Flashpoint Campaigns

Professional Edition 1.0

Professional Features

FCPMW-FM02/R13

On Target Simulations

MATRIX PRO SIMS

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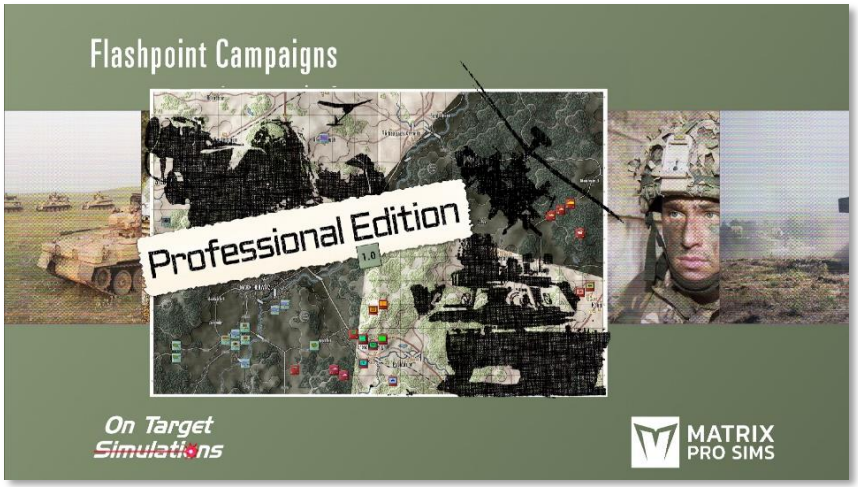


1 Introduction

Welcome to FLASHPOINT CAMPAIGNS PROFESSIONAL EDITION (FCPE)

This is a grand tactical simulation of combat on the modern or near-future battlefield. As the force Commander, you will plan and then issue orders and Standard Operating Procedures to your battalion, brigade, or regimental forces, shaping the fight by maneuver and your intent. Your forces will engage the enemy on rendered real-world map locations. Each hex is 500m of militarily significant terrain. Each battle can last 4 to 24 hours of in-game time. Your troops will meet their foes any time of day and in any environment.

The game engine is based on asynchronous WEGO turns. This means you will issue orders and then watch a variable amount of time unfold on the battlefield. Then, issue or adjust orders to react to what has happened as you execute your battle plan.

Flashpoint Campaigns Professional Edition is a deep simulation of combat operations where your forces are arranged in maneuver units of companies, platoons, and sections of tanks, infantry fighting vehicles, infantry squads and teams, recon forces, engineers, air-defense and anti-tank systems, helicopters and more. As the Commander, you must use available off-map assets like long-range artillery, rockets, or airstrikes.

Your efforts in this complex battlespace will be constantly challenged by modeled features like Electronic Warfare, Air Superiority, Realistic Weather, Line of Sight and Fire, Terrain and Elevation, Smoke and Mines, and Human Factors like training, morale, and readiness. All these elements must be considered if you are to be victorious on the battlefield.

The game is packed with information dialogs, map overlays, and range rings to aid you as Commander, master the situation, and understand your force's capabilities.

Flashpoint Campaigns Professional Edition is a data-rich simulation where each nation has information on National Characteristics, Command Parameters, and Orders of Battle. Data Tables are packed with era-specific equipment and troops. Weapon Systems of the time, such as guns, missiles, precision munitions, small arms, and much more, are comprehensively modeled.

As a toolkit, you can create your own scenarios and campaigns. You can also dive deeper and create or modify game data, artwork, and sound effects as you see fit. All these modding capabilities are supported by detailed documentation.

1.1 What's in This Document

There are several features in the Professional edition that are not in the commercial offerings from OTS and Matrix (Flashpoint Campaigns: Red Storm (FCRS) or Flashpoint Campaigns: Southern Storm (FCSS). These features are enumerated and described in this manual. As new Professional Features are added, this document will be updated. If Professional Features move into the Commercial game, they will be moved into the Operations Manual (FM01).

NOTE: Areas of interest or buttons on form pictures are outlined in red.

NOTE: Some images in this manual are from the commercial version of the game. While your maps and units may be different, all the

information and how it is used and displayed will match the information seen in this manual.

1.2 Manuals

We have invested in using many living manuals to cover interface/play, learning the game, basic tactics, and Content Creation for the Professional Modern War game engine. As the engine is updated, the affected manuals and guides will be updated, and new PDFs will be included with new updates.

1.2.1 The Field Manuals (FM)

These are the core manuals related to how to play and create content for the game engine. At a minimum, we suggest that new and returning users look over this manual and the Professional Features manual to get details on new features and capabilities. These documents are found in the Documents\FMs folder.

- FM01 - Game Operations
- FM02 - Professional Features – **THIS DOCUMENT**
- FM03 - Scenario Creation
- FM04 - Battle Planning
- FM05 - Map Making
- FM06 - Battle Space Management – ***Placeholder for New Feature***
- FM07 - Data File Structure Overview
- FM08 - Data Modifications
- FM09 - Data Logging
- FM10 - Weather and Weather Data
- FM11 - Game Engine Models
- FM12 - Umpire Mode
- FM13 – Map Rendering Toolkit
- FM14 – Game Engine Modifications
- FM15 – Externalized Characteristics
- FM16 – Lua Scripting
- FM17 – Transport Operations

1.2.2 What's New

The What's New PDFs cover a summary of any changes and fixes when updates are released.

These can be found in the Documents\WhatsNew folder.

1.2.3 FPC Hotkeys

This PDF document lists all the unique game key presses for Function keys and all hotkey definitions. Due to the large number of functions in the game, rebinding is not possible.

This document is in \Documents folder.

1.3 Gender Pronouns and Inclusion

We understand that our simulation will be played by users of all genders. We try to keep language in the game and use manual gender neutral, when possible, but sometimes, we use the pronoun "he" to refer to the user. This is merely to streamline the writing, not to exclude anyone or note a specific gender.

The On Target Simulations team supports the inclusion of all people in the field of wargaming.

2 Air Assault Operations

The forces that each side brings to the battle are composed of one or more Task Forces. Each task force is created separately in the scenario editor and has its own setup area. A task force internally tends to be a closely related group of units, e.g. an infantry battalion with attached supports, and a collection of task forces can be widely divergent, e.g., a brigade HQ, a tank battalion, an infantry battalion, an artillery battalion, close air support aircraft, a squadron of attack helicopters, etc. To this list, we can now add an air assault task force – a mixture of transport helicopters and helicopter-borne ground assault units.

2.1 Using the Scenario Editor

Using the game's Scenario Editor, carry out the following steps to plan an Air Assault. Access the Scenario Editor on the Main Menu by clicking the Scenario Editor Button.

2.1.1 Create an Air Assault Task Force

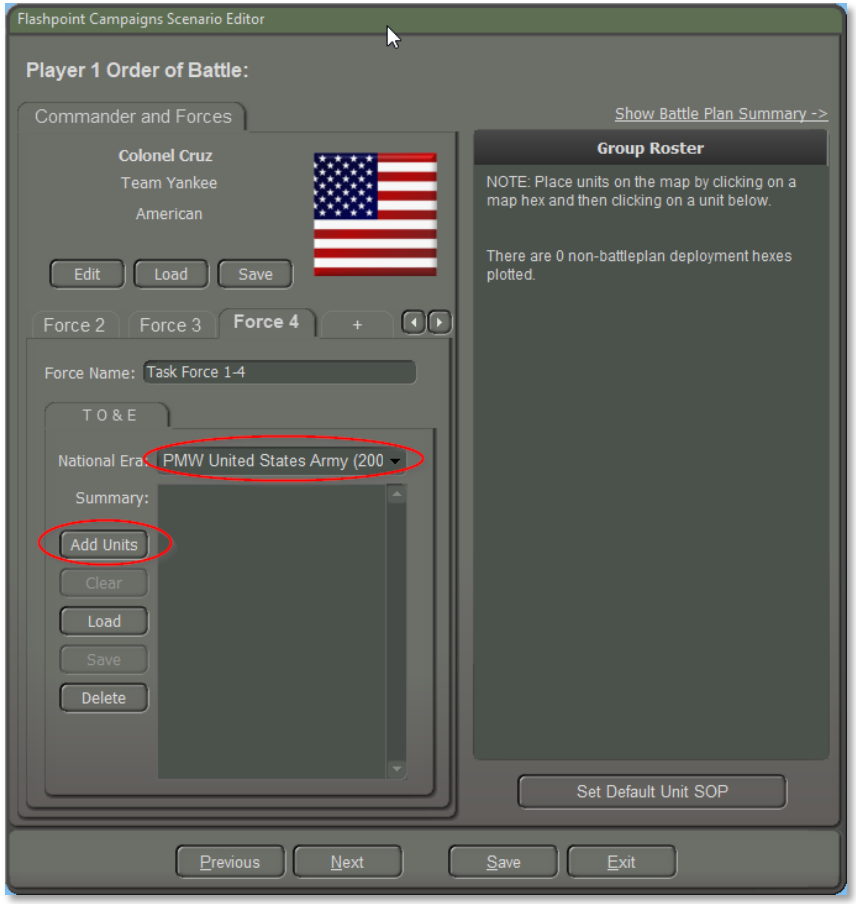
1) This entire force will be the air assault force so it must include a mixture of transport helicopters and helicopter-transportable ground assault units. Ground units that are not entirely helicopter-transportable will be left behind!

2) The scenario must contain regular ground force task forces too. The general rule for a valid scenario is that it must have active ground forces on the map at the start of the game, a clearly defined high headquarters in charge, and at least one victory point marker in position. The best approach might be to create a normal non-air assault scenario first and validate that. Then re-edit it to include an air assault plan. In this document, we are going to add an American air assault to "Base_1.scn" so load that now. If you do not have this scenario then use another as an example.

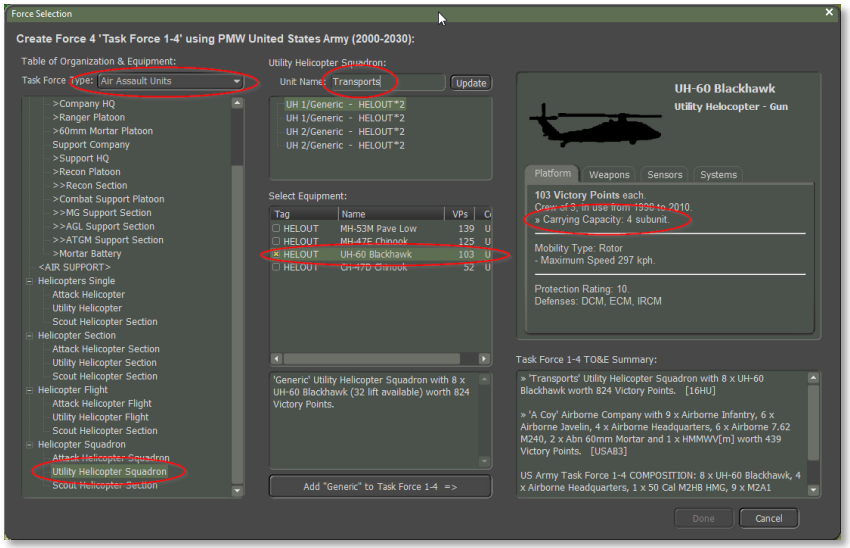
3) To create the air assault task force (assuming the US Player here)

   a) Go to the Player 1 Order of Battle page and click on the "+" tab in the far-right side of the task force notebook control.

4) Make sure to select the correct national era data file. (Either "PMW United States Army (2000-2030)" or "CW 80s United States (1980-1989)" will do but the details will be different.) Then click on the "Add Units" button.

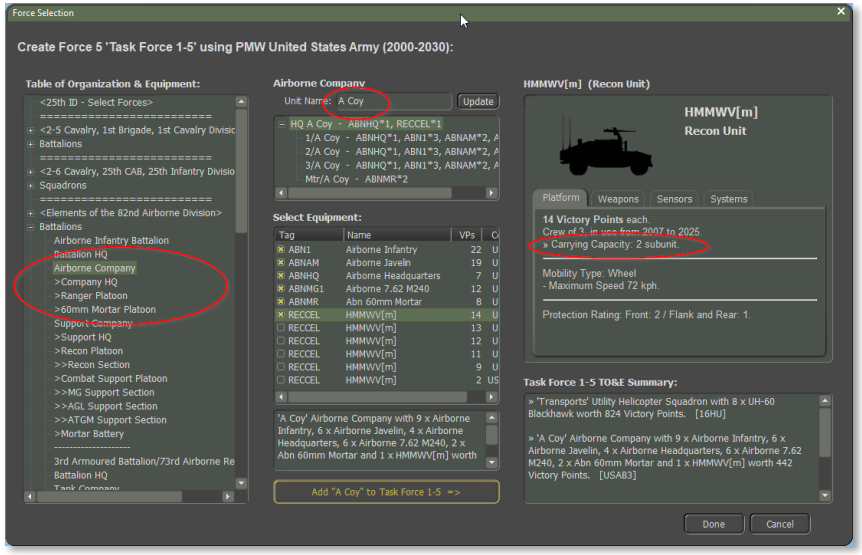


5) Create an air assault task force by first selecting the "Task Force Type" and set it to "Air Assault Units". This will filter the available formations down to just those who can participate in this kind of operation.
Find and add a squadron of utility helicopters. Change the name from "generic" to "Transports" or something more pleasing. Select UH-60 Blackhawks as the equipment type to populate it with. Note that you will get 8 UH-60s, each of which can carry four passenger subunits for a total of 32 points of lift. Click on the "Add Transports…" button but do NOT click on the dialog Done button.



6) Repeat Step 5) to add another squadron of UH-60 Blackhawks to bring your total lift capacity up to 64 points.

7) From the same screen, find and add an airborne company of the 82nd Airborne Division. We are going to fly them in on the helicopters selected above. Rename the company to "A Coy" and use the Add button to make them part of the task force. Note that the "Carrying Capacity" of each equipment type is effectively the lift it in turn requires from the helicopter transports.



8) Anticipating things, a bit, you can see that the lift required by this company at 51 points (as seen in the center bottom text box) is less than the 64 points of lift we have just assigned. That is good, as multiple lifts are not supported in the game yet.

9) With this done, click the Force Selection dialog Done button and return to the previous dialog.

   a) The task force tab ("4" in this case) is now populated with the units we have selected. The right had side of the display shows three alternative views, which are accessed in turn by the white hyperlink in the top right corner. It starts by showing the Group Roster and you can scroll up and down and look at your units.

10) Next, let us subordinate all the helicopters to the assault company HQ. Toggle the Group Roster to the Battle Plan view and then on again to the Order of Battle view. This is the 'before' view:

   b) Note that the helicopters, having no natural HQ unit, are all effectively showing as subordinated to the "Local HQ", that being the highest American HQ in this force package.

c) Click on each helicopter unit in turn and drag it to the "HQ A Coy" list item. Release the mouse and the helicopter unit will now be subordinated to the target unit. This is the 'after' view with the helicopter units neatly subordinated to HQ A Coy:

11) This might be a good time to save your work in progress. Ignore the warning that there are unfinished elements in the scenario if it comes up.

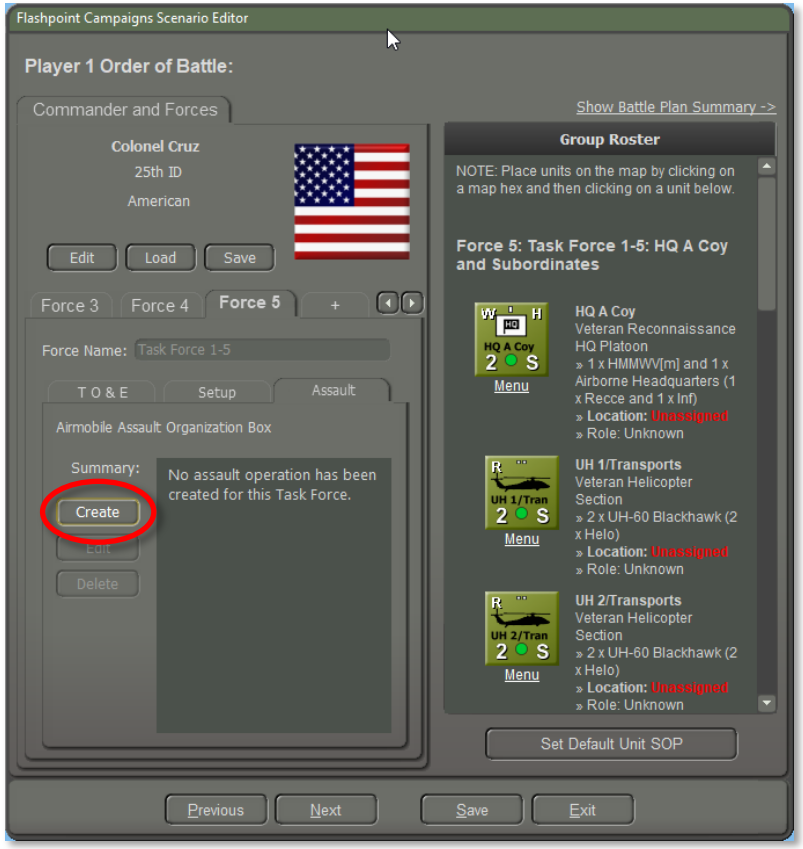
2.1.2 From Task Force to Air Assault Force

1) We are now ready to designate this task force as an air assault task force and go on to specialized air assault planning. Click on the task force Setup tab next. This task force is recognized as air-assault

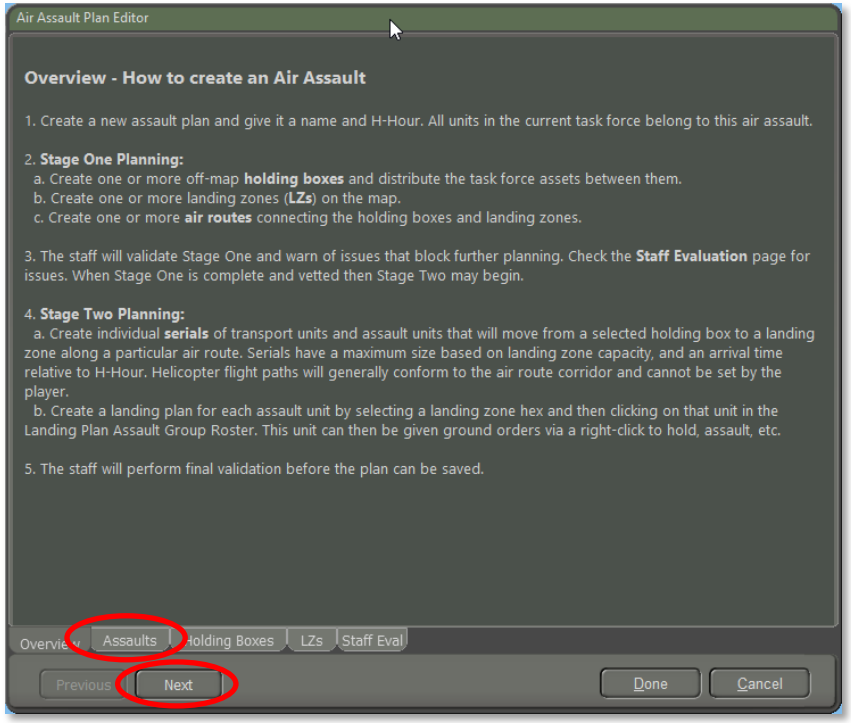
capable by the game and so you can go ahead and check the 'Organize air assault' checkbox now.

a) When you do, a third tab called "Assault" will appear that is the gateway to further air assault planning.

2) Click on the "Create" button to start a new air assault. All units in the current task force will belong to this air assault.

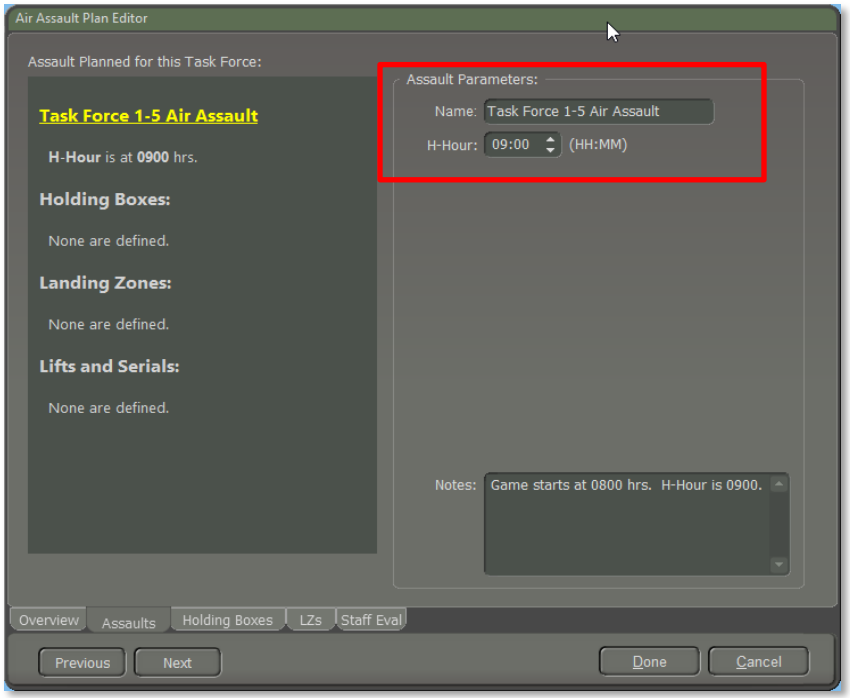


3) The first page is an informational overview of the process:



a) Click on the "Next" button or directly on the "Assaults" tab to go to the next screen.

