

## KEY COMMANDS QUICK REFERENCE

For a complete list of commands see the appendix of this book, or the “Keyboard Command Reference” topic in online Help.

**Note:** All keyboard commands noted in this manual are the Combat Flight Simulator 2 combat keyboard commands. If you want to change your settings to your own keyboard commands or to Flight Simulator keyboard commands, click **Settings** on the main screen and follow the prompts.

### GAME COMMANDS

Open online Help	<b>F1</b>
Key Commands Quick Reference	<b>F2</b>
Pause	<b>P</b> key
Skip to next action	<b>X</b> key
Bail out	<b>O</b> key (3 times)
Sound (toggle on/off)	<b>Q</b> key
Exit game	<b>CTRL+Q</b>

### FLIGHT CONTROLS

Bank left (ailerons)	Num Pad <b>4</b>
Bank right (ailerons)	Num Pad <b>6</b>
Yaw left (rudder)	Num Pad <b>0</b>
Yaw right (rudder)	Num Pad <b>ENTER</b>
Bank/Yaw Center (ailerons/rudder)	Num Pad <b>5</b>
Pitch down (elevator)	Num Pad <b>8</b>
Pitch up (elevator)	Num Pad <b>2</b>
Elevator trim up	Num Pad <b>1</b>
Elevator trim down	Num Pad <b>7</b>
Retract flaps in increments	<b>V</b> key
Extend flaps in increments	<b>F</b> key

### OTHER AIRCRAFT COMMANDS

Landing gear (toggle)	<b>G</b> key
Brakes	<b>B</b> key
Tail hook	<b>SHIFT+H</b>

### WEAPONRY

Fire guns	<b>SHIFT+SPACEBAR</b>
Fire cannon	<b>CTRL+SPACEBAR</b>
Fire guns and cannon	<b>SPACEBAR</b>
Cycle ordnance type	<b>BACKSPACE</b>
Drop/fire ordnance	<b>ENTER</b>

### VIEWS

Left 45 degrees	<b>SHIFT+Num Pad 7</b>
Left 90 degrees	<b>SHIFT+Num Pad 4</b>
Left 135 degrees	<b>SHIFT+Num Pad 1</b>
Right 45 degrees	<b>SHIFT+Num Pad 9</b>
Right 90 degrees	<b>SHIFT+Num Pad 6</b>
Right 135 degrees	<b>SHIFT+Num Pad 3</b>
Up 45 degrees	<b>SHIFT+Num Pad 8</b>
Up 90 degrees	<b>SHIFT+Num Pad 5</b>
Rear	<b>SHIFT+Num Pad 2</b>
Full screen (toggle)	<b>ALT+ENTER</b>
Cockpit/Full view with HUD/Full view (toggle)	<b>F3</b>
Cycle views	<b>F4</b>
Padlock view (toggle)	<b>`</b> (on the TILDE key )
Padlock view: next target	<b>TAB</b>

### DISPLAY COMMANDS

Cycle through checklists	<b>C</b> key
Tactical display (toggle)	<b>SHIFT+T</b>
Enemy indicator (toggle)	<b>I</b> key
Aircraft labels	<b>CTRL+SHIFT+L</b>
Damage text (toggle)	<b>SHIFT+D</b>
Display coordinates/Frame rate (toggle)	<b>SHIFT+Z</b>

### ENGINE CONTROLS

Display/Hide engine controls	<b>F5</b>
Auto engine start	<b>E</b> key
Decrease throttle	<b>-</b> (MINUS SIGN)
Increase throttle	<b>=</b> (EQUAL SIGN)
Decrease prop RPM	<b>SHIFT+ -</b>
Increase prop RPM	<b>SHIFT+ =</b>
Mixture idle cutoff	<b>SHIFT+3</b>
Lean mixture	<b>CTRL+ -</b>
Increase mixture	<b>CTRL+ =</b>
WEP/MW inj (toggle)	<b>W</b> key

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Manual  
No.2  
10¢

# COMBAT FLIGHT SIMULATOR 2

## WW II PACIFIC THEATER

COMBAT FLIGHT SIMULATOR 2

WW II PACIFIC THEATER

Microsoft



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# COMBAT FLIGHT SIMULATOR 2

WW II Pacific Theater

*TWO BANDITS ARE GUNNING  
FOR YOU HEAD-ON...*

*YOU'RE OUT  
OF FUEL...*

*THERE'S ANOTHER ONE  
ON YOUR SIX AND YOUR  
RUDDER'S JAMMED...*

*YOU'RE STUCK -  
WHAT WILL YOU DO NOW?!*

*READ ON, PILOT...*

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# TABLE OF CONTENTS

<b>ACKNOWLEDGEMENTS</b> .....	<b>1</b>
<b>CHAPTER 1: BEFORE YOU FLY</b> .....	<b>6</b>
<b>All Kinds of Help</b> .....	<b>7</b>
<b>Settings</b> .....	<b>8</b>
What's your game controller setup? .....	8
Making it all look good .....	8
<b>What's New?</b> .....	<b>9</b>
<b>Pacific Theater Features</b> .....	<b>10</b>
New aircraft .....	10
Active campaigns and you .....	12
And, on your wing... ..	12
Know your LSO .....	13
For the latest from the front lines... ..	13
Build your own missions! .....	14
Take the controls! .....	16
<b>CHAPTER 2: GETTING STARTED</b> .....	<b>18</b>
<b>Installing Combat Flight Simulator</b> .....	<b>19</b>
<b>The Main Screen</b> .....	<b>20</b>
Free Flight .....	20
Quick Combat .....	20
Single Missions .....	21
Campaigns .....	23
Multiplayer .....	23
Training Missions .....	24
Your other Main screen options .....	24
<b>Game Controllers</b> .....	<b>24</b>
Flying with a joystick .....	24
<b>Joystick Commands</b> .....	<b>25</b>
Customize your joystick button assignments .....	26



<b>Keyboard Commands</b>	<b>26</b>
Adjusting keyboard sensitivity	27
Flying with a mouse	27
Not so fast, pilot...	28
Tips and tricks	29
<b>Your In-Flight Menu</b>	<b>31</b>
Flights	31
Aircraft	31
World	31
Options	31
Views	32
Help	33
 <b>CHAPTER 3: FLIGHT SCHOOL</b>	 <b>34</b>
<b>First Things First</b>	<b>35</b>
The instrument panel	35
<b>Flight Controls</b>	<b>36</b>
Primary control surfaces	36
Secondary control surfaces	38
<b>Engine Controls</b>	<b>39</b>
Starting the engine	41
<b>Getting Up and Back</b>	<b>43</b>
Taxiing	43
Taking off	44
Using checklists	45
<b>Basic Flight Maneuvers</b>	<b>46</b>
Flying straight-and-level	46
Turning	47
Climbing	48
Don't stall!	49
Don't spin!	51
<b>Why It All Works</b>	<b>52</b>
Lift	52
Playing with lift	53
Weight	53
Thrust	55
Drag	55
Playing with induced drag	56
A few words about torque	56

<b>Basic Aerobatic Maneuvers</b>	<b>58</b>
Aileron Roll	58
Barrel Roll	59
Loop Over	60
Loop Under	61
<b>Carrier Operations</b>	<b>62</b>
Big and small carriers	62
Taking off from a carrier	62
Landing on a carrier	63
<b>CHAPTER 4: COMBAT OPERATIONS</b>	<b>66</b>
<b>Understanding the Pacific Theater of Operations</b>	<b>67</b>
Combat at lower altitudes	68
A hostile environment	69
Landing on small islands and smaller carriers	69
<b>Flying in Different Types of Weather</b>	<b>70</b>
Conditions being normal...	70
Your waypoints are your advantage	71
<b>Differences Between Japanese and U.S. Fighter Operations</b>	<b>72</b>
Aircraft dictate tactics	72
Teamwork makes the difference	73
What matters in combat?	74
<b>Communications</b>	<b>75</b>
Receiving radio transmissions	76
Sending commands to your wingman by radio	77
Nonverbal communications	77
Landing Signal Officer	77
<b>Navigating in the Pacific Theater</b>	<b>78</b>
Navigating over water	79
<b>Gameplay</b>	<b>82</b>
Skipping to next waypoint	82
Slewing in Free Flight and Quick Combat modes	82
<b>CHAPTER 5: EMERGENCY PROCEDURES</b>	<b>84</b>
<b>Damage</b>	<b>85</b>
What causes damage	85
Interpreting damage	86
Sustaining damage	88
What to do if you're hit	91

<b>Emergency Procedures</b>	<b>91</b>
Engine failure during takeoff	91
Engine failure during flight	92
Bailing out, ditching, and survival	93
<b>CHAPTER 6: AIR COMBAT</b>	<b>96</b>
<b>Tools of the Trade</b>	<b>97</b>
Using views	97
Getting a good look	99
Using the Heads Up Display (HUD)	99
Using the Enemy Indicator	100
Using the Tactical Display	100
Displaying aircraft labels	100
Using gunsights	100
Using weapons	101
<b>Japanese Fighter Tactics</b>	<b>102</b>
The five stages of aerial combat	102
Section 8: Air combat in general	104
<b>American Fighter Tactics</b>	<b>109</b>
<b>Air Combat Maneuvers</b>	<b>111</b>
Training Missions	111
Immelmann	112
Lead Turn	113
Lag Turn	114
Scissors	115
Up and Under	116
Strafing	117
Dive-bombing	118
The Break	119
The Split-S	120
The Chandelle	121
Overhead Attack	122
High Side Attack	123
<b>A Few Tips...</b>	<b>124</b>
<b>Tips and Tricks for Specific Aircraft</b>	<b>125</b>
<b>Telling Friend from Foe</b>	<b>125</b>



## **CHAPTER 7: THE MISSIONS** ..... **126**

<b>Mission Types</b> .....	<b>127</b>
Campaigns .....	127
Missions .....	127
Air-to-air missions .....	128
Air-to-ground missions (strikes) .....	129
<b>And Your Mission Is...</b> .....	<b>130</b>
The Mission Briefing .....	130
Getting information while you're flying .....	131
Mission Debriefing .....	131
<b>Managing Your Wing</b> .....	<b>132</b>
Wingmen commands .....	132
<b>Training Missions</b> .....	<b>134</b>
Basic maneuvers .....	135
Aerobatics .....	135
Combat maneuvers .....	136
<b>The Mission Builder</b> .....	<b>136</b>
Taking advantage of the easy-to-use graphical interface .....	138
Creating different types of missions .....	139
Mission Builder shortcut keys .....	140

## **CHAPTER 8: THE CAMPAIGNS** ..... **142**

<b>Flying a Campaign</b> .....	<b>143</b>
Active campaigns .....	143
<b>The Pilot's Career</b> .....	<b>144</b>
Squadron dynamics .....	145
Success and failure .....	146
<b>Campaign Parameters</b> .....	<b>146</b>
<b>Your Strategy</b> .....	<b>147</b>
What to do when you lose pilots .....	147
Short-term success (a mission within a campaign) .....	147
Long-term success (winning the entire campaign) .....	148
<b>Who Will Control the Pacific?</b> .....	<b>149</b>
The opening assault .....	149
Japanese strategy .....	150
Allied counter-offensive .....	150

<b>The Battles</b>	<b>155</b>
Wake Island (December 9 1941)	155
Counterattack in the Marshall and Gilbert Islands (February 1 1942)	157
Approaching Rabaul (February 20 1942)	159
The New Guinea campaign (1942–1945) and the Battle of the Bismarck Sea (March 2–4 1943)	161
Battle of the Coral Sea (May 8 1942)	163
Battle of Midway (June 4 1942)	165
Guadalcanal campaign (August 7 1942–February 21 1943)	167
Battle of the Eastern Solomons (August 23–25 1942)	169
Battle of Santa Cruz Islands (October 26 1942)	171
The Fight for Munda in the Central Solomons (January–June 1943)	173
Gilbert Islands (November 18–23 1943)	175
Marshall Islands (January 29–31 1944)	177
Battle of the Philippine Sea (June 19–21 1944)	179
 <b>CHAPTER 9: FOR EXCEPTIONAL SERVICE...</b>	 <b>180</b>
<b>The Reward System</b>	<b>181</b>
<b>Promotions, Medals, and Awards</b>	<b>182</b>
Promotions	182
Awards	183
Japanese medals and awards	184
American medals and awards	187
 <b>CHAPTER 10: HALL OF FAME</b>	 <b>190</b>
<b>Japanese Aces</b>	<b>191</b>
Tetsuzo Iwamoto, 1916–1955 (IJN; ≈ 80 victories)	191
Kaneyoshi Muto, 1916–1945 (IJN; ≈ 30 victories)	192
Shigeo Nango, 1917–1944 (IJA; 15 victories)	193
Hiroyoshi Nishizawa, 1920–1944 (IJN; 86 victories)	193
Toshio Ota, 1919–1942 (IJN; 34 victories)	195
Saburo Sakai, 1916– (IJN; 64 victories)	196
Junichi Sasai, 1918–1942 (IJN; 27 victories)	198
Shoichi Sugita, 1924–1945 (IJN; 30+ victories)	199
<b>American Aces</b>	<b>200</b>
Harold William “Joe” Bauer, 1908–1942 (USMC; 11 victories)	200
Joseph Jacob “Joe” Foss, 1915– (USMC; 26 victories)	201
Gregory “Pappy” Boyington, 1912–1988 (USMC; 28 victories)	202

