

REFERENCE GUIDE IBM-TANDY

SECRET WEAPONS OF THE LUFTWAFFE



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This guide gives you instructions on starting up and flying *Secret Weapons of the Luftwaffe* on an IBM or Tandy computer. It describes how to:

- load and play *Secret Weapons of the Luftwaffe* from floppy disks
- install the simulation on a hard disk drive
- make use of any expanded memory your computer may have
- use the code wheel
- fly a training mission right away (*Quick Start*)
- save important records on a floppy disk if you're not using a hard drive
- create custom missions

For your convenience, you'll also find a complete list of keyboard controls that you'll use to command all aircraft and weaponry.

The READ.ME file

Important last-minute changes may have been made to the simulation. You'll find these changes described in the READ.ME file. To read it:

1. Insert the disk labeled "Disk 1" in drive A or B.
2. Type **type a:read.me** (**type b:read.me** if you are running the program from drive B) and press **RETURN**.

Game Controllers

You can use a mouse, a joystick, or the keyboard for flying *Secret Weapons of the Luftwaffe*.

LOADING INSTRUCTIONS

Running the Simulation from Floppy Disks

NOTE: Installing the simulation on a hard drive will greatly speed up loading and running times. If you have a hard drive, you should refer to the section below entitled *Installing the Simulation on a Hard Drive*.

To install *Secret Weapons of the Luftwaffe* onto floppy disks, first boot your machine. Then:

1. Make working copies of the original

disks by following the instructions in your DOS manual. DO NOT write protect your working copy of "Disk 1."

2. Insert your copy of "Disk 1" in drive A or B.
3. At the A> or B> prompt, type **install** and press **RETURN**.
4. Select option #2 from the Installation Menu to configure *Secret Weapons of the Luftwaffe* to run on your computer system.

Starting Up from Floppy Disks

To start the simulation once you've configured your working copies of the original disks:

1. Start at the A> or B> prompt, and insert your copy of "Disk 1" in drive A or B.
2. Type **sw** and press **RETURN**.

Installing the Simulation on a Hard Drive

To install *Secret Weapons of the Luftwaffe* on a hard drive, first boot your machine. Then:

1. Insert "Disk 1" in drive A or B.
2. Type **a:** then press **RETURN**. Your computer will respond with the prompt "A>". (If you are running the program from drive B, type **b:** and press **RETURN**. Your computer will respond with the prompt "B>".)
3. Type **install** and press **RETURN**.
4. Follow the on-screen instructions to install and configure *Secret Weapons of the Luftwaffe* to run on your computer system.

NOTE: You can reconfigure *Secret Weapons of the Luftwaffe* at any time by running the Installation Program again. Select option 2 from Installation Menu to make the necessary changes. Your choices will be saved automatically when you exit the Installation Program.

Starting Up from a Hard Drive

To start the simulation once you've installed it on your hard drive:

1. Type the letter of your hard drive prompt, a colon, and press **RETURN**.
2. From your hard drive prompt, type **cd swotl** and press **RETURN**.
3. Type **sw** and press **RETURN**.

Secret Weapons of the Luftwaffe requires a substantial amount of memory to operate. If you are experiencing problems getting the program to run, or are receiving messages which indicate insufficient available memory, we suggest you try starting up your system with a DOS boot disk. Follow these instructions for creating a DOS boot disk.

1. Type **C:** and press **RETURN**.
2. Insert a blank disk in drive A.
3. Type **Format A:/s** and press **RETURN**.

Once the disk is formatted, you will be asked if you wish

"I have... serious doubts... about whether the Americans will ever achieve their objective.... Although it is quite easy to pick off small targets by day when you are not seriously opposed, it is an entirely different matter when you are being harassed all the time by fighters and flak."

Air Chief Marshal Sir Charles Portal, in 1942

"It is perfectly evident now that the Germans admit that our daylight bombing against their industry is the principal threat, and they are marshaling their strongest and best defenses to cope with it. We may as well frankly admit that it is going to be a bloody battle."

**U.S. Army Air Force Brigadier General
Ira Eaker, June 29, 1943**

to format another disk. Press **N** and **RETURN** to continue without formatting another DOS boot disk.

At the volume label prompt, type **SWOTLBOOT** and press **RETURN**.

You can restart your computer using this DOS boot disk by inserting the disk into your drive and restarting your machine. This disk starts your computer using as little memory as possible, freeing up more RAM to run the program.

Expanded Memory

If your computer has expanded memory, the simulation will automatically use it. The software that comes with the expanded memory must conform to the Expanded Memory Specification (EMS) 3.2, and a driver must be installed according to the instructions that came with the expanded memory card.

With expanded memory, you'll have faster access to cockpit views, along with more graphic detail. The more available expanded memory, the better the simulation will run. 560K of expanded memory is highly recommended, as the program won't have to search the disk for the views or graphics. If you've loaded any memory-resident programs or allocated memory to disk caches, you may be able to free up additional memory by disabling them.

Expanded memory should not be confused with extended memory. If you're running the simulation on a 386 computer, any extended memory can be converted to expand-

Rubble strewn about inside the cathedral at Cologne. This historic building survived the RAF's famous 1,000-plane raid in 1942, largely, joked RAF airmen, because the bombardiers had used it as an aiming point.



ed memory with a commercially available memory manager program. If you're using a 286, extended memory cannot be converted to expanded memory.

USING THE CODE WHEEL

Inside the box, you'll find a wheel with aircraft silhouettes on the inside, plus "nose art" illustrations around the perimeter. Nearly all of these illustrations graced the noses of various U.S. bombers and fighters during World War II.

After you've started up *Secret Weapons of the Luftwaffe*, you'll see the title sequence. Following this, a screen will appear with a nose art illustration, plus an aircraft silhouette. To use the code wheel:

1. Line up the **red pointer** on the wheel so that it points to the nose art illustration that matches the one displayed on the screen.
2. Find the aircraft silhouette on the wheel that matches the one displayed on the screen.
3. Type the name that appears inside the silhouette on the wheel, then press **RETURN**. If you've typed the correct name, the U.S./German Side selection screen will appear.

QUICK START

If you'd like to take *Secret Weapons of the Luftwaffe* on a quick introductory flight:

1. Start up the simulation by following the *Loading Instructions* above.
2. Select the U.S. side. The Main Menu will appear.
3. Select **FLIGHT SCHOOL** from the Main Menu by clicking on it. A U.S. Aircraft Selection menu will appear.
4. Click on **P-47**. A P-47 Training Flights menu will appear.
5. Click on the first menu selection from the Training Flights menu. You'll now be sent to Flight Briefing, which features a large map of Western Europe, along with a set of commands at the bottom of the screen.
6. Click on **START**.

You'll now find yourself flying a P-47 Thunderbolt in the treacherous skies over Germany. Your fighter won't ever run out of fuel or ammunition, and it can't be damaged. Although there are several Luftwaffe fighters flying around, they won't attack you. To fulfill the objective of your mission, shoot down as many fighters as you can. For more information about piloting a fighter and using its machine guns, see the *Mission Instructions: In-Flight* chapter of the manual.

If you need to temporarily stop the flight, press **Alt-P**. To end your mission, type **Q** at any time. You'll get a post-flight evaluation, and then return to the Main Menu. You may also leave the simulation at any time by pressing **ESC**.

"One of the great 'miracles' of the war was the fact that the long-range [Mustang] fighter escort did appear over Germany at just the saving moment."

U.S. Army Air Force General
Henry H. "Hap" Arnold

"A fighter pilot must possess an inner urge to do combat."

U.S. Army Air Force Colonel
Hubert Zemke

KEYBOARD REFERENCE

The following keys control the aircraft, view modes, and weaponry in *Secret Weapons of the Luftwaffe*. For a more detailed discussion of these controls, see the *Mission Instructions: In-Flight* chapter of the manual.

Simulation Controls

Keys	Function
Alt P	Pauses flight; press any key to continue
Alt S	Turns all sounds off and on
Alt E	Turns only the engine sound off and on
Alt V	Displays version number of simulation
Alt G	Changes amount of ground detail, to smooth out your flight if simulation is running slowly
Alt T	Turns accelerated time mode on; pressing repeatedly cycles through 2, 4, 8, and 16-times normal speed
Alt N	Turns accelerated time mode off
Alt X	Toggles between advanced and standard flight control modes
Alt C	Selects and calibrates joystick
Esc	Exits the program; returns you to your computer's operating system

Pilot View Controls

7 Left forward 10 o'clock	8 Forward 12 o'clock	9 Right forward 2 o'clock
4 Over left wing 9 o'clock	5 Straight up	6 Over right wing 3 o'clock
1 Over left shoulder 7 o'clock	2 Rearview mirror 6 o'clock	3 Over right shoulder 5 o'clock
0 Toggles you between "wing-level" view and 45-degree "high" angle view		
S Scan view (to look completely around without altering your flight path)		

Maneuvering Controls

NOTE: you can also use the arrow keys on your keyboard to maneuver your plane.

Controller Direction	Function
Forward (away from you)	Pushes the nose of the plane down
Backward (toward you)	Pulls the nose of the plane up
Right	Banks the plane to the right
Left	Banks the plane to the left

Advanced flight mode only

Key	Function
/ or F5	Moves rudder hard left
F6	Moves rudder partially left
F7	Moves rudder partially right
* or F8	Moves rudder hard right
F9	Centers rudder in fighters and bombers
. (Period)	Centers rudder in fighters only

Airplane Controls and Equipment

Key	Function
L	Lowers and raises landing gear
F	Cycles through the three settings for your flaps: up, partially down, and down
A	Turns automatic pilot on and off (B-17 only)
T	Cycles through the different fuel tank settings on your aircraft (the status of the active tank will be displayed on the fuel gauges)
D	Releases drop tanks (fighters only)
O	Turns gun camera on and off
V	Sends you to Film Viewing Room to watch your gun camera movie
M	Displays the In-Flight Map
J	Lets you jump from your aircraft and parachute to safety
Q	Ends mission; sends you to post-flight evaluation



A Bf 109 damaged by gunfire from a P-47.

Engine Controls

- | Key | Function |
|-----|--|
| | Increases throttle for all engines (shift key not needed) |
| | Decreases throttle for all engines |
| | Decreases the throttle for Engine #1 |
| | Increases the throttle for Engine #1 |
| | Decreases the throttle for Engine #2 |
| | Increases the throttle for Engine #2 |
| | Decreases the throttle for Engine #3 |
| | Increases the throttle for Engine #3 |
| | Decreases the throttle for Engine #4 |
| | Increases the throttle for Engine #4 |
| | Displays set of instruments for either the two left-wing engines or the two right-wing engines (B-17 only) |

Weapons Controls

- | Key | Function |
|-----|--|
| | Lets you choose which controller buttons will fire machine guns or cannons |
| | Cycles through the different bombload configurations, and arms and selects those bombs which are to be dropped (on a B-17, this key allows you to toggle between dropping only one bomb at a time and automatically dropping them consecutively when you press RETURN) |
| | Cycles through the different rocket configurations, and arms and selects those rockets which are to be fired |
| | Turns automatic shoot mode on and off if you're manning a machine gun position on a bomber |

Controller Button	Function
Left controller button or SPACE BAR	Fires primary guns or cannons
Right controller button or CTRL key	Fires secondary guns or cannons
RETURN	Drops armed bombload and/or rockets

Crew Position Controls (B-17 Only)

- | Key | Function |
|-----|--|
| | Sends you to a gun position (see <i>Gunner Position Controls</i> below) |
| | (Period) Switches you between pilot position and last gun position manned |
| | Sends you to bombardier position |
| | Sends you to pilot position |

Gunner Position Controls (B-17 Only)

- | | | |
|--------------------|----------------------------|--|
| | | |
| Left cheek gun | Chin turret or nose gunner | Right cheek gun |
| | | |
| Left waist gunner | Top turret gunner | Right waist gunner |
| | | |
| | Tail turret or tail gunner | |
| | | |
| Ball turret gunner | | Toggles between pilot and last gun position manned |

- | Key | Function |
|-----|---|
| | Switches autofire mode in machine gun position on and off |

Bombardier Controls (B-17 Only)

- | | |
|--|---|
| | |
| (up arrow) | Increases magnification of bombsight |
| Swivels the bombsight sighting mechanism up | |
| | |
| Repositions the sighting crosshairs of the bombsight nearly directly below your bomber | Resets magnification of bombsight to 1x |
| | |
| (down arrow) | Decreases magnification of bombsight |
| Swivels the bombsight sighting mechanism down | |

- | Key | Function |
|-----|---|
| | Locks on the target, and begins to count down the number of seconds until your bombload should be dropped to hit the target |
| | Toggles between dropping only one bomb at a time and automatically dropping them consecutively |

RETURN Drops bombload

MISSION INSTRUCTIONS: PRE-FLIGHT

LOADING INSTRUCTIONS

Game Controllers (Mouse/Joystick/Keyboard)

Your mouse, joystick, or keyboard cursor (arrow) keys will be referred to as the *controller* in this manual. *Controller buttons* will refer to the buttons on the mouse or joystick, as well as several keys on the keyboard.

To find out which controllers you can use with your computer, see your Reference Card.

If your computer doesn't support a mouse or a joystick, you can use the keyboard to control all of the game functions. However, flying an aircraft is easier and more enjoyable with a joystick or mouse. The joystick allows you to pilot the U.S. and German planes much the way you would in actual flight. The mouse gives you very precise control, which is helpful for positioning a fighter to attack and for aiming your guns.

Using the Controller to Select from Menus and Directories

After you've loaded *Secret Weapons of the Luftwaffe*, you'll need to make selections from several menus, often by choosing icons from those screens. You'll also need to make selections from a number of directories consisting of long lists of names, not all of which are displayed at once.

Whenever you're at a menu or screen that has a list of choices or icons, look for a floating arrow. Use your controller to move the arrow over the desired choice or icon, and then click your controller button. This procedure will be referred to as "clicking on" in the manual.

To select an item from a directory, click on its name. Sometimes, the list of names will be longer than what is displayed. To look down all the names in the directory, move the floating arrow over the down arrow icon at the bottom of the vertical bar that is located on the lefthand side of the list, and press and hold the controller button. To look back up the list, pass the floating arrow over the up arrow icon, and press and hold the controller button. There is also a small slider box inside the vertical bar, and you can use it to scan the directory: Position the floating arrow over the box, press and hold your controller button, and move the controller up or down. Release the controller button when

Preceding page: With its massive industrial strength, the United States turned out tens of thousands of heavy bombers during World War II. Courtesy of the United States Air Force

you're at the desired location in the directory. You can also click on the space in the bar above or below the box to move the directory list up and down.

This procedure for clicking on the arrow icons will be used on many screens, including the Flight Briefing Map and the In-Flight Map, both of which have a horizontal as well as a vertical bar.

Choosing Sides

After you start up the game, you'll go to a menu which will allow you to choose between flying as an American and flying as a German. Make your choice by clicking on either "United States Eighth Air Force" or "German Luftwaffe." This decision is critical, since it restricts all of your selections and options to the side you've chosen.

If you choose the U.S. side, your missions will largely involve strategic daylight bombing of various ground targets in western Europe, and providing fighter escort for these bombing raids. Other missions will involve trying to destroy Luftwaffe fighters in air-to-air combat, as well as utilizing fighter-bombers in the ground attack role.

As an American, you'll be flying for the U.S. Army Air Force. This was a branch of the U.S. Army at the time of World War II, and was divided into separate *air forces*, which commanded certain geographic areas. The Eighth Air Force was responsible for air operations against targets in western Europe from bases in England. (The chart below

"Do not needlessly endanger your lives until I give you the signal."

General Dwight D. Eisenhower



Luftwaffe crew prepares a Bf 109G for the day's mission.

details the organization of the Eighth Air Force, and how it compared to the Luftwaffe.)

If you choose the German side, your missions will largely involve defending German-occupied western Europe from American bomber attacks, and preventing these bombers from pulverizing key German factories, airfields, and other installations. As a fighter pilot you'll be trying to destroy the U.S. bombers, along with any fighter escort or fighter-bombers, in air-to-air combat.

The German Luftwaffe was organized into self-contained *Luftflotten*, or "air fleets," each of which covered the air operations for a given geographic area. The following chart shows how aircraft of the Luftwaffe and its *Luftflotten* were organized, as compared to the way the U.S. Army Air Force organized its aircraft:

U.S.A.A.F.	Number of Aircraft	LUFTWAFFE	Number of Aircraft
Air Force	1,000-3,000	Luftflotte	1,000
Wing	140-180	Geschwader	80-120
Group	48	Gruppe	36
Squadron	16	Staffel	12
Flight	4	Schwarm	4
Element	2	Rotte	2

Whether you're fighting on the U.S. or on the German side, these terms will be used frequently to describe the units you're flying with.

MAIN MENU

After you've chosen which side you want to fly on, you'll go to the Main Menu. There you'll see a large list of choices you can make:

FLIGHT SCHOOL Lets you learn and practice your aerial skills, including flying, takeoffs, landings, and firing weapons. The results of these practice missions will not count on any Combat Records.

HISTORICAL MISSIONS Allows you to fly a historically based mission, the results of which will count on your Combat Record.

CUSTOM MISSIONS Lets you create and fly customized missions. (See your Reference Card for information on how to use the Mission Builder.)

TOURS OF DUTY Challenges you to survive a given number of missions under the same circumstances that World War II pilots were required to serve.

CAMPAIGN BATTLES Allows you to command various large-scale campaign

battles on either the U.S. or the German side, so that you may alter the historical outcome of the air war over Europe.

COMBAT RECORDS Lets you look over the records of the pilots and crews who have flown on your missions.

FILM VIEWING ROOM From here you can watch the combat action you've recorded with the gun camera.

SWITCHING SIDES Allows you to switch between the German side and the U.S. side.

EXIT FROM PROGRAM Lets you leave the simulation and return to your computer's operating system.

FLIGHT SCHOOL

Going to Flight School is the best way to learn and practice the skills that will make you more successful in air combat. The mistakes you make in Flight School won't count on any Combat Records, so use it to practice aerial maneuvers and sharpen flying skills.

When you choose FLIGHT SCHOOL from the Main Menu, you'll be presented with an Aircraft Selection menu. There you'll see a list of either U.S. or German aircraft that you can choose from. Click on the name of the aircraft you wish to fly.

Next, you'll be shown a Flight School Selection menu. This is a list of training flights to help you master particular air combat skills. After you've selected a training flight, you'll go to Flight Briefing.

HISTORICAL MISSIONS

These missions duplicate historically authentic flights that took place at different times during the air war over Europe (see the *Historical Overview* chapter for more information). As an American pilot or crew, you'll be flying B-17s, P-47s, and P-51s in an attempt to seize control of the sky from the Luftwaffe. As a German pilot, you'll be flying the "secret weapons," including the Me 262 and the Me 163 Komet, against large formations of U.S. aircraft, as well as flying the formidable piston-engined Bf 109 and FW 190. The Go 229 is the only aircraft in the simulation that did not see any combat action during the war, although its prototypes were flight-tested in late 1944 and 1945. We've created several speculative missions for this innovative "flying wing," so that you can experience how it might have performed in combat.

To fly any of these missions, you can select from a roster of pilots you've created for the side you're flying on. Each of your pilots and crew will have a Combat Record, which keeps track of their successes, failures, medals, and promotions.

Click on HISTORICAL MISSIONS to select this type of mission. You'll then move to an Aircraft Selection menu, with a list of either German or U.S. aircraft. Click on the

"The [Bf] 109G and the P-51D were fairly evenly matched in level maneuvering flight, but the '51 could climb and dive faster, although the 109 had an advantage in initial acceleration in a dive—which was often sufficient to allow the 109 to get away."

