

# BALKAN THEATER

AN ADDON THEATER FOR FALCON 4.0©

USER'S MANUAL



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## INDEX

<b>INTRODUCTION</b> .....	<b>3</b>
<b>PRODUCER'S NOTES</b> .....	<b>5</b>
<b>KNOWN ISSUES AND COMMON PROBLEMS</b> .....	<b>8</b>
<b>INSTALLATION INSTRUCTIONS</b> .....	<b>9</b>
System Requirements .....	9
BEFORE Installation.....	10
Installation .....	10
Theater Activation.....	12
Theater specific Skins.....	13
Bug Reports.....	13
Theater Uninstallation.....	14
<b>FEATURES of the Balkan Theater</b> .....	<b>15</b>
Current beta 6 Features.....	15
Future Features .....	15
<b>DESIGN NOTES</b> .....	<b>16</b>
Goals .....	16
Theater Choice .....	17
<b>HISTORY of the Balkans</b> .....	<b>18</b>
The Conflict .....	18
<b>TECHNICAL INFORMATION</b> .....	<b>19</b>
Theater Area.....	19
Projection/Navigation Inaccuracies.....	20
The Terrain Files .....	20
Textures.....	23
Tiling.....	23
Object Placement .....	24
<b>VERSION HISTORY</b> .....	<b>25</b>
<b>CREDITS</b> .....	<b>27</b>
<b>DOWNLOAD LOCATIONS</b> .....	<b>30</b>

## INTRODUCTION

In late 1999, Hasbro Interactive made the fateful decision to end development on the flight simulation Falcon 4.0. The decision, one year after the product was released, and following a series of five patches for the product, was they would no longer continue development. The plans for a new flyable aircraft (rumored to have been the F-15E) set in a new campaign theater (rumored to have been the Balkans) were scrapped and the development team employed in Alameda, CA was dismissed.

The Falcon 4 community was left with a product that had clear potential for future development but, although better than the original release, contained a myriad of troubling bugs and inaccuracies in realism.

During this time a spirited group of people on the [www.delphi.com/falcon4](http://www.delphi.com/falcon4) forum started to use hacking and hex editing to provide 3<sup>rd</sup> party improvements and bug fixes. It rapidly became apparent that a significant percent of the program's core data could be modified to provide a more realistic environment and fix many of the bugs that had eluded the original development team. Early on the modular nature of the original program and its database style structure indicated an unfulfilled expansion potential. Inroads have been made into adding some of the promised expansion items, such as new theaters, cockpits, other flyable aircraft, and new 3D objects. The new Falcon 4 'electronic battlefield' has the potential to allow us to fly, drive, or sail any vehicles within it. Given enough time, someone will develop the know-how to do so.

As the expansion potential dawned upon the community, patches and enhancements started to be released by the pioneers in the hex editing and hacking community. After a time, and upon realization that to provide some of the more ambitious modifications, teamwork would be needed, the hex editors and hackers began forming into groups. There are now a number of groups working on various aspects of the simulation. **iBeta** initially sponsored a group that included a diverse cross section of people primarily focused on "Realism" fixes. Their charter was to 'fix the data' in Falcon 4. Many of the core members of this original group are now working together as the "**Realism Patch Group**". They continue to focus on bringing the maximum realism to this simulation. Another group, headed by eRAZOR, stated to work on enhancing and fixing the executable core of Falcon 4 in order to bring it up to date with modern PC technology, including a total rewrite of Falcon's graphics engine. The **F4Alliance** are primarily involved with aircraft package development for all the flyable aircraft and are releasing complete aircraft packages that rival the F-16 aircraft in the original release. Their packages include 2D and 3D cockpits, new sounds and video, and patches. The **F4Terrain** group is focused on theater development. The Balkan Theater is their first planned release and acts as a test bed for development of theater software tool development.

No review of Falcon's history would be complete without mentioning two names, Julian "Codec" Onions and Sylvain Gagnon. Julian has provided most essential tools and services to all the groups currently working to improve and develop Falcon 4. Without his help many of the improvements made to date would not have been possible. He has been instrumental in converting the initial hex editing

discoveries into useful graphical tools to enable changes to be made by almost anyone. Some of his tools include F4Browse, TACedit, Terrainview and recently Tlkviewer. I can't stress how important he has been or thank Julian enough for the work he has done. Sylvain, father of the bubble, grandmaster of the patch, is a name known and recognized by anyone that owns Falcon 4.0 and uses the Internet. He supplies expertise to all the Falcon development, giving freely of his time and energies.

## PRODUCER'S NOTES

When I first got involved in the hex editing back in late 1999 I initially looked at all the work done and tried to find an area where I would not be duplicating efforts by others. Initially I provided some documentary detail to Rhino of the Deltahawks who I believe used some of it in the early Realism patches. However, it became apparent that Rhino and crowd were way ahead of me and I therefore started looking at other areas.

I then made some inroads into the graphics, which made up the User Interface but lacked the skill/time with which to code a useful utility to enable the UI to be changed (although I could change the pilot photo's, UI map etc by hand using the AXE hex editor). One of the areas I looked at was the map display and the small campaign map with it's associated drop down theater selector and started to think about what it would take to add a new theater.

I got hold of Julian, who at this time was also looking at the same thing and together we started to crack open the files that make up the terrain. In parallel, Tbone had already started to amend the textures that make up the terrain and had embarked on an ambitious plan to change the entire Korean tile set into something useable in a Middle East theater. A flurry of emails went back and forth between us as we started to unravel the files that make up the terrain. I must admit, again, Julian did most of the work on how to import NASA Digital Elevation Maps (DEM's). I provided the areas I was interested in and discovered, by much manipulation of maps/atlas references (both paper and electronic), that the size of a theater was a  $10^{\circ} \times 10^{\circ}$  square. I discovered (although I think some people had already noticed this) that the Falcon 4 representation of Korea was not the same as you get in an atlas, but more on this later. Once we had established the  $10^{\circ} \times 10^{\circ}$  theory, I selected 5 areas and chose 2 to start with. One was the Balkan and the other was the Middle East, the latter was handed over to Tbone to use with his rapidly expanding desert tile set. At the same time, Julian developed TACedit, as I had envisaged initially placing objects and tiling the terrain simultaneously. Never one to be daunted by a challenge, I took the Balkan terrain and commenced tiling. This rapidly turned into a major task as to tile a completely land covered theater involves hand placing 1,048,576 tiles. Luckily (he laughs), we only had to do some 700,000 as the sea tiles could be placed automatically by a Perl script (another one of Julian's). I suggested that we get the script to place a limited tile set dependant on altitude so you would get grass in the lowlands progressing through to forest, rock and finally snow as you go higher. I enlisted the help of my LAN Squadron and together we did the coastline with a single set of tiles (there are about six different sets to choose from) after which it became apparent that help would be required.