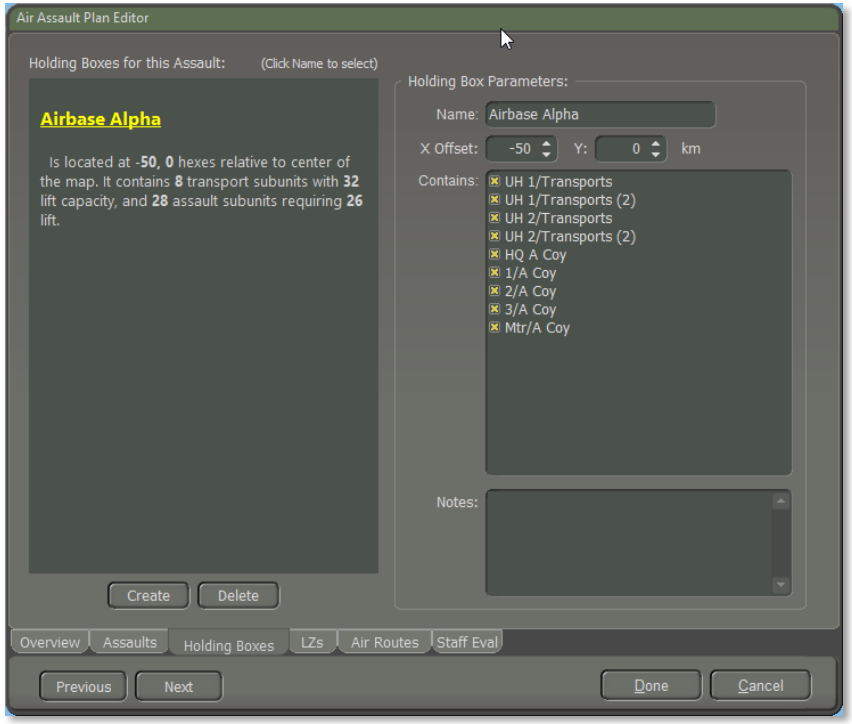
4) Give your plan a name and H-Hour that conforms to the start and end of the scenario.



2.1.3 Stage One Air Assault Planning

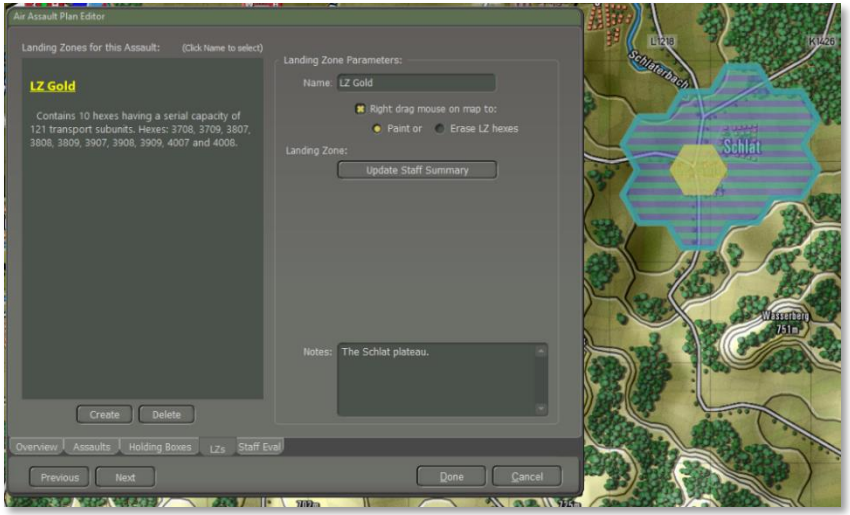
1) First, create one or more **off-map holding boxes** and distribute the task force assets between them. Holding boxes are abstract items like airbases from which the assault originates. They have a unique name (in case there is more than one) and an offset from the center of the map. A holding box 50 km due west of the map for example would have an offset of -50, 0. North would be 0, -50 and south would be 0, 50. This is important because the air assault will appear on the map in the hex closest to the holding box.

a) You can have multiple holding boxes per task force but in this case, we will create just one that holds everything. Check off all the units you want to assign to this holding box.



NOTE: If you create multiple holding boxes then they will be listed down the left-hand side of the form. Clicking on the yellow holding box name will bring up its details on the right-hand side of the form.

2) Second, create one or more **landing zones** ("LZs") on the map. This is a standard name and paint operation in Flashpoint. The maximum size of a serial that can land in an LZ is a function of the number of hexes and the openness of the terrain. You might also want some extra hexes in case enemy units are present. Assault units can debark on top of enemy units, but it is not pretty.



3) Third, create one or more **air routes** connecting the holding boxes and the landing zones.

a) The page that provides for this will not be visible until both a holding box and a landing zone have been defined.

b) Create a name for the air route and pick a holding box and an LZ that it will connect. As soon as you do then a straight-line air route will be drawn across the map to orient you.

c) You may set up to three air waypoints per air route. The serials will enter the map on the hex closest as the crow flies to the holding box, fly to the air waypoints (if any) and then to the LZ.

4) The staff will validate Stage One and warn of issues that block further planning. Check the Staff Evaluation page for issues. When Stage One is complete and vetted then Stage Two may begin.

2.1.4 Stage Two Air Assault Planning

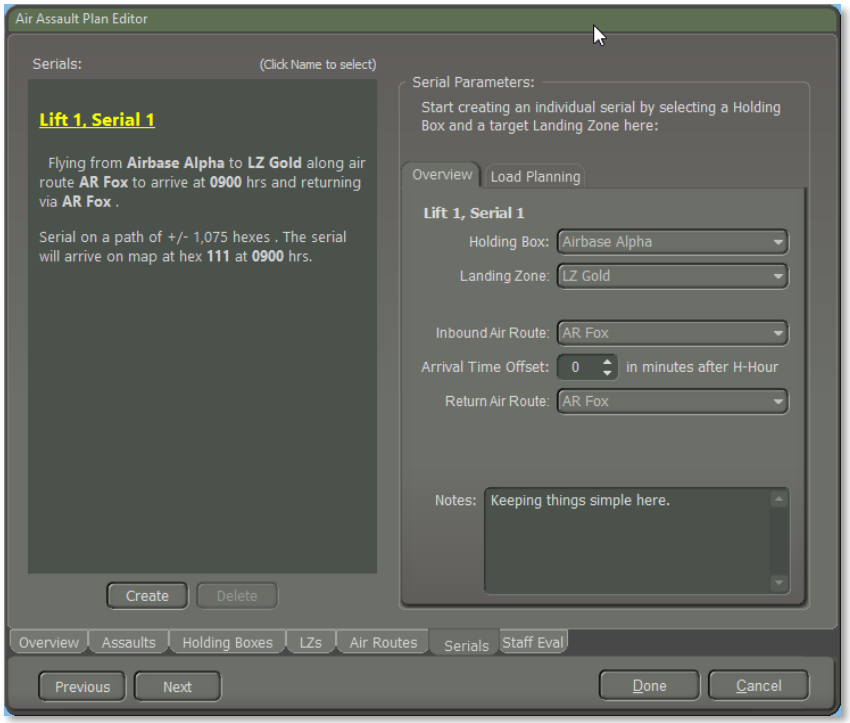
The Serials tab will now appear in the planning form.

1) The Overview Tab

   a) Create a new Serial with the "Create" button. You will divide your forces into individual serials of transport units and assault units that will move from a selected holding box to a land zone along a particular air route.

   b) First, pick a holding box and a landing zone. With these picked, you will then be offered a choice of air routes for the inbound and return legs of the mission.

   c) You will also supply an H-Hour offset in minutes for the arrival of this particular serial. Serials to the same LZ should have at least 10 minutes between arrivals. The first serial should be at 0 minutes and the offset editor has a minimum increment of 10 minutes.



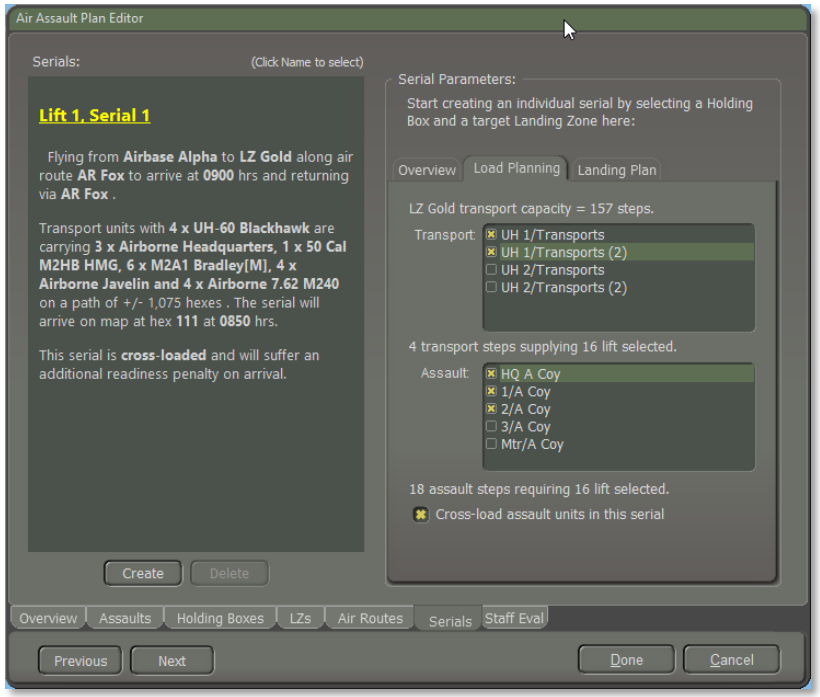
2) Select the "Load Planning" tab next.

a) Select from among the available forces to commit to this serial. Select transport units and then assault units. In this example you can pick half for the first serial and half for the second. There is room to do it all in one but let's take it easy.

   i) Serials have a maximum size based on landing zone capacity, and an arrival time relative to H-Hour.

NOTE: Helicopter flight paths will be governed by the air route way points, and generally conform to the air route corridor but cannot be set individually by the player.

   ii) In this screenshot we have selected half of the transports (with 16 lift) and the HQ, 1 and 2 platoons of A Company (requiring 16 lift) for the first serial. They will also be cross loaded so that losses in transit will be spread across the three units and not concentrated in one.



3) With the load planning for serial 1 done, a new tab "Landing Plan" appears.

   a) Click on this tab and give these first wave units their landing assignments and initial orders.

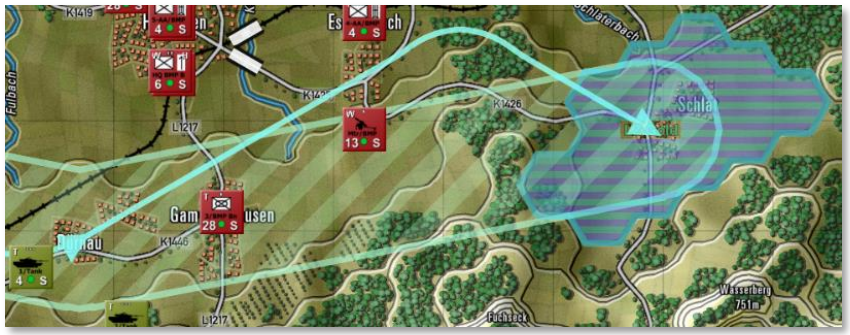
   b) Put specific units in specific LZ hexes by clicking on an LZ hex and then clicking on a unit. This is where the unit will try to disembark, all else being equal. The units will be drawn on the LZ as they are placed.

   c) When placed, the assault units will start with basic screen orders. You can right-click on them and issue unit orders in the usual way. This will cause the units, once they have landed and recovered a basic amount of readiness, to move hasty, assault, hold, etc. as you direct. The unit dashboard dialog is available to

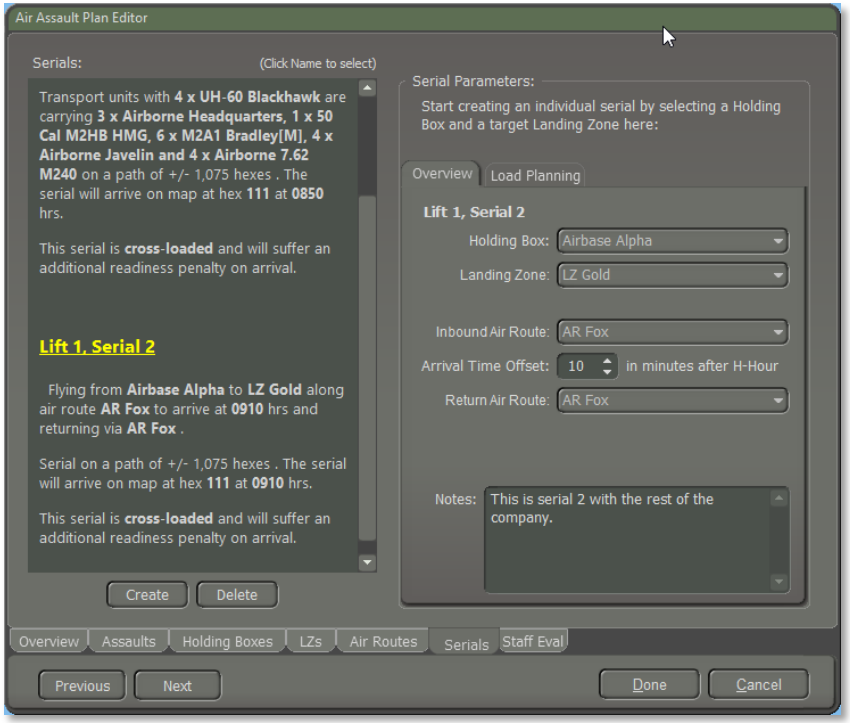
any on-map assault unit so that you can fine-tune the orders, SOP, etc.

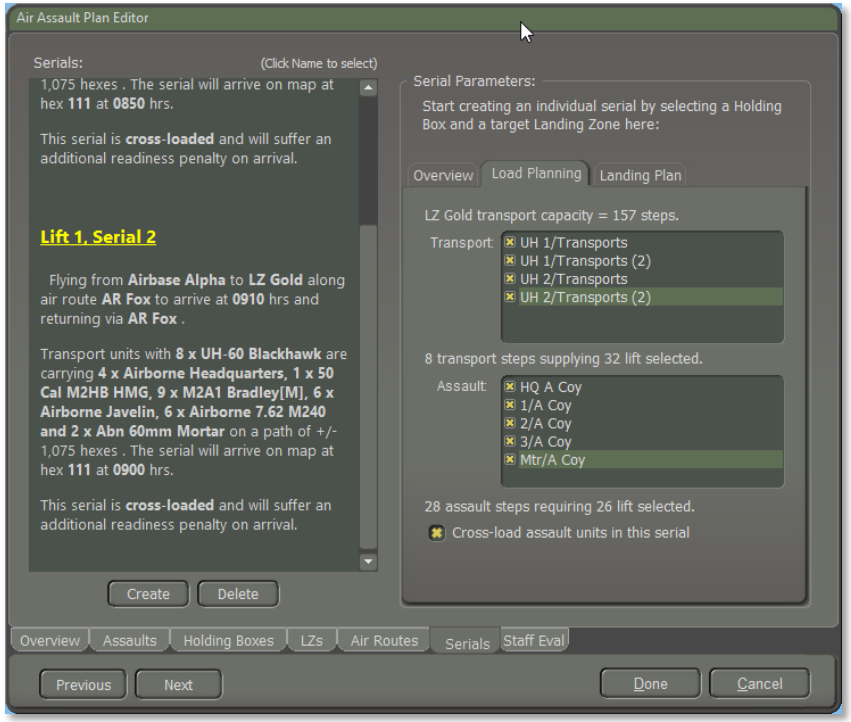
d) At some point soon, you will see the transport helicopters rendered on the entry hex and the flightpath to the center of the LZ drawn in.

   i) Helicopter pilots have healthy self-preservation instincts. If the nominal air route is suboptimal in some way (e.g. it crosses over high ground when low ground is available nearby) then you will see the flight path might leave the air route corridor. This is normal and expected behavior.



4) We will now create serial #2 with the rest of the helicopters and assault units by selecting the "Create" button again.



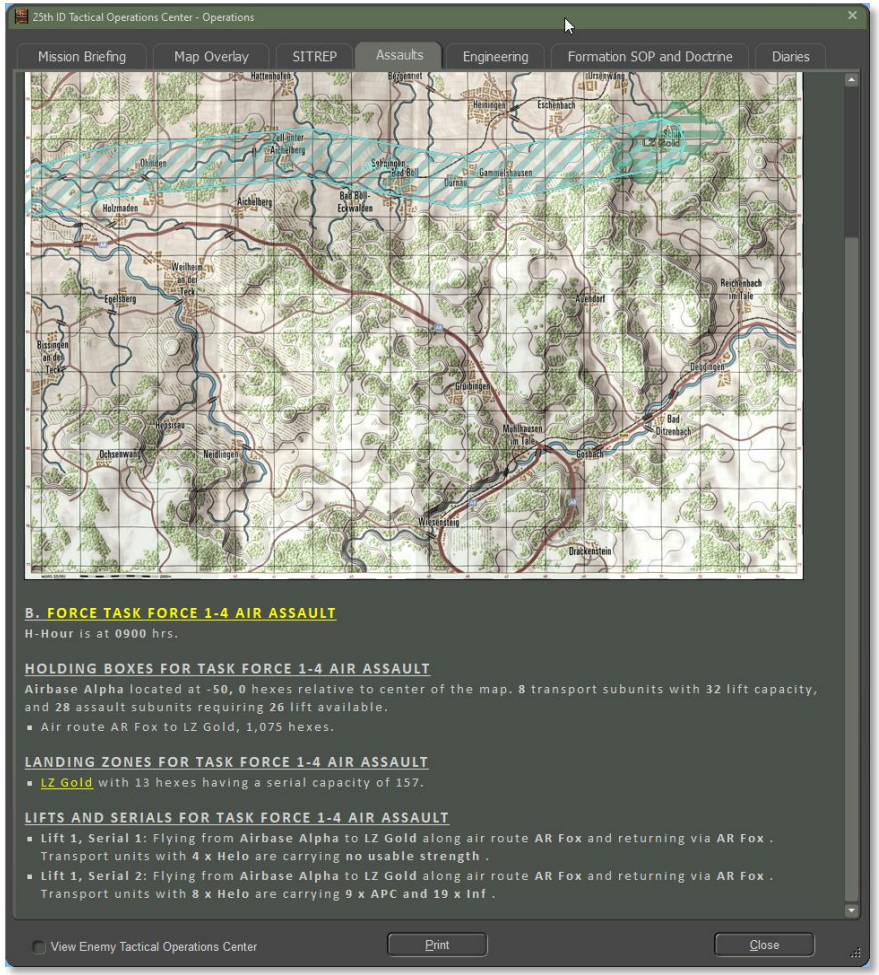


5) The staff will perform final validation before the plan can be saved.

6) Exit the Air Assault Plan Editor via the Done button in the bottom right corner and return to the scenario editor. Save your work again now.

2.2 Pre-Game Planning

The Operations TOC Assault Report.



1) Load a scenario that contains an air assault plan. Open the Operations TOC report and select "Assaults". This will show you the map with the air corridors and LZs marked in.
2) A short description of the air assault plan is found below the map.
3) The Name of the plan is shown in yellow and is hyperlinked to the plan editor. This allows the details of the plan to be browsed in detail, and certain elements can be edited at this time.
4) Editable Items. *Changes made here are for the current game only and are not saved to the scenario file.*
   a) Assault name and notes
   b) Holding box – nothing can be edited or created.
   c) Landing zone – existing LZ's can be modified, and new ones created.
   d) Air routes – existing ones can be modified, and new ones created.
   e) Serials – existing ones can be modified, and new ones created.

   NOTE: This part of the game needs a lot more work and not everything is thoroughly tested and validated at this time.

2.3 Plan Execution

Assuming that a full air assault plan is in place, the game will show the following:

1) 15 minutes prior to the scheduled arrival of the first serial, the player will be notified that an air assault is inbound. The inbound air corridor will be drawn on the map and will stay there until 15 minutes after the last serial has arrived.
2) The serials of transport helicopters will appear on the map edge closest to their respective holding boxes and fly the inbound air route to the landing zone. They will be mindful of the air route waypoints but will fly according to the terrain - they hate to fly over

ridges. They will take losses from enemy fire, and also from enemy air superiority, should it exist.

3) The lead helicopter transport will fly to the landing zone hex that contains the greatest number of passenger steps to be disembarked. When it reaches that hex it will disembark its share of the passengers. As the other helicopter units reach the other major landing hexes then the units will be augmented up to their full-strength net of inbound losses. There is not an exact one to one correspondence between where the helicopters unload and where the units appear because of cross-loading and the possibility that small units may be outliers, but the densest concentrations of landing zone hexes will be reached by transport helicopters.
4) Cross-loaded units will all suffer losses in a round-robin fashion as transports are shot down. If the passengers are not cross loaded, then losses will be assessed against entire units until the full number is taken.
5) After disembarkation, the transport units will take off and return to the holding box via the return air route, running the risk of ground fire as they go. They will exit the map when they reach the map departure point.
6) Assault units, once they reach the ground, will need a minimum of five minutes to organize and reconstitute. They will then proceed to execute their pre-arranged orders. The player is free to give them new orders in the normal way after that.