U.S. Army Air Force Colonel
Jesse Thompson

The Allied bombing offensive so infuriated German civilians that U.S. airmen who were forced to bail out of their stricken aircraft were sometimes beaten and killed. Even Luftwaffe pilots who bailed out over their own country would be rudely treated if they were mistaken for Americans. On one occasion, a German fighter pilot was hanging from a tree in his parachute when a civilian approached him with a shotgun. "Help me down, you fool," the pilot yelled. But the civilian stood his ground, raised his shotgun, and replied, "So! The pig even speaks German!"

name of the plane you want to fly. This will send you to a Historical Mission Selection menu, where you can choose from several missions appropriate for the type of aircraft you've selected. These choices are ranked in increasing order of difficulty, with the first choices being the easiest. To select a mission, click on its name.

If you're flying on the U.S. side, the terms listed below, commonly used during the war, will be used to describe the general types of missions you'll be flying:

Circus A mission in which a small group of up to six bombers was used to lure the Luftwaffe into the air, where the heavy U.S. fighter protection could pounce on them.



The P-47C Thunderbolts of the 56th Fighter Group, the "Wolfpack."

Rodeo A fighter sweep without bombers. The U.S. fighters would simply fly over enemy territory looking for Luftwaffe fighters to engage. Often they were ignored by the Luftwaffe, since they posed no threat to their fighters, until the U.S. fighters began strafing airfields and other targets.

Ramrod A bombing mission in which U.S. bombers, with heavy fighter escort, would try to knock out a specific ground target. The Germans, not knowing the difference between a Circus and a Ramrod, would usually attack the bombers in either case.

Sweep Differed from a Rodeo in that the U.S. fighters would be flying ahead of a bomber formation, where they could "sweep" the sky of Luftwaffe fighters before a target was bombed.

After you've selected a mission, you'll go to the Flight Briefing Map. Or, to leave the Historical Mission Selection menu altogether, click on EXIT.

CUSTOM MISSIONS

This is where you can create and fly in those missions that you've built yourself with the Mission Builder. Choosing this brings up three menu choices:

CREATE OR CHANGE CUSTOM MISSION FLY CUSTOM MISSION EXIT

CREATE OR CHANGE CUSTOM MISSION Sends you to the Mission Builder, where you can build or modify a mission (see your Reference Card for more information about using the Mission Builder to create your own missions).

FLY CUSTOM MISSION Displays a directory of all the missions you've previously created with the Mission Builder, along with a menu that contains the following choices:

FLY MISSION Use to select and fly a mission you've already created. To do this, click on a selection in the directory, then click on this button.

RETRY Use to search a new floppy disk for custom missions if you aren't using a hard drive.

EXIT Sends you to the main Custom Missions menu.

EXIT Returns you to the Main Menu.

Click on any of these menu items to make your selection. Once you've chosen a custom mission from the directory, you'll go to Flight Briefing.

TOUR OF DUTY

In World War II, pilots and crew had to fly a set number of missions before they could be taken off of active combat duty. This was known as a **tour of duty**. The number of missions an airman had to fly to complete a tour of duty varied, depending on the side he flew on, the circumstances of the war, and the type of aircraft he flew. When the U.S. first began bombing western Europe, a B-17 crew had to fly twenty-five bombing missions to complete their tour of duty. The crew of the *Memphis Belle*, a B-17F, became the first Eighth Air Force bombing crew to reach this mark, in June 1943. Later, the minimum number of missions in a tour of duty for bomber crews was raised to thirty, then to thirty-five. U.S. fighter pilots generally had to fly a hundred missions to complete their tour of duty, since the majority of their missions did not involve contact with the enemy. On the other hand, Luftwaffe pilots did not have a fixed number of missions to fly during their careers; however, they were sometimes taken off active duty for outstanding air

"I knew some of them would that day die. Still, I was certain I would survive...., but only if I followed my private ritual. Only if I went out and found a poppy to put in my buttonhole. I had worn poppies before. I am a reasonable man, but in matters of life and death, I do not exclude talismans.

U.S. Army Air Force navigator
Elmer Bendiner

"Our one hope is that the other side has an air force General Staff as scatterbrained as ours."

German Minister of Armaments
Albert Speer, in 1944

combat achievements, such as downing large numbers of enemy aircraft.

With the Tour of Duty option, your pilot or crew can fly a series of connected missions that make up a tour of duty. You'll be able to select the general type of mission for your pilot or crew to fly, but during their tour of duty the individual missions will vary tremendously, and will have a sense of the unexpected as random factors come into play. Just as in World War II, if your pilot or crew is killed in action or captured, their tour of duty will not be completed.

Starting, Continuing, and Viewing Records of a Tour of Duty

When you select TOUR OF DUTY from the Main Menu, a Tour of Duty menu will appear, with the following choices listed at the center of the screen:

START NEW TOUR OF DUTY
CONTINUE TOUR OF DUTY
VIEW TOUR OF DUTY RECORD
EXIT

START NEW TOUR OF DUTY Displays a series of menus that allow you to decide what kind of Tour of Duty you'll serve. The first asks you to choose the combat unit you're going to be a member of. This will determine the type of airplane you'll be flying, and the kinds of missions you'll be taking part in. After you've selected your combat unit, you'll see a directory of available pilots and crews, plus another menu with four choices:

SELECT PILOT/CREW FOR TOD
CREATE PILOT/CREW FOR TOD
RETRY
EXIT

SELECT PILOT/CREW FOR TOD Allows you to select an existing pilot or crew to fly a Tour of Duty. First, click on the name of the pilot or crew from the directory, then click on this button.

CREATE PILOT/CREW FOR TOD Click on this to bring up a cursor. Type in the name of a pilot or crew you want to create to fly a Tour of Duty, then press RETURN.

RETRY Use to search a new floppy disk for Tours of Duty if you aren't using a hard drive.

EXIT Returns you to the main Tour of Duty menu.

Once you've chosen a pilot or crew to fly a Tour of Duty, you'll be asked to select the time period that you want them to fly in, along with the mission emphasis. These choices are listed in order of difficulty.

CONTINUE TOUR OF DUTY Brings up a directory of the names of pilots and crew currently serving tours of duty, plus three menu choices:

CONTINUE TOD
RETRY
EXIT

CONTINUE TOD Use to select a Tour of Duty pilot or crew that you want to continue flying with. First, click on the name of a pilot or crew from the directory, then click on this button.

RETRY Use to search a new floppy disk for pilots/crews serving Tours of Duty if you aren't using a hard drive.

EXIT Returns you to the main Tour of Duty menu.

VIEW TOUR OF DUTY RECORD Brings up a list of pilots or crews who have served or are currently serving a Tour of Duty, so you can examine how the Tours are progressing. You'll also see three menu choices:

VIEW TOD
RETRY
EXIT

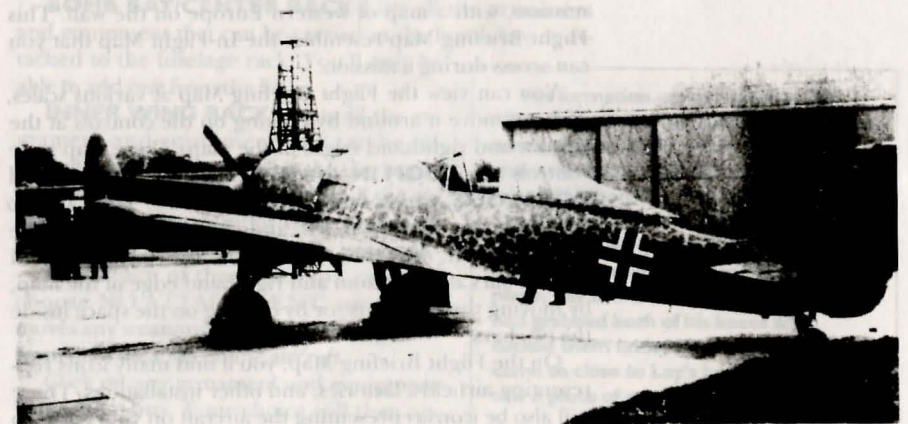
VIEW TOD Use to view the progress of a Tour of Duty. First, click on the name of a Tour of Duty pilot or crew, then click on this button.

RETRY Use to search a new floppy disk for Tours of Duty if you aren't using a hard drive.

EXIT Returns you to the main Tour of Duty menu.

EXIT Sends you to the Main Menu.

The FW 190, equally effective against U.S. bombers and fighters.



“On the days you flew, they’d let you go back through the kitchen, and you could tell the cook how you wanted your eggs fixed for breakfast. It was a ‘last meal’ kind of thing.”

**U.S. Army Air Force Pilot
Officer Robert Davila**

Tour of Duty Length

If you’re flying on the U.S. side, you can choose between flying as a fighter pilot, as a bomber pilot, or as a bomber crew. Your Tour of Duty as a fighter pilot will be from twenty-five to thirty-five combat missions, and you’ll engage the enemy in all of these missions. This is roughly equivalent to a historical tour of duty, since fighter pilots, who had to fly a hundred missions on a tour of duty, usually only engaged the enemy in about a third of their missions. As a bomber pilot or crew, your Tour of Duty will be either twenty-five, thirty, or thirty-five missions, depending on the time of war and the level of difficulty you select.

If you’re flying on the German side, your Tour of Duty will be longer and more difficult, and you’ll need to complete at least fifty missions or shoot down at least two hundred aircraft.

Each of your pilots or crew on either side can fly a maximum of five Tours of Duty. However, a pilot or crew can only fly one Tour of Duty at a time. A Combat Record will be kept for each pilot or crew that takes part in a Tour of Duty. Flying a Tour of Duty accelerates the process by which a pilot or crew earns medals and promotions, and will help them to move to the top ten list faster.

Before flying each mission in a Tour of Duty, you’ll go to Flight Briefing.

FLIGHT BRIEFING

After you’ve selected a training flight from Flight School, a Historical Mission, a Custom Mission, or a mission in a Tour of Duty, you’ll go to Flight Briefing. This is where you’ll learn about your mission in greater detail and make any last-minute modifications to it. You’ll also be able to select pilots or crews to fly in your mission.

The Flight Briefing screen depicts a typical flight briefing scene on either a U.S. or a German airbase before a mission, with a map of western Europe on the wall. This Flight Briefing Map resembles the In-Flight Map that you can access during a mission.

You can view the Flight Briefing Map at various scales, and can move it around by clicking on the controls at the bottom and righthand edges of the map. These map scale controls are: **ZOOM IN**, which enlarges the map size, and **ZOOM OUT**, which reduces the map size. You can also move the map up, down, left, and right by clicking on the up, down, left, or right arrows inside the horizontal and vertical bars at the bottom and righthand edge of the map, by moving the slider box, or by clicking on the space inside the two bars.

On the Flight Briefing Map, you’ll find many icons representing airfields, factories, and other installations. There will also be icons representing the aircraft on your side. To

get information about any of the installations or aircraft, click on an icon. A window will open over the map and display the relevant facts.

The course you’ll fly during your mission will also be indicated on the map. If you’re flying on the U.S. side, your bombing target will be highlighted.

On the bottom of the screen you’ll find a horizontal menu, with these choices listed from left to right:

MAP Brings the Flight Briefing Map back after you’ve made another choice from this menu.

BRIEFING Brings up a detailed text description of your mission which will replace the Flight Briefing Map. This description may be larger than what is displayed in the window, so click on the up or down arrows, move the slider box, or click on the space inside the vertical bar to scroll the text up and down.

WEAPONS Lets you modify the armament of your aircraft. (See the *Weapons Load Options* section below.)

ROSTER Lets you create pilots and crew, and assign them to fly in your mission. (See the *Flight Roster* section below.)

ABORT “Scrubs” your mission and sends you back to the Main Menu, where you can choose a different mission if you want.

START Lets you begin your mission.

Weapons Load Options

When you choose WEAPONS from the Flight Briefing Map screen, the map will be replaced by a display headed by the name of the aircraft you’re flying, along with a list of its standard armament. You’ll also see up to three lists that indicate the various locations at which specific weapons and equipment — including a variety of guns, cannons, bombs, rockets, and fuel tanks — can be attached to your aircraft. These locations include:

BOMB BAY/CENTER RACK Lists all the armament and equipment that can be carried in the bomb bay or attached to the fuselage rack. You’ll only be able to add one from the list.

INNER WING RACKS Lists all the armament and equipment that can be attached to the wing racks near the fuselage.

OUTER WING RACKS Lists all the armament and equipment that can be attached to the wing racks near the wing tips.

From each of these lists you can also choose **NO ATTACHMENT**, which removes any weapons or equipment you want from their location on the aircraft.

Click on any armament and equipment from these lists. Your choice will then ap-

His formation under attack by Me 109s, Colonel Beirne Lay noticed a bright metal object, which he recognized as the main exit door of a B-17, tumble past the wing of his bomber. Then, he saw a “black lump” fly through the bomber formation, nearly striking several propellers. When the lump got closer to his plane, Lay saw that it was a man, who had grabbed both of his knees and tucked them under his chin. The man came so close to Lay’s bomber that he saw a piece of paper fly out of his jacket.

“Aeronautics opened up to men a new field of action, the field of the air. In so doing, it of necessity created a new battlefield; for wherever two men meet, conflict is inevitable.”

Italian General Giulio Douhet

pear next to the headings for these three lists.

While it may be tempting to load up your aircraft with every type of gun, cannon, bomb, rocket, or fuel tank it can carry, keep in mind that the more items you add to your aircraft, the less maneuverable it will be in flight, which will affect its performance in combat.

Below the weapons load options are three choices you can make to modify your aircraft settings for these missions. If you change any of these settings, however, the results of your mission will not count in any Combat Record. (If you add armament and equipment from the weapons load options, the results of your mission will still count.) Whenever you select a mission to fly, the aircraft settings you'll see will reflect the values for that particular mission.

The aircraft settings you can alter are:

DAMAGE Use to toggle between STANDARD and UNLIMITED amounts of damage your aircraft can sustain in combat. In the STANDARD mode, your aircraft can be damaged and even shot down. In the UNLIMITED mode, your aircraft can't be damaged or shot down, and it can't even crash.

AMMO Use to toggle between STANDARD and UNLIMITED amounts of ammunition. In the STANDARD mode, your aircraft will carry the same number of machine gun rounds, cannon rounds, rockets, and bombs that World War II aircraft carried. In the UNLIMITED mode, you'll have an endless supply of ammunition.

FUEL Use to change between STANDARD and UNLIMITED fuel capacity. In the STANDARD mode, your plane will carry a finite supply of fuel, and use it up at the same rate as World War II aircraft. In the UNLIMITED mode, you'll never run out of fuel.

FLIGHT ROSTER

The ROSTER button below the Flight Briefing Map allows you to create pilots and crews, and assign them to fly in your missions. If you don't create or select a pilot or crew to fly your mission, you can still fly it, but the results won't be kept in any Combat Records and you won't earn any medals or promotions.

You can also create pilots and crews to fly in any other aircraft that are taking part in a mission. As you create a roster of pilots and crew, and as they gain mission experience, they will become more proficient in battle, and you can select these experienced personnel to help you achieve more successful mission results.

When you click on the ROSTER button, a Flight Roster appears in place of the map. On the right will be a list of either U.S. or German aircraft, under the heading AIRCRAFT FOR MISSION. The aircraft that you're going to fly will be highlighted. Next to each aircraft will be the name

of the pilot or crew assigned to it, or a blank if no assignment has been made. If you've flown a previous mission with a certain pilot or crew, they will be automatically reassigned to your aircraft if they have survived. This way, you won't have to create or select a new pilot every time you fly a new mission. If you're serving a Tour of Duty, your pilot or crew will be automatically scheduled to fly your aircraft. On the left will be a directory of all the pilots and crews you've already created, under the heading AVAILABLE PILOTS. This list will give their names and their status (whether they're alive, dead, captured, or retired). For U.S. pilots, the list will note if they are fighter or bomber pilots. If this list is long, click on the up or down arrow keys, move the slider box, or click on the space inside the vertical bar to scroll the list up or down.

Creating and Deleting Pilots and Crews

Below the Available Pilots menu, you'll see three menu choices which allow you to manage your roster:

CREATE Lets you create a new pilot or crew. When you click on this button, a text cursor will appear. Type in the name of a pilot or crew, then press RETURN. If you're on the U.S. side, you'll be asked if you want that person to be a fighter pilot or a bomber pilot.

DELETE Lets you remove a pilot or crew from the directory. To do this, first click on this button, then use the text cursor to type in the name of the pilot or crew you want removed from the list, and press RETURN.

RETRY Use to search a new floppy disk for pilots or crews if you aren't using a hard drive.

Assigning Pilots and Crews

To assign a pilot or crew to a particular plane, first click on their name from the directory of available pilots or crews. Then, click on the slot next to the name of the aircraft

The adaptable Bf 109G.



"When I saw Mustangs over Berlin, I knew the war was lost."

Reichsmarschall
Hermann Göring

that you want to assign that pilot or crew to fly. The pilot's or crew's name should appear next to the aircraft name. If you're flying on the U.S. side, you won't be able to assign a fighter pilot to fly a bomber, or assign a bomber pilot to fly a fighter.

To replace a pilot or crew with another pilot or crew, first click on the name of the new pilot or crew from the directory. Then, click on the name of the old pilot or crew, which will be next to the name of their assigned aircraft. This will remove their name. Clicking on a second time will put the new pilot or crew in that airplane. (Note: The pilot or crew serving a Tour of Duty cannot be replaced.)

To deactivate a pilot or crew, click on their name when it appears next to the name of their assigned aircraft.

How to Have More Successful Missions

Whenever you complete a mission, the Combat Records for all pilots and crews that fly in that mission will be updated. The more experience that each pilot or crew assigned to fly in your mission gains, the better they'll perform in future missions. When you select proven, experienced pilots or crews for your missions, they'll usually repeat their successes while flying with you. This will help you to achieve the goals of your missions more often, and earn more medals and promotions as a result.

To see the Flight Briefing Map again, click on the MAP button at the bottom of the screen.

"In the Reich and in the western theaters of the war the barrels of ten thousand anti-aircraft guns were pointed to the sky. The same guns could have well been employed in Russia against tanks and other ground targets."

German minister of armaments
Albert Speer

SAVING MISSION INFORMATION ON A FLOPPY DISK

If you're running the simulation from floppy disks, and want to save pilot and crew records, Custom Missions, Campaign Missions, Tours of Duty, combat film replays, and other important mission data, you must format a blank floppy disk before you start up the simulation (consult your DOS manual for information on formatting a floppy disk). To save this information, insert the floppy disk and click on **SAVE**.

If you've loaded the simulation on a hard drive, all mission information will automatically be saved in the SWOTL subdirectory.

CREATING CUSTOM MISSIONS WITH THE MISSION BUILDER

With the Mission Builder, you can open up a world of entirely new and unique air combat challenges. It lets you create your own missions and then save them to disk for yourself and others to fly. When you create a mission, you organize the forces of both the Eighth Air Force and the Luftwaffe into flight groups, and create a flight plan for them to follow. (This process is nearly identical to setting up a Campaign Mission.)

NOTE: Before you begin to build your mission, it's a good idea to plan it out on paper. The large Battle Map at the back of the manual is helpful for choosing targets to attack or defend.

The Mission Builder Map

To create a mission, select **CUSTOM MISSIONS** from the Main Menu. You'll then move to the Custom Mission menu, which displays three selections:

CREATE CUSTOM MISSION FLY CUSTOM MISSION EXIT

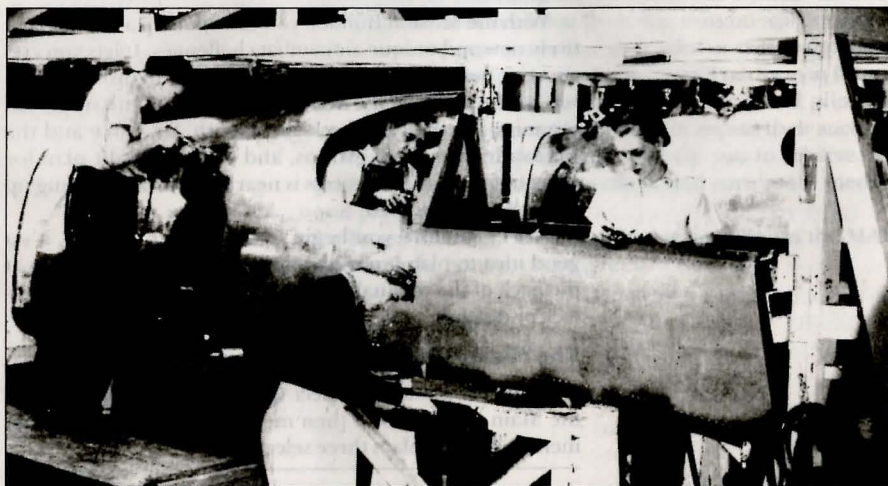
When you choose **CREATE CUSTOM MISSION**, you'll move to a screen with a map of Western Europe in the upper left-hand corner. A menu will appear over the map, and you'll be asked to choose a historical time period between August 1943 and October 1945. The disposition of U.S. and German forces will depend on which time period you choose.