Marion Carl, 1915–1998 (USMC; 18.5 victories) . . . . .	203
Richard Bong, 1920–1945 (USAAF; 40 victories) . . . . .	204
Thomas McGuire, 1920–1944 (USAAF; 38 victories) . . . . .	205
David McCampbell, 1910–1996 (USN; 34 victories) . . . . .	205
Edward “Butch” O’Hare, 1914–1943 (USN; 7 victories) . . . . .	206
John S. “Jimmy” Thach, 1905–1981 (USN; 7 victories) . . . . .	207
<b>Key Players of the War . . . . .</b>	<b>208</b>
Isoroku Yamamoto (1884–1943) . . . . .	208
Chester Nimitz (1885–1966) . . . . .	209
Chuichi Nagumo (1887–1944) . . . . .	210
William F. Halsey (1882–1959) . . . . .	211
<b>The Historical Advisors . . . . .</b>	<b>212</b>
Saburo Sakai . . . . .	212
Joe Foss . . . . .	213
Bob Campbell & Mike Weide . . . . .	215
From Bob Campbell’s WW II Diary (unpublished) . . . . .	216
 <b>CHAPTER 11: MACHINES OF WAR . . . . .</b>	 <b>218</b>
<b>The Fighter Planes . . . . .</b>	<b>219</b>
<b>Player-Flyable Aircraft . . . . .</b>	<b>221</b>
Mitsubishi A6M2 (Model 21) Reisen (Type Zero Fighter) “Zeke” (IJN) . . . . .	221
Tips for combat—Zero A6M2 . . . . .	223
Mitsubishi A6M5 (Model 52) Reisen (Type Zero Fighter) “Zeke” (IJN) . . . . .	224
Tips for combat—Zero A6M5 . . . . .	225
Kawanishi N1K2-J Shiden-kai (Violet Lightning, improved) “George” (IJN) . . . . .	226
Tips for combat—Shiden-kai . . . . .	227
Grumman F4F-4 Wildcat (USN) . . . . .	228
Tips for combat—Wildcat . . . . .	229
Grumman F6F-3 Hellcat (USN) . . . . .	230
Tips for combat—Hellcat . . . . .	231
Lockheed P-38F Lightning (USAAF) . . . . .	232
Tips for combat—Lightning . . . . .	234
Vought F4U-1A Corsair (USN, USMC) . . . . .	235
Tips for combat—Corsair . . . . .	236
<b>Other (Non-Player-Flyable) aircraft . . . . .</b>	<b>237</b>
Bell P-39D Airacobra (USAAF) . . . . .	237
Nakajima Ki-43-IIb Hayabusa (Peregrine falcon) “Oscar” (Japanese Army) . . . . .	239
Aichi D3A1 “Val” dive-bomber (IJN) . . . . .	240



Mitsubishi G4M2 “Betty” medium bomber (IJN) .....	241
Nakajima B5N2 “Kate” torpedo bomber (IJN) .....	242
Douglas TBD-1 Devastator torpedo bomber (USN) .....	243
Grumman TBF-1 Avenger torpedo bomber (USN) .....	244
Douglas SBD-2 Dauntless dive-bomber (USN) .....	245
North American B-25D/PBJ Mitchell medium bomber (USN) .....	246
Douglas C-47 Skytrain (USAAF)/R4D (USN) Transport .....	247
Consolidated PB4Y/B-24D Liberator heavy bomber (USN) .....	248
<b>Fighter Aircraft Strengths &amp; Weaknesses .....</b>	<b>250</b>
<b>The Warships .....</b>	<b>252</b>
Japanese capital ships .....	252
U.S. capital ships .....	255
<b>Other Vessels &amp; Vehicles .....</b>	<b>259</b>
Japanese vessels & vehicles .....	259
U.S. vessels & vehicles .....	261
<b>Aircraft Armaments .....</b>	<b>264</b>
Rifle-Caliber (Light) Machine Guns .....	264
Heavy Machine Guns .....	265
Aircraft Cannon .....	266
<b>Rockets .....</b>	<b>268</b>
 <b><i>JOYSTICK AND KEYBOARD COMMANDS .....</i></b>	 <b><i>270</i></b>
<b>Joystick Commands .....</b>	<b>270</b>
<b>Keyboard Commands .....</b>	<b>271</b>
<b>Flight Commands .....</b>	<b>272</b>
<b>Engine Commands .....</b>	<b>273</b>
<b>Other Aircraft Commands .....</b>	<b>274</b>
<b>Weaponry Commands .....</b>	<b>274</b>
<b>Basic View Commands .....</b>	<b>275</b>
<b>Panning View Commands .....</b>	<b>277</b>
<b>Display Commands .....</b>	<b>278</b>
<b>Windows .....</b>	<b>279</b>
<b>Slewing in Free Flight and Quick Combat .....</b>	<b>280</b>
 <b><i>RECOMMENDED READING .....</i></b>	 <b><i>282</i></b>
<b><i>GLOSSARY .....</i></b>	<b><i>286</i></b>
<b><i>TECHNICAL SUPPORT .....</i></b>	<b><i>296</i></b>
<b><i>INDEX .....</i></b>	<b><i>298</i></b>

# GRATEFUL ACKNOWLEDGEMENT

A great deal of research went into *Microsoft® Combat Flight Simulator 2 WW II Pacific Theater*. There is an immense amount of material about the air war in the Pacific—published and unpublished—but a far larger body of material is stored in various archives.

To provide added historical and technical depth and detail we visited the National Archives, the U.S. Naval Historical Center, and the National Air and Space Museum library and archive in Washington, D.C.

We were also fortunate to be able to draw on the impressive resources of the Confederate Air Force's archive and American Airpower Heritage Museum in Midland, Texas. Two other outstanding aircraft museums—the Champlin Fighter Museum and the New Zealand Fighter Pilots Museum—provided opportunities to photograph rare Japanese aircraft from the Pacific war.

## ***The National Archives and Records Administration (NARA)***

The massive Archives II facility in College Park, Maryland, maintains paper documents back to 1789, including thousands of boxes of original U.S. Army and Navy WWII intelligence reports and technical data. NARA also houses an enormous

quantity of photographs, negatives, film, and video. We came away with some stunning and rarely seen material, including:

- Hundreds of pages of original documents from 1942 to 1945, including combat reports, operation plans, aviation unit war diaries, and aircraft technical data. Highlights included a lengthy discussion of “Colonel Boyington’s Combat Tactics” in the VMF-214 War Diary, and an in-depth Bureau of Aeronautics interviews with fighter pilots John S. “Jimmy” Thach and Joe Foss.
- Hundreds of original photographs from the Pacific theater in WWII, including seldom-seen Japanese war art.
- Rare shipboard and gun camera footage.

Archivist Sandy Smith deserves special thanks for guiding us to some remarkable materials.

## ***The U.S. Naval Historical Center (NHC)***

Located at the Old Navy Yard in Washington, D.C., the Naval Historical center is a treasure trove of historical material on naval aviation. The archivists and historians of NHC’s Operational Archives

Branch and the Naval Aviation History Office guided us to a wealth of material, including:

- Hundreds of period Navy and Marine Corps photos from the Pacific theater.
- Photocopied and microfilmed documents, including U.S. intelligence reports, air target bulletins, and squadron histories.
- A variety of translated Japanese documents, including technical data, assessments of enemy strength and tactics, diaries, and tactical doctrine.

Kathy Lloyd, Head of Reference at the NHC's Operational Archives Branch, steered us to invaluable reference materials in the center's archive. Historians Mark Evans and Todd Baker and archivist Jack Green provided access to aircraft technical data and a unique collection of historical photos.

### ***The National Air and Space Museum (NASM)***

The top floor of the National Air and Space Museum houses a library and archive of historical and technical data where we acquired American and Japanese technical data, including:

- Aircraft manuals
- Flight test data and engineering reports
- Blueprints and drawings
- Pilot handbooks



### ***The Confederate Air Force (CAF)***

The Microsoft Combat Flight Simulator team established a working relationship with the Confederate Air Force while developing version 1, the European Theater of Operations. For version 2 we were able to photograph and record several aircraft owned by CAF members at various locations, and did research at the CAF's excellent archive and American Airpower Heritage Museum in Midland, Texas. The CAF management and staff guided us through their collections and archive, and we came away with:

- U.S. Navy pilot training materials.
- Aircraft manuals and technical data.
- Images of U.S. and Japanese medals and memorabilia.
- Transcripts and recordings from the CAF's ongoing oral history project.

CAF Executive Director Bob Rice, American Airpower Heritage Museum director Tammi O'Bannion, curator Therese Buckley, and Oral History curator Stan Spurgeon made sure we had access to all aspects of the CAF's museum, archive, and collections. Museum interns Robert Tidwell and Chris Trobridge guided us to an array of historical materials.



### ***Champlin Fighter Museum***

We worked with Champlin Fighter Museum in Mesa, Arizona, during production of Combat Flight Simulator 1, photographing and recording some of their outstanding collection of fighter aircraft. This relationship continued during the new Pacific theater version, when we arranged to photograph the extremely rare Kawanishi *Shiden-kai* (“George”) fighter displayed at Champlin. On loan from the National Air and Space Museum, this *Shiden* was restored at Champlin, and is probably the best remaining example anywhere in the world. Our thanks to Bill Rummer, Champlin’s Executive Director, for making this possible.

### ***The New Zealand Fighter Pilots Museum***

Our special thanks go to Ian Brodie, curator of the New Zealand Fighter Pilots museum, for taking the time to provide detailed photography of the museum’s beautifully restored Nakajima *Hayabusa* (“Oscar”) fighter. Like Champlin’s *Shiden*, this aircraft is one of the gems among surviving Japanese aircraft from the Pacific war.

We want to extend our sincere appreciation to the people at each of these facilities who took the time and effort to guide us to so much rare and seldom-seen material. They have helped us to make Combat Flight Simulator 2 the most historically detailed, technically accurate, and immersive historical flight simulator on the market.

### ***The Historical Advisors***

During our research, we had the rare opportunity to interview two living legends of the air war in the Pacific, **Saburo Sakai** and **Joe Foss**, whose biographies are included in Chapter 10, **Hall of Fame**. We have gathered a collection of quotes from the memoirs of these famous aviators, and from their recent interviews.

We were also fortunate to find two veteran naval aviators in our own backyard. **Bob Campbell** and **Mike Weide** have been kind enough to share their wartime reminiscences, photos, and records with us, and to spend time answering a barrage of questions about U.S. aircraft and carrier operations during the last year of the war. See the Hall of Fame chapter for their contributions as well.

We want to thank John F. Hall, who as a young Lt. (jg) served as a gunnery and communications officer aboard the light aircraft carrier *USS Bataan* (CVL29) in 1944–45. His generous loan of the *USS Bataan* “yearbook” and other memorabilia, and his patience in answering questions about shipboard life during the war in the Pacific helped to make Combat Flight Simulator 2 more detailed and immersive.

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# BEFORE YOU FLY

1

CHAPTER





*MICROSOFT® COMBAT FLIGHT SIMULATOR 2: WW II PACIFIC THEATER, PUTS YOU IN THE COCKPIT OF A FIGHTER AIRCRAFT, THEN SENDS YOU SOARING INTO THE UNFORGIVING SKIES OVER THE PACIFIC DURING WWII. AS BULLETS TEAR INTO YOUR TAIL, SHOOT DOWN THE ENEMY—THEN NAIL THAT TRICKY CARRIER LANDING!*

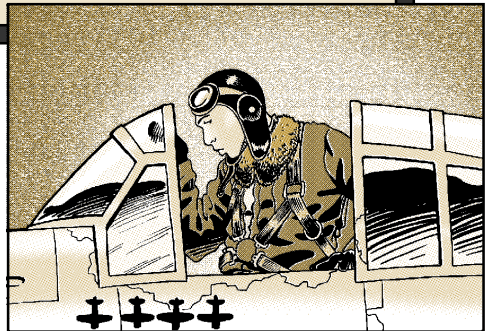
*IN THIS CHAPTER*

- *ALL KINDS OF HELP*
- *SETTINGS*
- *WHAT'S NEW*
- *PACIFIC THEATER FEATURES*

## ALL KINDS OF HELP

This manual will teach you the basics of flight and combat tactics, and give you a sure hand on the throttle. In addition, Combat Flight Simulator contains other kinds of help for you.

- ◉ **Online Help**—Press **F1** or click Online Help from the Help option on the in-flight menu for in-depth coverage of the topics in this book, late-breaking technical info, flight tips and tricks, and additional step-by-step procedures.
- ◉ **Key Command Quick Reference**—Press **F2** at any time for a list of key commands.



- ◉ **Mouse Rollover Help and What's This?**—To learn what an instrument is, move your pointer over the item. The name of the instrument will appear. If the item is a gauge, such as an altimeter or an airspeed indicator, the information is “dynamic”; in other words, information about your altitude or how fast you're going will also display. To find out exactly what that instrument *does*, right-click it, and then click **What's This?** on the menu that appears.



*A Navy Hellcat poised for takeoff. Note the signal officer at left, background, ready to drop his checkered flag. (Corbis)*

You don't have to have a **joystick**, **throttle control**, or **rudder pedals** to play Combat Flight Simulator, but these accessories give you a more genuine in-flight feel. If you do have one or more of these accessories, make sure they're properly installed and set

up in Windows®, enabled in Combat Flight Simulator, and configured to work the way you want and expect them to. For more information on your game controllers, take a look at Chapter 2, **Getting Started**.

## SETTINGS

### ***What's your game controller setup?***

Combat Flight Simulator is designed to run on a variety of computers with different accessories. Before you fly, make sure that you've set up your computer system *and* Combat Flight Simulator to make the most of the hardware you've got. How well Combat Flight Simulator runs on your system depends largely on how you set certain options.

### ***Making it all look good***

Check your screen resolution. Your computer must be capable of running its screen resolution at 800 x 600. But if you've got a fast system, try setting the resolution higher than 800 x 600; this way, you'll get the most realistic experience without sacrificing too much in performance.

***"...EVERYBODY TALKS ABOUT AERIAL COMBAT. I MAINTAIN THAT HITTING GROUND TARGETS-AND ESPECIALLY SHIPS-IS MORE DANGEROUS THAN AERIAL COMBAT."***

***-CFS2 ADVISOR JOE FOSS,  
PRIVATE INTERVIEW, MARCH 2000***

**Note:** If you plan to design and build your own missions, keep in mind that the **Mission Builder** included with Combat Flight Simulator 2 requires that your screen resolution be set to 1024 x 768.

If you've got a 3-D card installed, make sure you enable it. Experiment with your display settings in Combat Flight Simulator; it's the only way you'll find the best balance between the level of scenery detail you want to see and the level of performance you want. And remember, you can always make your flights more challenging and realistic by adjusting options like the sensitivity of the flight controls, the realism level of the flight model, and the skill level of the enemy.



#### **To check or change your settings**

- On the Main screen, click **Settings**.



*WAFS (Women's Auxiliary Ferrying Station) leaving hangar to fly planes, 9/23/42. (Corbis)*

## **WHAT'S NEW?**

Combat Flight Simulator offers some great new features aimed squarely at making your combat experience as real as it can be. You can look forward to even more detailed scenery and enhanced damage effects that feature details like the fireball that occurs when you've punctured the enemy's fuel line—in real time. And, of course, you'll be searing the wartime skies in aircraft that look and perform just like those flown in the Pacific theater. Here is a sampling of the new and enhanced features in this version of Combat Flight Simulator.

- **Advanced level of aircraft detail.**  
The aircraft you're flying feels like the real thing.
- **Increased and advanced damage effects.** You'll see and feel the damage—just try and bring that baby down after your wingtip has been shot off. You'll also be able to see the damage *you've* inflicted from your cockpit.
- **A new, scrollable virtual cockpit system** that's fully 3-D; you'll see moving control surfaces and damage. Also, Heads Up Display (HUD) is now available in Virtual Cockpit view, so you can see critical information from the panel even when it's not in view.

