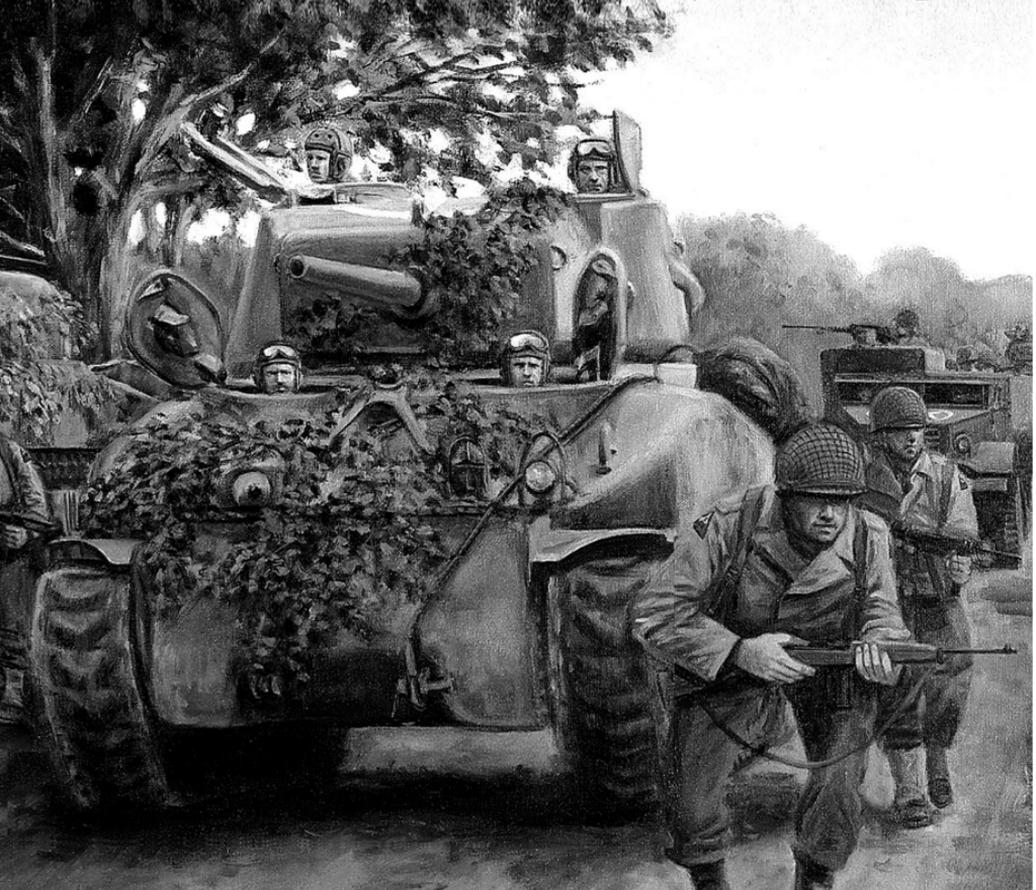


COMBAT MISSION



MANUAL



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SUPPORT

Please write down all important configuration data of your computer and an exact description (when, how and where the error occurred; what exactly were you doing?), before contacting our technical support. This guarantees that we can help you in a fast and efficient way.

Please provide us with the following information:

Personal details:

- E-mail address
- If you contact us from outside the USA, please provide us with information on your location and the language version of the program you are using.

Computer details:

- Computer make and model
- Windows version
- Speed and manufacturer of the processor
- Speed and manufacturer of the CD ROM drive
- Total system RAM
- Video card make and model
- Sound card make and model
- Mouse and driver information as well as information on any further peripherals (e.g. joysticks)

In order to get this information, please go to "Run" in your Windows-start-menu and type "dxdiag" in the command line, before confirming it by pressing the Enter-key. Now the DirectX diagnostic program will start. It mainly shows all the relevant driver files of your system components. In order to receive a text file of this information, simply click the button "Save All Information". You can then place a text file with all the relevant data on your hard drive in order to send it via e-mail or keep it for future reference.

Contacts:

- 24 hours via e-mail at: support@battlefront.com

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COMBAT MISSION BEYOND OVERLORD



"War is a muddle; it is bound to be. There are so many incalculable accidents in the uncertain business - a turn in the weather which could not be foreseen; a message gone astray; a leader struck down at acritical moment. It is very rarely that even the best laid-plans go smoothly. The lesson is to realize this, and to provide, as far as possible, against the uncertainties of war - and not be surprised when they happen."

Field Marshal Earl Wavell during
a wartime broadcast

Found in: Battleground Europe Series; Gold Beach, Normandy
by Christopher Dunphie and Garry Johnson, page 82.

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THIS MANUAL

This manual is intended to explain the basic game mechanics, help install the game properly and serve as a first source for solving problems. It also provides a brief introduction to World War Two small-unit tactics; but that is a large, complex subject that merits its own treatment far beyond the scope of a game manual. Experience, tactical skill and intuition are required to master the game and defeat the enemy, and all will develop with time.

This manual is also different from many other game manuals. Combat Mission is an extremely dynamic game that uses fuzzy logic and real-world physics models wherever possible instead of static combat result, terrain modifier or line of sight calculation tables often found in other wargames. Therefore, the manual cannot explain all the game mechanics with absolute precision (short of reprinting the computer code!). Instead, it talks more about chances and probabilities than offensive or defensive values, hexes and dice rolls.

This manual has been divided into five distinctive parts to allow beginners an easy start, experienced players a quick and handy reference, and a few interesting tidbits for those interested in more.

The first part - **The Basics** - covers all the important game functions, menus and features. Starting with the main game screen, this section explains all subsections, windows and features step by step in order of appearance.

The second part - **The 3D Battlefield** - concentrates on the simulation and action parts of Combat Mission. It describes major game elements, like terrain, units, command and control, morale, fortifications, combat resolution, weather, and operations.

The third part - **Making Scenarios** - details how to make Quick Battles, scenario Battles, and Operations.

The fourth part - **The Tutorial** - guides the player through the first few turns of an easy scenario, explaining some of the major game elements, tactics, and features.

Lastly, the fifth part - **Appendices** - provides handy reference tools to find the information you need when you need it.

Macintosh Users

This manual is written using PC/Windows nomenclature for mouse clicks and key presses. Here's how to translate:

- Left-click = click
- Right-click = click and hold down the mouse button
- ENTER key = RETURN key
- ALT key = COMMAND key

THE BASICS



GENERAL OVERVIEW

"On reflection, I came to the conclusion that it was fortunate ... that the U.S. Army first met the enemy on the periphery, in Africa rather than on the beaches of France. In Africa we learned to crawl, then walk - then run. Had the learning process been launched in France, it would surely have ... resulted in an unthinkable disaster."

General of the Army Omar N. Bradley

Found in: Closing with the Enemy, by Michael D. Doubler, pg 10

Combat Mission: Beyond Overlord is a tactical WWII combat simulation set in a 3D environment. Players issue orders in turns and then see the action executed in real-time. It simulates battles in north-western Europe immediately following the Allied "D-Day" invasion of Normandy in June of 1944, also known as Operation Overlord, through to the end of the war in May 1945. Combat Mission allows the player to lead the soldiers of six nationalities (U.S., British, Canadian, Polish, French, and German) into battle, using historical Tables of Equipment and Organization (TO&E), surroundings, and combat results. Combat Mission is not a video game. It requires thoughtful strategy and tactical skill to overcome the enemy while preserving one's own forces and achieving the mission objectives.

Playing the Game

The basic game engine is simple. Both players issue their orders in the Orders Phase. The game is paused and players can take as much time as they like to plan their actions and issue orders to their units.

After giving orders to their units, players click the GO! button. The computer calculates the Action Phase, 60 seconds of real-time combat, based on both players' orders. After the calculation (usually between a few seconds for small engagements up to a minute or more in extremely large battles), the Action Replay begins and the simultaneous action in real time plays out on the screen. Players have no influence at this stage on the results of the orders they have given, but the player is not just a spectator. Instead, the player can move around the battlefield while the action unfolds using the virtual camera to zoom,

pan, and move up and down. Doing this is an important part of the game, as it reveals a lot about the actions of the enemy and is vital for future planning.

The Action Replay can be reviewed an unlimited number of times to make sure no important event is missed. After the Action Replay is ended, by clicking on the DONE button, one game turn is completed and the next turn starts again with an Orders Phase.

The game ends when the turn limit for the given scenario has been reached, or a mutual cease-fire is agreed to, or one side has surrendered (sometimes forcibly, when casualties are extreme).

The "We go" Principle

Although Combat Mission is essentially a turn-based game, it moves away from the classic "I go, you go" (IGOUGO) game system used by many other wargames. "I go, you go" is a highly abstracted way to incorporate the flow of combat into a battle simulation, allowing players to move their units one by one, before their opponents can move theirs. Further abstractions like opportunity fire and assault movement phases are necessary to make this concept more realistic, and still there are many loopholes left for "gamey" and unrealistic tactics like the ability to "scout" the terrain ahead with an unimportant unit (e.g. a truck) before moving the bulk of one's forces, all in one game turn. In short, IGOUGO is a holdover from the days of tabletop wargaming where no computer was available to do the number-crunching generally required for accurate simultaneous movement.

Instead, Combat Mission uses "simultaneous execution", or simply "we go" as explained above. Players are not allowed to interact with their forces during the real-time Action Phases to prevent micromanagement of one's own troops and simulate the unpredictability and chaos of combat. In other words, players cannot change orders while they are being carried out. The player can, however, click on units to obtain detailed info about their status, change the camera positions and replay the action as often as they like.

Since both players are forced to issue orders to all of their units before they see the outcome of one unit's actions, most "gamey" aspects of "I go, you go" systems disappear. Real world military concepts like coordination and concentration of forces, bases of fire, overwatch - just to name a few - can now be translated right into the game, with

the same results, risks, and problems as in the real world. In fact, you will be forced to use them if you want to defeat the enemy.

Combat Mission remains a "turn based" game, however, in the sense that each turn is preceded by an Orders Phase in which the action is paused. We chose this arrangement because we feel it is conducive to players' development of thoughtful and realistic strategies, rather than the "click fest" that some fully "real time" games can become, where all the orders and action occur simultaneously. It is our opinion that pure "real time" works only at a very small scale, where there are perhaps just a few soldiers under a player's command. It does not work well at the scale of a full company or battalion, which is the level simulated by Combat Mission.

The Big Difference and some Words of Caution

In many respects, Combat Mission is just different from wargames you have played before; in others, it is groundbreaking. The introduction of a real 3D environment into a wargame has introduced elements of a true simulation, eliminating many "crutches" known from the days of classic hex-based "I go, you go" wargames. The best way to approach Combat Mission: Beyond Overlord is with an open mind, not holding on too tightly to old habits you may have picked up playing other wargames.

Apply common sense and intuition and don't expect "gamey" tactics to work - no matter how successful they were in other games. Because Combat Mission: Beyond Overlord uses real-time Action Phases, you won't be able to observe the results of the action of one unit before having to order another one to do something. You will be forced to plan ahead, use timing, suppression fire, feints and flanking attacks to survive, let alone to win. When planning your moves, think about what would work in the real world, not what would work in "game".

GETTING STARTED

How to Install the Game

Computers Running Windows

1. Insert CD-ROM into your computer's CD-ROM drive
2. Double-click "Setup.exe" (sometimes just listed as "Setup")
3. Follow the on-screen instructions

Computers Running MacOS

1. Insert CD-ROM into your computer's CD-ROM drive.
2. Double-click "Install Combat Mission"
3. Follow the on-screen instructions

Starting Up the Game

Computers Running Windows

1. Make sure your Combat Mission CD-ROM is in your drive
2. Click on the Start Menu
3. Select "Programs"
4. Go to "Combat Mission Beyond Overlord" directory
5. Select "Combat Mission Beyond Overlord" program

Computers Running MacOS

1. Make sure your Combat Mission CD-ROM is in your drive
2. Locate the "Combat Mission Beyond Overlord" folder (installed, by default, in the same place as your System Folder)
3. Double click on the "Combat Mission Beyond Overlord" application

Intro Movie

Every time you launch Combat Mission it displays a QuickTime™ (a trademark of Apple Computer, Inc.) movie to help get you in the mood. Your computer must already have QuickTime™ installed for this to work. Macintosh machines come with QuickTime™ preloaded, but machines running Windows do not. So if you are using Windows you need to download the free QuickTime™ software from, Apple Computer's Website in order to see the movie (if you don't, the movie will simply be skipped with no adverse result).

Note: Clicking the mouse skips the movie. Also, if you hold down the Shift key while CM starts up you can toggle the movie on/off permanently.

Starting Options

Play Game - Allows you to start a new battle (including a randomly-generated Quick Battle) or operation and to load a saved game

Join Multiplayer - Allows you to load a PBEM file from your opponent or play via TCP/IP

Create Scenario - Opens the scenario editor, in which you can create your own maps, battles and operations

Exit - The Exit button brings you back to your Desktop. You'll hardly ever use this one!

Each one of these is explained in further detail in the following sections.



Play Game

Select a battle, saved game, or operation you want to play from the Load Window or start a new randomly generated Quick Battle Scenario with a few mouseclicks.

The Load screen shows you all available battle and operation files in the "Scenarios" folder of the Combat Mission directory.



In the upper right corner of the screen, you can toggle the display to Battles or Operations. Battles are the standard Combat Mission scenario type. Operations are a series of Battles spanning a couple of hours or even a few days of simulated time (some people might call them "short campaigns").

The top entry in the window is Quick Battle, which allows you to randomly generate a Do-It-Yourself scenario. Below that, you will find entries for any previously saved games (none if this is the first time you enter this screen).

Following that you will notice all the scenarios available, including those that come with the game CD as well as any that you might have downloaded or created yourself.

Note: you will have to copy downloaded scenarios and operations into the "Scenario" folder of your Combat Mission directory to make them appear on this screen.

For each battle and operation, the follow info is displayed:

- its name
- its length (number of turns for battles, and number of battles for operations)
- its size (tiny, small, medium, large, and huge), depending on the number of units in the game
- a short description of the engagement
- two icons representing the two main opposing forces (in scenarios with a mixed force, e.g. Canadian/British units, the icon shows the bigger force)



From left to right: United States, British, Canadian, French, Polish, US Airborne, British Airborne, Polish Airborne, Heer (German Army), SS, Fallschirmjäger (Airborne), Gebirgsjäger (mountain troops), Volkssturm ("People's Army")

GO BACK allows you to return to the main game screen, while PLAY SCENARIO opens up the GENERAL BRIEFING screen to give you a more detailed description of the selected engagement.

General Briefing

Describes the battle/operation background and gives an idea what the battle/operation is all about.

Down Arrow - Scrolls the text down (if longer than one window length)

Up Arrow - Scrolls the text back up

Cancel - If you don't like what you read, click on cancel to go back to the main screen.

Done - Click on it when finished reading to play the battle/operation.

Force Selection & Options

This screen allows you to select which side you want to play - Allied or Axis - by clicking on the appropriate button. Besides that, you can also set a number of options to customize the scenario.

Fog Of War

None - enemy units are visible all the time and detailed information is available for all of them.

Partial - enemy units are spotted only when one of your friendly units has actually spotted them. However, the enemy unit positions and details are always identified correctly and revealed to the player immediately.

Full - enemy units are spotted only when one of your friendly units has actually spotted them. Detailed information about the spotted enemy will be revealed only after it becomes available, such as after the enemy has closed to within a certain distance of your forces and has been under observation for some time.

Computer Player Setup

Free to place units - the computer can place its defending forces as a human player would, within the restrictions of the setup zones predefined by the scenario designer.

Stick to scenario default - the computer player can not move its forces and instead leave them as preset by the scenario designer.

Computer Experience Bonus

For an added challenge the Experience level of the computer player's troops can be increased up to 3 levels above the scenario designer's settings. For example, if the computer player has one Green and two Regular platoons a "+1" setting would change that to one Regular and two Veteran platoons.

Play Balance

Play Balance lets you set a handicap for battles (not available for Operations) by assigning extra units to one side. Choices range from "No change" to "+200% troops". The percentage value determines how many extra troops are added to a given side. If the scenario allocates 1000 points to a side and the handicap is set to +100%, then that side will start the game with 2000 points. The computer automatically adds extra troops, of the same types that are already included in the battle, to the side selected to receive them. This means that if a scenario only has M4A3 Shermans, no other tanks other than M4A3

Shermans are added - if any. When several types of units are in scenario, the game randomly chooses which ones to add.

After selecting the side you wish to play and the options, you can choose which type of game you want to play.

Choose Game Type

Make your selection and click on OK to proceed. The two screens that come next allow you to choose the following options

Single Player - Play a single player game against the computer.

Hotseat - Two players can play on the same computer in hotseat mode.

EMAIL - Start a Play-By-Email-Game (PBEM)

TCP/IP - Start a game over the Internet

Detailed Briefings - a detailed description of your forces, mission and objectives.

Down Arrow - Scrolls the text down (if longer than one window length)

Up Arrow - Scrolls the text back up

Done - Click on it when finished reading to play the battle/operation.

Password (Hotseat, EMAIL and TCP/IP PLAY ONLY) - When playing against another human opponent, the game will now ask you for a password. Enter the password and click on OK. This brings you to the 3D battlefield map.

TCP/IP MULTIPLAYER

Minimum TCP/IP Requirements

To play using the Internet or a LAN you need two players both using Combat Mission version 1.1 or later, on either a Mac or Windows based machine. An active connection to the Internet or a TCP/IP based LAN is also a requirement. You might need special networking software for LAN games played between Macintosh and Windows based systems. Alternatively, two people can also Play By E-Mail (see next section).

Basic Concepts

One player is designated as the Host and the other as the Guest. The Host is responsible for picking the Scenario or Operation and selecting any applicable parameters for a Quick Battle. Combat Mission picks the faster computer to process turns on, so the Host need not be the person with the best machine for optimal game performance.

Note: Because there is no method for Quick Battle options (time period, unit restrictions, point totals, etc.) to be seen by the Guest, the Host should communicate these using email, IRC, phone, or the in-game chat feature.

Starting a Game

The Host starts up an Operation, Battle, or Quick Battle in the normal way (see Getting Started section). Once the game is loaded the Host selects the side to play then is presented with the connection choice screen (see previous page). Click on the TCP/IP option and select a turn time limit if desired. After this is done, click on OK, enter a password, and click OK again.

Note: The optional turn time limit governs both Action and Orders Phases combined, however the Setup time is twice the amount of the timer setting. Keep in mind how big the battle is and the amount of time pressure the players both want to have. Quick turn times for large battles are probably not a good idea.

The next screen you see is the Host Connection Page. This lists all of the Host's Current IP addresses, one of which the Guest needs in order to connect to the game (see IP Address Tips later in this section). The

Host must wait until the Guest connects, at which point the game proceeds almost like a single player game in terms of the game mechanics.

Joining a Game

All the Guest needs to do is start up Combat Mission, click on the Join Multiplayer button, then select Join Network Game. At this point a screen appears asking for the Host's IP address. This number must come from the Host at the time the game is set up. Once the IP address is entered a connection with the Host should be established almost immediately and start downloading the scenario data so that the game can begin.

Note: Unlike many multi-player games, a scenario file only needs to be present on the Host's system for a game to play correctly.

Turn Timer

One of the unique features of TCP/IP play is the optional Turn Timer, which is set by the Host before the Guest joins the game. Each player has twice as much time as the Turn Timer's setting in order to set up units in the Setup Phase. For example, a setting of 2 minutes allows 4 minutes. Once the game begins the selected time is shared between the Action Playback Phase and the Orders Phase. This means you have only one block of time to view the action from last turn and issue orders for next turn.

Each player has one "free" viewing of the Action Playback (i.e. 60 seconds). After this "free" 60 seconds the timer automatically starts counting down. Multiple reviews of a movie quickly eats into the total amount of time you have to give orders. The timer switches to a warning color (red) as it gets close to zero.

Note: If the player clicks on "Done" right away, and stops viewing the playback, the timer starts counting down. In other words, the extra 60 seconds can only be used for watching the playback, not for issuing orders.

The timer continues regardless of what the player is doing, like switching Combat Mission to the background to check email. If a player needs to take a break for any reason a Pause request can be made. This is accomplished by pressing the Alt (or Command on the Macintosh) and P keys at the same time. This flashes a message on

both player's screens requesting the Timer be temporarily disabled. The other player now has the option of accepting by requesting a Pause also, or denying this request by doing nothing. When both players request a Pause a message pops up indicating that the Timer is disabled for the rest of that turn. Both players can now take as long as needed to complete the turn. When both players have clicked on the "OK!" button (or "Done!" if in the Action Playback Phase) the game proceeds with the time re-enabled. If a Pause is issued during an Action Playback Phase the timer remains disabled until the the next full turn.

Multiplayer Chat

Each player can send a text "chat" message to the other. To activate the Chat feature, press the "~" (tilde) key or the number "0" (zero) key. Users with non-US standard keyboards most likely can only use the "0" key. You can now type in your message and press the "Enter" key to send it. If a message is no longer necessary, but the entry box is already presented, simply press the "Enter" key with no text typed in. Messages are displayed in the upper right corner of the screen and new ones are announced by an audio "squawking" sound on the receiving player's system.

Note: As soon as a Guest join a game the players can begin chatting. At this point it is a good idea for the Guest to send a brief message to indicate to the Host that the connection is indeed established.

Chat messages can not be viewed when in the 2D part of the game. This means while you are in a Briefing screen you can not read or responded to messages. However, the audio "squawking" sound can be heard to indicate the other player is trying to make contact.

Special Note for Operations

Operations proceed just like normal single battle except that at the completion of one battle you are shown the current Operation Debrief Screen. Remember that you cannot chat when viewing this screen. As soon as both players click OK the next battle will commence to load and the setup phase will begin.

IP Address Tips

When a player Hosts a game, Combat Mission lists ALL the IP addresses assigned to a system. If you have multiple modems or network cards it will list all IP addresses associated with those devices. What it can't do is tell you which one is the correct IP address as it depends on how your system is configured. Users of AOL, for instance, may have up to three addresses listed. You will need to have your opponent try to use each IP address in order until they find the one that allows connections. Once you have found the correct IP address, make note of its place in the list since it should always be the same one. For example, let's say when you host a game Combat Mission shows three separate IP addresses. You give the first one to your opponent and it doesn't work but the second one makes a connection. In the future, the correct IP address should always be the second one in the list even though the address itself may change.

If you need more help with IP addresses, please see *Appendix C - Troubleshooting*.

Lost Connections

If at some point during play the connection is lost (not uncommon for even "stable" Internet connections) both players receive messages indicating that the connection is now broken and the game must be restarted by loading the autosave. The autosave file is created on each players' system when the game detects the players are no longer connected. It does not matter which player reloads the autosave, and thereby acts as Host, but depending on the timing of the disconnect some orders may need to be reissued. Autosaves created due to a broken connection during the Action Playback does not allow either player to issue any orders. This is done to prevent one player from purposefully breaking a connection during a turn that is going badly in order to "redo" orders.

PLAY BY E-MAIL (PBEM)

Playing by E-mail (PBEM) can be an extraordinary gaming experience. Matching your tactical skills directly against those of another human opponent, regardless of where he is in the world, will bring your enjoyment of Combat Mission to new heights.

PBEM games play just like single player games against the AI, except that each time you finish a game turn, you will need to send this information to your opponent.

Starting a PBEM Game

To start up a Play By E-Mail game one player starts up an Operation, Battle, or Quick Battle in the normal way (see Getting Started section). Once the game is loaded the player selects the side to play then is presented with the connection choice screen. Click on the "Email" button, click on OK, enter a password, and click OK again. See below for how the game flows from turn to turn.

To load a PBEM file from another player, load Combat Mission and then click on the "Join Multiplayer" button. Click on the "Load Email" button and then select the appropriate PBEM file (usually recognized by the .txt suffix).

Playing Out a PBEM Game

After you click GO!, Combat Mission generates a text file, which contains the encrypted turn data that needs to be emailed to your opponent. You are asked to name the file, which is saved into the PBEM directory within the CM directory. The default name is PBEM, but you can change it to anything you like.

When renaming the file it makes sense to use a short description of what that file is, as it will allow you to track down quickly what game and which turn it is. The moment you start playing more than one PBEM game at once, you'll learn to appreciate naming your files logically. There are many ways to do this. You can simply number the files in sequence, starting with "Villers 1" - this is the easiest way to find a file. If you also want to know exactly what the file contains, you could also label it "Villers Turn 15 US", or "Steve Setup US". Use whichever file names work best for you. Remember that files with the

same name will be overwritten - that's why it makes sense to label files after the scenario name or even your opponent's name.

Sending Files Intact

It is very important that both players use the same, compatible method for sending PBEM files to each other. If one player can't load a file it is most likely because of a transmission error due to an incompatible email format. Macintosh users playing against Windows users should pay close attention to this! Generally it is best if "uuEncoding" is used without any form of compression. Since the files are text compression generally doesn't reduce transmission times that much. If you should use compression make absolutely sure that it can be decoded on the other end.

PBEM Turn Sequence

The turn sequence in PBEM games is designed to allow for a fast game, but at the same time provide security and prevent cheating. One of the weakest points in the PBEM chain of some games is that a player can open the file sent to him by his opponent as often as he likes, plotting new orders for his units until he achieves the results he wants. This is not possible with Combat Mission, since the PBEM turn sequence prevents the player from watching the Action Phase before sending the file to his opponent.

The PBEM sequence goes like this:

1. Player A starts a scenario and chooses the side he wants to play. He chooses a password and enters the game during the Setup Phase and positions his units. After hitting GO!, the PBEM file is generated. He emails this file to Player B.
2. Player B opens the file, chooses a password for himself, and enters the game during the Setup Phase. After positioning his units and hitting GO!, the PBEM file is generated, which he sends to Player A.
3. Player A opens the file, plots his turn one orders and hits GO!. He sends the file to Player B.
4. Player B opens the file and plots his orders for turn one. He does not watch the Action Phase yet - he has to email the file to Player A first.

5. Player A watches the Action Phase, and sends a file back to Player B.
 6. Player B watches the Action Phase, after that he plots his turn 2 orders.
 7. Player A plots his turn 2 orders.
 8. Player B watches turn 2 Action Phase.
 9. Player A watches turn 2 Action Phase and plots turn 3 orders.
 10. Player B plots turn 3 orders.
 11. Player A watches turn 3 Action Phase.
 12. Player B watches turn 3 Action Phase and plots turn 4 orders.
- Steps 7 to 12 repeat until the game ends.

Successful PBEMing

But in order to start and complete a PBEM game successfully, a little bit of organization can help. Without it, PBEM-ing can quickly become a frustrating experience: whose turn is it? Where is the last file? Did I plot my last turn already? Did the last PBEM file get overwritten? There is no one right way to organize PBEM game files, so do whatever works best for you.

THE 3D BATTLEFIELD



GETTING TO KNOW THE FIELD

"I can see again the earth banks, the green hedgerows, the white dust of Normandy, and I can feel again the hush and quiet, the grim and threatening quiet, that broods over a frontline position."

Major Cooke (8th Royal Scots) after the war

Found in: On the Front Lines by John Ellis, page 76

The 3D battlefield is the heart of Combat Mission. Here is where epic battles are fought and either won or lost. There are a few fundamental things you need to understand about the 3D battlefield in Combat Mission, however, before you can fully appreciate the concept.

The 3D battlefield isn't an exact rendering of the internal game data. It is merely a graphical representation of the data, presented in as much detail as today's hardware allows. The reason for this is simple. While today's computers can handle complicated mathematical models very quickly and efficiently, graphics - especially 3D graphics - are still limited by things like memory (VRAM), drawing speeds, and screen resolutions. Showing real-time action at the scale of Combat Mission with maps frequently as big as a few square kilometers rapidly eats up hardware resources. Therefore, while the mathematical 3D battlefield used "under the hood" is extremely detailed, the graphical representation of it has to be (somewhat) simplified. Combat Mission would arrive at exactly the same combat results even if the screen were blank, though it would not be much fun to play! In other words - Combat Mission is not using on-screen pixels to determine combat results. The 3D graphics are determined by the internal algorithms, not vice-versa.

The differences between the two models are marginal in most cases, but sometimes they can impact gameplay. The TERRAIN section explains some of the most important differences in more detail.

Navigating

There are several ways to navigate around the 3D battlefield of Combat Mission.

The Buttons

The main user interface at the bottom of the screen has a number of buttons on the right hand side. The arrows on these buttons indicate the direction - right, left, forward, and backward - in which the camera moves when you click on them. You can also rotate the camera left or right using the curved arrow buttons. Finally, using the up and down arrows you can adjust the camera's height in eight steps (or view levels), from a "ground view" (level 1) to a "birds eye" top-down view (level 8).

The Mouse

You can also use the mouse to navigate. If you move the cursor to the top of the screen, the camera will automatically move forward. If you move it to the lower edge of the screen, the camera will move backward. The right and left edges ROTATE the camera right and left respectively (or around a point using the SHIFT-J option). Holding down the SHIFT key and moving the cursor to the right or left edges, however, will MOVE the camera left or right. View levels (height), however, cannot be changed with the mouse in this manner.

The Number Pad

The number pad mimics the main user interface buttons.

- 7 - rotate left
- 8 - move forward
- 9 - rotate right
- 4 - move left
- 2 or 5 - move back
- 6 - move right

The + and - keys on the number pad changes the view levels up or down, respectively.

View Levels

The view levels (the "camera" positions) can also be accessed through

hotkeys. The numbers 1 to 8 on the keyboard (not the number pad) switch to the respective view level, with 1 being ground view and 8 being the highest top-down view.

Map "Jumps"

If you want to "jump" quickly from one point on the map to another, simply hold the CTRL-key and left-click on the map location you want to move to. Your viewpoint (the "camera") moves immediately to the new location. This is a great feature especially for large maps if you need to jump from one edge quickly to another one.

If you hold CTRL and left click on a unit, the map view will automatically jump to that unit and "lock" the view behind it - see "locking the view".