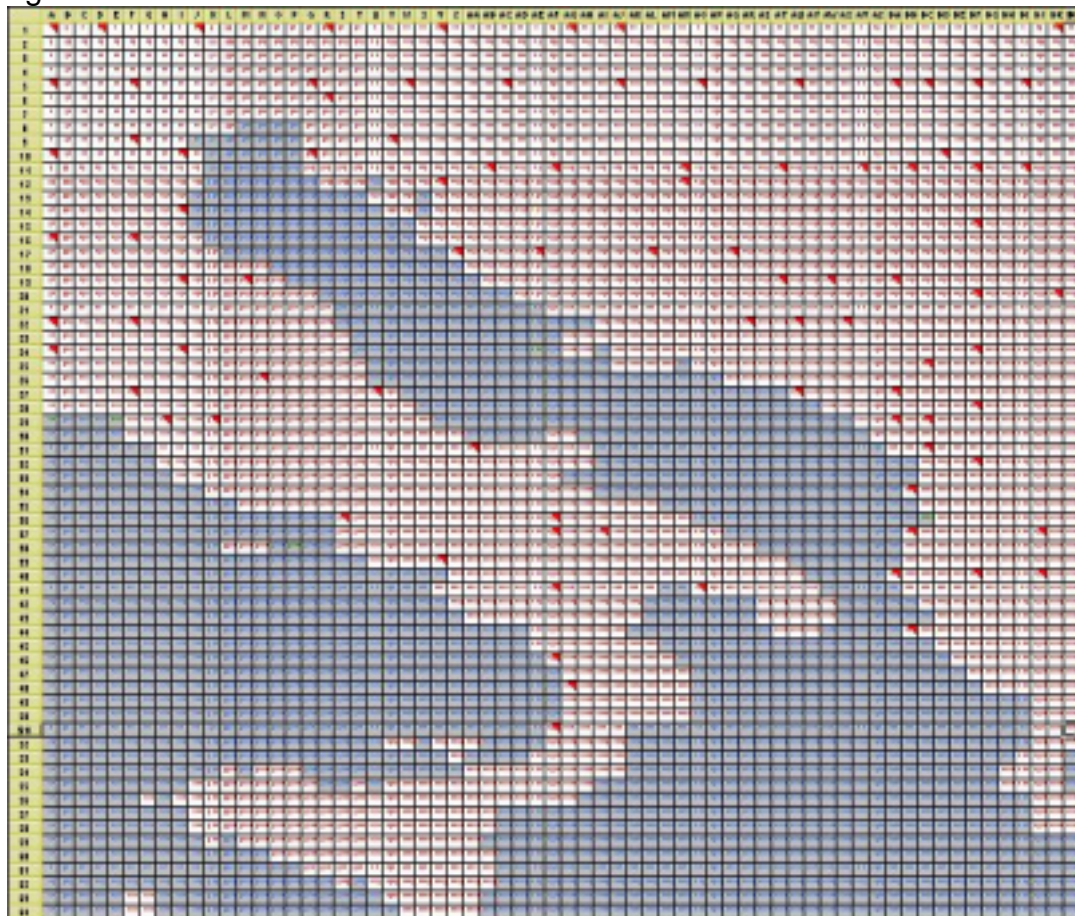
The F4Terrain eGroup was created and volunteers were asked to help out in tiling. Meanwhile Terrainview had matured from a program where you had to highlight a tile from a list of numbers and then change it's tile value to the one you wanted to a graphical tool where you could drag and drop tiles from a palette. I began to allocate areas to volunteers and after they had finished they would send back their assignments for inclusion into a master file. Slowly at first, areas started to look more natural and realistic. Completed areas started to appear on the allocation



spreadsheet I used for this purpose (see Fig 1). I must mention at this stage that due to a house move I rather neglected the project but luckily Manfred “Schumi” Nelles (a respected tiler at that time) provided many suggestions on how to improve Terrainview so that areas could be tiled more efficiently. He has since become an invaluable member of the project team, dealing with many aspects of the design details and together with Fred “Baldeagle” Balding have provided the packaging and collation of the last Beta and made many other contributions to the effort as a whole. This has enabled me to concentrate purely on the tiling part of the project and allowed Julian to get involved in some of the more exciting developments we are now seeing within the Falcon 4 community.

We can leave the tiling effort at this stage and look at the placement of objects on the terrain. As stated earlier I had started to relocate the objects in the Korean map to town locations in the theater. This again was a laborious task where I had to get the coordinates for each town over a certain size and manually converting it to a location on the 1024 x 1024 grid in the theater. The objects at this point were not of the correct type. Tobias “Buster” Adam volunteered to take over this part of the project due to the sheer amount of work needed. Since then Tobi has taken on the object placement role and the number and variety of objects in the theater has progressed in leaps and bounds. Again, Manfred has provided a lot of assistance in this regard.

Fig 1



Anyway to sum up we have been working on this project now for over a year and I dread to think of the man-hours that have been put in towards it's completion. Every member of the team involved deserves a large thank you from everyone that uses this product. My thanks are included!

I hope that you enjoy flying this terrain and take advantage of the features we will be adding in the future. Falcon 4 is the best modern combat simulator available and with the projects being developed, will remain this way for years to come.

Chris "Washout" Carter  
CO: The Vulture Squadron  
F4 Balkan Terrain Team

## KNOWN ISSUES AND COMMON PROBLEMS

Below is a list of known issues we are trying to resolve or common problems. We have workarounds for some of the problems that have occurred with previous Beta releases. If you encounter problems not listed or have other feedback please post it on the Falcon 4 forums at <http://www.delphi.com>, <http://www.simhq.com>, <http://www.f4community.com> or <http://www.f4freeware.de>. We will try to help (be patient as we are all volunteers with real life jobs to pay for our Falcon 4 addiction).

1. Distant Textures Change – Previous version of the theater had a problem with textures popping into existence as you fly toward them. Fred and Manfred have developed a workaround by reducing the detail used to create the distant textures. Textures will not longer change with changes in distance, like coast tiles changing into mountains in previous releases. Still possible is that the terrain itself may pop up or down in a larger scale as it changes in distance to your aircraft.
2. Rivers Run Uphill – This is a fault of the initial tiling run where rivers are only displayed in the middle of textures. If a valley bottom is located at the joint between textures then we have had to place the river on one side of it or the other. This is being cured in a Quality Assurance tiling pass, which should be complete for the next release.
3. No Ground War – That’s right we haven’t finished all the necessary research on how a unit finds its way to enable a full ground campaign but rest assured this is high on the priority list for the next release.
4. CTD or Lock on Pie Screen – The explanation we have so far is if you are running the theater on a Windows 2000 machine, the terrain install program can sometimes introduce errors into the terrain files it populates. Please contact the team on the forums on [F4Community](#), [Delphi](#), [F4Freeware](#) or [SimHQ](#) and we will try to assist you. Alternatively try running the uninstall program and reinstall the theater from scratch, this can sometimes cure the problem.
5. TSwitch missing – TSwitch is no longer included. We are now using Joel Bierling’s F4Patch program to switch theaters. This is explained in “Installation Instructions” later in this document.
6. Distorted Theater Map - looks stretched or distorted – see Projections and Navigation Errors later in this document.
7. Ownership overlay maps are rather roughly laid out. We will try to find a better way to paint them.
8. If you try to apply or unapply the “Training Mission 29 fix” while the Balkan theater is installed, you will get a file mismatch error just because there is no Training Mission 29. So just don’t change this patch if you haven’t Korea applied.