- ◉ **Active missions and campaigns.** How well you do in your current mission determines the next mission you fly, and the fate of the campaign overall.
- ◉ **Wingmen and squad-mates.** You can coordinate attacks and even generate in-flight maneuvers, and your wingmen and squad-mates will respond.
- ◉ **Landing signal officer (LSO).** Your LSO is on deck to help you negotiate those challenging carrier landings.
- ◉ **Scuttlebutt.** Get the latest “skinny” from the front lines.
- ◉ **Smarter computer-controlled aircraft.** AI aircraft are ready to attack and react in real time, and put your feet to the fire.
- ◉ **The Mission Builder.** This long-awaited feature is a stand-alone application that you can use to create and edit your own missions. It’s a graphical tool, making it easier to make changes and see them as they happen.

## PACIFIC THEATER FEATURES

### *New aircraft*

The aircraft that flew in the Pacific had to meet its unique demands, running the gamut from furious dogfights to carrier operations. These planes offer a mix of strengths and weaknesses. It’s on *you* to make the most of both. Here are the new player-flyable aircraft:

- ◉ **Mitsubishi A6M2 Reisen (Zero Fighter) or “Zeke” (JNAF)**
- ◉ **Mitsubishi A6M5 Reisen (Zero Fighter) or “Zeke” (JNAF)**
- ◉ **Kawanishi N1K2-J Shiden (Violet Lightning) or “George” (JNAF)**
- ◉ **Lockheed P-38F Lightning (USAAF)**
- ◉ **Vought F4U-1A Corsair (USMC)**
- ◉ **Grumman F4F-4 Wildcat (USN)**
- ◉ **Grumman F6F-3 Hellcat (USN)**

***"KEEP IN MIND THE FACT THAT ALTITUDE IS BETTER THAN A STOUT HEART."***

*—JAPANESE FIGHTER TACTICS  
(FROM DECEMBER 1943 DOCUMENT CAPTURED ON SAIPAN)*



And these computer-controlled aircraft take to the skies with you or against you:

- ◉ **Nakajima Ki-43-lib Hayabusa (Peregrine) or “Oscar” (JAAF)**
- ◉ **Nakajima B5N2 or “Kate” (JNAF)**
- ◉ **Douglas TBD-1 Devastator (USN)**
- ◉ **Aichi D3A1 or “Val” (JNAF)**
- ◉ **Douglas SBD-2 Dauntless (USN)**
- ◉ **Grumman TBF Avenger (USN)**
- ◉ **Mitsubishi G4M2 or “Betty” (JNAF)**
- ◉ **North American B-25D Mitchell (USAAF)**
- ◉ **Douglas C-47 Skytrain (USAAF)**
- ◉ **Bell P-39D Airacobra (USAAF)**
- ◉ **Consolidated B-24D Liberator (USAAF)**

For all the specs, strengths and weaknesses, and thorough descriptions of these aircraft, see Chapter 11, **Machines of War**.



*Japanese pilots await flying orders.  
(Maru magazine)*



**For a closer look at the aircraft**

- From the Player Aircraft screen, click **Plane Tour**.

*"DOPE IS OUT THAT A COUPLE OF CARRIERS ARE IN THE MARSHALLS. LOOKS LIKE CONTACT IS CERTAIN FOR THIS TRIP. OUR CANS HAD A SUB ON THEIR ASDICS (SONAR) AT SUNSET, BUT IT GOT AWAY. I'M AFRAID THE (JAPANESE) KNOW OUR POSITION TO THE INCH. NOTHING SIGHTED DURING THE DAY. WISH WE HAD THOSE SELF-SEALING TANKS AND ARMOR PLATE NOW."*

*—FIGHTING SQUADRON SIX (VF-6) OFFICIAL HISTORY, "SOME SCUTTLEBUTT"*

### **Active campaigns and you**

When you're in it for the long haul, Combat Flight Simulator's active campaigns place the burden of outcome on you, the pilot. While firmly grounded in historic reality, how a campaign ends depends on you: your aircraft, your combat skills, and your success against the enemy. The campaign will end as it ended at the time, but the battles you fight depend on your performance. See Chapter 8, **The Campaigns**, for detailed information.

### **And, on your wing...**

You're not hanging out there on your own. You have wingmen to watch your six o'clock position and just maybe save your tail. You can call in your wingman to help you annihilate that enemy fighter that just dove out of the clouds; request that your wingman rejoin formation; tell your wingman that it's time to split formation; or, when the soup has gotten just a little too thick, call in your best wingman with the **Help Me!** command.

You can do all this with quick keyboard shortcuts. See Chapter 7, **The Missions**, for the details.



*Zero at Japanese base. (Maru magazine)*

### **Know your LSO**

Combat Flight Simulator 2 gives you the chance to test your mettle and land on a moving carrier. You'll experience the thrill of approach and landing on a carrier, complete with an animated landing signal officer (LSO) guiding you in or waving you off.



#### **To display your LSO**

- Press **SHIFT+L**.

You'll see a window displaying your LSO, giving you any of nine commands. Follow your LSO's suggestions until he makes the critical "cut" or "waveoff" signal. You'd best take these two commands seriously; it means the difference between landing on the deck or in the drink.

To learn more about the LSO, see the "Carrier Operations" section in Chapter 3, **Flight School**.

### **For the latest from the front lines...**

The Scuttlebutt screen gives you the latest scoop and strategy from the front lines. The scuttlebutt includes information that you want to know; it might just help you succeed in your mission. But pay attention closely and keep your judgment sharp; it's up to you to use the scuttlebutt wisely.



#### **To get the latest scuttlebutt**

1. On the Squadron screen, click **Scuttlebutt**.
2. Scan the screen and listen for the latest news, and then click **Close**.



*Zero taxiing from Japanese base. (Maru magazine)*



*Loading .50-caliber ammo on a Navy fighter. (U.S. Navy)*

### ***Build your own missions!***

Combat Flight Simulator 2 includes a **Mission Builder**, a full-featured tool for creating and editing missions. The Mission Builder is a stand-alone application that you launch from your computer's Start menu. The Mission Builder features a graphical interface that takes the guesswork out of creating and editing missions.

When you use the Mission Builder, you'll see what you're creating visually represented on a map that mirrors your chosen theater of battle. The Mission Builder is designed with ease of use in mind, so you can focus on planning and creating your missions rather than figuring out how to use the tools.

#### **Mission Builder features**

- ⊙ A clear and crisp graphical interface; you'll see a mission evolve before your eyes.
- ⊙ Drag-and-drop object placement.
- ⊙ Dialog boxes in which you can fine-tune objects, waypoint routes, event areas, and so on.
- ⊙ An Information Area that gives you exact heading and bearing information as you place your objects. Create and edit flights at will; if you're willing to put in the design work, you never have to fly the same mission twice!
- ⊙ The ability to import missions from Combat Flight Simulator, version 1 (the European theater) and adapt and save them in version 2 (Pacific theater) format.

- ⊙ The ability to test missions during the design process by launching Combat Flight Simulator from within the Mission Builder.
- ⊙ The ability to create and place objects with a couple of clicks of the mouse.
- ⊙ The ability to create or select an object, and then just move the mouse and click the chart area to create the waypoints that you want.

**Note:** Because the Mission Builder is so powerful and complex, it's aimed at the advanced user. If you don't have a lot of experience designing missions, it'll take some practice to design them.



**To start the Mission Builder**

1. On the Windows® Start menu, select Programs/Microsoft Games/Combat Flight Simulator 2/Mission Builder.
2. Click **Mission Builder**.

For more information, see Chapter 7, **The Missions**, as well as the Help system included with the Mission Builder. For the most up-to-date information on the Mission Builder and creating, editing, and importing missions, go to the Combat Flight Simulator Web site:

[www.microsoft.com/games/combatfs](http://www.microsoft.com/games/combatfs)



*Ordnance crew loads 5-inch rockets onto a fighter-bomber. (U.S. Navy)*



*Ordnance crew prepares to load torpedoes. (U.S. Navy)*

### ***Take the controls!***

Now that you've had a taste of what you can expect in the Pacific, as well as some of the pre-flight preparation necessary to get you there, it's time to climb into the cockpit and get into combat. Well, almost. Take a minute before you hit the flight deck and look at Chapter 2, **Getting Started**. Here you'll get the inside track on how to prepare for combat, fly over water, and other crucial briefings.

And if it feels like that flight training school was long ago and far away, brush up on your flight skills by looking at Chapter 3, **Flight School**. Use your skills well, keep a cool head, and nail that enemy fighter. Good luck!



Walt Disney designed a number of military patches during the war, among them Fifinella, the heroic mascot of the Women Airforce Service Pilots. (WASP patch courtesy of the Confederate Air Force)

## **WOMEN AIRFORCE SERVICE PILOTS (WASP)**

***BETWEEN SEPTEMBER 1942 AND DECEMBER 1944 MORE THAN 1,000 AMERICAN WOMEN VOLUNTARILY SERVED THEIR COUNTRY AS FERRY PILOTS, INSTRUCTORS TEACHING MALE FLIGHT TRAINEES, AND TEST PILOTS. THIRTY-EIGHT OF THEM DIED IN THIS SERVICE.***

***IT ALL BEGAN IN 1942 WITH THE WOMEN'S AUXILIARY FERRYING SQUADRON (WAFS), 25 EXPERIENCED FEMALE PILOTS UNDER THE COMMAND OF NANCY HARKNESS LOVE. WITHIN MONTHS FAMOUS PRE-WAR AVIATOR JACQUELINE COCHRAN GOT AIR FORCE CHIEF HAP ARNOLD'S APPROVAL TO BUILD A SECOND ORGANIZATION, THE***

***WOMEN'S FLYING TRAINING DETACHMENT (WFTD). ABOUT 300 GRADUATES OF THIS PROGRAM JOINED THE WAFS. IN JULY 1943 THE WAFS AND WFTD COMBINED TO FORM THE WOMEN AIRFORCE SERVICE PILOTS (WASP).***

***WASPS FLEW EVERY TYPE OF U.S. MILITARY AIRCRAFT, FROM AT-6 TRAINERS TO THUNDERBOLT FIGHTERS TO B-29 BOMBERS-AND THEY DID IT ALL WITHOUT HEALTH OR DEATH BENEFITS. WHEN A WASP WAS KILLED IN THE LINE OF DUTY, THE WOMEN THEMSELVES HAD TO PAY TO SHIP THE BODY HOME.***

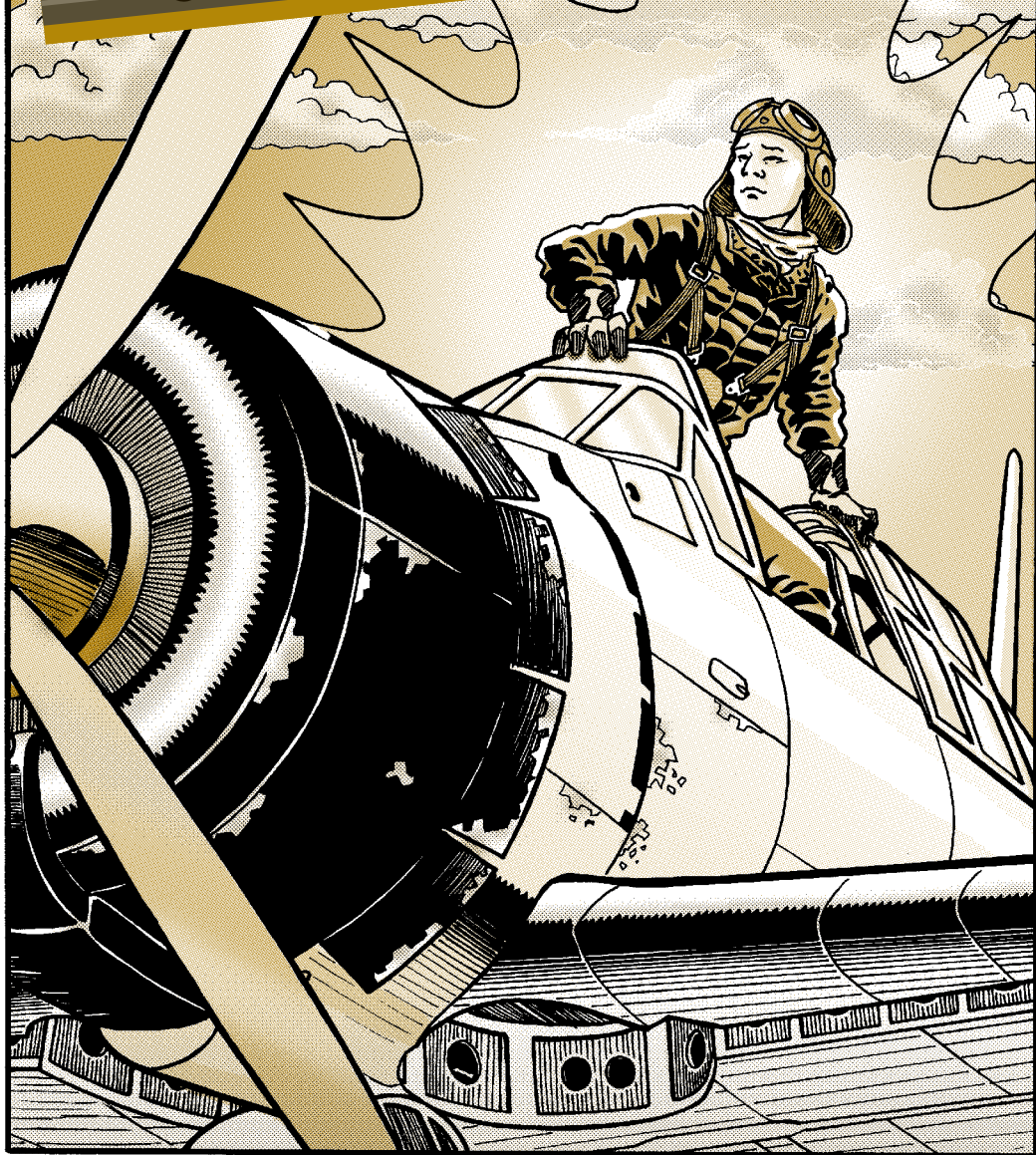
***AS ALLIED VICTORY BEGAN TO LOOK MORE LIKELY, AND MALE PILOTS BEGAN TO RETURN FROM OVERSEAS DUTY, THE GOVERNMENT DISBANDED THE WASPS ON DECEMBER 20 1944. WASPS RECEIVED NO FORMAL RECOGNITION FOR THEIR CONTRIBUTION IN WWII, AND NO VETERANS' BENEFITS, UNTIL 1979.***



# GETTING STARTED

2

CHAPTER

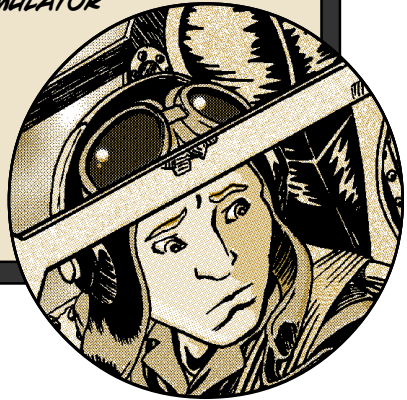




*FOR A SMOOTH FLIGHT, MAKE SURE YOU'RE PREPARED. YOUR GAME CONTROLLER SHOULD WORK JUST LIKE YOU WANT IT TO, YOU SHOULD KNOW YOUR WAY AROUND WITH THE CLICK OF A BUTTON, AND THE VIEW FROM THE SKY SHOULD BE THE ONE THAT HELPS YOU THE MOST IN COMBAT.*

*IN THIS CHAPTER*

- *INSTALLING COMBAT FLIGHT SIMULATOR*
- *THE MAIN SCREEN*
- *GAME CONTROLLERS*
- *JOYSTICK COMMANDS*
- *KEYBOARD COMMANDS*
- *YOUR IN-FLIGHT MENU*



## **INSTALLING COMBAT FLIGHT SIMULATOR**

Microsoft® Combat Flight Simulator 2: WW II Pacific Theater includes two compact discs. You should install both for maximum gameplay.