Fine-Tuning Movement

The four arrow keys on the keyboard can be used to fine-tune movements forward, backward, left or right. They move the camera much more slowly than the navigation choices described above. The , and . keys can be used for fine rotation left and right, respectively.

"Locking" The View

You can also "lock" the camera behind a particular unit and follow it as it moves on the battlefield. Simply select a unit (by left clicking on it) and press the TAB key. The camera now moves and rotates along with the unit. Holding CTRL while left-clicking on a unit works the same way as using the TAB key.

You can switch view levels while the camera is locked, from a "shoulder shot" to a top-down view. You cannot, however, rotate the camera away from the facing of the unit. Doing so breaks the "lock".

You can also deselect a unit after the camera has been "locked" to it. This does NOT break the lock. You can even select other units without breaking the "lock", as long as you don't press the TAB key.

Zoom

The [and] keys toggle zoom, much like a telephoto lens. Four settings are available: 1x, 2x, 4x, and 8x. Note that this distorts the perspective of scale to some degree the higher the magnification.

Scaling Units

This feature is especially useful when trying to get an overview of the battlefield is CM's scaling option. It allows the graphical enlargement of friendly and enemy units to make them more easily viewable from greater distances. Scaling has no meaning to the game's internal calculations no matter how big or small a unit looks on the screen. This is merely a visual aid for the player.

Scaling can be toggled by the hotkey combination SHIFT-C. Scaling is dynamic, i.e. units further away are scaled more than units closer by.

Action Replay

During the Action Phase replay, the player has the ability to rewind and replay the action as often as he likes. The playback controls are located in the lower part of the screen, on the right side of the main user interface and the navigation buttons.

The playback controls work just like the controls of your VCR. There are buttons for PLAY (to start the replay), FULL REWIND (to reset the movie to the beginning), REWIND, and FORWARD. To rewind or forward the action move in 2 second intervals (instead of 10), hold the shift key while clicking the respective buttons. Additionally, once you hit the PLAY button it changes into a PAUSE button, allowing you to stop the replay at any time.

Once the action plays back completely the first time, the DONE button appears under the VCR controls and start blinking. You can still rewind and watch the action as many times as you want, though. Once you're finished, click the DONE button. This ends the Action Phase and bring you to the beginning of the next turn's planning phase.

UNITS

Units in Combat Mission represent squads, teams, individual vehicles, and guns with their crews. These are (with a few exceptions discussed below) the smallest tactical elements that can receive orders. In other words, in Combat Mission you do not tell every individual soldier what to do, but instead issue orders to groups of men from the position of a squad or team leader.

Although you see individual figures standing on the map these do not represent single men, but rather a group. In the case of squads, usually three figures (two if you use the "reduced figures" option) represent anywhere from 7-14 men. Teams (including HQs and gun crews) are shown as one figure regardless of the actual team size - a design decision to keep squads and teams easily recognizable.

Designer's Note: We would have loved to have shown every single man on the battlefield, but current computer hardware does not allow this if we want to keep the scope of Combat Mission at battalion level. Single men and their position on the battlefield ARE tracked with regard to casualties and individual positions, albeit somewhat abstractly.

Selecting Units

A unit can be selected in two ways, the easiest being to left-click on it. A yellow frame then forms around the unit and the its details are displayed in the main user interface at the bottom of the screen.

Alternatively, you can also use the + and - keys on the keyboard (not the number pad) to jump back and forth between your friendly units. The units are selected according to their ID numbers, i.e. A1, then A2, A3 and so forth.

Group Select

When a lot of units are on the map you can speed up issuing orders, or quickly move formations around during the Setup Phase, using the group-move function. There are two ways to enter group mode:

Click and drag

Simply left-click and drag a square box around the units you wish to select. The units within this box will appear with a blue highlighted box around them, indicating that they are in "group" mode.

Formation select

By double-clicking on a platoon HQ (e.g. B-0), all of its subordinate units (e.g. B-1, B-2, B-3) including any teams currently attached, become highlighted.

If you want to add another unit to the selected group, or if you want to deselect a unit already in the group, simply left-click once on it while holding the SHIFT key. Selecting a currently unselected unit without holding the SHIFT key cancels "group" mode.

In group mode members of the group can now be issued the same order with a couple of mouseclicks or one hotkey. Right-clicking on any of these units brings up the group orders menu. These are the available orders for the group. However, they do not include some special orders which can be used only by some units. These orders need to be issued to such units individually (you have to deselect the group first).

The order you give for the selected unit is copied automatically for all other units within the selected group. If you order a FAST command to a group which contains units with heavy loads that cannot run, they will MOVE instead. If the destination for a unit happens to be illegal (e.g. water for any unit other than an assault boat) that unit receives no order at all.

After giving a group order, the order for each individual unit can be changed, cancelled or modified. Simply deselect the group, select the individual unit, and issue orders normally.

Unit Info

When a unit is selected, an information screen appears in the bottom central area of the screen. The selected unit's most important data is shown here.



Picture

There are different generic pictures for each nationality, troop type (infantry, vehicle crews, etc.) and rank (HQ units).

Flag

Shows the nationality the unit belongs to.

Name

The name and rank of the selected unit.

ID Tag

Every unit on the map has its own ID tag. There is a simple system behind tags. The highest HQ unit in the game (could be a company HQ or a battalion HQ) is always A-0. All other battalion or company HQ units are then numbered, i.e. A-1, A-2, A-3 etc., in descending order.

Platoons are labeled B, C, D etc. in descending order, with B-0, C-0, D-0 etc. being the Platoon HQ, and squads being numbered, B-1, B-2, B-3, C-1, C-2, etc.

Support weapons like MG teams, Panzerschreck teams, AT Guns, mortars, etc. are labeled and numbered independently, T-1, T-2, T-3, etc.

Vehicles are labeled V and numbered independently as well, V-1, V-2, V-3, etc.

Radio Icon

If crossed out (in red) the unit is NOT in command and will suffer from a higher command delay. Otherwise, the unit is in command and benefits from the commanding HQ's leadership abilities. (See COMMAND & CONTROL section)

Leadership Icons (HQ units only)

HQ units have special leadership abilities, which (if better than average) are also shown in the unit info window as icons. Each icon represents a leadership ability:

Star: Command

Lightning Bolt: Combat

Heart: Morale

Question Mark: Stealth

If the attribute is +2 (the highest rating), the icon appears in a gold-en box. More about leadership abilities can be found in the COMMAND & CONTROL section.

Unit Type

The unit type is displayed here (e.g. "Panther G", "Platoon HQ", etc.)

Unit Experience

A quick glance reveals if the unit is conscript, green, regular, veteran, crack, or even elite. See the EXPERIENCE section of this manual for details.

Fatigue

Units are usually "Rested", but can degrade to "Ready", "OK", "Tired", "Weary" and "Exhausted" as the battle progresses. You should allow your troops to rest after running for more than two turns in a row, otherwise they will become exhausted quickly. Troops with heavy loads (e.g. machineguns or mortars) tire more quickly, and the ground conditions (e.g. deep snow) play an important role as well. Exhausted troops cannot run or sneak.

Headcount

The number beside the helmet symbol shows the ACTIVE (i.e. living, unwounded) members of the selected unit.

Casualties

The number beside the medical cross shows the number of dead, wounded, or otherwise incapacitated or missing (in other words: INACTIVE) members of the selected unit.

Ammo

This number represents how many "shots" the selected unit has. For infantry units, this is not necessarily the number of actual bullets available, but instead an abstracted number averaged across all members of a unit. Small arms ammunition never completely runs out. Instead,

when the ammo number drops below 1, the word LOW is displayed. This signals that the unit will fire only in self-defense, and even then only infrequently and at reduced strength. This simulates the occasional scrounging of ammo off the battlefield as well as exchanging the last few clips between squad members.

Vehicles and Guns/Mortars have their ammo displayed in a different fashion. Each round is tracked individually. A letter following an ammo number indicates the ammo type.

- h - High Explosive (HE)
- a - Armor Piercing (AP)
- c - Hollow Charge or Shaped Charge (HEAT)
- t - Tungsten core (HVAP, APCR, APDS, SVDS, or PzGr40)
- s - Smoke

See the AMMUNITION section for more details

Some squads may also have special weapons. Small icons represent any additional weapons the unit might have at its disposal (e.g. Panzerfausts, rifle grenades, demolition charges, and Gammon bombs). Each icon represents one "shot" available.

Hand grenades are not tracked individually in the game.

Designer's Note: if in an average 10-men squad, every soldier is imagined to carry two handgrenades, each squad would have about 20 grenades available. Since rarely are more than four or five grenades used in the course of a battle, tracking them would detract more from the simplicity of the interface and game play than would be gained in realism.

Status

The status window displays additional information (if applicable) about a unit, such as:

Reloading - some weapons take a relatively long time to reload. While a unit is reloading, be it a Gun or Tank, it cannot fire its main gun, although secondary weapons (e.g. bow-machineguns for tanks) can be fired.

Taking Cover - the unit is keeping its head down due to incoming fire and is trying to use available terrain for cover.

Bogged - all sorts of vehicles can bog down in unfavorable ground conditions like mud or snow. Vehicles with high ground-pressure ratings

are more likely to bog down as well. Bogged vehicles might be able to free themselves, but also might become immobilized.

Immobilized - not able to move or rotate. This can happen to tanks that take a hit in the tracks or engine or that throw a track due to bogging. Heavy weapons teams which do not have enough men left to move their gun and ammo can also become immobilized.

Shocked - vehicle crews may become shocked when one of their crew members is hit (e.g. the tank commander is shot in an open hatch). Shocked vehicles do not respond to orders for a while and are also less likely to spot enemies while they're shocked.

Eliminated - when the last man of an infantry unit becomes a casualty, the "eliminated" tag is displayed and a soldier's body is shown at the location where the last man fell.

Abandoned - a gun or vehicle may be abandoned either because the crew routed or has been wiped out, or because it has sustained progressive heavy damage (like losing its main gun and being immobilized). Abandoned vehicles may be recovered and repaired during operations, but are considered knocked out for game play purposes during the course of a single battle.

Knocked Out - a vehicle which has suffered major internal damage, and is now combat-useless, forcing the crew to bail out.

Unlimber - after a Gun has been moved (or transported), it might need to "unlimber" first before being able to engage targets. This status will be displayed here, together with an estimate of how long it will take to prepare the weapon for firing.

Time - only applicable to artillery spotters, this gives the estimated time that it will take before an artillery strike arrives on the specified target.

Located In

Displays the terrain the unit is currently located in.

Suppression

Displays the degree to which the unit is "heads down" as a result of enemy fire. See the Morale section of this manual for details.

DETAILED UNIT INFORMATION

Even more detailed unit info can be accessed by pressing the ENTER key after a unit has been selected. This opens the Detailed Unit Information window in the upper left corner. Detailed stats about the unit, its weapons, and capabilities are displayed here.

G-3 Alliierte Gewehr 45 Gruppe					
Geschw. Klasse: Schnell					INFO
Transport Klasse: 1					ABSCHÜSSE
Waffen	Reichweite:	40m	100m	250m	500m 1000m
9 M1 Gewehr		117	63	27	9
1 Thompson MP		45	9		
2 BAR		68	52	30	15
TOTALE FEUERKRAFT		230	124	57	24 0

Infantry

ID, Nationality and Type of Unit

This shows the ID of the selected unit, which side it belongs to (Axis or Allies) and the type of the unit.

Speed Class

The speed class determines the speed at which the infantry unit is able to move. The speed class a unit belongs to depends on how much heavy equipment it is carrying. There are five speed classes:

Immobile - the unit cannot move on its own and has to be towed (usually only heavy guns, e.g. the 88mm Flak)

Very Slow - usually used for guns can be pushed by their crews (e.g. the 57mm AT Gun)

Slow - light guns, heavy machineguns (e.g. the HMG42)

Medium - light machineguns, light mortars (e.g. the 60mm mortar)

Fast - squads, sharpshooters, and the US bazooka team

Only fast units can use the RUN and SNEAK movement orders since it is difficult to do these actions while carrying heavy equipment. Very slow units are also not allowed to crawl with the exception of Panzerfaust and PIAT teams (for short distances only!).

Transport Class

Ranges from 1 to 9. Units can only mount vehicles which offer at least the same or higher transport class. Additionally, vehicles can only tow guns with the same or a lower transport class.

Leadership Abilities

If the selected unit is an HQ unit, its leadership abilities are displayed as, for example, "Morale +1" or "Command +2".

Special Equipment

If a unit is carrying special equipment (e.g. Panzerfaust, rifle grenades, demolition charges, or gammon bombs), the type and quantity is displayed here (e.g. "1 Panzerfaust-30" or "2 Demolition Charge")

Weapons & Firepower

A list of available small arms for the selected unit is displayed. Which weapons are available depends on the nationality and type of the selected unit. As the unit takes casualties, individual weapons disappear from the list, showing that the soldier carrying that particular weapon has been put out of action. Sometimes, however, soldiers can exchange weapons. For example, if the soldier carrying a squad's machinegun is hit, another soldier of that squad might drop his own weapon and pick it up.

Beside the weapons listing, a firepower table shows the firepower of each weapon according to the range to a target. The firepower (FP) is shown for all weapons of the same type, e.g. 5 M1 rifles means 5 x fp 3 at 250m = 15 fp. However, the firepower as shown in increments of 40m, 100m, 250m, 500m, and 1000m is a reference for the player only - the game engine uses a more precise system measuring down to the meter.

T-1 Allied 6 pdr Antitank Gun						
Speed Class: Very Slow					Info Kills	
Transport Class: 6						
Main Weapon: 57mm 823 m/sec blast = 19						
Armor Penetration (can vary)						
Angle	Range:	100m	500m	1000m	2000m	
0 deg		100	91	78	70	AP (a)
30 deg		77	71	63	56	
60 deg		42	39	36	30	
0 deg		166	141	112	67	TUNG (t)
30 deg		133	113	90	54	
60 deg		57	49	41	28	

Guns/Mortars

The first three entries are the same as for infantry units. After that, the MAIN WEAPON is shown, including caliber (e.g. 57mm), muzzle velocity (e.g. 823 m/sec) and a Blast value. The latter indicates roughly how lethal the weapon is within a certain range from the impact point.

Below that is an armor penetration table, which is intended to give a rough idea of the potential of the gun. It's a rough idea only because a lot of factors influence the actual chance of armor penetration in the heat of battle.

The penetration table states how many millimeters of armor the shell can penetrate at four ranges (100m, 500m, 1000m, and 2000m), for three different armor slopes and the best anti-armor ammunition types that the gun can fire.

V-2 Axis Panther (Pz VG)						
Type:	Medium Tank	Info Kills				
Maximum Speed:	30 mph (13.4 m/s)					
Weight:	50 tons (45 metric)					
Engine:	700 horsepower (14.0 hp/ton)					
Ground Pressure:	12.5 psi (0.88 kg/sqcm)					
Silhouette:	118					
Transport Class:	2					
Passenger Capacity:	squad					
(mm/slope)						
Armor (85% quality)	Front	Side	Rear			
Turret	110/11°	45/25°	45/25°			
Upper Hull	80/55°	50/30°	40/30°			
Lower Hull	60/55°	40/0°	40/30°			
Top	16					
Nahverteidigungswaffe, Shot Trap						
MG: bow, coaxial (192)						
Main Weapon: 75mm 925 m/sec blast = 34 slow turret						
Armor Penetration (can vary)						
Angle	Range:	100m	500m	1000m	2000m	
0 deg		173	160	145	114	AP (a)
30 deg		139	122	111	91	
60 deg		62	59	54	46	
0 deg		49	47	44	40	HE (h)
30 deg		39	37	35	32	
60 deg		23	22	21	20	

Tanks / Vehicles

ID, Nationality, and Type of unit

This shows the ID of the selected unit, which side it belongs to (Axis or Allies) and the type of the unit.

Maximum Speed

This is as fast as the vehicle can go on a paved road. Cross-country movement is generally much slower.

Weight

Measured in tons (U.S. and metric).

Engine

The horsepower is used for speed and acceleration calculations. Diesel-powered engines are somewhat less likely to catch fire when hit.

Ground Pressure

Measurement of the vehicle weight and the surface-contact area of its tracks. Determines the chance of bogging down.

Silhouette

A numerical value representing the size of the vehicle, modified especially by its height, that affects gunnery accuracy and spotting against it. A value of 100 is "medium size".

Transport Class

A vehicle can only transport (tow) other units with the same or lower transport class.

Passenger Capacity

Can be squad, team or none. Units may ride on the deck of a tank for example.

Armor

The armor table gives the thickness and slope of armor for various tank parts (usually turret, upper hull, lower hull, and top) for the front, sides and rear. Other information may include armor quality (values lower than 100% represent manufacturing and metallurgical flaws, common in early Allied vehicles and some late-war German vehicles. Special features like armor skirts (Schürzen) or partly-open vehicles (open top and/or sides) are also noted here.

Special Equipment

Smoke Dischargers - small chemical packets mounted on the outside of a tank that can create a smoke cloud.

Smoke Mortar - a small mortar which can be used to fire smoke rounds in front of the tank.

Nahverteidigungswaffe - close defense weapon - hurls a HE or smoke grenade from the inside of the tank against any enemy infantry approaching the tank.

Alternate Rear-facing Driver - some German armored cars were equipped with a second driver seat in the rear of the vehicle, allowing them to reverse quickly out of enemy view.

Gyrostabilizer - some tanks (mostly Shermans, Stuarts, and Pershings) are equipped with a gyrostabilizing system, which keeps the gun barrel level even while the vehicle is moving. This enables the tank fire more accurately on the move.

Special Features

Burns Easily - some vehicles stow ammunition and/or fuel in such a way that internal damage regularly causes the entire vehicle to catch fire.

Shot Trap - certain vehicles (like the early Panther model A) have a design flaw in their shape, which creates a "shot trap" - a curved surface on the underside of the turret front which deflects incoming projectiles downward into the turret ring, or the weakly-armored hull top, where it often penetrates easily.

Slow ROF - certain vehicles are known for their slow "rate of fire", i.e. long reloading times for their main gun. This can be due to design flaws (e.g. a cramped crew compartment) or especially bulky ammunition.

Turret Speed

Turreted vehicles (mostly tanks but also some armored cars) are rated for their ability to rotate the turret. Four different speeds are possible: Fast turret, medium turret, slow turret, very slow turret

Machine Gun

Most vehicles have one or more machineguns mounted in various places. Most common are bow and co-axial MGs, with the first able to fire only within the vehicle hull's front arc, while the latter can be directed wherever the main gun can point. "Flexible" machineguns, usually top-mounted and meant for antiaircraft purposes, have a full 360° traverse but can normally only be operated when the vehicle is unbuttoned, though some German vehicles have remote-control capability for these weapons (which, if applicable, is also listed here). Machinegun ammo is listed in brackets.

Flame

Vehicles equipped with a flamethrower have this entry, together with the available "ammo", i.e. flambursts. Note that flames fired at longer ranges can use more than one "ammo point".

Main Weapon

Gives the caliber, muzzle velocity and blast strength of the main gun, as well as any other special info, e.g. "rear-facing" for vehicles with guns (or mortars) only capable of firing towards the rear of the vehicle.

Armor Penetration

The penetration table states how many millimeters of armor the shell can penetrate at four ranges (100m, 500m, 1000m, and 2000m), for three different armor slopes (0°, 30° and 60°) and the best anti-armor ammunition types that the gun can fire. These values, however, can vary a lot in the heat of battle, and are supposed to give a rough idea only. Also, although only four ranges are shown, the game engine uses a much more precise system (down to a fraction of a meter).

Info/Kills

By clicking on the white Info/Kills box in the upper right corner of the info screen, you can toggle the display between unit stats and a summary of how the unit fared in the particular battle so far. To preserve the "fog of war", only verified kills are shown, however - so if your mortar team takes out a squad hiding in woods and nobody sees it, the kills will not be shown here.

SETUP PHASE

When entering the 3D battlefield for the first time to play a game, you are brought right into the Setup Phase in which you are allowed to position your units for battle.

Setup Zones

You should immediately notice a number of colored setup zones on the map. There are three setup zones for each side:

Red, White and Blue for Allies
Green, Black and Yellow for Axis

Units within such setup zones can only be moved within the same zone or to another zone of the same color. Notice that the base beneath a unit displays the same color as the setup zone it is located in. There are two exceptions:

Units with Gray Bases

Units are located in the so-called neutral setup zone and cannot be moved at all. (Exception: Target Reference Points)

Units with Orange Bases

Units are "padlocked" (by the scenario designer) and cannot be moved at all.

The layout of the setup zones and which units are padlocked or not, is determined by the scenario designer.

Orders for Setup Phase

During the Setup Phase, every unit has a slightly different set of allowable orders than during subsequent turns. The unit-specific order menu can be accessed by right-clicking on the unit or by left-clicking and pressing SPACE. The available orders are:

Move

Move the unit within its setup zone or to another zone of the same color. After moving the unit, the Rotate order is executed automatically, which allows the player to choose a facing for the unit. By moving units onto a vehicle, the unit can embark.

Place

Same as Move, except that the facing of the unit stays the same. By placing units onto a vehicle, units can embark.

Rotate

Allows the player to choose a facing for the selected unit.

Line Of Sight

Line of Sight tool, which enables the player to check lines of sight from the unit's current position.

Dig In

Only available for the defender if defending vehicles are allowed to start dug in (option preset by scenario designer). The vehicle ordered to dig in will be shown with only the turret sticking out from the ground and is considered hull down. A dug in vehicle, however, cannot move during the scenario! Defending infantry automatically occupy foxholes after exiting the Setup Phase.

Button Up

Allows tanks and other vehicles to button up (i.e. close their protective hatches) prior to game start.

Split

Allows the player to split a squad into two teams.

Activate Flag

Available only for attacking units when playing on a map with dynamic flags. After choosing this order, you will be prompted to click near one of the dynamic flags to select which one is "real".

Ambush

Allows HQ or heavy-weapons units to designate ambush points before game start. An Ambush Marker is placed on the map.

Note: With the exception of ACTIVATE FLAG and DIG IN, all other orders are also available throughout the rest of the game and are discussed in the ISSUING ORDERS section in detail.

ISSUING ORDERS

Every unit has its own set of orders which it can perform. The available orders depend on unit type (vehicle, infantry, gun, mortar, etc.) but also on its current status (immobilized, bogged, stunned, etc.).

By right-clicking on a unit, the unit's Orders menu opens. Alternately, you can press the SPACE key after selecting a unit to bring up its orders menu. Then, you can simply point the cursor over the order you want it to perform and left-click to select it OR you can use one of the shortcut "hotkeys" displayed next to the order name to select it. (You can use these hotkeys without first bringing up the menu - just select a unit and press a hotkey).

In some instances, simply selecting an order from the order menu is all you need to do (e.g. if you want to order the unit to HIDE), and the order is executed immediately at the start of the next Action Phase. In most instances, however, you need to specify a target point for the order (e.g. for movement or fire orders).

In this case, a line will extend from the selected unit towards the mouse cursor. Point the cursor to the intended target and left-click. This completes the order. You can of course navigate around the map and change view levels as you like, and as long as you don't click anywhere on the map the order target selection stays live.

The order lines are color-coded, depending on which type of order you issue. Additionally, the given order is displayed above each waypoint (see below).

There are several basic types of orders with their own special features discussed below.

Movement Orders

Movement orders are used to tell your units to move from one place to another during the Action Phase. They can do it as fast as possible, while paying little attention to incoming fire, or as carefully as possible, taking maximum cover in the available terrain. There are also some differences between the way movement works for infantry, guns, and vehicles, all of which are discussed below.

Units can also become immobilized and unable to receive movement orders. This is true not only for vehicles which have been hit or simply bogged down hopelessly, but also for heavy weapons teams which have suffered enough casualties that the remaining men cannot carry all their heavy equipment.

Movement - Infantry

Available movement orders for infantry units are:

Sneak, Crawl, Move, Run, Rotate, Withdraw, and Pause

A detailed description can be found in Appendix B.

Movement - Vehicles

Available movement orders for vehicles are:

Move, Fast, Reverse, Hunt, Rotate, and Pause

A detailed description can be found in Appendix B.

Impassible Terrain

Some units, especially many vehicles, can not enter certain types of terrain. Contrary to popular belief, tanks are not able to smash through thick forests in combat situations. As tough as tanks are, a single branch in the tracks can immobilize the vehicle and trees over a certain diameter (depending on the weight of the vehicle) can not be pushed over. Crossing forests might be possible given ample time and caution, but certainly not work within the timeframe and pressure of an average battle in CM, and therefore has been excluded for the sake of realism.

Vehicles Cannot Enter

Marsh, woods, tall pines, rough, water, fords, slopes, cliffs, ice

German Vehicles Also Cannot Enter

Bocage

Note: starting in July 1944, all fully-tracked Allied vehicles are assumed to have the so-called "Rhino" attachments - steel prongs welded to the front lower hull of a tank to enable it to smash through the dense bocage hedges of the Normandy. Germans did not use this equipment and therefore are not allowed to cross bocage.

Wheeled vehicles additionally cannot enter

Stone walls, bocage

Infantry cannot enter

Cliffs, water

If you try to issue a movement order to an impassable terrain feature, the movement order line turns red and disappears after left-clicking to indicate that movement to this objective is not possible. However, for the sake of convenience, it is possible to plot movement across impassable terrain. In such a case, when the unit approaches the obstacle, the AI will re-plot its movement path to allow the unit to move around the obstacle automatically.

Keep in mind that in such situations, the AI might not plot the movement quite as you had imagined it. Instead, you should use waypoints to lead the unit around an obstacle with precision.

Waypoints

It is possible to issue more than one movement order during an Orders Phase. In fact, there is (almost) no limit to how many orders you can issue. You could, for example, tell an infantry squad to run across a field to a patch of trees, then crawl through the trees, then walk down a road to a house. This is accomplished through the use of waypoints. After you issue the first movement order to a unit, you can then issue a second order. The second order automatically "starts" where the previous order ended (the only exception is the PAUSE order, which is ALWAYS used at the very beginning of a turn). The end-point of the last order becomes the starting point for the new order.

If you know that you want to issue more than one movement order to a unit, you can right-click instead of left-clicking after each order. This keeps the order menu open and the selected unit active, and speeds up the whole process. Right-click to place waypoints, and then left-click to place the destination.

Designer's Note: Although it is possible to plot out a great number of waypoints for a unit, it might be not a good idea to do so. There is a famous saying that "No plan survives contact with the enemy", and it is

just as true for Combat Mission. Issuing too many orders to your troops is dangerous, because they WILL try to fulfill them - this can lead to a situation in which your troops simply bypass an enemy because they were ordered to move forward. There is a fine balance between doing too little and doing too much in Combat Mission, and finding the right balance is one of the key points to mastering the game. What is so intriguing about this is that there is a similar balance in real-world combat operations - one of the very first things company commanders learn is to keep their orders simple, realistic and flexible.

Editing Waypoints

Combat Mission lets you change and edit orders issued on previous turns without having to redo them from scratch. Simply select a waypoint by left-clicking on it then move it around by holding the right mouse button. The waypoint follows the mouse, and when the mouse button is released, remains positioned at the last location pointed to.

If the waypoint was set in a previous turn (colored red) there is a limit to how far away you can move it. The distance you can move it depends mainly on the unit's experience level and whether it is in command or not. Veteran units can have their waypoints edited to a much larger degree than green ones. Conscripts have to stick pretty much to the previously given orders with only little room to maneuver. Waypoints placed in the same Orders Phase as you are trying to edit them (colored white) can be moved without restriction.

You can also change the movement speed for a waypoint by clicking on the waypoint and using a hotkey for the order you want to change it to, or by pressing SPACE to bring up an abbreviated Orders menu of alternatives. Like this, you could change a MOVE order to a RUN order without having to redo everything from scratch.

Of course, the option to delete orders is always available to you in addition to moving them. However, the big advantage of changing orders and waypoints (as described above) is that the unit does not suffer from a command delay as it would from being issued new orders.

Pausing

The "pause" order tells a unit to remain in place at the start of a turn for longer than the usual command delay, before executing subsequent movement orders. This can be used to coordinate movements

between units (e.g. have two tanks crest a hill at roughly the same time or have one column of vehicles start moving when another one is expected to have reached its target).

Pauses are allowed only at the beginning of a turn, you cannot order additional pauses in between waypoints or at a later time in a turn, for example. This, again, would allow for too much micromanagement, more than any company or even platoon commander would ever have.

Designer's Note: The PAUSE command can be used for carefully cresting a hill or "peeking" around a house corner with tanks. Order the tank to pause for 30-45 seconds (depending on how far away you are from the edge), and issue a movement order. The tank will start moving at the end of the turn only and should be just around the corner at the end of the current turn. At the beginning of the next, you can order the tank to reverse back. This should give you enough time to spot for the enemy, while keeping the tank in good control and able to move out of (unexpected?) harm's way.

Speed

Not all infantry units are allowed to run or sneak. Whether a unit is capable of running or sneaking depends largely on how much heavy equipment it is carrying, but also on the fatigue level of that unit. Exhausted units are not allowed to run or sneak, even if they could do so while rested.

When you look at the detailed unit info screen (by selecting a unit and hitting ENTER), you can see an entry for "speed class". Only units with "speed class: fast" are allowed to run and sneak. Additionally, very slow units are not allowed to crawl.

Designer's Note: Try doing a 100-yard dash while carrying an MG42 with tripod and a couple hundred rounds of ammo!

Embarking/Disembarking

Certain vehicles, like trucks, halftracks and even tanks, are capable of transporting units by towing them (guns), carrying them within the vehicle, or sometimes even allowing them to ride on top. Not all vehicles can transport all types of infantry. While a two-man artillery spotter team might fit into a jeep, it would be really hard to fit a 12-man squad into it! Which vehicles can transport which units is discussed in more detail in the Unit section.