## INSTALLATION INSTRUCTIONS

**Warning:** This software is provided free of charge and the F4Terrain Balkan Team accepts no responsibility for any damage to hardware or software that may result from its installation or execution. You install this **BETA** software at your own risk.

This theater is shipped as a single self-installing executable file and should run completely independent of any other modifications you have installed. Other Falcon 4 modifications may (and likely WILL) have an effect on the way the Balkan Theater operates. This theater utilizes vehicles and other entities altered by application of the Realism Patches, for example. If you intend to install the Balkan Theater over a heavily customized Falcon 4 installation you should backup your entire Microprose\Falcon4 directory and it's contents to provide a fallback position in the event of problems. Expect the 'apply' and 'remove' operations of the Balkan Theater patches to produce unexpected results at this beta stage.

### System Requirements

Generally the system requirements for the Balkan Theater are no greater than that used for the Korean Theater in the original game but our recommended specifications are listed as follows:

#### **The recommended configuration:**

Pentium III or Celeron processor running at 600MHz or higher

System bus at 100MHz or higher

128 MB minimum of system RAM

3D graphics card with 32mb video RAM

Hard drive with 250 MB free (required for installation and minimum virtual memory)

Sound card

The specification is the same as quoted by the Realism Patch Group with additional disk space required for the theater installation. A machine of this spec or higher will enable you to play the theater adequately with RP4 installed.

Additional memory or faster processors will result in better performance and smoother graphics for your flying experience but the often-debated FPS issues on the forums boil down to this:

*Falcon 4's campaign and graphics engine is massively scalable to such an extent that even a 2Ghz processor with the fastest graphics cards available could still choke by turning the graphics details to their highest and the player bubble higher than 3.*

This doesn't mean that the engine is flawed in any way. It simply means that the simulation is designed for the future. To run the simulation on less powerful machines you must turn down the graphics detail (Terrain Detail and Density, Object Detail) in Falcon 4. Turning down Object Density or the Player Bubble reduces realism and may have unexpected results.

The Balkan team has previously supplied beta builds that used the TSwitch utility, developed by Julian “Codec” Onions, to switch between the Balkan Theater and the default Korean Theater. This worked with previous builds as we were supplying terrain changes only. It has been apparent for some time that we would need a more elegant solution to terrain switching when we began including Campaigns, additional vehicles, and other entities. These are contained in the same files that are used for the default Korean Theater and there would be adverse effects unless the modifications could easily be swapped back and forth as the theaters are selected.

The initial installation program remains unchanged. To switch theaters Joel Bierling’s brilliant F4Patch program will be used.

**CRITICALLY IMPORTANT: Make sure you have at least 250Mb free disk space before beginning the installation steps below.**

### **BEFORE Installation**

1. We recommend reinstalling Falcon 4 with ibeta 108i2 executable or eRAZOR executable and F4Patch V3.2 or above before you install this theater. Don’t forget to backup valuable files like your logbook or campaign and TE savefiles.
2. If you have not ever installed any previous version of the Balkan Theater then skip straight to the Installation section below.
3. If you have a previous Beta of the Balkan Theater please use the TSwitch utility or F4Patch Terrain Activation to change to the **KOREAN** Theater (This is critical!). Uninstall the previous version using the “Uninstall Falcon 4 Balkan Theater” shortcut found on the Start Menu.
4. If you do not have an ‘Uninstall’ shortcut icon then delete the \Microprose\Falcon4\terrdata\Balkans directory and all the files and sub-directories it contains. Also delete any files named “balkans” in the Microprose\Falcon4\campaign\save directory.
5. If you have run the ‘Uninstall’ in Step 3 please check that you do not have a \Microprose\Falcon4\terrdata\Balkans directory. If this directory remains please delete it.
6. If you have run the ‘Uninstall’ in Step 3 please check that you do not have any files named “balkans” in the \Microprose\Falcon4\campaign\save directory. If any exist please delete them.
7. Be sure that you have **F4Patch V3.2** or above installed and expanded. It can be downloaded at various sites.

### **Installation**

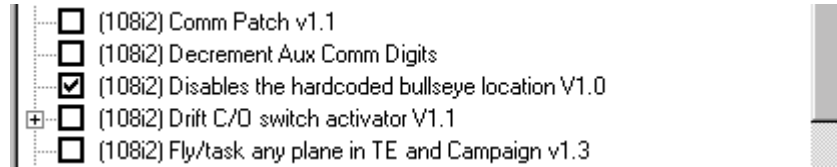
1. Run the “Falcon4BalkansTheater-b6.exe” from your hard drive.
2. Follow the on-screen instructions provided by the installation wizard.
3. Please allow the 'Tinstall' program to finish generating the terrain files.

**Note:** It may be possible that a windowed or full-screen MS-DOS environment pops up during installation. That is normal and you should wait until the installation is finished. Don't close the MS-DOS windows.

**Important Note:** The installation can take 15 minutes or longer (dependant on the speed of your machine) as the terrain is expanded from a single 15Mb file to the 150 – 200Mb required for a full theater. Please allow time for this to happen (a cup of coffee and a stroll around your house is a good thing to do if only to remind yourself that there is a world outside Falcon 4 ☺). Do not under any circumstance shutdown or reboot your computer during the installation process. If you believe the installation has failed or your computer has locked up please do not reboot until your hard drive has not shown any activity for a minimum of ten minutes. A reminder, again, that this is beta software that you use at your own risk.

## Theater Activation

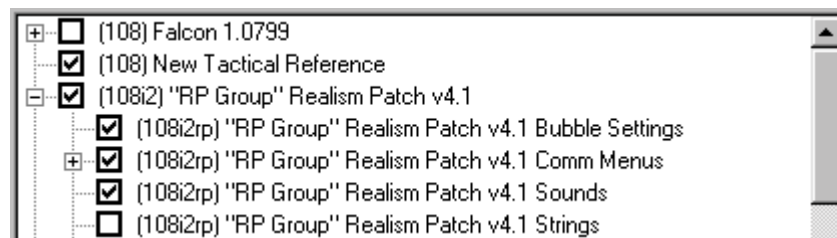
The Korean bullseye's position, which is fixed, isn't very suitable for other theaters. We recommend applying Sylvain Gagnon's "Disable hardcoded bullseye location" patch. The patch looks like this if you are using the 108i2 executable:



This patch does not change the Korean bullseye positions. It will generate the ideal bullseye positions when used in other theaters.