### **To install Combat Flight Simulator**

1. Insert the Combat Flight Simulator compact disc 1 into the CD-ROM drive. If your computer has automatic install, a Setup screen will appear on your monitor.
2. Click **Install**.
3. Follow the onscreen instructions for game setup. You will be prompted when it's time to install disc 2.



### **If your computer doesn't have automatic install**

1. After you've inserted disc 1 into the CD-ROM drive, click the Windows **Start** button, then on the pop-up menu, click **Run**.
2. If your CD-ROM drive letter is D, type **D:\setup** and click **Install**.
3. Follow the onscreen instructions for game setup.
4. Repeat the process for disc 2.

### What you'll see next

After you've installed Combat Flight Simulator, you'll see the Main screen with all your gameplay options. Here is a quick description of those options.

For even more detail, press the **F1** key on your computer keyboard for online Help.

## THE MAIN SCREEN

There are six buttons on the Main screen, each one leading you to an adventure in the Pacific theater of WWII. Here's what they do:

### Free Flight

Here you can fly without anyone shooting at you. You can fly all the aircraft, see how they handle, and get your moves down. Or just enjoy the scenery before you jump into fighting.



*Carrier-based Zeros prepare for takeoff. (Maru magazine)*

In Free Flight you can:

- ⦿ Choose your aircraft.
- ⦿ Specify what airfield to fly from or choose an exact location and altitude to begin your flight in midair.
- ⦿ Specify time, wind, and weather conditions.

### Quick Combat

Quick Combat throws you into a combat arena with a group of computer-generated planes, most of them your enemies, some of them your wingmen. You can select a mix of bombers and fighters, or select specific aircraft.

Practice your moves against other planes before you go on any actual missions. Just **shoot at your enemies**, because they'll all be shooting at you. You can fly any type of aircraft you want from either of the air forces.

In Quick Combat you can fight against wave after wave of **enemy planes**. Once you shoot down all the planes in the first wave, the next wave of planes will appear.



*Life rafts are secured to the side of a U.S. Navy carrier, with Curtiss-Wright Helldiver dive bombers. (Corbis)*

Choose the maximum number of enemies you want to face in each wave. You will have your choice of facing bombers or fighters. You can also practice being on the offensive, the defensive, or simply going head-to-head with the enemy.

You can also choose not to have any enemies, or to “respawn” the number of enemies or player-flyable aircraft in a wave any number of times.

Missions will take you through all sorts of **weather**, so try a few different weather scenarios in Quick Combat first.

You can also set the **Enemy A-I level** of the aircraft that are trying to shoot you down. If you choose Ace, you’ll be going up against some very skillful opponents. Start at the Rookie level, then work your way up through the Veteran and Ace levels for a real challenge.

You can choose an **airfield** or go directly to an **exact location** in the air. With this option you can practice flying in the mission’s staging area before you actually try the mission.

After a Quick Combat session, you can enter your name on the **Top Ten** screen.

## ***Single Missions***

Most Single Missions are based on actual historical missions, some are whimsical in nature. (If you want to fly some of these missions in the larger context of the war, click **Campaigns** instead.)



*Zero climbs above palm trees on its island base. Note destroyed aircraft at treeline. (Maru magazine)*

The **Difficulty level** setting (Easy, Medium, Hard, Random) affects the skill level of your enemies, as well as the amount of damage they can do to you. If you choose Hard, you'll meet more formidable enemy aircraft than you would in an Easy mission, and they'll be much more adept at shooting you down. If you're new to Combat Flight Simulator, try the Easy level setting first, then move up as you gain experience.

You can fly any mission for either Japan or the United States. Once you've chosen the mission you want to fly, a short summary of the mission appears. For more details on the mission, click **Next** to see the Mission Briefing.

### Mission Briefing

The Mission Briefing gives you the essential data you need and a description of the immediate situation. At the Mission Briefing you have these options:

- ⊙ **Recon photo:** See the general area of your target or the location you must fly to. This is very handy when you lose sight of the target visually.
- ⊙ **Advanced info:** This where you find your mission goals listed specifically.
- ⊙ **Player aircraft:** Choose the aircraft in which you want to fly your mission.

### Mission Debriefing

After you've flown a mission, a Debriefing screen appears to tell you how you did and how the mission went. Those could be two different things, since you could shoot down enough planes to make you an Ace, but still fail at the objective of the mission.

### Campaigns

Not all campaigns progress the same way each time. How you perform in a campaign depends on the outcome of each mission within the campaign. Your progress through each mission is always within the context of a major campaign of the war.

You will create a pilot who will have a career in one of these campaigns, complete with a combat record, advancements in rank, and medals for service.

### Multiplayer

In Multiplayer you can choose to fly against (or with) other real players over a network or the MSN Gaming Zone ([www.zone.com](http://www.zone.com)). Test your skill against other human pilots. For details on hosting or joining a multiplayer game, press **F1** on your keyboard for online Help.



*Zero takes off as ground crew waves; note crewman waving fan. (Maru magazine)*

## Training Missions

Training Missions teach you the classic aerial maneuvers that you'll need for combat. Practice these maneuvers until they become second nature to you.

To learn more about training missions see Chapter 7, **The Missions**.

## Your other Main screen options

### Settings

Click **Settings** to set a variety of options for gameplay. You can choose the settings for your computer display, your game controller (keyboard or joystick), and the level of realism you want for your airplane.

Your settings cover four main areas:

- ◉ Display
- ◉ Sound
- ◉ Realism
- ◉ Controllers
- ◉ Scenery

### Exit

Click this button to quit Combat Flight Simulator.

## GAME CONTROLLERS

After you've chosen your settings, you can fly with a joystick, mouse, or keyboard.

**Note:** For a full list of all joystick and keyboard commands, see the **Joystick and Keyboard Commands** section at the end of this book.

## Flying with a joystick

You don't need a joystick to use Combat Flight Simulator, but it does make for a more realistic experience. You control your aircraft's movement with the stick, and use the buttons to shoot at targets and change views quickly. To get the most out of your joystick, make sure you have the latest drivers. If in doubt, download them from the manufacturer's Web site. Different joysticks have different configurations, so read your joystick's documentation to learn where the different buttons are located. Also, before you fly, be sure to click **Settings** on the Main screen and go to the joystick section to make sure your joystick is enabled and calibrated.

For more detailed instructions on settings, press the **F1** key on your keyboard for online Help.

*"THE FOOD WAS THE LOWEST LEVEL OF FOOD CONSUMABLE BY HUMAN BEINGS. THE OFFICERS' FOOD WAS DIFFERENT. THERE WAS NO RADIO, NEWSPAPERS, OR MAGAZINES, AND WE RECEIVED HARDLY ANY LETTERS FROM OUR FAMILY AND FRIENDS IN JAPAN. THERE WAS HARDLY ANY NEWS OR INFORMATION."*

*-CFS2 ADVISOR SABURO SAKAI, PRIVATE INTERVIEW, APRIL 2000*

## JOYSTICK COMMANDS

Here are the most useful commands you can make with your joystick.

Action	Command
Bank left (ailerons)	Move stick left
Bank right (ailerons)	Move stick right
Pitch down (elevator)	Move stick forward
Pitch up (elevator)	Move stick backward
Yaw left (rudder)	Twist stick left (Not all joysticks can do this)
Yaw right (rudder)	Twist stick right (Not all joysticks can do this)
View up 45 degrees	Hat switch up (Joystick's top button)
View left 45 degrees	Hat up/left
View left 90 degrees	Hat left
View left 135 degrees	Hat down/left
View right 45 degrees	Hat up/right
View right 90 degrees	Hat right
View right 135 degrees	Hat down/right
View rear	Hat down
Fire guns	Button 1 (Trigger)
Fire cannons	Button 2
Next target	Button 3
Previous target	Button 4
Fire rocket	Button 5
Release bomb	Button 6
Engage WEP or W/M-W injection (toggle)	Button 7
Padlock view (toggle)	Button 8

## Customize your joystick button assignments

You can reassign any button on your joystick to any function in the game.

1. On the Main screen (or on the Options menu while flying), click **Settings**.
2. Make sure the **Enable joystick** check box is selected.
3. Click **Customize controllers**.
4. Make sure **Joystick/Axes** is selected.
5. In the Assignment list box select the joystick assignment you'd like to replace.
6. Click **Change assignment**.
7. A new dialog box appears, containing an empty box. Press the joystick axis or button that you want, and its name will appear in the box.
8. Click **OK**.

**Note:** To remove a button assignment, select it, then click **Delete joystick assignment**. To reset all joystick button assignments to the default settings, click **Reset defaults**.



*Japanese air crew watches fighters taking off. (Maru magazine)*

## KEYBOARD COMMANDS

You have a choice of keyboard command layouts: you can use the **CFS2 combat** keyboard commands, your own **customized** keyboard commands, or **Flight Simulator** keyboard commands. That means if you're an experienced Flight Simulator fan, you don't have to relearn your keyboard commands—you can select the Flight Simulator keyboard commands. You can also save keyboard profiles to suit the preferences of each the pilots in the family.

You select these layouts either during the Setup process or by clicking **Settings** on the Main screen and assigning your key commands on the Controller Assignments screen.



In the back of this manual you'll find all the basic keyboard commands for both Combat Flight Simulator 2 and Flight Simulator listed together. While you're flying, press the **F2** key to bring up the Key Command Quick Reference screen, which lists the basic commands you'll use the most.



### To change your keyboard commands

You can reassign any key on your keyboard to any function that appears in the key commands list in Combat Flight Simulator.

1. On the Main screen (or on the Options menu while flying), click **Settings**.
2. Click **Customize controllers**.
3. Make sure **Buttons/Keys** is selected.
4. In the Event box, select the keystroke you'd like to replace.
5. Click **Change assignment**.
6. A new dialog box appears, containing an empty box. Enter the keystroke you want to use in the box.
7. Click **OK**.

**Note:** To remove a key assignment, select it, then click **Delete key assignment**. To reset all keyboard assignments to the default settings, click anywhere in the Keyboard column, then click the **Reset defaults** button.

## Adjusting keyboard sensitivity

You can make your aircraft respond more quickly or more slowly to the keyboard commands for rudders, elevators, and ailerons.

### To adjust keyboard sensitivity

1. On the Main screen (or on the Options menu while flying), click **Settings**.
2. Click **Controller sensitivity** and follow the prompts to change your settings.

**Note:** To reset all keyboard sensitivity options to their default values, click **Reset defaults**.

## Flying with a mouse

You can use your computer's mouse as the flight control stick in Combat Flight Simulator. Right-click anywhere on the control panel and choose **Mouse as Stick** from the menu that appears. Any movement you make with your mouse will control your aircraft just like a joystick. (Moving the mouse to the left causes your aircraft to bank left, and so on.)

To operate controls on the instrument panel, right-click the panel again and the Mouse as Stick will turn off. Then click the control you want to affect. Some controls (like landing gear) are toggles, meaning one click changes their state. Other controls (like the flap switch) have moving parts. Drag and drop these controls, just like you would adjust them with your hand in a real airplane.

*"IN COMBAT IF YOU DIDN'T GET SCARED YOU WOULDN'T HAVE A BRAIN, BECAUSE YOU REALIZE THAT IT'S A MATTER OF LIFE OR DEATH. WHEN SOMEONE'S SHOOTING AT YOU, IF YOU DON'T GET A THRILL OUT OF THAT, YOU'RE NEVER GOING TO GET ONE. YOU'RE DEAD. IT WAS THAT SIMPLE..."*

*-CFS2 ADVISOR JOE FOSS,  
PRIVATE INTERVIEW, MARCH 2000*

### **Not so fast, pilot...**

Before you fly, you'll make a number of adjustments and modifications to your aircraft and settings. While you're making your way through the pre-flight screens, press **F1** or click the question mark at the top of a screen to open a Help topic about that screen.

### **Getting Help while you're playing (F1)**

To get Help while you're playing Combat Flight Simulator, press **F1**. Or, on the **Help** menu, click the option you want.

### **Key command quick reference (F2)**

Can't remember which key extends the flaps, fires the rockets, or bails you out? At any time during a Combat Flight Simulator mission, you can press **F2** to bring up the key command Quick Reference.

To see a full listing of key commands, see the appendix in this manual.

### **Cockpit help (right-click)**

Right-click to select a cockpit instrument and discover what it is and how it functions. To see an example, move your pointer over the instrument panel. When the pointer changes into a pointing hand, click the right mouse button. When the shortcut menu appears, click **What's This?** for the definition and function of the instrument.

### **Tooltips (mouseover Help)**

To learn what an instrument is, move your pointer over the item. The name of the instrument will appear. If the item is a gauge, such as an altimeter or an airspeed indicator, the information is "dynamic"; in other words, information about how fast you're going or what the altimeter's setting is also appears.

## Tips and tricks

### Maximizing performance

Combat Flight Simulator 2 is designed to work on many kinds of computers with many kinds of accessories. How well the simulation performs on your system depends in large part on how you set certain options.