In order to embark a unit into or onto a vehicle, you issue a movement order with the vehicle to be entered as its destination. When your cursor with an active movement order touches a vehicle eligible to transport the moving unit, the line color will turn white and the word EMBARK will be displayed.

When trying to embark units, keep in mind that it's difficult to do so while the vehicle is moving. Issue a PAUSE command for the vehicle in question or - even better - do not order it to move for the current turn. However, if the vehicle to be embarked is far away, you can, of course, order it to move closer. The infantry unit will wait until the vehicle comes closer before it starts moving.

Use the same procedure to disembark from a vehicle. Simply select the unit you want to move off the vehicle, and give it a movement order somewhere on the map. However, just as with embarking, keep in mind that it's difficult (and dangerous) to jump off a vehicle while it's moving. Keep in mind the command delay of the infantry unit and make sure that the pause order is longer than that.

Sometimes when the vehicle slows down to take a sharp turn, it might become so slow that the infantry will jump off without a pause order. Additionally, embarked units might decide to disembark even if not ordered to, and even while the vehicle is moving - mainly when they are shot at. It depends on how heavy the incoming fire is and if the unit is protected while embarked, e.g. units in halftracks will usually stay there even if fired on, but units riding on the exposed back of a tank will jump off and search for cover quickly.

FIRING ORDERS

Units on the battlefield constantly look for their own targets, and engage them based on many variables including exposure of the enemy, distance, cover, probability to hit, ability to cause damage, facing, available ammo, etc.

Most of the time the player does not need to worry about targeting - in fact, it is a good idea NOT to issue firing orders to your units most of the time. The reason is that units without player-issued firing orders usually react very quickly to new threats, whereas units with firing orders try to stick to them for as long as possible and override them only when another threat becomes disproportionately serious.

However, there are occasions when you want to make sure that a unit targets a particular enemy. There are several firing orders you can issue, but only one can be issued per unit per turn. Your units try to execute your orders and regard them as high priority, but they can and will retarget if they think it is wise to do so.

Available Firing Orders

Each unit that is allowed to target (isn't panicked, gun is working, etc.) has one of three targeting orders available to it. A more detailed description of the use of each can be found in Appendix B.

Target

General purpose "shoot at this unit" order. If you click on a piece of terrain, the order automatically changes into an "Area Fire" order. The difference between target and area fire is that one targets a specific unit while the other targets any unit in that general area.

Target Wide

Artillery spotters can instruct the firing battery to spread out its shells rather than aim at a pinpoint target. This is a good way to suppress large, dispersed formations of enemy troops.

Next Target

This is a great way to scan quickly through all available targets for the selected unit, and also allows a quick check of which enemy units are actually visible.

Targeting Feedback

When you move the cursor over an enemy unit after selecting a target order, some additional data is displayed about the target. Which data is displayed depends on the firing unit as well as target.

Unit Type: the unit type is displayed on top, to the degree it has been identified at least. A "?" after the unit type means that it has not been fully identified yet

Distance: the distance between the firing unit and the target is shown in meters

Exposure (Infantry/non-Armored Vehicles): a percentage value, stating how much of the target is vulnerable based on an abstract maximum (100%)

Firepower (Infantry/non-Armored Vehicles): the amount of firepower that the firing unit (i.e. the one you're giving orders to) can bring to bear on the unit pointed to by the cursor

Hit Chance (Armored Vehicles): a rough chance to hit the target - rough, because it changes constantly during the course of an Action Phase

Kill Chance (Armored Vehicles): an approximate chance the firing unit has to destroy the target. This can be None, Rare, Medium, Good, or Excellent depending on a lot of factors which change constantly during an Action Phase. Even with an extremely small kill chance (e.g. "None"), it is possible to damage a tank (hit the tracks, gun, or cause internal armor "flaking", killing crew members) or even destroy it by a lucky hit on a weak spot. Weak spots can be hatches, MG mounts, vision blocks, or even poorly-manufactured armor plate.

Out of range: when the target is out of effective range of the firing weapon (too far or too close), this is displayed in yellow text. (Note: you can find the minimum or maximum range of a weapon in the Detailed Unit Info screen)

Out of sight: if the enemy unit is not within sight of the selected unit checking its line of sight, the "out of LOS" message is displayed. Additionally, no hit or kill chances are shown.

Hull down (Vehicles): both the firing unit as well as the target can be hull down (i.e. only the turret/superstructure are visible and therefore

exposed to fire). If the target is hull down, this is displayed above the target unit. If the shooter is hull down, this is displayed above the firing unit.

In some instances, no additional information besides the unit type and distance is displayed. This usually indicates that the firing unit is not capable of damaging the target (e.g. firing pistols at a tank).

Direct Fire and Area Fire

The target of a fire order does not always need to be an enemy unit. You can order your troops to fire at anything such as houses, woods, even open fields. The term used for this type of fire is "Area fire". Area fire can cause casualties to units within the target area, but is less effective than aimed direct fire. However, area fire is the only way to go if the enemy unit has not been spotted (and therefore cannot be directly fired at) and is also useful for suppressing the enemy.

Area fire usually lasts until the order is cancelled by the player. However, area fire automatically stops if a friendly unit enters the target zone OR - on rare occasions - when the firing unit has decided to engage another target on its own. Direct fire lasts for only as long as the target is within line-of-sight (LOS) and is automatically cancelled a few seconds after it goes out of sight or is destroyed.

Hint: Units which go prone often disappear out of sight of the firing unit (e.g. behind a stone wall), so "area fire" is usually the better choice when the aim is to suppress an enemy generally, because it is kept up even after the target is not visible. In such instances, it is better to select an area close to the enemy you intend to suppress, not the enemy unit itself.

On some occasions, you might see generic unit markers (a star for US units for example) which seem to be within LOS of your units. However, the fact that a generic marker rather than the actual unit is displayed indicates that the unit in fact is completely out of sight (e.g. prone in a foxhole, behind a hedge, or has retreated away), even though the area is within LOS. In such cases you are only allowed to target the area, not the particular unit.

Note: the blast from high explosive rounds can hurt units out of LOS of the shooter.

It is also possible for the player to issue a Direct fire target order even if the enemy unit is out of LOS during the Orders Phase, but might come into LOS during the following Action Phase. The firing unit tracks the designated target for a few seconds and engages it should it come within LOS. If it doesn't, then the firing unit cancels its order and looks for other targets. However, it retains a tendency to retarget the original enemy should it appear later on. This way you could, for example, stop behind a house, issue a movement order forward and at the same time target an enemy tank which might come into view during the Action Phase. This usually ensures that your tank will engage this enemy (unless a much more significant threat suddenly appears).

Some units, like artillery spotters and (in certain cases) mortars, can be issued indirect fire orders against units or areas out of LOS. In such cases the units start firing immediately, without waiting to obtain a line of sight.

Hint: If, in the middle of issuing a targeting order you change your mind, you can press the SPACE bar and the new order will be canceled, preserving the previous targeting order.

Firing Arcs

Vehicles without a turret (e.g. assault guns which have the main gun fixed to the main hull) can only engage targets within a limited arc in front of the unit without having to rotate the whole vehicle or gun. This is called a "firing arc". How wide it is (in degrees) depends on the particular vehicle model. Should you issue a target order to such units and point outside of its firing arc, the target line becomes maroon to indicate that the firing unit has to rotate first in order to aim and fire. Not only does this cost time and usually mean worse accuracy for the first shot, it is also especially bad news if the firing unit is immobilized!

Special Equipment

Panzerfausts, demolition charges, rifle grenades and Gammon bombs are infantry squad weapons that are handled specially. The player does not give direct orders for the use of these weapons; that is determined instead by the TacAI.

Panzerfaust

A short-range, one-shot antitank rocket launcher commonly possessed by late-war German infantry squads to possess. They come in three different sizes and ranges (30m, 60m, and 100m) depending on the scenario date.

If an enemy armored vehicle comes within range, your squad tries to fire its Panzerfaust. However, suppression can reduce the likelihood of this significantly. Sometimes your troops might even fire a Panzerfausts at enemy infantry if the enemy is heavily dug in and/or your unit is carrying several Panzerfausts and feels it can spare one for antipersonnel use.

Demolition Charges

Usually carried only by engineers, these bags of explosives are automatically used to clear minefields, destroy enemy units in close combat, or knock out fixed fortifications. This weapon packs a lot of punch!

Rifle Grenades

U.S. squads might be armed with special grenades which can be fired using a modified rifle. They provide a decent anti-tank capability at greater ranges than hand grenades or demolition charges.

Gammon Bombs

Essentially lumps of TNT wrapped in small pouches, this weapon is treated exactly like demolition charges except that they are carried by Allied airborne troops.

TERRAIN

There are many different terrain types in the game. Each one has an impact on lines of sight, cover, concealment, and movement. What you need to understand to play the game is that what you see in the game is merely a visual representation of the underlying mathematical 3D battlefield and some abstractions are necessary to keep the game (dis)playable.

Trees are one of such abstraction. Although you see individual trees on the map, their actual placement plays no role for the game as such. What counts is the "woods" terrain, as seen by the different kind of ground beneath and around trees.

"Open ground", although seemingly "empty", is not. Bushes, small dips, high grass and other features are all taken into account, and so the LOS cannot be traced endlessly even across open ground. More importantly, weapons accuracy decreases dynamically with range, not only because it is harder to hit something farther away, but also because it is harder to see the target at all.

The LOS tool is very useful an aid to understand the terrain on the map better, as it shows what kind of terrain is used for the in-game calculations. You can pinpoint the exact end of woods, the exact corner of a building, the exact point where a wall or hedge starts, etc. Most of the time such things are clear from looking at the map (and your judgement will become better with playing experience), but when in doubt, the LOS tool provides the answer.

Terrain also changes with the different seasons. For example, depending on the scenario's time and date trees can be dense and thick (summer) or leafless (winter). Grain fields also change dramatically with the seasons and weather. This has a direct impact on the concealment and cover provided by such terrain.

Buildings

There are various types of buildings in the game: two types of small farm houses (light and heavy), a tall light building (2-levels), a big blockhouse (2-levels, heavy), and a church (basically a special type of the big blockhouse, i.e. heavy building). They, too, have an impact on concealment and cover, with heavy buildings being more protective than light ones. Light buildings also tend to be reduced to rubble

much more quickly than heavy buildings, with a few high-explosive rounds of 75mm caliber and higher being enough to achieve this. Buildings can also become reduced to rubble when they catch fire and have been burning for some time. Any unit inside a 2-level building which collapses or catches fire will suffer serious casualties.

Lines of sight can be a bit tricky around buildings, although most answers are easy once you think about it. In order to be able to look outside of a building without restrictions, a unit needs to be within a few meters of the outside wall (i.e. to peer through windows or other openings). If it is further away than about 5 meters, it can still see a few meters outside of the house, but not far beyond that.

When a building or a unit in a building is fired at, regardless if it is direct fire or indirect fire (from mortars for example), most of the fire hits the outer walls of the building. Units hiding within can still be hurt by the blast from such things as flying stones, glass, shrapnel etc. However, some rounds can also make it into the building and explode within, e.g. through holes in the outer walls or roof, blasted doors or windows. Such shots can cause severe damage. There is even a very small chance that a round can make it into and THROUGH a building, exploding on the other side - bad news for any troops lurking behind it!

The interiors of buildings are abstracted and included into combat resolution calculations. Although you can trace an LOS within a building without restrictions (though with limited range) the chance of enemy units hiding within the same building and remaining unspotted is relatively high (imagine them hiding in another room), but drops dramatically the more time your units spend inside.

There are also two different height levels for buildings. Level one, the ground level, simulates houses that are one to two stories high. Level two simulates houses three to four stories high. These are the only available levels for Combat Mission. You cannot place units in church towers.

One thing to keep in mind with buildings is that they are a confined space and can contain only so many soldiers at a time. The general rule of thumb is one squad per corner of a building. But if you try to put a whole platoon into a small farmhouse, don't be surprised to find that one squad has to leave and wait outside.

Watch out when you want to fire weapons with backblast (like bazookas and Panzerfausts) from buildings - this often suppress the

firing unit. Vehicles and guns are not allowed to enter buildings. Mortars can enter a building, but cannot fire from it.

Building Damage

Buildings and bridges display "damage" or "heavy damage" labels when they have taken over 50% damage and the "Warning Labels" option is on. Additionally, they're listed with a "*" attached, like "light building*", or a "***" for heavy damage.

Rubble

These are the leftovers after a building has collapsed. Vehicles may not enter rubble. It provides excellent cover and concealment for infantry, though. LOS is heavily restricted across rubble, but only to a certain height (which is naturally much lower than the building previously was).

Bocage

"Bocage" is the French name for their (in)famous Normandy hedgerows, incredibly thick bushes with intermingled leaves and trees growing on an earthen mound several feet high. The bocage is hundreds of years old and a natural barrier not known in other parts of the world. Bocage hedgerows can be easily three to five meters high and more, and provide a serious obstacle for infantry and vehicles alike. They also completely block LOS unless a unit is within a few meters of the hedgerow.

Infantry is allowed to enter and cross the bocage hedgerows, but does so very slowly (it takes about one minute on average). No vehicles are allowed to enter or cross hedgerows, the only exception being Allied fully-tracked vehicles from July 1944 on. This simulates the use of "hedgehogs" or "Rhinos" - steel teeth mounted to the front of a tank which aid in cutting through the brush. German tanks are NOT allowed to enter or cross "bocage" hedgerows.

Scattered Trees

These are single trees with little or no brush, standing in loose groups together or along a road. Orchards fall into this terrain type as well. They provide only light cover and concealment, but are certainly better than open ground. Do not expect miracles, especially in winter when

even a single squad has trouble hiding in scattered trees.

Designer's Note: Scattered trees can also be used to simulate narrow paths in forests, allowing tanks and other vehicles to pass at a slow rate and considerable risk of bogging down.

Woods

This is the "usual" woods terrain, which includes mixed types of trees, some underbrush and bushes. Woods provide good cover and concealment. No vehicles are allowed to enter woods in Combat Mission.

Tall Pines

Tall pines represent dense woods terrain with thick underbrush and bushes, and provide cover and concealment similar to "Woods", except that the pines are taller and so are more likely to block elevated lines of sight from tall buildings or hilltops.

Hedges

This is the common type of hedge and is about one meter high, planted or naturally grown, and is passable for all types of vehicles and infantry (with some impact on speed, however). It provides decent concealment, but little cover.

Stone Wall

A man made stone wall, about 1 meter high, and thick enough to block even a direct hit from a tank main round. Walls are passable for tracked vehicles and infantry, albeit at a lower speed. Vehicles behind stone walls can achieve hull down status, unless the enemy is on a higher elevation. Stone walls provide good cover and concealment, especially for prone units behind it, but not when the attacker is at a higher elevation or attacking from the sides or rear.

Brush

Brush can be used to simulate several things types of terrain such as high grass, to bushes, and even wild fields. It provides good concealment and restricts LOS, but offers little cover.

Grain Fields

Grain fields are just that. Note, however, that the concealment and cover they provide vary with the seasons. Basically open ground in winter with not much to hide behind, they can provide decent concealment in summer and less so in fall or spring. Cover, however, is almost nonexistent. Grain fields also increase the chance of vehicles bogging down in them, even with otherwise dry ground conditions.

Marsh

Marsh is swampy open ground, with provide little more cover than some bushes and grass. It is difficult to walk on even for infantry, and cannot be entered or crossed by vehicles of any type.

Rough

Rough represents especially broken or rocky terrain, impossible for vehicles to cross and accessible only by infantry. It provides decent cover and concealment.

Roads

Roads come as two types: dirt and paved. Dirt roads are the main type of road encountered in northwest Europe outside of the big cities and towns. There is no cover or concealment on a road, but movement is fast.

Paved roads have gravel or hard concrete surfaces and are relatively easy to drive on even during muddy ground conditions or snow. However, besides some main highways and city streets, paved roads are not encountered very often.

Bridges

There are three types of bridges - wooden bridges, often encountered across small streams or creeks and are two elevations high; stone bridges, spanning small rivers at two elevations high; and tall stone bridges, across major rivers or valleys, four elevation levels in height and allowing vehicles and troops to pass under them.

Railroad Tracks

These offer little concealment and almost no cover, and troops do not

gain much speed advantage on them (in fact, wheeled vehicles are slowed down).

Water

Water tiles are used to simulate rivers or lakes, and cannot be entered by any units except infantry embarked in assault boats. When there is snow on the ground, water becomes frozen - vehicles and guns are still not allowed to enter, but infantry is able to cross ice.

Fords

Sometimes water is either shallow or rocky enough to safely cross on foot. Fords, therefore, provide alternative, limited access to bridges over water.

Slopes

These are inclines steep enough to prohibit vehicular travel. Infantry can still climb them, albeit slowly.

Cliffs

No unit is allowed to traverse a cliff.

HIDING AND AMBUSHES

Often enough, you do NOT want to fire at a visible enemy unit, but instead hold your fire and hide until it comes closer within your lethal zone. There are several orders available which allow players to do this. Skillful use of these orders helps ensure your success on the battlefield.

The following orders are available:

Hide - Causes the unit to remain hidden/quiet

Unhide - Reverts a Hidden unit back to normal mode

Ambush - Designates a "trigger" area to target

A detailed description can be found in Appendix B.

Hiding, if done right, keeps your units unspotted until the enemy virtually steps on them. "If done right" are the key words here. Trying to hide in the middle of open ground, on top of a bare hill, or behind a stone wall when the enemy is coming across a high hill are not a good ideas. Hiding in buildings, woods, or rubble (to name a few examples) works much better and usually allows you to remain unspotted until you choose to engage the enemy. Needless to say that hiding has little effect if your troops get nervous and open fire too early.

How well your units hide themselves depends to a large extent on their quality and training. Staying hidden while the enemy is advancing slowly towards you takes a lot of courage and discipline. Green troops or conscripts are likely to get nervous and fire too early, thereby giving away their positions and reducing potential enemy casualties. The STEALTH leadership ability helps to keep troops from being jumpy, especially if the units under command are green or conscript.

Depending on the situation, troops ordered to HIDE try to withhold fire if their chance of causing harm to the enemy is slim and the danger of being overrun is small. When the situation is optimal, or desperate (as just noted), units automatically open fire at any enemy coming within their lethal zone, usually 100m or less.

If you issue a TARGET order to hiding troops, they automatically unhide, ready to open fire immediately at the beginning of the next Action Phase. You can, however, order them to hide again. This keeps the TARGET order active, but your troops try and remain hidden until the chosen target comes well within their lethal zone. Of course they might still get nervous and open fire too early, or engage another target

if it becomes a serious threat.

Only HQ units, teams (machineguns, mortars, and anti-tank teams), guns, and tanks can be (directly) ordered to AMBUSH. When the order is selected you place an ambush marker (which looks like a yellow target bullseye) on the map within LOS and a certain range of the unit. The ambush marker represents the "trigger point" of the ambush. Other units, including squads, can then target the ambush marker, which allows them to participate in the ambush. Squads, however, can only target an ambush marker when in command of the HQ which designated it, simulating the need for an overall plan involving so many men is to succeed.

Any enemy unit which moves into the location of an ambush marker causes the ambushing units to unhide and open fire, unless the chances of harming the target are too low or opening fire would be suicidal (a rifle squad without any infantry anti-tank weapons usually won't open fire against a tank at anything but point-blank range).

SPECIAL ORDERS

There are several special orders in CM, which do not fall into any of the previous categories. Some are available for all units, others only for specific types.

Line of Sight (LOS)

This order is unlike any other because it doesn't actually instruct the selected unit to do anything. Instead, it's a "LOS tool" which can be used to check exactly what the unit can see and what it can't. After selecting the order, a line extends from the unit towards the mouse cursor as with other movement or targeting orders. But this line does not tell the unit to go anywhere or rotate. Instead it gives information about its field of view.

The line of sight (LOS) line is color coded. There are basically three colors (blue, red and black), which indicate:

Blue

The area or unit at which the cursor is pointing is within line of sight and therefore can be seen (and probably fired on if necessary) by the selected unit. Depending on the "quality" of the line of sight can be light blue (excellent visibility), dark blue (bad visibility), or any shade in between. As you move your line of sight from an open field to woods, you can see that the line's color gets darker and darker, showing that more and more foliage and trees obstruct the unit's vision.

Red/Black

The area or unit at which the cursor is pointing is not within line of sight and therefore cannot be seen (and only fired at using indirect-fire weapons like artillery). The line has two colors in such a case - red towards the first obstacle on the path blocking the line of sight, and black from there on. This is useful because it hints at what exactly is in the way between your unit and the area/unit to be seen. In woods, for example, you are able to judge how far forward you have to move in order to peek outside of the forest while remaining in maximum cover and concealment. However, the point between the red and black color shows only the FIRST possible obstacle within the line of sight. There can be additional ones behind it, but you are not able to see them yet.

Keep in mind that because Combat Mission employs a three-dimensional battlefield, lines of sight can be found in all three dimensions. A unit on a hill may be able to see behind a stone wall or even a house, if it is sufficiently higher than the obstacle. Also don't be surprised if you are able to see the second story of a house, but not the first one, if, for example, a patch of trees is blocking the lower levels.

When you move the LOS line above an enemy unit, some additional information is displayed (see "FIRING ORDERS" section).

Note: A detailed description of the Line of Sight order can also be found in Appendix B.

Button Up/Unbutton

Many armored vehicles are built to provide all-around protection for their crews. Once they close their hatches or steel doors, they are more or less protected at least from small arms fire. "Button up" orders hatches closed, while "Unbutton" has the reverse effect.

Even open-top vehicles can "button up" in a sense, by having the crew duck down to take cover within the armored hull. Even if buttoned up, such open-top vehicles of course can still be hurt from above by grenades or small arms fire at higher elevations.

In any case, buttoned up vehicles may not use any weapons which are mounted on the outside (e.g. anti-aircraft machineguns on tanks and halftracks), with the exception of remotely-operated machineguns (mounted on some late-war German assault guns), since these can be triggered from the inside of the crew compartment, and the MG42 mounted on the front of the German Schützenpanzerwagen (SPW), because it has a full-size armored shield to protect the shooter (from the front at least).

Usually, you don't need to order your vehicles to button up as they will do so automatically when they receive enemy fire or shrapnel from nearby exploding artillery rounds. However, sometimes this might be too late, and if you know that your vehicle is going to enter some lines of fire, it might be a good decision to order it to button up before the bullets start pinging against the armor. Unfortunately, buttoned vehicles are virtually "blind", as visibility is reduced to small vision slits or periscopes, and buttoning up too early might end up leading your vehicle into a nasty ambush. Note that vehicles NEVER unbutton themselves - you must order them to do so.

While unbuttoned, your crew runs the risk of being killed or injured by all the hot lead flying around on a battlefield. Tank commanders during World War Two suffered significant casualty rates for this reason. Once a crew member is injured or killed, the rest of the crew usually will be SHOCKED for some time and not able to execute any orders for as long as it remains shocked. Moreover, the remaining crew will have to rearrange positions within the vehicle and/or show a natural reluctance to expose themselves to enemy fire for the remainder of the scenario. Such vehicles will remain buttoned for the remainder of the battle.

A detailed description of the Button up/Unbutton order can also be found in Appendix B.

Split Squad

While squads usually are the smallest maneuverable unit on CM's battlefield, under certain circumstances the player might want to split one or more of his squads, e.g. in order to set up outposts in front of his main positions. The SPLIT SQUAD order allows this, but not without certain drawbacks.

One drawback is that half-squads have less combat power than it does as when they are one coherent and well coordinated squad. By splitting squads, the player sacrifices a good portion of a squad's concentrated firepower in exchange for higher maneuverability of the two units.

The other drawback, maybe even more serious, is that half-squads tend to panic more quickly than full squads. For these reasons, half-squads are usually good only in an observer role (as outposts or scouts), and should be withdrawn as soon as contact with the enemy has been made.

Only half-squads originating from the same full squad can be re-joined. This happens automatically by moving them close together (10m or closer) at the end of a turn. Should one half of the squad be eliminated, the other half still can not join with any other half-squad for the remainder of the game. It is not possible to split teams or any other units.

A detailed description of the *Split Squad* order can also be found in Appendix B.

TACTICAL ARTIFICIAL INTELLIGENCE (TACAI)

When issuing orders, you have to keep in mind that your units are not robots. Being trained soldiers, they try their best to do what you tell them, but there are limitations. On certain occasions a unit might change your order a little or completely disregard it. The "Tactical Artificial Intelligence" (TacAI), which is responsible for this behavior, simulates the individual on the battlefield and takes into consideration what he thinks, sees and hears. It is, however, never pro-active and acts only in self-preservation and self-defense!

Imagine a situation in which you order one of your units to fire at an enemy hidden in woods several hundred yards away, and all of a sudden another platoon appears on your flank, from behind a dip or a house merely 40 meters away. If your men dutifully carry out your orders for the full 60-second Action Phase, the enemy will probably overrun your position before you - the player - get a chance to change your orders accordingly. Instead, the TacAI usually intercede to simulate your soldiers taking it upon their own initiative to switch fire toward the suddenly far more threatening enemy unit. Imagine another situation where your lead tank runs into a mine! Would you want to see your other units, which were plotted to follow the lead vehicle, simply rumble forward into the same minefield? If your answer is no then you'll be happy, because the TacAI will change their orders and have them try to drive around the obstacle.

Not only does the employment of the TacAI result in a more rewarding and realistic gaming experience, it also serves to simulate the behavior of human beings on a lethal World War Two battlefield. The uncertainties of human behavior (stress, morale, panic, will to survive) are taken into account and simulated in the game.

The TacAI uses "fuzzy logic" principles when determining the likely reactions of your units. This leads to a rich and varied set of possible unit behavior in different situations, and makes the units appear human in their actions. Some might run away when facing a new enemy close by, some might stand and fight or even charge. Although you might not always like the results, keep in mind that real world commanders often feel the same way! In other words, the TacAI is not programmed to be "perfect" since there is no such thing as perfection in war.

Only after the 60-second Action Phase has elapsed can you issue new orders to your units and redirect their actions, simulating tactical input from a squad or platoon commander to the individual soldiers.

Designer's Note: The TacAI leads the actions of units for both the human and computer player, simulating the minds of the soldiers in every individual unit. But there are two additional levels of Artificial Intelligence in the game, which guide only the actions of the computer player. We (very loosely!) call them the Strategic AI (StratAI) and Operational AI (OpAI). The StratAI is responsible for determining the general course of action for the Computer Player. It scans the map for key terrain, routes of attack, points of defense, and decides what needs to be done in order to win the game. The Operational AI is responsible for executing the StratAI's "orders" by plotting waypoints, assigning individual targets, etc. All AI levels use fuzzy logic routines, making the AI somewhat unpredictable and "smart" enough to tackle any map or scenario without special battle-specific coding.

AMMUNITION

Small Arms Ammo

Small arms and MGs use abstracted "ammo points". When a squad or team fires it expends one ammo point. Infantry units never run completely out of ammunition. Instead, when the last ammo point has been used, ammo is considered to be "low" and the unit tries to conserve its last ammo. Such units rarely fire more than once a turn and even then primarily in self-defense.

Machineguns on vehicles are treated like other Small Arms. Ammo counts for MGs are displayed in the unit's Detailed Unit Information window. Vehicle-mounted flamethrowers sometimes consume more than one "ammo point" per shot when the target is near the maximum flamethrower range.

Ammo Types for Guns/Mortars

Ammunition is tracked individually for heavy guns (tanks, ordnance, infantry anti-tank weapons, and mortars) only. The five types of ammo are:

"h" - High Explosive (HE)

Rounds of this type carry a significant explosive charge and are intended to generate on impact as many shell fragments (shrapnel) as possible, thereby increasing the lethal radius against soft targets (infantry, lightly armored or open-top vehicles) but sacrificing penetrating power against more heavily-armored targets.

"a" - Armor Piercing (AP)

This type of shell (or shot) uses kinetic energy to punch through armor plate and has little or no explosive charge. This makes it ideal for use against armored vehicles but generally ineffective against soft targets.

"c" - Hollow Charge

Also referred to as HEAT ammunition, this projectile uses a "hollow" (or "shaped") explosive to focus a thin jet of hot gas against armor plate, literally melting a hole through it instead of smashing through with brute force (like AP ammunition does). Because it does not rely on kinetic energy, a HEAT round's penetrative capability does not decrease over long range.

"t" - Tungsten Core

Known by the Americans as HVAP (Hyper Velocity Armor Piercing), by the Germans as PzGr40 (Panzergranate 40), and by the British as APCR (Armor Piercing Composite Rigid), APDS (Armor Piercing Discarding Sabot), and even SVDS (Super Velocity Discarding Sabot). This type of projectile is lighter than a standard AP round and can be fired at a higher muzzle velocity. It has a high-density shatter-resistant metal core (usually made of tungsten) with greatly improved penetrative power against armor. The drawback to tungsten ammo is that its smaller (effective) caliber and lighter shell mass mean that kinetic energy is lost more rapidly over long distances, and the shell has a tendency to ricochet off steeply sloped armor. But the increase in velocity and shell strength almost always make up for these drawbacks. APDS/SVDS are generally the most effective types, because the lightweight metal jacket which surrounds the tungsten core is discarded as the shell leaves the muzzle, leaving only the thinner, more aerodynamic core to fly on to the target, meeting less air resistance and preserving more kinetic energy. Tungsten is a relatively expensive material meaning these shells are generally rare. By 1944 Germany suffered from a severe shortage of tungsten and other metals, and so had virtually no PzGr40 available.

"s" - Smoke

These projectiles are designed to generate a thick smoke screen as cover for other friendly forces. Smoke ammo causes no damage if fired against enemy infantry or armor, but generally blocks LOS through it for a short time.

Designer's Note: understand the above five ammo types as basic categories, used to describe the countless types and models of projectiles used during the war. Internally, Combat Mission tracks the weight, velocity, and size of explosive charge of all the different shell types from all the different guns in the game individually. The HE shell fired by a Panzer Mark IV tank's 75mm gun (weight 12.79 pounds, velocity 548 m/sec, explosive is 11% of total mass) is NOT the same as that used by the 75mm gun on a Sherman (weight 14.7 pounds, velocity 463 m/sec, explosive is 10% of total mass).