Installshield checks if you have installed **F4Patch V3.2**, which includes this fix, before proceeding with the installation of the **Balkan Theater**.

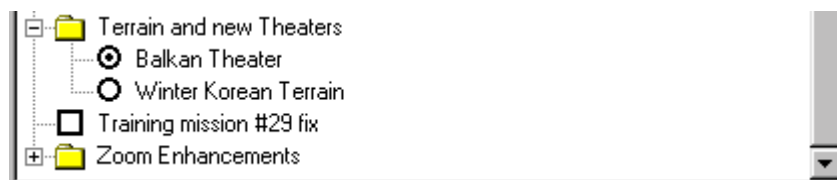
After installation of F4Patch\_Standard Version 3.2, a new patch named "(108i2rp) "RPGroup" Realism Patch v4.1 Strings" appears in the "(108i2) "RP Group" Realism Patch v4.1" folder below the "Sound" patch:



This new patch is not automatically selected when you apply RP4.1.

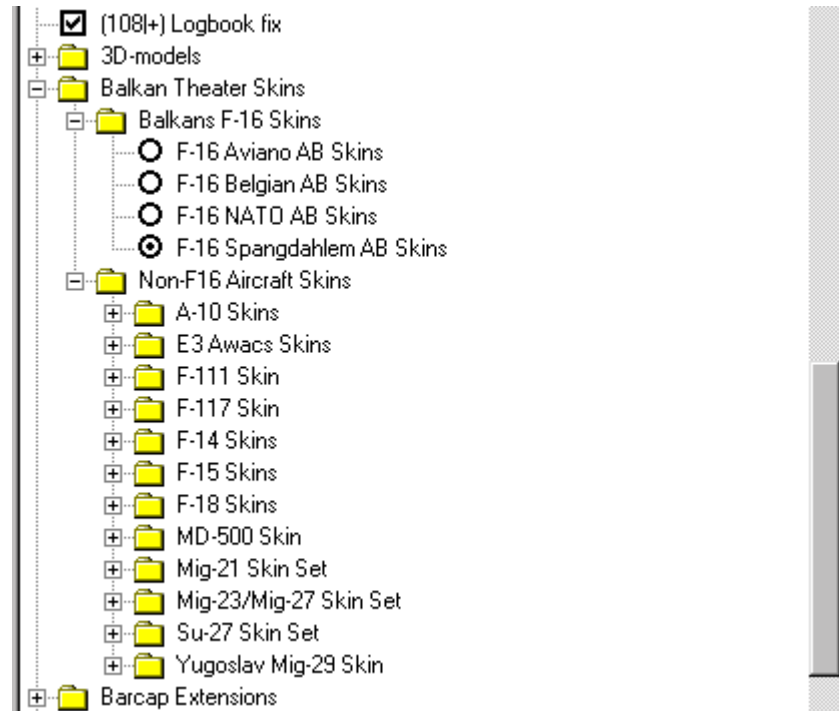
To switch to the **Balkan Theater** while RP4.1 is applied, you have to remove the above mentioned "Strings" patch if it is applied before you can apply the **Balkan Theater**. This patch does **NOT** change any RP4.1 data for weapons, ground units, or aircraft!

In both cases – RP4.1 applied or not – you activate the Balkan Theater using the "Terrain and new Theaters" folder:



## Theater specific Skins

This package also installs theater specific aircraft skins for the first time. These are found in the Balkan Theater Skins folder. We decided not to place them in the “Terrain and new Theaters” folder so that you may apply these skins whether or not Balkan theater is applied. You may choose any one of the F-16 skins and any single skin for any other aircraft.



## Bug Reports

Such a large project as a theater may also provoke errors and bugs. If you encounter any, please report them in one of the various Falcon4 Online Forums mentioned above, furthermore providing the following information:

- System specifications (CPU, RAM, HDD free space...)
- Version of executable you use (108i2, RP4 or eRAZOR with version number)
- Other patches that are applied
- Exact description of the error and what has provoked it
- Is the error recreatable ? Is there a “ping” sound ?
  - If so, try to run the executable by adding “-window” to the commandline and look out for any error message that may occur

## Theater Uninstallation

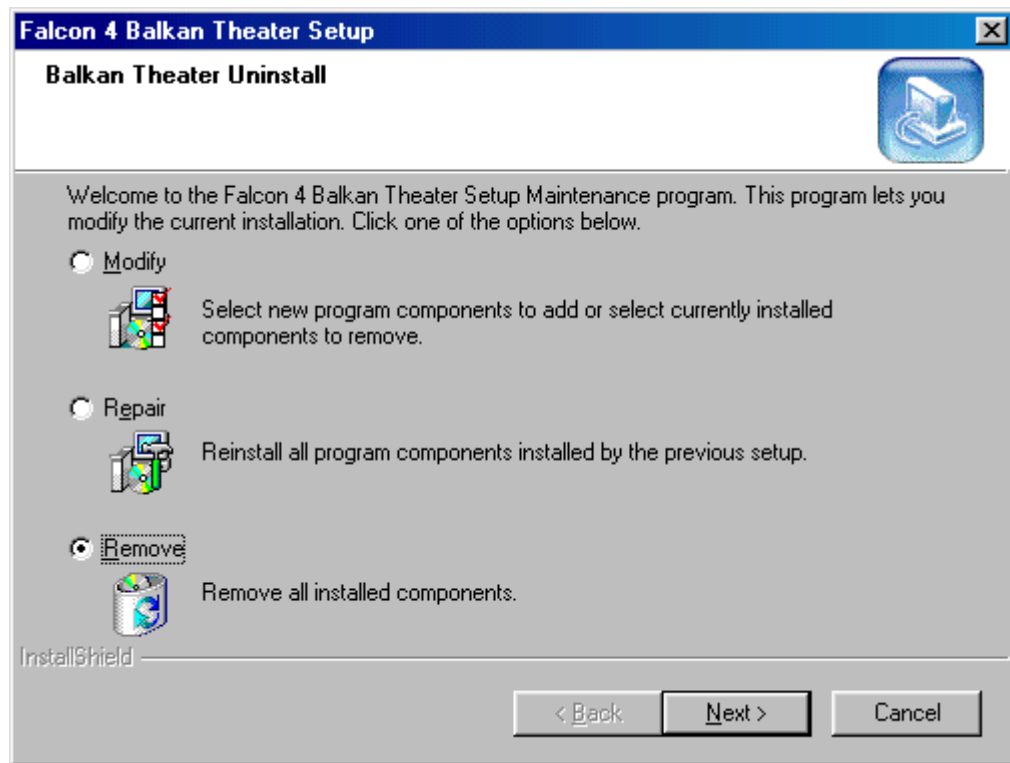
It is **absolutely necessary** that you unapply a theater before it can be uninstalled.