### Making the tradeoff between graphics quality and performance

When talking about a flight simulation's graphics, *quality* refers to how real the images look on the screen; *performance* refers to how real the images "feel" as they move. No matter what kind of hardware you have, you can make tradeoffs between graphics quality and graphics performance.

If you want to explore the skies over Rabaul in Free Flight mode, you're probably willing to sacrifice a little performance for a better view. But if you want to test your dogfighting skills by taking on five enemy fighters at once in Quick Combat, your focus is more on how smoothly the plane and its instruments move than on how sharp the scenery looks.

### About 3-D graphics cards

A 3-D graphics card is *highly* recommended for Combat Flight Simulator 2. Many models are available; most of them increase frame rate and enhance details of the scenery. If you're curious about 3-D cards, or if you've got a 3-D card and

want to make sure you're getting the most out of it, see "Using a 3-D Graphics Card" in the online Help.

For you to experience Combat Flight Simulator's graphics, your computer must turn a three-dimensional perspective on a three-dimensional world into a two-dimensional image your monitor can display.

A 3-D graphics accelerator card makes this task easier by working with your computer's video card to take some of the burden away from the CPU (Central Processing Unit). The result is that the CPU can spend more of its brainpower worrying about the simulation's flight model, controls, and navigational data. What does this mean to you? Better performance and graphics quality.

Once you have a 3-D card installed, make sure you set the display options in Settings to take full advantage of it. See the "Settings" section earlier in this chapter.

The Readme.txt file in the Combat Flight Simulator 2 directory on your hard drive can also be of help. This file describes known issues with certain 3-D cards, sound cards, joysticks, and so on. If you find yourself having problems with graphics performance that you can't solve on your own, try one of the Combat Flight Simulator Technical Support options listed in the online Help.



*Saipan takeoff: B-29 Superfort on the way to bomb Tokyo 11/23/44. (Corbis)*

### **Other ways to improve performance**

There are many other ways to improve the performance of Combat Flight Simulator and to control the level of detail you see. You can:

- ⦿ Quit other applications.
- ⦿ Reboot your machine.
- ⦿ Make sure you have enough free space on your hard drive.
- ⦿ Keep the number of windows to a minimum.
- ⦿ Change the screen resolution in Windows.
- ⦿ Use Full Screen mode.
- ⦿ Use Full view.
- ⦿ Change display preferences.
- ⦿ Increase the cloud cover.
- ⦿ Upgrade your hardware.
- ⦿ Experiment.
- ⦿ Read the Readme.txt file.

For more details on these topics see the online Help.

## YOUR IN-FLIGHT MENU

A convenient menu bar is available once you begin to fly, so you can make changes and adjustments without leaving a mission. You can display the menu bar at any time during flight by pressing the **ALT** key. The menu bar will appear at the top of the Combat Flight Simulator window. Press **ALT** again to hide the menu bar.

Below are the features you will find under each menu heading. Note that some commands display keyboard shortcuts to make it easier to access those features.

**Note:** When a command is active it has a check mark next to it on the menu.

The six menus on the Combat Flight Simulator menu bar are:

### Flights

You have two choices:

- ⊙ **End Flight** to leave the current mission.
- ⊙ **Exit (CTRL+Q)** to quit Combat Flight Simulator altogether. (You'll be asked to confirm that you want to quit the application.)

### Aircraft

- ⊙ **Change/modify:** Change your aircraft or modify your weaponry. You might want to change the plane you're flying or make fuel and ordnance changes (possible only if stores are not already set to Unlimited).

- ⊙ **Checklists:** Display a checklist of step-by-step procedures for each phase of flight (Takeoff, Landing, etc.). To hide or display checklists, on the Aircraft menu, click **Checklists** (or press the **C** key).
- ⊙ **Kneeboard:** Keep a short list of commands and features you might need. Experiment with the options to find your best use of them.
- ⊙ **Slew Mode:** In slewing mode you can rapidly change your aircraft's position, direction, location, or altitude without flying there in real time.

### World

- ⊙ **Time and Weather:** Make changes in the weather. To add a new challenge to a mission, you can make time of day and weather changes.  
**Note:** The weather option is not available in Single Missions or Campaigns.
- ⊙ **Go To:** Position your aircraft anywhere in the world.
- ⊙ **Skip to Next Action:** On long missions you may want to skip over extended periods of flight where no combat action is occurring.

### Options

- ⊙ **Pause Flight:** Choose this option if you want to take a break during flight but don't want to end the mission.
- ⊙ **Simulation Rate:** Speed things up to cover distance quickly or slow things down to catch the action.

- ◉ **Sound:** Turn the sounds in a mission (engines, guns, explosions, etc.) on or off.
- ◉ **Radio Communication:** There may be times when you do or do not want to listen to radio chatter.
- ◉ **Settings:** Modify display, realism, volume, and controller options.

## Views

Turn elements of the in-flight display on or off. For example, if you want to view your game in a window instead of in full screen mode, on the Views menu, click **Full Screen (ALT+ENTER)**. Clicking Full Screen again restores the full screen mode. Experiment with different view options to see what works best for you in different situations.

## Tactical Display

The Tactical Display gives you information on the location of the enemy relative to your aircraft.

## Enemy Indicator

The Enemy Indicator is a 3-D cone that points in the direction of your nearest enemy.

## Aircraft/Vehicles Labels

The labels tell you what kind of aircraft or vehicle you're seeing.

## Status Messages

Status Messages are useful in telling you exactly what shape your plane is in.

## Instrument Panel

Turn elements of the panel on or off. The Global On feature toggles all your panel elements on or off at once.

## New View Window

Place a small secondary window on top of the main window. This is handy for seeing more than one view at a time. For example, you can have the cockpit view in the main window and open a second window to use as a rear-view mirror.

To open another window, click **New View Window**. Click the secondary view window you want to display.

You can open more than one of these secondary windows at a time and display something different in each one. Use this feature sparingly, as you don't want a cluttered view when you go into combat.

- To close the window, right-click in the secondary window and choose **Close Window**.

### **View Mode**

Change what you see in the active window. If you have both the main window and secondary windows open, first click the window in which you want the view to change before selecting a view mode.

### **Forward View**

This submenu offers options for what you see when looking forward out the windscreen. You may choose to view the panel or stay with the Heads Up Display (HUD) for better visibility.

### **Undock Window**

You can treat the active window as a moveable, sizeable window. Some players like to use this command to separate and resize the main and secondary windows, placing them in different places on their screen.

### **Help**

From the Help menu, you can go to the online Help, tips, the Combat Flight Simulator Web site, and more.



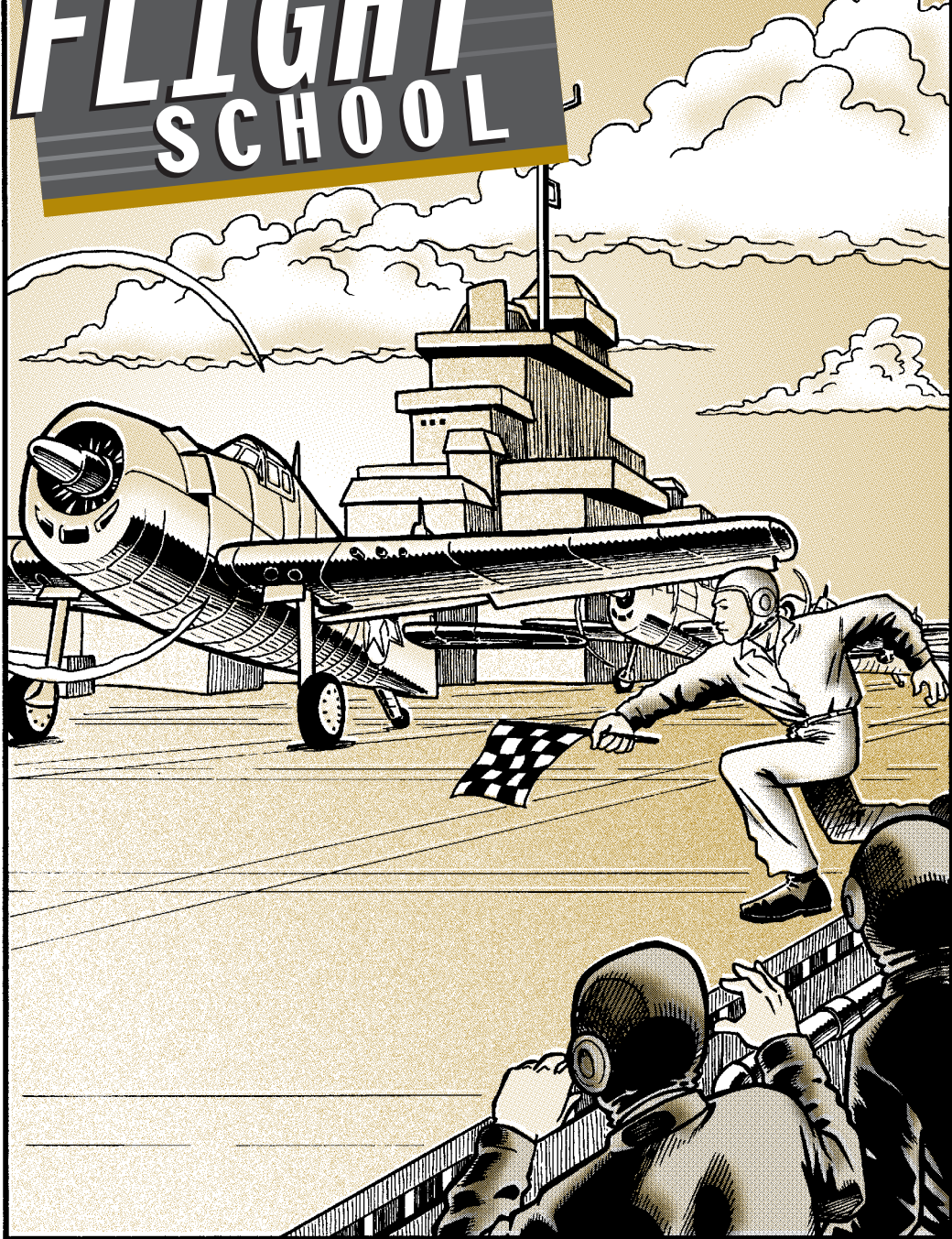
*A Douglas SBD Dauntless dive-bomber flies over the carrier Enterprise. (U.S. Navy Photo)*



# FLIGHT SCHOOL

3

CHAPTER

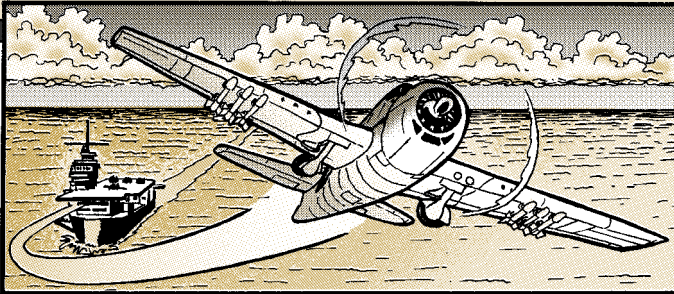




*IF YOU MAKE ASSUMPTIONS ABOUT HOW AN AIRPLANE WORKS YOU PUT AN EXPENSIVE MACHINE, YOUR LIFE, AND YOUR COUNTRY AT RISK. PRACTICE AND STUDY EVERY ASPECT OF FLIGHT AND COMBAT, AND WHEN YOU GO TO SLEEP-DREAM IT.*

### *IN THIS CHAPTER*

- *FIRST THINGS FIRST*
- *FLIGHT CONTROLS*
- *ENGINE CONTROLS*
- *GETTING UP AND BACK*
- *BASIC FLIGHT MANEUVERS*
- *WHY IT ALL WORKS*
- *BASIC AEROBATIC MANEUVERS*
- *CARRIER OPERATIONS*



## **FIRST THINGS FIRST**

### **The instrument panel**

You don't *need* an instrument panel to fly, but it sure helps. Every aircraft has a different panel, but for the most part, they all feature the same basic elements.

- ⊙ **Gauges:** Each aircraft has its own set of gauges that indicate how your aircraft is performing.
- ⊙ **Mouse rollover:** While you fly, you can find out an instrument's name by pointing to the instrument with the mouse.
- ⊙ **Right-click:** To find out what an instrument does, right-click it, then choose the **What's This?** option.

## FLIGHT CONTROLS

You can control an airplane's movement with the stick, rudder pedals, buttons and levers. In Microsoft® Combat Flight Simulator 2, these controls are simulated by the joystick and rudder pedals (both optional), the keyboard, and the mouse. No matter what your setup, you'll use these controls to move "control surfaces" that deflect air in one direction and cause the airplane to move in the opposite direction.

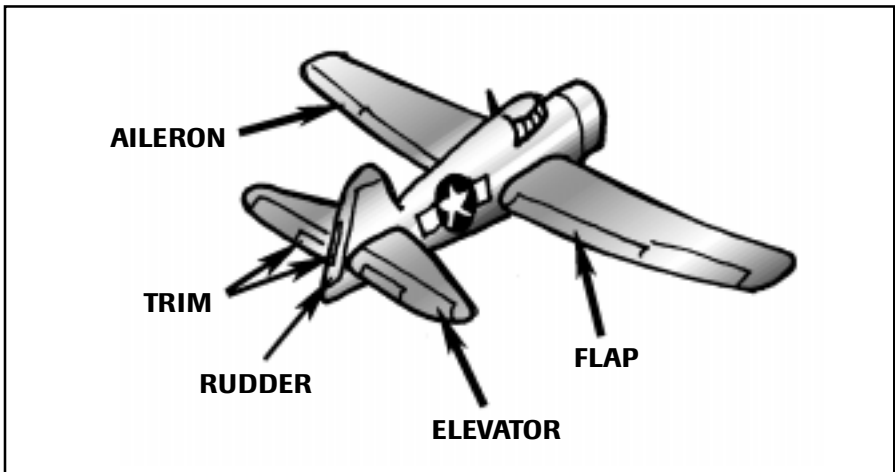
### Primary control surfaces

#### Ailerons

Moving the stick left and right moves your plane's ailerons. These hinged rectangular surfaces are located on the trailing edges of the wings near the wing tips, and they control your plane's banking (rolling) motion.

The ailerons move in opposite directions: if you move the stick left, the left aileron moves up, reducing lift (upward force) on the left wing. At the same time the right aileron moves down, increasing lift on the right wing. The result? The airplane banks (rolls) to the left. When the wings reach the angle of bank you want, center the stick. Banking with the ailerons is what **causes a plane to turn**.

