- Never place too many trees in an area;
- Don't use too many effect objects of a same type;
- Don't place too many objects in the map;

I don't exactly the maximum number. You need to test. Possible bugs include but not limited to: messy display of sky; no effect on casting spells; missing reincarnation circle pillars; game crash when pressing Esc to restart, etc. Please carefully chek your map and delete unnecessary objects to resolve bugs if encountered.

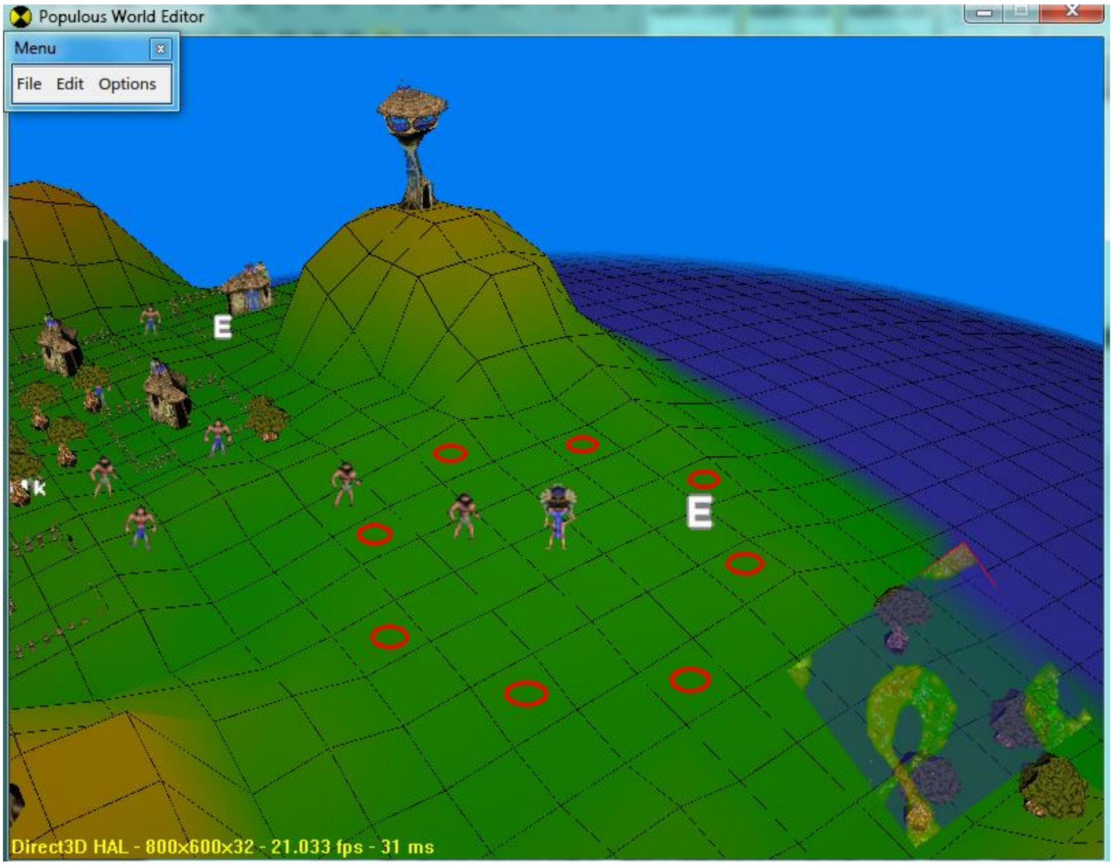


Figure 18 Place of rincarnation circle pillars

Notice and known bugs on some objects

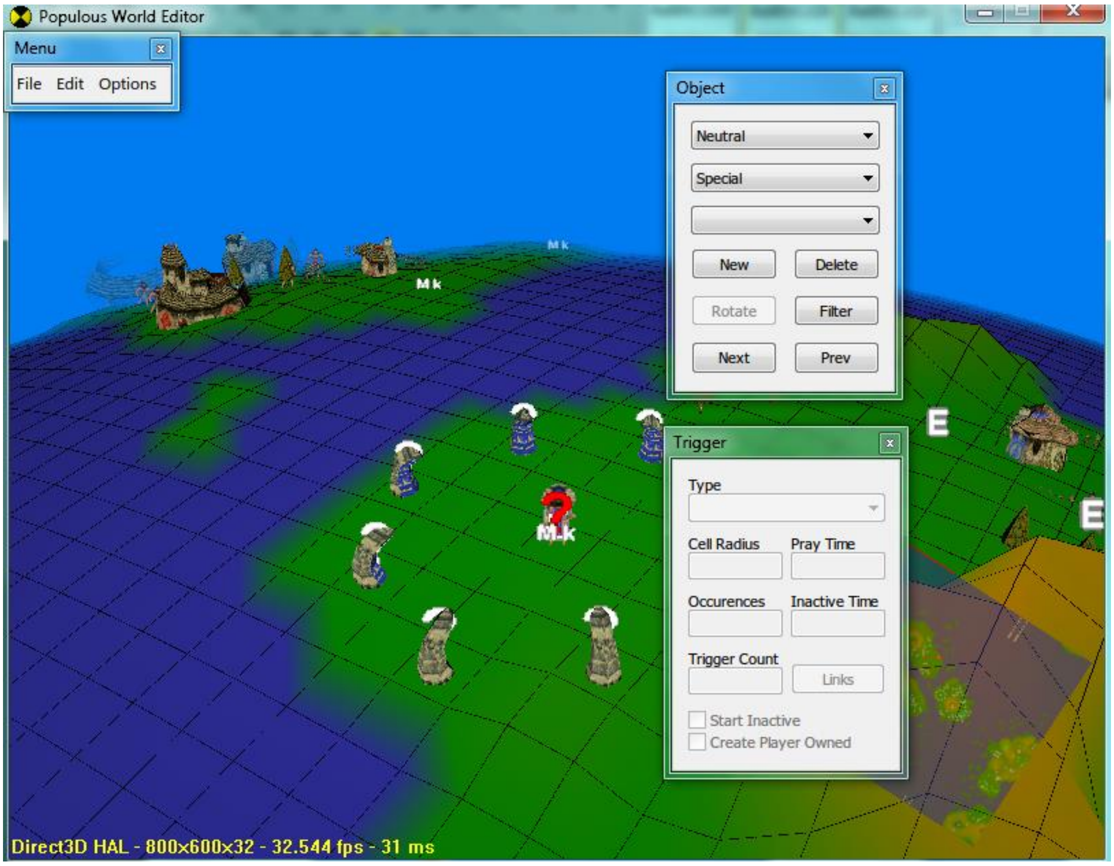
- Effect – Armageddon cannot be used (crashing the game);
- Effect – Tornado object will display a fixed tornado at the place;
- Triggers connected to Effect – Atlantis Invok cannot be activated by DO TRIGGER_THING in script. They can be only placed under worshippable objects;
- Prison cannot trap people other than shamans;
- If the player's shaman is in the prison, cast of a lightning spell by any enemy shaman will lead to the lose of the level, regardless of the casting point
- When AI shaman are trapped in the prison, she will still automatically cast the spells specified by SPELL_ENTRY; if no SPELL_ENTRY is set, she will still cast blast; to prevent her from casting any spell, use the following code:

```
EVERY 2
{
  IF ( INT_MY_MANA > 10000)
  {
    DO GIVE_MANA_TO_PLAYER RED -10000
  }
  ENDIF
}
```

  Thus she will never cast a spell due to lack of mana; but this might affect the speed of training troops.
- If a statue uses Effect – Statue to AOD, a Flyby event will automatically be created after 5 AODs appear; when the AOD in the middle kills a shaman, if player's shaman is killed, then the level is lost, otherwise the level is won.

Specific objects unknown to PopWorldEditor

DW levels have used some specific objects which cannot be recognised by PopWorldEditor. Those in DW5 are categorised as Special (displayed as ?), whose effect is to prevent player from building constructs within the artificial reincarnation circle.



Neutral

Special

```
Direct3D HAL - 800x600x32 - 32.544 fps - 31 ms
```

Figure 19 Special objects in DW5

Those in DW14 are categorised as Effect, making buildings to be partially damaged at the beginning:

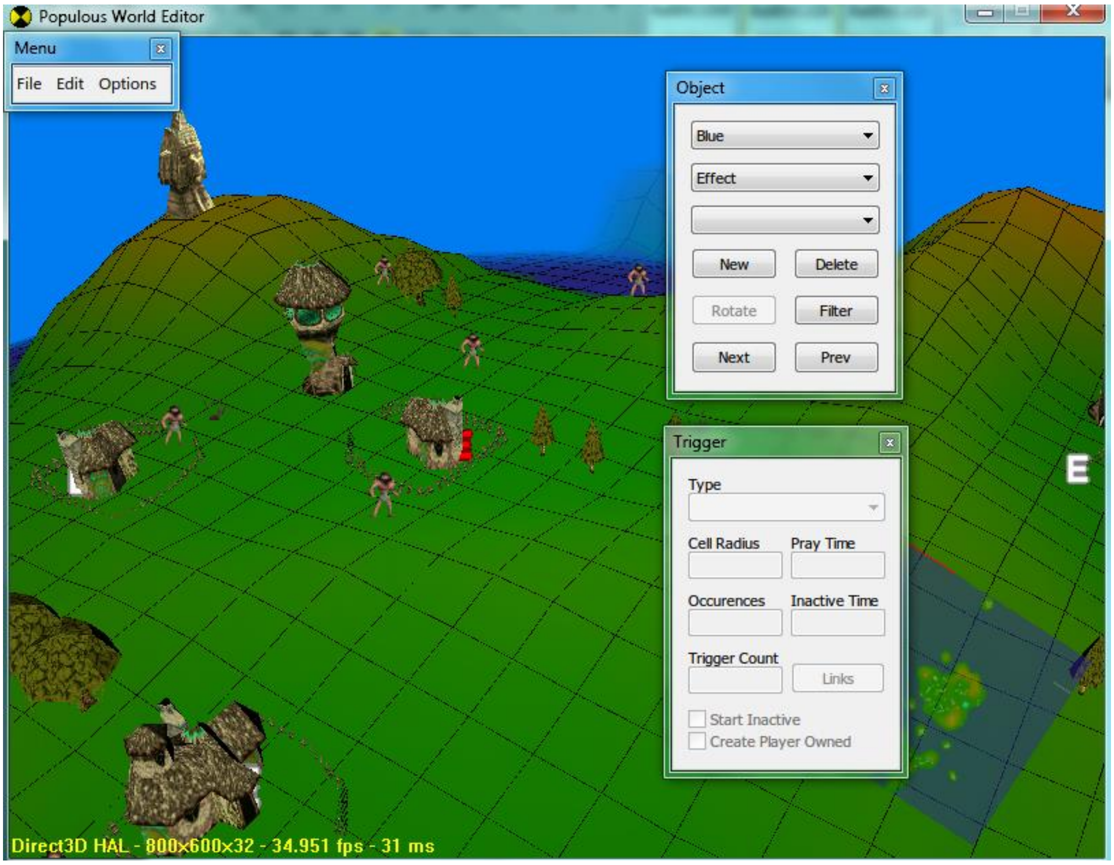


Figure 20 Special objects in DW5

As these objects cannot be created by PopWorldEditor, if you want to place them in your map, you can only:

1. Modify the map of DW5 or DW14 to your map;
2. Use Notepad++ or Ultraeditin in Hex mode to open the map levl2xxx.dat, copy the correspoing part of objects in DW5 and DW14 maps into your map. You need to know the structure of levl2xxx.dat. Refer to the page: http://wiki.popre.net/Dat_Format (in English)

Markers and actual place of objects

Marker are specific objects used in PopWorldEditor to mark the places in the map. The index of markers appears as parameter in many script commands. The places of markers will only affect the behaviours of AI, while have nothing to do with the player. When you create a new map with PopWorldEditor, all markers are placed a (0,0).

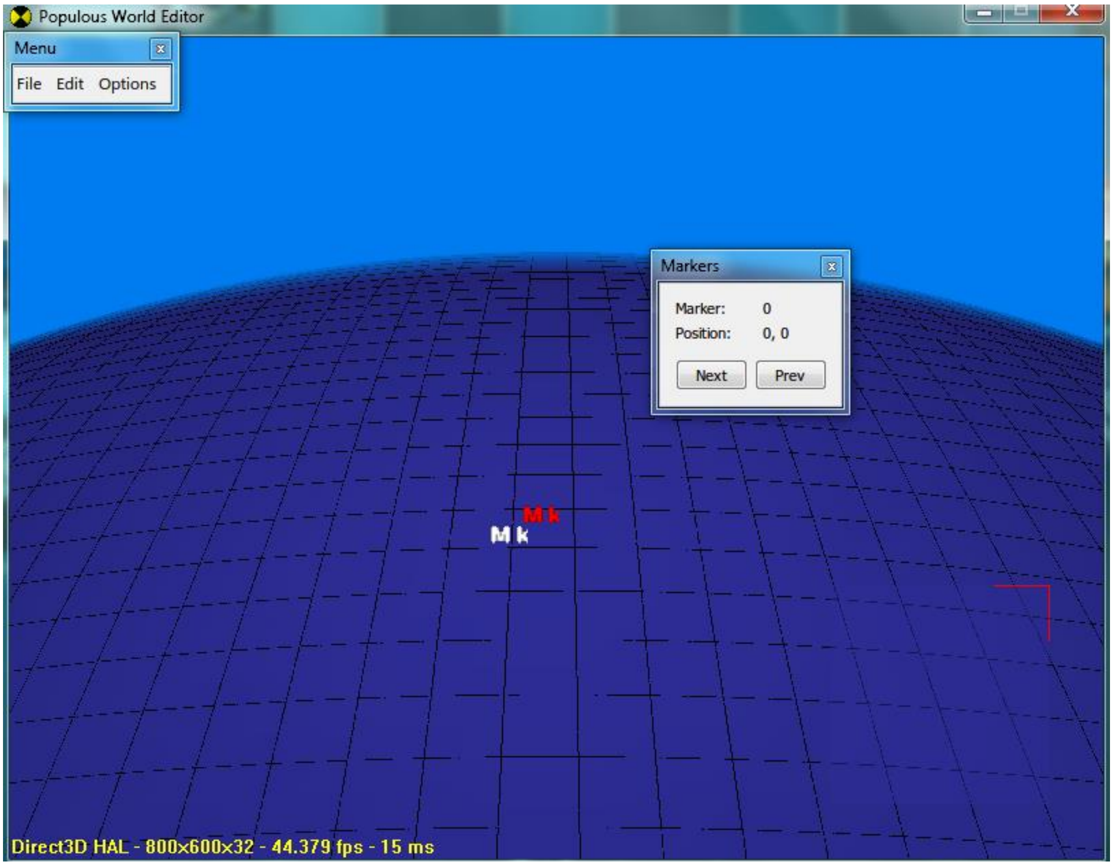


Figure 21 The place of markers after creating a new map; shifted place

You might notice that at the beginning, all markers are places on the intersection of grid lines; after moved, they can only be places in the squares of the grids. In fact, for marker moved from the original place, the displayed coordinates is slightly different from actual values. As shown in Figure 21, marker0 has been moved. The displayed coordination is (0,0). The truth is, the place of other unmoved markers is the real (0,0), the coorinates of marker0 is actually (1,1). In PopWorldEditor, the dislayed value of coordinates of markers can only be even number, while the actual coordinates can only be odd numbers once moved. Therefore, the actually places where the AI perform action are slightly shifted from specified markers: they will only use the points with even coordinate values. Once you save the map and reopen it, all unmoved markers will shift to (1,1) point.