3 Umpire Mode

This is a new mode to allow a neutral party to edit the game state during the course of a game. If umpire mode is available (the default for professional editions) a new "Umpire" menu will appear in the main menu. Umpire mode itself is disabled until it is explicitly enabled by a user with the menu item "Enable Umpire Mode".

If enabled, the neutral party has the following options:

1) Lock and unlock the random number generator,
2) Switch sides,
3) Magic move units and map markers,
4) Turn Off Special Ammo Chance of Depletion. ICM, smoke and minelet munitions are invariably in short display and units can run short. A special rule determines at random when a unit runs out. This rule can be disabled using this option so that supplies never run out.
5) Change the OODA command cycle lengths in three ways,
6) Override fog of war to hide or show all units for each side,
7) Kill and unkill selected units,
8) The operational map popup menu is enabled.
9) New victory point locations may be created,
10) The bridge control dialog is available so that bridges may be built or removed without engineer units.
11) All map markers other than craters and kills may be deleted.
12) The unit popup menu will allow 'Delete Unit and Subordinates' during the game and not just when in the scenario editor.
13) The unit popup menu will allow the 'Unit parameters' setup menu item during the game not just when in the scenario editor. This will allow individual units to be edited, for example, to change their arrival or departure times from the game.
14) Units in the Reinforcement and Withdrawal report found in the Personnel and Logistics Staff Diary will also have a popup menu access to the 'unit setup parameters' dialog.
15) Enemy units can be selected and browsed, and the unit popup menu will be available for them.
16) The game will auto-save at the beginning of each orders phase and also the turn resolution phase. The saved file names have been

upgraded to always be unique so that previous files will not be overwritten.

17) Disable anonymous counter battery fires. When artillery units fire, there is a small chance that this will be detected by the enemy and off-map, higher echelon counter battery fires by 'anonymous' units scheduled in retaliation. This menu option can be used to disable this rule.

18) Disable air superiority interdiction effects. Depending on the relative air superiority levels, inbound air strikes are vulnerable to interdiction and may be reduced in effect or prevented. Also, helicopters on the map are subject to a tiny chance of destruction. This menu option can be used to disable this effect.

19) Dump the current scenario or game state to an Excel file for examination and some small edits.

20) Since making umpire mode changes can change the inputs for the game state in important ways, there are now also menu items to update all spotting, recalculate the turn length, and run the computer player routines again.

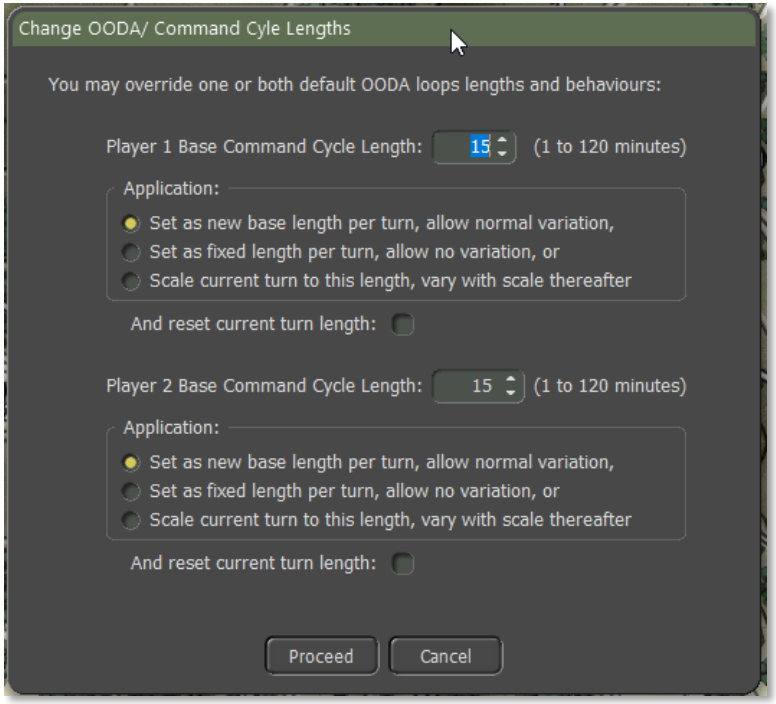
See document "**12 FCPMW - Umpire Mode -FM12.pdf**" for further details.

4 OODA/Command Cycle Control Lengths

The game originally used a 15-minute base command cycle before modifications for electronic warfare, ratio of HQ to subordinate subunits, and average readiness.

The game now offers command line support for varying the default per side. The default time is 15 minutes, the minimum allowed is 1 minute, and the maximum is 120 minutes.

- "/C3Blue <mins>" and "/C3Red <mins>"
- "/C3Locked <blue, red, both>" for locking the length of the C3 length.
- Umpire mode allows the values to be changed during the progress of the game.



1) There are three possible ways to apply the edit
   a) To make the new value the new base value for each side, and then apply all C3 modifiers in full in the usual way,
   b) To make the new value the new final value and ignore all modifiers, or
   c) To compare the new value to the current modified value and scale future calculations accordingly.

2) Examples:
   a) If the previous base is 15 minutes and it is set to 30 minutes, then this will become the new base value for all future OODA calculations.
   b) If normal variations are applied then if the previous OODA loop was 15 minutes plus 8 minutes in penalties, then a new base of 30 minutes will become 38 minutes in total.
   c) If the OODA loop is fixed, then the previous 15 + 8 becomes 30 + 0 minutes. The turn length for that side will never vary.
   d) If the scaling choice is made, then an OODA loop of 15 + 8 minutes will be scaled to 30 minutes (a 1.304 multiplier) and the turn will be 30 minutes long. The underlying OODA base will remain 15 minutes, as it is the final value that is adjusted, not the initial value as in the other calculations. All subsequent turns will be calculated as normal and then scaled by the factor of 1.304.
3) If a turn is in progress for a player and it is reset in this dialog, then the turn will end the new number of minutes in the future. This may or may not be what the umpire intends, so the option to finish the current turn at its stated length and then use the new value after that is offered.

5 Command Line & Config File Parameters

These parameters can be added in a game launching shortcut to turn on various features in the game engine. Add these code in the Shortcut's Target field after the "[Your Location]\FlashpointCampaigns.exe" with a space between them and no quote marks.

5.1 Intent

1. **"Headless play/config file support**.
   a. The requirement T3_FPC-12 from December 2019 was: "User to be able to launch the game with from the command line using command-line parameters (or the name of a text file containing parameters) such as scenario to play and a random number seed value to apply. The latter might become a line number in a separate file to that lists various random number seeds. This is to allow running of the game multiple times with random number seed variation switched on."
   b. OTS: If we use a configuration text file then we would want to specify at least the following:
      i. Module, e.g. "Firefly"
      ii. Scenario name, or possibly a saved file name to resume
      iii. 'style of play' = computer vs computer
      iv. The usual Game Options (5) and Fog of War settings (2)
      v. Battle Plan Name to use, once we get this further along. Otherwise, the game will just use the starting unit orders input via the scenario editor and follow on from there with the usual computer player routines.
      vi. OODA loop values to use, if other than the defaults
      vii. A specific magic number spreadsheet to use
      viii. Random number seed to use, locking the random number generator or not
2. As much as possible we want the new command line parameters to match up to the config file parameters.

5.2 Notes

1. Application order:
   a. On start-up the game looks first for a configuration file specified in the command line to fetch Module parameter,
   b. If none, it checks the command line for /Module

   c. It then looks for a config file to fetch the rest of the parameters
   d. It then checks the command line for any further parameters. Duplicates in the command line will override the configuration file.
2. Using a configuration file. The command line parameter is "/config" and then the target configuration file name, e.g. "Firefly Base_1 UK.ini". The ini file is expected to be in the game root directory with the game exe. If the config file name is not all one word then it needs to be enclosed in double quotes as shown above.
3. The configuration file must be in standard Windows ini-file format. The default (and only) section for all parameters will be "[**General**]".
4. Note that Boolean values in the command line and in the configuration file use the Windows .ini file convention where 1 = True and 0 = False. Do NOT use "T" and "F" or you will get frustrated.
5. As much as possible, the command line parameters mirror the config file parameters. When both exist the command line parameter will prevail. Precede the command line parameters with the usual "/" or "-" characters, and put parameter arguments in double quotes (") if there are any spaces, such as may happen in a file name.
6. To bypass the Setup screen completely you will need to specify all of:
   a. Scenario name (in the appropriate module) => Load SCN tab
   b. Style of Play: Red computer AI, Blue Computer AI, H2H, AI vs AI => Player Settings tab
   c. Game Options (5) and Fog of War settings (2) => Game Options tab. (If not specified then the previous values will be used.)

5.3 Command Line-Only Parameters

1. "/**Config** <file name>" - The name of a configuration file can be passed in the command line which contains all parameters in a more organized and convenient form.
2. "/**madExcept**" – forces a divide by zero error as the game starts to prove that the exception handler ("madExcept") is hooked up and working. Gameplay can continue after the exception is forced.

5.4 Command Line and Config File Parameters

5.4.1 Module Selection and Related

1. "/**Professional**", "/**Pro**" – If either of these parameters is present then it forces the game into Professional mode (license tier = premium). There is no "0" or "1" parameter for this.
2. "**Module** <module short name>" – defaults the game to the specified module. Values currently are FCSS, FCCS, FCNS, FCMW, Baltic2020, Firefly, Connections, and Origins2019. If the specified Module is Professional level then the game goes into Professional mode, otherwise, it does not. Note that the other parameters require the Module to be set before they can be effective.
3. "**Umpire** <0 or 1>" – displays the Umpire main menu header and allows the game to be put into Umpire mode. NOTE: This is automatic in Professional mode and does not need to be separately specified for Professional modules. "0" means disable this option. "1" means force it on in the non-Professional module.
4. "**DataLog** <0 or 1>" – "1" turns on the new detailed logging mechanism for non-Professional modules. Logging is already on by default in Professional mode and does not need to be separately specified. It can be turned off by passing a "0" here or in the Umpire menu if desired.

5. "**Magic_Numbers** <file name>" specifies a specific magic numbers xlsx file to use. If the Module is not specified, or if the module is not a Professional level module, then this parameter will be ignored. The Default value is "FCPMagicNumbers.xlsx" found in \<module>\Staff\. The ".xlsx" suffix must be included.

5.4.2 Random Numbers and Seeds

1. "**RNG_Locked** <0 to 1>" – if "1" is passed then the random number generator sequences are locked and will provide repeatable gameplay.
2. "**RNG_Seed** <number>" – a 64-bit number that will be used as the random number seed if found and RandomSeedsLineNum is not specified.
3. "**RandomSeedsLineNum** <line number>" - The requirement allows for a look up by line number of a random number seed in a separate text file of numbers. If a value is specified here then the program will attempt to look up the line number referred to. "**RandomSeeds.txt**" must exist in the game directory and the line number must be within range of the lines contained in that file. The first line of that file is number one (not zero). If this parameter is specified, then the parameter "RNG_Seed" will be ignored.

5.4.3 Launching a Scenario

1. "**Scenario** <scenario or saved game name>" – specify the scenario name to load by default, e.g. "Base_1" or "Base_1.scn". In this example, the routine will look under the current Module for "\Scenarios\Base_1\Base_1.scn" and load it. *Both are done and tested.*
   a. In the alternative, a saved file may be loaded, e.g. "Base_1 200129_1150 @ 00_pc_0800_hrs.sav". The saved file name must include the ".sav" suffix to be recognized. It will be searched for in the usual Module \Saved folder.
   b. When a saved game is launched then the other new configuration parameters will be applied to it, overwriting the original ones. Avoid this by removing unwanted parameters from the config file.
2. "**StyleOfPlay** <0 to 3>". – 0 (Blue) or 1 (Red) = which will be played by the computer, 2 = computer plays both sides, 3 = Head to Head. This applies to new games only and not to saved games. Special case: "-1" (or no value at all) forces the normal display of the Setup screen to view the game setup parameters.
3. "**BlueBP** <file name>", "**RedBP** <filename>". "Random" can be used as a file name so that an eligible battle plan will be randomly selected. These parameters have no effect if a scenario is not specified, or if a saved game is loaded.
4. Game Options (5 * 2) and Fog of War settings (2) => Game Options tab. Each should have a value of one for enabled or zero for disabled. *Please note that if being passed by the command line these get very cumbersome very quickly and the game will not launch automatically unless all are specified. It is far better, in that case, to set up a configuration file instead and pass that via the "/config" command line parameter instead.*
   a. "**FOWObjectives** <0 or 1>"
   b. "**FOWNonObjectives** <0 or 1>"

   Blue Player:

   c. "**AutoSpotting0** <0 or 1>"
   d. "**AutoResupply0** <0 or 1>"
   e. "**AllowEnemyBrowsing0** <0 or 1>"
   f. "**AllowPastSuddenDeath0** <0 or 1>"

   Red Player:

   g. "**AutoSpotting1** <0 or 1>"

h. "**AutoResupply1** <0 or 1>"

i. "**AllowEnemyBrowsing1** <0 or 1>"

j. "**AllowPastSuddenDeath1** <0 or 1>"

5.4.4 Scenario OODA Command Cycle Length

1. "**C3Blue** <minutes>", "**C3Red** <minutes>". This sets the base number of minutes for the standard base C3 command loop for this side. The actual C3 command loop length will start with this number and apply the usual modifiers. Minimum = 1 and Maximum = 120.
2. These values can also be edited during play via the Umpire > "Change OODA > Command Cycle Lengths…" menu item.
3. "**C3Locked <**red, blue, or both>", any other value is ignored. This will lock the C3 command loop to the base length (default = 15, or whatever is specified for /C3Blue or /C3Red or "cDefaultC3OodaLengthMins" for both in the "FPCMagicNumbers.xlsx" file). Every turn will be of the specified fixed length and will not vary with battlefield conditions.
4. This value can be edited during play via the Umpire > "Change OODA > Command Cycle Lengths…" menu item.

   NOTE: C3Locked and C3Scaled are mutually exclusive settings. If both are specified, then C3Locked will prevail.
5. "**C3Scaled <**red, blue, or both>", any other value is ignored. This will use the base C3 command loop length and then vary it with battlefield conditions and a scaling factor obtained with respect to the base value. All future player OODA lengths will then be scaled by this factor. Example: The base value is 15 minutes and the OODA length for the initial turn works out to 30 minutes. This is a scaling factor of 2. The actual first turn OODA length will be set to 15 minutes and all future calculations will be scaled (divided by two in this case) for the rest of the game. The purpose of this is to be able to set the general range of an OODA loop without losing the battlefield variability as in C3Locked. Requires that a scenario name be specified.

   NOTE: C3Locked and C3Scaled are mutually exclusive settings. If both are specified, then C3Locked will prevail.

5.5 Other Parameters

1. **"NATO_Sils <0 or 1>"** – if "1", the game will default to using NATO unit counter icons.
2. "**NATO_Large <0 or 1>"** - If, and only if, NATO Sils is true ("1") will this parameter draw them as 'large' as well if set to "1".
3. **"AirSuperiorityEffects <0 or 1>"** – This feature is on by default but can be turned off by passing a "0".
4. **"Quiet <0 or 1>"** – By default sound effects are on ("1") but the game can be brought up in quiet mode by specifying "/Quiet 0" in the command line or configuration file.
5. **"AutocreateFSGs <0 or 1>"** – if "1" then each side has default Fire Support Groups created on scenario load.
6. **"AtgmFree <0 or 1>"** - In the Cold War era, the rule of engagement for ATGMs was to fire only at tanks. This is what the game does by default, but this is not so universal in the modern era, and we have created this flag to allow this targeting restriction to be relaxed. "1" means that it is relaxed and "0" means ATGM targeting is tanks only.

   a. The constant 'cAtgmNoConstraints' in the FCPMW Magic Numbers file from version 1.12 upwards does the same thing and is set to "1" (relaxed) by default.

5.6 Example Configuration File:

```
[General]
Module=Firefly
Pro=1
Quiet=1
```

```
        Umpire=1
        DataLog=1
        Magic_Numbers=FCPMagicNumbers Test.xlsx
        RNG_Locked=1
        RNG_Seed=12345678
        RandomSeedsLineNum=
        Scenario=Base_1 UK.scn
        AutocreateFSGs=1
        StyleOfPlay=1
        BlueBP=
        RedBP=
        FOWObjectives=1
        FOWNonObjectives=0
        AutoSpotting0=0
        AutoResupply0=0
        AllowEnemyBrowsing0=0
        AllowPastSuddenDeath0=0
        AutoSpotting1=1
        AutoResupply1=1
        AllowEnemyBrowsing1=1
        AllowPastSuddenDeath1=1
        Autoplay=0
        C3Blue=15
        C3Red=20
        C3Locked=blue
        C3Scaled=red
        NATO_Sils=1
        NATO_Large=0
        AtgmFree=1
        AirSuperiorityEffects=0

RandomSeeds.txt:
        12345670
        12345671
        12345672
        12345673
        12345674
        12345675
        12345676
        12345677
        12345678
        12345679
```

5.6.1 Deprecated Items

- "/**Civilian**", "/**Civ**" – forces the game to run in non-professional mode regardless of whether the Module is Professional or not, or whether the command line /Pro or /Professional was used. It was a command line-only switch.
- **"AnonymousCB** <0 or 1>" – This feature is on by default but can be turned off by passing a "0". Deprecated 18 Jan 2021..
- "**AllowLOSChecks0** <0 or 1>"
- "**AllowLOSChecks1** <0 or 1>"

6 H2H Turn Resolution Player/Map Briefback Settings

There is a new way to resolve head-to-head turn resolution that forces less jumping up and down to swap seats. The intent is to also make game turn resolution more informative the first time around for each player.

An example of the new mechanic:

- Blue enters orders, hands over to Red,
- Red enters orders,
- Red resolves the turn seeing all his forces and with Blue out of the room,
- Red enters his next orders and leaves the room,
- Blue then watches VCR replay from the Blue perspective,
- Blue enters orders, etc.

This leads to a three-way choice immediately prior to turn resolution: 'Resolve turns as both no fog of war, 'Resolve as last player', 'Resolve as other player' or 'Resolve both with fog of war'. The default is to resolve as the player who last entered orders. The first option is wholly new, the

last option is the original resolution mechanic that displays only mutually spotted units and no information panels.

When resolved with fog of war, the fog of war settings used will be those set in the User Preferences and/or the Umpire mode selections.

If one player has multiple successive turns then the game turn replay events will accumulate appropriately for the other player.

NOTE: The turn resolution replay ("VCR replay") ran with no fog of war will do so and so will the game turn playback for the other player. In this case it will not use the fog of war settings of the game generally.

NOTE: The option to "resolve as other player" is very recently added and poses a number of technical challenges to the game architecture. The current implementation will need further testing and refinement to fully realize its potential.

7 Civilians on the Battlefield

FCPMW includes the ability to have civilians present on the battlefield, with limited effects. Civilian presence and behavior follow a fluid dynamics model of sources, sinks, and connecting conduits. Placement and configure of these model objects are done only in the Scenario Editor.

The object manipulated in the Scenario Editor are Spawn Points and Exit Points.

7.1 Spawn Points

These markers represent the sources of refugees (Civs) to be placed on the map. Normal spotting checks are done during Donovian movement and if a Donovian ground unit moves to a location 1000 meters or less from a spawn point and is spotted, the spawn point is activated. A spawn point can produce a only single type of Civ. Configuration settings for the type of Civ produced are:

- Mobility: On foot or in vehicles
- Average Speed: 2 to 40 KPH. No sanity check is performed here (e.g. on foot, 40 kph is accepted)
- Movement Penalty: 10 to 60 minutes of delay. Applies to US units only
- Earliest Activation Time: Elapsed time from game start that the spawn point may be triggered to create Civs. -1 means from game start.
- Frequency: Number of minutes between spawns once the spawn point is activated.

7.2 Exit Point

These markers represent the destinations for Civs. Once spawned, Civs will move to the Exit Point with the lowest movement cost. Once they move into the Exit point location, the Civ is removed from the map. If there are no Exit Points placed on the map, Civs will be spawned, but will not move.

7.3 Civilian Refugees

These markers represent groups of civilians attempting to leave the battle area. The effect of the Civs is to present a mobility hindrance and this is to US forces only. They are like a moving Obstacle marker that

can't be breached. They have no effect on Donovian force mobility. They can't be removed or destroyed.

They will tend to stick to the roads, but may go cross-country to get from one road to another if roads are not connected or staying on a road until the roads meet is a higher movement cost than going cross-country. Exit Points and Spawn Points used in the Baltics_2020 scenario have not produced any observed cross-country movement.

8 Decoy Units

Battlefield deception is an important dimension to warfare and the addition of decoys enhances the fidelity of the game. This feature enables players and scenario designers to have the capability to mask intentions and the scenario design can perform limited false maneuver.

Note that these decoys are distinct and separate from decoy-type countermeasure systems designed to improve platform survivability. Instead, these decoys function to hinder COA confirmation and location of critical systems and communication nodes. It can give a false answer to questions like "What is the enemy doing? Where is his TOC? How do I perform SEAD in this area?"

Both the US and Donovian forces may include decoy units. They must be included by the scenario designer. The building blocks are defined in the respective National Data spreadsheets.

For the US, these are tank and mech platoons, company and battalion HQs, and scout HMMWVs and CFVs.

Donovian decoys formations include tanks and motorized rifle platoons and companies, company, and battalion HQs, tracked recon with GSR, self-propelled air defense guns, and self-propelled SAM launchers.