Furthermore all of the new Balkan Theater Skins have to be unapplied if you want to remove the theater, as the F4Patch files which allow to switch them back to the original skins are removed at uninstallation, too.

The uninstall program contains a security check if the theater is uninstalled. Correct functioning of this check can only be assumed if the theater is installed according to the steps described in this documentation.

However it doesn't check if Balkan Theater Skins are still applied.

When using the Control Panel to uninstall, you will find the following screen:



At the place where you find "**Balkan Theater Uninstall**", there may be a warning message, for example if you still have the theater installed.

In this case, the "**Next >**" button would be deactivated and you can "**Cancel**" to unapply the theater - and eventually Skins.

The three given options above will all uninstall the theater in the present version. For future beta releases update-packs beside full install downloads are planned to be provided for fast download and installation of upgrades.



## **FEATURES of the Balkan Theater**

Below is a list of features that are currently included with this version of the theater and below that is a list of features we will be adding dependant on time, will power, and discoveries made by ourselves or other development teams.

### **Current beta 6 Features**

1. An accurate Digital Elevation Map (DEM) of the region to a resolution of 1Km (see Projections/Navigation Errors)
2. A completely tiled terrain with a representation of the landscape. (better than that included in the Korean theater)
3. New textures to provide a more accurate representation of the region
4. Static objects, such as towns, accurately placed according to data available
5. Accurate Military Objects (we have striven to be as accurate as we can but it must be acknowledged that the warring parties aren't that keen on deployment details being known and misinformation may cause us to put things where they are not)
6. New skins for the aircraft deployed in the region
7. New TE missions to familiarize yourself with the new terrain
8. Dynamic Air-to-Air campaigns
9. Switching of the Campaign\Save directory so that only Balkan missions and campaigns are accessible when the theater is selected
10. New kneemap and mission planning map
11. Dynamic bullseye position, which will change every 24hours under eRAZOR's 1.0799 executable to follow the FLOT
12. Balkan PAK map (without black outlines at this stage)
13. Fixed the night lighting on new textures
14. Corrected TACAN channels for known airbases
15. Airbases with flat runways so that AI flights can land properly

### **Future Features**

1. Several fully dynamic campaigns including full ground wars
2. An anomaly free terrain
3. New ATC voices (more appropriate to the region)
4. New music
5. 3D static object models for local landmarks
6. New aircraft for NATO countries other than the US
7. Usage of local squadron patches
8. Naval operations with a Carrier group(s) appropriate to the region
9. Carrier operations if they become available

## DESIGN NOTES

### Goals

The goal of the Balkan Theater project is to deliver a free, downloadable add-on to the original Falcon 4 game, which enables a player or players to fly TEs and Campaigns in the former Yugoslavian states. The add-on will, upon full release, include the following features.

1. Terrain as accurate as that modeled in the Korean Theater using a 1km resolution DEM downloaded from a NASA GIS site (I did look into acquiring higher resolution DEM's but they are only available for quite large sums of money, which wouldn't be justified given the greater accuracy)
2. Textures placed with as much, if not more, accuracy than the Korean Theater using more hand placement to cut down on the repetitiveness noticeable in the Korean Theater
3. Limited number of new textures to provide more variation and accuracy in the landscape. (One of the reasons the Balkan Theater was chosen was that as a "temperate" climatic area most of the same textures can be used between the Korean and Balkan theaters)
4. Objects placed on the landscape and linked so as to provide a ground war as active as that supplied in the Korean Theater
5. New static objects more in keeping with the architecture in the region including some more recognizable buildings such as the Coliseum in Rome.
6. The Integrated Air Defense System existing in the Balkan states with as much accuracy as possible
7. Fully operational dynamic campaigns using both the air and ground wars
8. New TEs to help Falcon 4 pilots get used to flying in the new theater
9. A simple executable installation program
10. Theater switching using Joel Bierling's F4Patch program or a drop down menu from within Falcon 4.0
11. Include new Skins for aircraft, ground vehicles, and ships appropriate to the region

There are a number of other features that may be included in later releases dependent on the Terrain Team's and other developer's discoveries in the Falcon 4 world. Our wish list currently is:

1. New weapons and ground vehicles relevant to the region.
2. A fully operational naval simulation to enable ships to move in the theater and participate in campaign operations.
3. A fully operational US/NATO carrier group enabling Naval aircraft, such as the F-14 and F/A-18, to be launched and recovered as part of the campaigns
4. New NATO aircraft such as Tornado, Mirage, Galebs, Raphale, etc.
5. New ground vehicles in keeping with the forces deployed in the region
6. New airfield objects

## Theater Choice

The F4Terrain Team's first and most difficult decision was deciding which theater to develop first. A list of Pros and Cons for the five theaters initially considered is listed below:

<b>Theater Name</b>	<b>Pros</b>	<b>Cons</b>
<b>Balkans/Italy</b>	Well known area Microprose's next choice Few new textures needed Good sources of info	New aircraft needed No naval facility in Falcon4
<b>Gulf War</b>	Well known area Good sources of info	Done to death New aircraft needed Long development (new textures needed) Long tiling effort (little sea) Lack of naval facility in Falcon4
<b>India/Pakistan</b>	Excellent mountains Few new textures needed	New aircraft needed Long tiling effort (no sea)
<b>Cold War Germany</b>	Good simulation as most military hardware was originally designed for this potential conflict Well known area Good info available Massive potential ground war	Not very current New aircraft needed Projection difficulties
<b>Scandinavia/Baltic</b>	Very moody atmosphere (see EF2000) Excellent mountains	Large amount of new textures needed New aircraft needed Lack of naval facility in Falcon4 Projection difficulties
<b>Ethiopia/Eritrea</b>	Varied terrain types Few if any new aircraft needed	Lack of naval facility in Falcon4 Not well known New textures needed

As 'Tbone' was already well into the development of the Middle East Theater and since Microprose had already decided that their next Falcon 4 add-on would be an F15E simulation in the Balkans, we agreed that the Balkans would be the best choice for a new theater. It allowed other potential developments such as a naval battles to be included if and when others, working on the simulation, implement this aspect of Falcon 4.

## **HISTORY of the Balkans**

Historically the region has been politically unstable for centuries but a major conflict began when the various states making up the Yugoslavian federation split from the central administration and began a bloody period of civil war. Added to this there are quite large and diverse, religious and ethnic groups, with their own agendas, whose geography doesn't match the political boundaries in the region. This makes for a very confusing and volatile situation.

Anybody who hasn't heard of the troubles in the region in the past decade must be very isolated indeed.