**Note:** All keyboard commands noted in this manual are the CFS2 combat keyboard commands. If you want to change your settings to your own keyboard commands or to Flight Simulator keyboard commands, click **Settings** on the main screen and follow the prompts.



*Primary control surfaces.*

Action	Joystick	Keyboard (Num Lock off)
Bank left	Move joystick left	Num Pad <b>4</b>
Bank right	Move joystick right	Num Pad <b>6</b>
Bank center	Center joystick	Num Pad <b>5</b>

### Rudder

Pushing the rudder pedals moves your plane's rudder. The rudder is a hinged surface located on the vertical stabilizer of the tail. It controls your craft's yawing (pivoting) motion to the left and right. The

rudder is used to **counteract your plane's tendency to yaw** in the direction opposite a turn, and to **counteract your engine's torque**. (Learn more about the effects of torque in "A few words about torque" later in this chapter.)

Action	Joystick/Rudder Pedals	Keyboard (Num Lock off)
Yaw left	Twist joystick left (not all joysticks twist) or press left rudder pedal	Num Pad <b>0</b>
Yaw right	Twist joystick right or press right rudder pedal	Num Pad <b>ENTER</b>
Yaw center	Center joystick or center rudder pedals	Num Pad <b>5</b>

### Elevator

Moving the stick forward and backward moves your plane's elevator. This hinged surface is located on the horizontal stabilizer of the tail, and controls your airplane's pitch (up and down) motion. Moving the stick forward *decreases* pitch

attitude (lowers the nose), while moving it backwards *increases* pitch attitude (raises the nose). **The elevator controls pitch attitude, but it doesn't necessarily make your plane climb or descend.** You'll learn why in "Basic Flight Maneuvers" later in this chapter.

Action	Joystick	Keyboard (Num Lock off)
Pitch down	Move joystick forward	Num Pad <b>8</b>
Pitch up	Move joystick back	Num Pad <b>2</b>

***"ALL SQUADRONS MUST KEEP THE WHITE STAR ON THEIR INSIGNIA FRESHLY PAINTED. CLEANING OF THE FUSELAGE CAUSES THEM TO BECOME INDISTINCT IN A MATTER OF DAYS."***

*—FROM THE VMF-214 ("BLACK SHEEP") WAR DIARY, MAJOR BOYINGTON'S COMBAT TACTICS*

## **Secondary control surfaces**

### **Trim**

As you fly, the oncoming air puts pressure on the primary control surfaces. Trim tabs are small, hinged surfaces on the elevator, rudder, and aileron that help you maintain specific control positions without your needing to exert pressure on the controls. Moving a trim tab one way deflects the elevator, rudder, or aileron the other way. When your airplane is properly trimmed, you can fly "hands off," applying only occasional, small control-pressures to

compensate for the occasional bump or minor changes in heading. (In some aircraft, elevator trim moves the entire elevator slightly, instead of moving a tab on it.)

**Use trim to relieve control pressure, not to fly.** If you want to change the airplane's attitude (position relative to the horizon), first move the stick or rudder and change the power setting if necessary. Then, after the airplane stabilizes, "trim off" the pressure.

<b>Action</b>	<b>Keyboard (Num Lock off)</b>
Aileron trim left	<b>CTRL+Num Pad 4</b>
Aileron trim right	<b>CTRL+Num Pad 6</b>
Rudder trim left	<b>CTRL+Num Pad 0</b>
Rudder trim right	<b>CTRL+Num Pad ENTER</b>
Elevator trim up	<b>Num Pad 1</b>
Elevator trim down	<b>Num Pad 7</b>

## Flaps

Flaps are hinged surfaces on the trailing edges of the wings, next to the fuselage. When extended, they increase lift by helping the wings deflect more air downward. They also increase drag (the resistance of the air), allowing your aircraft to descend more steeply without building up speed. The flaps are extended in increments, and are usually used during takeoff and landing.

As you extend or retract the flaps, **be prepared for changes in pitch**. The nose will rise or fall from the resulting change in lift. Add forward- or back-pressure on the stick to maintain the pitch attitude you want, and after the airspeed stabilizes, use elevator trim to relieve that pressure.

**Note:** Depending on the aircraft, flap increments will vary.

Action	Keyboard
Retract flaps fully	<b>SHIFT+V</b>
Retract flaps in increments	<b>V</b> key
Extend flaps in increments	<b>F</b> key
Extend flaps fully	<b>SHIFT+F</b>

## ENGINE CONTROLS

The engine controls are displayed in a separate window. To start your aircraft's engine automatically, press the **E** key: you'll see the controls move, and then you'll hear the engine start. If you'd rather do all the work yourself, you can start the engine manually. For details, see "Starting the engine," below.

Your aircraft has three basic engine controls:

- ⦿ **Throttle** control lever (the control that has the most direct effect on power)
- ⦿ **Prop** control lever (to adjust the pitch angle and thus, the propeller's rotation speed)
- ⦿ **Mixture** control lever (to adjust the air/fuel mixture as the airplane climbs and descends).

All three levers can be controlled with the keyboard or mouse. You can also control the throttle with a slider or wheel on your joystick (optional).

Action	Command
Display/Hide engine controls	<b>F5</b>
Auto engine start	<b>E</b> key
Decrease throttle	<b>– (MINUS SIGN)</b>
Increase throttle	<b>= (EQUAL SIGN)</b>
50% throttle	<b>5</b> key (keyboard)
60% throttle	<b>6</b> key (keyboard)
70% throttle	<b>7</b> key (keyboard)
80% throttle	<b>8</b> key (keyboard)
90% throttle	<b>9</b> key (keyboard)
100% throttle	<b>0</b> key (keyboard)
Decrease prop r.p.m.	<b>SHIFT+– (MINUS SIGN)</b>
Increase prop r.p.m.	<b>SHIFT+= (EQUAL SIGN)</b>
Lean mixture	<b>CTRL+– (MINUS SIGN)</b>
Enrich mixture	<b>CTRL+= (EQUAL SIGN)</b>
Full rich mixture	<b>SHIFT+4</b>
Engage War Emergency Power or Water/Methanol-Water injection (toggle)	<b>W</b> key

## Starting the engine

In most missions you'll start on the runway, all lined up and ready to go. Start your engine, and follow your squadron mates into the sky!

### Auto-start

- To start your aircraft's engine automatically, press the **E** key.

Want the thrill of starting the engine yourself? Use either your mouse or keyboard commands.

### Manual start

- Open the engine controls window by pressing **F5**.
- Drag the prop control lever with the mouse all the way forward to the **Max. r.p.m.** position.
- Drag the mixture control lever with the mouse all the way forward to the **Full Rich** position.
- Drag the throttle control lever with the mouse all the way back to the **Idle** position, then move it forward just a bit. You can also do this by moving the throttle control on your joystick.
- Turn the battery switch to **On**.
- If your aircraft has a magneto, click the Magneto switch to move it to the **Both** position.
- To engage the starter, click the **Starter** button/switch. Hold the mouse button down until the engine starts, then release it.

### Throttle control lever

The throttle regulates the amount of fuel and air that enters the engine cylinders. When fully "open," the throttle allows the maximum amount of fuel and air to enter the system to produce maximum power. When the throttle is "closed," only a small amount of fuel and air can get in, and the engine produces minimum power.

To open the throttle, move the control lever forward. To close it, pull it backward. The **manifold pressure gauge** on the instrument panel shows the pressure of the air moving into the engine's cylinders, and gives an approximate measurement of engine power. Generally speaking, the higher the manifold pressure, the more power you have.

### Propeller control lever

Adjusting the propeller in an airplane is a lot like using gears in a car. In low gears the engine turns fast to get you moving. Once you're underway, there's no need to use a lot of power, so you shift to a higher gear to make more efficient use of less power. In an airplane, the propeller control lever indirectly changes the angle at which the propeller blades meet the air, which affects how fast the engine turns. The **tachometer** on the instrument panel shows how fast your engine is turning.



During takeoff, in combat, and during landing (in case you need to abort and take off again) you'll need every bit of power your engine can develop. So during these three phases of flight, keep the propeller lever forward: the angle of the blades will be low, slicing through the air easily so you can get the engine's full power (like using a low gear in a car). During cruise, pull the propeller lever backward a bit: the angle of the blades will increase and take a bigger bite out of the air, making more efficient use of the engine's power (like using a high gear in a car).

Because your aircraft has a "constant-speed" propeller, any time you change the throttle setting a governor automatically adjusts the angle of the blades to maintain that speed. This reduces your workload!

**Note:** The default setting of your airplane's prop control lever is the forward (high speed) position. Don't change this setting if you don't need to. As a fighter pilot, you'll want this setting most of the time. Leaving the prop control lever forward during cruising flight means you'll fly less efficiently and use more fuel, but it won't cause any damage.

### Mixture control lever

Because your aircraft's engine operates over a wide range of altitudes, you can adjust the air/fuel mixture for maximum efficiency as you *climb* into less dense air

or *descend* into more dense air. A mixture that is too rich contains too much fuel for the existing atmospheric conditions and may cause the engine to run rough and lose power. The solution is to "lean the mixture." As you climb, make the mixture leaner by pulling the mixture control lever back until the tachometer indicates a drop in the fuel flow indicator (the EGT), then push it forward a little. Don't lean the mixture too much, though: a mixture that is too lean can cause the engine to overheat or cause detonation (a sudden, explosive combustion of fuel within the cylinders).

**Note:** By default, mixture control is handled automatically in Combat Flight Simulator. To adjust the mixture manually, from the Main screen click **Settings**, and in the Controls section clear the **Enable auto mixture** check box.



*Zero over Fujiyama. (Maru magazine)*

## GETTING UP AND BACK

### Taxiing

In general, you won't need to taxi down the runway unless you want to. If you do, remember: it's hard to see over the nose when you're on the ground. That's because your aircraft has a tailwheel (except for the P-38). To get a good view, make gentle S-turns by using the rudder pedals, and look to either side.

**Note:** When auto-rudder is set to On, you can steer by moving the stick left and right—the ailerons and the rudder are connected. To turn auto-rudder on or off, from the Main screen, click the **Settings** icon, and in the Controls section select or clear the **Enable auto-rudder** check box.



#### To taxi down the runway

Hold the stick back to keep the tailwheel on the ground. Taxi with the throttle at idle and use the brakes as little as possible. To turn sharply, brake just on the side you're turning toward (press the , (COMMA) or . (PERIOD) key). When you reach the runway, stop at a right angle and scan the sky for any approaching aircraft.

### BASIC RULES TO AVOID OVERSTRESSING THE ENGINE:

- To increase power, first increase propeller speed by pushing the prop control lever forward, then increase manifold pressure by pushing the throttle control lever forward.
- To decrease power, first reduce manifold pressure by pulling the throttle control lever backward, then decrease propeller speed by pulling the prop control backward.

## Taking off

Taking off is something even experienced pilots get excited about. But don't lose your head during this critical stage of flight. Every plane performs differently during takeoff. Here are some general guidelines:



### To take off

1. Line up on the runway.
2. Incrementally add some flaps if appropriate in your airplane (press the **F** key).
3. Make sure the prop control lever is in the full **forward** position (default setting), then smoothly advance the throttle to takeoff power.
4. Maintain back-pressure on the stick to keep the tailwheel on the ground until your rudder becomes effective.
5. Slowly ease forward on the stick so the tail rises (with the exception of the P-38, which has tricycle gear—keep that tail down!).
6. At your aircraft's takeoff speed, gently pull back on the stick and fly the plane off the runway.
7. Once airborne, retract the landing gear (press the **G** key) and flaps (press the **V** key repeatedly until the flaps are fully retracted).
8. Adjust your pitch attitude to climb out at your plane's best-climb speed.



*Not all takeoffs are perfect. Once in a while, a pilot miscalculates and the plane noses over, like this Dauntless dive-bomber. Both pilot and gunner were unhurt. (Corbis)*



## Landing

A good landing starts with a good approach:

1. Slow your plane down to its maximum gear-extension speed.
  2. Lower the landing gear (press the **G** key) and start a shallow 500-foot-per-minute descent toward the runway. Watch the **vertical speed indicator** on the instrument panel.
- Note:** If your hydraulic system is damaged, you may need to manually pump the landing gear down (press **SHIFT+G** key).
3. Incrementally add flaps to steepen the approach (press the **F** key).
  4. Maintain the approach speed recommended for your aircraft, and use pitch to control airspeed. To speed up, move the stick forward slightly to lower the nose. To slow down, gently pull the stick back.
  5. Pick a touchdown point and use the throttle to control descent rate. If the touchdown point appears to move down your windscreen, decrease power: you're too high. If the touchdown point seems to move up, add power: you're too low.
  6. As you cross the end of the runway, ease the throttle back to idle.

7. "Flare" about 20 feet above the runway by pulling back slowly on the stick, and touch down in a nose-high, "three-point" attitude. All three wheels should contact the ground at the same moment. Hold the stick full back after you touch down.

**Note:** The exception is the P-38, which has tricycle gear—you don't want all three wheels touching simultaneously.

8. During and after touchdown, maintain directional control with the rudder. (If auto-rudder is On, then move the stick left and right—the ailerons and the rudder are connected.)
9. After the aircraft has slowed to walking speed, apply the brakes (press the **B** key).

## Using checklists

Why rely on your memory? As you fly, you can view checklists for Takeoff, Cruise, Descent, and Landing to help you with these important phases of flight. To display and cycle through the checklists, press the **C** key. To close the checklists, press the **C** key until the window closes, or click the **X** in the upper-right corner of the checklist.

You can also get to the checklists from the menu bar. On the Aircraft menu, point to **Checklists**, then select the checklist you want to display.

**Note:** You can edit the checklists or create customized checklists. For more information, see “Creating Your Own Checklists” in the online Help.

## ***BASIC FLIGHT MANEUVERS***

There are four basic maneuvers to master: flying straight-and-level, turning, climbing, and descending.

### ***Flying straight-and-level***

Flying straight-and-level may look simple, but it's one of the more difficult maneuvers to master. Because hotshot pilots like to be in control, they overdo it most of the time and interfere with their airplane's basic stability. Like a balancing act, straight-and-level flight requires that you make smooth, small corrections to keep from wobbling all over the sky. There are two components to flying straight-and-level:

#### **Hold a constant altitude**

Keep an eye on the **altimeter**.

If your altitude starts to change, make small, smooth corrections with the throttle

or the stick. Use pitch to correct deviations of less than 100 feet. If your altitude has deviated more than 100 feet, you may want to add or reduce power a bit. Use elevator trim to keep the pitch attitude where you want it.



#### **To slow down without losing altitude**

Reduce power and keep the nose from falling by gently pulling back on the stick.