The actual places of Effect objects will also shift from displayed. As shown in Figure 22, the actual place of all Effect object will shift 1 unit towards the direction of southwest (x-, z-).

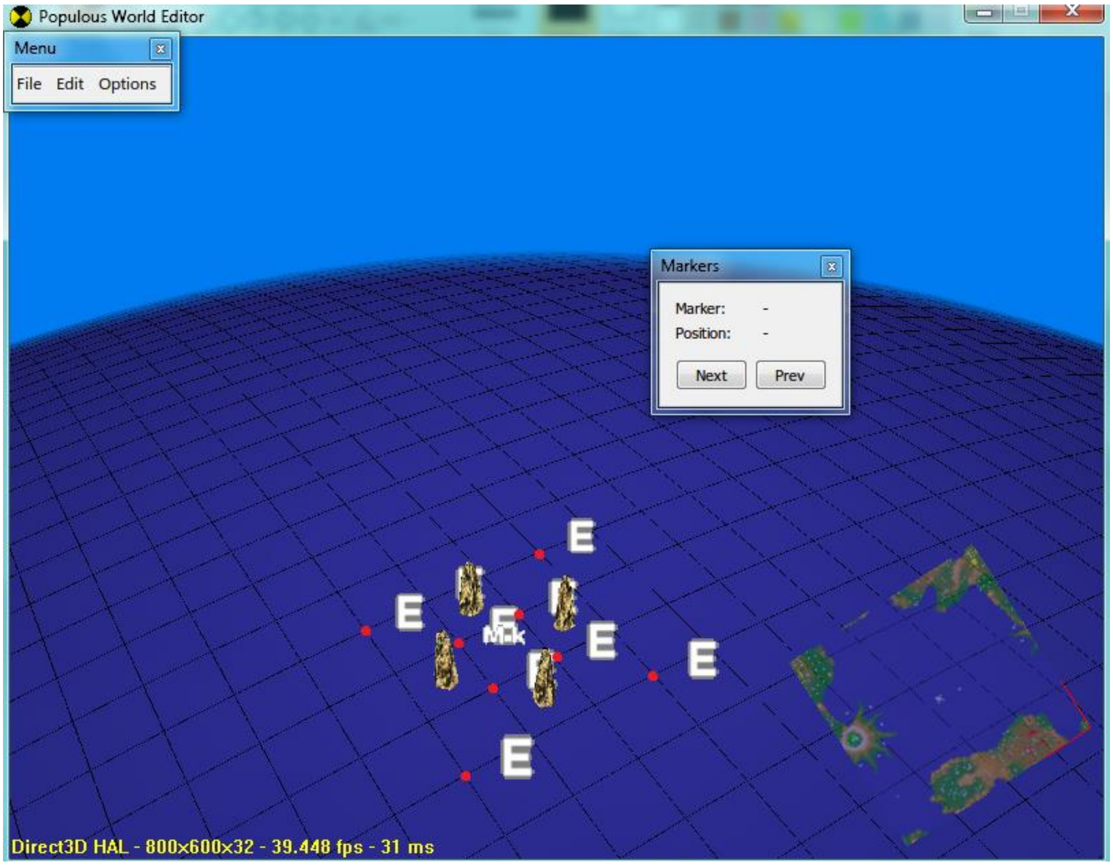


Figure 22 Shifting of effect objects

In addition, though you can edit the places of markers by opening levl2xxx.dat with PopWorldEditor they are actually save in the Header files of the map: levl2xxx.hdr.

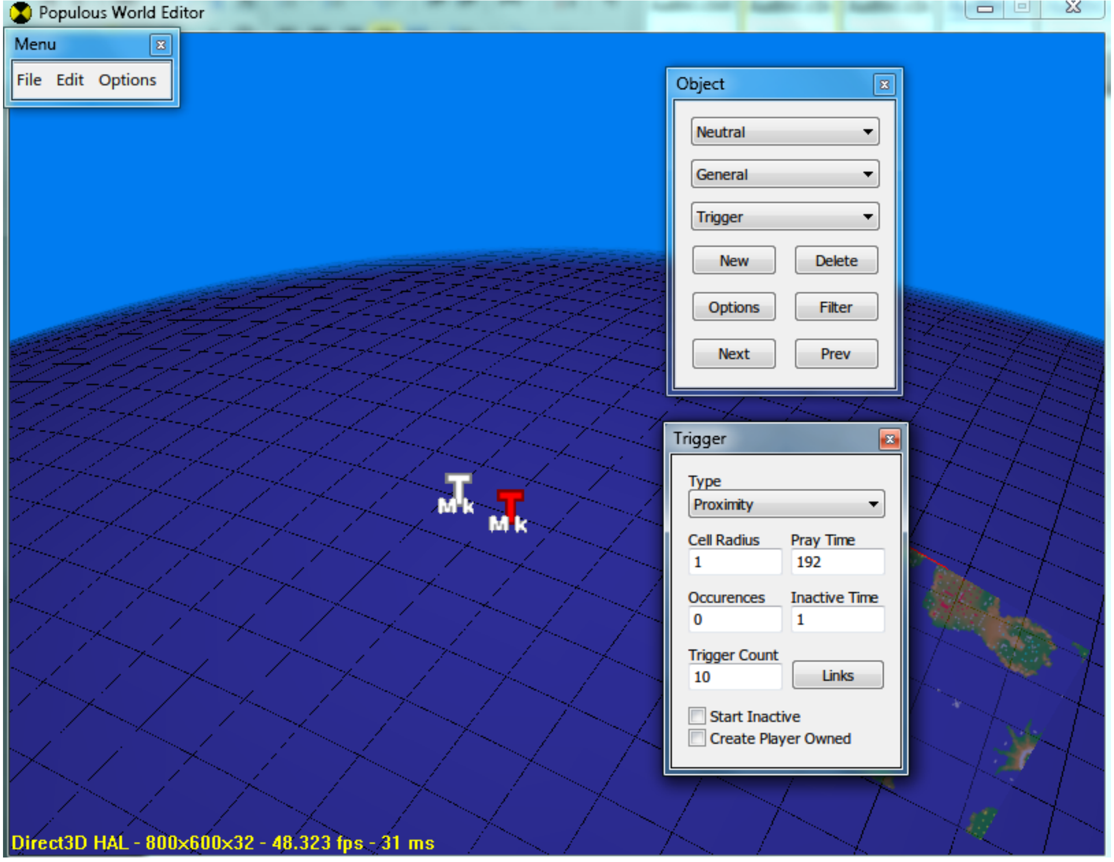
Usage of worshippable objects and triggers

Worshippable objects

There are only two types of worshippable objects in PopWorldEditor: Vault of Knowledge and Stone Head, categorised under Building and Scenery respectively, displayed as their names in PopWorldEditor. The Stone heads, totem poles, obelisks and statues of AOD are all displayed as stone heads in PopWorldEditor. Their actual appearance in game depend on the type of trigger beneath them.

Trigger

Triggers are key objects to create a plot for a level, which you can find from General category:



Neutral
General
Trigger

Type: Proximity
Cell Radius: 1
Pray Time: 192
Occurences: 0
Inactive Time: 1
Trigger Count: 10
☐ Start Inactive
☐ Create Player Owned

Direct3D HAL - 800x600x32 - 48.323 fps - 31 ms

Figure 23 Triggers

The camp (Neutral, Blue, Red, etc.) of the triggers doesn’t matter, after clicking Option button you can do advanced edit, where:

- Type ：
    - Proximity，trigger on worshipping or approaching. If trigger is linked to a Discovery object, it appears as a stone head in game; otherwise it appears as a totem pole.
    - Timed，trigger on time limit;
    - Player Death, unkown;
    - Shaman Proximity, trigger on worshipping or approaching by shaman. Appears as an obelisk;
    - Library，specifc trigger for VOK, placed at center beneath a VOK. If placed beneath a stone head, the stone head will become a VOK and take 5 by 5 area.
    - Shaman AOD, appears as a statue of AOD. Unless linked to Effect – Statue to AOD, otherwise have same effect with Shaman Proximity.
- Cell Radius – Checking radius for approaching
- Pray Time – Worshipping time in turns。
- Occurrences – Maximum number of activation. Unlimited if set to 0.

- Inactive Time – Used together with Timed triggers, indicating the time in turns need to activate the trigger since the beginning. Start Inactive need to be ticked. If placed under a worshippable object, this value needs to be set to 1. If set to 0, the worshipping time will lengthen each time it is prayed.
- Trigger Count – Number of people needed to activate the trigger. If the trigger is placed beneath a stone head, then the stone heads need that number of people to worship it; if not, then it will check if there is enough number of people within the checking range (Cell Radius), staying for at least a period of time (Pray Time), if so the trigger is activeated. Note for Shaman Proximity/Library/Shaman AOD triggers it must be set to 1.
- Links – Objects connects to the trigger, which will not appear until the trigger is activated. A maximum of 10 objects can be linked. If more is need, link to another timed trigger and link more objects with the latter.
- Start Inactive – Used together with Timed to make the trigger inactive at the beginning of the level.
- Create Player Owned – Make the objects produced by the trigger belong to the tribe which activates it. For example, consider a trigger is linked to a blue brave, and the red AI has activated it: if this option is ticked, then it creates a red brave, otherwise it creates exactly the item placed in the editor (a blue brave).

For activating triggers with DO TRIGGER_THING command script, refer to TB21 where many triggers have been used to activate the volcano, earthquake and lightning effects.

Header files of the map: levl2xxx.hdr

The following information are stored in map header files:

- Spells available to player (charging and not charging)
- Building available to player
- Buidling can be built for once*
- Spells can be used for limited times*
- Available vehicles
- Wether to turn of training mana consumpion*
- Name of level (Internally used, not the name displayed in the galaxy. To modify the latter, refer to Languages)
- Number of tribes. At least 2 if there are red objects, 3 if there are yellow objects, 4 if there are green objects
- Script number of AIs (Correspinding scripts files must exist)
- Ally information
- Texture
- Tree style
- Level options (Fog ON/OFF; God mode ON/OFF; Guest spells ON/OFF, only for multi-player game)
- Places Marker
- Place of the camera at the beginning*
- Angle of the camera at the beginning*

Those without * can be edited directly by PopWorldEditor; to edit the remaiders, you need know the detailed structure of the header files, then use Notepad++ or Ultraedit for Hex mode edit. Refer to:

http://wiki.popre.net/Header_Format (in English)

Texture making

Texture is the terrain style of the map including the colour of earth, water and sky etc. 36 different textures (numbered 0~9, A~Z) have been provided by the original files which can be previewed from PopWorldEditor.

Making new textures is not an easy matter, which may involve editing of palletes, raw files by different tools, which can be downloaded here:

http://blacksheeppp.ys168.com (in Chinese)

I won't go into detail here. Refer to the posts on Popre forum (in English) as well as instructions on Populous Online:

http://www.popre.net/forum/sky-modding-tutorial-t10633.html
http://www.popre.net/forum/custom-building-modding-t10635.html
http://www.popre.net/forum/freelance-s-terrain-style-thread-t10516.html
http://www.popre.net/forum/viewtopic.php?f=25&t=10515&p=228872#p228872
http://www.popre.net/forum/sprite-editor-dismantled-tutorial--t10501.html
http://www.populous-online.co.uk/ (MOD Making)

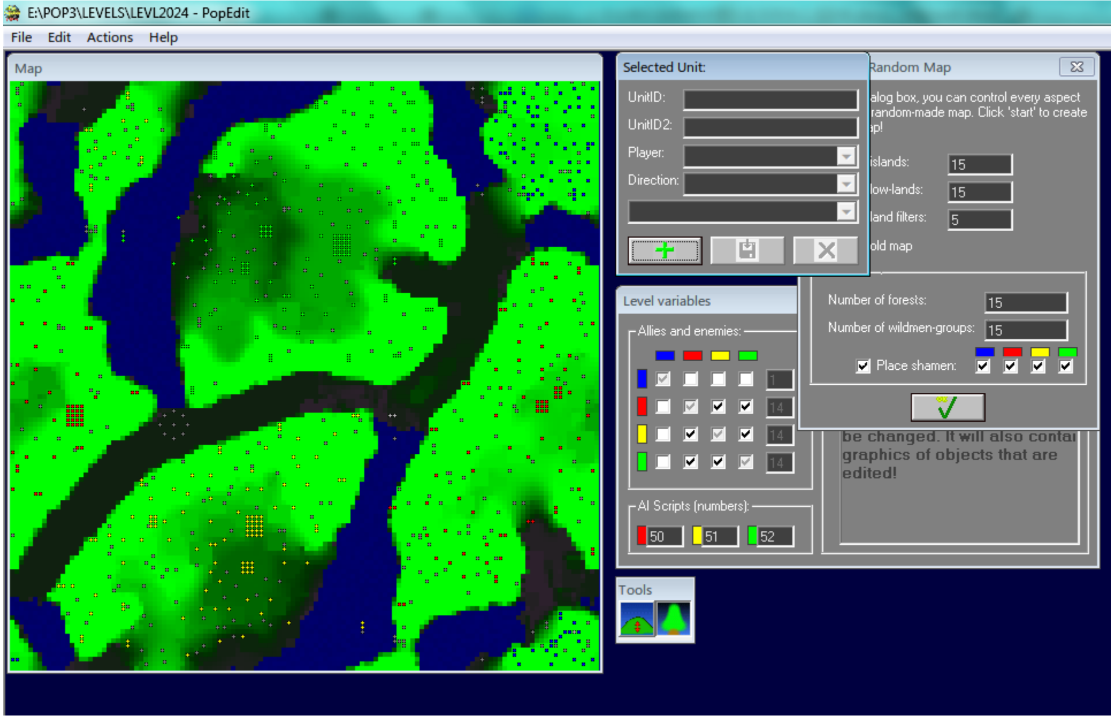
Map info, map vertion file and mapping making progress are optional.