NATO's involvement in the civil conflict began due to the disturbing reports of war crimes being committed against the civilian populations and the fear of an escalation of the conflicts into surrounding countries. The involvement of NATO and the UN was less than glorious as there was no clear understanding at the beginning of the war of who were the main aggressors. The warring factions manipulated the media and NATO/UN officials for their own ends.

### **The Conflict**

The conflict can really be divided into two actions when viewed from a NATO perspective. The first is the bitter civil war where the old Yugoslavian coalition disintegrated and various member states tried to gain disputed regions from each other. This resulted in NATO action, following the allegations of ethnic cleansing and continued military targeting of civilians. NATO first employed a "no fly zone" policy in the region. However, when the combatants refused to discuss settlements diplomatically and continued to kill indiscriminately amongst the civilian population, NATO started air strikes to convince the forces in the region to adopt a different stance and restart diplomatic negotiations.

The second action was taken after the various countries had signed an agreement of territory administration. This concerned the Kosovo region's (still part of Serbia at that time) attempt to become an autonomous state. Slobodan Milosovich (already on shaky moral ground due to his actions during the Yugoslavian civil war) reacted viciously to this agreement and ordered a retaliatory occupation of Kosovo by his armed forces. In fairness, the Kosovons did attempt to provoke this response knowing that NATO were watching.

In the end, NATO decided that rather than let the situation deteriorate to the levels seen during the previous conflict they would step in immediately. Following failed diplomatic attempts to halt Milosovich's actions, NATO embarked on an air campaign to restore sense to the Serb leadership. On the ground, in order to provide "policing" to prevent tit-for-tat retribution attacks by either side, the intent was to occupy Kosovo.

The actual events outlined here are very brief and much more could be written about all sides involved in the conflicts.

## TECHNICAL INFORMATION

### Theater Area

Setting reasonable limits for the allowable size of a theater, at the time of conception, meant we had to position the theater to allow the following (Subsequently this limit was removed by the efforts of Snake\_Man and Julian):

1. As many Italian airbases as possible (including Aviano, a major Italian base used by NATO, that was not in the first alpha build)
2. An area of land between Italy and the Balkans for a potential ground invasion to take place (This makes the enabling of a naval invasion unnecessary but the capability can be added later as the naval side of campaigns is enabled)
3. As much of Serbia as possible including Beograd
4. A good portion of the industrial northern regions of Italy

Unfortunately to include all these criteria, Kosovo is only partially represented in the theater. To create a full Kosovon campaign, including much more of Albania, Greece and other surrounding countries would have been necessary. This would have the effect of pulling the theater away from Aviano in the north. Although the Kosovo crisis was well publicized, it really only involved Kosovo, NATO, and Serbia. It lasted weeks rather than years.

We took the decision to design the theater around the earlier civil wars.

This has the following advantages:

1. The number of countries that can be involved increases.
2. The conflict situation at that time was extremely volatile and provides much scope for changing of sides by the participants as certain criteria are reached. Alliances can be forged and broken by the actions of the forces in the region.
3. Most of Italy can be included to provide a decent target for a Balkan's state retaliation if desired. This provides a sort of bi-polar situation.

It subsequently transpired that although Aviano airbase was included it was so close to the northern edge of the map you could look over the "edge of the world" on approach. It was decided that we should shift the theater North by about 50km to properly represent the Aviano area. This also had the advantage of including some of the Alps, which shield your view of the "edge of the world" and allowed a larger land area for a ground war to take place.

## **Projection/Navigation Inaccuracies**

One observation that appeared shortly after the original release of Falcon 4 in December 1998 was that the terrain and map supplied with it did not appear to fit exactly with other map references available.

This is a problem we were aware of from the earliest development stages of the theater. It is a result of the earth being nearly spherical and the Falcon terrain engine being flat.

If you look at a map of the planet in an atlas you are not looking at a true representation of the landscape. In order to lay a spherical object onto a flat piece of paper distortions have to be made. There are many different ways of doing this and these provide what are known as projections when transferred to flat paper. Any good atlas should contain more information on this subject if you wish to delve further.

Falcon 4 is no different to an atlas in this respect, as the DEM data obtained from NASA is a data set obtained from satellite surveys of the planet. They are therefore held spherically and to use them in Falcon 4, which uses a flat terrain, we need to distort them.

As both the Korean and Balkan theaters are Northern Hemisphere areas the spherical projection has to be stretched in order to make it flat and fit a square. This results in distances between objects at the top of the theater being larger than they are in real life. There is no real workaround for this without making Falcon 4's world spherical or part of a sphere, which would involve a complete rewrite of the terrain engine.

## **The Terrain Files**

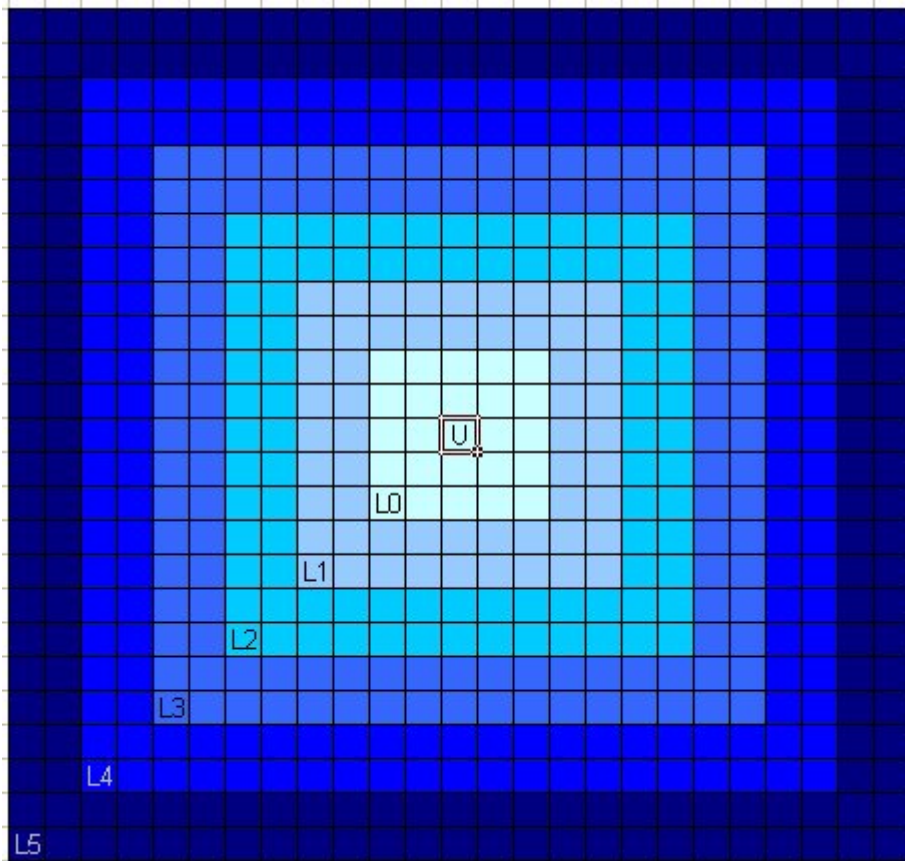
What follows here is a brief explanation of how the Falcon 4 simulation models terrain.