The air defense systems have air-search radar emitters, and the HQs contain decoy radio/network emitters

8.1 Underlying Decoy Technologies

The capabilities and performance of decoys units in the game are not predicated on any particular set of technologies (manned radio stations, inflatable replicas, thermal signature panels, loudspeakers, etc.). Instead, the game presumes relevant technologies have been assembled to enable the creation of high fidelity multi-spectral decoys.

8.2 Common Characteristics

Decoys exist at the subunit level and can be combined with real subunits to form a real unit. For example, a tank platoon can be augmented with decoys to make it appear to be a tank company on the battlefield. Pure decoy units can also exist.

Decoy subunits have a Protection Factor (PF) of zero, making them very vulnerable to fires, but not automatically destroyed upon being shot at. Once spotted (visually or by EW support), the combat AI may have units engage with direct fire or schedule fire support or air support missions via the Fire Support Control Center (FSCC).

Decoy platforms are unarmed. Only tank and mechanized infantry decoy units can perform target acquisition (i.e. spot enemy units, request fire support, etc.).

Decoy units contain an appropriate number of real and decoy platforms according to the unit being impersonated. The decoys do take up real space, so movement stacking limits apply to decoys just like real units (i.e. stacking limits and movement penalties include accounting for the presence of decoy platforms).

Decoys representing HQ, Air Defense, and Recon units are static and are of lower fidelity than combat unit decoys. See below.

Decoy units are rendered for the owning player with grayed silhouettes and the letter "D" into upper right corner of the counter.

8.3 Combat Unit Decoys

Combat decoy units are a mix of real tank or IFV and decoys, with a platoon of real vehicles being augmented with sufficient decoys to present the appropriate vehicle count for the unit being simulated.

These must be spotted visually. Given engagement ranges of density weapons, units will willingly engage spotted decoys and expend a goodly amount of ammunition reducing them. Destruction of a particular decoy platform does not cause the firing unit to determine it has engaged a decoy. We presume the incorporation of hit and kill signature technology in the decoy platforms.

Combat decoy units are able to maneuver. So, they can both utilize Battle Plan missions involving movement and, absent a Battle Plan, the AI will issue movement orders to such units.

The presence of real subunits means that decoy combat units will engage with direct fire, so long as the real platforms survive. Additionally, these decoy units will NOT be removed from the map once the range closes to 1500 meters.

8.4 HQ Decoys

The principal differences from a combat unit decoy are the addition of the RDS (Radio System) ability, marking the unit as a HQ, and the absence of any real subunits. This results in the emitting radio chatter when a real HQ unit does so and is revealed to EW support means.

Additionally, this type of decoy unit is static and can be determined to be a decoy once the range closes to 1500 meters. At this point, the decoy unit is removed from play.

8.5 Recon Platforms

Donovian decoy recon platforms are equipped with emitters that mimic GSR (Ground Surveillance Radar). Such decoys will be periodically spotted and marked with a radar cut unit. FCPMW does not identify units by EW emissions, so the unit will only be identified as "Recce" until visually spotted.

Like the HQ decoy, this type of decoy unit is static and revealed to be a decoy unit when the range closes to 500 meters.

8.6 Air Defense Platforms

Donovian decoy self-propelled flak (SPFLAK) and self-propelled surface to air missile (SPSAM) platforms are equipped with emitters that mimic ASR (Air Search Radar) that match the signature of the systems they mimic (2S1 Tunguska M and Buk M1). Such decoys will be periodically spotted and marked with a radar cut unit. FCPMW does not identify units by EW emissions, so the unit will only be identified as "Air Defense" until visually spotted.

Like the HQ decoy, this type of decoy unit is static and revealed to be a decoy unit when the range closes to 500 meters.

8.7 Simulating Movement

Although some decoy platforms, and thus some decoy units, are static, the scenario designer can create the simulation of movement by static decoys. This is done by creating multiple decoys with deployment locations along a movement path. The scenario designer controls the

rate of movement along the path by appropriately setting the arrival and withdrawal times of each decoy.

For example, to simulate a tank company moving along a road at 12 kph in 4 bounds, the designer adds 4 decoy tank company units to the scenario. These are placed at the start point, end point, and points in between at 3 km intervals. These four decoy companies will mimic one real tank company in space over an hour of time.

The decoy at the start point has an arrival time set and withdrawal time is set to 15 minutes later. The next decoy in line has its arrival time set to its predecessor and its withdrawal time set to 15 minutes after that. This is repeated for the remaining decoys, with the last decoy not having a withdrawal time set.

This can be extended in distance and time as well as number of decoys to mimic a larger formation moving a longer distance.

Note that this is not needed to simulate maneuver by the density units of a large force, as the decoy combat units have movement capability.

9 UAVs

UAVs are incorporated into FCPMW. Donovia has ISR UAVs, and the US has both ISR UAVs and UCAS. These aircraft perform basically the same as helicopters, with the notable exception of their altitude. They fly at an altitude of 1500 meters AGL (Above Ground Level). This is high enough to negate most terrain effects on LOS, which is a double-edged sword.

These platforms can see further, but also can't use terrain masking against AD systems. They are particularly vulnerable to long range SAMs. Donovia has several that can range an appreciable portion of the map (the entire map, in the case of the S-400).

10 Data Logging

FCPMW has extensive runtime data logging made in tidy logging format to csv files. The log is divided into two main sections: Scenario Data and Event Data. Scenario Data includes information about the map, units, their subunits and weapons. Event data includes information about spotting, orders, combat, and support request events.

This topic is covered more completely in documentation found in the \Documents folder:

- Data Logging – FM09
- Logging Data Dictionary – FM16
- Log File Extraction Tutorial – FM14

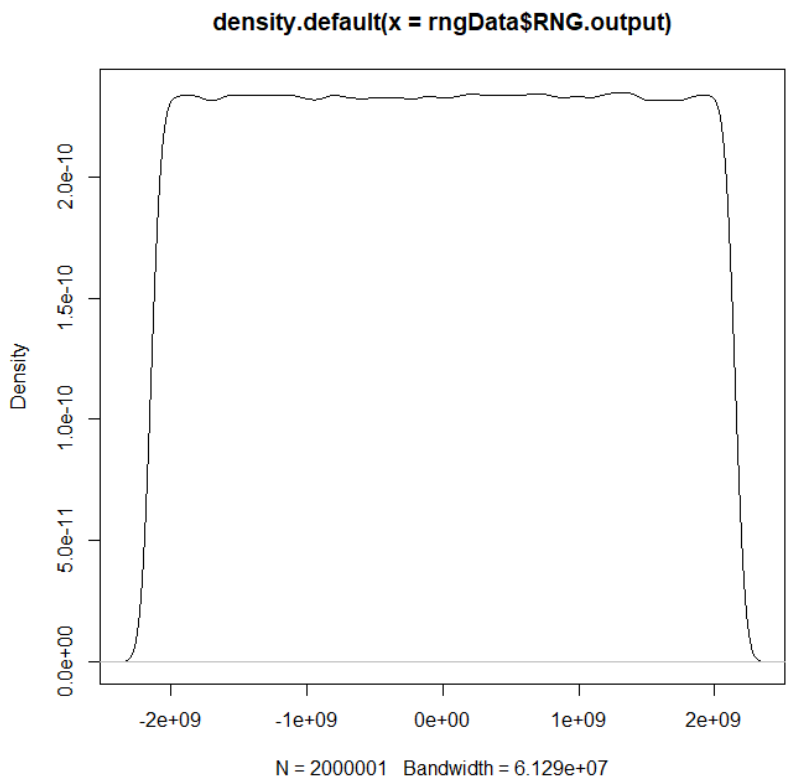
11 Random Numbers and Repeatability

The random number seed can be locked to assure repeatability of play. The default is to leave it unlocked but it may be locked before game start by adding the "/RNG_Locked" command line parameter that launches the program. In the alternative, when in umpire mode the sed may be locked or unlocked during any orders phase.

A random seed is generated whenever a scenario is first started, and is activated when the game turn resolution begins. When the turn resolution is complete, the random seed is preserved and activated again when the next turn resolution begins. Any random number generation that happens during an orders phase is made using a throw away random number generator. The practical result is that a saved turn will resolve exactly the same way every time it is loaded and run, assuming that no changes in orders have been made during the orders turn. If the orders have changed then the sequence of random numbers will now be applied to a different length list of uses and results will diverge immediately after the first different order that calls the random number generator is executed.

The random number generator itself has been switched from a linear congruential to a Mersenne Twister, a generator with a slightly more

uniform distribution. This is illustrated below:



12 Editable Global Modifiers

The previous game design allowed extensive editing of unit and weapon data, plus formations and certain 'national characteristics. The national characteristics have been enlarged to include a variety of engineering execution times, and a new category of 'global modifiers' has been created. These are magic numbers that exist at the game level and were previously hardwired into the code. The default values persist but may be overridden by editing the new "FCPMagicNumbers.xlsx" file found in 'Modules\<module name>\Staff\'. This file contains three dozen of the most important game constants such as how long an air strike takes, what the battalion command radius is, the chance of smoke dissipating in any given five-minute interval, etc.

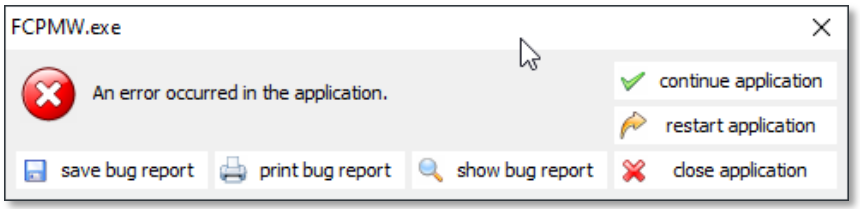
The values in this file are the game defaults but may be edited to a value within the indicated range. Where the upper limit is shown as "n" then any number may be supplied that is less than or equal to 999999. The Notes column shows the intended use of the modifier in question.

If the file is edited while the game is running, then the game will need to restart to give effect to the changes. This is a professional feature - if the file is not present then the normal default values will be used.

13 Program Exception Logging

FCPMW has a built-in exception handler to catch crash bugs and log the details for analysis.

1. Exception handling is enabled at compilation time and cannot be turned off by the user.
2. The log file is named "FCProDebugReport.txt" and is located in the root game directory.
3. When an exception is handled the following dialog is shown to the user:



4. The log file is saved before this screen appears. New incident data is appended to the existing file with a limit of 500 KB of disk space. If this limit is reached then the oldest reports are removed to make room for the new ones.
5. The user may view the details of the exception ("show bug report"), print it, or save a copy of the report to a user-selected location.
6. The user may choose to continue the application, restart it or close it. In our experience, continuing is rarely effective but is still worth a try. This may give the user a chance to save the game at that point so as not to lose the game data. Restarting will clear the program from memory and then immediately relaunch it. All in-process game data will be lost. Closing the application will do just that.
7. When reporting a crash bug, the user should attach the "FCProDebugReport.txt". If desired, the user can edit out "computer name" and "username". The rest of the information (operating system, physical memory, etc.) is useful - potentially crucial - to the developers for diagnostic purposes.

13.1 Sample Exception Report

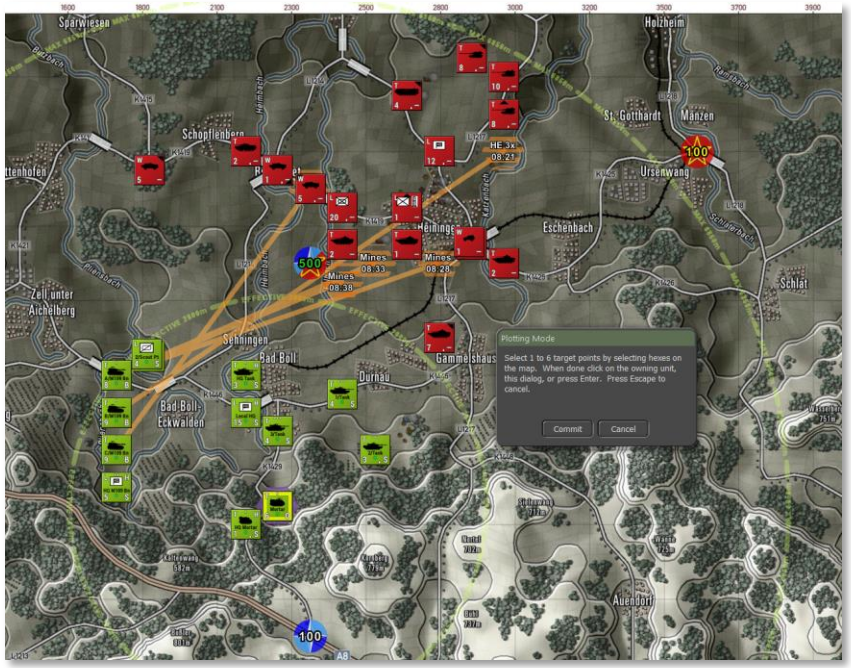
```
date/time          : 2019-07-16, 10:29:36, 150ms
computer name      : FREYA
user name          : Robert
registered owner   : Windows User
operating system   : Windows 10 x64 build 18362
system language    : English
system up time     : 23 hours 40 minutes
program up time    : 40 seconds
processors         : 8x Intel(R) Core(TM) i7-7700 CPU @
3.60GHz
physical memory    : 8542/16304 MB (free/total)
free disk space    : (C:) 49.21 GB (E:) 503.86 GB
display mode       : 2560x1440, 32 bit
process id         : $32cc
allocated memory   : 493.35 MB
largest free block : 131025.85 GB
command line       : "E:\Dev\FCPMW.exe"
executable         : FCPMW.exe
exec. date/time    : 2019-07-16 10:26
version            : 2.2.7136.37550
compiled with      : Delphi 10.2 Tokyo
madExcept version  : 5.0.0
callstack crc      : $c13299e1, $5cefaf37, $5cefaf37
exception number   : 1
exception class    : EDivByZero
exception message  : Division by zero.

main thread ($309c):
01ccf46e +1e FCPMW.exe Unit1 9460 +2 TfMain.actDebugAVExecute
01f4f1b1 +61 FCPMW.exe FCPMW  168 +4 initialization
```

14 Overlays for Visualizing Fire Support

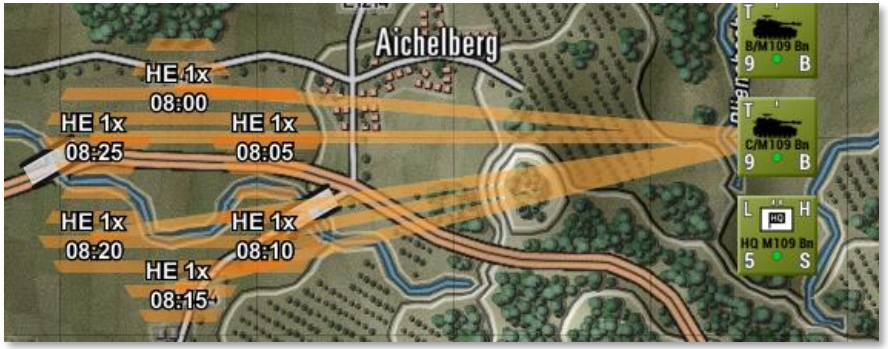
There are two new main menu items: "Multi Unit – Show > Fire-Support Missions" and "Multi Unit – Show > Fire-Support / Spotter". The purpose of these is to help the user get a) an overview of the fire support plan, and b) understand which units are forward observing for which artillery units.

In addition, the game automatically selects the 'Fire-Support Mission' when plotting artillery missions.



14.1 Fire-Support Missions

When selected, this creates a simple map overlay showing all firing units with lines radiating out to their target hexes. The target hexes are shaded horizontally in orange and show the type of arty barrage plus the scheduled time of impact.



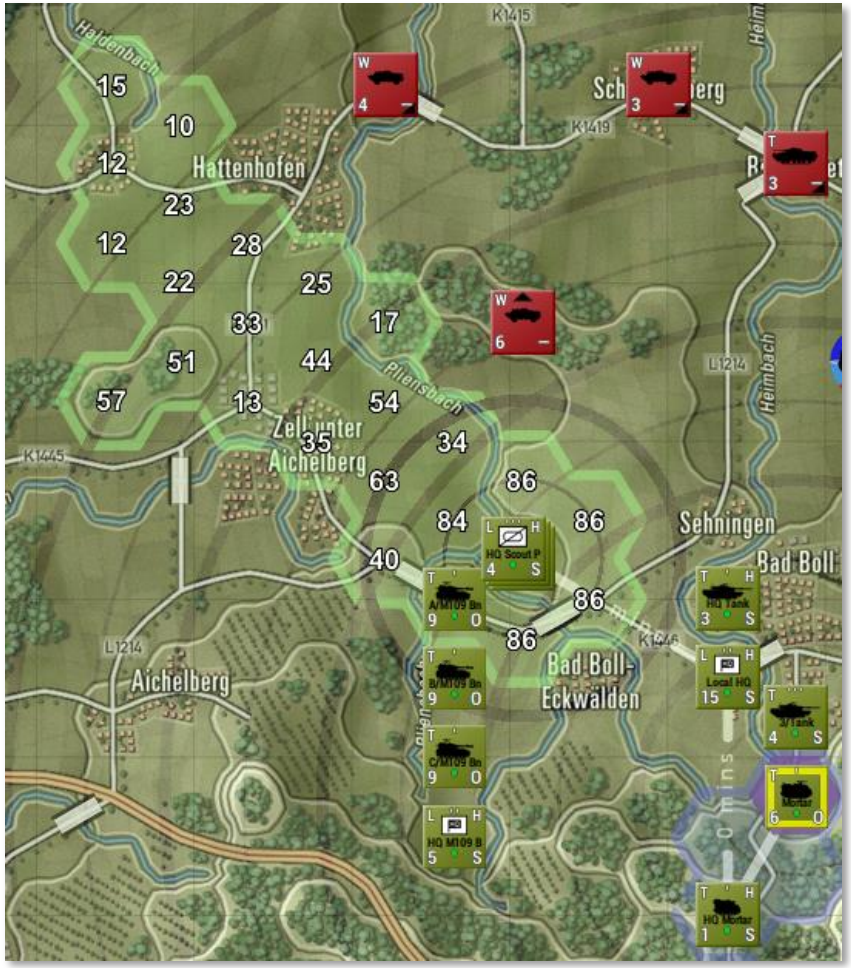
NOTE: At the present time, off-map artillery units firing onto the map will show fire lines originating from an arbitrary spot along the map edge. This is not meant to delineate the actual firing line but rather to signal to the user that this is off-map fire.

If the currently selected unit is an (on-map) artillery unit, range rings for the effective and maximum range are displayed, to help plotting fire missions.

Air Strikes. These are also shown but are shaded vertically and in a different color.

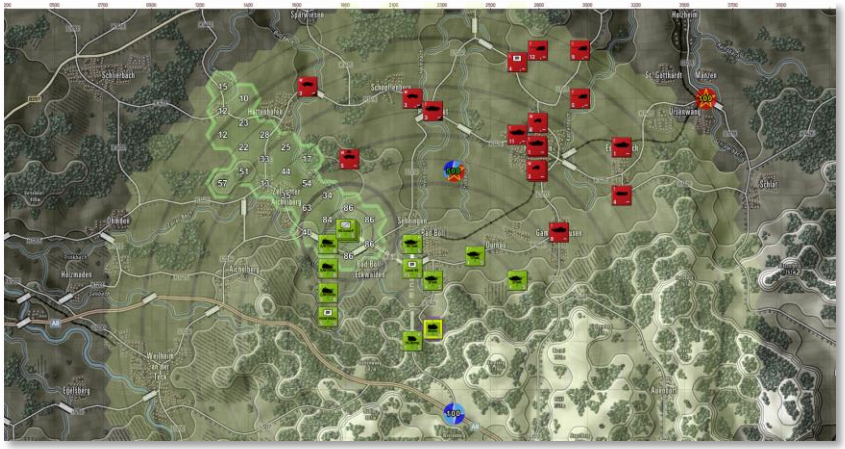
14.2 Fire-Support / Spotter

If you select an artillery unit, it will display links (along the CoC) to connected spotters, and their combined line-of-sight, with "enclosed" hexes being within range.



In this example, the Mortar unit in the bottom right corner has been selected and the "Fire-Support / Spotter" menu item enabled. White lines are drawn from Mortar to its HQ ("HQ Mortar") to the southwest, and from there north to its superior - the "Local HQ", and then to the forward observing unit "HQ Scout Ptn". Note the distance rings for the mortar unit at 1 km increments, and the distance rings drawn for the forward observing unit. Finally, the hexes bounded in light green with Visibility numbers are the hexes that can be observed by the forward observer for the Mortar unit.

Alternatively, if you select a forward observer unit, it will display links to connected artillery units, and show line-of-sight only for that forward observer.