The Mission Builder Map is nearly identical to the Campaign Map that you access during Campaign Missions. To move the map up, down, left, or right, click on the bars to the right and at the bottom of the map, or move the slider box inside the bars. Click on the map with the right controller button to center the map window around that point.

Click on the two zoom boxes to the right of the map to zoom in or zoom out of any section of the map.

Directly below the zoom boxes is the range circle button. Click on this button to display a series of concentric circles that indicate the range in miles from the center of the map. The number in the center of the range circle button indicates how many miles each circle represents from center. This number changes as the map is viewed at different zoom levels. To turn the range circles off, click on the button again.

Like the Campaign Map, the Mission Builder map will display icons representing the locations of ground installations, such as factories, refineries, railroad yards, and Luftwaffe airfields throughout western Europe, plus Eighth Air Force bases in England. If you click on any of these icons, a pop-up window will open, displaying information about



that installation. As you create flight groups and flight plans, they will be represented by icons that will appear on the map (see *Creating Flight Groups and Flight Plans* below).

Below the map, you'll see four buttons:

SAVE Lets you save the current mission that you're building

LOAD Lets you load a mission that you've already built and saved

NEW Cancels all the values for the mission you've been editing, so you can start creating a new mission

EXIT Returns to the Custom Missions menu

Creating Flight Groups and Flight Plans

Just as when you set up a Campaign Mission, you'll need to create one or more flight groups, which are a given number of aircraft that fly together as a unit. Each mission that

Women factory workers assembling a P-51B Mustang. While women made up a large percentage of the U.S. labor force during the war, German leaders deemed women unfit to work in wartime factories, and relied instead on slave laborers, which resulted in a poor quality of workmanship.

Stories about the B-17's legendary ability to withstand incredible battle damage and still return its crews to England abound. On one occasion, a Fortress copiloted by Lieutenant Robert Rosenthal was hit in the number one engine by flak over the Ruhr. The propeller ran wild, and the pilot, unsure of what to do, turned the plane over to Rosenthal. Suddenly, the propeller cut loose, first striking the number two engine's propeller, and then cutting off half the rudder and fin. With two engines out on the same side, little lateral control, and a fuel leak, the bomber fell out of its formation over Germany. The crew threw everything they could out of the B-17, and Rosenthal guided the bomber toward England, some three hundred miles away. Over the English Channel another engine went out, but the Fortress, flying on only one engine at 3,000 feet, still remained airborne. Finally it crossed over into England, and the crew spotted an emergency landing field. Twenty feet over the runway the last engine died, out of fuel. Nevertheless, Rosenthal gingerly glided the B-17 toward the field, where it made a wheels-down landing.

you build can have a maximum of ten flight groups. To create a flight group, click on an airfield icon on the map, then click on **CREATE FLIGHT GROUP**. This will display three new windows. The window on the right, titled **FLIGHT GROUP**, has a list of selections which let you determine the composition of the flight group that will depart from that airfield. These selections are:

PLANE TYPE Cycles through the types of aircraft that may make up this flight group. Each flight group must consist of one type of aircraft, and each mission can involve no more than four different plane types.

OF PLANES Lets you determine how many aircraft will be in this flight group. There must be at least one plane in a flight group before it can fly in your mission. (The number of planes available will be displayed in the chart at the upper right-hand corner of the screen next to the heading **PLANES AVAILABLE**, below which will be shown the number of planes you've assigned to the U.S.A.A.F. and the Luftwaffe.) The maximum number of planes in a flight group is six.

WAVES Cycles through the number of times a wave of aircraft may be vectored to the battle area to reinforce a flight group that has been destroyed in combat. Only intercepting enemy fighters can have multiple waves.

YOU IN FG Lets you determine whether or not you'll fly in this flight group, and choose whether to be a leader or a wingman. **NOTE:** Always remember to place yourself in one of the flight groups you create.

SKILL LEVEL Lets you determine how much experience this flight group will possess.

FORMATION Cycles through the different formations available for this flight group.

CAMOUFLAGE Lets you determine whether the aircraft in this flight group will fly in early-war or late-war camouflage patterns.

ORDERS Cycles through the different mission orders for this flight group. Luftwaffe fighters can intercept either U.S. bombers or fighters, or fly in a bomber escort role, a free-ranging role, or a fighter-bomber role. Eighth Air Force fighters can fly in a bomber escort role, a free-ranging role, or a fighter-bomber role. Eighth Air Force bombers can fly only bombing missions.

NOTE: Click the left controller button to cycle forward through the selections, and click the right controller button to cycle backward.

Once you've created a flight group, you'll need to place a series of navigational points on the Mission Builder Map for this group to follow. This is called a flight plan, and it is a course composed of a starting point (BEGIN), up to four rendezvous points (WAY POINTS 1-4), and an airfield to return to (LAND). During fighter sweeps, fighter patrols, and fighter escort, the flight group repeats the flight plan until it runs low on fuel and returns to base. In bombing missions, the flight group follows the flight plan only once.

To create a flight plan, use the window in the lower middle part of the screen that looks like this:

FLT PLAN	ETA	ALT	ATK
BEGIN			
WAY PT 1			
WAY PT 2			
WAY PT 3			
WAY PT 4			
LAND	DONE	DELETE	

To choose the starting point for a flight group's mission, click on **BEGIN**. This word will be highlighted, and the pointer will change to a crosshair (to change the crosshair

P-47 fighter-bombers of the 386th Fighter Group blasted this bridge on the Moselle.

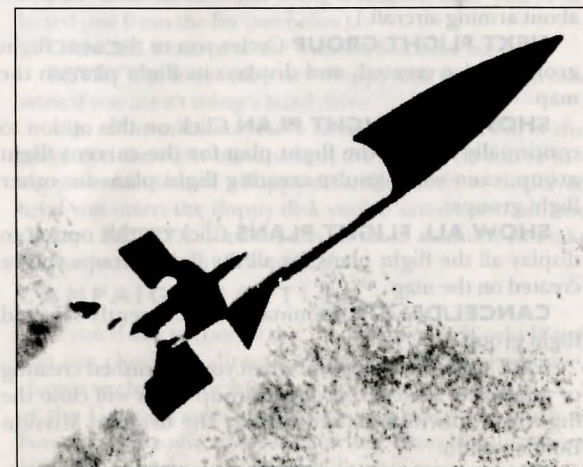


back to a pointer, click on the currently-highlighted Way Point, or click on **DONE**). The airfield icon will be encircled in red, to indicate the operational range of the plane type selected. Click on the location on the map at which you want the flight group to start its mission. A starting point icon will be placed on the Mission Builder Map. To change this starting point, click on a different location on the map.

NOTE: To center the map window around a Way Point icon, use the right controller button to click on that Way Point's name in the window at the bottom of the screen.

Next to FLT PLAN on the chart is a heading labeled ETA. Click on the number below this heading and to the right of BEGIN to set the time at which you want the flight group to begin. The player's flight group determines the start time for the mission; other flight groups can be set to start at the same time or at a later time. (The mission start time will also be displayed in the chart at the upper right-

A V-2 rocket in flight. Though far ahead of its time, this deadly missile was developed too late to turn the course of the war in favor of the Third Reich, and actually hindered Germany's overall war effort by using up valuable resources.



hand corner of the screen next to MONTH and YEAR.) Once you've set the start time, whenever you place a Way Point icon on the map, a number will appear under the ETA heading indicating the flight group's estimated time of arrival at that Way Point. These estimates are based on the cruise speed for each plane type.

The heading labeled ALT indicates the cruising altitude of this flight group, in feet. Click on the number below this heading and to the right of BEGIN to change the starting altitude.

To set the locations of up to four Way Points for the flight group, first click on **WAY PT 1**, then click on the desired location on the map. An icon will appear to show the location of that Way Point. Click on the number in the ALT column to the right of **WAY PT 1** to change the altitude of the flight

group as it reaches Way Point 1. If you want, place icons for Way Points 2, 3, and 4 on the map and set their altitudes. Finally, to assign the flight group to a landing area, click on **LAND**, and then click on the desired airfield.

If you're building a U.S. mission, the flight groups will automatically bomb or strafe a target if you place a Way Point icon on it, and the word **YES** will appear under **ATK** (attack) on the chart. Click on **YES** to call off the attack.

To remove one or more of the Way Points after you've created a flight plan, click on the Way Point you'd like to remove, then click on the **DELETE** button.

To choose weaponry for the aircraft in the flight groups and look over all the flight plans you've created, use the window in the lower left-hand corner of the screen:

SET WEAPONS Click on this option to set the armaments for all the aircraft in a flight group. (See *Weapons Load Options* in the *Flight Briefing* section of the *Mission Instructions: Pre-Flight* chapter of the manual for more information about arming aircraft.)

NEXT FLIGHT GROUP Cycles you to the next flight group you've created, and displays its flight plan on the map.

SHOW THIS FLIGHT PLAN Click on this option to continually display the flight plan for the current flight group, even while you're creating flight plans for other flight groups.

SHOW ALL FLIGHT PLANS Click on this option to display all the flight plans for all the flight groups you've created on the map.

CANCEL/DELETE Eliminates the currently selected flight group.

EXIT Click on this option when you've finished creating or modifying the current flight group. This will close the flight group windows and display the original Mission Builder menu.

Once you've set all the variables for the mission, including the flight groups, their flight plans, and the weaponry for all aircraft, click on the **SAVE** button below the Mission Builder Map. This will prompt you to enter a name for the mission. Type the name, then press **RETURN**. The name of the mission will then be displayed in the chart in the upper right-hand corner of the screen.

NOTE: You cannot save a mission if you have not put the player in a flight group, or if you use more than four different types of planes.

Writing a Text Description of Your Mission

If other players are going to be flying a mission you've created, you may want to write a description of that mission, including the mission objective, what kind of enemy opposition they'll encounter, and maybe even a helpful hint or

"Whenever we saw one of our bombers go down, it was very important to count how many parachutes would come out."

**U.S. Army Air Force Pilot
Officer Robert Davila**

two. To do this, use any word processing program of your choice to write a brief mission description, and then save it under the name of your mission, followed by a period, and the letters **TXT**. For example, if you have a mission titled **SWEEP**, save the mission description as **SWEEP.TXT**. This text will appear on the Flight Briefing Screen.

NOTE: The lines of text in your mission description should not exceed approximately 40 characters in length. The first line of text in your file will be highlighted and centered for use as a title.

Flying a Custom Mission

To fly a mission you've created and saved, go to the Custom Missions menu by clicking on **EXIT** from the Mission Builder Map, or by clicking on **CUSTOM MISSIONS** from the Main Menu. Then click on **FLY CUSTOM MISSION**. This will send you to a screen with the following selections:

FLY Click on to begin flying a mission after you've selected one from the list (see below).

CANCEL Returns to the Custom Missions menu.

RETRY Use to search a new floppy disk for custom missions if you aren't using a hard drive.

A list of the missions you've created and saved will be displayed on the right-hand side of the screen. (If you're saving your missions on a floppy disk, they won't be displayed until you insert the floppy disk you've saved them on, and click on **RETRY**.) Click on any of these missions to make your selection, then click on **FLY**.

CAMPAIGN BATTLES

If you'd like to control the "big picture" of World War II, you can choose to direct a Campaign Battle, and have a chance to change the historical outcome for either the U.S. or the German side. You'll fly a sequence of Eighth Air Force or Luftwaffe missions, starting from the summer of 1943. The outcome of your side's entire campaign rests to a large extent on what you accomplish, or fail to accomplish, in each mission you fly. Moreover, the gains and losses of each mission affect your ability to fly and direct future missions. For example, if you're playing the German side and you fail to defend German aircraft factories that are then destroyed by U.S. bombing, you may later find that you won't have enough aircraft left to mount an effective defense. After you've finished each mission, a scoring screen will let you know how your side is doing in the campaign.

The conditions for winning a campaign will vary, depending on which side you choose. For example, if you're flying a U.S. campaign, your winning conditions can include bombing key German industries until production drops below levels necessary to continue supplying the war effort. If you're directing the German side, you'll win by

protecting vital installations such as oil refineries and factories, and by making critical decisions regarding the German war economy.

Starting a Campaign

Choose CAMPAIGN BATTLES from the Main Menu to begin your campaign. You'll then see a menu with the following choices:

START NEW CAMPAIGN
CONTINUE CAMPAIGN IN PROGRESS
EXIT

START NEW CAMPAIGN Creates a new campaign, to begin in the summer of 1943. Type in the name of your campaign at the text cursor, and press RETURN.

CONTINUE CAMPAIGN IN PROGRESS Displays a new menu. On the right will be a directory of the names of the ongoing campaigns of either the U.S. or the German side. On the left will be three buttons:

CONTINUE CAMPAIGN Click on after you've selected a current campaign from the directory.

RETRY Use to search a new floppy disk for Campaign Battles in progress if you aren't using a hard drive.

EXIT Click on to go back to the main Campaign Battle menu.

EXIT Returns you to the Main Menu

The Campaign Map

Once you've started a new campaign or chosen an existing one, you'll go to a special Campaign Map. At the top of this map will be displayed the name of your campaign, plus the historical date on which you'll direct your forces into combat. After organizing your aircraft into flight groups, moving them around to different airfields, and giving them orders, you'll begin that day's mission by taking the controls of one of the planes. If you're on the German side, you can also control portions of the German economy to affect production of war materials.

The Campaign Map displays icons representing the locations of different German ground installations, such as factories, refineries, railroad yards, and Luftwaffe airfields around western Europe. It also

"In the briefing room, which was just a big old room with chairs, there was a curtain, and when they'd pull that curtain back, there was a map, with a tape pointing to where you were going. When everybody saw that tape, they would moan. If that tape had gone around the corner to London and back, you would have heard the same moan."

U.S. Army Air Force
Pilot Officer Robert Davila

shows U.S. airbases in England. Clicking on any of the icons on the map will open a pop-up window containing information relevant to your side. The Campaign Map also displays aircraft icons for the flight groups you've created including enemy aircraft positions, as well.

At certain times in the campaign, this map may have a line through it, which represents the battle line between the Allied and German forces. This line may fluctuate, depending on whether the campaign decisions you make are beneficial to your side.

At the bottom of the screen, you'll see several choices:

MAP Will bring the Campaign Map back after you have made a different choice from this menu.

STATUS Will bring up a text description of how well or how poorly your campaign is faring.

WEAPONS Lets you modify the armament of the plane you will be flying in this campaign.

ROSTER Lets you create pilots and crew, and assign them to fly in your campaign (see the *Flight Roster*

ABORT Cancels this mission of your campaign and sends you back to the Main Menu.

START Lets you begin the day's mission of your campaign.

Directing the German Fighter Defense

If you're directing a German campaign, you'll be marshaling Luftwaffe fighters from various airfields to mount a defense against U.S. bombers and fighters. You'll be in charge of:

(1) Launching interceptions: creating flight plans and deciding which U.S. aircraft you're going to intercept in an incoming raid.

(2) Assigning the alert status to those Luftwaffe airfields within range of a U.S. attack, so that additional fighters can intercept.

(3) Moving air units between different airfields. You'll use the Campaign Map to do all this.

On each day of your campaign battle, the Campaign Map for the German side will highlight the ground targets that are most likely to be attacked that day by the Eighth Air Force (This does not necessarily mean that the U.S. will actually bomb all those targets, but German intelligence believes that some or all will be hit.) Icons representing the Luftwaffe airfields that are near these targets will also be

"You had to wear so much junk you'd hope you didn't have to go use the tube. You'd have your longjohns on, pants on, electric suit on, then you'd have your summer flying coveralls or your winter flying stuff on top of that, and then you had your Mae West and your parachute harness."

U.S. Army Air Force
Pilot Officer Robert Davila

Flying at altitudes of 20,000 feet and higher, where temperatures often dropped to -40 degrees, U.S. bomber crews had to wear many layers of clothing to avoid freezing. When Luftwaffe planes attacked, the gunners removed their gloves to fire their machine guns and some lost their fingers to frostbite as a result.

highlighted, designating that they have automatically been put on alert. Finally, any incoming U.S. bombers that have been spotted will be displayed, to show which direction the attack is coming from.

At the bottom of the Campaign Map screen will be the same choices discussed above: MAP, STATUS, WEAPONS, ROSTER, ABORT, and START, plus a new one, UNIT TRANSFERS. This shows all the transfer orders you've given to move various Luftwaffe air units to new airfields so that they can be used to defend particular installations. The process of moving these air units will require a certain number of days (see *Making Aircraft Unit Transfers* below).

To set up flight groups and flight plans, as part of your fighter defense, click on any airfield icon that is near incoming U.S. bomber forces (see *Creating and Modifying Flight Groups* below). To cover other targets, as well as to set up another line of defense, you can also change the alert status for each airfield. These additional forces may defeat the incoming raid if none of your flight groups succeed in intercepting it.

Clicking on the desired airfield icon to set up a flight group or to change an airfield's alert status will open a pop-up window, whose selections include:

AIRCRAFT Shows the type of aircraft stationed at that airfield.

CREATE FLIGHT GROUP Allows you to build a flight group to intercept U.S. raids, and to create a flight plan that you yourself will fly. (See *Creating and Modifying Flight Groups* below.)

ALERT STATUS Sets the number of flight groups that will automatically take off from that airfield to intercept incoming U.S. aircraft (in addition to the flight groups you create). Toggles through the different alert status settings, so that either all, some, or none of the aircraft will respond.

MAKE AIRCRAFT TRANSFER Allows you to move your aircraft between different fighter bases. (See *Making Aircraft Unit Transfers* below.)

EXIT Closes the airfield window.

Changing Production in the German Economy

On the German side, in addition to directing the fighter defense, you control those sectors of the economy that provide war material for the Luftwaffe. You'll be able to choose exactly what is produced at aircraft assembly plants, aircraft engine factories, oil refineries, and even research and development facilities, where "secret weapons" are emerging. These decisions can affect what kind of aircraft will be available to fly later on in the campaign.

To command German war production, click on any factory icon on the Campaign Map. This opens up a window, which tells you the type of factory it is. If it is an aircraft factory, an aircraft engine factory, an oil refinery, or an R & D facility, you can convert it to the production of other products.

Below the factory heading is a list of production figures:

% CAP Displays the percentage of total capacity that the factory is currently operating at.

% OF INDUSTRY TOT Indicates the amount of production that this factory is contributing to the industry as a whole.

PRODUCTION Clicking on this cycles through and selects the different types of war material that this factory can produce. If you're examining an aircraft factory at the beginning of the campaign, it will be able to produce only Bf 109s or FW 190s, but will later be able to produce Me 262s, Me 163s, or Go 229s. Aircraft engine factories can produce standard piston engines, jet engines, or rocket engines. Oil refineries can produce regular fuel, jet fuel, or rocket fuel. The R & D facilities can research and produce the V-1 flying bomb, the V-2 rocket, the Me 262, the Me 163, or the Go 229.

DISPERSE Allows you to scatter production for certain industries into hidden facilities that are impossible for the Eighth Air Force to locate and bomb effectively. This option has the side effect of lowering production. Click on a second time to reconsolidate production in one centralized location.