Other tools

Now I briefly introduce other tools that might be useful.

PopEdit1.3.1

The software can be used for editing the map with 2D interface. It is semi-finished and hence may sometimes be buggy. Do not use it for object editing. However editing landscape with it is much more efficient than using PopWorldEditor, as you can have a global view of the entire map. Its function of generating random map is also very useful.



UnitID:
UnitID2:
Player:
Direction:

alog box, you can control every aspect
random-made map. Click 'start' to create
ap!

islands: 15
low-lands: 15
land filters: 5
old map

Number of forests: 15
Number of wildmen-groups: 15
☑ Place shamen: ☑ ☑ ☑ ☑

be changed. It will also contai
graphics of objects that are
edited!

Allies and enemies:

	🟦	🟥	🟨	🟩	
🟦	☑	□	□	□	1
🟥	□	☑	☑	☑	14
🟨	□	☑	☑	☑	14
🟩	□	☑	☑	☑	14

AI Scripts (numbers): 🟥 50 🟨 51 🟩 52

Figure 24 Interface of PopEdit1.3.1

PopSymmetryTool

This tool is very useful in making multi-player maps, which is capable of mirroring the map with regard to different axes or rotating the map. However it cannot mirror the entire map. Note that the places of marker will not change after using it. You may need to edit with PopWorldEditor manually.

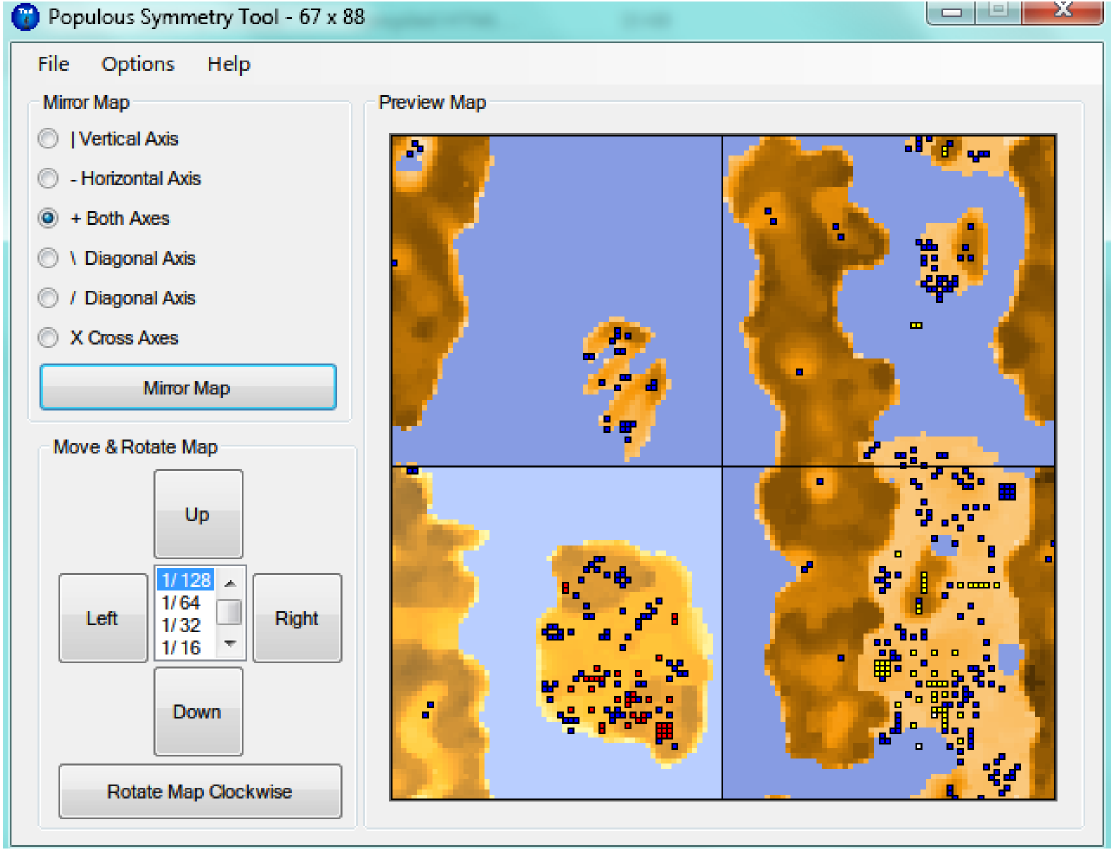
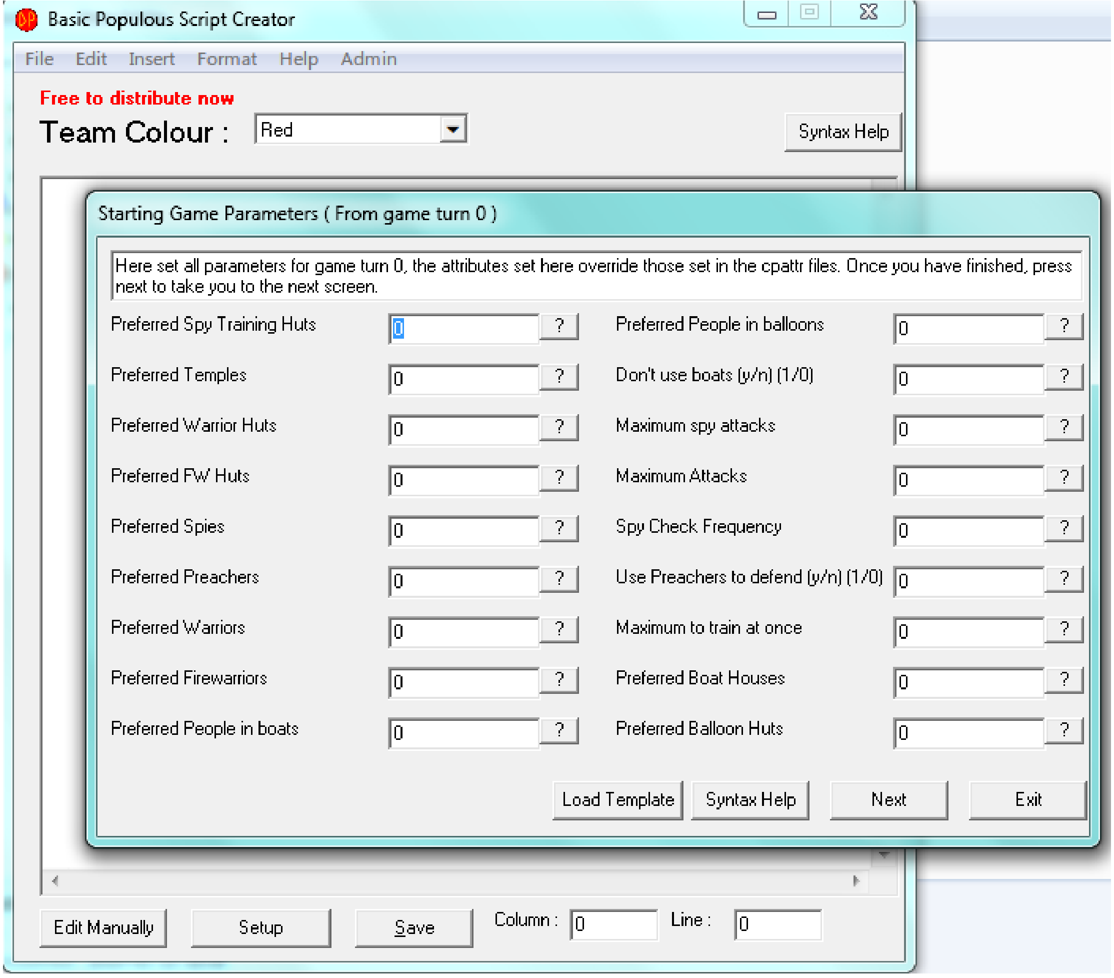


Figure 25 Interface of PopSymmetryTool

DMKP-ScriptCreator

This is a script generating tool providing templates for step by step script generation. It can also compile and decompile scripts. However the generated scripts are usually too simple with only basic functions, which often need to be further modified by Notepad++ before actually used.



Free to distribute now

Team Colour : Red

Starting Game Parameters (From game turn 0)

Here set all parameters for game turn 0, the attributes set here override those set in the cpattr files. Once you have finished, press next to take you to the next screen.

Preferred Spy Training Huts	0	Preferred People in balloons	0
Preferred Temples	0	Don't use boats (y/n) (1/0)	0
Preferred Warrior Huts	0	Maximum spy attacks	0
Preferred FW Huts	0	Maximum Attacks	0
Preferred Spies	0	Spy Check Frequency	0
Preferred Preachers	0	Use Preachers to defend (y/n) (1/0)	0
Preferred Warriors	0	Maximum to train at once	0
Preferred Firewarriors	0	Preferred Boat Houses	0
Preferred People in boats	0	Preferred Balloon Huts	0

Column : 0 Line : 0

Figure 26 Interface of DMKP-ScriptCreator

Appendices

1 Contents of Constants.dat (with notes)

```
###########################
#      POP3 BALANCE FILE
###########################

P3CONST_START_MANA         =      30000         # Players mana at start of
level (as blast and convert both takes 10000 mana, this explains why you
have 1.5 shots of blast and 1.5 shots of convert at the beginning of most
levels)

P3CONST_MAX_MANA           =      1000000              # Max mana player can
have (Only affect AIs, have nothing to do with human player)

(Manacost of spells, PLAGUE=SWARM; BOLT=LIGHTNING; WWIND=TORNADO)
P3CONST_SPELL_BLAST        =      10000         # Mana cost of firing spell
P3CONST_SPELL_CONVERT_WILD        =      10000
P3CONST_SPELL_GARMY        =      18000         # Mana cost of firing spell
P3CONST_SPELL_PLAGUE              =      40000         # Mana cost of firing
spell
P3CONST_SPELL_INVIS        =      50000         # Mana cost of firing spell
P3CONST_SPELL_SHIELD              =      60000
P3CONST_SPELL_LBRIDGE             =      70000         # Mana cost of firing
spell
P3CONST_SPELL_BOLT         =      80000         # Mana cost of firing spell
P3CONST_SPELL_HYPNO        =      85000         # Mana cost of firing spell
P3CONST_SPELL_WWIND        =      90000         # Mana cost of firing spell
P3CONST_SPELL_SWAMP        =      100000        # Mana cost of firing spell
P3CONST_SPELL_FLATTEN             =      125000        # Mana cost of firing
spell
P3CONST_SPELL_QUAKE        =      175000        # Mana cost of firing spell
P3CONST_SPELL_EROSION             =      210000        # Mana cost of firing
spell
P3CONST_SPELL_FIREST              =      400000        # Mana cost of firing
spell
P3CONST_SPELL_AOD          =      510000        # Mana cost of firing spell
P3CONST_SPELL_VOLCANO             =      800000        # Mana cost of firing
spell

(Life value of each kind of people)
P3CONST_LIFE_BRAVE         =      1000          # Persons initial life value
P3CONST_LIFE_WARR          =      1800          # Persons initial life value
P3CONST_LIFE_SPY           =      600           # Persons initial life value
P3CONST_LIFE_PREACH        =      1100          # Persons initial life value
P3CONST_LIFE_SWARR         =      700           # Persons initial life value
P3CONST_LIFE_SHAMEN        =      2000                 # Persons initial life
value (Shaman can always take 2 shots from FWs on vehicles regardess of her
life value or attack damage of FWs)

(Mana generated by each type of people in each turn, 12 turn=1s,
SWARR=Firewarrior)
P3CONST_MANA_F_BRAVE              =      15                   # Mana Values
P3CONST_MANA_F_WARR        =      4                    #
P3CONST_MANA_F_SPY         =      4                    #
P3CONST_MANA_F_PREACH             =      4                    #
P3CONST_MANA_F_SWARR              =      4                    #
P3CONST_MANA_F_SHAMEN             =      30                   #
```

```
(Percentage of mana generation with regard to the state of followers)
P3CONST_MANA_F_TRAINING         =     50           # %
P3CONST_MANA_F_HOUSED           =     100          # %
P3CONST_MANA_F_WORKING          =     100          # %
P3CONST_MANA_UPDATE_FREQ  =     15           #   Must   be   (2^n)-1,   eg
1,3,7,15,31,63,....

(Larger value indicates faster mana generation)
P3CONST_HUMAN_MANA_ADJUST =     125
P3CONST_COMPUTER_MANA_ADJUST    =     50

(People can pass through if the height difference between two point is
below this value)
P3CONST_WALK_ALT_DIFF2          =     384          # Max Walkable Alt Diff

(Unknown)
P3CONST_CONV_BRAVE        =     1
P3CONST_CONV_WARR         =     1
P3CONST_CONV_SPY          =     1
P3CONST_CONV_PREACH       =     1
P3CONST_CONV_SWARR        =     1

P3CONST_CONV_TEMPLE =     4000
P3CONST_CONV_SPY    =     4000
P3CONST_CONV_WARRIOR      =     4000
P3CONST_CONV_SUPER  =     4000
P3CONST_CONV_RECONV =     128

(Time taken for huts to give birth to new people)
P3CONST_HUT1_SPROG_TIME   =     4000         #   X 0 - 0.5, 1 - 1.0, 2 -
1.5, 3 - 2.0 ....
P3CONST_HUT2_SPROG_TIME   =     3000
P3CONST_HUT3_SPROG_TIME   =     2000

(Wood quantity for each type of tree, 100=1 pile)
P3CONST_TREE1_WOOD_VALUE  =     400
P3CONST_TREE2_WOOD_VALUE  =     400
P3CONST_TREE3_WOOD_VALUE  =     400
P3CONST_TREE4_WOOD_VALUE  =     400
P3CONST_TREE5_WOOD_VALUE  =     400
P3CONST_TREE6_WOOD_VALUE  =     400

(Tree growth rate for every 16 turns, every 100 units for 1 pile)
P3CONST_TREE1_WOOD_GROW   =     2     #  trees  incremented  by  this  number
every 16 frames.
P3CONST_TREE2_WOOD_GROW   =     2     #  trees  incremented  by  this  number
every 16 frames.
P3CONST_TREE3_WOOD_GROW   =     2     #  trees  incremented  by  this  number
every 16 frames.
P3CONST_TREE4_WOOD_GROW   =     2     #  trees  incremented  by  this  number
every 16 frames.
P3CONST_TREE5_WOOD_GROW   =     2     #  trees  incremented  by  this  number
every 16 frames.
P3CONST_TREE6_WOOD_GROW   =     2     #  trees  incremented  by  this  number
every 16 frames.

(People can carry wood piles)
P3CONST_WOOD_BRAVE  =     100
```

```
P3CONST_WOOD_WARR   =      0
P3CONST_WOOD_SPY    =      0
P3CONST_WOOD_PREACH =      0
P3CONST_WOOD_SWARR  =      0
P3CONST_WOOD_SHAMAN =      0
```