We have excluded White Phosphorus as a distinct ammo type (and therefore the capability to use the incendiary effect of the phosphorus offensively) for various reasons, but largely because our research indicates that its offensive use was usually limited to very specific

purposes (like marking targets) or situations that weren't necessarily appropriate to the general-purpose combat simulated by Combat Mission. More importantly, introducing WP would allow for an ahistorical overuse of this type of ammunition by American forces and could unrealistically unbalance the game.

Selecting Ammo Type

Your units decide, based on your orders and the type of target they are about to fire at, which ammo type to use. You cannot order a tank specifically to fire tungsten ammo, for example. The tank commander (read: TacAI) is responsible for the choice of ammo and usually tries to first fire some regular rounds to "bracket" it. The tank commander uses special ammo once a hit is likely to be achieved, but only when the standard type proves ineffective.

Long Distance Targeting

In the case of infantry squads, all weapons of a squad which are effective at the particular range to the target are fired automatically. That means that usually past 400 meters, only the squad's light automatic weapon will fire. As the target comes closer first rifles, and then submachineguns, join in.

Ammo Loss Due to Casualties

Ammo points are reduced whenever a moving team-served weapon (not squad!) suffers casualties. This simulates the "lost" ammo carried by the now-incapacitated men. Take a bazooka team for example. It consists of two men; a gunner and an ammo bearer. If one of them is hit, expect to see the ammo available for the unit cut significantly. The same is true for machinegun teams, although these usually have more than one ammo bearer which means the ammo loss is not as dramatic.

Extra and Reduced Ammo Levels

During prepared defense situations, units often are awarded (by the scenario designer) extra ammo to "stockpile" within their fortified positions. Even if a unit suffers no casualties, the extra ammo is lost once the team decides to leave its defensive position, because there's no one to carry it!

Units can also start out with less ammo than they normally can carry. This would be done to simulate units that are under-supplied or have recently had intense combat and have not yet had the chance to acquire replacement ammo fully.

SMALL ARMS FIRE

"Small arms" is a military term describing rifles, pistols, machineguns, and other small-caliber bullet-firing weapons wielded by the individual soldier. Although Combat Mission simulates squads and teams rather than individual soldiers, it does treat all weapons of an infantry unit individually.

At 500+ meters usually only a squad's light automatic weapon (the light MG42 for the Germans, the Browning Automatic Rifle (BAR) for the U.S., and the Bren LMG for the British) is able to fire effectively at the enemy. As the enemy unit comes closer, the other weapons in a squad may join in. This is reflected in a unit's firepower rating. Look at the unit's detailed info window and you'll see how the firepower changes between 1000m, 500m, and 100m.

When a unit fires, the firepower rating is used to determine the chance of causing damage. Many factors are used in the calculations, like exposure of the enemy unit, the terrain it is in, the activity and suppression of both firer and target (running, crawling, hiding), the marksmanship (experience) of the firing unit - just to name a few.

Generally, the higher the outgoing firepower and the higher the exposure of the target, the more casualties can be expected with each "shot". A random factor is built in, however, as "lady luck" always takes part in any combat situation.

Suppression

Even when no casualties are caused, incoming fire always has a chance to suppress the target and other units nearby. The higher the effective firepower, the higher the chance of suppressing the enemy.

But suppression does not always mean that the enemy goes prone or runs away. Sometimes incoming fire will "only" change the enemy unit's status from OK to Alerted or Cautious, which might be enough to cause it to re-evaluate its orders or return fire less effectively.

Small arms fire from a unit (simulating sometimes the firing of a dozen rifles and machineguns at a time) is NOT directed at one pinpoint area only. Instead, each "shot" affects an area around the target unit or zone, in which it can cause casualties or suppression.

Infantry Casualties

Casualties for infantry squads and teams are tracked on a man-by-man basis instead of an arbitrary "unit strength" rating. When a squad is fired at, the game determines how many and which of its members are hit. When a man (or men) of your unit has been hit, you can see this immediately in the detailed info window, because the weapon carried by that particular soldier is removed from the list, and the firepower ratings adjusted accordingly.

Example: a US rifle infantry squad ('44 Pattern) consists of 10 Rifles (M1 Garand), 1 Submachinegun (Thompson) and 1 Browning Automatic Rifle (BAR). If the squad is hit and suffers one casualty, one of these weapons (and the soldier carrying it) is removed. You might lose a rifle, the submachinegun or - if you're unlucky - the BAR gunner.

However, important squad weapons - like machineguns (e.g. BARs, MG42s) as well as light anti-tank weapons - might be picked up by another squad member even though the man initially carrying the weapon is hit. In such a case, one of the squad members drops his own weapon and acquires the more important one.

Casualties do not necessarily represent dead soldiers. In fact, most of the soldiers regarded as casualties are not dead, just (more or less) seriously wounded. But the end result is the same since the soldier is not capable of fighting any more and is removed from the squad as a casualty. Only at the end of the battle is the actual distribution of wounded vs. killed determined (randomly). A portion of the casualties sustained might be wounded just lightly and return for subsequent battles (during operations).

Casualties for infantry units have several effects during the course of a game. Besides an adverse effect on a unit's morale, there is a loss of firepower as individual weapons are removed. Additionally, if a heavy infantry weapon (e.g. most mortars and heavy machineguns) loses most of its crew, not only is ammunition lost if the unit attempts to move, but when only one man remains the weapon becomes entirely immobilized because a single man simply cannot effectively carry the weapon, ammo, and personal equipment by himself.

Hand-To-Hand Combat

Up close and personal, this kind of combat usually does not last very long, as one or the other side (and often both) are decimated quickly

and either surrender or are completely annihilated. Close combat starts when two infantry units are within 20 meters or so from each other. You can recognize hand-to-hand combat by the sounds of shouts and rifle butts knocking on helmets, as well as liberal use of grenades by both sides. The victor usually is the one that had some combination of superior numbers, close-range firepower (e.g. SMGs), better experience, and suppressing fire from other friendly units.

Blast Strength

Often much deadlier than small arms are the high explosive rounds from mortars, howitzers and tank guns. The firepower of these weapons is represented by a BLAST VALUE, which is a rough measure of both the size of the shell and the amount of explosive charge it carries.

The *blast value* helps give a general guide to the strength of an explosion, which increases the closer you are to its center. It also helps combine blast radius and blast strength into one easy-to-use number, which helps illustrate the difference between. For example, the U.S. 75mm and 76mm HE shells are roughly the same size, but have different blast radii. The 76mm has a lesser amount of explosive (TNT), so its blast radius is smaller. If it's an accurate shot then the shrapnel from the 76mm is (nearly) as deadly as that from the 75mm, because there's about the same amount of it. But if it's not an accurate shot the shrapnel must therefore travel farther to hit a target. Thus the smaller TNT charge of the 76mm causes less damage since it has less ability to project shrapnel over distance compared to the 75mm round.

The *blast value* is measured in the same game units as small-arms firepower.

Infantry Against Armored Targets

Normally, small arms like rifles and machineguns are too weak to cause serious damage to armored vehicles. The exception is lightly-armored vehicles like halftracks and armored cars, or "soft" vehicles without any armor (e.g. jeeps, trucks, and assault boats). These can indeed be penetrated and even destroyed by small arms fire. The penetration chances decrease with distance, but the HMG42 can destroy US M3 based halftracks out to 200 or 300 meters, while the mighty .50 caliber MG can penetrate light armor out to 1000 meters or so under the right conditions.

But even if no penetration is achieved, small arms fire can still be effective against armored targets. It can cause crew casualties if the target vehicle is "unbuttoned", or force it to button up. Open top vehicles, like the M-10 tank destroyer or the Hummel assault howitzer, are also vulnerable to small arms fire. Firing rifles from a higher elevation right into the top of such a vehicle usually achieves good results in Combat Mission, as it would in real life.

The closer the armored target, the more options are available to destroy it. Most German units have Panzerfausts available (see SPECIAL EQUIPMENT section), but all infantry squads and HQs have hand grenades, which can be used for a close assault against a tank. Hand grenades work best against open-top vehicles, but can also be used effectively against buttoned up tanks. This simulates the occasional hero climbing on, or right up to, an enemy tank and placing the grenade in a vulnerable spot. Demolition charges and gammon bombs are also very useful anti-tank weapons at very close ranges, as are rifle grenades (mostly used by the US), which can take out light armored vehicles at medium distances.

ANTI-TANK FIRE

The phenomenon of armor penetration by projectiles is a complex matter. Unlike other wargames, Combat Mission simulates the process by modeling real-world physics instead of abstract CRTs (Combat Resolution Tables).

Hit Chance

First of all, an anti-tank round - regardless if fired from an anti-tank gun, a light infantry anti-tank weapon like a bazooka or another tank - has to hit its target. As a guideline, a Hit Chance is shown whenever you order a unit to fire at an enemy armored vehicle. The hit chance is calculated based on many different dynamic factors, which also change constantly during the course of an Action Phase - but it does give the player a rough idea about the capabilities of the firing weapon.

Some factors taken into account when calculating hit chances are:

- size of the target (the silhouette rating)
- facing of the target (vehicle sides are usually bigger - longer - than the front)
- distance between firing unit and target
- exposure of the target (it's much more difficult to hit something which is obstructed from view by trees, a stone wall, a house or a slope - see HULL DOWN)
- if the firing unit and/or target are moving, and their speeds
- the accuracy of the firing weapon, which is often directly proportional to its muzzle velocity, i.e. a faster shot means a flatter trajectory and easier aiming
- the experience rating of the firing crew
- number of previous rounds already fired at this target, which allow the gunner to "bracket"
- ammunition type, caliber, and weight

Hull Down

One of the best tactics to enhance the survivability of your armor is to occupy hull down positions. "Hull down" means that only the turret or superstructure is visible to (and hittable by) the enemy, thereby minimizing the target area tremendously (the silhouette of a vehicle is reduced) without sacrificing one's own ability to fire. Hull-down

vehicles are also harder to spot in the first place.

Hull-down positions are not as easy to find as one might think, though. What makes it so difficult is that a hull-down position is always relative between the firing unit and the target. It is entirely possible to be hull-down against one tank, while being in full view of another one. Only rarely will you find a natural dip in the terrain large enough to fit a tank which also provides hull-down status in multiple directions. (Note: in some scenarios you might be allowed to dig in your tanks, however, which achieves exactly this result).

Experience is what it takes to spot good hull-down positions. Hull-down positions can be found anywhere, all the time, and not only in "holes" but even on top of a hill. If your tank is far enough off the ridge, only its turret/superstructure will be visible to targets on the opposite side.

Since hull-down status is so dynamic and relative, there is no simple "hull down" order in Combat Mission. You are required to scout the map and use your best judgement. Only when an enemy appears can you be sure if you are truly hull-down. If you use the LOS or TARGET tool, the words "hull down" will appear over the target and/or firing unit, if at all.

Hint: a good way to achieve hull-down status is to park a tank behind an elevation and out of view of enemy tanks (called "turret down" or "defilade"). When your other units spot (or hear) an approaching enemy tank moving into line of sight, issue a HUNT order to your tank. This will order it to move forward until it spots the enemy, rendering it hull-down towards the target on most occasions.

Misses

If a shot misses, it does not magically disappear. Instead, the round is tracked to its impact point. Since the trajectory of gun rounds is modelled realistically (i.e. rounds drop by gravity as they travel), this might mean that a missed projectile ends up somewhere behind the missed target in the ground or, if fired too short, in front of it. But elevations can change this dramatically, and when a target on a hill is missed, the round can easily travel hundreds or thousands of meters further.

Wherever the impact point lies, damage is caused. If a round which missed the intended target sails further and lands near another unit,

damage is assessed just as if the unlucky target was the intended one. It won't happen often, but it can.

Armor Penetrations

When a gun round hits an armored target, it does not mean an automatic kill. Far from it - both Axis and Allies had tanks in service which could shrug off direct hits, especially if the shell came from long range and at an oblique angle.

Some factors taken into account when determining whether a round penetrates armor are:

- armor thickness for front/side/rear as well as top/turret/upper hull/lower hull
- armor slope for all of the above
- Side angle (i.e. obliquity)
- Striking velocity (reduced by air resistance as the shell travels)
- Armor quality (i.e. metallurgical flaws)
- Face hardened or homogeneous plate
- Brinnell Hardness Number (BHN)
- Shot-to-plate diameter ratio
- Shell "cap" type and strength
- Special ammo (like tungsten rounds and discarding sabot rounds)
- Shot shatter
- Shot traps (a design flaw in the vehicle shape which tends to "catch" shells rather than let them ricochet away)
- Armor skirts ("Schürzen")

Note: Combat Mission does not use a generic armor "strength", but real-life values taken directly from historical sources: armor thicknesses in millimeters and slopes measured in degrees.

A successful anti-armor round penetrates the armor, sending molten metal fragments and spray into the crew compartment, and - if the shell also contains an explosive charge - explodes inside the vehicle. In many (but not all) cases this means that the penetrated vehicle is either physically damaged in some fundamental way, members of the crew are incapacitated or panicked, or both. A vehicle so damaged is called "knocked out", and surviving crew members hastily "bail out" of their wrecked vehicle before the next shell arrives. Sometimes the results are even more horrific. If the penetration contacts live ammunition inside the vehicle, or a tank of gasoline, the whole vehicle can burst into flames, otherwise known as a "brew up". Sometimes no one

escapes these deadly infernos. Early Sherman tank models were known to catch fire easily, and were nicknamed "Tommycookers" by the Germans, "Ronsons" by the British, and "Zippos" by the Americans (the latter two after cigarette lighter brands).

Non-Penetrating Hits

An armored vehicle can still be damaged even by a hit which does not penetrate the armor. External equipment such as the gun or its optics can be damaged, as well as the vehicle becoming immobilized by a hit to the tracks or a vital engine component. A non-penetrating hit can even injure or kill crewmembers by causing internal *armor flaking* or "spalling". This happens when the impact force on the outside rips small fragments off the inside of the armor and hurls them around the crew compartment, potentially injuring or killing the crew.

A round can also bounce off and ricochet. This happens mostly when the armor slope and angle of impact (called *side angle* or *obliquity*) prevents the round from striking the target plate head-on. If the round lacks the power to penetrate the armor it literally bounces back or even shatters. Ricochets can sometimes cause *armor flaking*, but are usually harmless and good news for the tank crews.

"Piercing caps" were developed to help reduce the chance of a ricochet. Armor piercing shells originally were just blocks of metal, but it was discovered that these had a tendency to ricochet off sloped armor, so a "cap" was put on the tip of the shell. The cap is somewhat flat in shape and "grips" the target when it hits, reducing the chance of ricochet. AP with a cap is called APC (or APCBC if it also has a second, outer "ballistic cap" which improves aerodynamics, but that's a different issue).

Ricochets sometimes are also "prevented" by the target itself. Pockets in a vehicle's shape that tend to "catch" shells are known as *Shot Traps*. Look at the underside of a Panther model A mantlet. You can see how a hit would be deflected downward, right into the thin roof of the hull. This was fixed with the later Model G's additional "chin".

Rounds can also shatter upon impact. German shells were made stronger than Allied shells, and the metal could withstand greater stress without breaking apart. *Shot shatter* happens when an improperly tempered (i.e. heat-treated) shell hits very thick armor and breaks upon contact. Allied shells often were not tempered properly.

This defect didn't show up much in the 75mm Sherman because its low velocity did not unmask the problem (the shell just bounced). But in the 76mm it became apparent, especially against the frontal armor of Panthers and Tigers.

The *shot diameter-to-plate thickness ratio* can have a significant impact on the chances a shell might penetrate its target. The shot-to-plate ratio compares the caliber of the round with the thickness of the armor. A general rule of thumb is that if the ratio is <1 (the plate is thicker than the caliber of the shell), the round is "underpowered" and has a lesser chance of achieving a penetration. If the ratio is >1 (the shell is bigger than the thickness of the armor), the shot is "overpowered" and the chances for a penetration are higher.

Armor Types

Different qualities of steel and different types of manufacturing have a big impact on the effective resistance of armor. The *Brinnell Hardness Number* (BHN) is a measure of the metallurgical "hardness" of the armor. Obsolete or poor manufacturing techniques can cause armor to resist with less capability than one would expect for a given thickness. For example, the armor of early war Sherman models is known to be less than ideal - you will see this in the detailed unit info window. For example, check out the basic M4 Sherman. Its armor quality is rated at only 85%.

There are also different types of armor: *face-hardened* and *homogenous*. Homogenous plate is a largely uniform block. Face-hardened armor has been treated to arrive at a higher "hardness" (measured in the BHN), thus increasing the chance that a shell will ricochet or shatter. Face-hardened armor does have a weakness, though. Because it is more brittle than uniform block, it can catastrophically break apart upon impact.

Armor Skirts (Schürzen)

Schürzen is the name for the relatively thin (about 5mm) soft steel plates mounted a short distance (usually a couple of feet) from the primary flank armor of a tank. Originally designed by the Germans to help protect vehicles from the Soviet 14.5mm Anti-Tank Rifles, they proved useful against shaped charges used by many types of light anti-tank weapons like bazookas.

This defensive measure essentially detonated a hollow charge round before it struck the main armor. Although the vehicle might have suffered damage, it was not likely lethal to the crew and greatly increased the chances the vehicle remained functional. It is interesting to note that although the Germans fielded large numbers and types of hollow charge weapons (like the Panzerfaust), the Germans were the only ones to employ "skirts" on its vehicles in a standardized way.

COMMAND & CONTROL

Like any commander in the field, the ability to control your troops' actions depends on how well you communicate orders to them. *Combat Mission* simulates this through a variety of different means.

Command Delay

Every unit has an inherent command delay before it can execute any new movement orders, though it can still use its weapons and react during this time. This simulates the time it takes for your orders to reach that unit, which in real life would be through hand signals, radio, or simply shouting, and for the unit to understand and respond.

The length of the delay depends on the experience of the unit and whether it is within command range of a "parent" Headquarters (HQ) unit. The exception are vehicles, which are always considered to be in command (by use of radios), and suffer a delay based on their experience only. HQ units are always considered in command.

Command Range

A HQ unit can keep any number of units within its command range and grant them the benefits of a shorter delay time and leadership bonuses. The command range of a HQ unit depends on its experience, its COMMAND leadership ability, and whether there is a line of sight between the HQ unit and its subordinate unit. Vehicles themselves receive no benefit from HQs, but a bailed out crew is treated like any other infantry team.

Platoon HQs can keep any unit from its own platoon under command, as well as any nearby teams (recognizable by their ID-number starting with T).

Company HQs and Battalion HQs can keep any non-vehicle unit (regardless to which platoon they belong) under command. If a Platoon HQ is eliminated, its subordinate squads are out of command for the remainder of the game, unless a Company HQ or Battalion HQ unit is close enough to keep them in command.

By left-clicking on an HQ unit, a number of brown lines extend from the HQ to all subordinate units currently under its command. By clicking on a subordinate unit, a brown line extends to the HQ unit under

which control the unit currently is. If the line is black, then the unit is out of command range and suffers an increased delay penalty. If the Platoon HQ is eliminated, NO lines are displayed unless the unit is in command of a higher-level HQ, in which case brown lines appear.

The small radio icon in the unit interface (visible after clicking on a unit) tells you if a unit is in command or not. If the radio icon is crossed out, the unit is out of command.

Leadership Abilities

Besides shorter delay times, a unit in command also benefits from the leadership abilities of the HQ that is keeping it "in command". These are:

Command (icon: star)

Increases the command radius of the HQ unit.

Combat (icon: lightning bolt)

Increases the fighting abilities of units under its command (i.e. to-hit chance, firepower)

Morale (icon: heart)

Lowers the chance of a unit panicking or routing under its command. Panicked units rally faster.

Stealth (icon: question mark)

Increases the chance of remaining unspotted in ambush and while sneaking.

Possible ratings for HQ units are 0 (normal), +1 (very good) and +2 (exceptional). Platoon HQs tend to have better combat related skills, while Company and Battalion HQs more likely excel in command.

Take a careful look at your HQ units. Learning to ambush with the platoon that has the highest Stealth ability while charging into close assault with the one that has good ratings in Combat and Rally can make the difference between victory and defeat.

MORALE AND EXPERIENCE

Combat Mission is designed to simulate human behavior on the battlefield as realistically as possible, while still allowing for the game to be... a game.

The typical World War Two battlefield is a horrid place to be in. Your life is at risk almost all the time, friends are being killed and mutilated and you are forced to kill for your own survival. Needless to say, even the boldest man can and will break eventually under such conditions and perhaps panic, run away, hide or simply become insane.

The soldiers in CM are no different and value their own virtual lives highly. If you expose them to enemy fire or if they have to fight an overwhelming enemy, chances are that at some point they will start disobeying your orders and act toward their own self-preservation. The morale status, as displayed in the unit's info screen, indicates what the unit thinks about its current situation.

The Eight Levels of Morale

OK

Not suppressed to any significant degree.

Alerted

The unit has noticed incoming enemy fire or danger of some sort, but is not yet adversely affected by it.

Cautious

The unit has encountered direct opposition and will think twice before doing something risky. Cautious units tend to take cover when fired upon and are somewhat reluctant to leave their current positions (as indicated by the longer command delays imposed on such units) and might replot waypoints on their own if they feel that their commander (the player) is nuts to have them walk across that open field.

Shaken

Danger is mounting. The unit's morale is still holding together, but the soldiers are on edge, and will disobey orders if they feel it's a matter of survival. Usually shaken squads try to look for cover and not expose

themselves to enemy fire, might simply disobey orders and instead choose to remain where they are. They might even go looking for better cover.

Pinned

These guys are not going anywhere. They simply keep their heads down and stay in cover. Pinned units often try to finish a movement order when they become pinned while moving, but most likely ignore their orders and try to move to nearest cover.

Panicked

The player loses control over the unit as self-preservation becomes first priority. Panicked units usually try to run away from danger.

Broken

The unit's morale and cohesion is shattered. This state takes much longer to recover from than panicked, and the unit usually runs farther away. Broken units are also permanently rattled, indicated by a "!" marker beside the tag (see below).

Routed

This unit has had enough and wants to get as far away as possible as quickly as possible. Routed units take a long time to recover and brought back under control. Routed units also remain seriously rattled for the duration of the battle.

Occasionally, an "!" (exclamation mark) appears to the right of the Suppression status. This indicates that although the unit might have recovered from an earlier *Broken* or *Routed* condition, it has been RATTLED by what it went through, and is more likely to panic, surrender, or rout when it comes into contact with enemy units again. Such brittle units are less combat effective for the rest of the game and should be used for "safer" duties.

How quickly a unit moves from OK to Routed depends on:

- the amount of incoming fire and resulting casualties
- if the unit is in command or not. Platoon, company and battalion commanders have the ability to keep their men rallied under even the most intense enemy fire
- the experience of the unit. Green units might cower at the first shot fired at them, while elite units might withstand even the heaviest artillery barrage

Designer's Note: Most crews that have their vehicle or gun shot to pieces under them will become rattled, regardless of their suppression status. This is not only realistic, but meant as an additional discouragement to use such crews in an unrealistic (offensive) way. Simply put, they won't be very effective so get them back to the rear.

Fanatic Troops

It is possible to encounter fanatic troops in Combat Mission. There are many historical examples for such troops - the indoctrinated Hitlerjugend formations and the "stubborn" defenders of Bastogne fit this description well.

Fanatic troops will not panic, break, or rout even when suffering heavy losses and rarely surrender. However, the player does not know which of his troops will turn out to be fanatic. In fact, there is no indication of this state of being at all, at any point in the game. This prevents easy abuse and misuse of Fanatic units in unrealistic ways. The result is that you can only guess which units are going beyond the call of duty due to being fanatic.

Note: There is one exception to fanatic units' immunity from panicking - being the victim of a flamethrower attack. Even the most hardcore units pack it in when they are on fire!

The scenario designer determines, for each side independently, whether fanatic troops can appear in a given scenario. He cannot, however, designate a specific unit to be fanatic. This is determined randomly for each unit based on a percentage chance set by the designer in the scenario parameters (see EDITOR).

Experience

The morale of inexperienced soldiers, not yet used to the sights and sounds of war, tends to deteriorate more quickly under fire than that of seasoned veterans. This does not mean, however, that as experience grows, soldiers turn into emotionless robots. Instead, they simply learned how to deal with certain situations and, even more importantly, how to improve their chances of survival.

Artillery barrages are a good example. While heavy artillery fire is most likely enough to pin and/or panic an inexperienced squad in the middle of an open field (which will result in heavy casualties more often than not), a veteran squad might push forward across the field

and out of the killing zone despite heavy initial casualties, and so - in the end - ensure the survival of more of its members.

But better morale is only one advantage of troops with experience. They usually are able to react faster to new orders and/or situations even when not currently "in command", which is reflected in a much better (shorter) command delay. Units also tire more quickly the less experience they have.

Lastly, the experience rating of a unit also has an impact on its offensive capabilities, i.e. firepower. This reflects, among other factors, better marksmanship, better use of ammunition and proper handling of weapons - in short, the ability to bring firepower onto a given target quickly and effectively.

There are six experience ratings in Combat Mission:

Conscript

"Third line" troops who received little or no training, and have probably never been in battle. The Volkssturm and "ear and stomach" formations (named so because most of their members were either deaf or had serious stomach problems) of late war Germany are the primary examples. Very likely to panic or surrender when under enemy fire. Certain combat arms, like airborne troops and Gebirgsjäger, which always required a certain amount of training and physical fitness to be accepted within their ranks, cannot be conscripts.

Green

"Second line" troops. Received basic training but have little if any combat experience. Can also simulate troops used outside of their usual role, e.g. artillery crews used as foot soldiers. Newly-raised American infantry units shipped over to Europe as replacements are good examples of green troops.

Regular

Properly trained, and most likely have some combat experience, though not extensively. Some German units with a mix of seasoned veterans (often from the Russian front) and fresh replacements (the typical way the Germans refitted units in Europe) can also be considered regular. The majority of troops from all nations should be in this category.

Veteran

These are first line troops who received first class training and/or have proven themselves in combat. Able to withstand even fierce close combat without breaking. Many airborne and WG troops, along with regular infantry units with long combat histories, are considered veterans.

Crack

The best veteran soldiers achieve this level. Able to fight independently and overcome superior forces. You should encounter troops of this caliber only rarely.

Elite

The best of the best. Only a handful of personalities/squads qualify as elite soldiers. Extensive combat experience AND first-class training are required for elite status. Soldiers of this caliber are exceedingly rare, even among first-rate forces like the airborne. The famous German tank ace Michael Wittmann is a good example of an "elite" tank commander.

Unlike some other games, units do not rise from one experience level to another during battles or even operations. It takes much more than a few hours' worth of battle to become a true veteran in real life, and can take years before reaching elite status - all of which is far beyond the scope of Combat Mission.

Fatigue

If a unit is ordered to run for long stretches without break, its physical fatigue will rise - in other words, your men become tired. Units generally start out "rested", then can become "ready" (not yet tired but no longer fresh), "OK", "tired", then "weary" and finally "exhausted" after running for too long. Crawling, sneaking, and even walking can cause fatigue, albeit much more slowly than running.

Fatigue has two distinct effects on troops. Exhausted troops are not allowed to RUN or SNEAK (try moving stealthily while trying to catch your breath!) and their hand-to-hand combat capabilities are reduced.

In order to reduce the fatigue of your men, you have to let them "rest" (just stop moving). It takes less than a minute to go back from ready

to rested, but might take longer to get from tired to ready. Weary units need even more rest time and exhausted units need to sit down and drink a cup of tea before they can move out again (well, at least the British ones).

FOG OF WAR

Unless you choose to play with "Fog of War: none" (in the Options menu at scenario startup), only friendly forces will be visible on the map initially. Enemies must be spotted by one of your units before they appear on the map. Combat Mission uses a complex spotting and sighting model to simulate the limited knowledge of a battlefield commander and what is generally known as Fog of War.

Enemy units can be displayed on the map according to five "spotting levels":

No Contact - Level 0

No enemy unit is displayed. It's still out there somewhere, but you won't see it, because none of your units are able to see or hear it. Keep in mind, though, that the enemy might see you! If you're walking down a quiet road and the enemy is hiding behind some hedges, he might have identified all your units before you even catch a glimpse of him. In fact, your units might be dead before they see where the fire is coming from in such a situation.

Sound Contact - Level 1

Most wargames allow spotting only when a line of sight exists between the spotter and the target. In Combat Mission, sound also plays an important role. If you are close enough, or if the target is loud enough (e.g. a tank racing down a road at full speed or an infantry squad firing its weapons), you can "spot" a unit even when no line of sight exists. Such units are displayed as generic gray icons, and clicking on them reveals SOUND CONTACT in the unit info window. The general type of the unit is displayed as well, e.g. infantry? or tank?, but do not rely too much on this. Additionally, the enemy unit is shown at a location which may be somewhat incorrect (your soldiers are making their best guess by listening), so don't be surprised if the enemy unit seems to move through impassable terrain (or even off-map), and then suddenly "moves" into line of sight in a different (but nearby) location.

First Contact - Level 2

The enemy unit has moved into line of sight and one of your friendly units has caught a glimpse of it or the enemy has opened fire at you

and you see the muzzle flashes. At this point only sketchy details are available. When you click on such a unit, a general unit type is given (Infantry? or Tank?), but not much more than that. Enemy infantry units are always displayed using one soldier figure, regardless of the actual type. Enemy vehicles and guns are always displayed with a generic grey model.

Contact - Level 3

If the enemy is close enough, is exposed, or has been firing at you for a while, more information becomes available. Enemy infantry units now are classified as squads or teams (e.g. mortar teams, anti-tank teams) and weapons can be spotted, too. Vehicle types - tanks or tank destroyers or assault-guns - are usually identifiable at this stage.