There will be other sectors of the economy whose production you will not be able to control, such as power plants, munitions factories, and railroad marshaling yards. However, you may still need to provide fighter protection for these installations.

Directing the U.S. Bombing Campaign

On the U.S. side, your main concern will be to select strategic targets to bomb, so that you can cripple German war production. To do this, you'll command a main raid by creating and selecting flight groups and making a flight plan for that raid, which you yourself will fly in.

You'll also create a series of secondary raids against as many German targets as you want. The more effective your main raid, the more likely the secondary raids are to succeed. To create a series of secondary raids, click on a German ground installation icon on the Campaign Map. A window will display information about the target, plus the following list of choices:

Flying at altitudes of 20,000 feet and higher, where temperatures often dropped to -40 degrees, U.S. bomber crews had to wear many layers of clothing to avoid freezing. When Luftwaffe planes attacked, the gunners removed their gloves to fire their machine guns, and some lost their fingers to frostbite as a result.

OF BG Lets you choose how many bombardment groups are going to bomb the target.

OF FG ESCORT Lets you choose how many fighter escort groups are going to protect the bombers en route to the target.

OF GROUND ATTACK Lets you choose how many fighter-bomber groups are going to attack the target.

To choose how many of each type of group to send against a target, click on one of these selections. Pressing the left controller button increases and pressing the right controller button decreases the number.

Creating and Modifying Flight Groups

Before you begin any German or U.S. Campaign Battle, you'll need to assign the aircraft under your command to various flight groups. A flight group is a given number of aircraft that fly together as a unit. Using the Flight Group menu (see below), you'll determine the number and type of aircraft in each flight group and then assign mission objectives by creating a flight plan. Flight groups are created from airfields, so you'll need to open an airfield window and select the CREATE FLIGHT GROUP button, to bring up the Flight Group menu.

The Flight Group Menu

Following the words PLANES AVAILABLE on the screen is a number which indicates how many total aircraft are available to be placed in all of the flight groups that you wish to create. Below the words PLANES AVAILABLE are five buttons which you'll use to determine the composition of each group:

YOU Allows you to select whether or not you are going to fly as a member of this flight group.

PLANE TYPE Click on to cycle through the different types of aircraft you can allocate to a particular flight group from the airfield. Each flight group must be made up of the same type of aircraft.

OF PLANES Lets you determine the number of aircraft in the flight group you're creating. A flight group must have at least one plane before it can fly in your mission. Press the left controller button to increase the number, and the right controller button to decrease it.

FORMATION Click on to cycle through and set the flight formation for the current flight group you're creating.

ORDERS Click on to cycle through and set the mission orders for your current flight group. If you're directing the Luftwaffe, you can choose to have your fighters attack either bombers or fighters. If you're directing the Eighth Air

"The Americans are good at making fancy cars and refrigerators, but that doesn't mean that they are any good at making aircraft. They are bluffing. They are excellent at bluffing."

Reichsmarschall Hermann Göring, in early 1942

"The fighter is simply a flying gun, and its basic qualities of speed and surprise should always be used to the greatest advantage."

RAF Group Captain Johnnie Johnson

Force, the choices vary depending upon the type of plane you choose. American fighters can fly in a bomber escort role, a free-ranging role, or a fighter-bomber role, but American bombers can fly only bombing missions.

Creating a Flight Plan

After you've created a flight group, you must implement a flight plan for it. To do this, you'll plot a course on the map identifying a series of navigational points that this group will follow. A flight plan is composed of up to six locations, including its starting point (BEGIN), four rendezvous points (WAY POINTS 1-4), and an airfield to return to (LAND).

Below the flight group buttons, you'll see a chart which looks like this:

FLIGHT PLAN	ALT	ATK
BEGIN		
WAYPT 1		
WAYPT 2		
WAYPT 3		
WAYPT 4		
LAND		DELETE

To choose the starting point of your flight group's mission, click on BEGIN. The word BEGIN will be highlighted, and a large circle will be drawn around the airfield. Click on a location inside the circle where you want the flight group to start its mission. A starting point icon will appear on the Campaign Map. To change the starting point, click on a different location inside the circle.

Now, look for the ALT heading on the chart. The first number in this column indicates the current cruising altitude for this flight group in thousands of feet. Click the left controller button to increase and the right controller button to decrease the altitude at which the flight group begins your mission.

To set the locations of the four Way Points, first click on WAYPT 1, and click on the desired location. An icon will appear on the map to represent the location of that Way Point. Click on the second number in the ALT column to adjust the altitude for the flight group flying toward Way Point 1. Repeat this procedure for Way Points 2, 3, and 4 if you want. You can use these different Way Points to plot a course that may confuse or divert the enemy.

In fighter sweeps, fighter patrols, and fighter escort, the flight group repeats the flight plan until it runs low on fuel and returns to base. In fighter-bomber and bomber missions, the flight group follows the flight plan only once.

If you're flying a U.S. campaign, the bomber or fighter/bomber flight groups will automatically bomb a tar-

get if it is located where you've placed a Way Point icon. If you don't want to attack this target, locate the ATK (attack) column on the chart. The word YES will appear if an attack is to occur. Click on YES to call off the attack.

To assign each flight group to a landing area after you have assigned them different Way Points, click on LAND, then click on the desired airfield.

To remove one or more of the Way Points after you've created a flight plan, click on the Way Point you'd like to remove, then click the DELETE button, which is located to the right of the LAND button.

To cancel the creation of a flight group, click on CANCEL. When you're finished creating all of the elements of a flight group and its flight plan, click on EXIT.

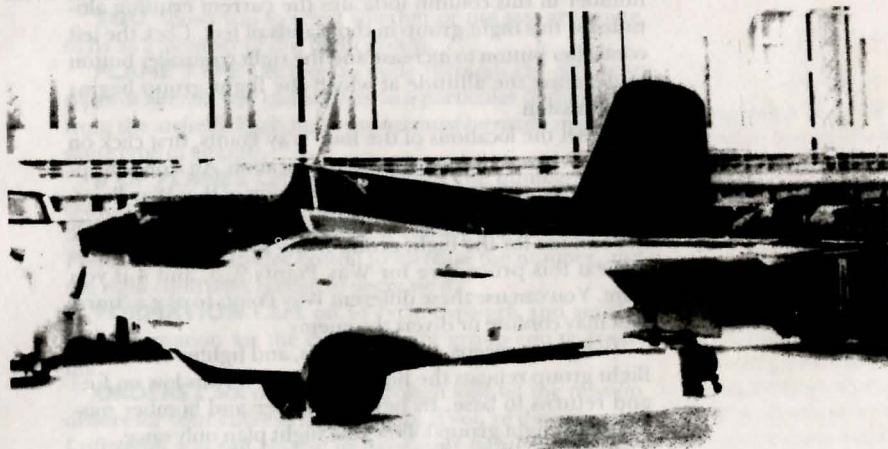
As you create flight plans for all of your flight groups, their starting points will be marked by icons on the Campaign Map. To modify a flight group that you have already created, click on its icon on the Campaign Map and repeat the above-outlined procedures.

Making Aircraft Unit Transfers

In both the German and the U.S. campaigns, you can transfer air units to different airfields. On the German side, this is vital for defending factories, airfields, and other installations from U.S. bombing raids. On the U.S. side, you may not find it as critical to move your forces around, except after D-Day, when you may want to move them from England to the Continent.

To transfer air units, click on an airfield on your side that you want to transfer aircraft from. A window will appear with the airfield name on the top. On the lower part of the window will be a button labeled MAKE AIRCRAFT TRANSFER. Clicking on this button will open a window labeled TRANSFER ORDER.

The volatile Me 163 Komet.



MISSION INSTRUCTIONS: IN-FLIGHT

Beneath the name of the airfield, the following choices will be displayed:

TYPE Cycles through the kinds of aircraft that you may want to transfer.

Cycles through the number of Gruppen or Groups that you may want to transfer.

TO Sends the Gruppen or Groups to a different airfield. First click this button, then click the desired airfield icon on the map. Below **TO** will be a heading, **# OF DAYS**, showing how many days it will take to transfer that unit.

EXIT Click on when you've finished issuing your transfer order. The lengthy process of transferring will then begin. To see the status of the transfer, use the UNIT TRANSFERS option on the Campaign Map screen.

CANCEL Stops the transfer order from being issued.

In addition to moving units between airfields, you can also move units from the reserves to the airfields. A window labeled RESERVES, in the upper righthand corner of the Campaign Map screen, will display all the different aircraft units produced by aircraft factories and waiting to be delivered to the airfields. Click on the button labeled MAKE AIRCRAFT TRANSFER, which will open a window just like the Transfer Order window you accessed from the airfield icons, with all the same transfer choices.

Campaign Results

Even though your mission involves flying just a few aircraft, the success of those few aircraft will be used to gauge the success of the secondary raids that you set up for

Perhaps the best piston-engined fighter of the war: the P-51D Mustang.



that day. Whichever side you command, the decisions you make will have a direct influence on the outcome of your campaign as well. On the U.S. side, choosing key targets to bomb is vital to success. On the German side, your decisions about fighter defense and wartime production will determine whether or not your side can come out on top.

At the end of each mission, the Campaign Map will appear and display various icons representing targets that may have been hit. Click on any of these icons to learn the status of these installations, including whether they have been destroyed or damaged. If you open a factory icon, you'll also see at what percentage of capacity that factory is now operating. The map will show icons representing downed aircraft, as well. Click on any of these icons to learn the type of aircraft, and who downed it.

COMBAT RECORDS

To look over the records of various pilots and crew on the particular side you've chosen, click on COMBAT RECORDS from the Main Menu.

In the middle of the Combat Records screen, a list of all the pilots and crew you've created will be displayed. On the right will be a list of the top ten pilots and crew, based on their mission performance. On the left will be four menu choices:

VIEW Brings up the Combat Record for a particular pilot or crew. To view, first click on the name of a pilot or crew, then click on this button. You'll then see detailed information about the pilot or crew you've chosen, including rank, status, number of missions flown, number of aerial victories, and various bombing statistics.

DELETE Lets you remove a pilot or crew from the list by first clicking on this button, then typing in the name of the pilot or crew you wish to remove.

RETRY Use to search a new floppy disk for Combat Records if you aren't using a hard drive.

EXIT Returns you to the Main Menu.

Choosing COMBAT RECORDS only lets you look at pilot and crew records, and doesn't allow you to create additional pilots and crews. To do this, select the ROSTER option, which you can access from Flight Briefing after you've chosen a mission

"Things don't look rosy for our big cities."

Feldmarschall Erhard Milch,
in March 1943

MISSION INSTRUCTIONS: IN-FLIGHT

This chapter details the different controls and instruments you'll use while you're flying *Secret Weapons of the Luftwaffe*. Except where noted, these instruments and controls have the same function in all the aircraft. For an instrument panel screen shot, with call-outs indicating the exact instruments and controls for the particular aircraft you're flying, look up your airplane in the *German and U.S. Aircraft and Weapons* chapter.

The midsection of this chapter, titled *Aircraft Operating Instructions*, will give you an overview of how aircraft are flown. And at the end of the chapter, you'll find instructions on how to use the Film Viewing Room and the In-Flight Map.

When flying an airplane from the pilot's position, you'll always see a cockpit interior, with various instruments and gauges displayed on the bottom. You'll also survey the view from the cockpit window, which you can change with the Pilot View Controls. And on the bottom of the screen a message line will flash important information throughout your mission.

The controls and instruments discussed in this chapter are grouped in the following order:

Simulation Controls Let you stop, adjust, and exit the program.

Pilot View Controls Give you the different views available from your cockpit.



Maneuvering Controls (including advanced mode) Allow you to move your airplane up, down, left, and right while in flight.

Airplane Controls and Equipment Many of the critical functions you'll need to use while flying a mission.

Engine Controls Determine the power of your aircraft's engine or engines.

Weapons Controls Allow you to drop bombs and fire machine guns, cannons, or rockets, depending on how the airplane you're flying is equipped.

Captain Robert Johnson, one of the leading U.S. fighter aces of World War II, with twenty-eight "kills."

Preceding page: B-17s of the 92d Bomb Group leave trails in the sky as they head out on a bombing raid.

Crew Position Controls (bomber only) Allow you to move to different crew positions in a bomber such as the B-17.

Gunner Position Controls (bomber only) Let you move and fire the different machine guns you can man in a bomber.

Bombardier Controls (bomber only) Allow you to use your Norden bombsight to drop a bombload accurately.

Cockpit Instruments The various gauges and levers you'll see in the cockpit of the aircraft you're flying.

SIMULATION CONTROLS

These controls can be used at any time during flight to stop, adjust, and exit the simulation:

Keys	Function
Alt P	Pauses flight; press any key to continue
Alt S	Turns all sounds off and on
Alt E	Turns only the engine sound off and on
Alt V	Displays version number of program
Alt G	Changes amount of ground detail, to smooth out your flight if program is running slow
Alt T	Turns accelerated time mode on and off
Alt X	Toggles between advanced and standard flight control modes
Esc	Exits the program; returns you to your computer's operating system

PILOT VIEW CONTROLS

You can look completely around your airplane in any of seventeen different directions by using either the numeric keypad or the number keys on the top of your keyboard. For a lateral, or "wing-level," view in any direction around your aircraft, press one of the eight view keys displayed below. To look up at a 45-degree angle from your aircraft, you can switch to the "high" view mode by pressing the **0** key; while in this mode, as well, you can use the eight view keys to look in any direction around your airplane. Pressing **0** again switches you back to the "wing-level" view. From either view mode you can look straight up at a 90-degree angle from your aircraft by pressing the **5** key.

You can look around your aircraft in any direction by pressing the **S** key for the scan mode and moving your controller (this will not affect your flight path). To find out your

"I learned firsthand that a man can resign himself to the certainty of death without becoming panicky."

Unidentified U.S. airman who survived the raid on Schweinfurt on August 17, 1943

"When caught by the enemy in large force, the best policy is to fight like hell until you can decide what to do."

U.S. Army Air Force Colonel Hubert Zemke, P-47 pilot and leader of the "Wolfpack"












An FW 190 dodges a stick of bombs during a U.S. raid on German railroad yards.

view angle coordinates, refer to the two numbers that appear in the cockpit panel. The first number shows where you are looking in vertical terms, starting at 0 degrees (level flight), and ranging from -90 degrees (straight down) to +90 degrees (straight up). The second number gauges your view from side to side. If you're looking to the right, the number ranges from 0 degrees (straight ahead, your flight path) to +90 degrees (directly right) to 180 degrees (behind you). If you're looking to the left, the number ranges from 0 degrees to -90 degrees (directly left) to -179 degrees (nearly straight behind you).

To help you orient yourself when in the "high" view mode — and in certain aircraft at other times — the cockpit view panel at the top of your screen will indicate what direction you're looking in **clock face** terms. U.S. fighter and bomber crews used the clock face system during World War II to note the direction from which enemy aircraft were approaching or attacking. To understand this system, imagine that a giant clock face is superimposed on your airplane from above, with the 12 at the nose, the 3 on the right wing, the 6 on the tail, and the 9 on the left wing. Therefore, if a fighter were to attack your airplane at "12 o'clock high," it would be diving on your nose at a 45-degree angle. On the



numeric keypad, each of the following eight view keys occupies the clock face position to which it corresponds. (For more information, see *View Indicators* in the *Cockpit Instruments* section below.)

- 
 Left forward
10 to 11 o'clock
- 
 Forward
12 o'clock
- 
 Right forward
1 to 2 o'clock
- 
 Over left wing
9 o'clock
- 
 Straight up
- 
 Over right wing
3 o'clock
- 
 Over left shoulder
7 to 8 o'clock
- 
 Rearview mirror
6 o'clock
- 
 Over right shoulder
4 to 5 o'clock
- 
 Toggles you between “wing-level” view
 and 45-degree “high” angle view
- 
 Scan view (to look completely around
 without altering your flight path)

If you're piloting a bomber, you'll only be able to use the five forward view keys, to look over each of your wings, straight ahead, ahead left, and ahead right, respectively. To command any other view from your bomber, you'll need to move to the gunner positions, by pressing the **G** key. To find the gun position you want, consult the *Gunner Position Controls* section below.

MANEUVERING CONTROLS

An aircraft can be maneuvered in three different directions. A pilot can make the aircraft **pitch**, or move its nose up and down, by controlling the **elevators**; **yaw**, or swivel left and right, by controlling the **rudder**; and **roll**, or tilt left or right, by controlling the **ailerons**.

There are two flight control modes you can choose from in *Secret Weapons of the Luftwaffe*. In the **standard** mode, the rudder is automatically coordinated with the ailerons and is not controlled separately. To maneuver your airplane in this mode, simply move your controller up or down to control pitch, and right and left to control roll. In the **advanced** mode, however, you can control the rudder separately in order to make the airplane yaw, so that you can perform

“We had a completely different system from the American pilots. They normally went home after one hundred missions. If I would have been sent home after one hundred missions, I wouldn't have had any victories at all. There were some of us who had a second tour of two hundred missions and some who had three hundred missions. As long as you were able to fly and as long as you were willing to fly, you could fly. But on the other hand, you saw them die — all of them, slowly they disappeared and that was very difficult. So you also had the feeling — It's just the time, to die very, very young.”

Luftwaffe General Walter Krupinski







Luftwaffe Major Walter Nowotny piloting an experimental night fighter with Kurt Tank, the designer of the FW 190. *Courtesy of the Galland Collection*

different kinds of maneuvers that require more sophisticated flying skills. To select this advanced mode, press **Alt-X**. Then, to maneuver in this mode, press the function keys and move the controller right and left to control yaw and roll, and move the controller up and down, as in the standard mode, to control pitch.

Controller Direction	Function
Forward (away from you)	Pushes down the nose of the plane
Backward (toward you)	Pulls up the nose of the plane
Right	Banks the plane to the right
Left	Banks the plane to the left

Advanced mode only

Key	Function
 F5	Moves rudder hard left
 F6	Moves rudder partially left
 F7	Moves rudder partially right
 F8	Moves rudder hard right

AIRPLANE CONTROLS AND EQUIPMENT

These keys control many of the important functions of your aircraft during a mission.

Key Function

- L** Lowers and raises landing gear or skid
- F** Cycles through the three settings for your flaps: up, partially down, and down
- A** Turns automatic pilot on and off
- T** Cycles through the different fuel tank settings on your aircraft (the status of the active tank will be displayed on the fuel gauges)
- D** Releases drop tanks (fighters only)
- C** Turns gun camera on and off
- V** Sends you to Film Viewing Room to watch your gun camera movie
- M** Sends you to the In-Flight Map
- S** Lets you jump from your aircraft and parachute to safety
- O** Ends mission; sends you to post-flight evaluation

ENGINE CONTROLS

All of the aircraft in *Secret Weapons of the Luftwaffe* are powered by either jet, rocket, or propeller-driven engines. The following keys control the throttle or power settings of the engines of all aircraft, with the function keys applying only to multi-engined aircraft. On twin-engined aircraft, if you're facing forward in the cockpit, the left engine is numbered 1, and the right engine is numbered 2. On four-engined aircraft, when you're facing forward in the cockpit, the engines from left to right are numbered 1, 2, 3, and 4. If you're flying a four-engined aircraft, pressing the **E** key will let you view a set of engine instruments for two engines only, on either the left or the right wing. To turn off an engine, decrease its throttle until its RPM indicator reads 0. (For

Crews of the two main U.S. Eighth Air Force heavy bombers, the B-17 Flying Fortress and the B-24 Liberator, developed a less-than-serious rivalry. B-24 crews touted their plane's superior bombload capacity and speed. B-17 crews, on the other hand, bragged that the Fortress could fly at higher altitudes and was better able to withstand battle damage. Noting the B-24's large, ungainly fuselage, they cracked that the Liberator was really the crate that the B-17 was shipped in. Since the B-24s were forced to fly several thousand feet below the Fortresses, where they were easier targets for German fighters, the B-17 crews also joked that the Liberator was the best fighter escort they could ask for.

more information, see *Engine Indicators* in the *Cockpit Instruments* section below.)