Essentially the terrain is made up of six files named theater.I0, theater.I1, theater.I2, and so on, up to theater.I5. Each of these files contains essentially a data table containing a point identifier to provide a location and then a number of fields to define that point. The fields define attributes such as altitude, texture offset used and three other attributes related to the way the terrain is displayed and the mist/haze.

There are an increasing number of data points in each file with the I5 having the least and the I0 the most. The theory is that the I0 displays closest to your aircraft and progresses out to the distant I5. This principal is shown in the Fig 2 that shows a plan view with your F16 marked as "U".



Fig 2.



The increase in data points as you get towards L0 means that the terrain is going to be more detailed the closer a point is to your aircraft. The textures used for each L file are also more detailed and larger. This gives a realistic representation of the landscape with less detail in the distance and more in the foreground. (More on textures later).

The amount of each layer (L) file displayed is also dependant on altitude so if you were in the center of the diagram and started to climb the boxes would start to reduce from the center outwards (see figs 3 to 5). Progressively the inner/more detailed layers get smaller and are replaced by the L5 until that is all that remains in view. You can see the opposite effect by flying as high as the aircraft will allow then pointing straight to the ground and letting it fall earthwards.

Fig .3

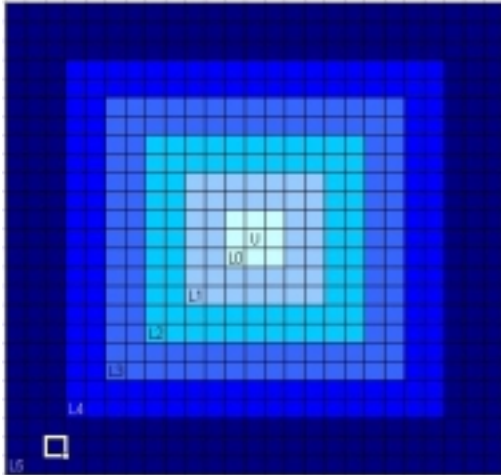


Fig.4

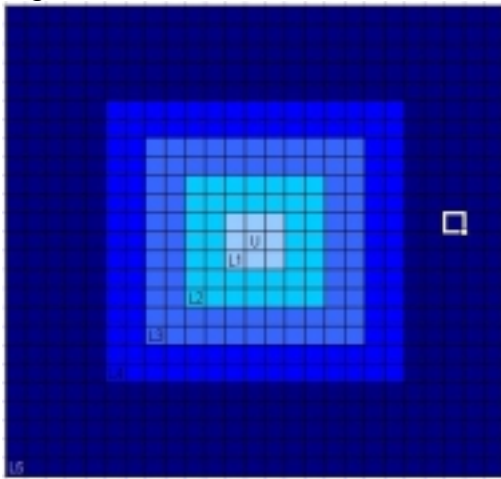
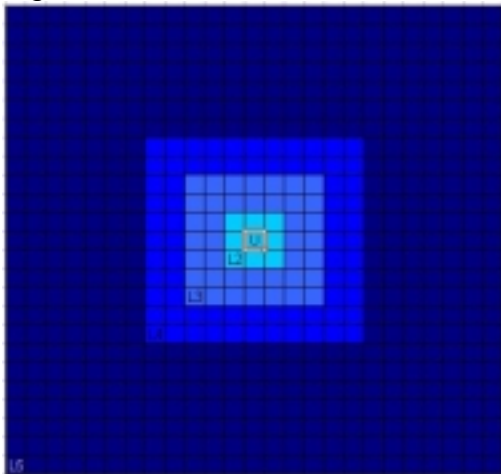


Fig. 5



## Textures

Having discussed the concepts behind the files that make up the terrain layer files, the next items are the textures placed on the landscape.

There are two distinct types of textures dependant on the "I" file that uses them. The first set are plain .PCX graphics files which are held in `\terrdata\theater\textures\texture.zip`. The textures located here are used to populate the L0, L1 and L2 files. There is a set of textures for each L file with the most detailed (and largest) being for the L0 and getting smaller and less detailed for the L1 and L2.

The textures for the L3, L4 and L5 files are held in the `fartiles.raw` file. These are constructed by taking 4 adjoining textures from the L2 and pasting them together to form one tile for the L3. The L3 tiles are then combined to make the L4 tiles and so on for the L5.

## Tiling

During the initial investigation into the terrain file structure it became rapidly apparent that most information relating to the terrain is held in map files using a 1024x1024 grid. These files include the `theater.L2`, `theater.mea`, `theater.thr` and the TAC files, which hold the static object locations. It was decided that the `theater.L2` would be the sensible file to tile as it provide the smallest number of tiles to place without using the `fartiles.raw` as a palette. Even using this file it can be seen that to tile a 1024 x 1024 landlocked theater (such as India/Pakistan) would require the hand placing of 1,048,576 textures. Tiling the L2 allows all the other L files to be generated automatically which cuts the amount of data to download to 10mb rather than the 130mb+ which makes up a theater.

Microprose used a 3<sup>rd</sup> party program to generate their theater, which essentially takes a DEM, places a satellite image of the area over it. The image is then chopped up into 1,048,576 individual textures, algorithms are run on those textures to reduce their number, and by finding matching terrain types the data reduced to a level manageable by Falcon 4. This still resulted in a terrain with some 1700 textures but this is manageable and falls within the 2 byte index that `fartiles.raw` uses.

The package that Microprose uses is expensive, so to speed up the process of tiling we first used a single tile for land and a single tile for sea. The sea tiles were placed automatically wherever the altitude for a tile was 0. We further refined the algorithm in order to place tiles according to altitude so that the terrain used grassland tiles for low altitude and progressed through forest then rock to snow as altitude increased. This gave us a "banded" terrain and helps the tiling team in placing the right set of tiles. The coastline was then added to provide a more natural transition from sea to land.

Julian helped further by finding some GIS overlays showing roads, railways, rivers, cities, etc. that he imported into Terrainview. The overlays had the advantage of providing a standard filter for roads, rivers, etc. that tilers could then follow. An auto-tiling facility was added to places tiles according to the overlays.

The auto-tiling features of Terrainview still leaves a huge amount of work in order to get the right tile types placed and to provide a realistic representation of what is actually there. The Balkan Theater took a year to tile even though it is only 60-70% land! It is finished now and the other important areas of the theater's development can be finalized, such as object placement and campaign generation.