Infantry is displayed with the corresponding number of figures based on unit strength and vehicles are displayed as a common model of vehicle for the identified vehicle type (a heavy German tank will most likely be displayed as a Tiger, a US tank destroyer as an M10, etc.)

Take careful note of the fact that sometimes your troops - especially the inexperienced ones - can incorrectly identify enemy vehicles, usually as something bigger and scarier than they really are. It was common in WW II for American soldiers to refer to just about any German tank as a "Tiger", when in reality only a small portion of the Panzer units were equipped with Tigers. Most of these so-called "Tigers" were probably Mark IV medium tanks (whose silhouette is similar to the Tiger), and you'll see this sort of mistake happen in Combat Mission, too. Once the spotting reaches level 4 (see below) any "mistakes" are corrected and the true identity of the vehicle is displayed.

Identified- Level 4

If the unit is sufficiently close or exposed, one of your units will identify it fully. This means that the number of soldiers in a squad or team are displayed in the unit window, as well as the correct model of vehicle, experience of the unit, and more. This is as much information as you will ever get about the enemy.

Lost Contact - Generic Unit Marker

After a unit has been spotted, it is possible to lose contact with it. The "lost" unit will be graphically replaced by a generic unit marker

(each nationality has its own unique marker type- stars for Americans, crosses for Germans, etc.), showing the last known position of the enemy unit. Clicking on such a marker will display the last available information about the unit.

These markers stay on the map until the same unit has been spotted again (even if in a completely different location) or if you approach near enough to the marker to verify that the previously spotted unit is no longer there. In such a case the marker disappears, regardless of whether the enemy has been spotted elsewhere.

Option - Partial Fog of War

With the options set to "Fog of War: partial", enemy units must still be spotted, but every spotted enemy is fully identified from this point on. This is a good way for less-experienced players to get used to the game system.

Option - No Fog of War

With the setting "Fog of War: none", all enemy units on the map will be shown and fully identified, regardless if they are spotted or not. This is a great way for beginners to get a feel for the game, but also for scenario designers who wish to test a battle they made.

SPOTTING

Units spot best when stationary. Movement, especially running, means that a unit's field of vision is generally restricted to the direction in which the unit is moving. The same is true for vehicles, as the driver and tank commander are (at least partly) focused on getting to their objective without colliding with obstacles or bogging down. Hiding and crawling units also spot worse, as their main task is to keep their heads down, not watch for the enemy. Sneaking, on the other hand, allows for a reasonable degree of spotting.

Vehicles are generally poorer spotters than infantry, especially when buttoned up. Don't be surprised when one of your tanks with closed hatches suddenly runs into an anti-tank team hiding just a few meters away from it. Also don't be surprised when YOU (as the player hovering above the battlefield) can see a target that your tank simply will not engage. What you can see is not necessarily what the tank can see!

It's often tactically wise to keep some units stationary on overwatch duty while others advance. Unfortunately, one cannot always afford the luxury of being cautious.

Designer's Note: In order to prevent the abuse of bailed out crews as disposable scouts, we drastically reduced their ability to spot enemy units. Be warned that if you go moving your crews off into enemy territory the first unit they spot might be their last!

CLOSE AIR SUPPORT

Both sides can have fighter-bombers for close air support (CAS) in a battle. However, the player does NOT control the actions of his planes. They roam above the battlefield, spot and engage targets at their own discretion.

Combat Mission does NOT simulate carpet-bombings or large scale raids. These are outside of the game's scope. Instead, the fighting on the ground is intended to take place AFTER such bombings, and close air support in Combat Mission means the appearance of small formations of fighter-bombers (maybe just a single plane), over which company and battalion commanders have little or no immediate control.

There are two basic types of fighter-bombers in the game. One is equipped with rockets (enough for two passes), the other with a pair of 500-pound bombs, dropped simultaneously. Axis airplanes always carry bombs, while Allied aircraft can be of either type. British aircraft are more likely to carry rockets. Additionally, every plane has .50 caliber machineguns (American) or 20mm cannon (British and German) with which to make strafing runs.

How often a plane attacks and conducts strafing runs depends on how much anti-aircraft fire it encounters (i.e. how many AA assets the opposition has on the map). Heavy AA fire can make a plane break off its attack early and even become damaged or shot down.

Besides dedicated AA (Flak) guns, vehicles equipped with AA machine-guns will engage airplanes unless they are busy firing at ground targets, or are buttoned up and unable to access the MG. Infantry will rarely if ever fire at planes, choosing instead to save ammunition.

Since airplanes have to spot targets just like ground units do, it does improve survivability for the player under air attack to hide units in trees or other cover. A tank sitting out in an open field is an easy target.

Fighter pilots can misidentify targets and attack friendly units by mistake. Do not be too surprised when, especially while locked in close combat with an enemy, a couple of "friendly" bombs take out YOUR last tank!

Fighter-Bombers appear only in clear weather. However, even in clear weather, there is a small chance that a fighter-bomber might not arrive at all. Mechanical problems and communications snafus cause this sort of thing and were not uncommon on the WW II battlefield.

ARTILLERY AND MORTARS

There are two forms of artillery in Combat Mission: on-map and off-map. For the sake of this discussion, "artillery" stands for any form of weapon designed to hurl an explosive charge at a designated target. This includes howitzers, mortars, rockets, and naval guns unless otherwise noted.

On-Map Artillery

On-map artillery is represented by actual artillery guns, while off-map artillery is represented by artillery spotter teams. Except for small-caliber mortars (60mm and 81mm for example) it is rather unusual to have an artillery gun on the battle map, since most of the time artillery batteries were positioned well behind the front lines. They are included in the game, however, to simulate rear guard actions and exceptional circumstances.

While on-map, artillery units behave just like any other units and have their own set of available orders. Some big artillery guns cannot move (they're simply too big and it can take hours to relocate them), but many can be either towed or manhandled (slowly). After moving, however, a gun has to be "unlimbered" and prepared for firing (the process is automatic). Depending on the type of the gun, this can take anywhere between one and several minutes.

Off-Map Artillery

Most of the time, an artillery battery is represented on the map by an artillery spotter team. This team is equipped with binoculars, detailed terrain map with overlay grid, and a radio. Its job is to spot targets for a particular artillery battery by reporting the location of incoming rounds and adjusting the aim.

Plotting Artillery Missions

To call in an artillery strike, simply issue a TARGET or TARGET WIDE order to the artillery spotter team. Target is the normal choice, while Target Wide is useful for larger and dispersed formations of enemy units. When the spotter can actually see the target area, the speed and accuracy of the barrage are greatly enhanced, but it is not required. In other words, you can call in artillery anywhere on the

map without having to trace an LOS.

This is not true when the firing artillery piece is actually on-map. In such cases, a direct LOS is required. The exception to this are on-map mortars. Usually, mortars require a LOS to be able to fire. However, if a mortar unit is within command radius of an HQ unit, the HQ unit can serve as spotter and the mortar is able to AREA FIRE at locations which are out of its own LOS but within LOS of the HQ unit. Additionally, mortars are allowed to fire at Target Reference Points (TRP), even if out of LOS, but only provided they have not moved from their initial setup positions.

Using HQs for Indirect Fire

An on-map mortar can carry out AREA FIRE missions without Line-of-Sight (LOS), provided it is "in command" of an HQ that does have LOS to the desired target location. A mortar can also AREA FIRE at (or very near) a Target Reference Point (TRP) without LOS, but does not need an HQ to do this. Additionally, a mortar can not be moved at all or it will lose its ability to fire at a TRP indirectly. It took a lot of time to set up and register mortars to do this sort of shooting, so if you move you lose!

To fire indirectly simply set up everything as described above, and target the mortar as you normally would. The LOS line, if pointing to an area not visible to the mortar team, will still appear to be BLACK. Click where you would like the target to be and, if the HQ commanding the mortar can see it, the targeting line will "stick" showing that an Area Fire order was successfully plotted. If the line does not "stick" it means the HQ does not have LOS to that exact spot. Double check with the HQ unit's LOS to choose a legitimate spot to target.

Artillery Ammunition

Artillery spotter teams have AMMO displayed in their unit info window just like any other unit. On-map artillery units have a limited number of specific types of shells (HE and usually Smoke). But in the case of a spotter, ammo represents the number of shells attached battery is allowed to fire (for game purposes, four individual guns/mortars comprise a battery). Many types of batteries can fire SMOKE as well as normal high-explosive shells. In this case, each ammo point can be used as either smoke or high-explosive. Rounds used for "spotting" count against the battery's total.

Delays

There is a delay between issuing a target order and the arrival of the first rounds, ranging anywhere from about 30 seconds up to about 5 minutes. The delay depends primarily on the nationality and experience level of the spotter. In addition, mortars (rather than howitzers or guns) are considered to be attached to the fighting formation at a lower, more local level, and therefore react much faster to your artillery requests.

The ESTIMATED time delay before the strike commences is shown in the artillery spotter's unit info window. Keep in mind that this is only the estimated time and it can take a little less or much longer before the first rounds fall. This "clock" will tick down much more slowly while the spotter does not have a line of sight to the target.

Usually about 30-60 seconds before the full strike, a few "spotting rounds" fall on or near the target. These are needed for the spotter team to adjust the fire properly (and is automatic - no input from the player is required). Accuracy for the main strike is considerably better if the spotter has a line of sight to the target. The artillery strike will continue over several turns until either the ammo is used up, or until the spotter's targeting order is cancelled.

Adjusting Fire

You can also adjust or "walk" the aiming point a short distance even after the strike has begun, in which case the fire shifts with a much shorter time delay than for a whole new order. Simply issue a new target order for the spotter, not too far away from the original target point. If the targeting line is light green, you are within the acceptable "quick adjustment" radius of the original aiming point. If the line is blue, you are too far away and the time delay will be the same as if a completely new order had been issued, since the guns have to recalibrate. (Press SPACE to cancel a retargeting order in progress without disturbing the current targeting order if you realize you can't get a "green line" where you want it).

Target Reference Points

Target Reference Points (TRP) are locations which have been carefully pre-registered for artillery - i.e. all heavy weapons have recorded the coordinates and necessary firing adjustments before the battle, in

order to be able to bring fire on such an area with the highest accuracy and in the shortest possible time.

Usually players put TRPs, which look like red-colored bullseye markers, onto important locations like enemy staging areas, likely defensive strongpoints, road junctions, or probable avenues of attack. In fact, the first thing to do for a combat unit, sometimes even before digging foxholes, is pre-registering targets for the artillery.

In the game, TRPs are available for the defender and attacker alike, but the scenario designer decides to include them (or not) for each side. During the Setup Phase (and only during the Setup Phase), they can be moved freely across the map (unless padlocked) and are not bound by setup zones.

If a TRP is targeted by an artillery spotter, the time it takes for the artillery strike to arrive is cut drastically. It can take as little as ten seconds for the first rounds to arrive!

TRPs can also be targeted by on-map mortars, even if they are out of LOS, but only if the mortar team did not move from its original setup position.

Other on-map ordnance, like antitank guns, can use TRPs as well. When firing at enemy units on or very near a TRP, they gain a considerable accuracy bonus because they are considered to have "bore-sighted" or "ranged" their weapons to the TRP before the battle.

Designer's Note: You will notice some very large artillery calibers in the game - as big as 14-inch battleship guns. We included these enormous weapons for the sake of completeness, because they did have a (rare) presence on the CM-scale battlefield during the first weeks of combat in Normandy. However, if you begin to design scenarios for people other than yourself, we implore you to add heavy artillery (200mm and up) very sparingly if at all to your scenarios. Huge guns just weren't commonly used at the small tactical level.

FORTIFICATIONS AND MINES

Fortifications (bunkers, pillboxes, wire, and mines) are available only for the defender, and never in meeting engagement scenarios. They are granted to a side by the scenario designer or can be bought for Quick Battles. During the Setup Phase of a battle, you are free to move and place them within the constraints of the setup zones, but they cannot be moved during the battle itself.

All forms of fortifications (including mines) may be placed only within a valid setup zone. A minefield is 20m x 20m in size, with the mine marker placed in its center. The defender can place minefields next to each other, thereby creating larger minefields, but for game purposes CM treats these as separate 20m x 20m elements. Once a minefield has been spotted, the TacAI will try to move units around it during the Action Phase.

Fortified Firing Positions

Bunkers and pillboxes have a firing arc inside which they can engage targets through a frontal firing slit. Outside of this arc, they are basically impotent. The rear of a bunker or pillbox is its weak point - since this is where the exit doors are located - and can be penetrated even by light ordnance. From close range, however, a bunker/pillbox is always vulnerable to infantry, which can throw grenades through firing ports. Flamethrowers are especially useful for knocking out bunkers/pillboxes. Additionally, ordnance can occasionally score a lucky hit to a pillbox's frontal firing slit, possibly knocking out the pillbox in the process. But this is generally only possible at close range (within a few hundred meters).

Note: AT gun Pillboxes receive an accuracy bonus, vs. a normal AT gun, because such fortifications have already "ranged in" the area within their firing arc. Range determination is one of the greatest contributors to aiming accuracy, so predetermined and reliable range information greatly increases accuracy (all else being equal).

Barbed Wire

Wire can be crossed by infantry or tanks, but only at a much slower pace. Roadblocks can be crossed by infantry (at a slower pace) but are impassable to vehicles.

Mines

There are three types of mines in the game.

Antipersonnel Mines

Lethal to infantry and can cause several casualties within seconds when stumbled upon. Casualties are higher for infantry units moving quickly through a mined area than when sneaking or moving slowly. Once spotted, a mine marker appears in the area. Infantry will refuse to enter such a minefield even when ordered to. They may, however, enter it when in panic or rout.

Antitank Mines

Dangerous to tanks and vehicles, and although not always lethal, can at least immobilize them. Antitank mines are harmless to infantry because they are not heavy enough to detonate them.

Daisy-Chain Mines

Hastily-placed anti-vehicle mines that are easily spotted by the enemy because they are above ground. They do not generally cause direct harm, but rather deny the enemy certain approaches, generally across road surfaces. Their real life advantage is that they can be placed MUCH faster than normal minefields and hence were used often in hasty retreats.

Clearing Mines

Engineers with demolition charges are able to clear gaps through minefields. Simply move them within 25 meters of the minefield and wait. It takes a few minutes (turns) to clear a gap through the mines. Additionally, engineers can clear Daisy-chain mines without the use of demolition charges. The number of engineers affect their speed in clearing mines. Generally a near full squad is needed to accomplish clearing a particular mined area.

BATTLES AND OPERATIONS

Battles

Battle scenarios in Combat Mission represent anywhere from a few minutes up to two hours of fierce combat action on the front lines. This is the essence of "battles" or "engagements" or "firefights" that you will find described in books on military history. Reconnaissance has been done, both sides know that the enemy is out there somewhere and contact is imminent. All other questions about supplies, reinforcements and artillery allocation have been solved. Also, any preparatory artillery strikes or air raids have been completed prior to the start of a Battle. In other words, CM is a TACTICAL game and does not simulate strategic, large scale military actions.

Therefore, units in single battles do not get resupplied and cannot gain experience (e.g. "rise" from regular to veteran troops), as CMs timeframe is simply too narrow for this to happen realistically. Also, do not be confused about casualty levels - CM simulates front line combat only, and casualties within heavily-engaged frontline rifle companies are MUCH higher than those for whole divisions (which is generally what casualty statistics in books represent). During WWII whole companies and even battalions were often almost totally annihilated within an hour of fierce combat, and this is exactly what you might see in CM.

Tip: Keep an eye on ammo levels, especially for longer battles. Even fully-equipped, front line units rarely carried ammo for more than 20 minutes of continuous firing, so ammo preservation (ensuring its most effective use) is an important point in this type of engagement. Close range combat, particularly under 30 meters or so, greatly increases the expenditure of ammo.

Operations

Combat Mission's tactical approach to wargaming changes only slightly with Operations. Operations allow players to fight a connected series of battles over a large map, using only a portion of the map at a time (wherever the front line is), with the front line dynamically moving back and forth depending on the results of previous fighting. Operations can stretch over several days, so certain "strategic" elements are introduced.

Supply

Supply is one of the major elements lacking in Battles. In operations units are resupplied between battles, replenishing ammunition and even receiving fresh replacements. The supply level is preset by the operation designer, though, and can range from SEVERE (for cut-off surrounded troops) to FULL. Additionally, ineffective units (crewmembers from knocked out tanks and guns, almost completely wiped out or routed squads etc.) are generally moved off the front lines.

Part of resupply also includes the recovery and replacement of damaged, bogged down, or abandoned armored vehicles. Such vehicles disappear off the map between battles (usually overnight) and might return fully fit for fighting later on. But do not expect miracles - it often takes days for a tank to return to the front line, so you will most likely not see this for operations spanning only one or two days. Be aware that a vehicle can only be repaired if its crew escapes from the battle map (or if they're killed/captured, but then there is additional delay before the repaired tank will return) so don't keep tank crews around to fight like infantry.

Note: Armored vehicles that catch fire are not repairable. Combat Mission allows ordnance to shoot at armored vehicles which are already knocked out, for the specific purpose of setting them on fire and prohibiting repair. The Germans, aware of the efficient Allied repair system, often used this tactic in real life.

The Next Battle

After the first battle of an operation is over, the next one will start with a new Setup Phase for both sides. All units except bunkers, pillboxes, roadblocks and wire can now be moved freely within the setup zone. Additionally, target reference points can be moved across the whole map.

Front lines are calculated anew in between battles, and depending on the progress made during the last battle, can move forward or backward. The front line is straightened out in this process, sometimes forcing one side's units to withdraw to new defensive positions further back on the map (but of course fortifications like bunkers and pillboxes cannot be moved back and get their own "private" setup zone forward - you can move some of your units forward to protect the bunkers - and risk an envelopment of the bunker AND the supporting elements).

While the setup zones for the first battle are determined by the

designer, they can expand to cover the whole width of the battle map for subsequent battles.

Units have to be spotted again when a new battle begins, even when they stayed in place (after all, they COULD have moved). However, fixed emplacements (like pillboxes and - if their location is known - mines) are automatically re-spotted during the Orders Phase of turn 1.

Note: Although a narrow strip of "no man's land" is added automatically between the two setup zones, keep in mind that you might easily start the next game within view of enemy units. Often putting all your forces as far forward as possible during the Setup Phase is not a good idea and might lead to their quick death from enemy fire.

Reinforcements

If scheduled to do so, reinforcements arrive during the Setup Phase of a new battle and are simply placed in the middle of the setup zone in no particular formation. A pop-up screen announces the arrival of reinforcements, and the player is then allowed to incorporate the fresh forces into his front line as he likes.

Tip: Units that exit the map during an operation will not return for the next battle. Therefore, exiting is generally unwise.

Night Combat

When night falls, a few special rules come into play. The Setup Phase of the night battle allows you to reposition your forces (including any reinforcements). However, actual combat can only take place during the night if one or both sides have been set to "May initiate night combat: Yes" by the designer of the operation scenario. If so, once the Setup Phase is finished, a screen will appear asking - "Attempt to skip night combat?" If both players decide to skip it, or are not allowed to initiate night combat in the first place, then no night combat takes place and the next battle (at dawn or during the day) starts with another Setup Phase.

THE ENVIRONMENT

It is common military knowledge that weather can dictate the outcome of wars. The German progress (or lack of it in the winter) during Operation Barbarossa - their attack against Russia - is a good example. The Allied ability to bring their air superiority to bear (with decisive results) during periods of clear weather is another. At the tactical level, bad weather means troops tire more quickly and vehicles get stuck more easily. Movement is generally slower during periods of rain or snow, and visibility can be seriously impaired as well. Simply changing a battle's weather settings can fundamentally alter the way the battle plays out.

Time of Day

There are three daylight conditions simulated in CM: day, dawn/dusk, and night. Visibility is reduced during dawn/dusk and heavily restricted during night. Nighttime fighting also creates a risk of misidentifying one's own troops as enemy and friendly fire can result. Keep this in mind when separating your forces and/or moving close to enemy positions.

Atmospheric Weather

Clear - a nice sunny day with few or no clouds, offering good visibility across long distances. This is the only weather type that allows airplanes to operate in the game.

Overcast - the sky is full with dark, low hanging clouds. Visibility is somewhat reduced.

Rain - Visibility is reduced substantially. Noises are muffled and sound contacts are considerably more difficult to obtain.

Fog - a light mist covers the battlefield and visibility as well as noise are reduced.

Thick Fog - you almost can't see your own hand if you stretch it out in front of your face. Visibility is reduced to a mere few meters and the fog reduces the chance for sound contacts.

Snow - reduces visibility and has a slightly lesser impact on sound contacts than rain.

Ground Conditions

Very Dry - very dry ground conditions are seldom found in Europe, where sunny weather never really lasts more than a few days in a row. However, during the high summer months of June-August, the ground can be very dry after extended sunshine. Very dry ground conditions increase the chance of fires.

Dry - dry ground, the typical kind of ground condition during a "normal" European summer.

Damp - early in the morning, in woods, or after several days of overcast weather or fog, ground conditions will most likely be damp. This raises the chance for vehicles bogging down when off dirt or paved roads.

Wet - after rain showers you tend to have wet ground. The chance of bogging down when off roads is substantially increased, and even the dirt roads pose some danger of bogging.

Mud - when it has been raining for a few days, wet ground will turn into mud. Vehicles tend to get stuck in muddy ground (even on dirt roads) quickly and mud also greatly reduces the speed of vehicles and infantry.

Deep Mud - after long periods of rain or melting snow, the ground can become a quagmire. Vehicles should stick to roads (paved if possible) and even infantry will find the going slow and tiring through such ground conditions.

Light Snow - a few inches of snow. The chance for bogging is increased slightly and the snow affects movement speed a bit, but most vehicles can handle it well. In all three depths of snow conditions, rivers and lakes are frozen and can be entered by infantry, but not vehicles.

Snow - roughly 8 inches of snow. Wheeled vehicles will get stuck frequently and even tracked vehicles will find the going tougher. Infantry moves more slowly.

Deep Snow - 12 inches or more. Most vehicles will get bogged eventually and infantry movement is slowed down substantially.

ASSAULT BOATS

Assault boats are used to simulate small, simple vessels (e.g. boats, floats) for small-scale crossings of rivers. They are only lightly protected and therefore vulnerable even to small arms fire.

Assault boats won't move on their own. In order to move an assault boat, you need to embark at least a half squad worth of men into the boat (somebody needs to do the paddling), before being able to issue movement commands to it. The same procedure is used to manhandle boats across land. Needless to say, the going is much slower across land than over water.

When embarking or debarking from boats, pay attention to where the boat is located. Keep in mind that no units can enter water - even though you might issue a movement/debark order to a passenger unit, if the boat is still on water, the unit will not move. Move the (occupied) boat slightly up onto land first.

Designer's Note: the artificial intelligence is not programmed to handle assault boats. Therefore, battles and operations which include assault boats can only be played against either a human opponent or against the computer with the human playing the side which has the boats.

SMOKE AND FIRE

If there is anything to be found on a WWII battlefield more often than casualties, it is smoke and fire, from burning terrain or vehicles, or from smoke rounds used to cover the attacker's approaches or defender's line of retreat.

Smoke

Smoke in varying sizes comes from burning buildings, fields, woods, vehicles, and smoke rounds from tanks, guns, or artillery. Smoke usually completely blocks the line of sight for at least a little while. Small shells or small burning vehicles (e.g. jeeps) only degrades, not blocks, LOS through it.

Designer's Note: Infantry smoke grenades, a source of smoke commonly found in other WWII games is not available in CM: infantry smoke grenades. Our research shows little credible evidence that this type of smoke was used at the squad level in WWII for anything beyond signaling purposes.

Fire

The chance of a piece of terrain catching fire depends largely on ground conditions and weather. You will see fewer terrain fires during rain or with wet or snowy ground. On the other hand, very dry ground increases the chances for fires, and sometimes even tracer ammunition from an MG can be enough to spark a blaze.

Units located in terrain that catches fire are forced to exit the area immediately. If for some reason a unit cannot do this (say it is immobilized), the unit will be destroyed by the fire and any remaining crew will abandon the vehicle/gun immediately and run to safety. Units will also refuse to enter burning terrain.

Burning terrain and vehicles remain burning for the duration of a battle. Fires and smoke will cease, and burnt buildings will collapse to rubble between the battles of an operation.

How a Game Ends

There are several ways a game can end in Combat Mission, and there are differences between operations and battles.

Turn Limit

Usually a game ends when the turn limit (or battle limit for operations) has been reached.

Ceasefire

A game can end by mutual agreement of both players. Use the ALT-C keyboard command to ask for a Ceasefire. This is done secretly, i.e. the other player does not know if you have decided to opt for a ceasefire, until he does so himself. When he does, the game ends immediately with both sides remaining in position, and victory levels are calculated from there.

During multiplayer games (network or PBEM), both human players can of course communicate with each other and agree on a ceasefire. But playing against the AI means that a ceasefire can only be reached when the AI independently decides to do so. However, the AI is intentionally forgiving on this score, to maximize freedom of play for the human player. Just don't abuse the privilege!

Surrender

You can surrender at any time by using the ALT-G keyboard command. This will end the game immediately. You will concede all of the victory locations on the map to the opponent and your soldiers will be captured. The computer opponent will also decide to surrender when the situation becomes hopeless.

Auto Surrender

When one side's Global Morale rating is 15% or less, AND the other side's is at least four times as high, the game will automatically end even if the losing side wishes to continue the fight. If BOTH sides' Global Morale is lower than 15% the game will also automatically end. Auto Surrender will never happen if the losing side still has reinforcements on the way. Suffice it to say that Auto Surrendering only comes into play when one side totally crushed the other.

Designer's Note: Rarely did a force ever fight to the last man, but that is often the way other wargames end their battles. This can lead to turn after turn spent hunting down and eliminating the last scraps of the other side's force, when realistically the battle would have simply ended. Anybody who has played through a few games like this knows EXACTLY why this feature was put into Combat Mission. There are few things as frustrating as an opponent with only a mauled squad or two running around trying to secure an undefended Victory Location when it is VERY clear that the battle is over.

Operation Specific

Operations can end for any of the same reasons as battles, but there are a few additional ones. Automatic endings may happen during Advance or Assault type operations when:

- The end of the map has been reached by the attacker.
- The attacker has been pushed back close to his own starting map edge.

Note: Destroy type operations DO NOT end when a map edge has been reached. In fact, they can be designed so that there is no map movement at all, i.e. the battle map is as big as the operations map.

Exit Zones

If part of the scenario objective is to exit some or all troops off a particular map edge, an exit zone marker appears on the 3D battlefield at the appropriate map edge. You can exit your troops by simply plotting a movement order beyond the map edge. They will automatically leave the map upon reaching the edge of the map.

Not all units might be eligible for exiting the map for points. You can find out which are by accessing the detailed unit window (by hitting ENTER). The phrase "should exit for points" is displayed if the unit is eligible. Exiting such troops yields extra points, while failing to do so gains points for the opposing player.

Note: You can exit any troops off any map edge at any time, however you win points only troops that are eligible for exit (other than denying your enemy points for eliminating them). Use discretion when moving troops off the map during an operation, as they will not be available to you for future battles.

After Action Reports (Battles)

After a Battle ends, the After Action Report (AAR) is displayed. This report is a score card of sorts, designed to show how well each side did in a simple, easy to understand way. After viewing the results, you can either VIEW BATTLEFIELD, to see the area fought over without Fog of War, or click DONE and return to the main screen.

Casualties

Total number of soldiers put out of action. The number of killed soldiers is given in brackets.

Captured

Total number of soldiers captured during the course of the battle, or as a result of Surrender.

Destroyed/Knocked out

The numbers of mortars, guns, knocked-out vehicles, and fortifications are listed by type.

Victory Points

Victory points are awarded for the following:

- Control of victory flags.
- Casualties caused to the enemy.
- Captured enemy (counts double that of casualties).
- Exited units, generally worth 2-3 times the unit's purchase value (note: units eligible for exit that do not exit score points for the enemy).
- Any "bonus" set by the scenario designer.

Victory Level

Each side scores points, which generally add up to 100. The ratio determines the victory level displayed below, as follows:

- ≤ 1.25 to 1 = draw
- ≤ 1.75 to 1 = minor victory
- ≤ 2.50 to 1 = tactical victory
- ≤ 5.00 to 1 = major victory
- > 5.00 to 1 = total victory

After Action Report (Operations)

After each individual battle of an Operation ends, you receive a summary of your own force, but without revealing any information about the enemy. Besides displaying friendly casualties, there is a line displaying how many battles in the given operation have been fought and how many more remain. Additionally, you will be told how many battles are left before the next night battle. Since the success or failure of an Operation is decided based on your total results, there are no Victory Points or Victory Levels awarded for an individual battle.

At the end of an entire operation (when the last battle has been fought, one side has surrendered, or a side's forces was eliminated), a summary AAR for all the battles of an operation appears. Just like the battle AAR, it lists friendly and enemy casualties, knocked out guns and vehicles and captured soldiers. No points are awarded, but instead a victory level is displayed for the complete operation. How victory levels are computed depends on the type of the operation played:

Advance - speed is essential. The faster the attacker reaches the opposite end of the map (the full operations map, not the single battle map), the higher the victory level. Casualties sustained during the advance count as well, of course, but not as heavily as with other operation types. The game ends automatically when the end of the map has been reached.

Assault - an assault is, essentially, an Advance operation but against stronger defensive forces. The attacker is not expected to reach the opposite end of the map, but instead make it only a part of the way within the allocated time (number of battles). How far he is expected to advance is pre-set by the operation's designer, and can be anywhere between 20% and 80%. How well the attacker performed during the game (i.e. how far he progressed) is then compared with the expected progress and a victory level is determined after considering both sides' casualty figures as well.

Destroy - only the kill-ratio (attacker casualties vs. defender casualties) determines the victory level. If the game ends with the attacker above the maximum casualty ratio (as defined by the operation's designer), he loses.