(Wood consumption of each building, note than huts already have 1 pile when upgrading, hence the actual values for mid hut and large hut are 500 and 700, however required 3 piles before it for the upgrade to begin, using only 2 of them; AIRSHIP=BALLOON)

```
P3CONST_WOOD_HUT_1         =      300
P3CONST_WOOD_HUT_2         =      300
P3CONST_WOOD_HUT_3         =      300
P3CONST_WOOD_DRUM_TOWER          =      500
P3CONST_WOOD_TEMPLE        =      800
P3CONST_WOOD_SPY_HUT             =      800
P3CONST_WOOD_WARRIOR             =      800
P3CONST_WOOD_SUPER         =      800
P3CONST_WOOD_RECONV        =      300
P3CONST_WOOD_BOAT_1        =      500
P3CONST_WOOD_AIR_1         =      1100
P3CONST_WOOD_VEHICLE_BOAT1=      400
P3CONST_WOOD_VEHICLE_AIRSHIP_1   =      300
```

(Melee damage of each type of followers)

```
P3CONST_FIGHT_DAMAGE_BRAVE=      60
P3CONST_FIGHT_DAMAGE_WARR =      360
P3CONST_FIGHT_DAMAGE_SPY  =      60
P3CONST_FIGHT_DAMAGE_PREACH      =      60
P3CONST_FIGHT_DAMAGE_SWARR=      60
P3CONST_FIGHT_DAMAGE_SHAMAN      =      60

P3CONST_SW_BLAST_DAMAGE          =      100 (Damage of FWs’ fire)
P3CONST_SW_FIRE_RATE             =      25 (Firing rate of FWs)
```

(Approximate value of population for AIs to stop building new huts when the house percentage is set to …)

```
P3CONST_SPROG%_POP_BAND_00_04%   =      30
P3CONST_SPROG%_POP_BAND_05_09%   =      35
P3CONST_SPROG%_POP_BAND_10_14%   =      40
P3CONST_SPROG%_POP_BAND_15_19%   =      50
P3CONST_SPROG%_POP_BAND_20_24%   =      60
P3CONST_SPROG%_POP_BAND_25_29%   =      70
P3CONST_SPROG%_POP_BAND_30_34%   =      80
P3CONST_SPROG%_POP_BAND_35_39%   =      90
P3CONST_SPROG%_POP_BAND_40_44%   =      100
P3CONST_SPROG%_POP_BAND_45_49%   =      110
P3CONST_SPROG%_POP_BAND_50_54%   =      120
P3CONST_SPROG%_POP_BAND_55_59%   =      130
P3CONST_SPROG%_POP_BAND_60_64%   =      140
P3CONST_SPROG%_POP_BAND_65_69%   =      150
P3CONST_SPROG%_POP_BAND_70_74%   =      160
P3CONST_SPROG%_POP_BAND_75_79%   =      170
P3CONST_SPROG%_POP_BAND_80_84%   =      180
P3CONST_SPROG%_POP_BAND_85_89%   =      190
P3CONST_SPROG%_POP_BAND_90_94%   =      195
P3CONST_SPROG%_POP_BAND_95_99%   =      200
P3CONST_SPROG%_POP_BAND_100_100% =      300
```

```
P3CONST_NEAR_BLDG_CELLS          =      3 (Unknown)

(Maximum number of people than can be born from small, medium and large
huts)
P3CONST_MAX_POP_VALUE__HUT_1     =      3
P3CONST_MAX_POP_VALUE__HUT_2     =      5
P3CONST_MAX_POP_VALUE__HUT_3     =      7

(Mana generation percentage adjustment for people in each type of hut)
P3CONST_MANA_F_HUT_LEVEL_1=      100
P3CONST_MANA_F_HUT_LEVEL_2=      110
P3CONST_MANA_F_HUT_LEVEL_3=      120

(Mana lost and mana gaint by enemy when the shaman is killed)
P3CONST_SHAMEN_DEAD_MANA_%_LOST  =      25
P3CONST_SHAMEN_DEAD_MANA_%_GAIN  =      25

P3CONST_PREACHEE_CONV_FREQ       =      200          #    freq    used    is
(THIS_NUMBER + (random(this_number/16))) !!!!
P3CONST_PREACHEE_CONV_CHANCE            =      3            #      1       in
THIS_NUMBER chance of coversion every P3CONST_PREACHEE_CONV_FREQ
P3CONST_HYPNO_COUNT_X8                  =      55           #   time   people
hynotised is (THIS_NUMBER X 8)
P3CONST_INVISIBLE_COUNT_X8       =      180          # time people invisible
is (THIS_NUMBER X 8)
P3CONST_SHIELD_COUNT_X8                 =      180

(Cast range of spells)
P3CONST_SP_W_RANGE_BLAST         =      3072
P3CONST_SP_W_RANGE_BOLT          =      6144
P3CONST_SP_W_RANGE_WWIND         =      4096
P3CONST_SP_W_RANGE_PLAGUE        =      6144
P3CONST_SP_W_RANGE_INVIS         =      4096
P3CONST_SP_W_RANGE_FIREST        =      4096
P3CONST_SP_W_RANGE_HYPNO         =      4096
P3CONST_SP_W_RANGE_GARMY         =      4096
P3CONST_SP_W_RANGE_EROSION       =      4096
P3CONST_SP_W_RANGE_SWAMP         =      4096
P3CONST_SP_W_RANGE_LBRIDGE       =      5120
P3CONST_SP_W_RANGE_AOD                  =      3072
P3CONST_SP_W_RANGE_QUAKE         =      4096
P3CONST_SP_W_RANGE_FLATTEN       =      4096
P3CONST_SP_W_RANGE_VOLCANO       =      3072
P3CONST_SP_W_RANGE_CONVERT_WILD         =      8192
P3CONST_SP_W_RANGE_SHIELD        =      4096
P3CONST_SP_W_RANGE_TELEPORT             =      65536
P3CONST_SP_W_RANGE_BLOODLUST            =      4096

P3CONST_SWARM_PERSON_DAMAGE      =      100
P3CONST_LAND_BRIDGE_MAX_CHANGE   =     256 (effect of LB spell. If set to 1,
then LB can only connect low lands separated by water, cannot connected
hills or low lands divided by hills)
P3CONST_SW_BLAST_RATE_TOWER      =      100  (Attack rate adjust percentage
of FWs in tower)
P3CONST_SW_BLAST_DAMAGE_TOWER    =      400100    (Attack    damage    adjust
percentage of FWs in tower)

(warning radius of each kind of people in tower, MEDICINE_MAN=SHAMAN)
P3CONST_BRAVE_DT_RADIUS          =      5
```

```
P3CONST_WARRIOR_DT_RADIUS =      8
P3CONST_RELIGIOUS_DT_RADIUS      =      5
P3CONST_SPY_DT_RADIUS            =      10
P3CONST_SUPER_WARRIOR_DT_RADIUS  =      8
P3CONST_MEDICINE_MAN_DT_RADIUS   =      5

(Cast range adjust percentage on different heights)
P3CONST_ALT_BAND_0_SPELL_INCR                =      80           #   %   of
default spell cast dist at altitude band 0 (lowest)
P3CONST_ALT_BAND_1_SPELL_INCR                =      90           #   %   of
default spell cast dist at altitude band 1
P3CONST_ALT_BAND_2_SPELL_INCR                =      100          #   %   of
default spell cast dist at altitude band 2
P3CONST_ALT_BAND_3_SPELL_INCR                =      110          #   %   of
default spell cast dist at altitude band 3
P3CONST_ALT_BAND_4_SPELL_INCR                =      120          #   %   of
default spell cast dist at altitude band 4
P3CONST_ALT_BAND_5_SPELL_INCR                =      130          #   %   of
default spell cast dist at altitude band 5
P3CONST_ALT_BAND_6_SPELL_INCR                =      140          #   %   of
default spell cast dist at altitude band 6
P3CONST_ALT_BAND_7_SPELL_INCR                =      150          #   %   of
default spell cast dist at altitude band 7 (highest)

(FWs' attack range adjust percentage on different heights)
 P3CONST_ALT_BAND_0_SUPER_INCR               =      80           #   %   of
default super fire dist at altitude band 0 (lowest)
P3CONST_ALT_BAND_1_SUPER_INCR                =      90           #   %   of
default super fire dist at altitude band 1
P3CONST_ALT_BAND_2_SUPER_INCR                =      100          #   %   of
default super fire dist at altitude band 2
P3CONST_ALT_BAND_3_SUPER_INCR                =      110          #   %   of
default super fire dist at altitude band 3
P3CONST_ALT_BAND_4_SUPER_INCR                =      120          #   %   of
default super fire dist at altitude band 4
P3CONST_ALT_BAND_5_SUPER_INCR                =      130          #   %   of
default super fire dist at altitude band 5
P3CONST_ALT_BAND_6_SUPER_INCR                =      140          #   %   of
default super fire dist at altitude band 6
P3CONST_ALT_BAND_7_SUPER_INCR                =      150          #   %   of
default super fire dist at altitude band 7 (highest)

(Max number of shots of each spell)
P3CONST_SP_1_OFF_MAX_BLAST=      4
P3CONST_SP_1_OFF_MAX_BOLT =      4
P3CONST_SP_1_OFF_MAX_WWIND=      3
P3CONST_SP_1_OFF_MAX_PLAGUE      =      4
P3CONST_SP_1_OFF_MAX_INVIS=      4
P3CONST_SP_1_OFF_MAX_FIREST      =      2
P3CONST_SP_1_OFF_MAX_HYPNO=      3
P3CONST_SP_1_OFF_MAX_GARMY=      4
P3CONST_SP_1_OFF_MAX_EROSION     =      2
P3CONST_SP_1_OFF_MAX_SWAMP=      3
P3CONST_SP_1_OFF_MAX_LBRIDGE     =      4
P3CONST_SP_1_OFF_MAX_AOD   =     1
P3CONST_SP_1_OFF_MAX_QUAKE=      2
P3CONST_SP_1_OFF_MAX_FLATTEN     =      3
P3CONST_SP_1_OFF_MAX_VOLCANO     =      1
P3CONST_SP_1_OFF_MAX_CONVERT     =      4
```

```
P3CONST_SP_1_OFF_MAX_SHIELD      =      4
P3CONST_SP_1_OFF_MAX_ARMAGEDDON  =      1
P3CONST_SP_1_OFF_MAX_TELEPORT    =      4
P3CONST_SP_1_OFF_MAX_BLOODLUST   =      4

P3CONST_SPY_DISGUISE_DELAY=      63 (turns taken for spies to disguise)
P3CONST_INVIS_NUM_PEOPLE   =      6 (Maximum number of people that can be
affected by a shot of invisibility)
P3CONST_HYPNO_NUM_PEOPLE   =      6 (Maximum number of people that can be
affected by a shot of hpynotism)
P3CONST_LIGHTNING_NUM_KILLS      =      6 (Maximum number of people that can
be killed by a shot of lightning)
P3CONST_SHIELD_NUM_PEOPLE =      6 (Maximum number of people that can be
affected by a shot of magical shield)
P3CONST_BUILD_ALT_DIFF2          =      160 (Unknown)
P3CONST_FIRESTORM_DURATION=      220

(Mana consumption for training each type of followers for player)
P3CONST_HUMAN_TRAIN_MANA_WARR    =      3500  # Mana cost for human warrior
conversion
P3CONST_HUMAN_TRAIN_MANA_SPY     =      4000  # Mana cost for human spy
conversion
P3CONST_HUMAN_TRAIN_MANA_PREACH  =      3500  # Mana cost for human
preacher conversion
P3CONST_HUMAN_TRAIN_MANA_SWARR   =      4000  # Mana cost for human super
warrior conversion

(Mana consumption for training each type of followers for AIs)
P3CONST_CP_TRAIN_MANA_WARR=      1000  # Mana cost for CP warrior
conversion
P3CONST_CP_TRAIN_MANA_SPY =      1000  # Mana cost for CP spy conversion
P3CONST_CP_TRAIN_MANA_PREACH     =      1000  # Mana cost for CP preacher
conversion
P3CONST_CP_TRAIN_MANA_SWARR      =      1000  # Mana cost for CP super
warrior conversion

(Unkown, possibly affecting the mana of AIs)
P3CONST_TRAIN_MANA_BAND_00_03    =      100   # % of mana cost used for
this number of specialists
P3CONST_TRAIN_MANA_BAND_04_07    =      125   # % of mana cost used for
this number of specialists
P3CONST_TRAIN_MANA_BAND_08_11    =      150   # % of mana cost used for
this number of specialists
P3CONST_TRAIN_MANA_BAND_12_15    =      175   # % of mana cost used for
this number of specialists
P3CONST_TRAIN_MANA_BAND_16_20    =      200   # % of mana cost used for
this number of specialists
P3CONST_TRAIN_MANA_BAND_21+      =      250   # % of mana cost used for
this number of specialists

P3CONST_SW_BLDG_DAMAGE_DELAY     =      1200  (Number of turns before a
damaged building can be repaired)

P3CONST_SW_BLAST_DAMAGE_WARR     =      5 (Damage to buildings by FWs)

P3CONST_MULTIPLE_SELECT_NUM      =      5  (Number of follower selected by
pressing ‘Ctrl’)
```

```
P3CONST_DME_RESTORE_TIME   =      6000  (Number  of  turns  for  damaged  ground
to recover)

(Movement speed of each type of followers)
P3CONST_BRAVE_SPEED        =      70
P3CONST_WARRIOR_SPEED             =      59
P3CONST_RELIGIOUS_SPEED           =      58
P3CONST_SPY_SPEED          =      66
P3CONST_SUPER_WARRIOR_SPEED       =      55
P3CONST_MEDICINE_MAN_SPEED=      58

P3CONST_AOD_KILL_COUNT            =      40  (Maximum  number  of  people  that
can be killed by an AOD)
P3CONST_AOD_DURATION              =      2500 (Duration of an AOD)
P3CONST_LIFE_AOD           =      10000 (HP of an AOD)
P3CONST_BLAST_DAMAGE_AOD   =      10 (Damage taken when an AOD is shot by a
FW)
(I  guess  AOD  will  expire  after  killing  the  maximum  number  of  people  or
after the specified period of time, or explode after taken enough damage)

P3CONST_TRIGGER_REACTIVATE_TIME =       768   (Default   activated   time   of
inactive triggers)=
P3CONST_LAND_BRIDGE_DURATION      =      64 (Duration of LB spell)

P3CONST_BLOODLUST_COUNT_X8=      180 (Duration of bloodlust)
P3CONST_BLOODLUST_NUM_PEOPLE      =      6 (Maximum number of people that can
be affected by a shot of bloodlust)
P3CONST_BLOODLUST_DAMAGE_X=     3 (Multiplier of melee damage by bloodlust)
P3CONST_BLOODLUST_HEALTH_X=      3 (Multiplier of HP by bloodlust)
P3CONST_BLOODLUST_SW_BLAST_X      =      3 (Multiplier of firing rate of FWs
by bloodlust)
P3CONST_HUMAN_REINC_START_DELAY  =      0 (Unknown)

(Unknown, might be related to AI spell casting)
P3CONST_SPELL_AOD_OPT_S    =      300    #Seconds
P3CONST_SPELL_VOLCANO_OPT_S       =      300    #Seconds
P3CONST_SPELL_CONVERT_WILD_OPT_S =      300    #Seconds
P3CONST_SPELL_HYPNO_OPT_S  =      240    #Seconds
P3CONST_SPELL_EROSION_OPT_S       =      240    #Seconds
P3CONST_SPELL_QUAKE_OPT_S  =      240    #Seconds
P3CONST_SPELL_FLATTEN_OPT_S       =      240    #Seconds
P3CONST_SPELL_BOLT_OPT_S   =      180    #Seconds
P3CONST_SPELL_WWIND_OPT_S  =      180    #Seconds
P3CONST_SPELL_FIREST_OPT_S=      180    #Seconds
P3CONST_SPELL_SWAMP_OPT_S  =      180    #Seconds
P3CONST_SPELL_LBRIDGE_OPT_S       =      180    #Seconds
P3CONST_SPELL_PLAGUE_OPT_S=      45     #Seconds
P3CONST_SPELL_INVIS_OPT_S  =      120    #Seconds
P3CONST_SPELL_SHIELD_OPT_S=      120    #Seconds
P3CONST_SPELL_BLOODLUST_OPT_S     =      120    #Seconds
P3CONST_SPELL_TELEPORT_OPT_S      =      120    #Seconds
P3CONST_SPELL_BLAST_OPT_S  =      30     #Seconds
P3CONST_SPELL_GARMY_OPT_S  =      60     #Seconds
P3CONST_SPELL_ARMAGEDDON_OPT_S    =      60     #Seconds

P3CONST_LSME_DURATION_SECS=      120 (Unknown)
```