Key Function

- +** Increases throttle for all engines (shift key not needed)
- Decreases throttle for all engines
- F1** Decreases the throttle for Engine #1
- Shift F1** Increases the throttle for Engine #1
- F2** Decreases the throttle for Engine #2
- Shift F2** Increases the throttle for Engine #2
- F3** Decreases the throttle for Engine #3
- Shift F3** Increases the throttle for Engine #3
- F4** Decreases the throttle for Engine #4
- Shift F4** Increases the throttle for Engine #4
- E** Toggles between left and right set of engine instruments (four-engined aircraft — instruments for only two engines displayed)

Even after being rammed by a Bf 109, this B-17 still managed to drop its bombload on the oil storage tanks at Buchen and return to its base. The vertical gashes on the left were ripped by the spinning propeller of the German fighter. Surprisingly, the tail gunner did not know that the collision had occurred until after the bomber had landed.



WEAPONS CONTROLS

All the aircraft in *Secret Weapons of the Luftwaffe* can carry and deploy a wide variety of weapons, including fuselage- and wing-mounted machine guns, cannons, and bombs, plus wing-mounted rockets. The following keys and controller buttons allow you to select, aim, adjust, and fire these formidable weapons.

Key Function

- G** Lets you choose which controller buttons will fire machine guns or cannons
- W** Cycles through the different bombload configurations, and arms and selects those bombs which are to be dropped. (On bombers, this key allows you to toggle between dropping only one bomb at a time and automatically dropping them consecutively when you press **RETURN**)
- R** Cycles through the different rocket configurations, and arms and selects those rockets which are to be fired
- A** Turns automatic shoot mode on and off if you're manning a machine gun position on a bomber

Controller Button	Function
Left controller button or SPACE BAR	Fires primary guns or cannons
Right controller button or CTRL key	Fires secondary guns or cannons
RETURN	Drops armed bombload and/or rockets

CREW POSITION CONTROLS (Bomber Only)

In a bomber, you can fly as a pilot, a bombardier, or in a variety of gun positions. These keys allow you to move to all the different crew stations.

Key Function

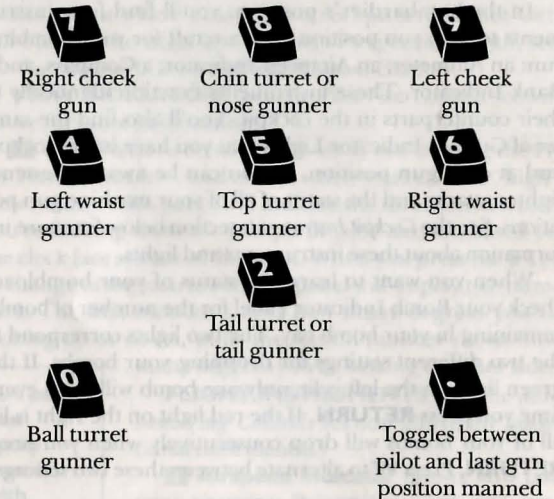
- G** Sends you to a gun position (see *Gunner Position Controls* below)
- (Period)** Switches you between pilot's position and last gun position manned
- B** Sends you to bombardier's position
- P** Sends you to pilot's position

"I stay with the enemy until he is destroyed, I'm out of ammunition, he evades into the clouds, or I'm too low on gas... to continue."

U.S. Army Air Force Colonel
Hubert Zemke

GUNNER POSITION CONTROLS (Bomber Only)

When you're flying a bombing mission and you're in the pilot's position, you can move to any gun position by first pressing **G**, then pressing one of the keys in the chart below. The bomber will continue to fly with the controls left where you set them, unless you press **A** to turn on the autopilot before you leave the cockpit; press **P** to return to the pilot's position, or press **B** to move to the bombardier's position. If you go back to the pilot's position and then press **G** again, you'll be returned to the last gunner position you manned. To move from any gun position to a different gun position, press one of the appropriate number keys, as follows:



Key Function

- A** Switches automatic shooting mode in machine gun position on and off

To position your machine gun when you're manning any of these gun stations, move your controller up, down, left, and right. Press your controller button to fire. The number displayed on the machine gun indicates how many rounds of ammunition remain. To set the machine gun so that it automatically aims and shoots for you, press **A**. A red light will turn on to indicate that the gun is in the auto-shoot mode. You won't be able to manually aim and shoot the gun until you turn off the auto-shoot mode by pressing **A** again. In all gun positions you'll also see Gunner Indicator Lights, similar to those in the cockpit, which indicate the status of every gun position.

BOMBARDIER CONTROLS (Bomber Only)

When you press **B** from the pilot position of a bomber, you'll find yourself in the bombardier's position looking straight down through the Norden bombsight. Your bombsight is hooked up to the automatic pilot of the bomber, so you'll actually fly the bomber and maneuver it into the ideal position for precision bombing. To do this, simply move the controller as though you were piloting the bomber from the pilot's position. From the bombardier's position, you'll still be able to use the Maneuvering Controls, Engine Controls, and, of course, those Weapons Controls that relate to dropping bombs.

In the bombardier's position, you'll find four instruments to help you position your aircraft for your bombing run: an Altimeter, an Airspeed Indicator, a Compass, and a Bank Indicator. These instruments function identically to their counterparts in the cockpit. You'll also find the same set of Gunner Indicator Lights that you have in the cockpit and at each gun position, so you can be aware of enemy fighter attacks and the status of all of your machine gun positions. See the *Cockpit Instruments* section below for more information about these instruments and lights.

When you want to learn the status of your bombload, check your Bomb Indicator Panel for the number of bombs remaining in your bomb bay. The two lights correspond to the two different settings for dropping your bombs. If the green light on the left is lit, only one bomb will drop every time you press **RETURN**. If the red light on the right is lit, all of your bombs will drop consecutively when you press **RETURN**. Press **W** to alternate between these two settings.

Using the Norden Bombsight

Your Norden bombsight can pinpoint any ground target along the flight path of your bomber, and can calculate the precise instant a bombload needs to be dropped in order to hit this target. The bombsight is used during the final phase of the bombing run when the bomber is being flown level at a constant speed directly at the target. It's important that you position your bomber correctly during the bombing run before activating, or "synchronizing," the bombsight.

When your bomber is flying a steady course, and is approaching the target area, press the **8** (up arrow) key to move the sighting mechanism of the bombsight forward and bring the center of the crosshair directly on the target. Press the **2** (down arrow) key to move back in the opposite direction. Press **5** to reposition the sighting crosshairs of the bombsight directly below your bomber. When the center of the crosshair on the bombsight is lined up on the desired target, press the **S** key. The Norden bombsight will then calculate when your bombload should be dropped to hit the

"The bombing attacks on German oil production, begun in 1944, were the largest factor of all in reducing German war potential."

Generalmajor
Albrecht von Massow

target. The green indicator light in the control box labeled "NORDEN" will illuminate to show that a calculation has been made, and the digital timer below will begin counting down the number of seconds until your bombload needs to be dropped to hit the target. When this timer reaches 0, press the **RETURN** key to drop your bombload. Between the time of synchronization and the release of your bombload, any speed, altitude, or heading changes will cause bombing inaccuracies.

COCKPIT INSTRUMENTS

The following is a description of all the instruments you'll find in the cockpits of the aircraft you'll fly in *Secret Weapons of the Luftwaffe*. All the aircraft have these instruments except where noted. For a cockpit screen shot with call-outs for the exact instruments of a specific aircraft, see the *German and U.S. Aircraft and Weapons* chapter.

VIEW INDICATORS (See the *Pilot View Controls* section above for more information.)

1 View Panel At certain times when you're using the Pilot View Controls — and always when you're in the "high" view mode — this panel will indicate the direction in which you're looking from the cockpit of your aircraft, based on the clock face system of direction. When you press the **S** key to change to the scan mode, this panel will display two numbers. The first number shows how many degrees you're looking up or down, while the second number shows how many degrees you're looking to either side.

FLIGHT INSTRUMENTS (See the *Maneuvering Controls* section above for additional information.)

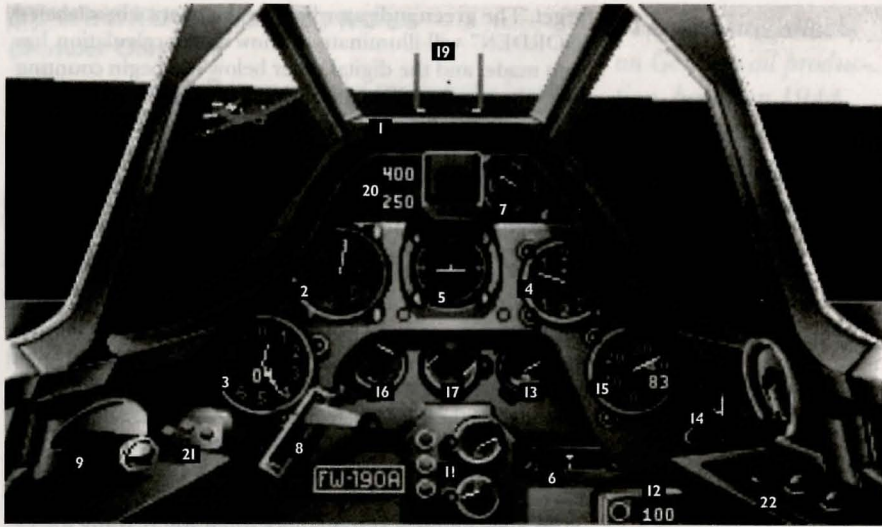
2 Airspeed Indicator Shows how fast your aircraft is flying, in tens of miles per hour. For example, if the hand on the gauge is pointing to "30," you're flying at 300 miles per hour.

3 Altimeter Displays the number of feet your aircraft is flying above sea level. The digital number in the center of the dial indicates thousands of feet, the small hand on the dial indicates hundreds of feet, and the big hand tens of feet. For example, if the digital display reads "8," the big hand is on the "2," and the small hand on the "7," your altitude is 8,720 feet.

4 Rate of Climb Indicator Shows the rate your airplane is climbing (+) or diving (-), in thousands of feet per minute.

5 Banking Indicator Shows the roll of your aircraft as you bank (see the *Aircraft Operating Instructions* section below for a de-

Several older-model B-17s were used in Project Aphrodite, which was an attempt to knock out the V-weapons launching sites on the coast of France. These "Fortresses" were filled with explosives and flown toward the target by the crew, who then bailed out. As the unmanned drone flew on, it was guided by remote control by another B-17 and put into a steep dive to crash on the target. This project proved to be a disaster, as the drones sometimes blew up before the crew could get out. Since the B-17 was very stable in flight, it would resist going into a dive and usually missed the target altogether. One crewless B-17 that had flown past the target actually made a wheels-up landing in Germany. It was surrounded by German soldiers, who ordered the crew to surrender. When they got no response, the soldiers opened fire on the bomber, which exploded, leaving a crater twenty feet deep.



Cockpit of an FW 190A-5 and FW 190A-8

scription of roll and banking). The large horizontal bar indicates the attitude, or the position of the wings of your aircraft relative to the ground, while the small vertical bar shows the direction your tail is pointing. As you bank left or right, the horizontal bar will rotate in the same direction.

6 Rudder Indicator Shows the position of your rudder: left, center, or right. If you're flying in the advanced mode, you'll need this information to steer your plane properly, since the rudder will be controlled separately from the ailerons.

7 Compass Gives you the direction your aircraft is headed: north, south, east, or west.

AIRPLANE CONTROL INDICATORS

8 Landing Gear Lever Shows the position of your landing gear. If the lever is up, your landing gear is up; if the lever is down, your landing gear is down. You'll always need to lower your landing gear by pressing **L** when landing, and raise it by pressing **L** after takeoff. If you're flying a fighter and are engaged in a dogfight, it may be useful to lower your landing gear to slow your airspeed, but always check the performance data beforehand for the maximum speed you can safely fly with the landing gear lowered.

9 Flaps Lever Indicates the position of your aircraft's flaps, which you can change by pressing **F**. If the lever is in the up position, the flaps are up; if it is in the middle position, the flaps are partially lowered; if it is in the down position,

"The [enemy] fighters had much more speed than we did, and you had to try to follow the plane, and between the speed and the evasive action and the rolling of the airplane and everything, it was awfully hard to get what you'd call a decent shot."

B-17 waist gunner John Doherty

tion, your flaps are down. You should keep your flaps up during normal flight, but lower them partially or fully for takeoffs and landings, to increase lift and lower the stalling speed. Lowering your flaps partially will slow your airplane and give you greater maneuverability in combat. However, your flaps can be damaged when lowered at high speeds, so be sure to check the performance data for the aircraft you're flying first. (See the *German and U.S. Aircraft and Weapons* chapter for aircraft performance data.)

10 Automatic Pilot Light (bombers only) Will be illuminated if you've turned on your automatic pilot by pressing the **A** key. If you're flying a bomber, be sure to turn on the automatic pilot before moving to the bombardier position or any gunner positions, or else the bomber will fly with the controls set where you left them.

11 Fuel Gauges Are found on the upper and lower sections of a circular dial, and give you two readings. The top gauge indicates the amount of fuel pressure remaining in the tank your aircraft is currently drawing fuel from, while the bottom gauge shows the amount of fuel remaining. The needle will point to the right when the tank is full and to the left when the tank is empty. A group of lights next to this gauge indicate which fuel tanks are currently in use on your airplane, including drop tanks. If a given light is **black**, there is either no tank attached or no fuel remaining in the tank. If a light is **red**, a tank of fuel is available but you're not using it at the moment. If a light is **green**, you're currently drawing fuel from that tank.

On the fuel pressure gauge, if the needle moves into the red zone, the tank has low fuel pressure. This indicates that you are losing fuel, which is a highly dangerous condition, since a leaky fuel tank that is still attached to your airplane could explode.

12 Gun Camera Indicator Shows the percentage of film remaining in your gun camera after you have switched it on. The number displayed will steadily decrease until the camera is out of film. The light above the indicator will go on when you press **C**, and will stay on until you have turned your camera off, or have used up all the film.

13 Hydraulic Pressure Gauge Indicates the amount of pressure in your airplane's hydraulic pressure system, which is needed to raise and lower landing gear, flaps, and other controls. If you have no hydraulic pressure, you may not be able to use these controls.

14 Clock Displays the time of day of the mission.

ENGINE INDICATORS (See the *Engine Controls* section above for additional information.)

15 RPM Indicator (one per engine) Gives you two readings. The dial shows the number of revolutions per minute (RPMs) the engine is delivering, in units of one hundred. The dial will move farther to the right as you increase your

RPMs; if it moves into the red area, you're using up fuel at a high rate and causing wear and tear on the engine. Extended usage at this level may damage the engine. The white number at the bottom of the gauge displays the throttle or power setting of the engine. For example, if it reads "90," the engine is set to operate at 90 percent of its capacity. If the number is in gray, it means that the engine has either been shut off or destroyed.

16 Manifold Pressure and Temperature Gauges (one per engine) A circular instrument divided into two gauges by a horizontal bar. The gauge on the top shows the amount of pressure in the manifold of a given engine, and the gauge on the bottom indicates the temperature of the manifold. The needles of these gauges will be in the black when you begin your mission, but will move to red if the manifold pressure drops and the manifold temperature increases. If either needle moves into the red, that engine may catch fire and explode, and you may have to reduce power or shut it off by using the function keys.

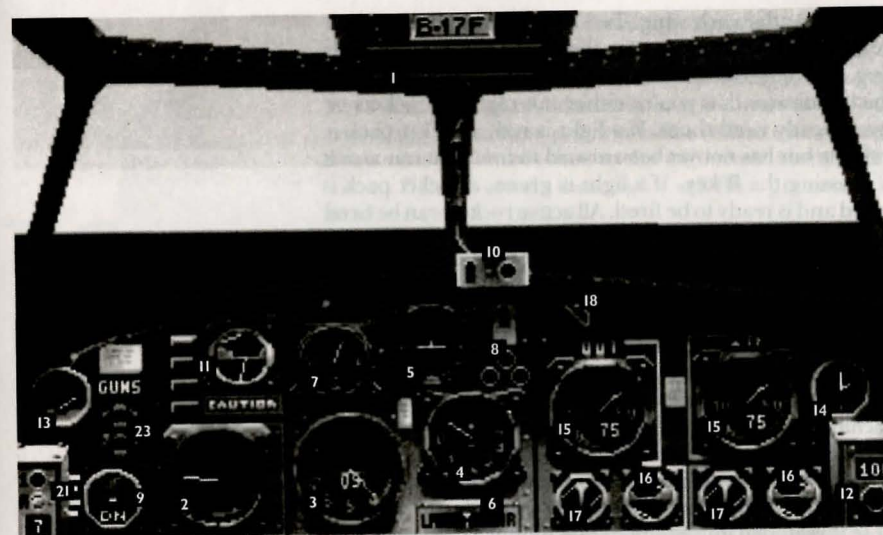
17 Oil Pressure and Temperature Gauges (one per engine) A circular instrument divided into two gauges by a vertical bar. The gauge on the right shows the amount of oil pressure remaining in a given engine, and the gauge on the left indicates the oil temperature. At first, the needles of these gauges will be in the black, but if the engines are damaged, the needles will move into the red as the oil pressure decreases and the oil temperature increases. If either needle moves into the red, the engine is in the danger zone and could start smoking, burst into flames, and explode. You may need to reduce power or shut it off by using the function keys.

18 Engine View Selector Allows you to view either the left-wing or the right-wing set of engine instruments on any four-engined aircraft by pressing the **E** key. These instruments are the RPM indicator, the manifold temperature and pressure gauge, and the oil temperature and pressure gauge.

WEAPONS INDICATORS

19 Cockpit Gunsight (fighters only) Used to aim forward-firing machine guns and cannons at enemy aircraft. The small dot in the center shows where the bullets will hit enemy aircraft if you're flying straight and level. (See the *Combat Tactics* chapter for a discussion of how to use the gunsight.)

20 Cockpit Ammunition Round Indicator (fighters only) Displays up to three numbers. The top number indicates the number of rounds remaining in the gun you're firing with the left controller button, which is normally a machine gun. The bottom right number shows how many rounds you have remaining in the gun you're firing with



Cockpit of a B-17F

the right controller button, which is normally either a second set of machine guns or a cannon. On some aircraft there will be a third number, on the bottom left, which shows the number of rounds in a second set of cannons that will fire simultaneously with the first.

21 Bomb Indicator Panel This shows the status of your bombload, if you're carrying one. On a bomber, there will be a number on the panel showing how many bombs you have left to drop. Next to this number, you'll see two lights, one marked "1," the other marked "A." If the light next to the "1" is on, one bomb will drop every time you press **RETURN**. If the light next to the "A" is on, your entire bombload will drop consecutively when you press **RETURN**. To toggle between these two lights, press the **W** key.

On a fighter, as many as three lights will be illuminated on the panel. The two outer lights indicate the status of wing-mounted bombs, and the inner light refers to the fuselage-mounted bomb. These lights will be **black** if you have no bombs to drop, or have already dropped them. When any or all of these lights are illuminated **red**, bombs are being carried but are not armed to be dropped, which you can do by pressing **W**. When any of the lights are illuminated **green**, they are armed to be dropped. Pressing **W** cycles you through all the possible configurations for dropping the bombs you carry. (Note: wing-mounted bombs are always carried in pairs.) When you press **RETURN**, all bombs symbolized by the illuminated green lights on the panel will be dropped.

22 Rocket Release Indicator (fighters only) Certain fighters can be optionally fitted to carry rockets. The Rocket Release Indicator shows the status of the rockets that are

mounted under each wing. Two lights will be displayed on the instrument panel, one for the rocket pack under each wing. If a light is **black**, there is no rocket pack on that wing, which indicates that you're either not carrying rockets or have already fired them. If a light is **red**, a rocket pack is available but has not yet been armed to fire. You can arm it by pressing the **R** key. If a light is **green**, a rocket pack is armed and is ready to be fired. All active rockets can be fired by pressing the **RETURN** key.