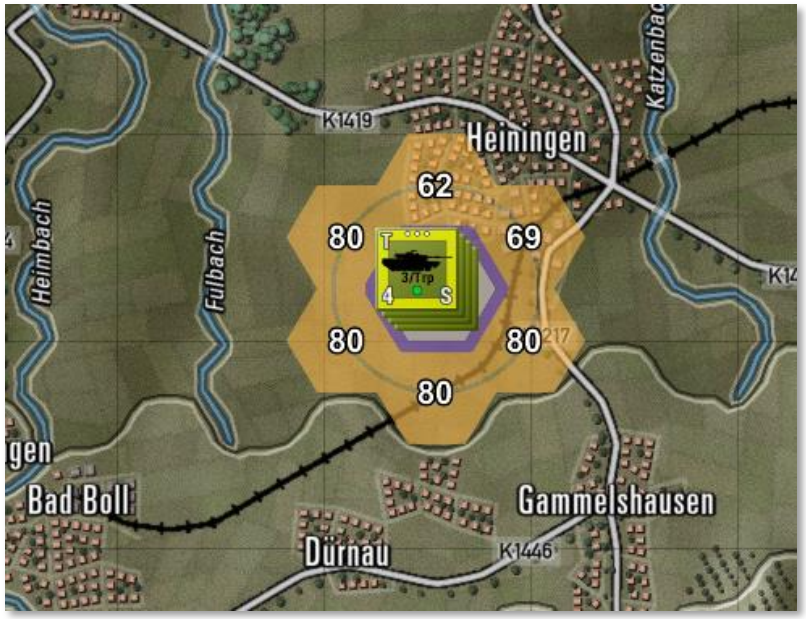
If the artillery unit is selected (or the spotter has just a single artillery unit), the display implicitly shows the maximum range of the artillery unit, with subtle range rings around the unit's position extending up to maximum range of the artillery unit.

Similarly, if the spotter unit is selected (or the artillery unit has just a single unit spotting), the display implicitly shows the maximum spotting range for the spotter unit, with subtle range rings around the unit's position extending up to maximum spotting range.

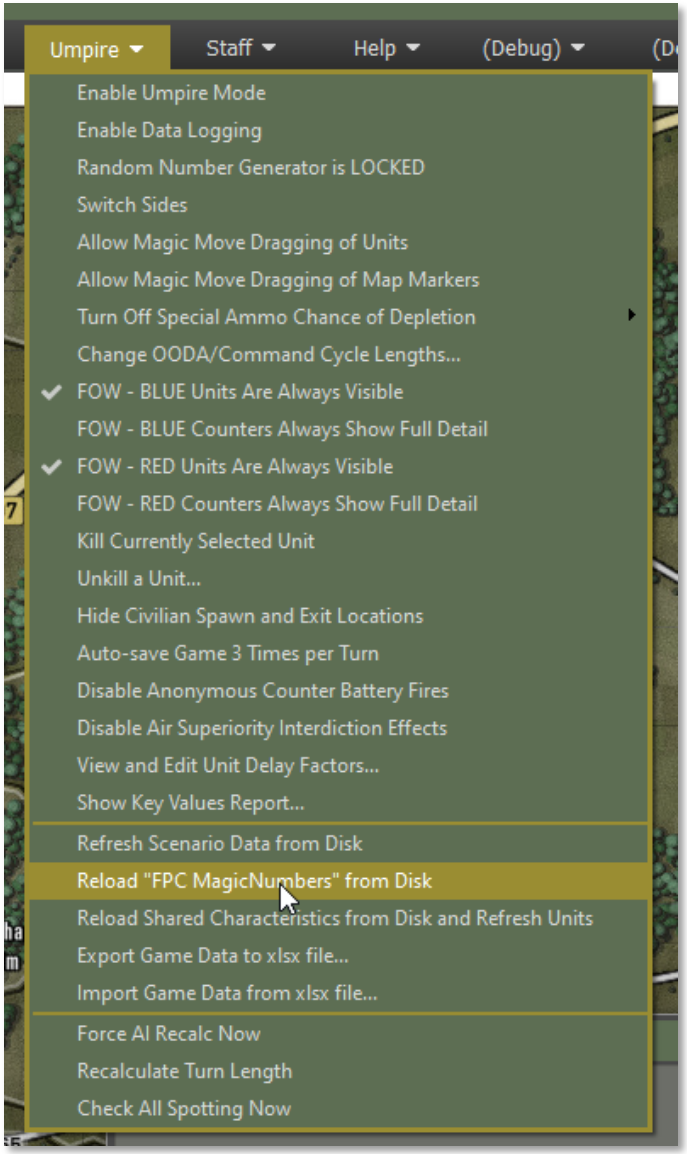
15 Modifiable Spottable Range

The game now supports a way to adjust unit 'spottable range' per player.

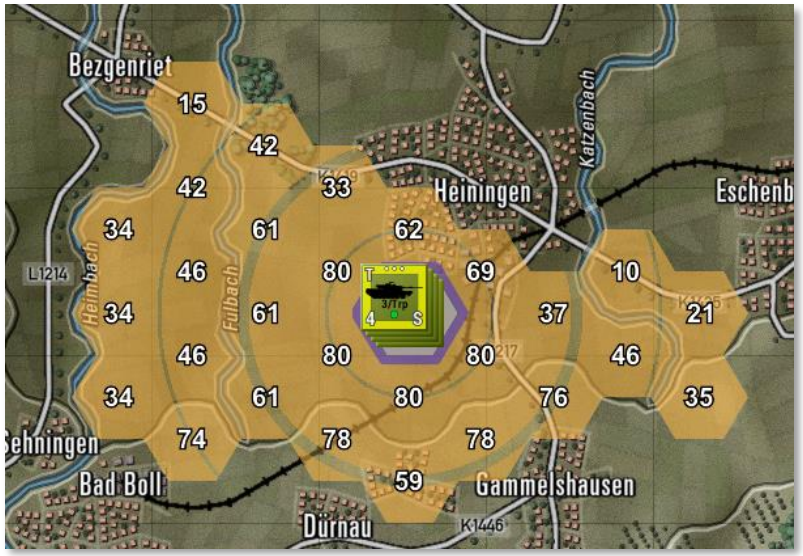
1. All units have a maximum spottable range – the range beyond which they cannot be spotted by the enemy. This is a complicated calculation using terrain, posture, number, and size of subunits, whether it is moving or shooting, the weather and visibility range, height above ground for helicopters and drones, special characteristics like 'stealth' or 'recon bonus', and the presence of improved positions.
2. Each professional game module (not commercial game modules) has a dedicated "FPC MagicNumbers.xlsx" file of game-level magic numbers that are loaded as soon as a module is selected on game launch. This file contains a set of numbers that override the original values hardwired into the game code. These numbers then get embedded when a scenario is created and then played.
   This file is not a true 'inject' file as it is not read in at scenario run time. It is a design-time data file, but see below.
3. Two new rows have been added to this file: "cSpottableRangePcMultBluer" for side 1 and "c cSpottableRangePcMultBlue" for side 2. These are percentage multipliers of the base spottable range for each side. The default value for each is 100 and the allowed range is 1 to 10,000. If the value is changed from 100 to 200 then all units of that side will be spottable at roughly twice the distance as before. It is not an exact visual doubling, due to hex rounding and terrain considerations in the newly included hexes, but it is close. If the spottable range was formerly 900 meters (rounded down to one hex @ 500 m per hex) and a factor of 300 is applied to it, the spottable range will now be 2700 meters (rounded down to five hexes) before specific terrain considerations.
4. To make testing and experimentation easier, a new command has been added to Umpire Mode that allows the umpire to reimport the module's FPC MagicNumbers.xlsx at any time. For example, if the umpire is in the scenario editor and loads an existing scenario where the default value was 100%, he or she can select a unit and ask to view the Spottable From range. It will show something like this:



5. Then the umpire can change the value in the FPC MagicNumbers.xlsx to "300", save it, and reload it into the game via this new menu item:



6. Selecting the same unit and executing Show / Spottable From will now give this result:



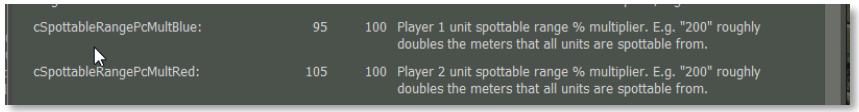
This screenshot shows a 'tripling' of spottable range give or take rounding error to the nearest hex and the effect of newly included terrain. This is rough justice but a good start in the right direction. There are a lot of other rules in play here, and just because a unit can be spotted at some longish range doesn't mean it will be, it depends on the overall context and not just the raw 'spottable meters'.

15.1 Limitations

- Since this is a player level adjustment, the two players can have different values and the new value will apply equally to all types of units on that side.
- Be aware that this data model change will have transition effects on current scenarios and saved games.
- Scenarios and games in progress saved before this new build will automatically use the new values found in the magic number

spreadsheet. They will have implicitly been using '100' until now, but if the value is currently '300' then that is what they will use without further ado.

- Starting with the new build, as soon as a scenario is opened and saved again, or as soon as a game in progress is saved again, then the magic number in effect at that instant will be saved and become the new default. If '300' was in effect at the time of saving then it will be saved, restored, and used again in the future, notwithstanding that the value in the magic number file might have changed since then. This is done to make the scenarios play consistently in the future, or at least to know what value they had been using most recently. (The danger is that newer, possibly temporary, values in the magic number file will silently alter the play of scenarios that were not meant to be changed.) Several scenario instances can be run this way, each with their own custom values, and not dependent on the central magic numbers file while they run. This is consistent with our other treatment of magic numbers.
- The Umpire Mode "Show Key Values Report" can be used at run time to see what the current value for cSpottableRangePercentMultiplier is set to.



- If there are a set of scenarios that should all be changed to use a new value of cSpottableRangePercentMultiplier then opening each in turn in the scenario and saving it will suffice to embed this new value and it will be used regardless going forward.
- If the user wants to change the values for a select few scenarios then this can be done by changing cSpottableRangePercentMultiplier in the magic number file, loading and saving just those scenarios, and then restoring cSpottableRangePercentMultiplier to the original value in the magic number file.
- As described above, the current value can always be looked up in the Key Values Report and can be changed on the fly by editing the spreadsheet and reloading it from disk.

16 Editable Unit Delays

When a unit is given an order it does not respond immediately. Three types of delay control how long it takes for the order to come into effect:

- HQ Transmission Delay. This represents the time it takes for an order to be given to staff and makes its way down the chain of command to the CO of the receiving unit. This is primarily based on the HQ Delays of the intervening HQs (5 minutes each if not moving, firing, or under fire, also electronic warfare hindrance) and whether they are within command range or not for each link.
- Unit Response Delay. This represents the time it takes from when the unit's CO receives the order to when he or she has worked out an implementation plan and communicated it to all subordinates. This typically takes 2 to 60 minutes for ground units and is a function of unit quality (training, morale, and readiness), and also if scooting.
- Orders Transition Delay. Once the new order has been received by the subordinates they have to stop their current order, process the new order, and start implementing the new order. Sometimes very little time is required, and the transition delay is zero. For complicated orders requiring some planning, instruction, and liaison (for example, Assault) this can take 30 minutes. The length of time depends heavily on the type of unit and what order it was previously implemented. There is a list of eleven transition categories for which a separate delay value can be given. Only one of these eleven categories will be used in any given situation.
- Fire Support Node Transmission Delay. For artillery requests where a unit other than the receiving artillery unit is calling for fire, a fire support request goes up the chain of command to a common HQ with the receiving artillery unit and then back down to the artillery unit. This imposes a delay on receiving fire support that is a function of the number of nodes traversed. The standard delay per node can be set in seconds (default is 30 seconds).

All of these delay values were hardwired into the game but now have been surfaced for inspection and editing. The values are contained in a

spreadsheet called "FPC National Inject.xlsx" which is found in the game directory "\Modules\Common\Data\Common\".

16.1 Editing Default Values

To edit the default values, open this spreadsheet and look on the Default tab for the row containing "UNIT ORDER DELAY FACTORS". The next rows will contain the explanatory captions in the "CASE" column and the values to use in the "DelayChangeValue" column. All values are in minutes except for the Fire Support Node Transmission delay which is in seconds.

There is one special case: If the "Basic Response Delay Ground" is set to "-1" then the original extended calculation will be used as described above. If a number from 0 to 60 minutes is provided, then that number will be used without modification.

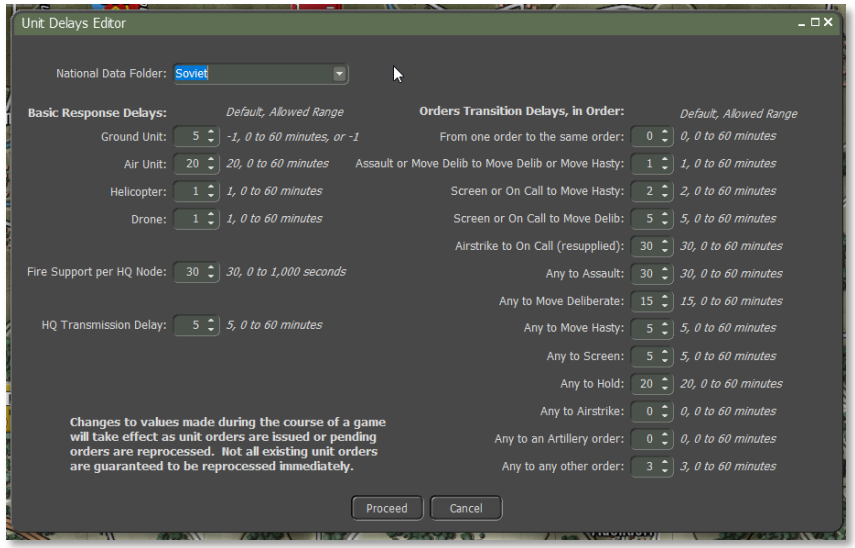
16.2 National Variations

The values on the Default tab will be used by default unless there is a national variation override. For example, if we want a custom variation for Donovian forces then we can create a new tab entitled "Donovian" and cut and paste the entire default tab sheet into it. With this pasted in, the data author can then make whatever changes desired, and these will take effect for any force that has a nationality of "Donovian". Where does the exact nationality name come from? Excel tab names have a very limited character width, so we had to use short names. If the data author looks in the folder <game>\Modules\Common\Data he or she will see all 'national names' as child folder names. For the Cold War data files this would be "American", "British, "Soviet" and "West-German". These are the names to use for national variations in the inject spreadsheet. A national variation need not be provided, if a matching name is not found then Default will be used instead.

These values will be loaded and used at scenario design time and will be embedded as the defaults in each scenario. This spreadsheet will also be loaded at run time and the values injected into the scenario or saved game about to be played. The original embedded values will be overwritten by any new values at that time. This allows a stock scenario to be run with a variety of different values in a sequence of tests without having to manually edit the scenario each time. It is important to remember that this is in effect when the FPC National Inject file is being altered or delightful confusion could result.

16.3 View and Edit

To make it clear what delay values are being used, a new report has been created for Umpire Mode that allows inspection and editing of these values. Under menu item "Umpire Mode" is an "View and Edit Unit Delay Factors…" menu item that brings up this display:



This shows all the values currently in use by all participating nationalities. Each item shows the current value (which may be edited) plus the original default value and the allowed range of new values. If changes are made they will take effect as new orders are given or pending orders are reprocessed by the game engine. Orders 'in progress' will not be updated.

17 Editable Readiness Gain and Loss Factors

"**Readiness**" is used in the broad sense of 'having what you need precisely where and when you need it'. Loss of readiness is a kind of micro-damage that causes units to underperform their potential. It is lost when movement or combat causes disorganization, or when wearing MOP gear or operating in a contaminated area. It is restored minute by minute as part of the internal housekeeping of the unit, and in particular, when the unit resupplies – a quick internal reorg and fix up is assumed to be part of that.

There are a number of events or activities that have hardwired readiness costs or benefits. These values have been surfaced for inspection and editing. They are contained in a spreadsheet called "FPC National Inject.xlsx" which is found in the game directory "\Modules\Common\Data\Common\".

17.1 Editing Default Values

To edit the default values, open this spreadsheet and look on the Default tab for the row containing "UNIT READINESS FACTORS". The following rows will contain the explanatory captions in the "CASE" column and the values to use in the "ReadyChangePercent" column. All values are in percentages and so should be in the range of 0 to 100. Decimal values are allowed, e.g. "1.5".

The one exception is "Loss recovery per hour" where "-1" has a special significance. The engine calculates how many readiness points a unit can recover per hour based on training and morale. This number is shown as the "Readiness Recovery" rate in the unit dashboard. This number divided by sixty is added to the unit Readiness value once a minute while turn resolution is happening. If a value other than "-1" is specified then that value is applied on a declining value basis. For example, if a unit with 50% Readiness loses 10%, then it loses 10% of 50% and goes to 45% Readiness.

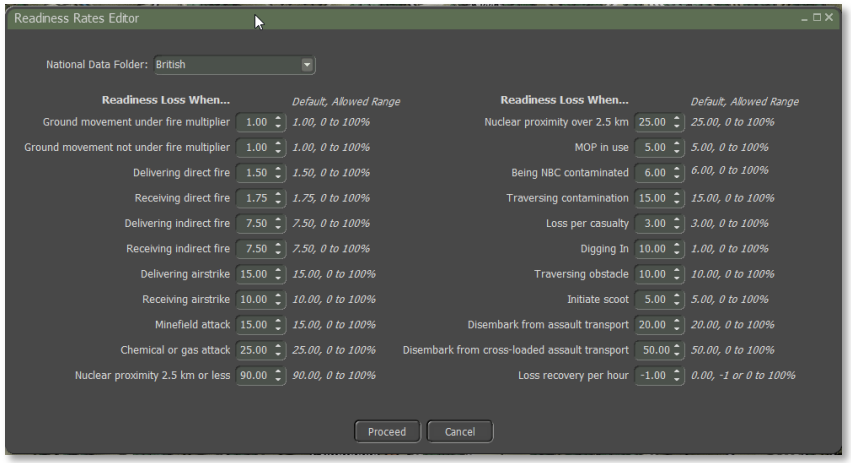
17.2 National Variations

The values on the Default tab in the injects spreadsheet will be used by default unless there is a national variation override. For example, if we want a custom variation for Donovian forces then the data author can create a new tab entitled "Donovian" and cut and paste the entire default tab sheet into it. With this pasted in, the author can then make whatever changes desired, and these will take effect for any force that has a nationality of "Donovian". Where does the exact nationality name come from? Excel tab names have a very limited character width, so we use short names. If the author looks in the folder <game>\Modules\Common\Data he or she will see all 'national names' as child folder names. For the Cold War data, this would include "American", "British, "Soviet" and "West-German". These are the names to use for national variations in the inject spreadsheet. A national variation need not be provided, if a matching name is not found then Default will be used instead.

These values will be loaded and used at scenario design time and will be embedded as the defaults in each scenario. This spreadsheet will also be loaded at run time and the values injected into the scenario or saved game about to be played. The original embedded values will be overwritten by any new values at that time. This allows a stock scenario to be run with a variety of different values in a sequence of tests without having to manually edit the scenario each time. It is important to remember that this is in effect when the FPC National Inject file is being altered or delightful confusion could result.

17.3 View and Edit

To make it clear what readiness values are being used, a new report has been created in Umpire Mode that allows inspection and editing of these values. Under menu item "Umpire Mode" is a "View and Edit Readiness Factors…" menu item that brings up this display:



This shows all the values currently in use by all participating nationalities. Each item shows the current value (which may be edited) plus the original default value and the allowed range of new values. If changes are made they will take effect immediately.

NOTE: Some items remove readiness, and some add to it. There is no inherent balancing mechanism so the data author must use some care in setting values. If the depleting values are too high relative to restoring values then the unit will tend towards 0% readiness as the game progresses. If the depleting values are too low then the unit will tend towards 100% readiness.

17.4 Logging

The data logging will record the readiness values used at the instant they are assessed. The fact that they have been changed in the editor is not logged.

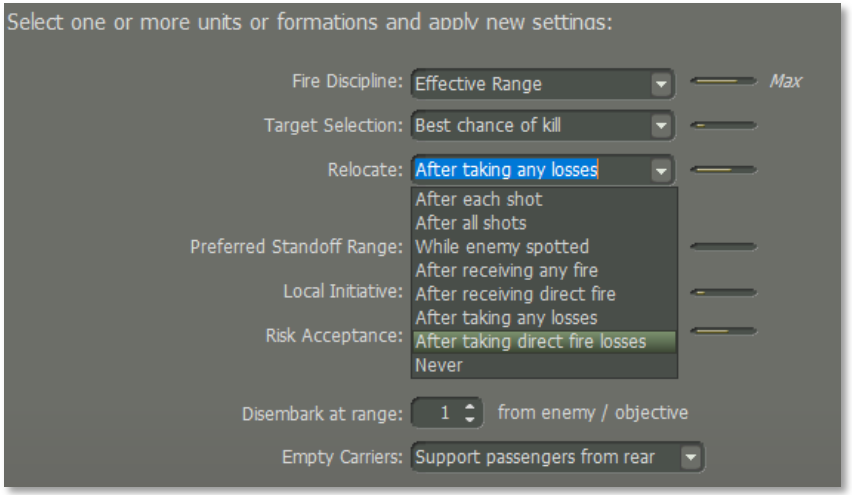
18 Unit Behavior on Receiving IDF

The player and scenario designer have been given more control over unit behavior on receiving indirect fire.

18.1 IDF Sensitive SOP Settings

The SOP relocation conditions have been refined to distinguish between direct fire and indirect fire, and units can now be told to:

- Relocate after receiving any fire (so direct or indirect fire)
- Relocate after receiving direct fire (so ignoring indirect fire)
- Relocate after taking any losses (so from direct or indirect fire)
- Relocate after taking direct fire losses (so ignoring losses from indirect fire).



With these options for SOP (and the existing option to 'never' relocate), groups of units can be ordered to continue movement when receiving direct fire and or indirect fire.

These options also apply to all other orders, for example screening or holding positions.

19 Emitters and EMS

Units can now set electromagnetic systems like radars on and off and also introduced ESM capability to find and locate enemy units that ares broadcasting EM signals (radars).

19.1 Data

Four new columns have been added to EQ-SN in carebears spreadsheet. A lot of the EQ-SN specials have these new capabilities ("TRUE")

AQ	AR	AS	AT
IsEmitter	AirRdr	GndRdr	CMARdr
TRUE	TRUE		
TRUE	TRUE		

Nine new columns have been added to EQ-RC for detecting emitters.