#### **To speed up without gaining altitude**

Add power and keep the nose from rising by gently pushing forward on the stick.

#### **Hold a constant heading**

Check the **heading indicator** on the instrument panel frequently to make sure the nose is pointed in the right direction. Crosscheck the turn indicator and the wing tips to hold the wings level and to correct minor deviations. Pick a point on the horizon and keep flying toward it. Use aileron trim and rudder trim to make the job easier.

## Turning

An airplane turns by banking (dipping one wing and raising the other). In a bank, some of the lift that the wings produce pushes the aircraft “around the corner.” Add a little rudder pressure simultaneously to keep the turn coordinated. (Add left rudder if you’re turning left, right rudder if turning right.) In theory, you could skid an airplane through a turn without banking using just the rudder. But that’s an inefficient and uncomfortable way to change direction. (In combat, though, you can use skidding to confuse an enemy on your tail.)

You might think that the faster you go, the faster you can turn. But flying fast in a turn means more centrifugal force, and that means a bigger turn radius. The result? The turn takes longer! So sometimes to turn faster you’ll need to fly slower. How fast you can turn (and how much sky you can do it in) depends on your aircraft, its engine, and your airspeed.

### A note about auto-rudder

By default, auto-rudder is set to Off. This adds realism to your flights—you can control the rudder yourself with rudder pedals, a joystick that supports rudder control, or the keyboard (press the numeric keypad **0** key for left rudder or keypad **ENTER** key for right). When auto-rudder is set to On, the rudder moves



*“Pregnant Turkeys” (U.S. Avengers) look graceful in formation flight. (U.S. Navy)*

automatically to maintain coordinated flight in turns, making your airplane easier to fly.

**Note:** If you do not have rudder hardware, the auto-rudder will be set to On.

To turn auto-rudder on or off, from the Main screen, click **Settings**, and in the Controls section select or clear the **Enable auto-rudder** check box.



### How to turn

**Bank the wings:** Move the stick right or left to manipulate the ailerons and initiate a bank. Center the stick when you reach the bank angle you want. By banking the wings, you deflect some of their vertical lift sideways. This part of the airplane's total lift is called the "horizontal component of lift," and it is this force that pushes the plane around in a turn.

**Simultaneously add some rudder:** Your plane will have a tendency to yaw (pivot) opposite the turn. So as you bank, apply some rudder pressure in the same direction as the turn. As you bank left, add a little left rudder, and vice versa. How much rudder? Just enough to keep the ball/needle in the turn indicator centered.



*A dramatic crash landing was lucky for this American pilot (note aircraft number). He landed on the deck of his carrier following a strike against the Japanese at Kwajalein, in the Marshall Islands, 12/4/43. (Hulton Getty/Liaison Agency)*

**Use some up-elevator:** Because some of the lift is deflected sideways in a turn, you need to raise the nose slightly to generate more lift. Add a little back-pressure on the stick as you roll into a turn. The steeper the turn, the more up-elevator pressure you add to maintain altitude. You might even need to add some power. As you roll out of the turn, remember to relax the back pressure on the stick.

**"Paint the horizon":** To maintain level flight as you turn (or to turn while climbing or descending at a constant speed and rate), "paint the horizon" with the nose—keep the pitch attitude the same after you've started the turn. In general, if the nose moves up as you're turning, you climb. If it moves down, you descend.

### Climbing

There are two ways to get your aircraft to go up:

#### Use momentum

Pull back on the stick to create a "hill"—your airplane will start to climb. You'll go higher but you'll also slow down—just like climbing a hill on a bicycle. Pulling back on the stick to go up means you **trade airspeed for altitude**.



### **Use excess thrust**

A sustained climb is made possible by using thrust to pull your plane up the “hill.” Determine how steep the “hill” is by moving the stick. Then add power with the throttle to pull yourself up, just like pedaling a bike faster. Using excess thrust is a way to **gain altitude without losing airspeed**.

Every aircraft has a “best-climb speed.” With full power, this is the speed where the airplane gains altitude fastest in a sustained climb. Adjust your speed by raising or lowering the nose. To find your aircraft’s best-climb speed, see the chart in the “Planes” section of the **Machines of War** chapter.

### ***Descending***

There are two ways to get your aircraft to descend:

#### **Dive**

Push forward on the stick to make a steep “hill” to dive down. As you descend, your speed will increase. Pushing forward on the stick to go down means you **trade altitude for airspeed**. Be careful! If the air traveling over your wings in a high-speed dive exceeds the speed of sound, your control surfaces may lose their effectiveness. “Compressibility” is a very dangerous condition, and you may not be able to pull out of the dive.

### **Low-power descent**

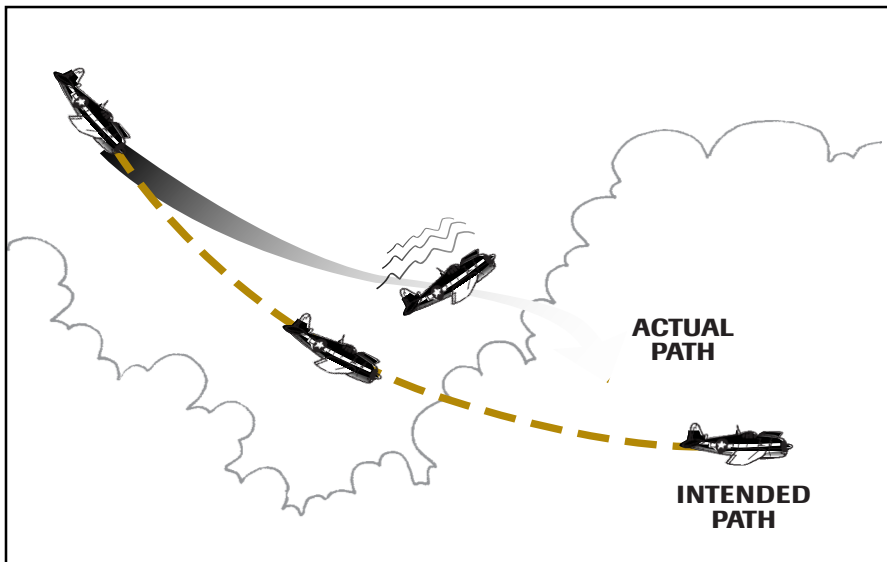
To descend more slowly than in a dive, make a shallow “hill” with the stick (or leave the stick where it is), and reduce your throttle a bit. When the engine stops producing enough thrust to maintain level flight, your plane will start to glide slowly toward the ground. Descending at low power is a way to **lose altitude without gaining airspeed**.

Every aircraft has a “best-glide speed.” If the engine quits, this is the speed that lets the airplane glide the farthest. Adjust your speed by raising or lowering the nose. For your aircraft’s best-glide speed, see the chart in the “Planes” section of the **Machines of War** chapter.

### ***Don’t stall!***

A stall has nothing to do with an airplane’s engine sputtering. **You can stall at any airspeed**—even when the plane is in a fast dive!

A stall has to do with the “angle of attack.” This is the angle at which a wing meets the oncoming air. If you increase the angle of attack too much, the wings won’t deflect the air downward. You won’t get any lift—so you “stall”: the wings can’t generate enough lift to counteract the plane’s weight, so it starts to fall toward the ground. (See “Why it All Works” later in this chapter.)



*Be careful: No matter how fast you're going, if you pull back on the stick too hard, your wings will stall!*

A wing always stalls at the same critical angle of attack, at any attitude, no matter how fast or slow you're flying.

If you add weight to your airplane, it will stall at a higher speed. More fuel and more ammunition make the plane weigh more. But so does maneuvering. In a turn, for example, centrifugal force will push you into your seat, so it's as if both you and the airplane are heavier. Then you need more lift to offset that weight and maintain level flight. To get the additional lift, you have to increase the angle of attack—but that puts you closer to the *critical* angle of attack—and a stall.

So go easy on the stick when you're maneuvering. Just because you're going fast doesn't mean you can't stall!

### Warning signs

A stall near the ground can be deadly. But you can learn to sense one coming and prevent it. As the air flowing over the top of the wings gets turbulent, you'll feel a slight shaking or buffeting, and you'll see a "Stall" text message on the screen. Reduce the angle of your climb or dive.

### Recover promptly

The only way to recover from or prevent a stall is to **reduce the angle of attack**. Apply forward-pressure on the stick, and add some throttle to compensate for the loss of altitude. If you continue to pull back on the stick (the intuitive thing to do, since your nose is dropping!), your ship will not recover. If one wing drops before the other, the stall may become a spin.

## ***Don't spin!***

You go into a spin when one wing stalls first. The plane corkscrews toward the ground at a steep angle of descent and at a low airspeed. Sound scary? It's no big deal once you've done a few. But understand that for an airplane to spin it must first be stalled. Avoid a stall and you'll avoid a spin.

**Note:** When auto-rudder is set to On, it's unlikely a stall will develop into a spin. To turn auto-rudder on or off, from the Main screen, click **Settings** and in the Controls section select or clear the **Enable auto-rudder** check box.

You don't have many options if you get into a spin close to the ground. Press the **O** key three times and bail out! If you

think you have enough altitude to recover (at least 5,000 feet in most aircraft), here's what to do:



### **To pull out of a spin**

1. Center the stick—that neutralizes the ailerons.
2. Apply full rudder opposite the direction of your spin, and relax back-pressure on the stick to decrease the angle of attack and break the stall. (In some planes you'll have to “pop” the stick forward sharply.)
3. As soon as the rotation stops, neutralize the rudder.
4. As your airspeed builds, smoothly pull back on the stick to recover promptly from the dive. As the pitch attitude returns to level flight, smoothly add power to maintain your airspeed.

## ***THE PILOT'S GOLDEN RULE***

Pitch + Power = Performance. “Pitch” is the angle of the airplane's nose above or below the horizon. If you establish a specific pitch and set power at a constant level, your airplane will fly at a particular airspeed and either maintain level flight, or climb or descend at a constant rate.



*U.S. Navy plane leaving the deck of an aircraft carrier for an attack on the Japanese-held Gilbert and Marshall Islands, which eventually provided bases for bomber attacks on Japan 2/14/42. (Hulton Getty/Liaison Agency)*

## WHY IT ALL WORKS

There are four forces that affect an airplane in flight, and they act in pairs. **Lift** opposes **weight**, and **thrust** opposes **drag**. To get your crate to behave like you want it to, you've got to manage these four forces. Understanding them makes it easier.

### Lift

Lift is the upward force produced by a wing as it moves through the air. It's the force that counteracts the gravity of an airplane's weight.

### How a wing works

Ask engineers how a wing works and they'll go on about circulation theory, the shape of the wing, and "Bernoulli's Theorem." They'll talk your ear off but the most useful information for a combat pilot learning to fly in a hurry is admittedly simplistic: A wing keeps an airplane up by **deflecting the air down**.

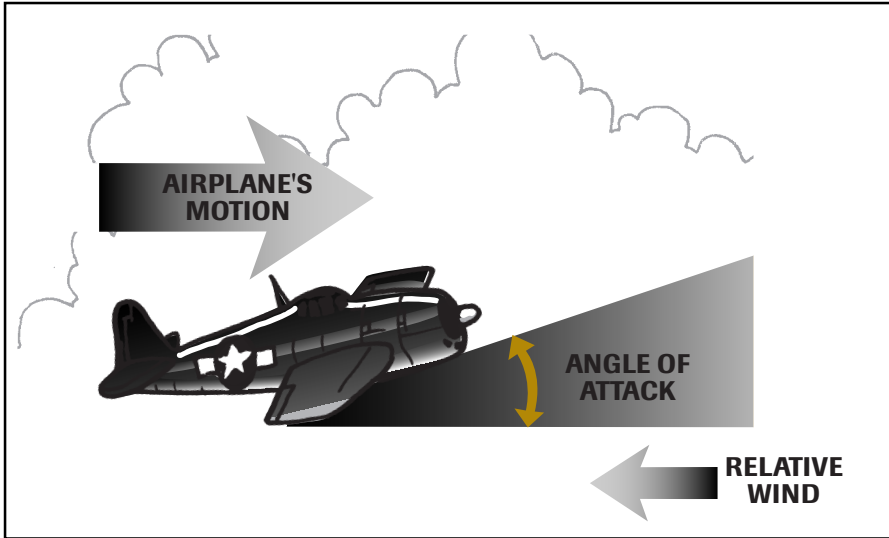
### The angle that matters most

The angle at which a wing meets the air is called the **angle of attack**. This is not the angle between the airplane's nose and the horizon. It's the difference between where your wing is pointing and where it's actually going.

### Changing the amount of lift

You can control the amount of lift a wing generates by adjusting two things: speed and angle of attack. To produce a certain amount of lift at low speeds, the air must be deflected using a large angle of attack. To produce the same amount of lift at high speeds, the air must be deflected using a small angle of attack. If the speed is very low, the angle of attack you'll need to maintain lift will be so large at a certain point (the "critical angle of attack") that the air cannot flow smoothly over the wing, and the wing will stall.

You can also add lift by extending the flaps, which increase the curvature of the wing. With the flaps extended, more air is deflected downward, so there is more lift. Flaps also cause an increase in drag.



*Angle of attack: the angle at which the wing meets oncoming air.*

### ***Playing with lift***

Think about what happens to your hand when you stick it out the window of a moving automobile, letting it get bounced around by the wind. If the car speeds up, you can reduce the angle of your hand relative to the wind (the angle of attack) to keep it from blowing upward. If the car slows down, you can increase the angle of your hand to keep it from falling downward. If you increase the angle of your hand too much, it will stop generating lift, and fall (stall).

### ***Weight***

Weight opposes lift—it's the downward force caused by gravity pulling an airplane toward the center of the earth.

For your ship to fly, the wings must develop enough lift to counteract its weight. The “real” weight of your aircraft changes only as fuel and ammunition are used up. But changes in “apparent gravity” (measured in G-forces) are caused by maneuvering. For example, a level turn with a 60-degree bank puts a 2-G load on the plane and its pilot. Both seem to weigh twice as much as they do when in straight-and-level flight—and in a way they do—because of the increase in “apparent gravity.”

### Compensating for G-forces

During maneuvers, you have to adjust the amount of lift to compensate for the changes in weight caused by G-forces. To stay level during a steeply banked turn, for example, you'll need to raise the nose slightly (increase the angle of attack) and add more power (thrust) to produce more lift to balance you out.

### Blackout and redout

Most maneuvers create only slight, brief G-forces. But combat maneuvers produce strong, rapidly changing G-forces that can be uncomfortable, or even incapacitating.