23 Gunner Indicator Lights (bomber only) Give you the status of each of your bomber's machine gun positions. From the top light down, these eight lights represent the nose gun or turret, the two cheek guns, the top turret, the ball turret, the left and right waist guns, and the tail gun or turret. The location of each light corresponds to the actual machine gun position on the bomber. At each gun position, and in the bombardier's position, you'll find the same group of lights. The chart below tells you how to read these lights while you're flying your bomber, so that you can switch to those threatened gun positions and mount a defense.

Color of Light	Gun Status
Gray	Gun idle
Yellow	Enemy fighters approaching the field of fire of that gun; an attack from that direction could occur
Black	Gun is either out of ammunition or has been destroyed.
Red	Gun has been switched on to automatic shoot mode
Green	Gun is firing at enemy fighters in automatic shoot mode

These colors may be different on some computers. Consult your Reference Card to see which colors your computer uses.

No guns will shoot at enemy aircraft automatically when your bombing mission begins. To ward off first attacks by enemy fighters, you must move to each individual gun position and either fire the machine guns manually or set each gun to fire automatically. To put the guns into this auto-shoot mode, press **G**, then press the number of the gun position you want to move to. When you've moved to that position, press the **A** key. A **red** light on the machine gun barrel will illuminate, indicating that the gun has been set for the auto-shoot mode. As long as the machine gun is in this mode, you won't be able to manually

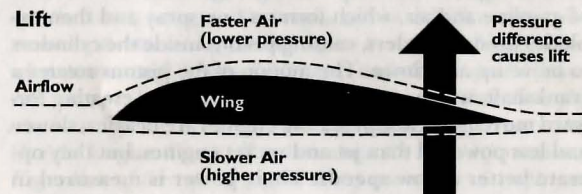
move and shoot the gun. Pressing **A** again will turn off the auto-shoot. Return to your pilot's seat by pressing **P**, or move to the bombardier's position by pressing **B**. The Gunner Indicator Lights in the cockpit, in the bombardier's position, and in each gun position will be red for every gun position that you've switched to the auto-shoot mode. When enemy fighters attack, these lights will flash green as your machine guns fire back.

AIRCRAFT OPERATING INSTRUCTIONS

The following discussion covers the dynamics of flight and how they pertain to operating and maneuvering your aircraft. Those sections that will be useful to you in the simulation are in italics.

Flight Fundamentals

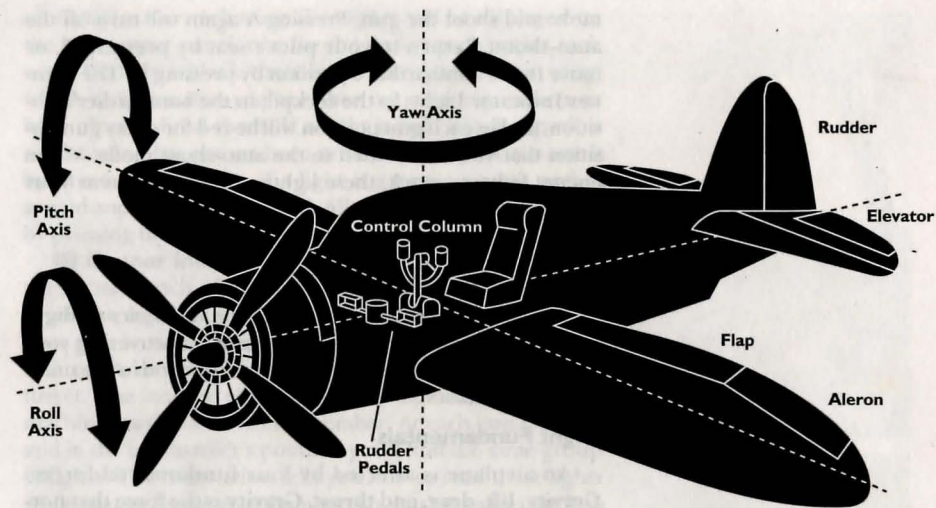
An airplane is affected by four fundamental forces: **Gravity**, **lift**, **drag**, and **thrust**. **Gravity** is the force that normally keeps the plane on the ground or pulls it toward the earth while it is in flight. **Lift** is the force which acts against



gravity and pushes the aircraft upward. As air flows around an airplane's wing, high- and low-pressure zones form around it to create lift. The amount of lift an airplane's wing creates must be more powerful than the opposing force of gravity, or the plane will not fly. The wing needs to have a streamlined shape, so that there's always a smooth flow of air around it. Otherwise, it will produce too much wind resistance, or **drag**, and the amount of lift will be reduced. Drag is the force which acts against the forward movement of the airplane. To create a smooth flow of air around the wing of an airplane so it can remain in the air, an engine is used to push the aircraft through the air by providing forward **thrust**, or movement. Thrust is the force that opposes drag, and the greater the forward thrust, the more lift is created. As a result, even a large and heavy airplane will fly as long as it is equipped with a powerful engine.

Aircraft Engines

There are three main types of engines used to provide the power that allows an airplane to fly: **reciprocating engines**, **jet engines**, and **rocket engines**. Of these, the recip-



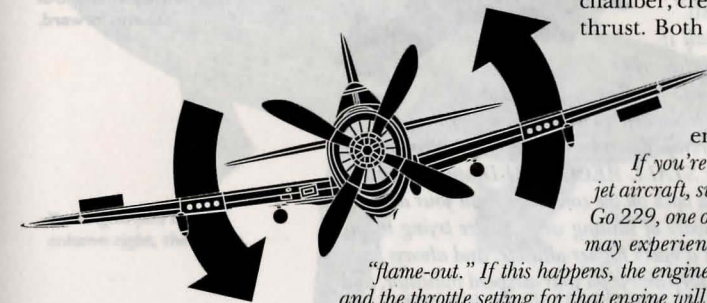
rotating engine is the most widely used. This is the engine used by propeller-driven aircraft, and is similar to an automobile engine. The reciprocating engine burns a mixture of gasoline and air, which forms a fine spray and then explodes inside cylinders, causing pistons inside the cylinders to move up and down. The motion of the pistons rotates a crankshaft, which in turn spins the propeller, creating forward movement. Reciprocating engines are heavier, slower, and less powerful than jet and rocket engines, but they operate better at low speeds. Their power is measured in horsepower.

For higher-speed aircraft, jet engines are used. The first successful jet engine was developed by the Germans in the 1930s and is known as a **turbojet**. A jet engine is shaped roughly like a cylinder and operates by taking in air through a large opening in the front. The oxygen in the air is then burned with fuel in a combustion chamber, and the exhaust formed by this combustion escapes out the rear of the engine with tremendous force. This escaping exhaust causes the engine to move in the opposite direction, thus providing forward thrust. Most jet engines today are **turbofan** engines, which differ from turbojets in that they have a large fan at the opening, which draws in large amounts of air, part of which is burned with the fuel while the remainder is added to the exhaust to create even greater thrust. The power of a jet engine, as well as that of a rocket engine, is measured in pounds of thrust.

The most powerful of the three engines is the rocket engine, which utilizes many of the same principles as the jet engine. However, unlike a jet engine, which burns oxygen in the atmosphere, a rocket engine carries its own supply of oxygen and therefore has no opening in the front to draw in

air. Rocket engines are much more dangerous than jet engines, since they can, and do, explode. The two main types of rockets used in World War II were solid-fuel rockets and liquid-fuel rockets. A solid-fuel rocket burns a plasticlike material called a **grain**, consisting of a fuel and an oxidizer, in a combustion chamber. The gas created by this combustion escapes through the rear of the rocket, creating forward thrust. The German R4M air-to-air missile was a solid-fuel rocket. A liquid-fuel rocket burns liquid fuel and liquid oxygen, which are stored in separate tanks. The fuel is first cooled and then ignited with the oxygen in the combustion chamber, creating exhaust gas and thrust. Both the German Me 163 and the V-2 rocket were powered by liquid-fuel rocket engines.

If you're flying a multi-engined jet aircraft, such as the Me 262 or the Go 229, one or both of your jet engines may experience what is known as a



Roll right: push control column right.

"flame-out." If this happens, the engine will not be operational, and the throttle setting for that engine will be at 0. To restart it, increase the throttle setting for that engine by using the function keys when your aircraft is below 13,000 feet and your airspeed is below 186 miles per hour. At altitudes and speeds greater than these, you may have difficulty restarting the engine and it may even catch fire. (See the Engine Controls section above for more information.) Regardless of the type of engine that powers your aircraft, you should always monitor your RPM indicators and your manifold temperature and pressure and oil temperature and pressure gauges to prevent engine damage. Operating an engine frequently at maximum RPMs, a condition U.S. pilots referred to as "war emergency power," is a major cause of engine overheating and damage, so try to avoid leaving your engines set for maximum RPMs. If the needles for any of your engine gauges begin to move into the red, look out the window to see if the corresponding engine is smoking or flaming, and decrease the power to that engine. If the condition of the engine is severe, turn it off altogether by using the function keys to set the throttle for that engine at 0. If you switch off a propeller-driven engine, it will automatically disconnect itself from the propeller and will be "feathered." Your fuel supply should be constantly monitored, too. Watch for any drops in fuel pressure, which could indicate a leaky fuel tank that could soon explode, and keep an eye on your fuel consumption. If you're flying a fighter and are carrying drop tanks, your fighter won't be as maneuverable, so you should always jettison your tanks before engaging enemy aircraft. Also, if you fail to jettison your drop tanks and are hit by enemy gunfire, your tanks could explode. If you're flying an Me 163, your fuel supply is extremely volatile, so you should make an extremely smooth landing. Otherwise, your remaining fuel could explode as you touch down.

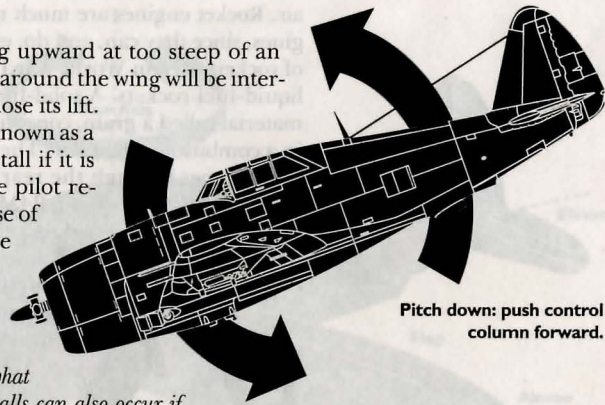
Stalling

If an airplane is climbing upward at too steep of an angle, the smooth flow of air around the wing will be interrupted and the aircraft will lose its lift. This dangerous situation is known as a **stall**. An airplane can also stall if it is flying too slowly. Unless the pilot regains lift by dropping the nose of the aircraft and allowing the aircraft to build up enough speed, the plane will go out of control and crash.

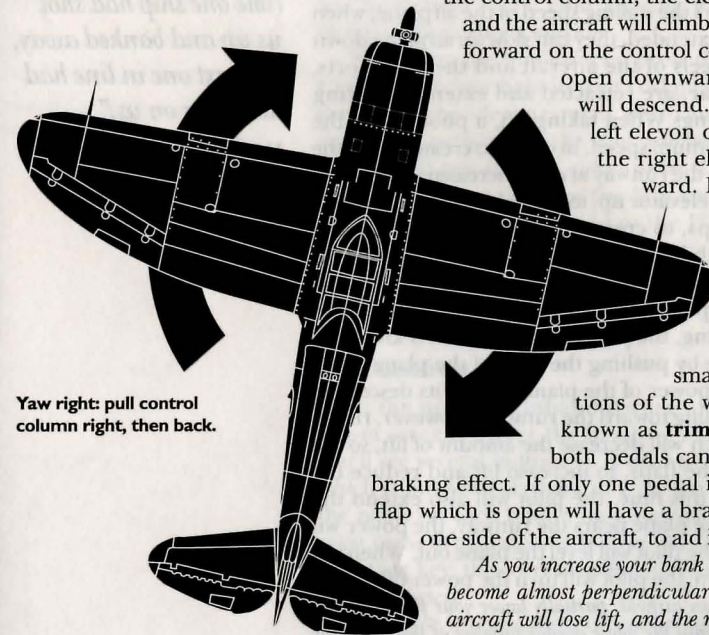
Your aircraft may stall if you let its airspeed drop below what is called the "stalling speed." Stalls can also occur if you pull your nose up at too sharp an angle. If you stall, push the nose of your aircraft down by moving the controller forward, until the message *STALL RECOVERED* appears on the screen. Then, quickly pull back on the controller until your aircraft is flying level again. Beware of stalling when you're trying to engage an aircraft that's at a much higher altitude, and always gain altitude gradually. Also, keep an eye on your airspeed indicator, and listen for the distinctive sound that your aircraft makes when it is about to stall.

Maneuvering

As discussed earlier, a conventional aircraft can **pitch**, or move up and down; **yaw**, or swivel left and right; and **roll**, or tilt left or right. A **control stick** or **column** is used to control pitch and roll, and the pilot steps on **rudder pedals** to control yaw. To make an aircraft dive, or pitch down, the pilot pushes forward on the control stick. This moves the trailing-edge (or rear), horizontal portions of the tail, called **elevators**, down. To climb, the pilot makes the plane pitch up by pulling back on the stick, which moves the elevators up. To turn, the pilot moves the control stick either left or right, which creates roll by raising and lowering the small, trailing-edge sections of the wing near the wing tips, called **ailerons**. At this time, the pilot will also step on either the left or right rudder pedal, which creates yaw by moving the trailing-edge vertical segment of the tail, called the **rudder**. This will swing the nose of the plane either left or right. As a plane rolls, its wings will tilt more and more to the side it is turning toward. This is called a **bank**, and the more steeply the plane banks, the sharper the turn will be, up to a full ninety degrees, when the wings will be pointing straight up and down. The more a plane banks, the more lift is lost, so a pilot will usually increase the throttle setting while making a turn. The German Go 229 and the Me 163 were both tailless aircraft that relied on **elevons** to maneuver. As its name suggests, an elevon is a control surface that combines the



Pitch down: push control column forward.



Yaw right: pull control column right, then back.

functions of the elevator and the ailerons of a conventional aircraft. It is a large, trailing-edge (or rear) section of the wing which opens upward or downward whenever the control column is moved. If the pilot pulls back on the control column, the elevons open upward and the aircraft will climb. If the pilot presses forward on the control column, the elevons open downward and the aircraft will descend. For left turns, the left elevon opens upward, and the right elevon opens downward. For right turns, the left elevon opens downward and the right elevon opens upward. Also, two rudder pedals open small trailing-edge sections of the wing near the tips, known as **trim flaps**. Depressing both pedals can give the aircraft a braking effect. If only one pedal is pushed, the trim flap which is open will have a braking effect on that one side of the aircraft, to aid in turning.

As you increase your bank turn, your wings will become almost perpendicular to the ground, your aircraft will lose lift, and the nose will start to drop.

To counter this, pull back on the controller slightly or increase your throttle setting when you bank. To come out of a bank turn and return to level flight, move your controller in the opposite direction of your bank. In the standard flight control mode, the rudder is coupled with the ailerons, and turns are accomplished easily without any sideslipping (when your airplane flies in a different direction from where it's pointed). In the advanced flight control mode, however, the rudder is moved independently by the function keys. Therefore, when banking for a turn in the advanced mode, you must move the rudder in the direction of the turn in order to prevent sideslipping. Having independent control of the rudder can allow you to pull off many difficult maneuvers. For example, if you're attacking an aircraft that is making a tight turn, you can yaw, or pivot your aircraft on its vertical axis, to adjust your aim. An extremely sharp turn that you can pull off only with the rudder is called the **hammerhead turn**. To execute this, make a steep climb at full throttle until your airspeed is less than 100 miles per hour and you're close to stalling speed. Then, give the airplane full left or right rudder. When the airplane has yawed around a full 180 degrees, center the rudder, ease back on the throttle, and recover to level flight.

Takeoffs and Landings

Flaps are the large, trailing-edge sections of the wings that allow an aircraft to gain lift for takeoffs, and slow it down for landings. When they are extended downward, the added lift lowers the stalling speed of the airplane; when they are partially extended, they can slow an airplane down in flight. The wheels of the aircraft and their supports, called **landing gear**, are retracted and extended during takeoffs and landings. When taking off, a pilot brings the airplane to its maximum speed, in order to create lift. As the plane moves down the runway at ever-increasing speed, the pilot will move the elevator up, to pitch the nose up, and will also lower the flaps, to create even more lift. When the plane gains enough lift to counter the force of gravity, the plane will take off and fly. Once the plane is airborne, the pilot will raise the flaps and move the elevator to a neutral position. When landing, the pilot will make what is known as an **approach glide** by pushing the nose of the plane down and reducing the power of the plane during its descent so that it is nearly gliding toward the runway. However, reducing power too much will decrease the amount of lift, so the pilot must lower the flaps, to increase lift and reduce the stalling speed. At this time, the pilot will also extend the landing gear. As the plane nears the runway, the power will be nearly off, and the pilot will level the plane out. When the plane touches down, the pilot will turn the power off.

To take off from an airfield, partially lower your flaps and increase your throttle until the white digital number at the bottom of the RPM indicator reads "100%." As your aircraft moves down the runway, wait until the airspeed exceeds 100 miles per hour for propeller-driven aircraft, 135 miles per hour for jet aircraft, and 180 miles per hour for the rocket-powered Me 163. Then, pull back on your controller to become airborne. Retract or jettison your landing gear, raise your flaps, and decrease your throttle setting to conserve fuel. When approaching an airfield to land, slow your airspeed by decreasing the throttle setting as you begin your descent. Gradually flatten your descent, then line up your aircraft with the airstrip. As you continue to descend, lower your flaps and your landing gear, and decrease the throttle setting until it is just above the stalling speed of your aircraft. (If you're flying an Me 163, you must land very gently on its landing skid, or the airplane will explode.) When you touch down, decrease the throttle setting to 0 and let your aircraft taxi until it has come to a complete stop.

"When they peeled off to attack, they came in so close together that by the time one ship had shot us up and banked away, the next one in line had his sights on us."

U.S. Army Air Force pilot Charles W. Paine, describing Luftwaffe fighter tactics

"A B-17 turned gradually out of the formation to the right, maintaining altitude. In a split second, the B-17 completely disappeared in a brilliant explosion from which the only remains were four balls of fire, the fuel tanks, which were quickly consumed as they fell earthward."

U.S. Army Air Force Lieutenant Colonel Beirne Lay, Jr., who flew in the August 17, 1943, bombing mission on Regensburg

FILM VIEWING ROOM

You can use the gun camera to record your aerial action on film, and then watch this film in the Film Viewing Room anytime during a mission. You can also save these film clips and view them in the Film Viewing Room at any future time, except during a mission.

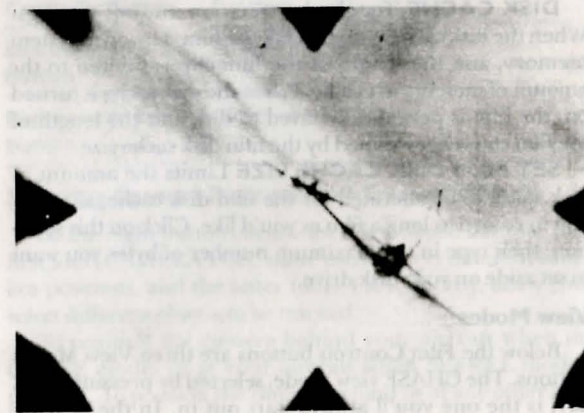
To turn on the gun camera, press the **C** key. The Gun Camera Indicator light in your cockpit will illuminate, and the number beside the camera, which indicates the percentage of film remaining to be shot, will begin to decrease. To turn off the gun camera, either press **C** again or wait until the film runs out. To view the film you've just recorded, press **V**, which will send you to the Film Viewing Room screen. To view a film clip you've already recorded and saved, choose FILM VIEWING ROOM from the Main Menu. The name of the previously recorded film will appear after the heading FILM.