MAKING SCENARIOS



QUICK BATTLE

Quick Battle Scenarios are randomly generated battles following the parameters set by the player.

	Axis	Allied
Type	Combined Arms	Combined Arms
Force	No Restriction	No Restriction
Quality	Medium	Medium
Purchase Units	Automatically	Automatically

Battle Type	Attack	Date	November 1944
Force Size	500 points	Time	Day
Map Size	Medium	Weather	Clear
Attacker	Allied Attacker	Game Length	30 turns +/-
Handicap	None		

Selecting Battle Options

Type of Force - Infantry, Mechanized, Armor, or Combined Arms. The selected force type has a direct impact on how many and what types of units the player is allowed to buy from each category (see below - PURCHASING UNITS)

Force (composition)

Axis: No restriction, Wehrmacht, WG, Fallschirmjäger, Gebirgsjäger, Volkssturm.

Allies: No restriction, American, American Airborne, British, British Airborne, Polish, Polish Airborne, Canadian, French.

Quality - Low, Medium, High, or Random. Sets the available troop experience ratings. Low quality means that only conscripts or green units can be used. At medium, only green or regular units can be bought. At high, only veteran, crack, or elite units can be bought.

Purchase Units - Automatic or Allow Human. Automatic has CM decide the forces for that side while Human Player allows the player to choose them.

Battle Type - Assault, Attack, Probe, or Meeting Engagement. This determines the force balancing (how many points the defender gets, how many the attacker), the map size, whether the defender may have fortifications, as well as victory flag placement.

Force Size - 500-2000 points. These are the maximum points allowed for the DEFENDER.

Map Size - Small, Medium, or Large. The actual map size (in meters) depends on the selected force size.

Attacker - Axis or Allied. This choice has no effect on meeting engagements.

Handicap - None, Attacker -50% to Attacker +100%. This determines how many extra buying points are added to or subtracted from the attacking force, based on the Force Size selected above.

Date - June 1944 - May 1945.

Time - Day, Dawn/Dusk, Night, Random

Weather - Clear, overcast, rain, fog, thick fog, snow, Random

Game Length - 20-60 turns.

After setting the general preferences, the random map generator screen appears. It works exactly the same as the auto-generate map function in the scenario editor (see the next section, CREATE SCENARIO)

Finally, choose which side you want to play and if you want to start a single player game, a PBEM game, a hotseat game or a game over the Internet via TCP/IP.

Purchasing Units

If you let the computer select your forces, you will be brought directly to the 3D battlefield. If, however, you chose to "buy" your own units, you will see the Unit Purchase screen appear. Some special restrictions are detailed below. See the next section on the Editor for more details about using this screen.

Depending on what type of force mix you designated in the Quick Battle setup screen, you are allowed to spend only a limited amount of points for each unit type. If your force mix was set to INFANTRY, you are only allowed to buy units from the infantry slot, as well as possibly some support weapons, artillery and/or fortifications. No vehicles are allowed. If, however, you chose an ARMORED force mix, you are allowed to spend much less on infantry, but can spend points on tanks and vehicles. A MECHANIZED force contains mostly infantry, support elements and vehicles other than tanks. Lastly, COMBINED ARMS allows you to buy units from all combat arms.

How many points you are allowed to spend and how many you have already spent is shown in the two lines under the force type selection buttons labeled "spent" and "allowed". If you have chosen more units of a type than you are allowed, the number in the appropriate column turns red and you must change your selection before you click the OK button to proceed. You do not have to use all your points, but any unused points are lost.

CREATE SCENARIO

All the Battles and Operations that came with Combat Mission CD-ROM were made with the same exact Scenario Editor detailed here. It is very powerful, flexible, and easy to use. Although there is no reason why you should ever have to make your own scenarios (Quick Battles and scenarios made by others assures this!) you will probably want to play around with the Scenario Editor just for fun at the very least.



Basic Features

New Battle - Start creating a new battle scenario.

New Operation - Start creating a new operation.

Load - Load a battle or operation to edit.

Save - Save the current battle/operation to hard disk.

Parameters - Sets the battle/operation time, date, weather, type and more.

Map - Allows you to create and edit the map, as well as setup the default positions for the units.

Units - Select the opposing forces.

Load Briefings - Allows you to load in three text files which will be displayed as briefings to the player.

Tournament Save - This special option allows you to save a scenario in tournament mode. This means that it cannot be opened in the editor anymore, thereby preventing future opponents from "spying" on the enemy or changing the setup. Note that scenarios which have been "tournament saved" cannot be opened and changed at all. You probably want to save such a scenario normally (and separately) before saving it in tournament mode so you can edit it later.

Exit - Exit the editor and go back to main screen. Do not forget to save any changes before exiting!

PARAMETERS

Although quite similar, the Parameters screen is different for Battles and Operations. Probably the most important setting (for both) is the Date, since it determines the unit types which are available as well as the weather. If you should ever wonder why you can't find a particular unit in the Purchase screen, check out the Date setting. Units that were not historically available before/after the current Date are not displayed.



Battle Parameters

Date - Select the month and year. June 1944 until May 1945 is available.

Time - Day, Dusk/Dawn, Night.

Weather - Clear, Overcast, Rain, Fog, Thick fog, Snow.

Ground Condition - Very dry, dry, damp, wet, mud, deep mud, light snow, snow, heavy snow.

Game Length - 2-120 turns are possible.

Type - Allied Attacker, Axis Attacker or Meeting Engagement.

Map Edges Friendly To - All four directions can be toggled to Axis, Allied, or Neutral.

Map Edge for Exit Points - If the goal for one side is to fight through and exit the map, the map edge eligible for exit is set here.

Flag Type - There are two flag types - large and small. These identify primary and secondary objectives for both sides. Controlling these flags at game end (by having a superior force and no significant enemy presence in their vicinity) awards the side that controls them the appropriate number of points (100 for small, 300 for large flags).

Additionally, flags can be static (all flags are valid victory objectives) or dynamic. There are two options for dynamic flags:

- the attacker chooses one flag to be the valid one.
- the one valid flag is determined randomly

Regardless of how it is chosen (randomly or by the attacker), only that ONE flag is eligible for awarding victory points and the defender does NOT know which flag is the valid one. Note that in Meeting Engagements all flags must be static.

Axis Bonus - Can be positive or negative. Used mainly for unbalanced historical battles where one side is superior to the other. The inferior side is awarded this many points to allow it to "win" when it achieves greater success than expected, given the situation.

Map Contours - Can be 2.5m or 5m per elevation change.

Defending Vehicles - Can or cannot dig in during the Setup Phase. Note that vehicles which are dug in will not be able to move at all for the entire Battle.

Fanaticism - Same choice for Axis and/or Allies: 20% or 50% chance for all troops of regular or better experience OR 20% or 50% chance for all troops regardless of experience level. This determines the percentage chance that the selected type of troops will be fanatic, i.e. never panic and rarely surrender. Neither player knows beforehand which of their troops will be fanatic.

Brief Description - Enter a brief description about the scenario you're creating. This is displayed in the Load Game Window as a quick reference for players.

Operation Parameters

Date - Select the month and year. Dates between June 1944 until May 1945 are available.

Operation Type - This is the most important setting for an Operation. It defines, in no small way, how the Operation will play out. It might take a few tries to understand the subtleties of these options, but the more you think about historical examples the better your Operations will be.

Advance - the attacker is expected to march all the way to the end of the operations map BEFORE the operation officially ends and will be judged on speed. If he reaches the end of the map before the last battle, the game automatically ends.

Assault - resistance is heavier and the attacker is expected to make it only partway (the percentage value) to the other end of the operations map by the end of the operation. Alternately, he may push beyond that but be counterattacked if the enemy gets big reinforcements at some point (designer's discretion). If the attacker reaches the end of the map before the last battle, the game automatically ends.

Operation Parameters	
Date	November 1944
Operation Type	Assault
Expected Progress	70%
Weather Pattern	Mixed
Ground Condition	Dry
Operation Length	10 battles
Attacker	Allied
Night Falls	Every 4th Battle
Each Battle Lasts	15 turns
Attacker Comes From	West
Battle Window Size	1200m
Map Contours	Normal [2.5m]
Opening Battle Time Slot	1st [Dawn]
Brief Description	
May Initiate Night Combat	Axis: Yes, Allied: No
Supply	Axis: Adequate, Allied: Full
Vehicle Recovery & Repair	Axis: Average, Allied: Excellent
Fanaticism	Axis: Normal, Allied: Normal
Size of No Man's Land	400m

Destroy - points are awarded for destroying the enemy, not achieving territorial objectives. The attacker is judged based on the pre-set attacker-defender casualty ratio. In other words the attacker loses if the ratio is worse than the pre-set one. The game will NOT end if the end of the map is reached. In fact, you can make a non-moving map using destroy type operations, i.e. the battle map can be the same size as the entire operation's map.

Weather Pattern - Good, Mixed or Bad. Combat Mission semi-randomly assigns the weather conditions for each battle in a scenario based on this setting.

Ground Condition - Very Dry, Dry, Damp, Wet, Mud, Deep Mud, Light Snow, Snow, Heavy Snow. Depending on the weather, the ground conditions might change between battles. After several fights in rain, you can expect to see the ground slowly turn from dry to damp, then wet and finally mud. Similarly, continuous snowfall will turn the ground from light snow, to medium and finally heavy snow.

Operation Length - 1-20 battles. 10 battles is generally an appropriate length.

Attacker - Allied or Axis

Night Falls - No night, or every other to every tenth battle. Example: a ten battle operation with night on every fifth battle would simulate two days of combat. A ten battle operation with "no night" would simulate fighting ten engagements on the same day.

Each Battle Lasts - 10 to 30 turns (minutes)

Attacker Comes From - North, south, east, or west. This defines the direction in which the operation map moves.

Battle Window Size - 1200m to 1600m. Determines how large the map is per battle.

Map Contours - 2.5m to 5m per elevation change. This determines the overall degree of "hilliness" of your map.

Opening Battle Time Slot - Can be anything between 1st to 10th. 1st is the default setting and means that the operation will open with the first battle conducted during dawn. If you choose a subsequent setting, the battle will open at the time of day specified for that slot. For example, if an operation is set to Night on every fifth battle, and the opening battle time slot is set to five, the operation will start with

the first engagement played during the night.

May Initiate Night Combat - Axis/Allies, yes or no.

Supply - Ample, Full, Adequate, Limited, Scarce, Severe - determines the amount of ammo replenished between battles.

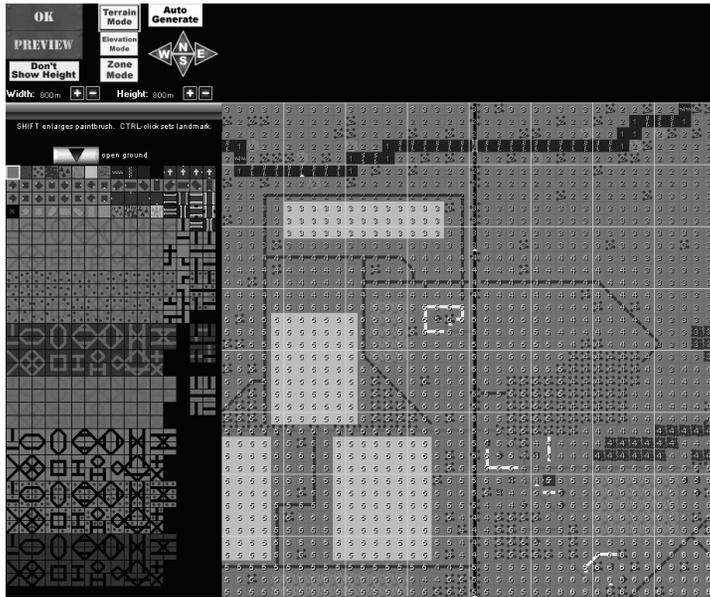
Vehicle Recovery & Repair - Excellent, Good, Average, Poor, None per side. Determines the chance that an abandoned vehicle can be recovered, repaired, and returned to the game after a few battles.

Fanaticism - Same choice for Axis and/or Allies: 20% or 50% chance for troops with regular or better experience level OR 20% or 50% chance for all troops regardless of experience level. Shows a percentage chance that the selected type of troops will be fanatic, i.e. never panic and rarely surrender. Neither of the players know beforehand which of their troops will be fanatic.

Brief Description - Enter a brief description about the operation you're creating. It is displayed in the Load Game Window as a quick reference for players.

CREATING A MAP

You can make your own maps, have the computer generate one for you, or do a combination of both. The procedure to make maps is basically the same for battles and operations, with a possible exception. An operation map is usually bigger, but only a certain portion of it is played on per battle (although operations that play solely on one map are possible). Setup zones can be changed for operations, but the default outlines should be used as a guideline.



Basic Interface

Go Back - Moves you back to the Editor main screen.

Preview - Lets you preview the map in 3D mode. This is where you place units in default positions as well as double check your map. Double checking is important because the 2D editor map does not give any indication of LOS, which is an important part of designing a map. Also, imperfections are very easy to spot once you "fly" around in 3D.

Hint: When you save a scenario to disk, the last camera position you used is saved as well, and becomes the "opening shot" of the 3D battlefield. This is true for both sides - use the "\n" hotkey to set the camera to Allied or Axis view. Both views are saved separately. This way you can determine what the Allied and Axis player will see when they first enter the battlefield.

Show Height - Shows the height information on every tile. The default elevation level is 7 and no number is shown on the map tiles for that value. Possible elevations range from 0 to 19. Each elevation represents a height difference of 2.5 or 5 meters, depending on the parameters set for that map.

Terrain Mode - Lets you place terrain tiles. Each tile represents an area of 20 by 20 meters. Click on a terrain tile on the left hand palette to select it, then left click anywhere on the map grid to place it. You can also Shift-left click to place a "square" of 5 by 5 tiles which is good for filling in large areas quickly.

By keeping the left mouse button pressed, you can simply "paint" a map. Doing this places the selected tile wherever you move the mouse.

In order to place "landmarks" (a short text describing terrain features, objectives, and historical areas, visible on the 3D map), you have to use CTRL-left click. This will open a new window in which you can enter the text for the landmark. Landmarks are denoted by a small yellow triangle within the tile they have been placed into. You can remove landmarks by CTRL-clicking on a tile with a yellow triangle and erasing the entered text description.

Elevation Mode - Allows you to adjust the elevation of each tile. Use the + and - keys to adjust the "current" elevation that each subsequent click on the map will set. Again, shift-left click allows you to fill an area of 5 by 5 tiles. You can also "paint" elevations just like terrain tiles.

Zone Mode - Allows you to define setup zones for both sides. Each side has three (color-coded) setup zones. There are no restrictions on how many tiles a setup zone has to consist of, nor do the setup zone tiles have to be adjacent to each other. Units can be moved only between setup zones of the same color. There is also a neutral setup zone (gray). Units CAN be placed in the neutral setup zone, and consequently cannot be repositioned during the setup turn in a battle (exception: Target Reference Points).

Shift-left click and "painting" work for zones just like for placing tiles.

Width, Height - Sets the size of the map. Maximum area for a Battle map is 5 square kilometers (e.g. 2000m x 2500m) but neither dimension may exceed 4000m. An Operation map may be 5000m along the axis of advance, and 3000m across. We recommend smaller maps, however.

You can adjust the size of your map at any time and from all four directions. In order to extend/cut the map from the north/east, simply click on the Height/Width buttons. If you hold SHIFT and click on those buttons, the map is cut/extended from west/south.

Wind Rose (Compass) - "Scrolls" the map grid up, down, left or right. Useful for maps larger than the map grid display window.

Down Arrow, Up Arrow - Lets you access the remaining parts of the terrain tiles "palette".

Terrain Panel - Select a piece of terrain to place by left-clicking on it. Terrain is organized by type and once clicked on its name is displayed next to the Arrow buttons.

Map Panel - Left-click anywhere on the big green area and the current piece of terrain is placed. Note that there can be only one piece of terrain occupying one square at one time so you can not put a building on top of woods on top of a road. The last terrain placed is the one that is used by Combat Mission.

Hold down the SHIFT key when clicking on the map and a 5x5 block of terrain is placed instead of a single piece. There is no Undo, so use this feature carefully or you might wipe out large sections of your map by accident!

AUTO-GENERATE MAP

The auto-map function of the editor allows you to quickly generate a random map in with a few easy steps. You are able to set a number of preferences which determine how the map will look. The options you have are:

Map Type

- Town** - Creates a town the size of several blocks with surrounding suburbs.
- Village** - Creates a village near the center of the map, surrounded by fields and farms.
- Farmland** - Creates a number of scattered farms and small hamlets surrounded by fields.
- Rural** - Creates mainly unpopulated terrain with a only a few scattered farms.

Tree Coverage

- Open** - Very few scattered trees.
- Light** - Mostly scattered trees and very few woods.
- Modest** - Some woods and a few tall pines.
- Heavy** - Most of the map is covered by woods, tall pines and scattered trees.

Hilliness

- Flat** - Not more than one or two height levels.
- Gentle** - A few small elevations, rarely more than two or three height levels difference.
- Small Hills** - Usually one or two distinct hills surrounded by largely flat ground.
- Modest Hills** - Several hills on map with elevation differences of ten meters and more.
- Large Hills** - Several large hills on map with elevation differences of at least 20 meters.

Using these three options together with the preferences for a scenario, it is possible to randomly generate almost any terrain historically fought over within the North West European Theater of Operations. The Hürtgenwald battles could be easily recreated by using "rural", "heavy trees", and "large" or "modest hills" settings. Fighting on the plains south of the British invasion beachheads could be represented by a "farmland, light trees, flat" random map. Feel free to experiment.

HOW TO MAKE A MAP

Random maps are nice, but there will come a time when you want to recreate a specific battle or location (how about your own hometown?) and make your own. Making a good map (one that is challenging and offers tactical problems, but at the same time looks realistic) is simple once you learn to follow a few easy principles. Following are a few hints for how to improve your maps for Combat Mission:

Elevations or Terrain First?

What to do first, elevations or terrain? Good question. In the end it will depend on personal preference, but over the course of making maps to be shipped with the game, starting with elevations seemed to work best for us. The reason might be that if you start by placing terrain tiles first, you still have to keep possible elevation lines in mind ("I want to make a wooded hill over here"). It might be better to get that done first and have the mind clear.

OK, so it's elevations...

Combat Mission provides 20 different elevation levels. Not only that, the elevation height can be either 2.5m or 5m per level, allowing for height differences of up to 100m on a single map! However, only one elevation height is allowed per map (in fact it is set in the parameters screen). Since 2.5m elevation heights make a much smoother map (and still allow height differences of up to 50m), they should not be used unless it is really necessary to show fighting in the mountains or across extremely rugged terrain.

Elevations in historical scenarios should follow the actual topographic lines from the area. Many battle descriptions offer accurate small scale maps of the areas fought over, and if not - the National Geographic Institutes in Europe sell 1:25000 scale maps which can be used to get this information.

In non-historical scenarios, elevation lines should be set while keeping a natural look AND tactical challenge in mind. Endless variations are possible, a ridge splitting both flanks, or wide flat open ground ("tank country"). Steep cliffs blocking the advance are possible, too, by skipping one or more elevation levels and connecting, say, level 10 with level 3.

CM's 3D engine and maps are unique and might take a few tries to get used to. Especially players used to the "flat" worlds of other 2D wargames will have to overcome the habit of designing completely flat "pool table" maps with a bunch of hills sticking out.

CM offers the ability to accurately model the sloped landscape of Europe, with soft rolling hills, sharp river valleys and more. Be sure to use this feature. A natural landscape is going to reward the players with a rich and "real" gaming experience and literally introduce another dimension into tactical thinking. Except for some completely flat plains in Holland, most of Europe is "sloped"!

Combat Mission automatically connects all elevations and creates realistic slopes (rounding off the edges, for example). However, the tiles used on CMs map are square, and you will usually encounter no problems when running roads or rivers straight north-south and west-east. However, when running NW-SE or NE-SW, small "problems" might occur on the edges of the tiles because part of the road or river will be elevated towards the slope. In the case of rivers it simply looks sub-optimal (rivers really should be flat), but in the case of roads it might have severe impact on the game, since vehicles follow the ground contours and will be forced to dip to the side when going down such a road. The problem can be avoided by simply lowering the problematic tiles to the same elevation height as the road/river. Please also note that the problem is most visible when using steep elevation changes.

In general, simply have another look at the map once it is finished and try to pinpoint "rough" edges.

...and then it's the terrain...

Placing terrain is easy. Simply select one of the terrain tiles from the left, move the mouse over the "tile" you want to put the terrain into, and left-click once. If you want to re-use the same terrain in another spot (e.g. when running a straight road or tree line), simply click somewhere else or keep the left mouse button down to draw a continuous line. "Filling" larger blocks of terrain is also possible. By pressing the Shift-key and left-clicking at the same time, the selected terrain will be filled into a 5x5 square of tiles with the mouse in the center.

So much for the technique. Making "good" and natural looking maps is much more challenging and requires some thought. Why is this road

here? There are fields, so where is the farmer living? Hey, shouldn't that river flow DOWN instead of DOWN and UP? What is that lake doing on a SLOPE? These are just a few of the questions the player should keep in mind while plotting terrain for a map. "Logical" maps reward the players with a more real gaming experience and can turn an otherwise good scenario into an unforgettable challenge.

Whatever you do, keep in mind the tactical challenges provided by a map. Woods breaking the line of sight to the left, wide open fields to the right, a river valley coming in from the side - all these features add to the tactical and strategic choices that the players will have to face and will make the scenario more fun to play.

It's also important not to get lazy. Not only are big areas of uniform terrain unrealistic (Europe isn't really big enough to have kilometers after kilometers of fields or woods), but they quickly become boring to play on and are also less appealing to the eye. Attention to detail will, more often than not, make the difference between a playable map and an excellent one. A small farmhouse here, an orchard there, a hedge or stone wall separating these two fields sometimes all that is necessary to enhance a map.

Using trees helps avoid the problem of creating big empty spaces. You find trees everywhere in Europe like road junctions, in the open fields, besides houses, and on river banks. You cannot overuse trees. Not only do they spice up lines of sight and give the attacker something to hide behind, they also make the map look vivid and less sterile.

Below you will find some additional tips for creating realistic, challenging maps. Check them out when you have time.

Further Tips for Map Design

- It's a good idea to have rivers/ponds/lakes on lower elevations than the surrounding terrain, as it looks more real and gives the map a certain visual depth.
- Bridges in CM span two elevation levels above the terrain below. Tall bridges in CM span FOUR elevation levels above. Keep this in mind when planning to do bridges in a scenario - it might save you a lot of re-working later.
- The Normandy hedgerows (bocage) never encloses a space completely. This is important, because nothing except infantry

and Allied tanks can cross hedgerows, thus other unit types can easily be trapped within such a field. It makes sense, therefore, to provide openings in the hedgerows by using one tile of open ground or brush or scattered trees (not woods - woods are not passable for vehicles either) as the exit point. This simulates very well the narrow paths that french farmers used to access their fields and provides a visual "break" (keep in mind that the real bocage hedgerows include trees and brush alike).

- Towns and villages in Europe are usually very old (some a thousand years old and even more), and have grown steadily over the years. This is reflected in the way they are built, so do not expect many square house blocks with all the roads meeting at 90 degree angles and all the houses in neat rows. Instead, the typical town or village is a "messy" place, with curved roads, awkward crossings and T-junctions, and houses of different shapes and sizes strewn everywhere. On the other hand, a typical small village often has only one road running through its center with houses built at irregular intervals on both sides.
- Don't forget that houses are rarely "naked", i.e. surrounded simply by open ground. Use stone walls, hedges, brush and scattered trees or even rough terrain to simulate gardens and yards and everything else typically found around farm - and town-houses. Such a village or town will also look much less sterile in the game.
- Roads are just that - roads. Do not use roads to simulate dirt paths or muddy tracks or driveways towards a house unless it can really be considered wide enough to be a road. Open ground serves well to simulate these small paths, and a row of scattered trees within a forest of "woods" tiles can be used to simulate tracks.
- Do not use too many paved roads. There were not that many paved roads in 1944-1945, the exception being cities and main highways.
- Most (not all, but most) roads in Europe running through the countryside have some sort of vegetation on both sides, be it trees or brush or hedges. The reason is that such roads have been and still are used as windbreakers for farmland.
- Ditches on the side of a road are often very shallow. Since such

ditches usually do not provide enough cover for a whole infantry squad, there is nothing wrong with simply leaving them out and using flat open ground. Alternatively, scattered trees and brush can simulate the cover gained by such ditches. Use lower elevations only when deep ditches providing complete concealment are what you want. Keep in mind that since the elevation information is tied to a tile, such ditches will be a minimum of 20 m wide.

With a bit of practice you will soon be able to admire your own CM landscape - and then destroy it!

CHOOSING UNITS

All units are chosen and edited using the unit Purchase screen. There are two main panels which display the Available Units (left) and units Selected Units (right). Units can be removed from the purchased side by highlighting and clicking on the Delete button at the bottom of the screen. The rest of this section details how to make purchases.

ARMY	FORCE	EXPERIENCE	LOCATION	OK
Axis	Wehrmacht	Regular	On Map	
Infantry	Support	Vehicle	Armor	Artillery
105	0	0	0	0
				Fortification
				0
				TOTAL
				105

AVAILABLE	CHOSEN
Rifle Platoon	105 Wm Reg Platoon Headquarters
Rifle Company	372 Wm Reg Rifle 44 Squad
Heavy Weapons Company	360 Wm Reg Rifle 44 Squad
Infantry Battalion	1438 Wm Reg Rifle 44 Squad
Volksgrenadier SMG Platoon	96
Volksgrenadier Rifle Platoon	99
Volksgrenadier Company	298
Volksgrenadier Hvy Wpns Company	373
Volksgrenadier Battalion	1240
Volksgren. Fusilier SMG Platoon	100
Volksgrenadier Fusilier Platoon	106
Volksgrenadier Fusilier Company	574
Volksgrenadier Pioneer Platoon	187
Volksgrenadier Pioneer Company	669
Volksgren. Pioneer Battalion	1286
Pioneer Platoon	187
Pioneer Company	669
Pioneer Battalion	1941
Security Platoon	105
Security Company	444
Security Hvy Wpns Company	316
Security Battalion	1675
Sturmkompanie	579
Pz Grenadier Platoon (Mot)	129
Pz Gren Hvy Wpns Platoon (Mot)	178
Pz Grenadier Company (Mot)	557
Pz Gren Hvy Wpns Company (Mot)	273
Pz Grenadier Battalion (Mot)	1962
Pz Grenadier Platoon (Armored)	262
Pz Gren Hvy Wpns Platoon (Arm)	311
Pz Grenadier Company (Armored)	1168
Pz Gren Hvy Wpns Company (Arm)	591
Pz Grenadier Battalion (Arm)	3921
Pz Gren Pioneer Platoon (Mot)	212
Pz Gren Pioneer Company (Mot)	738
Pz Gren Pioneer Platoon (Arm)	608
Pz Gren Pioneer Company (Arm)	1606
Pz Grenadier Pioneer Battalion	3503
Panzer Recon. Hvy Wpns Company	779
Panzer Div Escort Company	595

1 x Platoon Headquarters	Edit	Delete
3 x Rifle 44 Squad		

Basic Properties

Army - Determines if you are selecting Allied or Axis forces. By default the screen starts out with the Axis selected.

Force - Each Army can choose from a variety of units Each choice restricts what specific units can be purchased according to historical organizations:

Five nationalities are available for the Allies:

American, British, Polish, Canadian, and Free French

American, British and Polish forces can additionally select between line troops and airborne troops.

The Axis player always selects from German forces, but has five different troop types available:

Heer (regular army), **SS**,
Fallschirmjäger (Airborne), **Gebirgsjäger** (mountain troops),
and **Volkssturm** (people's army)

Experience - Determines how skilled the purchased units will be. The less experienced, the less they cost. The choices are:

Conscript, Green, Regular, Veteran, Crack, and Elite

Location - Allows you to toggle between units on map and the five reinforcement slots. When you select units from the available units window, they are added to the currently selected slot. In other words, there can be up to six different unit lists in the "selected units window", one for each reinforcement slot and one for on-map units (see PLANNING REINFORCEMENTS for more info)

OK - accepts any changes made in this section and brings you back to the Editor main screen.

Unit Types

The menu bar allows you to access the list of available units for the various unit types. These are:

Infantry - anything from standard rifle infantry formations to engineers, pioneers, and various other formations.

Support - heavy weapons like mortars, machineguns, and on-map artillery. Other team weapons, like flamethrowers and sharpshooters, are also available here.

Vehicles - support and transport vehicles like halftracks, trucks, and some self-propelled artillery.

Armor - tanks and tank destroyers, as well as assault guns.

Artillery - off-map artillery, represented as spotters in the game. Also fighter-bombers for close air support.

Fortifications - bunkers and pillboxes as well as wire, roadblocks and mines.

Available Units Panel

Select your units/formations here. Which units/formations are available depends on the choice of calendar date made in the PARAMETERS section of the editor (certain vehicles are only available later in the war and even infantry formations changed over the course of the last one and a half years of the war).

By moving the cursor over a unit, some basic data is displayed at the bottom of the window.

Selected Units Panel

By clicking on a unit/formation in the Available Units Window (on the left side of the screen), the selected unit/formation appears in the Selected Units Window (on the right hand side). It is also automatically placed on a friendly map edge on the 3D map (not currently visible).

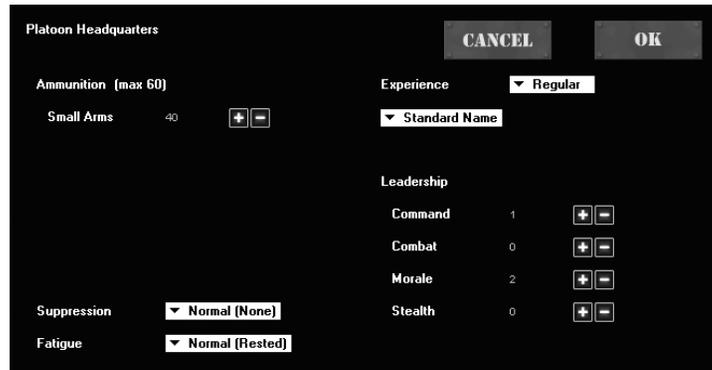
Clicking on a unit/formation in the Selected Units Window (on the right hand side) highlights the choice, and two buttons appear at the bottom: EDIT and DELETE.