O	P	Q	R	S	T	U	V	W
CanDetectGndRdr	GndRdrDetectRg	GndRdrClassifyRg	CanDetectAirRdr	AirRdrDetectRg	AirRdrClassifyRg	CanDetectCMARdr	CMARdrDetectRg	CMARdrClassifyRg
TRUE	10000	6000	TRUE	8000	5000	TRUE	6000	4000

CanDetectGndRdr, GndRdrDetectRg, GndRdrClassifyRg, CanDetectAirRdr, AirRdrDetectRg, AirRdrClassifyRg, CMARdrDetectRg, and CMARdrClassifyRg.

Only the new "ESM10" shared characteristic has these capabilities.

"PMW United States Army" US701 'ESM Vehicle' is the only unit that has an ESM10 ability.

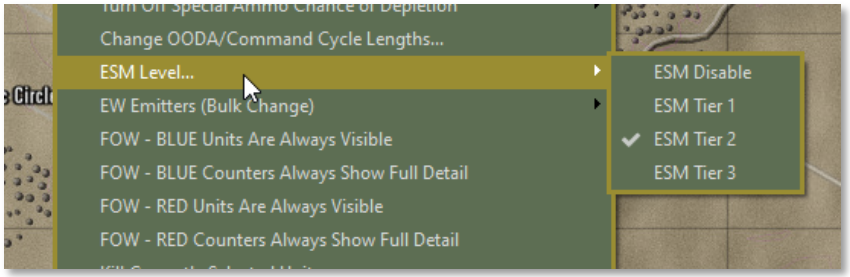
The requirement clearly says "detect", "recognize" and "identify" are the labels we should use. I'm pretty sure elsewhere they specified "detect", "classify" and "identify". Need to clarify.

19.2 Command Line Parameters

The command-line parameters "/ESMTier <ESMTierLevel>" works but the 'energizePlayer1emitters' and 'energizePlayer2emitters' have been disabled. The game defaults to ESMTier 2 now if there is no command-line override, whereas before it defaulted to Off.

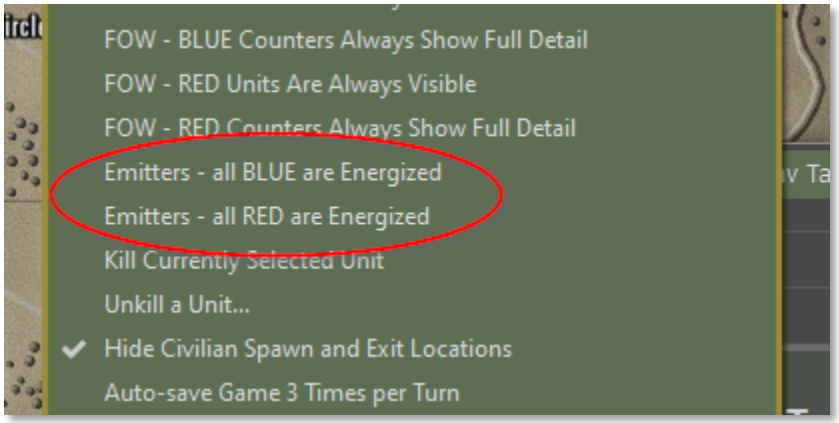
There is an Umpire menu item for ESM modeling choices. This sets the desired Game.EsmTierLeval and forces an immediate complete spotting update. EsmTierLevel is also persisted in the TGame Load/Save routines too now. This feature will be useful for DSTL testing.

NOTE: "Tier 3" is not enabled yet.



The umpire menu has commands to turn on/off all emitters at once per side. This duplicates the original command line params for energizing sides. If absolutely all emitters for a side are energized then the menu item is checked.

NOTE: If one or more are shut down then the menu item is not checked.

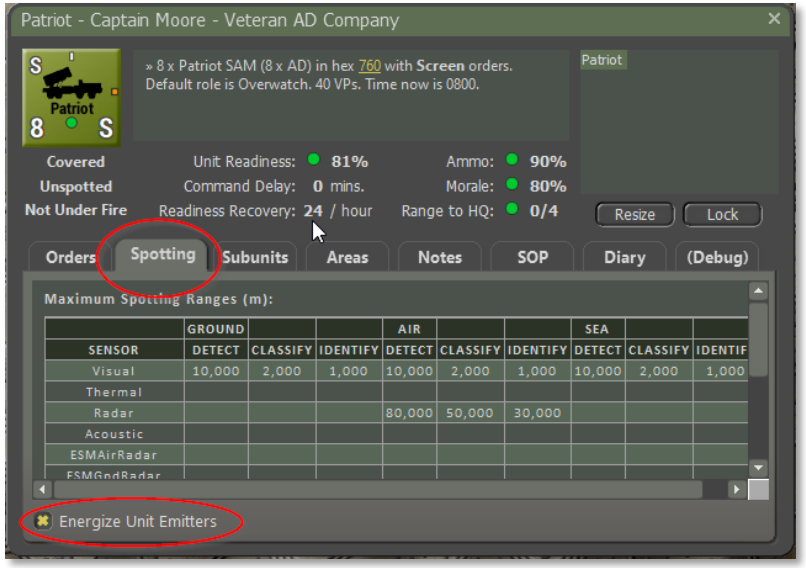


19.3 Emitting Pip

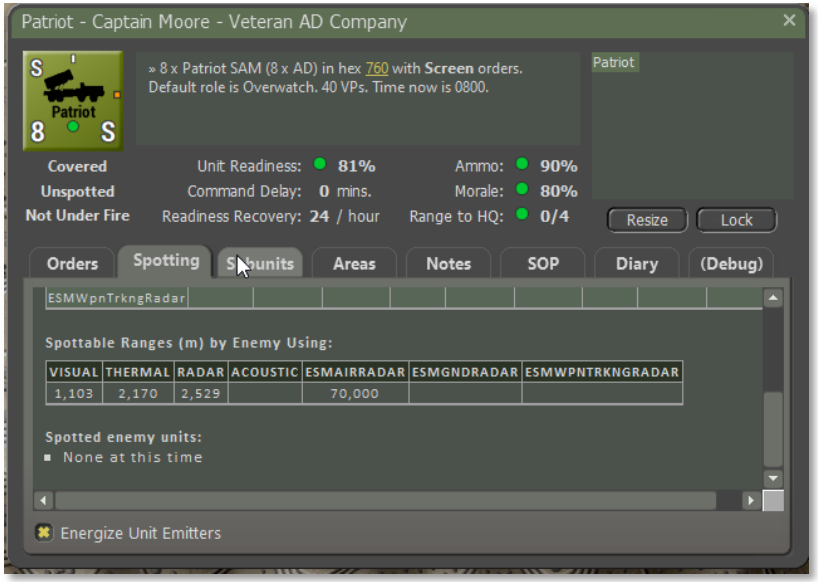
When a unit is emitting there is a new orange pip showing on the right-hand side. When it is not emitting nothing is drawn where the pip is.

19.4 Dashboard Spotting Tab

There is a new Spotting tab in the unit Dashboard. If the unit can emit then a panel at the foot of the spotting report is made visible. If the unit is actually emitting then the appropriate checkbox is checked. Unchecking it shuts down the unit emitters.



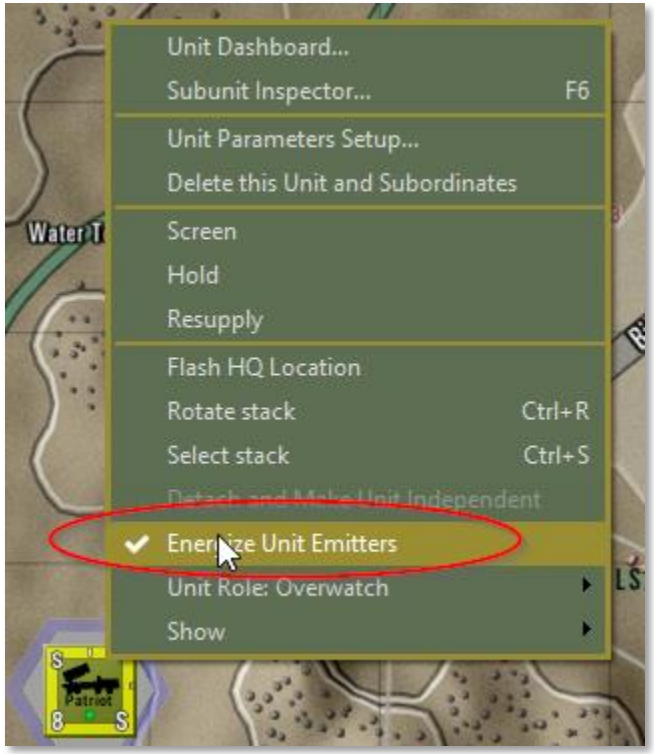
This Patriot unit has radar (an emitter). The rest of the report is shown below.



ESM detector units have a more interesting spotting grid:

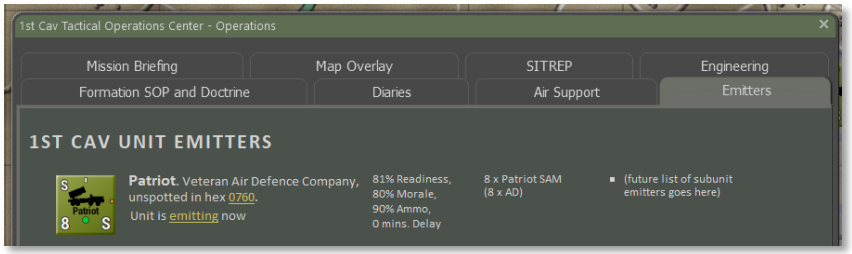
	GROUND			AIR			SEA		
SENSOR	DETECT	CLASSIFY	IDENTIFY	DETECT	CLASSIFY	IDENTIFY	DETECT	CLASSIFY	IDENTIF
Visual	10,000	2,000	1,000	10,000	2,000	1,000	10,000	2,000	1,000
Thermal									
Radar									
Acoustic									
ESMAirRadar	8,000	5,000		8,000	5,000		8,000	5,000	
ESMGndRadar	10,000	6,000		10,000	6,000		10,000	6,000	
ESMWpnTrkngRadar	6,000	4,000		6,000	4,000		6,000	4,000	

Each unit also has a right-click popup menu item to turn emitters on and off.



19.5 Operations Emitter Report

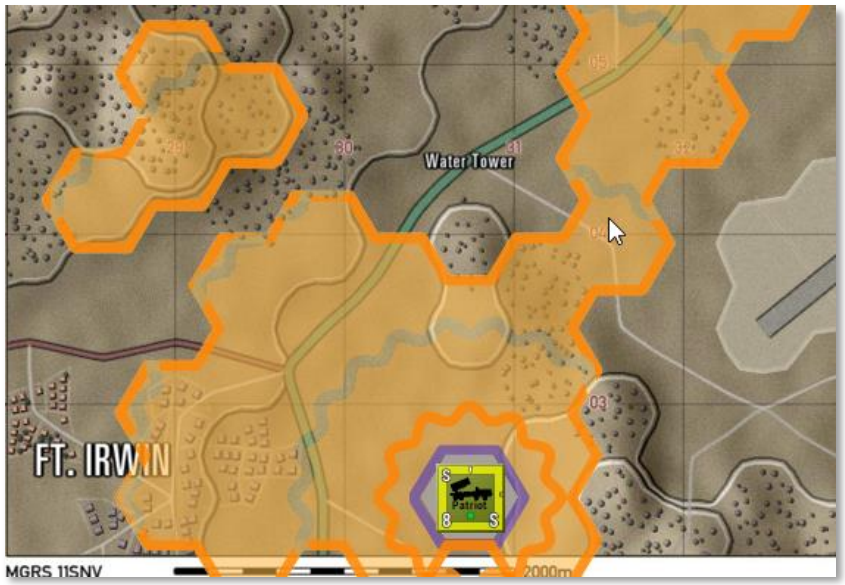
To quickly find all your emitters, use the TOC Operations Emitter report.



1. Click on the hex location hyperlink to flash the hex and locate the unit.
2. Click on the "emitting" or "NOT emitting" hyperlink to toggle it on/off.

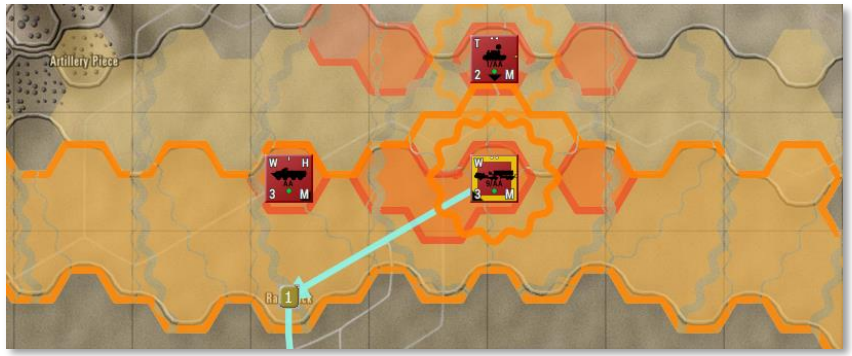
19.6 Visualizations

Unit right-click popup menu > Emissions will show the hexes that the emitter is emitting into, limited only by the ground/elevation and range.



When the emitter is off the overlay shows this distinctive pale blue wavy line color instead (as seen below).

Main menu > View > Multi-Unit Show > All Emissions will create an overlay with all the emitters overlays combined. The overlay of the currently selected unit will be darker and with a dark border.



When an enemy unit is spotted by emissions only, the enemy counter will be shown with the symbol on the right. This is electromagnetic detection only and does no classify they type of emissions.

20 Detail on Spotting

The following sections dive deeper into the Spotting Model or note additional features and adjustments.

In order to react to or fire on an enemy units, it must be spotted first (visible in some manner to the spotting unit) by some sensor(s) within the spotting unit. Range, weather, time of day and the composition and state of the enemy unit all impact the spotting chance.

20.1 Simple Optical Sensors (OPT)

All units have sensor OPT (optical spotting -eyeball and low-level optical zoom) added to them in code. The ranges for Detection, Classification, and Identification can be found in the Shared Characteristics spreadsheet and the ranges can be modified from there.

For those Units/Platforms that do not have an optical capability, there is a shared characteristic called "NOPT". This will suppress the addition of an OPT characteristic being assigned to the unit at game run time.

NOPTs have initially been added to static SAM units (Like Hawk and Patriot) and to Mobile SAMs and more may follow as required with new unit types.

20.2 Spotting States

In-game there are four basic states of spotting.

- UnDetected – Enemy target unit is not in range of any friendly unit's sensors
- Detected - Target is found and determined to be a target and not part of the environment
- Classified - Enough information about the target is collected to determine threat level to friendly forces
- Identified – More information allows for make and model or AFVs or functionality of infantry squads and teams

20.3 Spectrum of Sensors

The ability to detect an object varies based on the type of sensor being used to locate it.

20.3.1 Types of Sensors/Spectrum In-Game

The following list of sensors is currently supported in-game and each sensor is rated in three ranges (Detect, Classify, and Identify). These are the base ranges that a unit may see an enemy unit.

- Visual (Eyeball) – Basic 20/20 human sight
- Visual + Zoom (Eyeball + Optics) – Sight augmented by binoculars
- Visual + Night (Eyeball + SWIR) – Sight with Short Wave IR
- Visual + Thermal (Eyeball +M/LWIR) – Sight with Medium or Long Wave IR
- RF (Radars: Ground, Air/Space) – Air or Ground Search radars of any frequency band

20.3.2 Future Sensors/Spectrums

The following list are sensors or spectrums we plan to address in future builds as time allows.

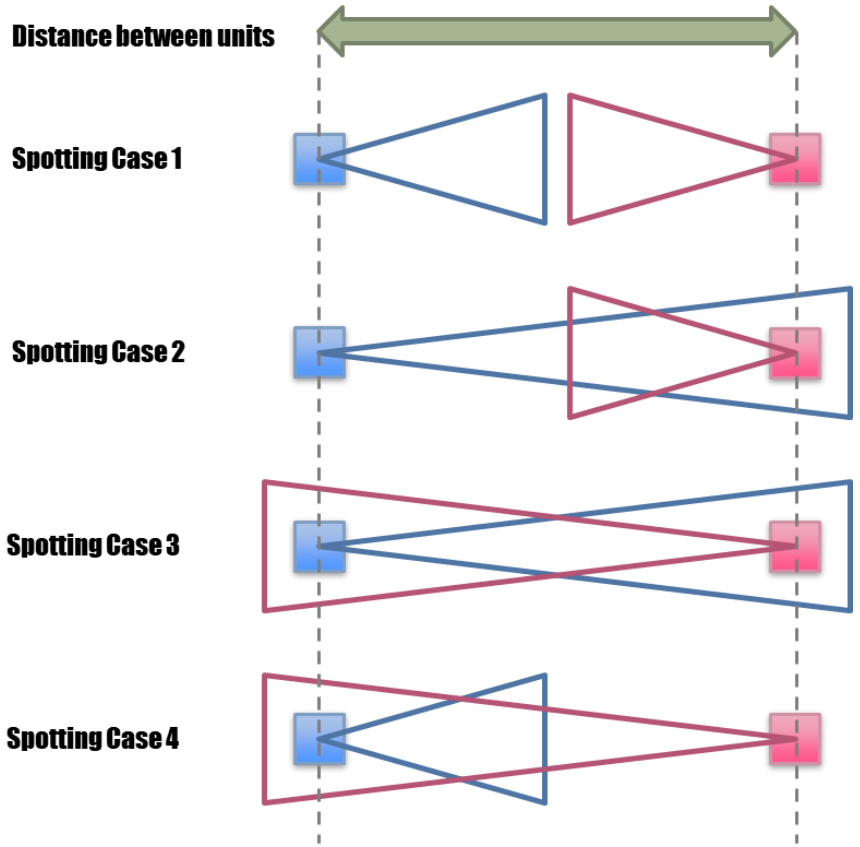
- Audio (Ear/Microphones)
- LIDAR (Laser/CPU: Ground cover removal)
- Sonar (Audio: Underwater)
- Others: MAD, Gravity, God's Eye, Bio/Chemical, Seismic

20.4 What is Spotting

Spotting in game terms if the ability of a sensor to be in range of a possible target and that target presents a large enough spottable range to overlap the sensor. This is the basic game engine model that is in use.

In the following case graphics, we have the possible outcomes of a Spotting Chance based on an arbitrary distance between units

- Case 1: Neither the sensor range or the spottable range match or exceed the distance between units
  - No Detection
- Case 2: Sensor is in range, but the spottable range falls short
  - No Detection
- Case 3: Sensor is in range and spottable range covers the sensor
  - Detection made (Current Model)
- Case 4: Sensor is short of range, but the spottable range covers the sensor
  - Not a case currently and the question is should it be and what does it mean
  - To me this is a bearing only type detection since my sensor "sees" something, but cannot resolve any kind of range



20.4.1 Sensor Ranges

Each sensor active in the game has a max detection range. This range during and spotting attempt can be attenuated by various factors like weather (rain and fog), and time of day (Dawn, Day, Dusk, and Night).

20.4.2 Spottable Ranges

One aspect of our spotting model that needs some explanation is the spottable range of the enemy unit. Each unit produces a spottable range signature based on its domain (air or ground), composition (type and number of AFVs and Troops in the unit), Orders (movement versus

stationary/landed), Posture (exposed to dug-in), and Weapons Fire (large signature boost based on weapons fired).

There is also an attenuation based on various shared characteristics that impact spottable range. These are Stealth Class characteristics.

20.5 Levels of Detection

Assuming we have spotted an enemy unit, the model needs to determine what level of information is returned about the enemy unit as noted in the cases below.

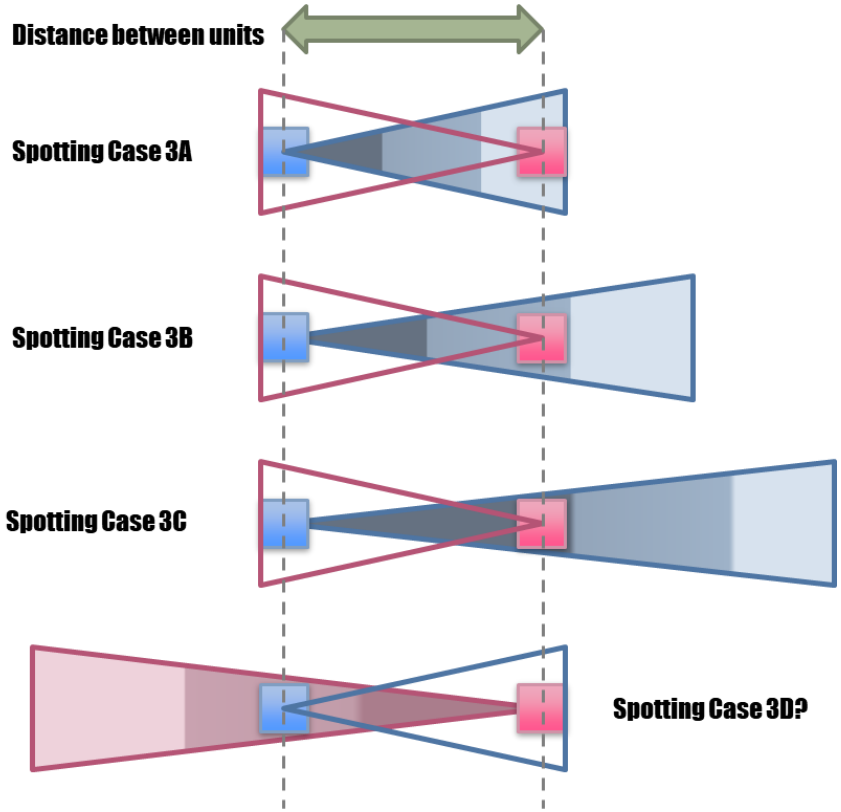
Case 3A: In the Detection range band and shown as a "?" on the counter. Lower right counter in the game picture Landed Helo (R).