(Maximum of turns a vehicle can survive when empty. Exceptions: boat on earth will explode very soon, or even instantly when other boat explode nearby, or spells such as blast or lighting is casted nearby; similar for balloons)

```
P3CONST_VEHICLE_LIFE_BOAT =      5000
P3CONST_VEHICLE_LIFE_BALLOON     =     5000
```

2 Format of scripts (subject to decompiled txt files)

Annotation

Thre are two ways to annotate: // or /* */, as in other languate. Annotated codes will not be executed.
Example:

```
Codes // This is an annotation.
Codes
/*
Annotation block
*/
Codes /* Another annotation block */ Codes
```

Start and end

Scripts start with {, end with }SCRIPT_END. Example

```
{
  Codes
}
SCRIPT_END
```

Variables and constants

Variables is denoted by a number with a $ before it. Constants are written as numbers. Example:

```
$1   //This is a variable.
100  //This is a constant.
```

Internal variables

Internal variables of game

Variable name	Explanation
INT_GAME_TURN	Number of turns since the start.
INT_MY_NUM_PEOPLE	Population of ‘this’ AI, including shaman, same fo the following
INT_BLUE_PEOPLE	Population of each tribe
INT_RED_PEOPLE	
INT_YELLOW_PEOPLE	
INT_GREEN_PEOPLE	
INT_MY_NUM_KILLED_BY_HUMAN	Number of my people killed by player till now
INT_RED_KILLED_BY_HUMAN	Number of people of each tribe killed by player till now
INT_YELLOW_KILLED_BY_HUMAN	
INT_GREEN_KILLED_BY_HUMAN	
INT_WILD_PEOPLE	Number of wildies on the planet
INT_MY_MANA	My mana
INT_BLUE_MANA	Mana of each tribe
INT_RED_MANA	
INT_YELLOW_MANA	
INT_GREEN_MANA	
NT_M_SPELL_BLAST_COST	Default mana cost of each spell by this AI
INT_M_SPELL_LIGHTNING_COST	
INT_M_SPELL_TORNADO_COST	
INT_M_SPELL_SWARM_COST	
INT_M_SPELL_INVISIBILITY_COST	
INT_M_SPELL_HYPNOTISM_COST	
INT_M_SPELL_FIRESTORM_COST	
INT_M_SPELL_GHOST_ARMY_COST	
INT_M_SPELL_EROSION_COST	
INT_M_SPELL_SWAMP_COST	
INT_M_SPELL_LAND_BRIDGE_COST	
INT_M_SPELL_ANGEL_OF_DEATH_COST	
INT_M_SPELL_EARTHQUAKE_COST	
INT_M_SPELL_FLATTEN_COST	
INT_M_SPELL_VOLCANO_COST	
INT_M_SPELL_SHIELD_COST	
INT_M_BUILDING_SMALL_HUT	Number of each building of my tribe
INT_M_BUILDING_MEDIUM_HUT	
INT_M_BUILDING_LARGE_HUT	
INT_M_BUILDING_DRUM_TOWER	
INT_M_BUILDING_TEMPLE	
INT_M_BUILDING_SPY_TRAIN	
INT_M_BUILDING_WARRIOR_TRAIN	
INT_M_BUILDING_FIREWARRIOR_TRAIN	
INT_M_BUILDING_BOAT_HUT	
INT_M_BUILDING_AIRSHIP_HUT	
INT_B_BUILDING_SMALL_HUT	Number of each building of blue tribe
INT_B_BUILDING_MEDIUM_HUT	
INT_B_BUILDING_LARGE_HUT	
INT_B_BUILDING_DRUM_TOWER	
INT_B_BUILDING_TEMPLE	
INT_B_BUILDING_SPY_TRAIN	
INT_B_BUILDING_WARRIOR_TRAIN	
INT_B_BUILDING_FIREWARRIOR_TRAIN	
INT_B_BUILDING_BOAT_HUT	
INT_B_BUILDING_AIRSHIP_HUT	
INT_R_BUILDING_SMALL_HUT	Number of each building of red tribe
INT_R_BUILDING_MEDIUM_HUT	

INT_R_BUILDING_LARGE_HUT	
INT_R_BUILDING_DRUM_TOWER	
INT_R_BUILDING_TEMPLE	
INT_R_BUILDING_SPY_TRAIN	
INT_R_BUILDING_WARRIOR_TRAIN	
INT_R_BUILDING_FIREWARRIOR_TRAIN	
INT_R_BUILDING_BOAT_HUT	
INT_R_BUILDING_AIRSHIP_HUT	
INT_Y_BUILDING_SMALL_HUT	Number of each building of yellow tribe
INT_Y_BUILDING_MEDIUM_HUT	
INT_Y_BUILDING_LARGE_HUT	
INT_Y_BUILDING_DRUM_TOWER	
INT_Y_BUILDING_TEMPLE	
INT_Y_BUILDING_SPY_TRAIN	
INT_Y_BUILDING_WARRIOR_TRAIN	
INT_Y_BUILDING_FIREWARRIOR_TRAIN	
INT_Y_BUILDING_BOAT_HUT	
INT_Y_BUILDING_AIRSHIP_HUT	
INT_G_BUILDING_SMALL_HUT	Number of each building of green tribe
INT_G_BUILDING_MEDIUM_HUT	
INT_G_BUILDING_LARGE_HUT	
INT_G_BUILDING_DRUM_TOWER	
INT_G_BUILDING_TEMPLE	
INT_G_BUILDING_SPY_TRAIN	
INT_G_BUILDING_WARRIOR_TRAIN	
INT_G_BUILDING_FIREWARRIOR_TRAIN	
INT_G_BUILDING_BOAT_HUT	
INT_G_BUILDING_AIRSHIP_HUT	
INT_M_PERSON_BRAVE	Number of each type of followers of my tribe
INT_M_PERSON_WARRIOR	
INT_M_PERSON_RELIGIOUS	
INT_M_PERSON_SPY	
INT_M_PERSON_FIREWARRIOR	
INT_M_PERSON_SHAMAN	
INT_B_PERSON_BRAVE	Number of each type of followers of blue tribe
INT_B_PERSON_WARRIOR	
INT_B_PERSON_RELIGIOUS	
INT_B_PERSON_SPY	
INT_B_PERSON_FIREWARRIOR	
INT_B_PERSON_SHAMAN	
INT_R_PERSON_BRAVE	Number of each type of followers of red tribe
INT_R_PERSON_WARRIOR	
INT_R_PERSON_RELIGIOUS	
INT_R_PERSON_SPY	
INT_R_PERSON_FIREWARRIOR	
INT_R_PERSON_SHAMAN	
INT_Y_PERSON_BRAVE	Number of each type of followers of yellow tribe
INT_Y_PERSON_WARRIOR	
INT_Y_PERSON_RELIGIOUS	
INT_Y_PERSON_SPY	
INT_Y_PERSON_FIREWARRIOR	
INT_Y_PERSON_SHAMAN	
INT_G_PERSON_BRAVE	Number of each type of followers of green tribe
INT_G_PERSON_WARRIOR	
INT_G_PERSON_RELIGIOUS	
INT_G_PERSON_SPY	
INT_G_PERSON_FIREWARRIOR	

INT_G_PERSON_SHAMAN	
INT_BLUE_KILLED_BY_ME	Number of people of each tribe killed by me
INT_RED_KILLED_BY_ME	
INT_YELLOW_KILLED_BY_ME	
INT_GREEN_KILLED_BY_ME	
INT_MY_NUM_KILLED_BY_BLUE	Number of my people killed by each tribe
INT_MY_NUM_KILLED_BY_RED	
INT_MY_NUM_KILLED_BY_YELLOW	
INT_MY_NUM_KILLED_BY_GREEN	
INT_BLAST	Spells
INT_LIGHTNING	
INT_TORNADO	
INT_SWARM	
INT_INVISIBILITY	
INT_HYPNOTISM	
INT_FIRESTORM	
INT_GHOST_ARMY	
INT_EROSION	
INT_SWAMP	
INT_LAND_BRIDGE	
INT_ANGEL_OF_DEATH	
INT_EARTHQUAKE	
INT_FLATTEN	
INT_VOLCANO	
INT_WRATH_OF_GOD[1]	
INT_SHIELD	
INT_CONVERT	
INT_TELEPORT	
INT_BLOODLUST	
INT_BRAVE	Follower types
INT_WARRIOR	
INT_RELIGIOUS	
INT_SPY	
INT_FIREWARRIOR	
INT_SHAMAN	
INT_SMALL_HUT	Buildings
INT_MEDIUM_HUT	
INT_LARGE_HUT	
INT_DRUM_TOWER	
INT_TEMPLE	
INT_SPY_TRAIN	
INT_WARRIOR_TRAIN	
INT_FIREWARRIOR_TRAIN	
INT_BOAT_HUT	
INT_AIRSHIP_HUT	
INT_NO_SPECIFIC_PERSON	No specific follower/building/spell
INT_NO_SPECIFIC_BUILDING	
INT_NO_SPECIFIC_SPELL	
INT_M_VEHICLE_BOAT	Number of vehicles of my tribe
INT_M_VEHICLE_AIRSHIP	
INT_B_VEHICLE_BOAT	Number of vehicles of each tribe
INT_B_VEHICLE_AIRSHIP	
INT_R_VEHICLE_BOAT	
INT_R_VEHICLE_AIRSHIP	
INT_Y_VEHICLE_BOAT	
INT_Y_VEHICLE_AIRSHIP	
INT_G_VEHICLE_BOAT	

INT_G_VEHICLE_AIRSHIP	
INT_CP_FREE_ENTRIES[2]	Number of free entries of my TODO list
INT_RANDOM_100	Random integer from 0 to 99
INT_NUM_SHAMEN_DEFENDERS	Number of people circling around shaman
INT_CAMERA_ANGLE	Current camera angle and position
INT_CAMERA_X	
INT_CAMERA_Z	

Notes:

1) Armageddon.
2) The maximum entry of AI's TODO list is 10. AI will one by one execute the commands in it, removing the executed command and add new commands into the it. If there is no free entrie, the command will not be executed. The following commands will take the free entries in the TODO list:
   - DO ATTACK
   - DO BUILD_AT
   - DO BUILDING_DRUM_TOWER
   - DO BUILD_MAIN_DRUM_TOWER
   - DO CONVERT_AT_MARKER
   - DO DEFEND_SHAMEN
   - DO GUARD_AT_MARKER
   - DO GUARD_BETWEEN_MARKERS
   - DO MARKER_ENTRIES
   - DO PRAY_AT_HEAD
   - DO PREACH_AT_MARKER
   - DO PUT_PERSON_IN_DT
   - DO SPELL_ATTACK
   - DO STATE_SPELL_DEFENCE
   - DO TRAIN_PEOPLE_NOW
   - DO VEHICLE_PATROL

Internal attribute variables

Attribute	Explanation
INT_ATTR_ATTACK_PERCENTAGE	Percentage of number of people attacking
INT_ATTR_AWAY_BRAVE	Proportion of braves used when attacking or worshipping
INT_ATTR_AWAY_FIREWARRIOR	Proportion of warriors used when attacking or worshipping
INT_ATTR_AWAY_RELIGIOUS	Proportion of preachers used when attacking or worshipping
INT_ATTR_AWAY_SHAMAN	Whether or not use shaman to attack or worship, 0=No, 1=Yes
INT_ATTR_AWAY_SPY	Proportion of spies used when attacking or worshipping
INT_ATTR_AWAY_WARRIOR	Proportion of FWs used when attacking or worshipping
INT_ATTR_BASE_UNDER_ATTACK_RETREAT	Whether to retreat the attacking armies when the base is under attack, 0=No, 1=Yes
INT_ATTR_BOAT_HOUSE_BROKEN	Unknown
INT_ATTR_COUNT_PREACH_DAMAGE	Unknown
INT_ATTR_DEFENSE_RAD_INCR	Unknown
INT_ATTR_DONT_AUTO_TRAIN_PREACHERS	Unknown, usually set to 0
INT_ATTR_DONT_DELETE_USELESS_BOAT_HOUSE	Unknown, usually set to 0