## **Object Placement**

The landscape is less than half the equation. For something to happen within the simulation it needs to be populated.

Objects basically fall into two categories static and mobile.

Static objects are defined as buildings, bridges and other objects that do not move. They are located in a "TAC" file and are linked together to form a hierarchical structure. For example, you can have a "Rome" object for the City itself then as children of that object place Rome Bridge, Rome Office, Rome Coliseum, etc. The links between these objects define how the ground war operates and provide targets for ground vehicles to capture.

Mobile objects define the placement of ground units and aircraft squadrons. In the next release we will expand on this and explain the operation of units within the theater.

Initially objects were placed by hand, which involved taking the te\_new.tac file from Korea and manually moving objects to new locations in the Balkans using TACEdit. The first objects to be located were towns and cities, which were placed by finding the LAT/LONG coordinates of the towns from Microsoft's Encarta Atlas and then converting these to a 1024 x 1024 grid position in the Balkan Theater. After this some bulk processing of the TAC was carried out to convert these objects into towns rather than the random object type that was initially used. Airfields were then placed with appropriate size and runway orientation, different from those provided in the Korean Theater.

As the tiling progressed repeated refinements were made to more accurately place objects to match the tile types used on the landscape. This eliminated, where possible, buildings being placed in the sea. This process was carried out while the building types were changed away from the defaults and additional structures were added to provide "populated" towns and cities.

The placement of objects continues in earnest now that the terrain is tiled. The next release will see a much more complete and rich landscape.

## **VERSION HISTORY**

Since development of the theater commenced we have released a number of Betas both internally for testing purposes and externally to keep interest in the project alive and to get feedback from the Falcon 4 community. I would like to thank those who have downloaded and provided feedback to us, you have been a valuable source for finding bugs and shaping the directions we have taken in creating this theater.

### **Versions and Highlights**

#### **Pre-Alpha – 20 March 2000**

Banded Terrain  
Coastline 80% Tiled

#### **Alpha 1.0 – 12 April 2000**

Banded Terrain  
Major Italian Lakes Tiled  
Snowline 10% Tiled  
Modifications in L2 now replicated into other L\* files  
L3-5 (Fartiles.raw) problems solved, now matches L2  
New Campaign\Save directory included

#### **Beta 1 – 2 May 2000**

Internal release

#### **Beta 2 – 15 May 2000**

Internal Release

#### **Beta 3 – 22 May 2000**

Terrain 45% Tiled  
TEs now available  
Object Placement Underway (Major Airfields now in Place)

#### **Beta 4 – 12 June 2000**

Internal Release

#### **Beta 5 – 26 June 2000**

Terrain 55% Tiled  
New Tiles for Rocks/Mountains/Highways and Snow  
New TEs in addition to those under Beta 3  
Object Placement progressing (Major Towns, Airfields, and Factories)  
Objects being matched to tiling progress

#### **Beta 5a**

Internal Release

#### **Beta 5b**

Internal Release

**Beta 5c – 5 October 2000**

Terrain 70% Tiled

Mini Campaign TE included

More objects placed with better diversification.

New Pie loader screen

**Beta 6 – Christmas Week 2000**

(See the Features list earlier in this document for details)



## **CREDITS**

These are the individuals who have given up their free time towards the development of this theater for no other reward than to be able to play the end result and share it with others. The members of the team are from all over the world and this represents a truly international effort.

If we have missed anybody, please accept our deepest apologies. If your name is misspelled or you have a "callsign" that is not listed then please let us know so that we can amend it.

The list is organized into meaningful tasks. Some names will appear more than once.

### **Producers**

Julian "Codec" Onions  
Chris "Washout" Carter  
Manfred "Schumi" Nelles

### **Compilation and Tool Creation**

Fred "Baldeagle" Balding

### **Object Placement and Campaign Creation**

Tobias "Buster" Adam  
Manfred "Schumi" Nelles  
Snakeman  
Joeri Cools

### **Tile Artists**

Scott "Seaghost" Eddy  
Manfred "Schumi" Nelles  
Gregor "Madman" Papez

### **Terrain Tiling**

Chris "Washout" Carter  
Manfred "Schumi" Nelles  
Fred "Baldeagle" Balding  
Scott "Seaghost" Eddy  
Masayuki "Jappo" Hojo  
Julian "Codec" Onions  
Dieter "Joxer" Blancqueart  
Roberto Grasso  
Anne-Marie "Motherhen" Carter  
James "Warlock" Farmer  
Francesco "Mix" Missarino

Contiero "Josc" Giovanni  
Thomas Waelti  
Jerry "Pookie" Davis  
Vincent "Vinman" Faraci  
Erik "Owl" de Klerk  
Darren "Merlin" Sadler  
William "Silent Death" Treasure  
Aaron "Spectre" Watson  
Edgar Wneuf  
Gayle "Beartrax" Galbraith  
Gregor "Madman" Papez  
Antonio "QWERTY" Ramos  
Rick "Drummer" Centeno  
Keith "Chumpy" Slaney  
Mats Andersson  
Matevz "White Angel" Jekovec  
Bob "Snowman" Crawford  
Steve "Ironklad" Klastrup  
Chera Bekker  
Paul "Too Easy" Poulson  
Snakeman  
Mariano "Parsifal" Maciel  
Jeff "Spin" Boaz  
Jason "Jaguar" Howlett  
Andreas "Komis" Kominos  
James "Rellick" Lumsden  
Steve "Aim" Wattebled

### **Additional Vehicles**

Jerry "Pookie" Davis

### **Additional Graphics**

Andreas "Komis" Kominos  
Mathieu-Claude "Olrice" Chaboud

### **Voices**

Andreas "Komis" Kominos

### **Music**

Steve "Bugman" Roach  
Johnny Viggins  
Jakob "VIP" Sejer-Neilson

## **Documentation**

Kurt "Froglips" Giesselman  
Colin "Cooler" Morrow  
Chris "Washout" Carter

## **Web Site Administration**

Matevz "White Angel" Jekovec

## **Advice, Technical Help and Other Resources**

TBone  
Sylvain Gagnon  
Luca "Grayhawk" Antinoni

Special thanks goes to all those partners of the team who have seen little of their loved ones over the development period as they have indulged in their passion for this simulation.

Thanks also go to those people from the original hex editing community who eased a crowbar into the lid of the box that is Falcon 4. You know who you are and you should be applauded for your efforts.

## DOWNLOAD LOCATIONS

This document will form the majority of the first full release's documentation and as such may be released a couple of days prior to the actual theater. Therefore, below is a list of the popular download sites where you should be able to find this theater:

Official Download Site

<http://balkans.falcon40.com> (USA)

Other sites or mirrors

<http://balkans.frugalsworld.com/>

<http://www.f4community.com> (Germany)

<http://www.dogfighter.com>

<http://www.simhq.com>