Case 3B: In the Classify band and shown as basic silhouette on counter.

Case 3C: In the Identify Band and shown with all info (fog of war on unit counts) on the counters. Lower left HQ unit with one platform/squad.

Case 3D(?): This case when the spottable range far exceeds the detected target is under design consideration as a mechanism to bump up the state of detection when the target presents overwhelming signature data.

NOTE: Case 3D is not currently modeled in-game.



20.6 Additional Spotting Information

Radars now detect in their specific domains. Air Search Radar (ASRs) will detect flying platforms (airstrikes, helicopters, or drones) and Ground Search Radars (GSRs) will detect AFVs, troops and landed helicopters and drones.

Optical and Thermal systems can look for enemy targets in both domains.

The best level detection is shown on the counter on the game map.

At night, Night Vision Systems require a non-zero level of illumination to see.

21 Changes to Indirect Fires (IDF)

The following key items are addressed in these changes to the IDF model in game:

- Ability to edit barrages, and adjust munition type, number of rounds, duration, and time-on-target
- Change delivery of artillery fires from an "all rounds simultaneously" to rounds fired over the duration of the mission
- Maximum fire rate defaults, and controlled by magic numbers (still in work)
- Overview of scheduled fire missions including end-time

Additional items changed with IDF connections:

- Off-map units previously were positioned at a vaguely defined off-set, complicating range checks. Because of that, we used three variants of range checks and combat mechanics: on-map vs on-map, on-map vs off-map, and off-map vs anything.
  Aside from complexity, it also led to weird behavior where an off-map mortar unit was able to cover all of the map, and where long-range on-map units sometimes were unable to target off-map units.
- By placing off-map units at true 2D offsets from the map's center, we can simplify the game internals to using one range-check and one combat mechanic for artillery. And enable the scenario designer to limit off-map fire support cover to specific parts of the map.
- These facilities remove the need for anonymous counter-battery fires.

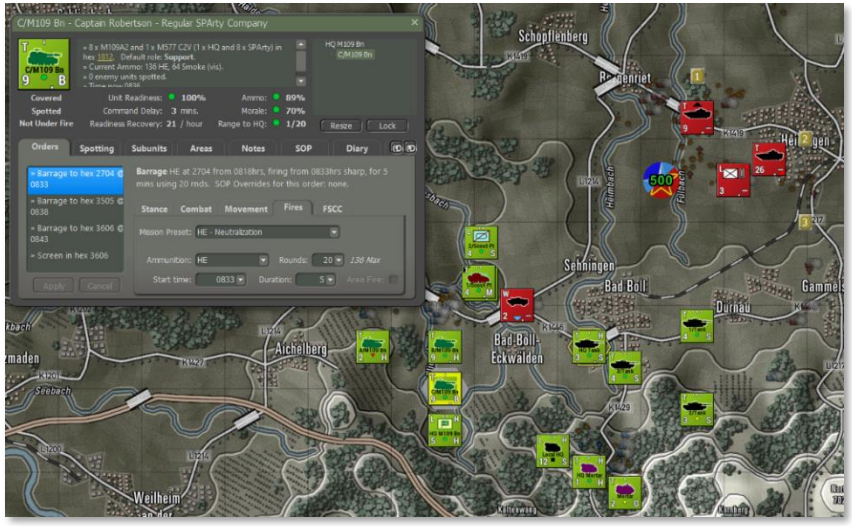
21.1 Issuing Unit Barrage Orders

Despite the changes the indirect fire, the main way to issue barrages remains the same: Barrages can be ordered from the unit's drop-down menu. The menu reflects the ammo types available, and, for HE, different mission intensities.

A barrage accepts up to 6 targets, each of which results in a separate barrage order.

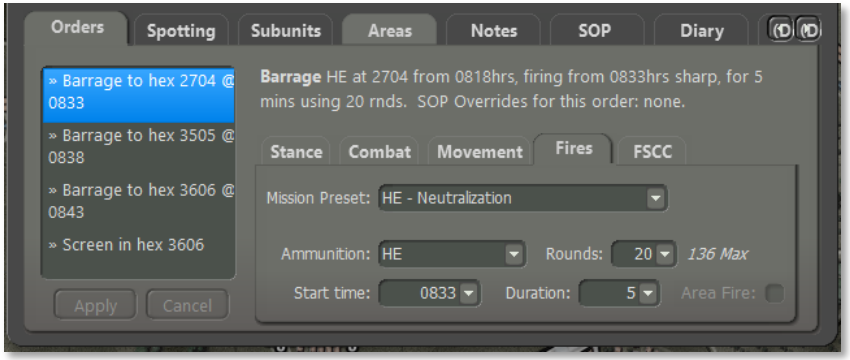
21.2 Modifying Barrage Orders in the Unit Dashboard (NEW)

The Unit Dashboard will show the fire mission details for each of the targets. Details are shown, per fire mission in the 'Fires' tab. The target locations are also shown as waypoints ("1", "2", etc.) on the map, and can be dragged to alternative positions within the unit's maximum range.



A fire mission is defined by the ammunition, the total number of rounds to be fired, the mission duration, the start time, and whether the fire mission covers a wider area than a single hex. The latter option is only available for units with a "WAFP" special that are able to saturate a large area (i.e. MLRS and BM rocket launchers).

NOTE: The game defines fire missions in total number of rounds for *all guns combined*, not in number of rounds per gun (as a FO might define it). The game looks at the mission from an overall commander's perspective, with focus on overall effect, and without requiring knowledge of the unit's gun count. However, gun count is considered, and a unit with fewer guns might need more time to fire the same number of rounds.

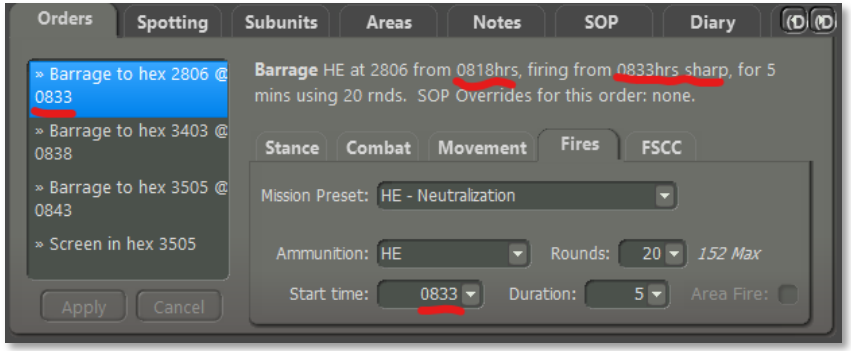


To quickly select a fire mission, one can choose a 'Mission Preset', which will fill the 'ammunition', 'rounds' and 'duration' and 'area fire' fields. Only those presets which apply to this unit's capabilities and ammo load are being shown. When changes are made to 'ammunition', 'rounds', 'duration' or 'area fire' such that they no longer match a preset, the 'mission preset' will show 'Custom'.

When increasing the number of rounds to be fired, the mission duration value will be automatically increased if the unit's number of guns and maximum firing rate is insufficient to fire the mission in the earlier allotted duration.

The fire mission by default is set to start ASAP (as soon as possible), which means as soon as the previous order is completed, and new orders have been received (command delay), and instructions have been given to the subunits (response delay), and the unit has deployed appropriately (orders transition delay). Command delay is zero for the second and later targets. The orders transition delay is zero when transitioning to a similar order. All three delays are zero for orders issued prior to the start of the scenario.

Alternatively, the start-time can be fixed to a specific time (but no earlier than the time corresponding to ASAP), which may be helpful synchronizing fires. The start-time dropdown offers those start-times (in steps of two minutes for near-future times, and larger steps for later times).



This distinction between the barrage order's start time and the first rounds being fired is listed in the orders description in the dashboard.

21.3 Gun-Count (Tube Count) and Firing Rate

A unit gun or tube count is determined as follows:

- Count of class FGN (field gun) + class (MTR) weapons that are active, plus
- Max ammo count in ammo package for class RKT (rocket artillery) weapons

The unit's firing rate is determined (hard-wired) as follows:

- 2 rounds per minute per gun for field guns (FGN)
- 6 rounds per minute per tube for mortars (MTR)
- 10 rounds per minute per gun for rocket artillery (RKT)

21.4 Execution of a Fire Mission

When it is time to fire the first rounds, the firing unit determines the number of guns / tubes available, the number of rounds to fire, and the mission duration.

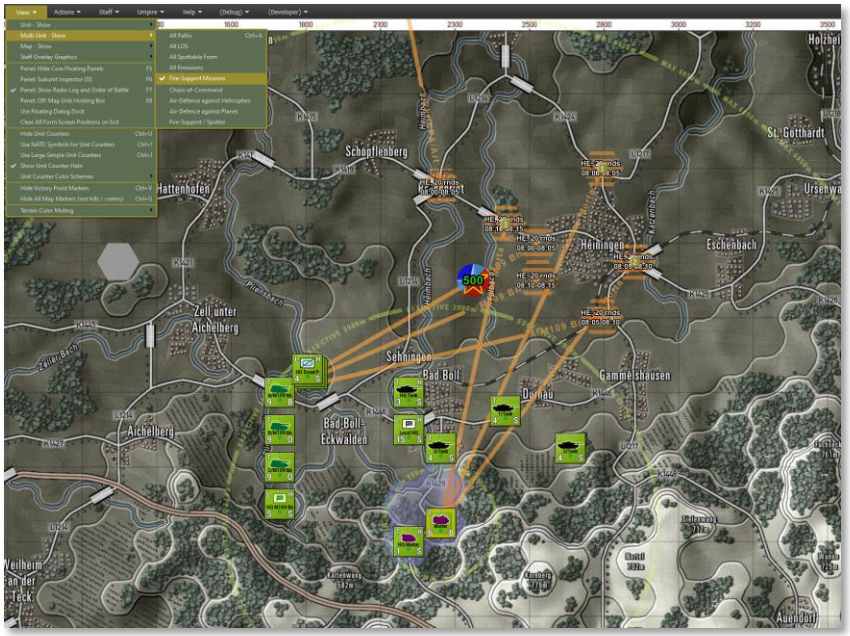
Based on those inputs, the number of rounds per gun is determined, and the interval between rounds. Based on these timings, the unit will fire one or more volleys, and attempt to deliver the requested number of total rounds.

When the unit loses guns or tubes during execution of the fire mission, it attempts to fire the previously determined number of units (and not increase the number of volleys to compensate for the loss).

When the mission's end-time is reached, no more rounds will be fired for that mission, whether all requested rounds have been fired or not.

When the mission starts later than planned, the unit will attempt to fire the requested number of total rounds, while respecting the end-time and maximum fire rate.

21.5 Fire Support Missions Overlay

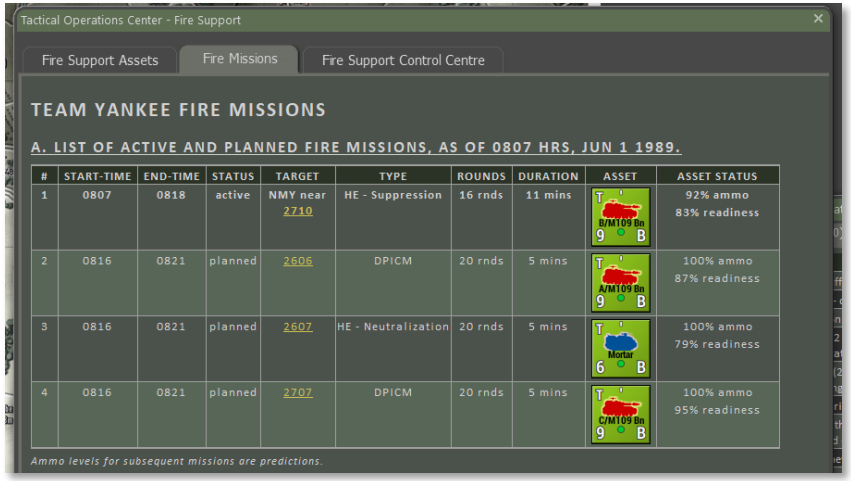


The Fire Support Missions overlay has been modified to show the mission targets, along with time of first round, time of last round, number of rounds and ammo type. For the selected artillery unit, the

maximum range, effective range, and, if applicable, the minimum firing range rings are being displayed.

21.6 TOC.FS and FSCC Modifications

In the Tactical Operations Center, the Fire Support staff provides an overview of active and planned fire missions.

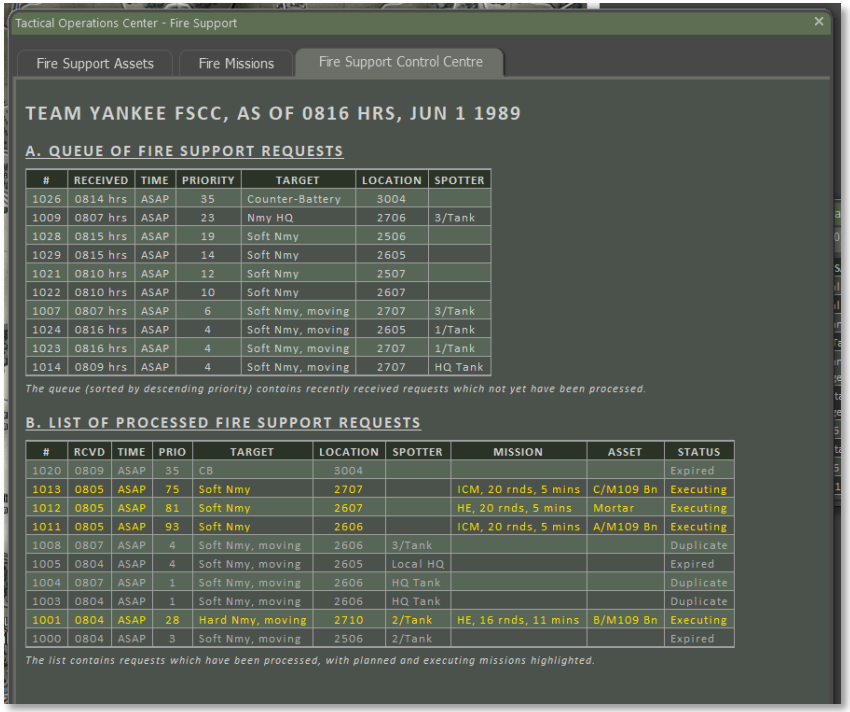


#	START-TIME	END-TIME	STATUS	TARGET	TYPE	ROUNDS	DURATION	ASSET	ASSET STATUS
1	0807	0818	active	NMY near 2710	HE - Suppression	16 rnds	11 mins	B/M109 Bn 9 B	92% ammo 83% readiness
2	0816	0821	planned	2606	DPICM	20 rnds	5 mins	A/M109 Bn 9 B	100% ammo 87% readiness
3	0816	0821	planned	2607	HE - Neutralization	20 rnds	5 mins	Mortar 6 B	100% ammo 79% readiness
4	0816	0821	planned	2707	DPICM	20 rnds	5 mins	C/M109 Bn 9 B	100% ammo 95% readiness

For every mission, the time of the first rounds (start-time) and end-time are displayed, as are the target, mission / ammunition type, number of rounds and duration.

In addition, the asset shooting the mission and its status are shown.

The Fire Support staff also provide an FSCC report, providing insight in the requests submitted to the FSCC, and the missions being generated in response to these requests.



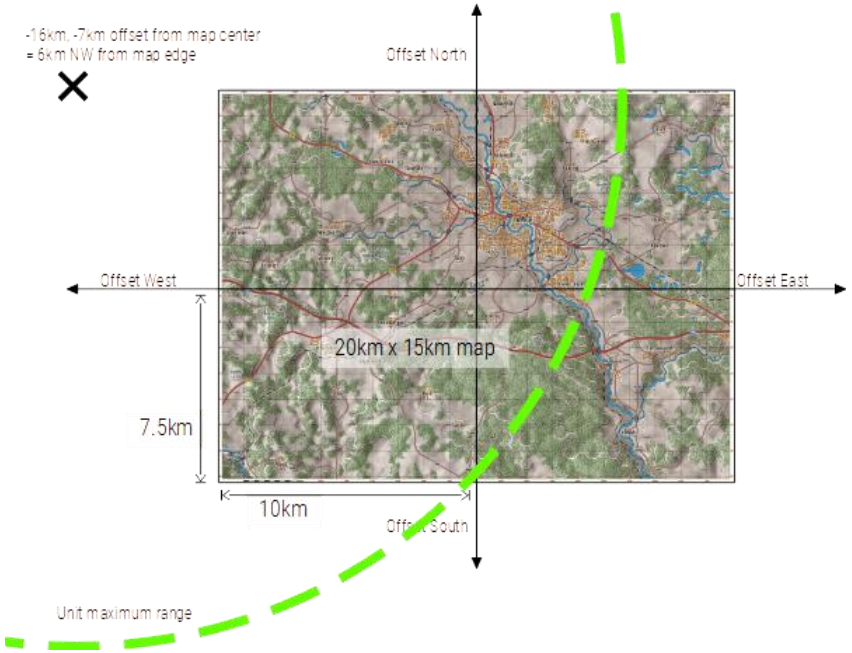
#	RECEIVED	TIME	PRIORITY	TARGET	LOCATION	SPOTTER
1026	0814 hrs	ASAP	35	Counter-Battery	3004	
1009	0807 hrs	ASAP	23	Nmy HQ	2706	3/Tank
1028	0815 hrs	ASAP	19	Soft Nmy	2506	
1029	0815 hrs	ASAP	14	Soft Nmy	2605	
1021	0810 hrs	ASAP	12	Soft Nmy	2507	
1022	0810 hrs	ASAP	10	Soft Nmy	2607	
1007	0807 hrs	ASAP	6	Soft Nmy, moving	2707	3/Tank
1024	0816 hrs	ASAP	4	Soft Nmy, moving	2605	1/Tank
1023	0816 hrs	ASAP	4	Soft Nmy, moving	2707	1/Tank
1014	0809 hrs	ASAP	4	Soft Nmy, moving	2707	HQ Tank

#	RCVD	TIME	PRIO	TARGET	LOCATION	SPOTTER	MISSION	ASSET	STATUS
1020	0809	ASAP	35	CB	3004				Expired
1013	0805	ASAP	75	Soft Nmy	2707		ICM, 20 rnds, 5 mins	C/M109 Bn	Executing
1012	0805	ASAP	81	Soft Nmy	2607		HE, 20 rnds, 5 mins	Mortar	Executing
1011	0805	ASAP	93	Soft Nmy	2606		ICM, 20 rnds, 5 mins	A/M109 Bn	Executing
1008	0807	ASAP	4	Soft Nmy, moving	2606	3/Tank			Duplicate
1005	0804	ASAP	4	Soft Nmy, moving	2605	Local HQ			Expired
1004	0807	ASAP	1	Soft Nmy, moving	2606	HQ Tank			Duplicate
1003	0804	ASAP	1	Soft Nmy, moving	2606	HQ Tank			Duplicate
1001	0804	ASAP	28	Hard Nmy, moving	2710	2/Tank	HE, 16 rnds, 11 mins	B/M109 Bn	Executing
1000	0804	ASAP	3	Soft Nmy, moving	2506	2/Tank			Expired

(The "B." section is only available when debugging the game).

21.7 Scenario Editor: Placing Units at Specific Off-Map Locations

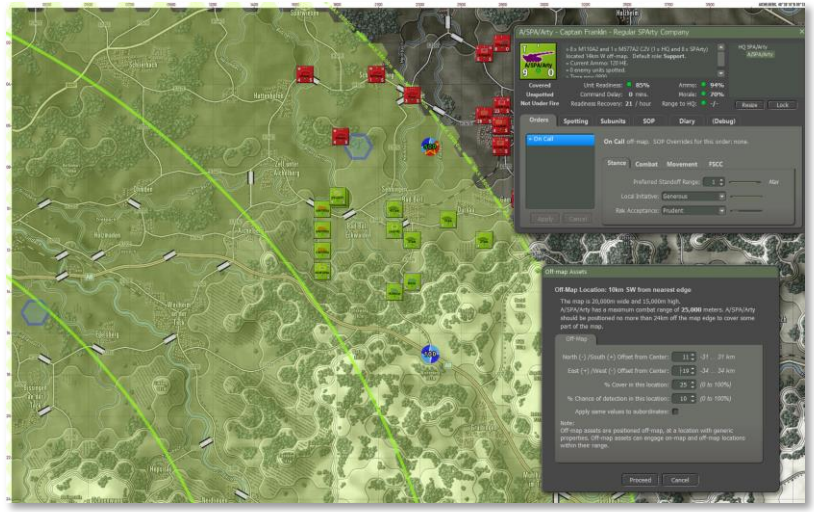
The placement of off-map unit has changed to an explicit off-set from the map center (in north-south direction, and in east-west direction), to facilitate range checks.