INT_ATTR_DONT_GROUP_AT_DT	Whether or not to assemble the army at the main drum tower, see DO SET DRUM TOWER POS, 0=Yes,1=No. If DO DELAY MAIN DRUM TOWER is set, then the AI will assemble at the reincarnation circle regardless of this variable
INT_ATTR_DONT_USE_BOATS	Unknown, usually set to 0
INT_ATTR_EMPTY_AT_WAYPOINT	Unknown
INT_ATTR_ENEMY_SPY_MAX_STAND	Unknown, usually set to 128/256/512
INT_ATTR_EXPANSION	Unknown
INT_ATTR_FIGHT_STOP_DISTANCE	Unknown
INT_ATTR_GROUP_OPTION	Assembling options, can be set to 0/1/2/3[1]
INT_ATTR_HOUSE_PERCENTAGE	Hut construction variable[2]
INT_ATTR_MAX_ATTACKS	Unknown
INT_ATTR_MAX_BUILDINGS_ON_GO	Maximum number of buildings under construction at the same time
INT_ATTR_MAX_DEFENSIVE_ACTIONS	Unknown
INT_ATTR_MAX_SPY_ATTACKS	Unknown
INT_ATTR_MAX_TRAIN_AT_ONCE	Unknown
INT_ATTR_PEOPLE_PER_BALLOON	This and followings determine the usagage of vehicles by AI with unknown mechanism. Use the recommended values 6~10
INT_ATTR_PEOPLE_PER_BOAT	Usually 5~8
INT_ATTR_PREF_BALLOON_DRIVERS	Usually 6~10
INT_ATTR_PREF_BALLOON_HUTS	Number of balloon huts. When set to values larger than 1 however, the AI will build but not use the extra balloon huts. Similar for boat huts and training buildings
INT_ATTR_PREF_BOAT_DRIVERS	Usually 5~8
INT_ATTR_PREF_BOAT_HUTS	Number of boat huts
INT_ATTR_PREF_FIREWARRIOR_PEOPLE	Percentage of FWs
INT_ATTR_PREF_FIREWARRIOR_TRAINS	Number of FW training huts
INT_ATTR_PREF_RELIGIOUS_PEOPLE	Percentage of preachers
INT_ATTR_PREF_RELIGIOUS_TRAINS	Number of temples
INT_ATTR_PREF_SPY_PEOPLE	Percentage of spies
INT_ATTR_PREF_SPY_TRAINS	Number of spy training huts
INT_ATTR_PREF_WARRIOR_PEOPLE	Percentage of warriors
INT_ATTR_PREF_WARRIOR_TRAINS	Number of warrior training huts
INT_ATTR_RANDOM_BUILD_SIDE	Unknown
INT_ATTR_RETREAT_VALUE	Retreat when this percentage of people is lost in a assault
INT_ATTR_SHAMEN_BLAST	Freqency of AI’s blast spell, usually set to 64 (highest)/128/256/512 (lowest)
INT_ATTR_SPARE	Unknown
INT_ATTR_SPELL_DELAY	Casting delay of spells in SPELL_ENTRY
INT_ATTR_SPY_CHECK_FREQUENCY	Spy checking frequency. Usually set to 128/256/512
INT_ATTR_SPY_DISCOVER_CHANCE	Spy discover chance of each check
INT_ATTR_USE_PREACHER_FOR_DEFENCE	Whether to randomly place preachers around the base

Notes:

1. Explanation for each value
   0 – Assemble at the specified place, then automatically select another place to assemblebefore attack.
   1 – Pass by the specified place, then automatically select another place to assemble before attack.
   2 – Assemble at the specified place, then directly attack without automatically select another place to assemble.
   3 – Pass by the specified place, then directly attack without automatically select another place to assemble.

   If set to other values, then use default action as option 2.
   Besides, when option 2 is used, the attack target is ‘person’, then the AI will assemble at the specified place and wait the target to approach. If assemble place is not set, they will wait at the main drum tower.
   （reference: http://tieba.baidu.com/p/3242495912，by blassdog）
2. This percentage determine the approximate number of huts the AI will build as follows (if there is enough earth): 5 – 3
   10 – 4
   15 – 5
   20 – 7
   25 – 8
   30 – 9
   35 – 10
   40 – 11
   45 – 13
   50 – 15
   55 – 16
   60 – 18
   65 – 19
   70 – 20
   75 – 21
   80 – 22
   85 – 23
   90 – 24
   95 – 25
   100 – 26
   110 – 28 (reaching the maximum number of people)
   120 – 30
   150 – 36
   200 – 45
3. Refer to existing scripts for setting the values of ‘Unknows’ attributes.

Basic operation on numbers

All numbers in Pop3 are dealt as integers.

SET

```
SET var/attr param1
```

Set the value of varible `var` or internal attribute `attr` to `param1`.

INCREMENT

```
INCREMENT var param1
```

Increase var by param1.

DECREMENT

```
DECREMENT var param1
```

Decrease var by param1.

MULTIPLY

```
MULTIPLY var param1 param2
```

Set the value of var to param1*param2.

DIVIDE

```
DIVIDE var param1 param2
```

Set the value of var to param1/param2, discarding the decimal part.

Conditional and circulation statement

IF statement

```
IF (condition)
{
  Code block 1
}
ENDIF
```

or

```
IF (condition)
{
  Code block 1
}
ELSE
{
  Code block 2
}
ENDIF
```

EVERY statement

```
EVERY const1
{
  Code block
}
```

or

```
EVERY const1 const2
{
  Code block
}
```

List of commands

DO STATE command

```
DO STATE_command ON/OFF
```

STATE_command list:

Command	Explanation
AUTO_MESSAGES	Unknown
EXTRA_WOOD_COLLECTION	Whether to collect extra wood
FLYBY_ALLOW_INTERRUPT	Whether to allow interrupting the FLYBY created
GIVE_UP_AND_SULK	When the AI will give and send all people to attack player's shaman
SET_AUTO_BUILD	When automatically send idle braves to build constructions
SET_AUTO_HOUSE	When automatically send idle braves, warriors, FWs and spies into huts
SET_BUCKET_USAGE	Whether to simulate the bucket of spells, refer to DO SET_BUCKET_COUNT_FOR_SPELL
SET_REINCARNATION	Whether to create reincarnation circle DO SET_NO_BLUE_REINC
STATE_AUTO_ATTACK	Whether to attack automatically
STATE_BRING_NEW_PEOPLE_BACK	Whether to send new people back to base
STATE_BUILD_VEHICLE	Whether to make vehicles
STATE_CONSTRUCT_BUILDING	Whether to build
STATE_DEFEND_BASE	Whether to defend the base reactively
STATE_DEFEND	Whether to defend the base with circling warriors
STATE_FETCH_FAR_VEHICLE	Whether to drive far vehicles close (For boats, automatically drive them to the shore; for balloons, drive them near the main tower; must be ON if using boats, otherwise they cannot be used because the people cannot get loaded)
STATE_FETCH_LOST_PEOPLE	Whether to send lost people back to base
STATE_FETCH_LOST_VEHICLE	Whether to fetch empty vehicle
STATE_FETCH_WOOD	Whether to automatically collect wood in front of huts
STATE_FIREWARRIOR_DEFEND	Whether to defend the base with circling FWs
STATE_HOUSE_A_PERSON	Whether to send idle people into free entries of huts
STATE_POPULATE_DRUM_TOWER	Whether to automatically fill empty towers
STATE_PREACH	Whether to randomly place preachers around the base
STATE_SEND_GHOSTS	Whether to use ghosts (created by ghost army) to attack, worship or defend shaman
STATE_SHAMAN_GET_WILDS	Whether to automatically convert wildies
STATE_TRAIN_PEOPLE	Whether to automatically train
TURN_PUSH	Unknown

DO commands (alphabetically sorted)

DO ATTACK

```
DO ATTACK team num_ppl attack_model target damage spell1 spell2 spell3
attack_type bring_back_vehicles marker1 marker2 marker3
```

Launch an attack.

Parameters:

- team – Tribe，BLUE(0)/RED(1)/YELLOW(2)/GREEN(3);
- num_ppl – Number of people which is a baseline. Actual number = num_ppl * INT_ATTR_ATTACK_PERCENTAGE * INT_ATTR_AWAY_XXXX;
- attack_model – ATTACK_PERSON/ATTACK_BUILDING/ATTACK_MARKER
- target – Primary attack target;
- damage – Damage to be made before retreat;
- spell1, spell2, spell3 – Spells to be casted in the attack;
- attack_type – ATTACK_NORMAL/ATTACK_BY_BOAT/ATTACK_BY_BALLON;
- bring_back_vehicle – 0/1;
- marker1 – Assembling place;
- marker2 – Casting place of spell1;
- marker3 – Unknown, always set to -1.

Example:

```
DO ATTACK BLUE 28 ATTACK_BUILDING INT_NO_SPECIFIC_BUILDING 981
INT_LIGHTNING INT_TORNADO INT_FIRESTORM ATTACK_NORMAL 0 5 -1 -1
```

DO BUILD_AT

```
DO BUILD_AT x z building 0
```

Place a building plan at the specified place. If no possible, then automatically choose another place nearby.

Parameters:

- x, z – Coordinates;
- building – Building.

Example:

```
DO BUILD_AT 8 38 INT_DRUM_TOWER 0
```

DO BUILD_DRUM_TOWER

```
DO BUILD_DRUM_TOWER x z
```

Build a tower at the specified place. If no possible, then automatically choose another place nearby.

Parameters:

- x, z – Coordinates.

Example:

```
DO BUILD_DRUM_TOWER 8 38
```

DO BUILD_MAIN_DRUM_TOWER

```
DO BUILD_MAIN_DRUM_TOWER
```

Build the main drum tower. Can be Used together with DO DELAY_MAIN_DRUM_TOWER. Regefer to DO SET_DRUM_TOWER_POS, for setting the position of the main drum tower.

DO CAMARA_ROTATION

```
DO CAMARA_ROTATION speed
```

Make the camera rotate with specified speed until the player do anything or DO STOP_CAMARA_ROTATION is executed.

Parameter:

- speed – Rotation speed.

DO CLEAR_ALL_MSG

```
DO CLEAR_ALL_MSG
```

Clear all messages.

DO CLEAR_GUARDING_FROM

```
DO CLEAR_GUARDING_FROM idx1 idx2 idx3 -1
```

Clear the guarding people from at most three places set by DO SET_MARKER_ENTRY.

Parameters:

- idx1, idx2, idx3 – Index of guarding places. Set to -1 if unused.

Example:

```
DO CLEAR_GUARDING_FROM 1 2 -1 -1
```

DO CLEAR_STANDING_PEOPLE

```
DO CLEAR_STANDING_PEOPLE
```

Clear standing guards set by DO ONLY_STAND_AT_MARKERS.

DO CONVERT_AT_MARKER

```
DO CONVERT_AT_MARKER marker
```

Convert wildies at specidfied marker。

Parameters:

- marker – Place to convert.

Example:

```
DO CONVERT_AT_MARKER 14
```

DO COUNT_ANGELS

```
DO COUNT_ANGELS team var
```

Get the number of AODs of specified tribe and store the the value with a variable.

Parameters:

- team – Rribe, BLUE(0)/RED(1)/YELLOW(2)/GREEN(3);
- var – Variable to store the value.

Example.

```
DO COUNT_ANGELS RED $2
```

DO COUNT_BLUE_IN_HOUSES

```
DO COUNT_BLUE_IN_HOUSES var
```

Get the number of people in huts of blue tribe and store the the value with a variable.

Parameters:

- var – Variable to store the value.

Example:
```
DO COUNT_BLUE_IN_HOUSES $2
```

DO COUNT_BLUE_WITH_BUILD_COMMAND

```
DO COUNT_BLUE_WITH_BUILD_COMMAND var
```

Get the number of braves constructing buildings the of blue tribe and store the the value with a variable.

Parameters:

- var – Variable to store the value.

Example:
```
DO COUNT_BLUE_WITH_BUILD_COMMAND $2
```

DO COUNT_PEOPLE_IN_MARKER

```
DO COUNT_PEOPLE_IN_MARKER team marker rad var
```

Get the number of people of the specified tribe (or wildies) around the specified place and store the the value with a variable.

Parameter:

- team – Tribe, BLUE(0)/RED(1)/YELLOW(2)/GREEN(3) or COUNT_WILD;
- marker – Place;
- rad – Count radius;
- var – Variable to store the value.

Example:
```
DO COUNT_PEOPLE_IN_MARKER COUNT_WILD 4 3 $5
```

DO CREATE_MSG_INFORMATION

```
DO CREATE_MSG_INFORMATION idx
```

Create message with spefied index with green 'i' icon. Refer to Appendices 3 for message indices.

Parameter:

- idx – Message index.

Example:
```
DO CREATE_INFORMATION 10
```

DO CREATE_MSG_INFORMATION_ZOOM

```
DO CREATE_MSG_INFORMATION_ZOOM idx x z zoom
```

Create message with spefied index with green 'i' icon and small triangle at the top right corner. When open, the camera will move the the specified place with specified zoom and return after the message is closed. Refer to Appendices 3 for message indices.

Parameters:

- idx – Message index;
- x, z – Coordinates;
- zoom – Zoom.

Example:
```
DO CREATE_INFORMATION_ZOOM 78 234 112 500
```

DO CREATE_MSG_NARRATIVE

```
DO CREATE_MSG_NARRATIVE idx
```

Create message with spefied index with book icon. Usually used at the beginning of a level. Refer to Appendices 3 for message indices.

Parameters:

- idx – Message index.

Example:

```
DO CREATE_INFORMATION 12
```

DO CREATE_MSG_OBJECTIVE

```
DO CREATE_MSG_OBJECTIVE idx
```

Create message with spefied index with blue flag icon. Usually used at the beginning of a level. Refer to Appendices 3 for message indices.

Parameters:

- idx – Message index.

Example:

```
 DO CREATE_INFORMATION 10
```

DO DEFEND_SHAMEN

```
DO DEFEND_SHAMEN num_ppl
```

Send some people to circle around the shaman. DO SEND_SHAMAN_DEFENDERS_HOME for cancelling.

Parameters:

- num_ppl – Number of people.

Example:

```
DO CREATE_INFORMATION 10
```

DO DELAY_MAIN_DRUM_TOWER

```
DO BUILD_MAIN_DRUM_TOWER
```

Do not build the main drum tower at the beginning. Build after a while if DO BUILD_MAIN_DRUM_TOWER is used. Refer to DO SET_DRUM_TOWER_POS for setting position of the main drum tower.

DO DELETE_SMOKE_STUFF

```
DO DELETE_SMOKE_STUFF x z rad
```

Remove the firestorm smoke object at the specified place. Used in TB21.

Parameter:

- x, z – Coordinates;
- rad – Radius.

Example:

```
DO DELETE_SMOKE_STUFF 92 194 5
```

DO DESELECT_ALL_BLUE_PEOPLE

```
DO DESELECT_ALL_BLUE_PEOPLE
```

Deselect people selected by player.