Delete - erases the unit from the Selected Units Window. Deleting a formation HQ, erases the complete formation. You can, however, also delete single teams/squads/vehicles.

Edit - allows you to edit a particular unit/team/squad/vehicle.

EDITING UNITS

Although certainly not mandatory, Combat Mission allows each individual unit to be customized to some extent. None of the changes allowed make fundamental changes to the unit's inherent qualities (for example, you can't give a Panther an 88mm gun, or a squad all light machineguns). Below is a picture of a Head Quarters' edit screen to give you an idea about what kinds of changes are possible:



Cancel - Negates any changes made in this window.

OK - Exits back to the unit Purchase screen and remembers changes made in this window. You have to save the scenario before these changes become truly saved.

Unit Type - In the upper left corner is the type of unit currently being edited.

Ammunition - Lets you select which and how much ammo is available for the particular unit. Which ammo types are available depends on the unit type. Infantry can have small arms ammo, demolition charges, bazooka/Panzerfaust/Panzerschreck ammo (handgrenades are not tracked and are automatically available). Vehicles/guns can have HE, AP, SMOKE, HOLLOW CHARGE and TUNGSTEN ammo.

Experience - You can adjust the experience level of each unit. This allows you, for example, to make the leader of a platoon Veteran and keep the squads at Regular, to simulate an exceptional platoon commander. Unit Value is adjusted if changed.

Name - Sometimes a particular unit needs to have a specific name. This is allowed, but the rank of the leader can not be changed. A platoon leader will always be a Lieutenant, a Company Leader always a Captain, a Battalion leader always a Major (or the appropriate ranks for other nationalities).

Leadership - HQ units, and only HQ units, can have bonus Leadership abilities customized. You can of course leave them "as is", thereby keeping the random ones assigned by default. The different choices are:

Command - determines the command radius of the HQ unit.

Combat - increases the fighting abilities of units under its command (i.e. to-hit chance, firepower)

Rally - lowers the chance of a unit panicking or routing under its command.

Stealth - increases the chance of remaining unspotted while hiding.

Possible ratings are 0 (normal), +1 (very good) and +2 (exceptional).

Exit Points - units eligible to receive exit points yield extra points for the player if they leave the battlefield off the map edge pre-set in the PARAMETERS section.

Note: units eligible for exit score points for the ENEMY if NOT exited before game end.

Suppression - Determines if the unit starts the game on the map unsuppressed, cautious, shaken, pinned or panicked.

Fatigue - Determines if the unit starts the game on the map rested, ready, tired, weary or exhausted.

Special Weapons - Units that are allowed to carry extra weapons, like satchel charges or Panzerfausts, can have more or less allocated to them depending on the unit type.

PLANNING REINFORCEMENTS

There are five reinforcement slots for each side. Each reinforcement slot looks just like the "selected units window", but contains some extra options at the bottom which allow the scenario designer to determine when the reinforcements are going to appear in the game.

First Possible Arrival

For battles, this number represents the first turn in which the units in the "selected units window" might appear. For operations, this number represents the first BATTLE in which the units can enter (during the Setup Phase).

Chance

This percentage gives the chance that the units will indeed enter on a given turn (or battle for operations). The lowest possible setting is 1%. If set to 100%, the units will always arrive on the turn of first possible arrival.

Example: A unit is set for a "first possible arrival" of turn 4, with a "chance" of 30%. This means it will never arrive on turns 1-3. It has a 30% chance to arrive on turn 4. If it does not arrive on turn 4, it then has a 30% chance to arrive on turn 5, and again 30% on every turn thereafter, until it does indeed arrive.

Note: the "chance" is the likelihood of arrival per turn (or battle, in the case of operations) not an overall chance of arriving.

Reserves (operations only)

For operations only, there is an extra reinforcement option: reserves. Instead of assigning reinforcements for a scheduled arrival (from battle #X on, with Y% chance), you can also grant a side a reserves pool, which the AI will allocate automatically depending on how the player is doing.

There are three reserve pools - Battalion, Regimental and Divisional. If things start going wrong, the AI will release the Battalion reserves first, then the Regimental reserves and finally (and only when things start really hitting the fan) the divisional one. The player has no influence on when this will be; his fate - as often in war - depends on his higher ups and how they view the situation at hand.

LOAD BRIEFINGS

Every scenario you make should have three "briefings" which inform the players what it is they are supposed to do. There is no one right way to do this, but following the format of the included scenarios will help ensure that you have all the necessary information included in your Briefings.

Create three different text files in any word processor, each one to do the following:

Text File 1 - General Briefing, viewable by both sides

Text File 2 - Axis Briefing, viewable by Axis player

Text File 3 - Allied Briefing, viewable by Allied player

These files MUST be in text format for Combat Mission to understand them. The names of the files are not important, as long as the text is saved as regular .txt files.

Clicking on "OK" brings up a Load dialog that asks for the three files, one after the other. When done the text becomes incorporated into the scenario as the three scenario briefings. Clicking on "Cancel" brings you back to the Editor main screen without having to select briefing texts.

If you want to make changes to your briefing texts at a later time, simply edit them in your preferred text editor, but you will have to go through this menu again to update them for the scenario.

There is a "hidden" feature that allows you to output the text from an already compiled scenario. This is great if you lost your originals or wish to use someone else's text as a basis for making your own descriptions. To do this simply hold down the SHIFT and CONTROL keys when you click on the "Load Briefings" button in the Editor's main screen.

THE TUTORIAL



TUTORIAL

This tutorial is intended to offer the beginner (especially the impatient one) a quick way to get into the thick of things - combat! You will learn how to start a game quickly, use the basic game mechanics and even pick up a thing or two about tactics and how to win.

Getting Started

The first thing you see when you start up *Combat Mission: Beyond Overlord* is the main game screen. It contains several buttons, but the only one you're interested in for now is **PLAY GAME**. Left-click on the button. When the Load Game screen appears locate the scenario called "Tutorial", select it (left-click), and then click on the **PLAY SCENARIO** button on the lower right of the screen - or simply double-click on the scenario name.

The next thing you see is the general scenario briefing. Here is where you get a general description of the battle you're about to play. The general briefings in the game are intended to give the player a feel for what to expect, without giving too much away, so that "fog of war" can be preserved.

After reading the briefing (you can scroll up and down using the arrows on the right), click on **DONE**.

Now select the side you want to play. For this tutorial, please select **ALLIES**. In the tutorial scenario, this means that you will command an American task force - other allied nations included in *CM* are British, Canadian, Polish, and French forces.

The next choice you need to make is how you want to play the game. Several options are available, including **Hotseat** and **PBEM**, left-click on **SINGLE PLAYER** for now, meaning that you will play one side and the computer player ("artificial intelligence" - AI) will control the enemy. You should leave the other settings with their default values selected.

This brings you to the detailed briefing for the side you have chosen. Read carefully - you will learn what your exact mission is in the game, what forces you have available to accomplish it, and perhaps even a little intel about the enemy you're expecting to meet (and hopefully defeat). However, keep in mind that not all of the info is necessarily

true - it is up to the scenario designer how much information he wants to release to the player, and sometimes you might even find purposely misleading information: promised reinforcements which do not arrive, wrong intel about the enemy, and so on. Feel free to take notes, but you do not need to memorize everything - the detailed briefing can be accessed from within the game at any time, by using the **ALT-B** hotkey combination.

The tutorial scenario is a "meeting engagement", i.e. neither force controls the victory locations on the map, but instead each has to move from its map edge towards the middle of the map to gain control over them. *Combat Mission* offers other scenario objective types, from assaults on heavily fortified defensive positions to advance-type operations against weakly held hasty defense lines.

When you've finished reading, click on **DONE**.

Discovering the Battlefield

Congratulations, you made it onto the 3D battlefield of *Combat Mission*! This is where the battles are fought, victory or defeat decided, heroic actions and costly sacrifices performed. The map and scenario editor of *Combat Mission* will allow you to generate your own maps, historical or hypothetical, just as you like. But let us concentrate on this one battle for now!

You enter the battlefield first during the **SETUP PHASE**, and are now able to scout out the map, deploy your forces, and establish a plan of how you want to defeat your opponent.

The battlefield screen is divided into the battlefield map at the top (which takes up most of the screen) and the main game interface, located at the bottom of the screen. This interface displays a lot of vital information to the player throughout a game - the name of the scenario, the type of battle ("meeting engagement" in this case), the participating nations (US and Germans) and their role (both attacking, since it's a meeting engagement), the length of the battle and the current turn, the weather, time and date. You also find two dynamic values in this window - the **Global Morale** and the estimated victory level for each side. The **Global Morale** depends on the casualties taken by each side and has a direct influence on the willingness of your troops to fight rather than run away. The victory level is a mere estimate, intended to give the player an idea about how well (or badly)

he is doing. The estimate is based on facts you know (enemies spotted, confirmed casualties etc.) and is just that - an estimate, to be taken with a grain of salt at best.

In the main game interface, you will also find a button labeled HOTKEYS. Left-click on this: a list of all the available hotkey commands appears. You will find another version of this at the end of the manual, complete with brief descriptions of their effects in the game. For now, let's just grab two as example: hold down the SHIFT key and press T. This toggles the display of trees on the map from NONE to MEDIUM to FULL. It's a good way to access your units if they're within woods and is useful for slower machines as fewer trees speed up the game considerably. Another thing you might want to try is SHIFT-C. This enlarges the graphical unit size from "realistic" up to "+4" and is especially useful if you want to issue orders to distant units without moving your viewpoint. It's just a graphical tool and has no impact on game physics.

On the right hand side of the interface you will find the navigating buttons, which move your viewpoint around the map.

The battlefield map of Combat Mission is three-dimensional, and you can move your viewpoint (the "camera"), in any direction, even up and down. There are several ways to navigate on the battlefield, but one of the easiest is by using the arrow buttons on the main game interface. For other viewpoint navigation methods (like how to zoom or adjust the camera angle up and down) read the GETTING TO KNOW THE FIELD section of the game manual.

Try moving around the map now. Make sure to try out the different view levels, from the "bird's eye view" (level 8) all the way down to the "trench cam" at ground level (level 1). You can use the UP and DOWN buttons on the main game interface or simply press the 1 through 8 keys on your keyboard. While the higher view levels are good to get an overview of the map and a feel for the battle in progress, the lower views are excellent for close-up action playbacks and fine plotting of moves, lines of sight etc. The view level you use the most depends on your personal style of play.

Take a good look at the terrain features displayed - such as woods, grain fields, buildings and villages, roads and even a bridge across a small river. More about that later.

Identifying Your Mission

In order to orient yourself on the battlefield, rotate the camera until you spot a black windrose with a big N above it slightly beyond the edge of the map. This map edge is NORTH. Your US forces are coming from the west, while the Germans are somewhere to the east.

Have a look at roughly the middle of the map. You will find a T-junction of two paved roads there, and a big grey flag with an "?" in the middle. This is the victory flag, showing the location you are about to fight over. The "?" indicates that the "owner" of the flag is unknown. Since this is a "meeting engagement" scenario, the flag is most likely not under German control (yet), but in other scenarios it could simply mean that although the Germans are in the area, you simply have not spotted any of them yet and cannot verify that they are, or are not, in control of the flag.

Unlike other games, your mission is not to put one of your units right on top of that flag to gain control over it. Instead, each flag has a certain control radius around it, and your mission is to move as strong a force into that area as possible and - just as important - stay there. Needless to say, the enemy is going to try to do the same. Important: The flag will NOT stay under your control when you move your force away - once your men are gone, you will not be able to make sure that the enemy has not moved in, and therefore the flag will convert to "?" immediately. You will only gain victory points for flags which are under your control at the end of the game.

Move towards the western edge of the map now. You should see a three sets of dotted colored lines (two red and one white) surrounding rectangular areas. These are your (the US) setup zones. While the number of setup zones for each side is not limited (you could have, for example, ten red setup zones or more), there are only three colors for each side. This is important, because during the Setup Phase you are allowed to move your units freely only within the same zone colors, e.g. you cannot move a unit from a red zone into a white zone. A unit belongs in the zone which matches the base color of the unit.

Additionally, some units may be "padlocked" from the start, i.e. they cannot be moved at all during the Setup Phase. These "padlocked" units are recognizable by an orange base color. Units can also be set up outside of such zones in the "neutral" area (to simulate advance elements for example). Such units have a grey zone color and cannot be moved at all.

Becoming Familiar with Your Units

Let's have a look at the US troops available for the tutorial. There are several ways to access your units. You can simply left-click on them. Try it now - left-click on one of the Sherman tanks standing on the paved road.

You will notice that a yellow frame appears around the selected unit. At the same time, the main game interface is replaced with the unit info window, which reveals important information about the selected unit. Besides the name and type of the unit, you can see the manpower, the ammo and experience, where the unit is located, etc. When the game is underway, you will also be able to see casualties, morale, the suppression status and current activity for each unit here. For a detailed description of this window, please look up the UNITS section of the manual.

If you wish more detailed information about the selected unit, you can also hit the ENTER key. A detailed unit info window will pop up, showing even more detailed stats - available weapons, weapon data and much more. Go to the DETAILED UNIT INFO section for more.

Learning How to Issue Orders

After having selected a unit, you can now access its orders menu. Simply hit the SPACE BAR, and it will appear on the screen. Alternatively, you can right-click on a unit to select it and bring up its orders menu simultaneously.

Since you are still in the Setup Phase, the order menu contains only a few orders, used mainly to redeploy your units within their setup zones. When the game starts, additional orders for targeting, different modes of moving, etc., will become available.

Besides each order, you will notice a letter. This is the hotkey command, which you can use to issue an order without having to call up the order menu.

All right, let's move around a few of the units. Select the PLACE order for the Sherman tank you have chosen by left-clicking on the order menu, or alternatively by pressing the P key. You will notice a blue line extending from the selected unit towards the mouse cursor. This line will follow your cursor wherever you move it. Point the cursor anywhere within the blue setup zone and left-click. The Sherman will jump to the new location.

There are restrictions as to where you are allowed to place your units. Tanks, for example, cannot enter woods or buildings or even steep slopes (CM is 3-dimensional already afterall!). As previously stated, you are also not allowed to move your units out of their setup zones. Try it - select the Sherman, press P and move the cursor into the red zone, then left-click. Nothing will happen - the Sherman cannot leave its own setup zone.

You can move units between setup zones of the same color. Select one of the units from the red setup zone. It doesn't matter which, but remember where it was, since you will have to put it back for the rest of this tutorial to make sense. Left-click on the unit, hit the P key, and move the cursor into the other red setup zone. Left-click again - the unit will be re-positioned. All right, well done - now put it back, will ya...

You can also change the facing of your units (your units will spot an enemy best in the direction they face!). This is done with the ROTATE command. Bring up the orders menu or hit R, move the cursor to the direction you want your unit to face and left-click. If you want to reposition a unit and change facing at the same time, use the MOVE command, hotkey M. This will first place the unit and then automatically call up the ROTATE command afterwards.

Notice also that the line color is different for each command you choose. An in-depth description of available commands, line colors and their effect in the game can be found in Appendix B of the manual.

The All Important Line Of Sight (LOS)

Another command available during the Setup Phase (and also thereafter) is LINE OF SIGHT. This is a very useful tool to check exactly what your units are able to see from their current positions. Try it - select a unit, hit L (or call up the orders menu and left-click on LINE OF SIGHT). Now move the cursor around the map - you will notice that the color of the line changes, depending on what you point at. You don't need to click, just pointing the cursor does the job (in fact, when you click you exit the LOS tool). Notice also that some text appears above your cursor describing the type of terrain you're pointing at right now.

The brighter the blue line color, the better the line of sight, i.e. the less obstructed the view to that particular location. Notice that line

of sight deteriorates with distance, even across open terrain. Additionally, some objects, like houses, completely block the LOS, while others, like woods, simply make it deteriorate faster. With the LOS tool selected, move the cursor slowly into the light woods off the road. The further the cursor moves, the darker the LOS line becomes.

At some point, the LOS becomes blocked. Your unit is not able to see any further - immediately, the LOS line color changes to red/black. The red part of the line shows what is still visible, the black part starts from the point where the LOS is cut, and nothing beyond that can be seen.

Lines of sight are extremely important in tactical combat - you need to see the enemy before you can fire at him. At the same time, you are trying to deny him lines of sight to your own troops, thereby effectively keeping him from firing at you. Mastering the concept of line of sight in the game is essential to your success as a battlefield commander. You won't always have to use the LOS tool. Being 3D in nature, and with the free camera movement, most often you can "eyeball" what your units can see. One of the best ways is to simply select "ground view" (level 1) and position the camera on top of the spotting unit. Keep in mind, however, that with the option to scale unit sizes and the generalization of individual trees and soldiers, "eyeballing" will never be as exact as the LOS tool. If in doubt, hit the L key - keep this in mind, it can save you from some frustrating defeats later.

Getting Your Units Ready for Battle

All right, so far, so good. Now it's time to apply all of the above and concentrate on the mission at hand. You have two Sherman tanks and roughly a company of infantry at your disposal, together with some supporting weapons (machineguns) and even an artillery forward observer carrying a radio. The radio enables him to direct the fire of a battery of 81mm mortars, which is located somewhere off-map behind your position. Your goal is to reach the T-junction, eliminate any German resistance and hold the road until further notice (i.e. until the scenario ends). You have 15 turns (minutes) to accomplish this mission. Of course you should try to do so with a minimum of casualties.

For the tutorial, we're going to try to move the Shermans down the road while moving the infantry platoons on the right side through the woods. This should accomplish three important things -

1. Keep the tanks away from the woods, where they not only can bog down easily, but are juicy targets for enemy ambushes,
2. Create free lines of fire for the tanks, so that they will be able to support your advancing infantry,
3. Allow your infantry to flank any defenders along the road with a right hook.

We think this is a good plan, but of course you can develop your own in later tries. The two rifle platoons are already set in perfect position for what we're planning to do, but we need to get the Company Commander, the 81mm artillery spotter and the .30 caliber machine-gun team into better positions. Let's load these guys onto the Shermans - the MG team is rather slow on foot, and the spotter and Company CO hate walking.

Select the MG team and press P (or choose the PLACE order from the unit's order menu). Move the cursor over one of the Shermans. You will notice that the line color changes to white when the cursor points at the tank, and the word "EMBARK" is displayed. Left-click and the MG team will be placed on the tank's rear hull. Do the same with the Company HQ unit and place it on the other Sherman. That leaves the spotter team... since it's only two men, it will still fit on either of the Shermans - select, hit P and left-click on the Sherman with the Company HQ.

Loading your units onto the tanks is a good way to transport them into battle, but keep in mind that they are quite vulnerable up there. It's not a good idea to leave them mounted when bullets start pinging against the armor. Additionally, units mounted on vehicles are not allowed to return fire, and so they really should be dismounted quickly. Later on you will encounter other vehicles in the game (armored half-tracks for example), which offer more protection to the passengers than the open hull of a tank.

OK, that's it - you've finished the Setup Phase. Your men are getting impatient to move out, and by clicking the GO! button on the main game interface you will tell them to do so.

The Orders Phase, First Turn

The Computer Player, or Artificial Intelligence (AI), now takes a few seconds to position its own units, then you enter the order phase for the first turn. You'll notice that the setup zones disappear (they have

no further meaning for the game) and your units are awaiting your orders for the first minute of action.

Methodically, we're going to issue the first round of orders to your units, based on the previous tactical considerations. Without any unit selected (you should see the main game interface at the bottom of the screen), hit the + key. This selects the next available unit, based on its ID Tag. Since you had no unit selected, that will be the first unit for the US - usually the highest commander on the field.

All units are numbered in the game, with A0 usually being the first. Next is A1, or B0, depending on the composition of your forces. More details about this can be found in the UNIT section of the manual.

Now press TAB (to lock the camera view behind the selected unit) and press 2 to choose view level 2. You should now see your Company HQ just below the camera sitting on the rear deck of a Sherman. Using the + and - keys is a quick way to find your units on the map and allows you to jump from wherever you are right to the exact location of the selected unit. It's up to you which view level you choose, of course, but for what we're about to do level 2 is not bad.

Hit the + key two more times. This brings you to the first to the 81mm Artillery Spotter (which should be on the Sherman) and finally the first Platoon HQ under your command. Stop here, we want to give these guys (which are the rightmost platoon) some orders.

Before we do so, let's talk a bit about HQs and their role. When you look at the screen, you'll notice a few brownish lines (and one black line) extending from the HQ unit to the surrounding troops. These are command lines and indicate if the subordinate units are in command or not. A brown line indicates IN COMMAND, a black line shows OUT OF COMMAND.

Keeping units in command is important, as it confers many benefits to your troops. The most important one is that units in command suffer from shorter "command delay" than units out of command. The command delay simulates the time it takes for orders to pass from higher HQs down to the fighting elements. If out of command, units can remain in place, delayed, for 20 seconds or more. This can be lethal in some circumstances.

Another effect of being in command is that each HQ unit has certain leadership abilities which can help the fighting units. These are command, morale, stealth and combat which are explained in detail

in the COMMAND & CONTROL section of the manual (where you can find more details about the effects of being in and out of command, too).

Now, according to our plan, we want to order this platoon to move through the woods in an easterly direction. Instead of giving orders to every unit, you can also use one of two group-move functions. Simple double-click (left mouse button) on the Platoon HQ unit. You will notice that all units in command (i.e. to which a brown or black line extends) are highlighted. Click M (or select Move from the orders menu) and move the cursor straight eastwards, until you come to the first bigger patch of WOODS (not "scattered trees"). Left-click into the middle of the woods. You will notice that movement order lines now extend from the entire platoon, relative to the route selected for the HQ unit. (If you don't see them, try pressing SHIFT-P a few times until they appear). Issuing orders in this way is called Formation select. Another possibility is the click-and-drag method. We'll use that to order the second platoon to move forward.

Find the Platoon HQ unit of the second platoon. You can do this either by using the + and - keys to scroll through your units, or simply move the camera over and click on the unit (shown as one kneeling soldier with a pistol). Set the camera view to level 3 or 4 (number 3 or 4 on the keyboard) and toggle trees off (CTRL-T) You'll notice a few units grouped around the Platoon HQ. Simply click somewhere on the map and, holding down the left mouse button, drag a box around the units. They will become highlighted - you have "group selected" them.

Order them to move forward (eastwards) until the end of the scattered trees right at the base of the elevation by the road. You can do this by pressing the M key or bringing up the orders menu by hitting SPACE.



There we go, both platoons will now move through the woods towards the objective.

Now what do we do with the tanks? Left-click on the first Sherman and order it to move down the road to the curve. But we don't want it to stop there. Instead we want it to move all the way down the road to the base of the small elevation. Simply hit M again - you will notice that the new order line now extends not from the tank itself, but instead from the last waypoint you ordered it to move to. During the upcoming Action Phase, the tank will not stop at the waypoint - it will simply take the curve and drive on.

If you know beforehand that you want to set a waypoint like this, you can also right-click (instead of left-clicking) on the target point for the movement order. This will set a waypoint and keep the movement order active.

Let's do that with the second Sherman. Select it, and order it to move where the first Sherman is positioned. Right-click somewhere around the first Sherman, then move the cursor off the road to the brush terrain beside the road. Left-click to finish the movement order on brush terrain.

If you're not happy with a waypoint, you have a few options. You can erase it (by hitting BACKSPACE) or simply right-clicking on the waypoint marker and - while holding down the right mouse button - drag it around the map as you wish.

That's it for turn one. You've ordered your force to move out! Now let's see what they do with it - hit the GO! button on the right lower edge of the screen.

Watching Your First Turn in Action

It will take a few seconds for the computer to crunch the numbers, and then the Action Phase will start. You have no influence on what happens for the next 60 seconds, but you can click on individual units and you have the "video" controls in the lower right hand corner to replay the action, fast forward, rewind, pause etc. Feel free to move around the battlefield, change view levels and replay the action as often as you like. For now, there won't be much action most likely. You should see your men move out (after a short delay - the command delay) and follow the assigned paths. It is extremely unlikely that you will encounter any enemy units this turn, but stay alert - they're near!

After the 60 seconds played through for the first time, the DONE button will appear under the playback controls. When you click on it, you will automatically jump to the next Orders Phase. You are then no longer able to go back and review last turn's action.

Once you are satisfied that you have seen all you need to see, click on DONE and off you go to Orders Phase for Turn Two.

Moving Through Turn Two

There is no need to adjust your movement or targeting orders, so simply hit GO! to compute Turn Two. After you have finished watching the action, click on the DONE button to move on to the next turn.

Turn Three Orders Phase

All right, for Turn Three the chance of encountering the enemy is rising. Your platoons and Shermans should have made it to their objectives for turn 1. Now is the time to crest the little elevation between you and the victory flag (and the enemy?) and see what's on the other side.

Since the first contact with the enemy often can decide the whole game, we want to coordinate your moves a little bit more. Combat Mission gives you a large variety of orders to allow you to coordinate your advance tactically, but not too much to avoid unrealistic micromanaging.

One of the main goals is to have both Shermans crest the elevation (almost) simultaneously. If there are any enemy tanks in sight, this will give them two targets at the same time and enable at least one of your Shermans to provide covering fire. Since the two Shermans are not at the same distance from the elevation, we will have to order the one closer to it (the one on the road) to pause for a few seconds.

Let's do it now - select the Sherman in the brush and order it to HUNT forward (hotkey: U) to the patch of scattered trees right beside the road on the elevation. (The hunt order makes the Sherman go at medium speed (slightly faster than MOVE) while keeping an eye out for enemies. It also means that the Sherman will stop and immediately engage an enemy tank if and when it spots one.) Then order the other Sherman to HUNT forward down the road a few meters past the crest. Also, order this Sherman to pause. You do this by selecting it and pressing the P key. This adds a delay of 15 seconds at the beginning of next turn before the tank will start moving. Hit P once again, and you add 30 seconds delay. That's what we need roughly, to make them

appear at the same time.

Note: Pause always works at the beginning of a turn. You cannot order units to pause at certain waypoints during the turn.

For the two infantry platoons, the orders are simply to keep advancing. Order both platoons to move forward to the next patch of woods terrain.

That's it. Hit GO! and watch.

Watching the Action for Turn Three

It's hard to predict exactly what will happen during the course of Turn Three. Most likely you will encounter some German armor and/or infantry. Maybe you will lose one (bad) or both (VERY bad!) of your Shermans. Combat Mission uses real-world physics and fuzzy-logic routines, which means no two battles or turns will ever be the same.

It is most likely, however, that you will be able to exchange a few shots with the enemy before the turn ends. You might be able to identify an enemy tank - or not. Maybe you will be fired upon and not even see where it's coming from! The possibilities are many and varied - and that's what makes Combat Mission such an intriguing game.

There is not much we can do for you now that the lead is flying, except give a bit of general advice. You know the basics now - how to give orders, how to navigate around the battlefield. We suggest you learn the finer details on the go as it is much more fun that way!

Additional Tips

- Forget old tricks and habits from other war or strategy games! Although some of what you know is still applicable in CM, much of it is not. So it is better to play with an open mind and a healthy dose of real-world combat tactics.
- Experiment with the available orders - many of them have subtle side-effects and some are suited for certain actions better than others.
- Move your Shermans around so that both of them are able to engage the same target at once (if not already the case).
- Make a wide flanking maneuver with your infantry platoons. Use one platoon to storm the German positions while the other provides suppression fire.

APPENDICES



APPENDIX A

Hotkeys

SHIFT-C

Unit (visual) scale -> Realistic, +1, +2, +3, +4
Increases the "visual enlargement" of units. The degree of enlargement is related to the distance from the camera, i.e. units further away will be graphically enlarged more than units close by. NOTE: "Realistic" is so small that it's difficult to see the units unless you're right next to them, so we recommend using at least +1, and probably +2 or +3 for the best gaming experience.

SHIFT-T

Tree coverage -> None, sparse, moderate, full coverage
Great option for finding units in forests and/or to speed up the game for lower-end systems.

SHIFT-H

Horizon range -> 1000m, 1500m, 2000m, 2500m, Unlimited
Good option to speed up the game for lower-end systems.

SHIFT-P

Show all moves/targets -> All paths/targets OFF, show all movement paths, show all target lines, all paths/targets ON
A good way to coordinate multiple units' movement orders as well as for getting a feel for firing lanes and hot spots.

SHIFT-V

Show vehicles -> ON/OFF
Toggles display of vehicles (and pillboxes/bunkers) on and off, allowing you to see their passengers more easily.

SHIFT-O

Occupied Buildings Transparency -> ON/OFF
Shows a building's walls as transparent or removes them completely when occupied by units. The transparency effect is not compatible with certain graphics cards.

SHIFT-F

Show objective flags -> ON/OFF
Toggles objective flags on or off.

SHIFT-A

Viewpoint up -> 0, 1, 2
Tips the camera angle up a few degrees. Automatically reset when the camera height is changed.

SHIFT-Z

Viewpoint down -> 0, -1, -2, -3, -4, -5, -6, -7, -8, -9, -10
Tips the camera angle down a few degrees. Automatically reset when the camera height is changed.

SHIFT-S

Sound -> OFF/ON/ON+ambient
Toggles sound on and off and enables ambient sounds.

SHIFT-R

Show building roofs -> ON/OFF
Toggles the display of building roofs on and off.

SHIFT-E

Show exit zone (if any) -> ON/OFF
Toggles the display of the exit zone(s) - if applicable.

SHIFT-B

Unit bases -> ON/OFF
Displays the units with a color-coded base for easier spotting on the map.