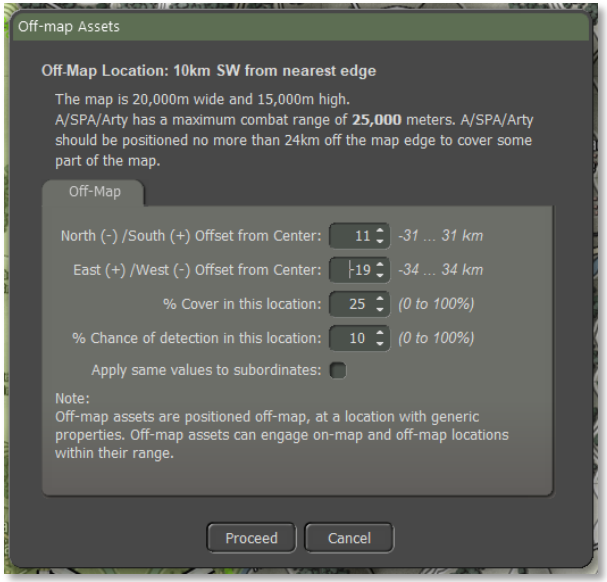


The offset is interpreted as shown above:

To be off-map, the unit's position needs to exceed half the map's width in east or west direction, or half the map's height in north or south direction. That position will be described as an offset to the nearest edge, and a compass direction from the map center (6km NW from the map edge in the example above).

When placing artillery units off-map, their range will be displayed by means of multiple range rings, in order to enable the scenario designer to see and adjust that artillery unit's coverage of the map.





22 Ammunition Round Counting and Types

Units, as defined in the national era spreadsheets on the Units tab, have weapons systems as defined in the Systems tab. Each weapon now has one or more ammo loads which may, in turn, be separately defined for different munition types.

22.1 Changes from Previous Builds

In the past, each weapon system specified in the Units tab had a column for 'Integrated Weapons List' that specified each weapon and the number of rounds it carried. These rounds are now tracked and decremented as they are used. Prior to now, only the 'average % ammo remaining' was tracked, and arbitrary special rules were required for high-value low-count items like ATGM ammunition. This resulted in distortions in outcomes, subjected the player to randomly running out of key ammunition, and made planning harder. Ammo supplies for each weapon are now tracked individually and can be looked up.

Further, weapons such as heavy artillery have a variety of real-world munition types available to them such as HE, ICM, smoke, FASCAM, chemical and nuclear. These different types of munitions can be entered into a new tab sheet and used as desired in the game. They are not required for all weapon systems, but are available as an option for those where it matters.

For backwards compatibility, the scenarios all still work as designed. They are converted automatically to the new format when loaded. The prior national datasheets all still work as before, but can now be extended to take advantage of the new munition types as shown below.

This encompasses our earlier notion of 'simple round counting' where different weapons will each keep their tally of rounds expended, and also the 'advanced round counting' where different types of munition for the same weapon (AP, HEAT, HE, Smoke) are distinguished and have separately tracked counts. For the weapon systems that need it, the data author can now specify the exact types of round and their exact characteristics on a brand-new tab sheet in the national XLS files.

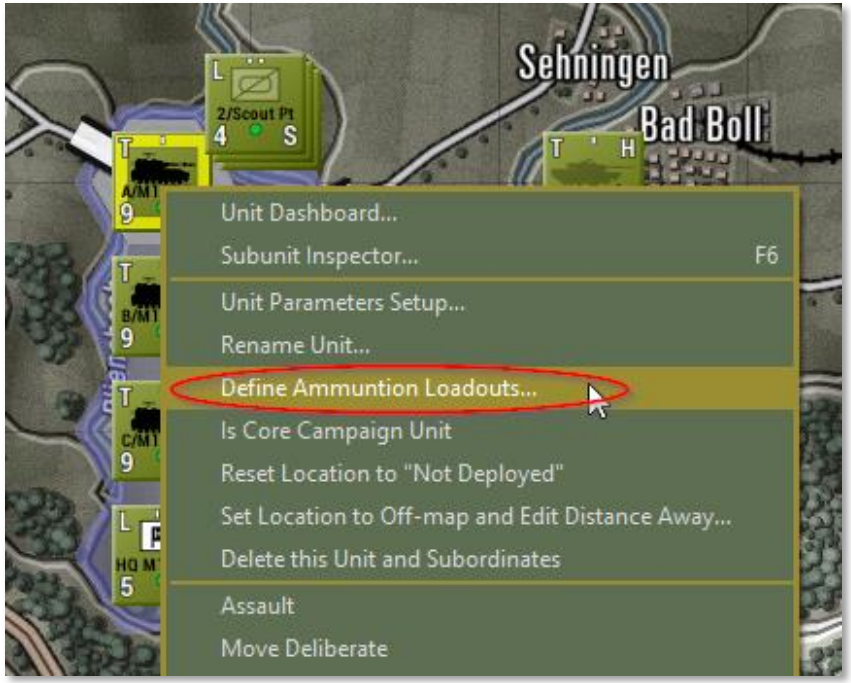
Example: If you open the "CW 80s United States.xls" and go to the "Units" tab, you can scroll down to US617 "81mm Mortar" (row 186) and see that column "U" (Integrated Weapons List) shows a value of "MTR8: MTR8_HE*50; MTR8_SMN*10, SMA5*60, EXP2*2". "MTR8" is the 81mm M252 mortar as defined in row 77 of the Systems tab. The two Tier 3 munition types are "MTR8_HE" and "MTR8_SMN" which have 50 and 10 rounds respectively in this loadout. "MTR8_HE" and "MTR8_SMN" are defined on the new "Munition Types" page along with any others for this system. Note the use of the colon character to tell the game that defined munitions are about to be referenced, and the semicolon character to separate the different defined munitions that belong to the same weapon. The last two weapons in the series, the SMA5 (M16 rifle) and the EXP2 (hand grenade) revert to the old comma + weapon tag + "*" + ammo count format, and are simply added on at the end. The Cold War United States and Soviet national XLS files have a number of tank and artillery gun systems that have been set up to illustrate how this works.

22.2 Using this Feature

First, update the data files for the weapons that you want to have multiple munition types for. Create the new munition types and then have the units explicitly reference them as described above.

Then update pre-existing scenarios with the usual scenario data refresh procedure. This will import the new data file entries.

In the scenario editor, invoke the new Munition Allocation editor to change the default munition type loadouts.

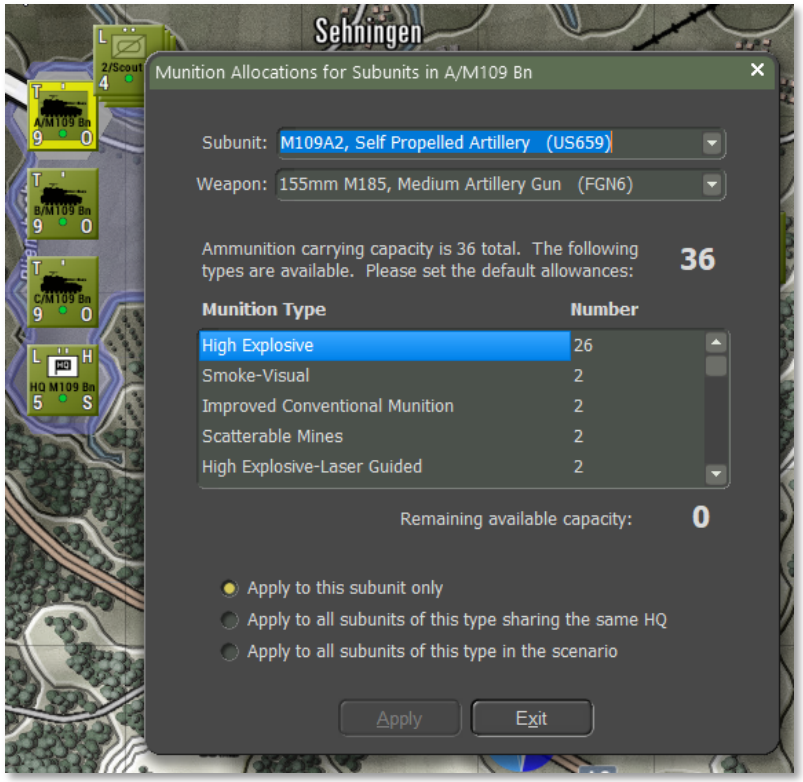


For example, the American M109A2 loadout uses just two (HE and smoke) of six possible (PGL, HEA, ICM, SCM) ammunition types.

NOTE: AmmoTypeIDs in purple are reserved for future feature development and should not be used.

NOTE: AmmoTypeIDs that have a leading "!" (exclamation mark) are temporarily disabled during development. If you want to put data in for a particular ammunition type but don't want it to be used in a scenario then put a "!" at the front of the AmmoTypeID and it will be ignored. This saves deleting and recreating the data row later.

The scenario author needs to be able to tailor the ammo loads precisely to requirements when making the scenario. For example, there may be a requirement for a significant amount of smoke or none at all.



This editor lists all the different subunit types found in the selected unit and selects the first in the top combobox. All weapons that exist for this subunit are then listed in the next combobox and the first of those is selected. For that weapon, all the possible munition types are listed below. The scenario author can then edit the number of rounds carried per type subject to overall carrying capacity. The changes can be applied to just the selected weapon of the subunits in the selected unit, or to that weapon of all matching subunits in siblings of the selected unit, or that weapon of all matching subunits in the game. Each weapon ammo load is edited separately, and the scenario author must Apply or discard changes when changing weapon type or subunit type in the comboboxes at top.

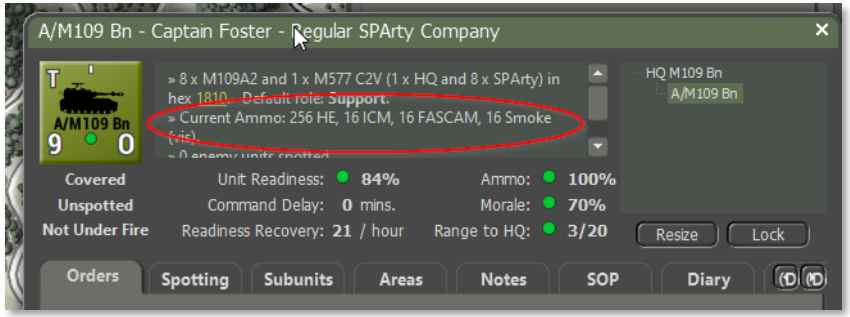
This editor does not change the default distributions in the national spreadsheet. This editor is available at any time for the currently selected unit when playing in Umpire Mode. For weapons that have only one ammunition type, for example, a machine gun, just one munition type is show and the only choice the editor has is to reduce the amount to less than what could otherwise be carried.

22.3 In-Game Ammunition Displays

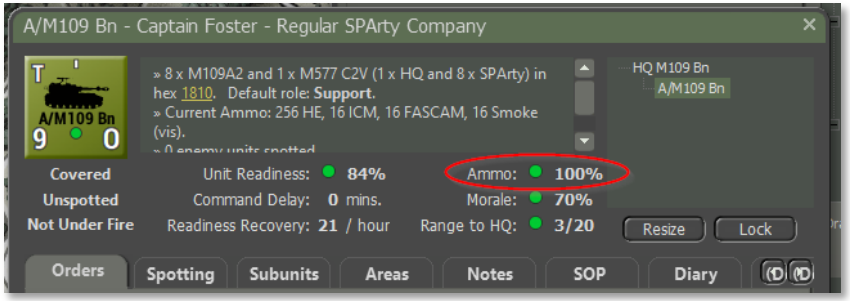
There are a number of dialogs that display ammunition related types and round count levels.

22.3.1 Unit Dashboard

On the Unit Dashboard for artillery units only, the total ammo loadout is described in the upper status report area. The purpose of this is to make it easier to plan barrage missions, and includes just the ammo for the main guns, not secondary weapons.

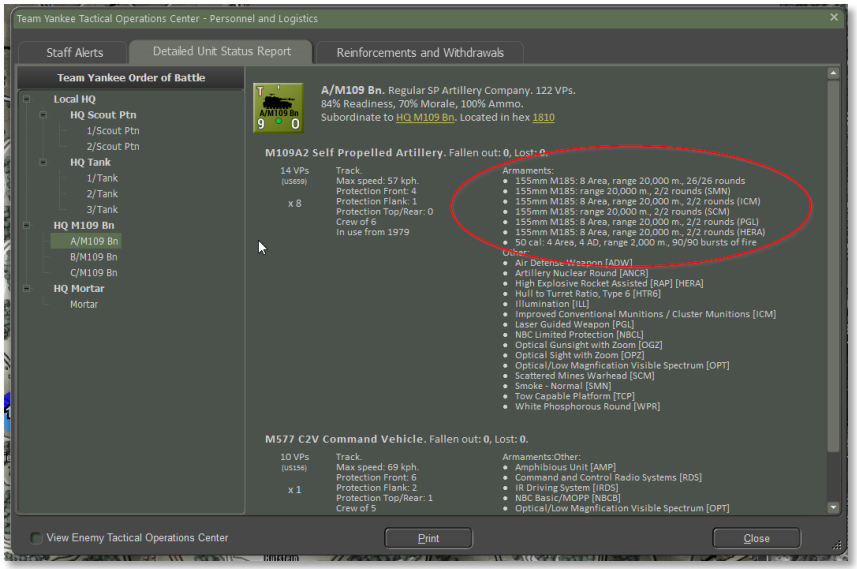


The % Ammo display that used to show the overall average amount of ammo for the unit now shows the 'critical ammo %' which is the lowest ammo load for any of the main weapons. For example, if a Bradley has used up 20% of its chain gun ammo, and 75% of its ATGM missiles, then this value will be 25% (the missiles remaining) as this is most likely to be the key information the player is seeking.



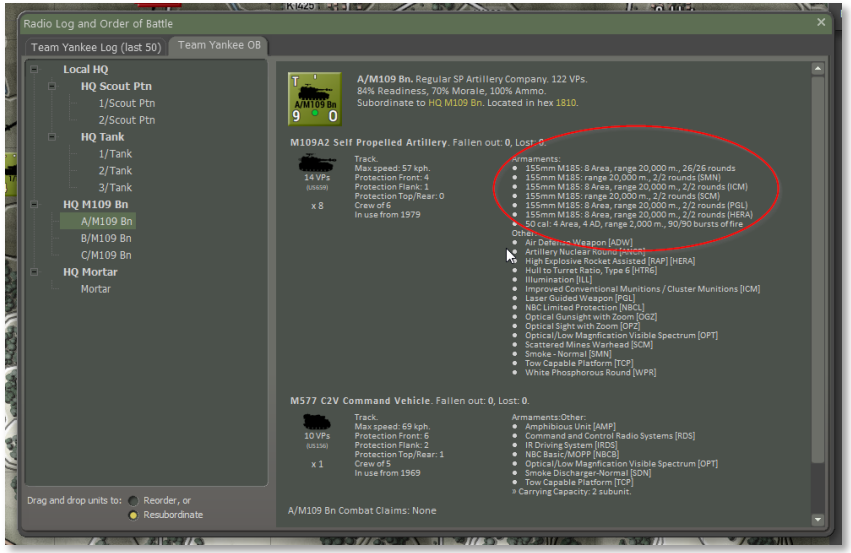
22.3.2 Personnel and Logistics Display

The Staff Personnel and Logistics / Detailed Unit Status Report shows *average* subunit munition counts. In the example below, there are 8 M109A2 subunits in the unit and the averages are shown in the area circled.



22.3.3 The OB Report

The OB report in the 'Radio Log and Order of Battle' display also contains this same information.

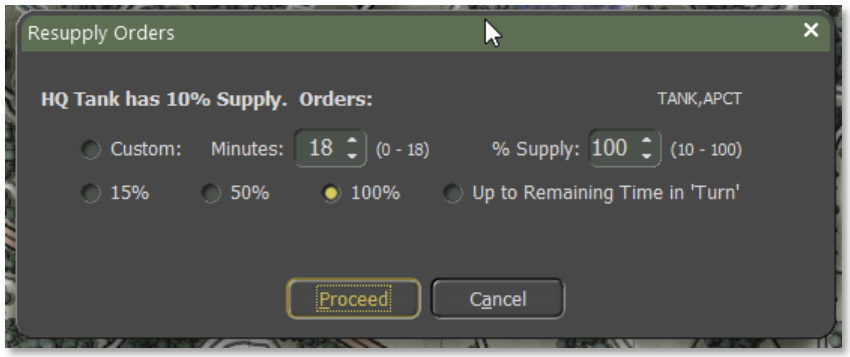


22.3.4 Subunit Inspector (SUI) Display

The Subunit Inspector is not focused on any particular instance of a subunit but rather describes the type in general terms. It will show the total ammunition carrying capacity, and the different ammunition types that it is nominally capable of carrying, but not the amount of what any one subunit is actually carrying.

23 Resupply Enhancements

The unit Resupply order has been enhanced to allow more flexibility. Previously, all unit resupplies took 30 minutes regardless of current supply state or composition of the unit in terms of different subunit types.



23.1 The New Version of Resupply

The default configuration is to restore supply to 100% and to take the number of minutes required to go from the current supply % to 100%. The user needs only click on the Proceed button to accept this.

The length of time taken to go from 0% supply to 100% is now specified in an external spreadsheet file, "FPC Subunit Parameters.xlsx", which is editable in the professional version. The times to resupply are expressed in minutes and can be independently set for every kind of subunit in the game (e.g. TANK) and national overrides (e.g. Donovian) can further refine the values. It is expected that subunits with inherently shorter resupply times will have less than 30 minutes given, and units with inherently longer times will have more specified.

NOTE: At present, all are set to 30 minutes.

If the resupply order is the **first** order in the order stack then the total time taken will also include the usual orders transmission time delay from HQ, and also the orders preparation time. Unless these extra times are waived, as they are during pre-game setup, they will be added to the actual orders completion time to get the total time. This is not shown in this dialog, but the player can look at the order in the unit Dashboard immediately after giving it to get an estimate of overall timing. If the resupply order is not the first order, e.g. if it follows a movement or barrage order, then it will not pay the additional delay factors.

If the unit contains a mixture of subunits, the longest resupply time will be used. For this reason, the different unit type codes are shown in the top right corner of the Resupply dialog. In the example here, they are "TANK, APCT" which are row entries in the spreadsheet.

The player need not accept the default 100% resupply option. There are radio buttons for emergency supply (15%), quick supply (50%), and "Up to Remaining Time in 'Turn'". If the unit supply level is below 15% then that option will be enabled, otherwise not. Similarly for the 50% option. The 'remaining time' option has no fixed time period but rather anticipates that the unit order will end before the player turn has finished and wants to resupply during that idle time. When the unit then starts this order it will calculate how much time is left in the turn and receive whatever additional supply can be obtained in that time. It will then start the next turn done with resupply and ready for new orders.

here is also a Custom option where the player may adjust either the number of minutes to resupply or the desired % supply level. As one is adjusted the other changes accordingly.

When supply is taken, all weapon ammo loads are individually restored by the % specified, rounding down. This rounding will matter for very low count ammo loads e.g. SAM missiles, or ATGM rounds. At the extreme, if the reload is one single missile then anything less than a 100% reload will be ineffective.

As before, units must be within supply range (1.5 x command range) and not in close contact (< 2 hexes) with the enemy or at high risk of destruction in its current hex to resupply as expected. If it is out of supply range or at high risk then it will receive 10 to 20% resupply, otherwise it will receive 5 to 20% resupply. Air and drone units will follow the old rules which are full supply or nothing, and only when at or near certain locations.

23.2 PC Subunit Parameters.xlsx Overview

The purpose of this file is to hold a group of game parameters that were previously hardwired into the game code. These parameters are ones that are determined at the "Subunit Type" level, for example, tank, mechanized infantry, mortar, and truck. There are currently 90 different subunit types, and this list may expand in the future. Subunit types match to values in the national era spreadsheets under the Units tab in the "SU Type" column.

The first four columns of the data pages are locked and are not editable. The remaining columns are editable in the professional version of the game.

The first iteration of this spreadsheet has a column for "Resupply Minutes". This is the average length of time in minutes that it takes a subunit of this type to resupply from 0% to 100%. If a value is left blank then a value of "30" will be assumed.

The "Default" page is required and provides values for all subunit types and is applicable to all nationalities. If desired, new nationality-specific tabs can be created to be used instead. If, for example, the Americans are particularly quick to resupply their attack helicopters (SUType "HELOAT") then a new tab can be created in the spreadsheet called "American" with a copy of the default spreadsheet modified in the HELOAT row to use, say, 20 minutes as the resupply value.

Notes: The name of the tabsheet, in this case "American", must match the name of the *data directory* and will apply to all national data sheets found there. The data directory name can be found in the game directory under "\Modules\Common\Data", and at the present time includes data directories such as American, Soviet, Donovian, US Army, and British. The Donovian directory has three alternative national era XLS files, and any Donovian modifier would apply to all three equally.

When creating a new national tab, all of the values must be copied over from Default as a starting point. If any values are missing, the program will default to the internal value and *not* to the value on the Default page. This is deliberate.

This spreadsheet is used twice. The first time is during scenario creation to set default values for the units in a scenario. This creates a baseline starting position. The second time is when the game is run. After the scenario is loaded, the contents of the spreadsheet are applied again as injects just before the game starts. The purpose of this is to allow values to be experimented with on the fly without having to rebuild the scenario for every little variation.

It is possible that the scenario author may use a spreadsheet that has different values than that on the target machine. In this case, the target machine values will govern. If the target has no such file locally though, then the author values will govern. The values in use will be the ones found in the "\Modules\Common\Data\Common\FPC Subunit Parameters.xlsx" of the local machine.