DO DISABLE_USER_INPUTS

```
DO DISABLE_USER_INPUTS
```

Disable player from doing anything until DO ENABLE USER INPUTS is executed.

DO DONT_TARGET_BLUE_DRUM_TOWERS

```
DO DONT_TARGET_BLUE_DRUM_TOWERS
```

Do not focus on player's towers. Refer to DO TARGET BLUE DRUM TOWERS.

DO DONT_TARGET_BLUE_SHAMAN

```
DO DONT_TARGET_BLUE_DRUM_TOWERS
```

Do not automatically lightning the blue shaman in the casting range. Refer to DO TARGET BLUE SHAMAN.

DO DONT_TARGET_FIREWARRIORS

```
DO DONT_TARGET_FIREWARRIORS
```

Do not focus on player's FWs. Refer to DO TARGET FIREWARRIORS.

DO ENABLE_USER_INPUTS

```
DO ENABLE_USER_INPUTS
```

Renable player's operations after DO DISABLE USER INPUTS.

DO FIX_WILD_IN_AREA

```
DO FIX_WILD_IN_AREA x z rad
```

Prevent the wildies in the specified area from automatically dying.
Parameters:

- x,z – Coordinates;
- rad – Redius.

Example:

```
DO FIX_WILD_IN_AREA 6 88 14
```

DO FLASH_BUTTON

```
DO FLASH_BUTTON idx on/off
```

Start/stop flashing of the button on the panel. Used in Tutorial level.
Parameters:

- idx – Panel button index.
- on/off – Start/stop flashing.

Example:

```
DO FLASH_BUTTON 16 ON
```

DO FLYBY_ALLOW_INTERUPT

```
DO FLYBY_ALLOW_INTERUPT on/off
```

Allow/don't allow the last created Flyby to be interrupted by pressing the space.
Paremeters:

- on/off – Whether or not to allow interruption.

```
Example:
DO FLYBY_ALLOW_INTERUPT ON
```

DO FLYBY_CREATE_NEW

```
DO FLYBY_CREATE_NEW
```

Creat a new Flyby.

DO FLYBY_SET_END_TARGET

```
DO FLYBY_SET_END_TARGET x z angle zoom
```

Set the position, angle and zoom of camera when the last created Flyby is interrupted.
Parameters:

- x,z – Coordinates;
- angle – Angle;
- zoom – Zoom.

DO FLYBY_SET_EVENT_ANGLE

```
DO FLYBY_SET_EVENT_ANGLE angle start duration
```

Set the camera angle of a Flyby event.
Parameters:

- angle – 0=NORTH (x+), 500=EAST (z+), 1000=SOUTH (x-), 1500=WEST (z-);
- start – Starting time (Starting from Flyby event start);
- duration – Duration.

DO FLYBY_SET_EVENT_POS

```
DO FLYBY_SET_EVENT_POS x z start duration
```

Set the position of a Flyby event.
Parameters:

- x,z – Coordinates;
- start – Starting time;
- duration – Duration.

DO FLYBY_SET_EVENT_TOOLTIP

```
DO FLYBY_SET_EVENT_POS x z obj start duration
```

Set the tooltip of the object in a Flyby event.
Parameters:

- x,z – Coordinates;
- obj – 0 (Buildings)/1 (Worshippable objects);
- start – Starting time;
- duration – Duration.

DO FLYBY_SET_EVENT_ZOOM

```
DO FLYBY_SET_EVENT_ZOOM zoom start duration
```

Set the camera zoom in the Flyby event.
Parameters:

- zoom – Zoom, 0 is normal view, positive values for closer, negative values for further and overlook;
- start – Starting time;
- duration – Duration.

DO FLYBY_SET_MESSAGE

```
DO FLYBY_SET_MESSAGE code start
```

Set the automatically opening message in Flyby.
Parameters:

- code – Line number the message in lang00.dat minus 1;
- start – Openning time since the start of flyby.

DO FLYBY_START

```
DO FLYBY_START
```

Start the last created Flyby.

DO FLYBY_STOP

```
DO FLYBY_STOP
```

Stop the last created Flyby.

DO GET_HEAD_TRIGGER_COUNT

```
DO GET_HEAD_TRIGGER_COUNT x z var
```

Get the trigger count at the spefied place and and store the value with a variable
Parameters:

- x, z – Coordinates;
- var – Variable to store the value.

Example:

```
DO GET_HEAD_TRIGGER_COUNT 32 18 $3
```

DO GET_HEIGHT_AT_POS

```
DO GET_HEIGHT_AT_POS marker var
```

Get the height at the specified place and store the value with a variable. 0 = sea level, 1024 = higest level.
Parameters

- marker – Place marker;
- var – Variable to store the value.

Example:

```
DO GET_HEIGHT_AT_POS 39 $4
```

DO GET_MSG_ID

```
DO GET_MSG_ID var
```

Get the latest message id and store it to a variable. Use together with DO KILL_ALL_MSG_ID to delete specific message.

Parameters:

- var – Variable to store the value.

Example:

```
DO GET_MSG_ID $10
```

DO GET_NUM_ONE_OFF_SPELLS

```
DO GET_NUM_ONE_OFF_SPELLS team spell var
```

Get the number of shots of a specified spell of a tribe and store it with a variable. For player, it means of number of shots shown on the panel; for AIs, it means the shots obtained from worshipping or given by DO GIVE_ONE_SHOT commands.

Parameters

- team – Tribe, BLUE(0)/RED(1)/YELLOW(2)/GREEN(3);
- spell – Spell;
- var – Varialbe to store the value.

Example:

```
DO GET_NUM_ONE_OFF_SPELLS BLUE INT_HYPNOTISM $4
```

DO GET_NUM_PEOPLE_BEING_PREACHED

```
DO GET_NUM_PEOPLE_BEING_PREACHED team var
```

Get the number of people being preached of a tribe and store it with a variable.

Parameters:

- team – Tribe, BLUE(0)/RED(1)/YELLOW(2)/GREEN(3)；
- var – Varialbe to store the value.

Examples:

```
DO GET_NUM_PEOPLE_BEING_PREACHED BLUE $7
```

DO GET_SPELLS_CAST

```
DO GET_SPELLS_CAST team spell var
```

Get the number of shots of a specified spell casted by a tribe and store it with a variable.

Parameters:

- team – Tribe, BLUE(0)/RED(1)/YELLOW(2)/GREEN(3);
- spell – Spell;
- var – Varialbe to store the value.

Example:

```
DO GET_SPELLS_CAST GREEN INT_EROSION $5
```

DO GIVE_ONE_SHOT

```
DO GIVE_ONE_SHOT spell team
```

Give a shot of a specified spell to a tribe.

Parameters:

- spell – Spell;

- team – Trive, BLUE(0)/RED(1)/YELLOW(2)/GREEN(3).

Example:

```
DO GIVE_ONE_SHOT INT_LIGHTNING BLUE
```

DO GIVE_PLAYER_SPELL

```
DO GIVE_PLAYER_SPELL team spell/building
```

Give the knowledge of a spell/building to a tribe that is available during the entire level. Spell is charging when given.

Parameters:

- spell/building – Spell/Building;
- team – Tribe BLUE(0)/RED(1)/YELLOW(2)/GREEN(3);

Example:

```
DO GIVE_PLAYER_SPELL BLUE INT_LIGHTNING
DO GIVE_PLAYER_SPELL BLUE INT_AIRSHIP_HUT
```

DO GUARD_AT_MARKER

```
DO GUARD_AT_MARKER marker brv_num warr_num fwarr_num rlg_num guard_type
```

Patrol at the specified marker.

Paramters:

- marker – Marker;
- brv_num – Number of braves;
- warr_num – Number of warriors;
- fwarr_num – Number of FWs;
- rlg_num – Number of preachers;
- guard_type – GUARD_NORMAL/GUARD_WITH_GHOSTS, whether to use ghosts

Example:

```
DO GUARD_AT_MARKER 18 0 7 0 0 GUARD_NORMAL
```

DO GUARD_BETWEEN_MARKERS

```
DO GUARD_AT_MARKER marker1 marker2 brv_num warr_num fwarr_num rlg_num
guard_type
```

Patrol between two specified markers.

Paramters:

- marker1, marker2 – Markers;
- brv_num – Number of braves;
- warr_num – Number of warriors;
- fwarr_num – Number of FWs;
- rlg_num – Number of preachers;
- guard_type – GUARD_NORMAL/GUARD_WITH_GHOSTS, whether to use ghosts

Example:

```
DO GUARD_BETWEEN_MARKER 18 19 3 4 0 0 GUARD_WITH_GHOSTS
```

DO HAS_TIMER_REACHED_ZERO

```
DO HAS_TIMER_REACHED_ZERO var
```

Check if the timer has reached 00:00 and store the value with a variable, 1 if Yes, 0 if No. Refer to DO SET TIMER GOING and DO REMOVE TIMER.

Parameters:

- var – Variable to store the value.

Example:

```
DO HAS_TIMER_REACHED_ZERO $1
```

DO I_HAVE_ONE_SHOT

```
DO I_HAVE_ONE_SHOT spell_type spell var
```

Check if the AI has a shot of a specified spell and store the value with a variable. The shots are given by DO GIVE ONE SHOT or obtained from worshipping, having nothing to do with mana.

Parameters:

- spell_type – SPELL_TYPE;
- spell – Spell;
- var – Variable to store the value.

Example:

```
DO I_HAVE_ONE_SHOT SPELL_TYPE INT_EROSION $5
```

DO IS_BUILDING_NEAR

```
DO IS_BUILDING_NEAR building x z team rad var
```

Check whether there is specified building of a tribe around the specied place and store the value with a variable.

Parameters:

- building – Building;
- x, z – Coordinates;
- team – Tribes, BLUE(0)/RED(1)/YELLOW(2)/GREEN(3);
- rad – Radius;
- var – Variable to store the value.

Example:

```
DO IS_BUILDING_NEAR INT_DRUM_TOWER 102 76 YELLOW 10 $7
```

DO IS_PLAYER_IN_WORLD_VIEW

```
DO IS_PLAY_IN_WORLD_VIEW var
```

Check if player is in the planet view and store the value with a variable.

Parameters:

- var – Variable to store the value.

Example:

```
DO IS_PRISON_ON_LEVEL $1
```

DO IS_PRISON_ON_LEVEL

```
DO IS_PRISON_ON_LEVEL var
```

Check if there is prison on the planet and store the value with a variable.

Parameters:

- var – Variable to store the value.

Example:

```
DO IS_PRISON_ON_LEVEL $1
```

DO IS_SHAMAN_AVAILABLE_FOR_ATTACK

```
DO IS_SHAMAN_AVAILABLE_FOR_ATTACK var
```

Check if the AI's shaman is available for attack and store the value with a variable. AI shaman is available if she is alive, not worshipping, no executing DO_ATTACK, DO SPELL_ATTACK or DO CONVERT_AT_MARKER.

Parameter:

- var – Variable to store the value.

Example:

```
DO IS_SHAMAN_AVAILABLE_FOR_ATTACK $1
```

DO IS_SHAMAN_IN_AREA

```
DO IS_SHAMAN_IN_AREA team marker rad var
```

Check if the shaman of a specified tribe is near the specified marker and store the value with a variable.

Parameters:

- team – Tribe, BLUE(0)/RED(1)/YELLOW(2)/GREEN(3);
- marker – Marker;
- rad – Radius;
- var – Variable to store the value.

Example:

```
DO IS_SHAMAN_IN_AREA RED 7 3 $1
```

DO KILL_ALL_MSG_ID

```
DO KILL_ALL_MSG_ID id
```

Delete the message with specifid id. To set and obtain the id of a messge, refer to DO SET_MSG_ID, DO GET_MSG_ID.

Parameters:

- id – Id of messgage to be deleted.

Example:

```
DO KILL_ALL_MSG_ID 0
```

DO KILL_TEAM_IN_AREA

```
DO KILL_TEAM_IN_AREA x z rad
```

Kill all people around the specified area of any tribe. They will disappear rather than die. If Shaman is killed in such way, she will not reborn from the reincarnation cycle.

Parameters:

- x, z – Coordinates;
- rad – Radius;

Example:

```
DO KILL_TEAM_IN_AREA 230 14 4
```

DO MARKER_ENTRIES

```
DO MARKER_ENTRIES idx1 idx2 idx3 -1
```

Activate the patrol at three places of maximum set by DO SET_MARKER_ENTRY.

Parameters:

- idx1, idx2, idx3 – Patrolling place indices, set to -1 if unused.

Example:

```
DO MARKER_ENTRIES 1 2 -1 -1
```

DO MARVELOUS_HOUSE_DEATH

```
DO MARVELOUS_HOUSE_DEATH
```

Unknown. Used in TB3.

DO MOVE_SHAMAN_TO_MARKER

```
DO MOVE_SHAMAN_TO_MARKER marker
```

Move the player’s shaman to a specified marker, allowing player to cancel.

Parameters:

- marker – Marker.

Example:

```
DO MOVE_SHAMAN_TO_MARKER 1
```

DO NAV_CHECK

```
DO NAV_CHECK team attack_model target remember var
```

Check if a specified target of a tribe can be attacked by land and store the value with a variable. Refer to DO ATTACK command.

Parameters:

- team – Tribe, BLUE(0)/RED(1)/YELLOW(2)/GREEN(3);
- attack_model – ATTACK_PERSON/ATTACK_BUILDING/ATTACK_MARKER;
- target – Primary attack target;
- remember – Unknown, usuall set to 0;
- var – Variable to store the value.

Example:

```
DO NAV_CHECK BLUE ATTAK_BUILDING INT_NOSPECIFIC_BUILDING 0 $6
```

DO ONLY_STAND_AT_MARKERS

```
DO ONLY_STAND_AT_MARKERS
```

Used together with DO SET_MARKER_ENTRY. When patrolling at a place, only stand there rather than circling. Preachers will always stand rather than circling.

Example:

```
DO SET_MARKER_ENTRY 2 1 -1 1 0 0 0
DO ONLY_STAND_AT_MARKERS
```

DO OPEN_DIALOG

```
DO OPEN_DIALOG idx
```

Directly open the massage with specified index without showing a message box. Refer to Appendices 3 for message indices.

Parameters:

- idx – Message index.

Example:

DO OPEN_DIALOG 102

DO PARTIAL_BUILDING_COUNT

```
DO PARTIAL_BUILDING_COUNT
```

Take plans, incompleted or damaged buildings into account when checking the number of specified buildings.