SHIFT-L

Landmarks -> ON/OFF
Turns the display of landmark labels on the battlefield map on and off.

SHIFT-I

Show smoke -> None, fast and compatible, high quality
Toggles the display of smoke effects. None - shows no smoke for better visibility of the battlefield. Fast and compatible - shows smaller smoke columns for slower hardware systems. High quality - shows bigger smoke columns and adds translucent effects for highest visual appeal; not compatible with certain graphics cards.

SHIFT-M

Show 3 men per squad -> ON/OFF

Toggles the display of 2 or 3 soldier graphics per squad. 3 is the default setting, but 2 can be used for slower systems.

SHIFT-K

Camera shake -> ON/OFF

Toggles the shaking of your viewpoint (the "camera") from nearby explosions.

SHIFT-W

Weather/Fog -> None, partial, full

Toggles the display of weather effects like rain, snow and fog. Use NONE for slower systems, PARTIAL for average systems, and FULL for high-end systems.

SHIFT-G

Labels -> ON/OFF

Toggles the display of unit status labels on the map.

SHIFT-D

Detailed armor hits -> ON/OFF

Toggles detailed armor hit reports on or off, showing you the location a vehicle has been hit and the effects of such a hit.

ARROWS	Move camera viewpoint
Keys 1-8	Set camera viewpoint height
< >	Rotate camera viewpoint
/	Rotate camera view 180 degrees
[]	Zoom camera in/out
TAB	Lock camera view on unit
ENTER	Show unit details
SPACE	Show orders menu OR cancels active order
BACKSPACE	Erase last waypoint
+	Go to next friendly unit
-	Go to previous friendly unit
\	Switch sides (Editor only)
ESCAPES	Switch to desktop

Alt-B

Scenario briefing

Calls up the scenario briefings (general and side-specific). For operations, the battle number is shown at the top.

Alt-G

(Windows only) Allows you to set one of five Gamma (brightness) settings. Select the one that works best for your monitor and video card. This option is accessible on all screens throughout the game.

Alt-S

Save game

Allows you to save a game in progress during the Orders Phase of a turn. You are prompted to enter a name for the save file. The file is automatically saved into the Saved Games subdirectory of Combat Mission and is available from the Load Game screen.

Alt-C

Cease fire request

A screen pops up asking you if you really want to (secretly) prepare for a cease fire. If your opponent chooses this option as well, the game automatically ends. Selecting this option again and choosing "no" cancels any cease fire preparations.

Alt-U

Surrender

Ends the game immediately with all friendly forces surrendering.

Alt-A

Abort scenario

Exits current game immediately. No End Game screen is shown.

Alt-Q

Quit Combat Mission

Quits the game and exits to the desktop. This option is accessible from any screen in the game.

APPENDIX B

Movement Orders for Infantry and Teams

Order	Unit Type	Hotkey	Color
Sneak	Fast units	S	Blue
Crawl	All except Slow units	C	Brown
Move	All	M	Aqua
Run	Fast units	F	Light Green
Rotate	All	O	Purple
Withdraw	All	W	Light green
Pause	All	P	N/A

Basic Descriptions

Sneak - Move cautiously and slowly to avoid detection, stop and take cover when engaged by enemy.

Crawl- Go prone and crawl forward cautiously using full cover but at a very slow speed.

Move - Move at walking speed.

Run - Move at running speed, spotting ability significantly reduced. Only units with speed class FAST can run.

Rotate - Change facing - facing is important for spotting, even for infantry units.

Withdraw - Retreat immediately! Unit will start moving without any command delay, but may panic or break. Withdraw can only be issued towards friendly map edge and away from visible enemy. Ability to spot is greatly reduced.

Pause - Remain in place for 15 seconds from the beginning of the next turn. Subsequent Pause orders increase the waiting time in 15 second increments, to 30 and 45 seconds. After 45 seconds the Pause order is cancelled by issuing it once again. The unit's inherent command delay is always added to the waiting time and can result in a pause of more than 60 seconds.

Movement Orders for Vehicles

Order	Unit Type	Hotkey	Color
Move	All	M	Blue
Fast	All	F	Light green
Reverse	All	R	Dark Purple
Hunt	Vehicles w/ mainGun	U	Green
Rotate	All	O	Purple
Pause	All	P	N/A

Basic Descriptions

Move - Move at walking speed.

Fast - Move at maximum speed (depending on terrain and vehicle type), do NOT stop before reaching destination.

Reverse - Move backwards and do not stop before reaching destination.

Hunt - Move at medium speed, stop when enemy target spotted and engage enemy until destroyed or out of sight. *NOTE: The Commonwealth Archer is not capable of using the Hunt command.*

Rotate - Change facing - facing is important for spotting, but even more so for pointing the strongest armor in the direction of the greater threat. This order is particularly critical to vehicles that have no turrets.

Pause - Remain in place for 15 seconds from the beginning of next turn. Subsequent Pause orders increase the waiting time in 15 second increments, to 30 and 45 seconds. After 45 seconds the Pause order is cancelled by issuing it once again. The units inherent command delay is always added to the waiting time.

Targeting/Firing Orders

Order	Unit Type	Hotkey	Color
Target	All	T	See Below
Target Wide	Artillery	I	Orange
Next Target	All	N	N/A
Smoke	Some non-Infantry units	K	Light grey
Cancel Target	All	X	N/A

Basic Descriptions

Target - Instructs the unit to fire at the designated target area. The Target line has more variations in color than the other orders:

- Red** -> direct fire target
- Orange** -> Area Fire target
- Maroon** -> Target outside of firing arc (if applicable)

If the target is not an enemy unit, the unit will automatically use Area Fire. Many units have a firing arc, outside of which they have to rotate to be able to fire in that direction (which they will do automatically).

Target Wide - Tells the unit to spray a wide area with artillery fire rather than try to hit a certain spot.

Next Target - Selects the next possible (and visible) target, starting with the "best", i.e. the one with the highest chance to hit

Smoke - Certain guns and tanks are capable of firing smoke rounds from their main gun or artillery battery. The order works just like the target order. Artillery spotters keep firing smoke until the order is cancelled or ammo is used up, but on-map ordnance usually only fires a few smoke rounds at the target area.

Cancel Target - Cancels the current firing order.

Other Orders

Order	Unit Type	Hotkey	Color
Hide/Unhide	All	H	N/A
Ambush	See Below	A	N/A
Line of Sight	All	L	See Below
Button up/Unbutton	Vehicles w/full crews	Z	N/A
Split	Squads	N/A	N/A

Basic Descriptions

Hide/Unhide - Keep heads down (or engines low idle) in order to avoid enemy detection. Unit will not open fire until enemy is well within the unit's lethal fire zone, usually less than 100 meters. Units that are hiding have their spotting capabilities reduced. A Hide order in combination with a TARGET command tells the troops to stay hidden but open fire when the selected target comes within lethal firing range. When a unit is using Hide the Unhide order becomes available to put the unit back into its normal state. Note that vehicles can only use Hide when they have no movement orders.

Ambush - Places an Ambush Marker on the map. The unit setting the ambush will only open fire if an enemy unit moves within a certain range of it. Friendly units within LOS of the Ambush Marker can also target the point, but only if their HQ unit is within command range. Great for ambushes if the firing troops are also hiding at the same time.

Line of Sight (LOS) - Shows what the selected unit can see from its current position. The color of the line indicates if the LOS is obstructed partially, completely or not at all. The darker it is, the more things are in the way, e.g. trees or fog. Even across open ground the LOS degrades with distance due to haze, small obstacles, dips and foliage. If the LOS is completely obstructed, the line is RED up to the point of the obstacle, and BLACK from there on.

Button Up/Unbutton - Orders crew to close hatches or (if open top) hide within the hull's armor. Most "flexible" MGs cannot be operated when the vehicle is buttoned up. When a unit is Buttoned Up the Unbutton order becomes available so long as the crew is at full strength (i.e. no casualties).

Split - Splits a squad into two half-squads which can be moved individually. Half-squads are useful for reconnoitering enemy positions, but are not good for fighting as they tend to panic easier. You can rejoin half-squads from the same squad only. This happens automatically if the two halves are moved close together and stopped at the end of a turn.

Special Orders during the Setup Phase

Order	Unit Type	Hotkey	Color
Dig In	Tanks	D	N/A
Activate Flag	HQ Units	N/A	N/A

Basic Descriptions

Dig In - Orders the unit to start the game with its hull dug in, so that only the turret is visible above the ground. This provides excellent protection but means that the vehicle is not able to move for the duration of the battle.

Activate Flag - Allows the highest HQ unit on the map to select - during the Setup Phase - which flag is the real objective on a map with dynamic flags.

APPENDIX C

We have taken great care to deliver a bug-free, compatible and playable game to you. However, the vast myriad of different hardware and software configurations available today makes it impossible to provide solutions for 100% of them. Below you will find answers to a few known issues as well as a guideline to any problems you might encounter with the game.

Install Issues

Problem: Setup halts part way through the install process. May indicate a problem reading a specific file or resource.

Cause/Solution: Could be a dirty or scratched CD. Advise to do the following:

Use some rubbing alcohol and dilute it with water (about a capful total) Dip a cotton swab into the solution and then gently rub the soaked swab across the shiny surface of the CD. Be sure to work any area that show smudges or scratches. Let the CD air dry. Reinsert the CD and try to reinstall. You can also use any aftermarket CD Cleaning kit or cleaning system to do the above.

If that fails see below for Manual Game Installation Procedure.

Problem: During installation on a Windows system setup prompts, "Please insert disk 0 that contains the file data 3.cab." or any other disk or data.cab file.

Cause/Solution: This occurs when a previous program leaves its setup files in the Windows Temp folder. Browse to your Windows Temp folder (default location c:\Windows\Temp) and delete all files and folders located there. Now rerun setup.

If that fails see below for Manual Game Installation Procedure.

Manual Game Installation Procedure (Windows):

Create a directory somewhere on your computer called "CMBO" (Recommend C:\Program Files\CMBO). Now open Windows Explorer and browse to the Combat Mission CD. Copy the Wav, BMP and Scenarios folders into your new CMBO folder. Be sure that you copy the folder AND files inside of them! Now copy the Combat Mission.exe file from the CD to your new CMBO folder.

Now launch the game from your hard drive. You will still need to have the CD in the CD drive to play the game (this is done for copy protection reasons) but all the files will be on your computer and it should be okay.

Manual Game Installation Procedure (Mac):

For the Mac all you need to do is copy all files and folders (and files inside of the folders) from the CD to your desktop.

Now launch the game from your hard drive. You will still need to have the CD in the CD drive to play the game (this is done for copy protection reasons) but all the files will be on your computer and it should be okay.

General issues

I have problems with transparency effects (smoke and buildings)

Unfortunately, some older graphics card drivers have limitations which do not allow transparency to be displayed properly: mainly apparent in CM's smoke and buildings. That's why we provide "fast and compatible" options for those who encounter problems with this. Simply leave the "Occupied Building Transparency" option (Shift-O) OFF, and set smoke effects (Shift-I) to "Fast and compatible".

Fog graphics either don't show up or the screen goes all white (Windows)

You may need to enable "fog table emulation" in the control panel for DirectX and/or your video driver. Check with your manufacturer to find if this setting is supported (most modern video cards do) and how to enable it, if available. If that doesn't solve the problem, you can disable fog graphics by pressing SHIFT-W once or twice.

CM crashes or exhibits very strange behavior PC/Windows Systems

DRIVERS! DRIVERS! DRIVERS! IMPORTANT! Before going further the most critical thing is to ensure you have up-to-date driver software for your graphics card, DirectX, and even your mouse. Nearly ALL compatibility problems can be directly linked to obsolete or buggy drivers. Good websites to visit for more information are:

<http://windrivers.com>
<http://www.3dchipset.com>

<http://www.reactorcritical.com>
<http://www.guru3d.com> (drivers for most mainstream video cards)
<http://www.nvidia.com> (drivers for Nvidia based (TNT, GeForce) cards)

DIRECTX: DirectX 8 is required, and it's a good idea to update to the very latest version from <<http://www.microsoft.com/windows/directx/downloads/drx90.asp>>.

NOTE: If you still have problems after installing the latest DirectX, it is often a good idea to REINSTALL your video and mouse drivers, because the installation of DirectX may have overwritten them.

CUSTOM THEMES/CURSORS: Do not use custom Windows "themes" or custom mouse pointers! If you get mouse pointer "flicker", or notice any unexplainable problems (even those which seemingly have nothing to do with cursors or the mouse) try changing the "Windows Theme" and mouse pointer to the Windows Default.

MICROSOFT INTELLIMOUSE: has been linked to various problems including crashes and graphical corruption. Obtain and install the latest drivers from Microsoft. If this does not solve the problem, disable the Intellimouse software (there should be an icon you can click in the lower-right portion of your screen, in the task bar).

LOGITECH MOUSE/TRACKBALL: Problems have been linked to obsolete drivers for these products. Obtain and install the latest drivers.

OVERCLOCKED GRAPHICS: If your video card has an over-clocking feature, this may cause very strange graphical problems. Drop the clock speed back to normal, using its control panel.

LATEST NVIDIA DRIVERS (41.09 or higher) AND FULL SCREEN ANTI-ALIASING (FSAA)

Nvidia has recently released a new set of Detonator drivers (version 41.09 released Decemeber 3, 2002). Testing has shown that the implementation of Full Screen Anti-Aliasing in these drivers once again has a fault in it which will cause issues in Combat Mission. The most common problem reported is invisible text in all 2D portions of the game interface including all game menu's.

There are several current workarounds for this problem.

A). If you wish to use these new drivers AND also have FSAA enabled you can minimize (alt-Tab) and then maximize the game. That should make the hidden text reappear.

B). If you disable FSAA with these drivers you should not have any problems with in-game text.

C). The last official driver release (30.82 and 30.87) was both stable, good performing and did not have this FSAA bug. Currently version 30.82 and 30.87 of the Detonator Drivers are the only ones we can recommend for all Nvidia based video cards. Those earlier drivers can be found at: <http://www.guru3d.com>

RADEON VIDEO CARDS AND SLUGGISH GAME PERFORMANCE

If you have a Radeon video card and are noticing sluggish or stuttering game performance you may want to try and disable the Z-Mask setting on your card. Many people have reported substantial performance improvements when they disabled the Z-Mask. This is a setting that is accessible using a Radeon Tweak Program which you can find here:

<http://www.rage3d.com/r3dtweak/>

For the latest info and Tech Support Info be sure and login to our Combat Mission Tech Support Forum located at:

<http://www.battlefront.com/cgi-bin/bbs/ultimatebb.cgi?ubb=forum;f=8>

ATI RAGE 128 and NON-INTEL MOTHERBOARDS: If you have a non-Intel based motherboard chipset and an ATI Rage 128 / 128 Pro, then you may want to get the earlier drivers (some VIA chipsets may be fine however), because the most recent ATI drivers for these cards (dated March 9, 2000) have caused problems for some users. Older drivers that may actually work better are available at the ATI website:

v. 4.11.6216: http://support.atitech.ca/drivers/win98_4116216.html

v. 4.11.6263: http://support.atitech.ca/drivers/win98_4116263.html

RIVA: Users of Riva122/128zx based cards are advised to use the Nvidia reference drivers to avoid problems.

The first time you run CM, it checks your graphics hardware by asking you "Can you see this?" It also displays the name of the graphics card it has detected, and a monitor resolution and refresh rate. If these are acceptable, you should click the button (if not - or you want a different setting, just wait a few seconds and alternate choices will be

shown, one at a time). Once you click the button to accept, the program then saves this as your default video setting. If you ever want to change it (e.g. you buy a new graphics card or monitor, or are troubleshooting to find a configuration that works) just delete the CM "preferences" file (called "Combat Mission Bynd Ovr Prefs") and the process of checking your graphics hardware will be reset and begin anew the next time you run CM.

Make sure that graphics acceleration for DirectX/Direct3D is ON (in the DirectX control panel).

Problems with Sound?

Go to the DirectX control panel. Click on the DirectSound tab. Turn down (or off) hardware acceleration for sound.

If CM won't start up properly, or won't show 3D graphics, try setting your desktop to a smaller resolution before running CM again (it's a good idea to delete CM's "prefs" file too).

You may need to examine the "control panel" for your video card and experiment with the settings. Pay special attention to "refresh rate": if there is a setting for "optimal", you should probably use it.

Problem: Saved games (or ones downloaded) do not show up in the Scenario/Operation list at the Main Menu.

Cause/Solution: Game is being run from the CD instead of from the installed location on the computer.

Make sure you are running the game from the hard drive and not off the CD. While the CD being inserted is required to run the game you need to be sure that the game itself (the Combat Mission.exe) is being run from the installed directory location on your computer. If you run the game from the CD it will only show files on the CD and not the new ones being saved.

Problem: Game reports that CD needs to be inserted in order to load the game.

Cause/Solution 1: The CD DOES have to be inserted into the CD Drive in order to launch the game. Once the game has loaded the CD can be removed.

Cause/Solution 2: Some users of Windows XP have reported this problem occurring with certain models and brands of CD-Rom Drives (most notably Creative Labs drives). Please check with the manufacturer of the CD-Rom drive and Microsoft for updated Windows XP drivers and software.

Problem: Game locks up or displays a black screen immediately after game is loaded.

Cause/Solution: This is usually caused by a QuickTime conflict as the game tries to play the intro movie. In order to disable the intro movie playback you will need to hold down the SPACEBAR when the game is loading. That will toggle the movie playback on/off.

Problem: Game seems to run in a lower resolution than desktop.

Cause/Solution: Combat Mission always tries to run in the same resolution as the desktop but if the desktop resolution is changed after the game is initially run it may not detect this change. To fix you will need to locate the "Combat Mission Bynd Ovr Prefs" file and delete it. Now re-launch the game. It should now prompt you to accept the current resolution. If you wish to run Combat Mission in one resolution and your desktop in another you will need to run a 3rd party Desktop resolution program such as QRes available at <http://www.berend.com/qres.html>

Problem: Sound in game used to work but is now silent.

Cause/Solution: The sound in the game can be toggled between ON, ON+Ambient and OFF. These settings are toggled via the Shift-S key-stroke.

Macintosh Systems

- VOODOO cards: If you notice the game runs slowly, or has dropped automatically to 640x480 resolution, the problem may be that your initial desktop resolution was too large for your Voodoo graphics card to handle. For 3D acceleration under Voodoo2, you must set your desktop to no larger than 800x600. For Voodoo3, up to 1024x768 is acceptable.

- MacOS 9 (including 9.0.4) on a G3 or G4 machine appears to cause random system lockups in some cases. Solution: Disable the backside cache. This can be done using the G3/G4 Cache Profiler from Powerlogix <http://www.powerlogix.com>
- Some users of iMac, G3, and G4 computers might have a problem displaying text as "white" and instead show it as "black". If this is happening to you, you will need to use MacOS 9.1 or greater to fix a video driver bug in earlier versions.
- To hear 3-D sound, you must have Apple's Sound Sprocket installed. This is the only part of Apple's Game Sprocket set of extensions that CM uses. It can be found at <http://asu.info.apple.com/swupdates.nsf/artnum/n11564> (for MacOS 8.1 or later) or <http://asu.info.apple.com/swupdates.nsf/artnum/n11167>.

Video Issues (Mac):

Problem: On a G3, G4 or iMac the display of text in the game is blank or is all whited-out.

Cause/Solution: This is due to a known bug in the video extensions for the ATI video card on those computers.

This problem was resolved with the release of MacOS 9.1. By upgrading to MacOS 9.1 (available for free from www.apple.com) the problem should be resolved.

Once that file is downloaded, just double-click on the "OpenGL 1.2.1" icon. It then mounts a "virtual disk" on the desktop which contains an installer.

Problem: Mac system has a Geforce 2/3 video card and the sky graphic textures in-game are all black.

Causes/Solution: Appears to be a conflict at some level with the Nvidia video extensions and Mac OS. No official fix available at time of this writing but Nvidia and Apple have said a new set of extensions should be released soon to address this problem. Those new extensions may be available now. Check with Apple at their website at: www.apple.com

Video Issues (Windows)

Problem: Operating System is either Windows XP or Windows 2000 and I am experiencing graphics corruption in Combat Mission with my Nvidia based video card (Geforce, TNT etc...)

Cause/Solution: The graphic corruption is caused by incompatibilities and bugs in earlier Nvidia video drivers. Recently Nvidia has released a new set of video drivers which are version 29.42 From our own internal testing as well as the testing of other game owners these beta drivers resolve ALL graphics issues within Combat Mission. These drivers can currently be found at the following site:

<http://www.nvidia.com>

Problem: When game is launched an Unhandled Exception: c0000005 at address: 0053d978 & 005419e5 (can also be some other addresses but they always start with c0000005) error occurs.

Cause/Solution: At some point a DirectX component file has become corrupted or is no longer correctly functioning. In order to resolve this issue you should re-install DirectX. Recommend the latest version, which is now DirectX 8.1 and can be obtained directly from Microsoft at the following URL:

<http://www.microsoft.com/windows/directx/downloads/drx90.asp>

Problem: Video card is a Voodoo 5000/5500 and all in-game text is blank or white and unreadable.

Cause/Solution: Issue is caused by a fault in the Voodoo Drivers. In order to fix this issue you will need to go into your Voodoo Control Panel and change the level of Direct 3D Full Screen Anti-Aliasing (FSAA) to any setting other than the default, which is normally set to Best Performance. That will clear up the text.

Problem: Video Card is a Voodoo based chipset (4000/5000/5500 but could be others) and when game is minimized and restored with the ESCape key the display is corrupted.

Cause/Solution: Caused by faulty Voodoo drivers. One solution is to select Single Chip Rendering Option from the Voodoo Control Panel. This will fix the corruption but game performance may suffer slightly. A

workaround is to save the game while the graphics are corrupted, exit the game and then re-load. The corruption will be cleared.

Problem: Video Card is a Nvidia based one (Geforce, Geforce II, TNT 2 etc..) and in-game text is blurry or flickering.

Cause/Solution: This issue appears in various Nvidia reference drivers including the 12.xx based Detonator 3 drivers. Nvidia has recently released a new set of drivers which are version 29.42 (or higher).

Problem: Video Card uses the Kryo II Chipset (Hercules Prophet 4500) and text and graphics in-game are blurry or corrupted.

Cause/Solution: A combination of the latest version of DirectX (8.1) from Microsoft and the latest Kryo II drivers (9.015 or higher) will resolve all corruption displayed.

You can download the DirectX 8.1 version from this site:

<http://www.microsoft.com/directx/homeuser/downloads/default.asp>

and the latest Kryo drivers directly from Hercules at this location:

<http://www.hercules.com>

You may want to also upgrade the video card BIOS and those files are also available at the site above.

If the above does not solve your problem please post a message to the Tech Support Forum and we can provide you with info to make a manual registry change that should resolve the corrupted text.

Problem: When mouse is moved across the screen it leaves a trail of corrupted graphics. Cursor itself may also appear as a white block.

Cause/Solution: That is usually caused by running with Custom Mouse cursors or having a Windows Theme Packs installed. Make sure that you are only using the Standard Windows Default Mouse cursor and disable or uninstall any custom mouse animations and effects that may have been loaded with a Theme pack. You may also want to upgrade your mouse drivers as applicable. Check with the manufacturers website for updated mouse drivers.

TCP/IP Troubleshooting

Firewalls and Proxies - If either player is behind a firewall (hacker protection) or is using a proxy system, you might need to reconfigure your system. In order to play a network game, Combat Mission requires that TCP port 7023 be open for all outgoing and incoming transmissions. Please configure your firewall and proxies accordingly. Users of the software packages Black Ice Defender and Zone Alarm may have to disable the software completely before a successful connection can be made. It is possible that some users of Black Ice Defender might have to do a full uninstall of the package in order for CM to be able to work correctly for TCP/IP play

Cable/DSL Router Configuration - If you use a home broadband router like the LinkSys Cable/DSL 4 port Router and wish to host games you will need to add TCP port 7023 to the routers forwarding table. You then need to match port 7023 to the internal IP address of the computer that you want to host the game with, then use the routers control panel (usually accessed via your browser) to get the external IP address given out by your ISP. Give this external IP address to your opponent and connection should work with you as Host.

Internet Connection Sharing - Many people use ICS on their home LANs to access a broadband or modem connection to the Internet across multiple computer systems. Currently a computer that is connected to the Internet via an ICS connection can not Host a Combat Mission game out to the Internet. They can however host locally to systems that are connected on the same home LAN. They can also still attach to a hosted game normally on the Internet or the home LAN. This limitation on hosting affects systems that gain their access to the Internet SOLELY through an ICS connection.

Problem: I am on Windows XP and I can't seem to host a game. I can connect to game though.

Solution 1: Windows XP comes with its own built in Firewall which may need to be modified or disabled in order to host games. First check your network properties by going into the Control Panel>Network Connections. Find the network adaptor that is used to establish your connection to the internet. Right click on the Network Adaptor and select "Properties". Click the "Advanced" tab. If there is a checkmark in the box labeled "Protect my computer and network by limiting or preventing access to this computer from the Internet", you have XP's built in Firewall and will need to configure it to allow you

to host CMBO games. If it is not checked, then see Solution 2 below. In order to enable the firewall to allow you to host a CMBO game you will need to click the "Settings" button from the "Properties>Advanced" screen. Once you click the "Settings" button you will see a list of Services and three buttons at the bottom of the screen. Click the "Add" button. You will be presented with another screen with several blank fields. The first field is for you to describe the service you are adding. Just type something like "CMBO Network Games" in that field. The second field is for the name or IP address of the computer which needs to host this service. You can type 192.168.0.0 (default IP of your system) or type in the computers "name". If your computer is part of a home network where each system has its own configured IP address then type in whatever IP is assigned to your computer or alternatively you can use the computers "name". In the third field "External port number for this service" type in the number "7023" (without the quotes). In the fourth field, "Internal port number for this service" type in the number "7023" (without the quotes). Make sure the button "TCP" is selected. Click the OK button 3 times to save the changes and exit. You should now be able to host games.

Solution 2: If your Windows XP is connected to the internet through a computer running Internet Connection Sharing you can not host a game but you can still join a game hosted by someone else.

Loading a PBEM file does not work

If one player can't load a file it is most likely because of a transmission error due to an incompatible email format. It is very important that both players use the same, compatible method for sending PBEM files to each other. Macintosh users playing against Windows users should pay close attention to this! Generally it is best if "uuEncoding" is used without any form of compression. Since the files are text, software compression generally doesn't reduce transmission times that dramatically. If you should use compression make absolutely sure that it can be decoded by the player on the other end.

Reporting bugs

The armor slope of that Panther is off by 0.5 degrees! My life is ruined!

If you spot any inaccuracies, problems, bugs or simply any weird stuff in the game, please feel free to post it on the Combat Mission message

board at www.battlefront.com. We've taken great care to bring you a bug-free, historically accurate game, but since we're realists we are more than happy to "tweak" the game if there are demonstrable inaccuracies. These tweaks will then be released in official patches, available for download from Battlefront.com.

What do I do if I have a defective CD-ROM?

Please do NOT send the CD back before you contact sales@battlefront.com. They will tell you how to proceed. Battlefront.com does not accept any returns without prior authorization through the above email address.

I need Tech Support

If none of the above resolves your problem or if your specific issue it is not covered then please login to the Tech Support forum and search through the extensive list of posts as you may very well find info on it there. If you wish to post a message seeking assistance to the Tech Support forum please be sure to include as much information about the problem AND you system as you can so we can assist you quickly and efficiently.

If this still doesn't work, you can also email support@battlefront.com with your question. Please include a detailed description of the problem as well as your hardware configuration in your email.

APPENDIX D

Technical Support

Please write down all important configuration data of your computer and an exact description (when, how and where the error occurred; what exactly were you doing?), before contacting our technical support. This guarantees that we can help you in a fast and efficient way.

Please provide us with the following information:

Personal details:

- E-mail address
- If you contact us from outside the USA, please provide us with information on your location and the language version of the program you are using.

Computer details:

- Computer make and model
- Windows version
- Speed and manufacturer of the processor
- Speed and manufacturer of the CD ROM drive
- Total system RAM
- Video card make and model
- Sound card make and model
- Mouse and driver information as well as information on any further peripherals (e.g. joysticks)

In order to get this information, please go to "Run" in your Windows-start-menu and type "dxdiag" in the command line, before confirming it by pressing the Enter-key. Now the DirectX diagnostic program will start. It mainly shows all the relevant driver files of your system components. In order to receive a text file of this information, simply click the button "Save All Information". You can then place a text file with all the relevant data on your hard drive in order to send it via e-mail or keep it for future reference.

Contacts:

- 24 hours via e-mail at: support@battlefront

APPENDIX E

A Note About Realism

There has never been, or will ever be, a wargame that is a 100% accurate representation of 100% of the elements that contribute to warfare 100% of the time. Since no wargame will ever model all aspects of warfare perfectly, then CM by definition must have some elements that have been approximated or omitted in some way. To claim otherwise would be a lie, so we make no such case to you the wargamer. Having said that, we feel quite confident that it is no exaggeration to say that Combat Mission is by far the most realistic wargame ever made for non-military consumption.

More often than not design decisions that depart from 100% accuracy were made, consciously, to work within the constraints of hardware limitations. However, it is our conviction that none of the approximations found in CM fundamentally affect the overall accuracy of its simulation of squad level warfare. The most important aspects associated with CM's level of warfare are done to the highest standards and designed to work in harmony with each other.

As designers of Combat Mission we feel no shame that CM is less than 100% totally realistic since that is an impossible goal to obtain. On the contrary, we are proud to have pushed the bar of realism higher than ever before, while making a game that is also immersive and fun to play.

Still, we constantly strive to make CM as realistic as possible, given the constraints of current hardware and feasible development schedules. We won't rest on our laurels, now that Combat Mission: Beyond Overlord is complete. We intend to expand the design and continue to advance the state of the art in tactical wargaming. That is a promise.

Sincerely,

Charles Moylan
Stephen Grammont

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