Film Controls

In the upper righthand corner of the Film Viewing Room screen, under the heading FILM CONTROLS, you'll see several buttons — similar to those on a VCR — which control the playback of your film. The first letter of the name on each button indicates the keyboard key you must press to activate that button. When you press the appropriate key, the corresponding button on the screen will be illuminated.

If you've interrupted a mission to watch your latest footage, your film will automatically be loaded and ready when you arrive in the Film Viewing Room. If you want to watch a film you've already recorded and saved, you'll need to load it first (see below). Press the **P** key to play, and press it again to pause the film. Press the **A** key to advance, and press it again to stop the film. Rewind the film to its beginning by pressing the **R** key. To leave the Film Viewing

A P-47 Thunderbolt shoots at a twin-engined Bf 110 fighter, striking it on the left wing. Major Everett Stewart, the pilot whose gun camera recorded this picture, was forced to cease fire for fear of hitting Lieutenant John Coleman's P-47 ahead of him. Moments later, the Bf 110 went down in flames.



Room, press the **E** key. Pressing **E** will return you to your aircraft if you were flying a mission; otherwise, you'll go to the Main Menu.

Key	Name	Function
P	PLAY	Starts and stops playback of film
A	ADVANCE	Turns film advance on and off
R	REWIND	Rewinds film to start
D	DISK	Moves you to Disk Menu (see below)
E	EXIT	Returns you to mission or to Main Menu

Disk Menu

Pressing the **D** key will bring up the Disk Menu, which allows you to save a film clip, load or delete a film clip you've already saved, and allocate disk space so that you can record longer films. On the righthand side of the screen will be a directory listing all the film clips you've previously saved, and on the lefthand side of the screen will be a menu displaying the following disk menu selections:

LOAD Lets you load a film clip. To do this, first click on a film clip name from the film clip directory, then click on the **LOAD** button. (The **LOAD** selection is not available during flight.)

SAVE Brings up a text cursor. Type the name of the film clip you're currently viewing, then press **RETURN** to save it.

DELETE Brings up a text cursor. Type the name of the film clip you want to erase, then press **RETURN** to delete it.

RETRY Lets you search a new floppy disk for film clips if you aren't using a hard drive.

DISK CACHE Toggles between on and off settings. When the disk cache is turned off, the film is saved to system memory, and the length of the film clip is limited to the amount of memory available. When the disk cache is turned on, the film is periodically saved to disk and the length of the film clip is determined by the film disk cache size.

SET FILM DISK CACHE SIZE Limits the amount of disk space to be allocated for the film disk cache, allowing you to record as long a film as you'd like. Click on this selection, then type in the maximum number of bytes you want to set aside on your disk drive.

View Modes

Below the Film Controls buttons are three View Modes buttons. The **CHASE** view mode, selected by pressing the **C** key, is the one you'll always start out in. In the **CHASE**

"Those poor bomber pilots had it the toughest, they had to just sit there and sweat through it. And when your bomber went down, that was you and nine other guys."

U.S. Army Air Force Captain James Finnegan

"The enemy knows that he must wipe out our fighters. Once he has done that, he will be able to play football with the German people."

Feldmarschall Erhard Milch, in 1943

mode, the camera looks at an object from directly behind it and moves along with it. To zoom in on the object the camera is chasing, press the left controller button. To draw back from the object, press the right controller button. You can "chase" different objects by repositioning the camera with the **F1** through **F4** keys (see below).

In the **FREE** view mode, selected by pressing the **F** key, the camera is free-floating and suspended in space. To pan this "eye-in-the-sky" left, right, up, or down, just move your controller. To move the camera forward, press the left controller button. To move the camera back, press the right controller button.

The **TRACK** mode, selected by pressing the **T** key, works in conjunction with either the **CHASE** or the **FREE** mode. In the **TRACK** mode, the camera follows an object that is moving independently within your camera's view, automatically panning to keep it in the center of the screen. For example, if you're watching a film in the **CHASE** mode from behind your fighter and you see an enemy fighter fly by, you can select the **TRACK** mode to have the camera lock onto the enemy fighter, and it will automatically follow the enemy fighter from your fighter's vantage point. Keys **F5** through **F8** allow you to track different objects. (Note: you cannot track an object you're currently "chasing.") If you're tracking an object in the **FREE** mode, you can press the left and right controller buttons to zoom the camera in on the tracked object or away from it.

Key Function

C	CHASE mode; positions camera directly behind an object
F	FREE mode; allows camera to be free-floating
T	TRACK mode; automatically pans camera to follow an object in either CHASE or FREE mode

Controller Button	Function
Left controller button	Moves camera forward
Right controller button	Moves camera back

Selecting Camera Positions and Tracked Objects

Of the eight buttons below the View Mode buttons, the first four, **CAMERA POS**, allow you to select different camera positions, and the latter four, **TRACK OBJ**, allow you select different objects to be tracked.

To position the camera behind your aircraft when in **CHASE** mode, or at your aircraft when in **FREE** mode, press **F1**. To position the camera behind or at any other air-

craft that was flying when your film was taken, press **F2**. If you press **F2** repeatedly, it will cycle through all the different aircraft in your film. If any aircraft dropped bombs or fired rockets while your film was being made, press **F3** to have the camera positioned at or behind these bombs or rockets, and press it repeatedly to cycle through all the different warheads. To position the camera at ground installations attacked or used in your mission, press **F4**.

Press **F5** to have the camera track your aircraft. To track any other aircraft, press **F6**, and press it repeatedly to cycle through all the aircraft. To track a warhead, press **F7**. Press **F8** to track any of the ground installations attacked or used in your mission.

Key Function

F1 Positions camera at or behind your aircraft

F2 Positions camera at or behind other aircraft

F3 Positions camera at or behind any active warheads

F4 Positions camera at or behind any ground installations

F5 Tracks your aircraft

F6 Tracks other aircraft

F7 Tracks active warheads

F8 Tracks ground installations



This gun-camera photo was taken by a P-51 Mustang as it opened fire on an Me 262 that had just slipped into an excellent attack position behind another P-51. The dogfight took place during a U.S. bombing raid on an oil refinery.

The View Window

The action recorded by your gun camera will be shown in the large view window in the center of the screen. As you view your film, you'll see two lists running horizontally across the bottom of the screen. In the list marked CHASE will be displayed the name of the aircraft that the camera is positioned behind while in the CHASE mode. The CHASE list will also display flight information for that aircraft, including its current speed in miles per hour, its heading in degrees, and its altitude in feet. When you're in the TRACK mode, the TRACK list will display the name of the aircraft that is currently being tracked, plus its ongoing speed, heading, and altitude, as well as the camera's distance from the object being chased.

IN-FLIGHT MAP

To acquire information about the location of various enemy and friendly aircraft and ground installations during your mission, examine the In-Flight Map by pressing **M**.

This map also allows you to change the orders for different groups of fighters on your side. The In-Flight Map depicts continental Europe and the eastern part of England, and has controls that let you move the map around and examine different portions of it. These controls are much the same as those for the Flight Briefing Map.

To the upper right of the map, you'll see two buttons: **ZOOM IN** enlarges the map size, and **ZOOM OUT** reduces it. To zoom the map in or out, either click on these controls or use the keyboard keys: the **Z** key to zoom the map in, and the **X** key to zoom it out. To move the map up, down, left, and right, click on the up, down, left, or right ar-

rows inside the horizontal and vertical bars at the bottom and on the righthand side of the map window, or move the slider box, or click on the space inside the two bars.

Getting Information from the In-Flight Map

On the map, you'll see various aircraft icons and ground target icons located throughout western Europe. To get information about any aircraft or ground target, click on an icon. A pop-up information window will display a text description of the aircraft or ground target. If you select an aircraft icon, the description will include the name of the aircraft, its altitude in feet, its heading in compass points, its speed in miles per hour, its bearing (relative to you and your aircraft), and its distance from your aircraft. Ground targets include aircraft factories, ball bearing factories, oil refineries, railroad marshaling yards, electric plants, munitions

"So far as the German jets were concerned, you'd got to be above them, by at least three thousand feet, because all we could do was open up everything and dive. But as soon as they knew you were there they were off..., so we just had that moment when you could catch that chap, when he couldn't see you, when you came down, going like the clappers hoping to get close enough to get in a burst before he saw you. He just had to open his throttle and he was gone! And that really was the name of the game."

RAF Wing Commander John Wray

plants, airfields, and secret weapons sites. If you click on an icon for an industrial target, the window will display what the target is producing and what kind of condition it is in (whether it has been damaged or destroyed). If you select an icon for an airfield or secret weapons site, the window will display what kind of aircraft or secret weapons are located there, as well as the condition of the airfield or site. If you're flying on the U.S. side, information on ground installations may not be accurate or precise, owing to poor weather, lack of reconnaissance flights, or inaccurate intelligence. The more U.S. missions are flown over a certain target in good weather, however, the more accurate subsequent information will be. If you're flying on the German side, the information will always be accurate and up-to-date.

If you have selected a fighter or a fighter-bomber on your side, the bottom of the information window will display, beside the EXIT button, a small button marked CHANGE ORDERS. Click on CHANGE ORDERS to reassign the selected fighters on your side to attack a different aerial target (see below). Click on EXIT to close the window altogether.

Changing Orders

When you click on CHANGING ORDERS, the Orders Window opens, displaying a menu that allows you to control which targets are attacked in air-to-air combat by selected fighters or fighter-bombers on your side.

When the Orders Window is opened, various air icons on the In-Flight Map will be lit in different colors. If an icon is lit **green**, that icon is the primary air target that your selected fighter is either trying to attack or will be attacking. Icons lit **red** represent any other air targets that your selected fighter could go after. (Your selected fighter can only be reassigned to go after alternative air targets, and cannot be reassigned to attack ground targets.)

Inside the Orders Window, you'll see four choices:

SET AIR TARGET Click on this, then click on any of the red secondary air target icons to change the primary air target for the selected fighter. The red icon you click on will turn green, designating the new primary air target.

IGNORE CURRENT TARGET Click on this to order the selected fighter not to attack its current target.

MISSION ABORT Click on this to order the selected fighter to go home. Beware: orders to abort a mission cannot be reversed.

EXIT Click on this to close the Orders Window.

To leave the In-Flight Map and return to your flight, either click on the EXIT button below the map or press **M** or **E** on your keyboard to exit.

"Men who walked through the rain to their aircraft; who slept in heated suits; who played sweaty games in their flying clothes, were wet when they took off. They were casualties when they came back."

Unidentified U.S. Army Air Force flight surgeon, on why so many bomber crewmen contracted frostbite in the below-freezing flying conditions

MISSION INSTRUCTIONS: POST-FLIGHT ENDING YOUR MISSION

Your mission can end several different ways:
Crashing If your plane impacts into the ground or into a body of water at a steep angle before the pilot or crew can bail out, they are considered killed in action.

Crash Landing If your plane comes down to earth at a shallow angle, lands with the landing gear up, or lands poorly, it will be completely demolished, but the pilot or crew will survive. If this crash landing occurs on enemy territory, however, the pilot or crew will be captured and will be lost for the war, unable to fly any more missions. (If you're flying on the U.S. side, there's a slight chance that your pilot or crew will avoid capture, return to England, and will be able to fly another mission.)

Ditching If your plane lands at a shallow angle in a large body of water, such as the English Channel, it will be lost. However, the pilot or crew will be picked up by a passing ship or a rescue seaplane from their own side, and can fly a new mission.

Bailing Out over Land If your plane is uncontrollable and cannot be flown back to your base, and you press **J** before it crashes, the pilot or crew will parachute to safety. Be sure to bail out before your aircraft reaches too low of an altitude. If the pilot or crew bail out over enemy territory, they will most likely be captured, and will be unable to take part in any more missions. If they bail out over friendly territory, they will be taken to their home airfield and can fly another

mission. (Keep in mind that the boundaries for friendly territory and enemy territory may change, depending on what time period of the war you fly in.)

Bailing Out over Water If the pilot or crew parachute from their plane over a major body of water, such as the English Channel, they will be rescued and can fly again.

Landing at Your Home Airfield When you fly back to your home airfield, land safely, and press **Q**, your mission will end.

Pressing Q in Midflight If you'd rather not make a landing, you can press **Q** to end your mission at any time while your plane is in the air. Doing this will not affect the Combat Record score for your pilot or crew unless you lose your plane, which can happen if you:

- Press **Q** while flying over enemy territory. This will cause the pilot or crew to be captured, and the plane will be lost. (On the U.S. side, there's a slight possibility that the pilot or crew can escape capture.)



A Bf 109 pilot bails out of his fighter over France.

Preceding page: This B-17 was forced to ditch in the English Channel. Some of the crew wait for rescue in the life raft. Courtesy of the National Film Board

• Press **Q** while flying over water. This will cause the plane to be lost, but the pilot or crew will be rescued.

If you're a U.S. Pilot, try to make it back to the airspace over England or any Allied-held territory in western Europe before pressing **Q**, to avoid being penalized on your Combat Record score for losing your plane. If you're a Luftwaffe pilot, try to reach the airspace over Germany or German-held territory in western Europe before pressing **Q**.

MISSION AND CAMPAIGN RESULTS

After your mission has ended, a Post-Flight Debriefing Map will appear, displaying icons representing various airfields and industrial targets in western Europe. Click on any of these icons to learn if the targets have been damaged or destroyed. You'll also see icons representing aircraft that have crashed at various locations. Click on any of these icons to learn what kind of aircraft crashed and who shot it down. At the bottom of the screen are three menu choices — MAP, STATUS, and CONTINUE. Click on STATUS to view a chart displaying the total number of victories and losses both for your side in the mission and for the airplane you were flying. If you're directing a Campaign Battle, this chart will display additional information summarizing the impact of your last mission on the air war over Europe, and will let you know how both sides are faring, and which side is closer to victory.

UPDATING COMBAT RECORDS

From the Post-Flight Debriefing Map, click on CONTINUE to view a screen displaying the updated Combat Records for the pilot or crew you've chosen, based on the results of this latest mission. The Combat Records of any additional pilots or crews that you selected from the Flight Roster to fly the mission will also be updated. The numeric score displayed on the screen ranks how well the pilot and crew performed during the mission. This cumulative score will be updated after every mission, and you can use it to compare different pilots and crews.

Your pilots and crews will achieve higher scores if they accomplish the main objectives of their missions. If you're a Luftwaffe pilot, your main mission objective is to prevent industrial targets, Luftwaffe airfields, and other German fighters from being destroyed by U.S. bombers and fighters. If you're flying a U.S. bomber, your main mission objective is to bomb your assigned target accurately. Knocking out a target is a group effort, so if other bomber crews also score direct hits on a target, your individual score will improve. If you're flying a U.S. fighter on an escort mission, your main mission objective is to protect the bombers from enemy fighter attack so they can drop their bombloads over the target. The more bombs that hit the target, and the

"On missions when everybody came home OK, we'd fly tight, wingtip-to-wingtip on the way back. I'd come up on my wingman and I'd say, 'Hey, Palmer, we were successful,' and get my wing under his, and tip him. He'd yell, 'You son of a bitch, knock it off,' and we were just laughing like hell all the way home. Those were the joyous times."

**U.S. Army Air Force
Captain James Finnegan**

"We were fighter boys. Fighter boys fight."

**Luftwaffe General Walter
Krupinski**

more bombers that survive, the higher your score will be. If you're flying a U.S. fighter in a free-ranging role, your main mission objective is to shoot down as many Luftwaffe fighters as you can. The lower the ratio of U.S. fighter losses to Luftwaffe fighter losses, the higher your score will be.

No matter which mission you choose to fly, the more you help your fellow pilots and crews to survive and complete their missions, the better your score will be.

MEDALS AND PROMOTIONS

Whether you're flying on the American or the German side, medals and promotions in rank will be awarded if you and your fellow pilots or crews successfully fulfill your main mission objectives. The medals listed below were awarded to courageous U.S. Army Air Force and Luftwaffe airmen throughout the Second World War.

U.S. Army Air Force Medals (in order of rank)

Congressional Medal of Honor

This medal is the highest award in the U.S. military, and was originally established by the Congress of the United States in December 1861 and signed into law by President Abraham Lincoln. The Medal of Honor is the only medal awarded in the name of Congress by the president, and is given to officers and enlisted men for an individual act of heroism that involves extraordinary bravery in combat "above and beyond the call of duty." Only an individual who conspicuously distinguishes himself in action against an armed enemy at the risk of his own life without harm to his mission can be eligible to win the Medal of Honor, and it is only awarded after thorough investigation. This medal may only be given once; if a second medal for valor is warranted, a gold star is awarded instead, and is worn on the ribbon of the Medal of Honor.



Major General Carl Spaatz, the commander of the U.S. Eighth Air Force, pins a medal on Brigadier General Ira Eaker, the leader of the Eighth's bombing offensive against Germany.

Distinguished Service Cross

This decoration was first instituted in January 1918 and is given in the name of the president. It is awarded for extraordinary heroism against an armed enemy when the circumstances do not warrant awarding the Medal of Honor, making it the second-highest award for valor in the U.S. military. A bronze oak cluster is awarded if the individual performs a second such act of bravery, and it is worn on the ribbon.

Distinguished Service Medal

Instituted on the same day in 1918 as the Distinguished Service Cross, the Distinguished Service Medal is given in the name of the president for "exceptionally meritorious

service to the government in a duty of great responsibility in time of war, or in connection with the military operations against an armed enemy of the United States." It is the highest medal for achievement in the U.S. military, and can be awarded for service in either combat or noncombat positions of duty. If a person has already received the Distinguished Service Medal, they are awarded a bronze oak leaf.

Silver Star

Based on a World War I badge of honor, the Silver Star is awarded for "gallantry in action" when the circumstances do not warrant awarding the Medal of Honor or Distinguished Service Cross.

Distinguished Flying Cross

Established by Congress in July 1926, the Distinguished Flying Cross is awarded for an act of heroism or extraordinary achievement performed while in flight. This medal of valor can be awarded for both combat and noncombat situations, and if a second medal is warranted, a gold star is given.

Air Medal

Created to award "meritorious achievement while participating in an aerial flight," the Air Medal is given for actions that do not justify the awarding of the Distinguished Flying Cross. Generally, it is awarded for missions that do not involve contact with an armed enemy, although a pilot or crewman can earn one for destroying an enemy plane. Bomber crews were awarded this medal after flying five missions of at least two-and-a-half hours' length, while fighter crews were awarded it after ten missions of under two-and-a-half hours, except for escort missions.

Purple Heart

Originally instituted by George Washington when he was Commander in Chief of the Continental Army during the Revolutionary War, the Purple Heart is awarded to those who are wounded in action against an enemy of the United States, and require medical attention. It is given to wounded personnel before or immediately after they arrive at the hospital. An oak leaf cluster is awarded to previous Purple Heart recipients.

Luftwaffe Medals (in order of rank)

Grand Cross

This was the highest class of the Knight's Cross of the Iron Cross, and was truly the most elite award ever given in the German military. The Grand Cross was awarded for

On his first mission, ball turret gunner Sergeant Maynard "Snuffy" Smith was busy firing at FW 190s as his B-17 bombed the submarine pens at Saint-Nazaire. When he heard no other gun positions firing, he crawled out of his ball turret to find out why. What he saw was a badly wounded tail gunner, two empty waist gun positions, and a radio compartment engulfed in flames. After giving first aid to the gunner, he tried to put out the fire by stomping on it and, in desperation, even urinating on the flames. When FW 190s began firing at the damaged bomber, Smith manned both waist guns and fired back. When the fighters broke off their attacks, he managed to put out the flames with his bare hands. Because of his efforts, his B-17 was able to make it back across the English Channel to Britain, and Smith was later awarded the Congressional Medal of Honor. His actions were confirmed by the crew of another bomber, who could actually see him through the numerous bullet holes torn in the B-17's fuselage.