Example:

```
DO PARTIAL_BUILDING_COUNT
SET $1 INT_M_BUILDING_SMALL_HUT
DO PARTIAL_BUILDING_COUNT
SET $2 INT_M_BUILDING_MEDIUM_HUT
DO PARTIAL_BUILDING_COUNT
SET $3 INT_M_BUILDING_LARGE_HUT
```

DO PRAY_AT_HEAD

```
DO PRAY_AT_HEAD num_ppl marker
```

Worship the object at the marker with specified number of people.

Parameters:

- num_ppl – Number of people;
- marker – Marker.

Example:

```
DO PRAY_AT_HEAD 6 2
```

DO PREACH_AT_MARKER

```
DO PREACH_AT_MARKER marker
```

Send a preacher to a specified marker.

Parameters:

- marker – Marker.

Example:

```
DO PREACH_AT_MARKER 6
```

DO PUT_PERSON_IN_DT

```
DO PUT_PERSON_IN_DT person_type x z
```

Send a follower into the drum tower at the specified place.

Parameters:

- person_type – Type of follower:
- x, z – Coordinates.

Example:

```
DO PUT_PERSON_IN_DT INT_FIREWARRIOR 68 174
```

DO REMOVE_HEAD_AT_POS

```
DO REMOVE_HEAD_AT_POS x z
```

Sink the worshippable object at a specified place.

Parameters:

- x, z – Coordinates.

Examples:

```
DO PUT_PERSON_IN_DT INT_FIREWARRIOR 68 174
```

DO REMOVE_PLAYER_THING

```
DO REMOVE_PLAYER_THING team spell/building
```

Removing the knowledge of a spell/building of a tribe.
Parameters:

- team – Tribe, BLUE(0)/RED(1)/YELLOW(2)/GREEN(3);
- spell/building – Spell/building.

Example:

```
DO REMOVE_PLAYER_THING BLUE INT_LIGHTNING
```

DO REMOVE_TIMER

```
DO REMOVE_TIMER
```

Remove the timer. Refer to DO SET_TIMER_GOING.

DO SEND_ALL_PEOPLE_TO_MARKER

```
DO SEND_ALL_PEOPLE_TO_MARKER marker
```

Send all people of the AI including the shaman to the marker.
Parameters:

- marker – Marker.

Example:

```
DO SEND_ALL_PEOPLE_TO_MARKER 17
```

DO SEND_BLUE_PEOPLE_TO_MARKER

```
DO SEND_BLUE_PEOPLE_TO_MARKER marker
```

Send all people of the player including the shaman to the marker.
Parameters:

- marker – Marker.

Example:

```
DO SEND_BLUE_PEOPLE_TO_MARKER 18
```

DO SEND_SHAMAN_DEFENDERS_HOME

```
DO SEND_SHAMAN_DEFENDERS_HOME
```

Disassmeble the people circling around the shaman after using DO DEFEND_SHAMEN.

DO SET_ATTACK_VARIABLE

```
DO SET_ATTACK_VARIABLE var
```

Set variable `var` to the attack variable, which is an internal variable increases each time the AI launches an attack, by the number of people take part in the attack excluding preachers.
Parameters:

- var – Variable to be set as the attack variable.

Example:
DO SET_ATTACK_VARIABLE $0

DO SET_BASE_MARKER

```
DO SET_BASE_MARKER marker
```

Set the center of the base to the marker.

Parameters:

- marker – Marker.

Example:

```
DO SET_BASE_MARKER 3
```

DO SET_BASE_RADIUS

```
DO SET_BASE_RADIUS rad
```

Set the radius of the base.

Parameters:

- rad – Radius.

Example:

```
DO SET_BASE_RADIUS 25
```

DO SET_BUCKET_COUNT_FOR_SPELL

```
DO SET_BUCKET_COUNT_FOR_SPELL spell time
```

Set the maximum shots of spell that can casted within the period of time equal to the maximum number of shots in the balance file.

Parameters:

- spell – Spell;
- time – Time in seconds.

Example:

```
DO SET_BUCKET_COUNT_FOR_SPELL INT_VOLCANO 320
```

DO SET_BUILDING_DIRECTION

```
DO SET_BUIDING_DIRECTION dir
```

Set the direct of the building. Use random value if not set.

Parameters:

- dir – Direction

Example:

```
DO BUILDING_DIRECTION 3
```

DO SET_DEFENCE_RADIUS

```
DO SET_DEFENCE_RADIUS rad
```

Set the automatic alert radius of circling warriors.

Parameters:

- rad – Radius.

Example:

```
DO SET_DEFENCE_RADIUS 10
```

DO SET_DRUM_TOWER_POS

```
DO SET_DRUM_TOWER_POS x z
```

Set the position of the main drum tower. This command can be used for only once. Further usage will be ineffective. AI will assemble at the main drum tower when executing commands such as DO ATTACK, DO SPELL ATTACK, DO PRAY AT HEAD. If the position is not set, the main drum tower will be built a nearest place northeast to the reincarnation circle; if DO DELAY MAIN DRUM TOWER is used, AI will assemble at the reincarnation circle. DO BUILD MAIN DRUM TOWER can be used after that to delay the construction of the main drum tower for a while.

Parameters:

- x, z – Coordinates.

Example:

```
DO SET_DRUM_TOWER_POS 180 96
```

DO SET_MARKER_ENTRY

```
DO SET_MARKER_ENTRY idx marker1 marker2 brv_num warr_num fwarr_num
rlg_num
```

Set the patrolling places. To acitate patrolling, use DO MARKER ENTRIES; to clear the patrolling people, use DO CLEAR GUARDING FROM; to stand at the patrolling place rather than circling around, use DO ONLY STAND AT MARKERS.

Parameters:

- idx1, idx2, idx3 – Indices of patrolling places. Set to -1 if unused;
- marker1, marker2 – markers. Set marker2 to -1 for single place circling/standing;
- brv_num – Number of braves;
- warr_num – Number of warriors;
- fwarr_num – Number of FWs;
- rlg_num – Number of preachers.

Examples:

```
DO SET_MARKER_ENTRY 1 7 8 0 4 3 2
DO SET_MARKER_ENTRY 2 9 -1 0 2 2 1
```

DO SET_MSG_AUTO_OPEN_DLG

```
DO SET_MSG_AUTO_OPEN_DLG
```

Set message automatically opening. Refer to DO CREATE MSG INFORMATION, DO CREATE_MSG_NARRATIVE, DO CREATE_MSG_OBJECTIVE.

DO SET_MSG_DELETE_ON_OK

```
DO SET_MSG_DELETE_ON_OK
```

Set message automatically deleted when player clicks OK. Refer to DO CREATE MSG INFORMATION, DO CREATE MSG NARRATIVE, DO CREATE MSG OBJECTIVE.

DO SET_MSG_ID

```
DO SET_MSG_ID id
```

Set the message id. Use together with DO KILL ALL MSG ID to delete specific messages.

Parameters:

- id – Id to be set.

Examples:

DO SET_MSG_ID 0

DO SET_MSG_TIME_OUT

```
DO SET_MSG_TIME_OUT timeout
```

Set message automatically deleted if not opened after a while. Refer to DO CREATE_MSG_INFORMATION, DO CREATE_MSG_NARRATIVE, DO CREATE_MSG_OBJECTIVE.

Parameters:

- timeout – Timeout in turns.

Example:

DO SET_MSG_TIME_OUT 256

DO SET_NO_BLUE_REINC

```
DO SET_NO_BLUE_REINC
```

Do not create reincarnation circle for the player’s shaman. DO STATE_REINCARNATION.

DO SET_SPELL_ENTRY

```
DO SET_SPELL_ENTRY idx spell mana_cost freq min_ppl bas
```

Set spells automatically used. Maximum: 8 (idx=0~7)

Parameters:

- idx – Index;
- spell – Spell;
- mana_cost – Mana cost;
- freq – Frequency;
- min_ppl – Minimum number of enemy people to trigger casting;
- bas – Whether or not to cast in the base. 1=Yes, 0=No.

Example:

```
DO SET_SPELL_ENTRY 2 INT_SWARM 40000 64 2 0
```

DO SET_SPECIAL_NO_BLDG_PANEL

```
DO SET_SPECIAL_NO_BLDG_PANEL on/off
```

Disable/enable the player’s building panel.

Parameters:

- on/off – Disable/enable.

Example:

```
DO SET_SPECIAL_NO_BLDG_PANEL ON
```

DO SET_TIMER_GOING

```
DO SET_TIMER_GOING time
```

Set a timer count down. Use DO REMOVE_TIMER to remove it.

Parameters:

- time – Time in seconds.

Example:

```
DO SET_TIMER_GOING 900
```

DO SET_WOOD_COLLECTION_RADII

```
DO SET_WOOD_COLLECTION_RADII rad
```

Set the radius of automatically collecting wood.

Parameters:

- rad – Radius.

Example:

```
DO SET_WOOD_COLLECTION_RADII 10
```

DO SPELL_ATTACK

```
DO SPELL_ATTACK spell marker 0
```

Cast the specified spell at the marker. If the marker is unreachable, the AIs shaman will stuck in place and die; if the marker is reacheable but the spell is in cool down due to the limitation of DO SET_BUCKET_USAGE_ON, the AI shaman will move to the marker and wait.

Parameters:

- spell – Spell;
- marker – Marker.

Example:

```
DO SPELL_ATTACK INT_ANGEL_OF_DEATH 70 0
```

DO STATE_SPELL_DEFENCE

```
DO STATE_SPELL_DEFENCE x z on/off
```

Turn on/off AIshaman's steady defence at a place.

Parameters:

- x, z – Coordinates'
- on/off – On/Off.

Examples:

```
DO SPELL_ATTACK INT_ANGEL_OF_DEATH 70 0
```

DO STOP_CAMARA_ROTATION

```
DO STOP_CAMARA_ROTATION
```

Stop camera rotation after DO CAMARA_ROTATION.

DO TARGET_BLUE_DRUM_TOWERS

```
DO TARGET_BLUE_DRUM_TOWERS
```

Focus on player's towers in advance. Use DO DONT_TARGET_BLUE_DRUM_TOWERS to cancel.

DO TARGET_BLUE_SHAMAN

```
DO DONT_TARGET_BLUE_DRUM_TOWERS
```

Automatically lightning blue shaman when she is in the casting range. Use DO DONT_TARGET_BLUE_SHAMAN to cancel.

DO TARGET_FIREWARRIORS

```
DO DONT_TARGET_FIREWARRIORS
```

Kill player's FWs in advance. Use DO DONT_TARGET_FIREWARRIORS to cancel.

DO TRACK_SHAMAN_TO_ANGLE

```
DO TRACK_SHAMAN_TO_ANGLE angle
```

Set the camera tracking the player's shaman with specified angle.
Parameters:

- angle – Angle.

Example:
`DO TRACK_SHAMAN_TO_ANGLE 33`

DO TRACK_TO_MARKER

```
DO TRACK_TO_MARKER marker
```

Track the camera to marker.
Parameters:

- marker – Marker.

Example:
`DO TRACK_TO_MARKER 9`

DO TRAIN_PEOPLE_NOW

```
DO TRAIN_PEOPLE_NOW num_ppl model
```

Train specified of number of followers right now.
Parameters:

- num_ppl – Number;
- model – People.

Example:
`DO TRAIN_PEOPLE_NOW 2 INT_RELIGIOUS`

DO TRIGGER_LEVEL_WON

```
DO TRIGGER_LEVEL_WON
```

Win the level right now.

DO TRIGGER_LEVEL_LOST

```
DO TRIGGER_LEVEL_LOST
```

Lose the level right now.

DO TRIGGER_THING

```
DO TRIGGER_THING marker
```

Activate the trigger at specified marker.
Parameters:

- marker – Marker.

Example:
`DO TRIGGER_THING 19`

DO TURN_PANEL_ON

```
DO TURN_PANEL_ON idx
```

Turn on the specific panel of the player.

Parameters:

- idx – Index, 0=control panel, 1=spell panel, 2=follower panel.

Example:

```
DO TURN_PANEL_ON 2
```

DO VEHICLE_PATROL

```
DO VEHICLE_PATRAL num_ppl marker1 marker2 marker3 marker4 vehicle
```

Send specified number of people to patrol on vehicle. Such patrol will be performed only once.

Parameters:

- num_ppl – Number of people;
- marker1, marker2, marker3, marker4 – 4 markers to sequentially pass by;
- vehicle – BOAT_TYPE/BALLOON_TYPE.

Example:

```
DO VEHICLE_PATROL 5 2 3 4 5 BOAT_TYPE
```

DO ZOOM_TO

```
DO ZOOM_TO x z angle
```

Track the camera to specified place with specified angel.

Parameters:

- x, z – Coordinates;
- angle – Angle.

Example:

```
DO ZOOM_TO 10 136 1076
```

3 Index of some texts in the lines of the original language file (lang00.dat)

Messages

Index	Line	Index	Line	Index	Line	Index	Line	Index	Line	Index	Line
0	687	26	535	52	673	78	612	104	644	130	663
1	689	27	537	53	674	79	613	105	649	131	683
2	693	28	538	54	676	80	614	106	650	132	574
3	695	29	539	55	677	81	615	107	651	133	575
4	698	30	540	56	678	82	616	108	667	134	576
5	700	31	541	57	680	83	617	109	653	135	1217
6	702	32	542	58	681	84	618	110	655	136	1218
7	708	33	549	59	682	85	619	111	656	137	1219
8	710	34	550	60	685	86	620	112	657	138	1220
9	714	35	551	61	568	87	621	113	543	139	640
10	711	36	552	62	635	88	622	114	544	140	1221
11	716	37	553	63	636	89	623	115	545	141	1222
12	703	38	554	64	637	90	624	116	546	142	1223
13	718	39	555	65	638	91	625	117	547	143	1224
14	691	40	556	66	696	92	626	118	548	144	1225
15	647	41	557	67	639	93	627	119	558	145	1226
16	720	42	560	68	645	94	628	120	570	146	1227
17	526	43	561	69	646	95	629	121	571	147	1228
18	527	44	562	70	652	96	630	122	536	148	1229
19	528	45	563	71	658	97	631	123	559	149	1230
20	529	46	564	72	659	98	632	124	573	150	1232
21	530	47	565	73	660	99	633	125	572	151	1300
22	531	48	566	74	662	100	671	126	712	152	1301
23	532	49	567	75	665	101	634	127	704	153	1302
24	533	50	669	76	666	102	642	128	705	154	1303
25	534	51	670	77	569	103	643	129	706	155	1304

Level names

Level	Line	Level	Line	Level	Line	Level	Line	Level	Line
1	611	6	664	11	684	16	694	21	709
2	641	7	668	12	686	17	697	22	713
3	648	8	672	13	688	18	699	23	715
4	654	9	675	14	690	19	701	24	717
5	661	10	679	15	692	20	707	25	719