"One time I got a bullet in the cooling system, and I saw the temperature was going up, so I turned my Bf 109 around and made a belly landing. At the moment when I was on the ground I heard an explosion and I thought that soldiers were shooting at my crippled aircraft. I thought, 'You have to get out fast.' I was opening the canopy and was just trying to pull out, when I saw two German soldiers ten or fifteen meters in front of me who were crying and waving with their arms. I looked around at my aircraft and saw that it didn't have a tail anymore. Then I looked around and saw that there were a lot of black boxes. I had come down in a minefield! And to cross the ten or fifteen meters to get me out, the minesweepers needed two hours to reach me! They were lying on the ground and feeling with their fingers and pulling the mines away, and then they came to my aircraft and got me out. Two hours I was left in a minefield!

Luftwaffe General Walter Krupinski

actions that decisively influenced the course of the war, and only one person, Reichsmarschall Hermann Göring, was ever given this medal. He received it after France surrendered to Germany in 1940.

Knight's Cross of the Iron Cross

Instituted by Adolf Hitler on September 1, 1939, the Knight's Cross of the Iron Cross was established to take the place of the order "Pour le Merite," which had been abolished after World War I. The Knight's Cross was given for gallantry in action, and was awarded to those in the Luftwaffe and the Wehrmacht, as well as in civilian branches such as the police and fire departments. Luftwaffe fighter pilots could be awarded this medal for shooting down a set number of enemy planes, although this number changed as

the war progressed. One pilot was awarded the Knight's Cross for shooting down 20 planes in 1941, while by 1943 another pilot had to shoot down 123 planes to receive this award.

Several upgraded classes of the Knight's Cross appeared during the war (listed in increasing order of importance):

Knight's Cross with Oak Leaves This was created on June 3, 1940, and was first awarded to Luftwaffe fighter pilots Werner Molders and Adolf Galland for recording forty aerial victories each.

Knight's Cross with Oak Leaves and Swords Instituted by Hitler on July 15, 1941, this award was first given to Adolf Galland for reaching the sixty-nine-victory mark.

Knight's Cross with Oak Leaves, Swords, and Diamonds Also instituted on July 15, 1941, this was first given to Werner Molders for downing twenty-eight Russian aircraft in twenty-four days. There were only twenty-six other recipients of this award, which was commonly referred to as "the Diamonds."

Knight's Cross with Golden Swords, Oak Leaves, and Diamonds This award, intended to be the highest award for gallantry, was established on December 29, 1944, and was to be given only to the twelve bravest soldiers of the Third Reich. However, it was only awarded once, to Luftwaffe pilot Hans-Ulrich Rudel, for flying 2,530 sorties and destroying some 500 Russian tanks in a Ju 87 Stuka dive bomber. The Golden Swords, Oak Leaves, and Diamonds award differed from the other Knight's Cross awards in that it was made of gold, instead of silver.

German Cross in Gold

Created by Hitler on September 28, 1941, as a bridge between the Knight's Cross of the Iron Cross and the Iron Cross First Class, this medal was awarded for "continuous military achievement." A recipient needed to have already been awarded the Iron Cross First Class; however, it was not necessary to win the German Cross in Gold before being awarded the Knight's Cross.

Iron Cross First Class

This award was first established by Friedrich Wilhelm III in 1813, and reinstated for the Franco-German War in 1870 and the First World War in 1914. It was the only major award given by the Nazis during World War II that they themselves did not create. The Iron Cross First Class was awarded for outstanding heroism, and a Luftwaffe pilot was usually awarded one after shooting down four or five enemy aircraft.

Iron Cross Second Class

This medal was given for acts of bravery or distinguished service, and over two million Germans were awarded it during World War II.

Wound Badge

Given to an individual who was wounded in action, this medal had three different colors, or classes. A person receiving one or two wounds earned a black badge. For three or four wounds, or the loss of an eye, a hand, a foot, or his hearing, he was given a silver badge. For five or more wounds, or blindness, brain damage, or total disability, he was awarded a gold badge.

Ranks and Promotions

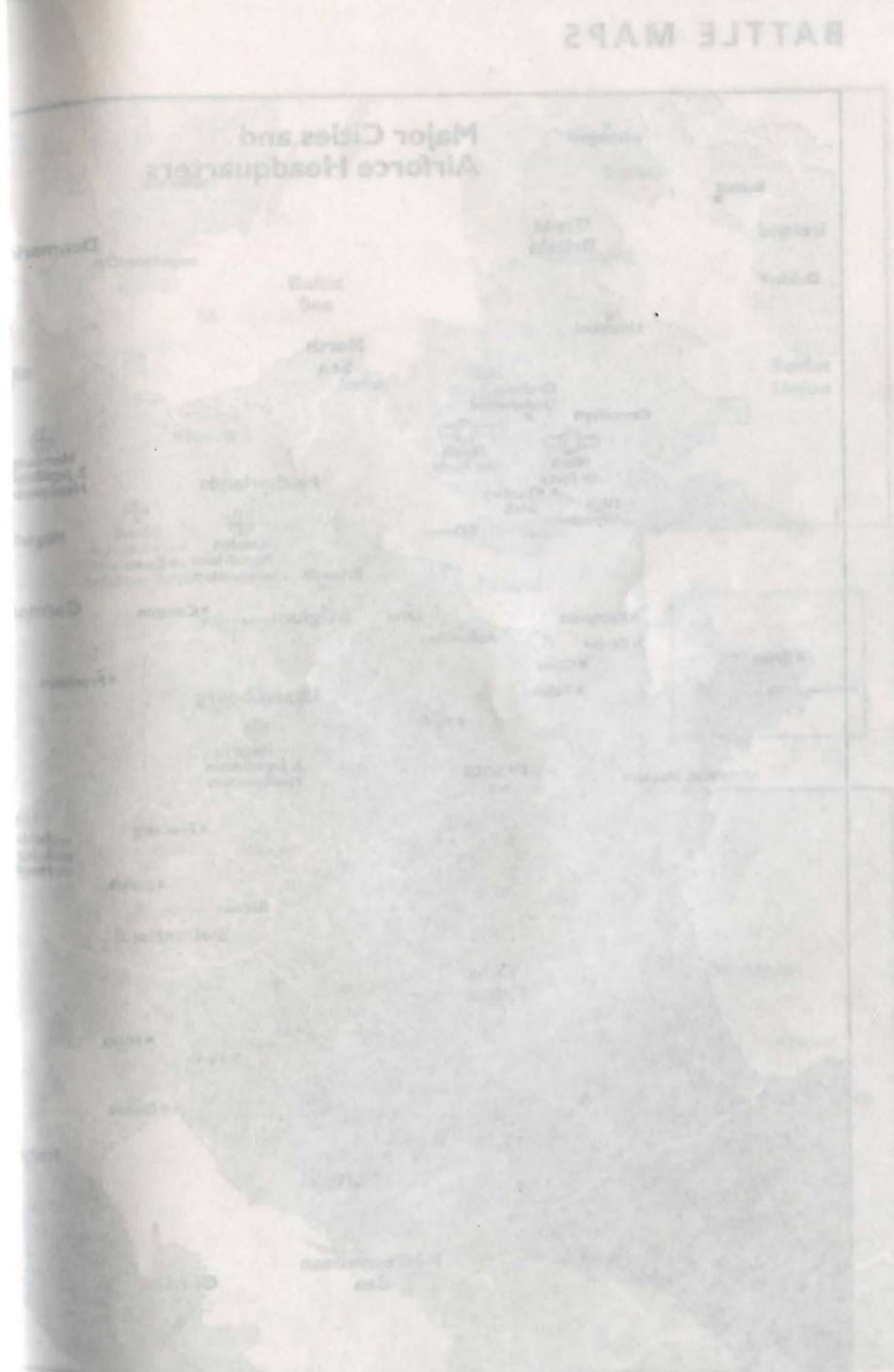
For both the U.S. Army Air Force and the Luftwaffe, promotions in rank were awarded to those pilots who demonstrated success in battle and exhibited qualities of leadership. New Luftwaffe pilots began their careers with the rank of Leutnant, while new U.S. pilots started out with the rank of Pilot Officer.

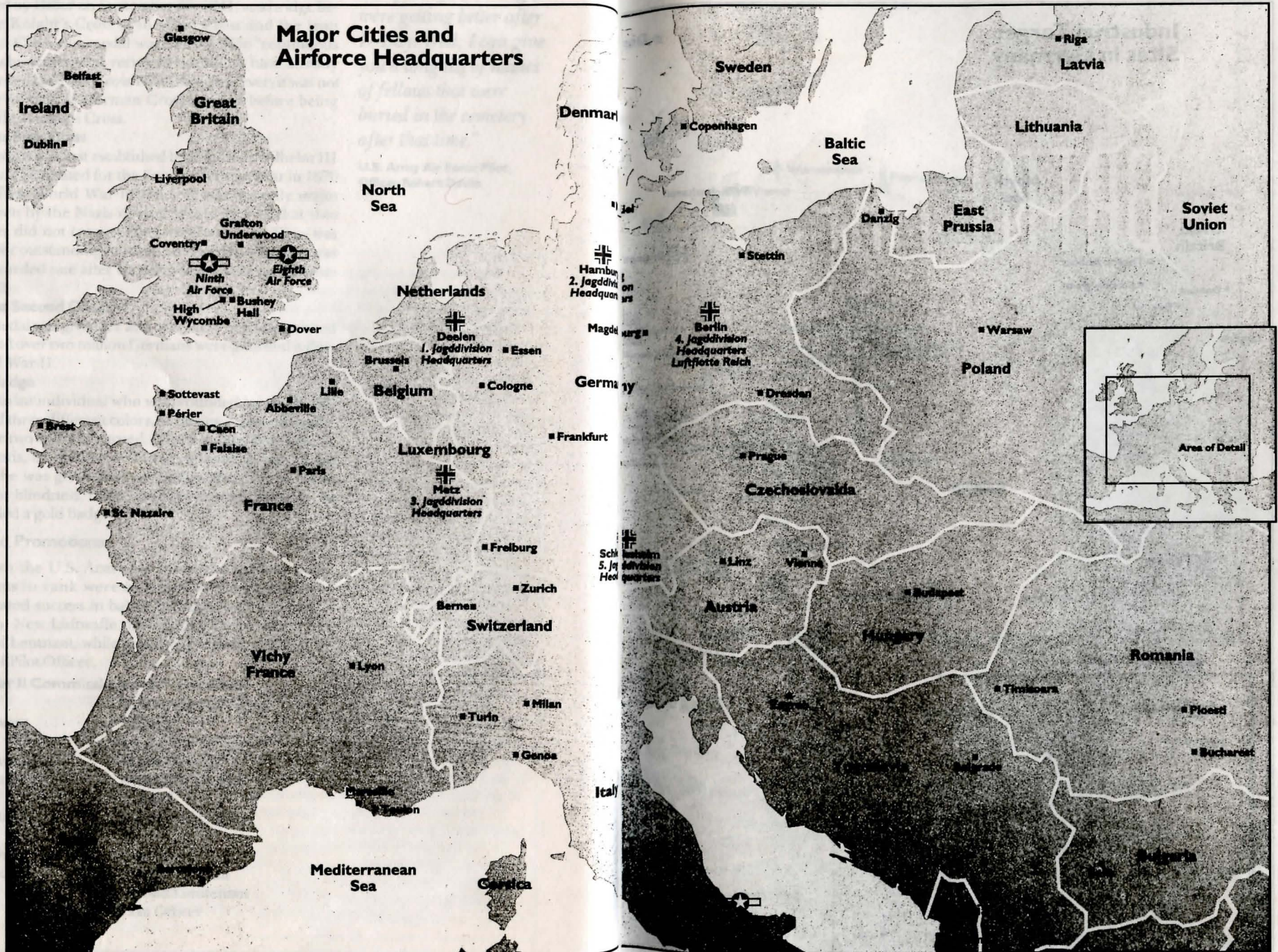
World War II Commissioned Officer's Ranks

Luftwaffe	U.S. Army Air Force
Generaloberst	General
General	Lieutenant General
Generalleutnant	Major General
Generalmajor	Brigadier General
Oberst	Colonel
Oberstleutnant	Lieutenant Colonel
Major	Major
Hauptmann	Captain
Oberleutnant	First Lieutenant
Leutnant	Second Lieutenant
—	Pilot Officer

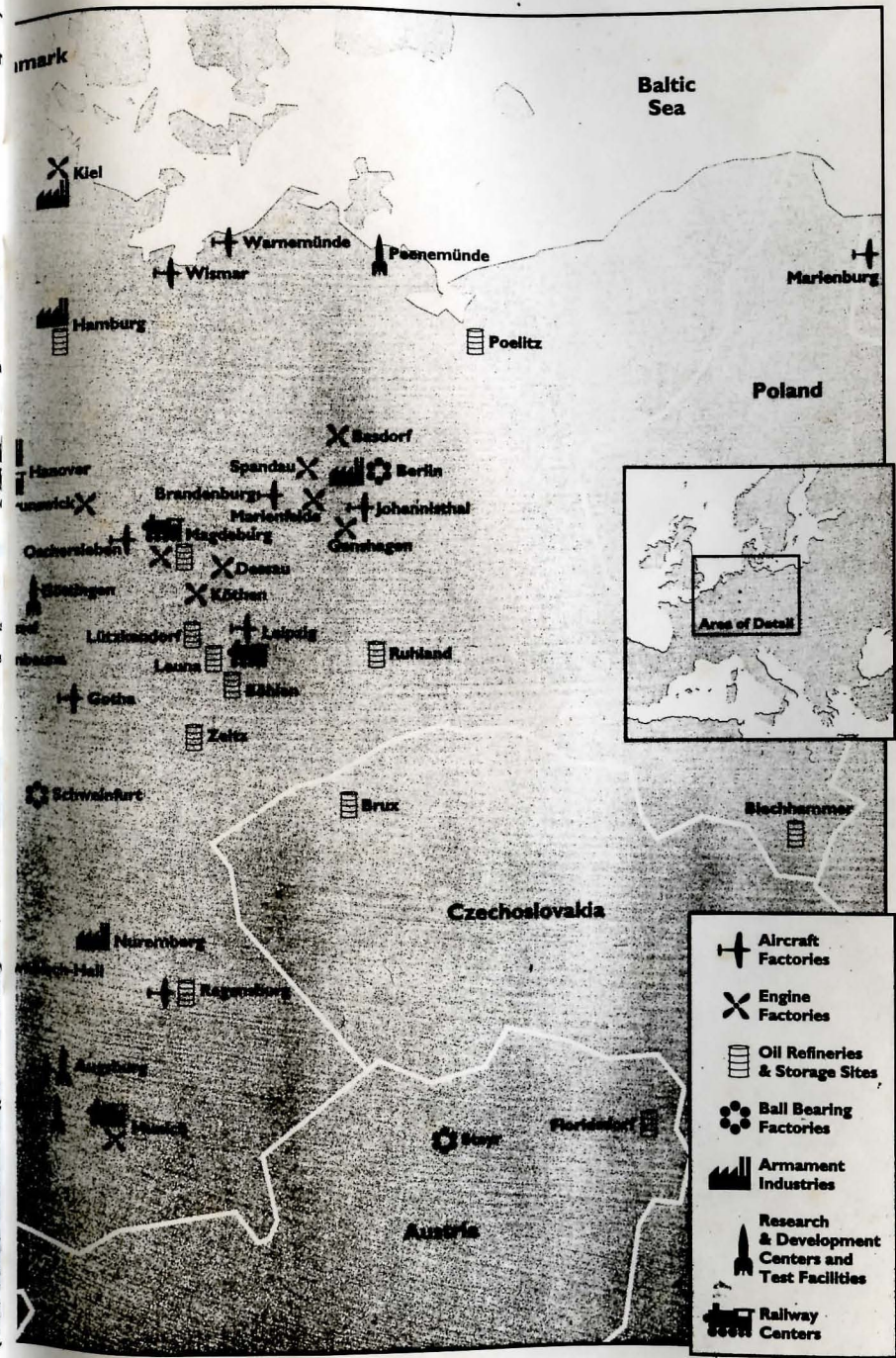
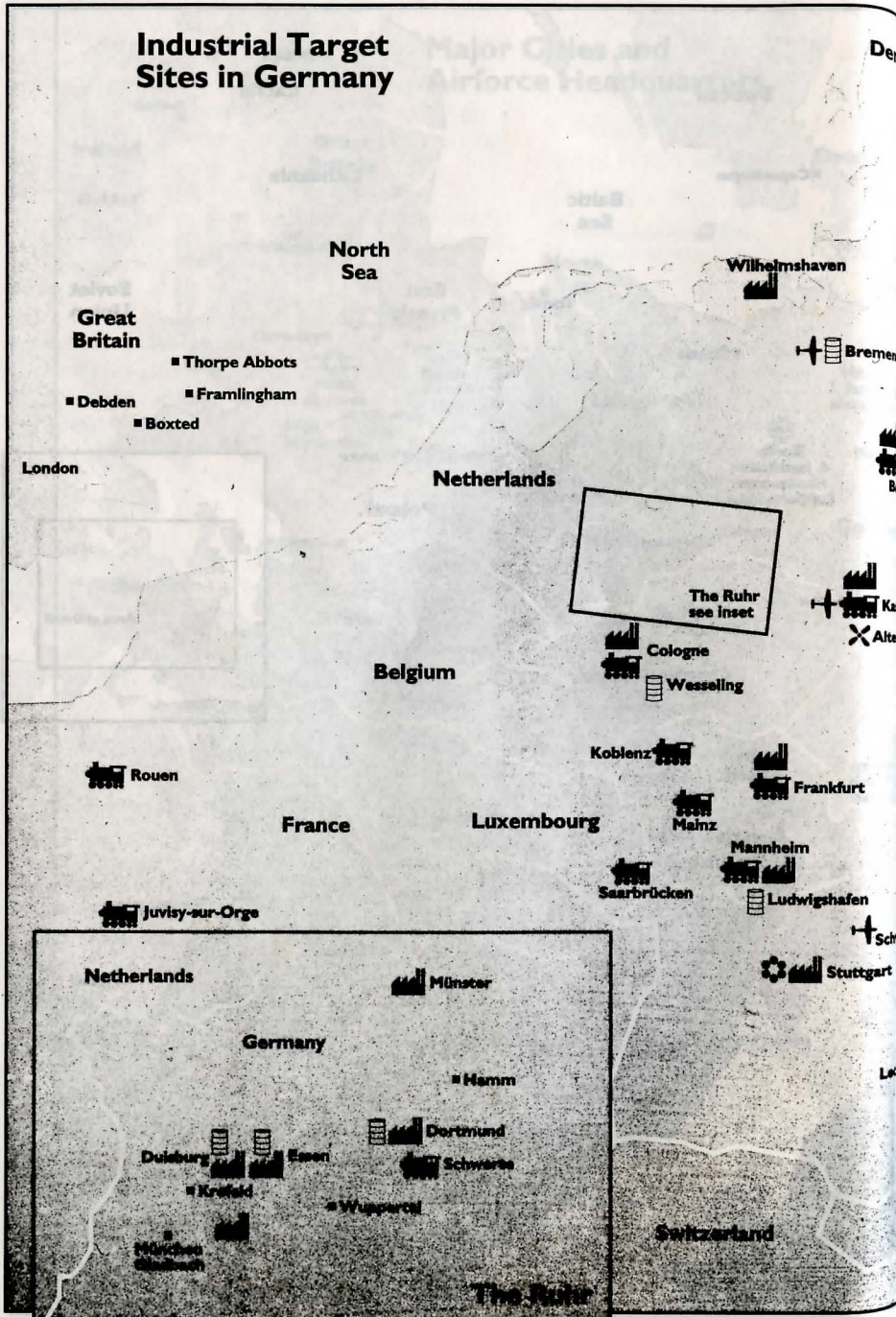
"People say that things were getting better after D-Day. Well, I can give you a long list of names of fellows that were buried in the cemetery after that time."

**U.S. Army Air Force Pilot
Officer Robert Davila**





Industrial Target Sites in Germany



Industrial Target Sites in Germany