**Positive Gs:** Rapid pull-ups and steeply banked, level turns create positive G-forces that act toward your feet. As the blood circulation to your brain decreases, your visual field narrows and you may experience "blackout": you'll lose color vision and eventually lose consciousness.



Aerial view of Japanese base at Rabaul. (Maru magazine)

**Negative Gs:** Rapid pushovers and certain aerobatic maneuvers create negative G-forces that act toward your head. As the forces increase, you'll experience discomfort, headache, "redout" caused by excessive blood flow to your eyes, and even unconsciousness. Most pilots have a harder time handling negative Gs than positive Gs.

## ***Thrust***

Thrust is the forward force provided by an airplane's propeller, and is opposed by drag (the resistance of the air as the airplane moves through it).

An airplane's propeller creates thrust in the same way its wings create lift: air is deflected backward, so the propeller (and the aircraft) move forward. The more powerful the engine (and the bigger the propeller), the greater the thrust, and the faster the airplane can fly. Thrust is also the most important factor in determining a plane's ability to climb.

## ***Drag***

Drag is the rearward-pulling force that opposes thrust, and has two components: "parasite drag" and "induced drag."

### **Parasite drag**

Parasite drag is caused by friction between the air and an airplane's structure. The more things there are sticking out into the airflow (antennas, landing gear, bombs, etc.), the higher the parasite drag. Your plane is designed to have as little parasite drag as possible, but the faster you go, the more there will be.

### **Induced drag**

As the angle of attack increases, lift pulls an airplane upward and backward. The upward component of lift is called "effective lift"; the backward component is called "induced drag." Effective lift counteracts weight to keep the airplane flying. Induced drag counteracts thrust and slows the airplane down. The slower you go (the bigger the angle of attack), the greater the induced drag. Eventually, you'll need to add more power to generate the lift necessary to remain aloft.



### ***Playing with induced drag***

You can understand how induced drag works by sticking your hand out the car window again. If you hold your hand relatively flat (at a low angle of attack), your hand gets pushed upward and slightly backward. As you increase the angle of attack you'll notice an increase in both the upward force (effective lift) and in the backward force (induced drag). Increase the angle too much and your hand will stall.

### ***A few words about torque***

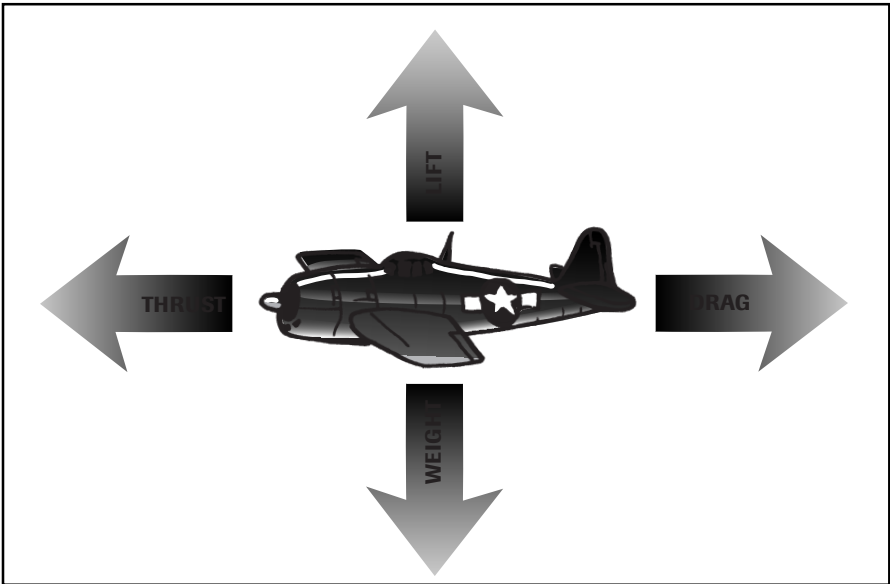
“Torque” is a catch-all term used to describe your plane’s tendency to yaw and bank in either one direction or the other at certain power settings. A fighter’s powerful engine and big propeller make

this effect very pronounced, especially when the throttle’s on high but the airspeed is low (as during takeoff). To counter these turning tendencies you’ll need to use the rudder and ailerons, although torque can be used to your advantage in a dogfight.

What causes torque? Four phenomena:

#### **Reactive force**

When the powerful engine of a fighter plane turns the propeller in one direction, there is an “equal and opposite force” that makes the plane roll in the other direction. When your throttle’s high but your airspeed’s low (as during takeoff), the plane will roll in a direction opposite to the rotation of the prop. This effect is most pronounced during acceleration.



*The four forces that affect an airplane in flight.*

### Spiraling slipstream

A propeller's spiraling slipstream (the air mass that the propeller "propels" behind it) hits one side of the tail and causes the nose of the plane to yaw (rotate left or rotate right around the vertical axis) in the same direction the reactive force causes it to roll. The result? An even stronger tendency to turn.

### Gyroscopic precession

Because it's big and spins rapidly, your plane's propeller behaves like a gyroscope. This makes it subject to the effects of "gyroscopic precession." When a force acts on a gyroscope, the gyroscope behaves as if the force were applied at a point 90 degrees to the direction of rotation. If your plane's propeller turns clockwise (viewed from the cockpit), then when the tail comes up on the takeoff-run the nose goes down—and gyroscopic precession makes the plane swerve to the left.

### NEVER IGNORE A WAVEOFF

*"WHEN COMING IN TO LAND  
TODAY I GOT TOO SLOW  
AND 'SPUN-IN' ON A WAVE-  
OFF! HIT THE WATER GOING  
STRAIGHT DOWN AT 80  
KNOTS—PROBABLY AS CLOSE  
AS I WILL EVER COME TO  
WINDING THINGS UP FOR  
GOOD. THIS WAS EXACTLY  
THE SAME WAY THE SKIPPER,  
JOHN HYDE, WENT IN AND  
HE NEVER CAME UP—THE  
DESTROYER USS FLETCHER  
PICKED ME UP AND I SPENT  
THE NIGHT ABOARD."*

*—FROM CFS2 ADVISOR  
BOB CAMPBELL'S PRIVATE WAR DIARY*

### P factor

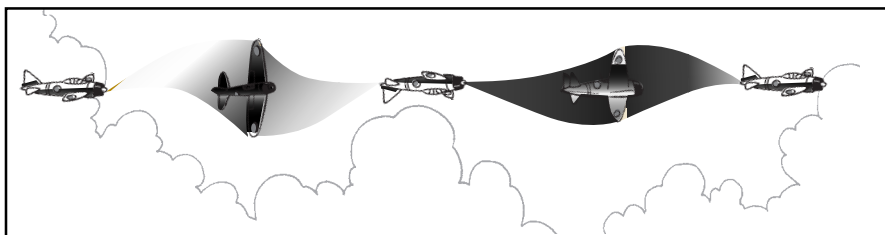
A propeller is a bunch of small wings moving around a crankshaft. Each propeller blade produces a certain amount of thrust. When an airplane is flying at a high angle of attack, the downward-moving propeller blades have higher angles of attack and produce more thrust than the upward-moving blades. The result is "P factor"—asymmetric propeller loading that creates a yawing motion.

## BASIC AEROBATIC MANEUVERS

There's flying an airplane, then there's flying an airplane in combat. Get familiar with these basic aerobatic moves before you learn combat maneuvers and you'll have a fighting chance!

For air combat maneuvers, see Chapter 6,

### Air Combat.



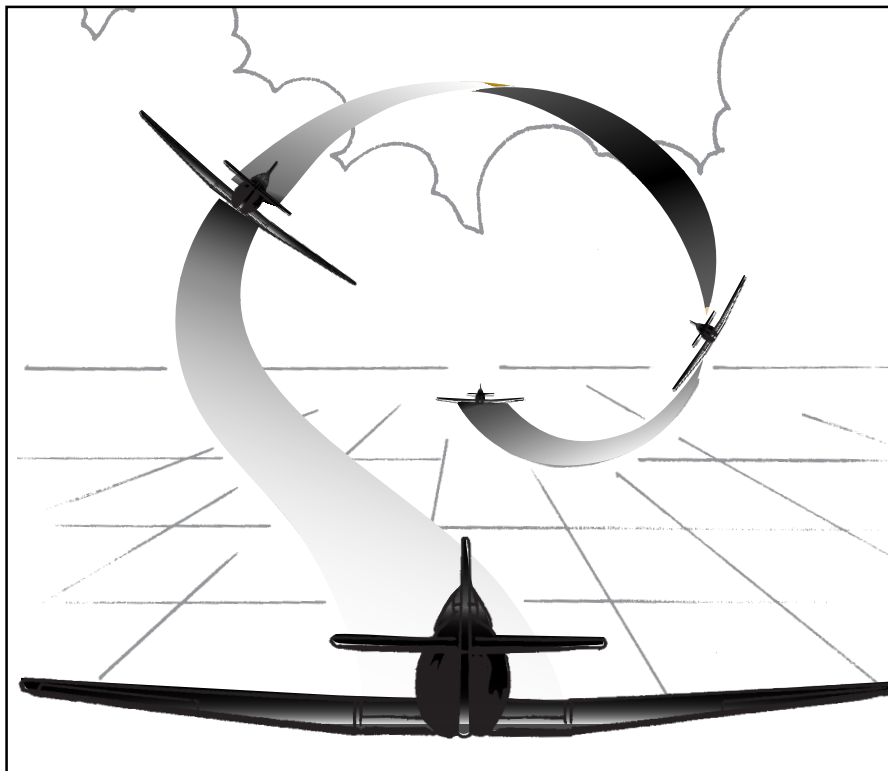
## Aileron Roll

### Purpose

Rarely used on its own in battle, the Aileron Roll is worth learning because it's part of many combat maneuvers.

### To Perform

Raise the nose slightly. Pick a reference point on the horizon, then smoothly push the stick all the way to one side and hold it there. Use the stick to keep the nose on the reference point, then center the stick as the wings approach level again. Practice stopping the roll partway through for a half-roll. That's an easy way to get inverted quickly.



## ***Barrel Roll***

### **Purpose**

This basic aerobatic maneuver can also be used in combat to shake an enemy from your tail. You'll corkscrew through the sky and lose airspeed, causing your opponent to fly right by.

### **To Perform**

Raise the nose, bank sharply left or right, and gently pull back on the stick to maintain the roll. Hold the sideways-pressure on the stick as you roll inverted, then center it when you return to level flight. During this move, the stick is essentially in the left- or right-rear corner of the cockpit. The nose will draw a circle on the horizon instead of rotating around a point, as in an Aileron Roll. If you do a Barrel Roll perfectly, you won't lose any altitude.



## ***Loop Over***

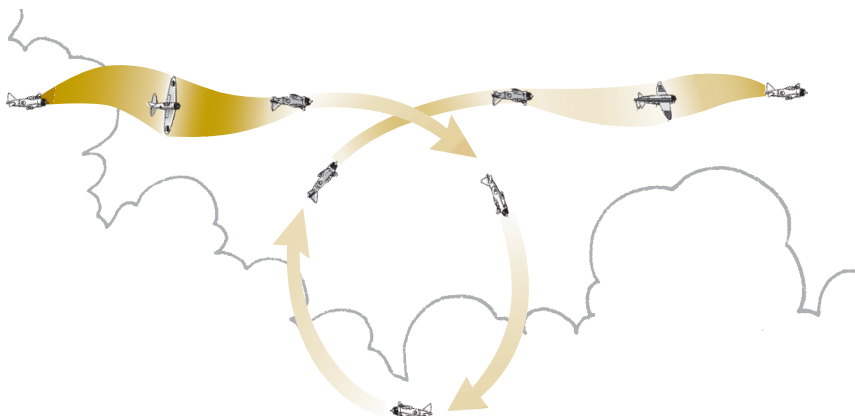
### **Purpose**

Commonly referred to as a “loop,” this move is a way to make a vertical circle in the sky and end up back where you started. Practicing Loop Overs will help you get accustomed to unusual pitch attitudes, rapidly changing airspeeds, and the effects of G-forces.

### **To Perform**

Make sure you have enough airspeed or you’ll stall at the top of the loop. Slowly pull back on the stick. As you climb, you’ll lose airspeed. Once inverted, ease off on the stick. Add a little back-pressure as you start down the back side, and reduce the throttle as you dive.

**Tip:** Watch your left wingtip to see where in the loop you are. The wing should draw a circle on the horizon.



## ***Loop Under***

### **Purpose**

A Loop Under is basically a reverse Loop Over, but it's more useful in combat since you gain speed early. Your airspeed has to be high to do a Loop Over, but your *plane* has to be high to do a Loop Under—or you'll hit the ground! Make sure you have enough altitude before you try this one, and don't pull too many negative Gs. The negative G-loads most aircraft can handle are half that of the positive G-loads.

### **To Perform**

Do a half-Aileron Roll to get inverted, then pull back on the stick smoothly. You'll gain airspeed, which will let you start up the other side of the loop. As you start to climb, keep back-pressure on the stick. You'll slow down as you become inverted. Push forward on the stick slightly to stop the loop, then finish the maneuver with another half-Aileron Roll: you should be flying in the same direction you were when you started, and at the same altitude.

## CARRIER OPERATIONS

Carrier flying is pretty tough. But it's being done every day as a matter of routine by hundreds of average graduates of squadron officer schools. You can do it!

### *Big and small carriers*

To some new pilots, landing on a big carrier seems easy, but the prospect of going aboard a small one gives them the jitters. Keep your wits sharp when landing on any size carrier, big or small. The small ones can become routine with practice, but it doesn't mean you can just relax on the big ones.

A good landing is a good landing—a bad landing, well...



*Japanese pilots toast one another with cups of sake. (Maru magazine)*

### *Taking off from a carrier*

Let's talk about the things you need to keep in mind when you're taking off from a carrier deck.

**Don't start your engine before the text message command is given.** When it comes, be able to respond quickly and efficiently, without running down the battery.

Pretty soon you'll be moving your plane down the deck to the takeoff spot. By the time you get there you should be ready to take off. Simple, isn't it? But carrier operations are delayed every day because someone didn't go through the checklist by the time he got to the takeoff spot.

So before it's time to move into position, go through your list—it's on the screen. (If you don't see the checklist, press the **C** key to bring it up.)



Go through the whole checklist. Check your magnetos by pressing **SHIFT+M**, but not at full throttle.

- ⊙ If you've been through the checklist and are satisfied the plugs are not fouled up, go to the next item on your checklist.
- ⊙ If your wings are folded, spread and lock them by pressing **SHIFT+W**.
- ⊙ Put your flaps down by pressing **SHIFT+F** if your aircraft requires it.

When it's finally your turn to take off, you will need to put your throttle on full and release your brakes. (The **B** key turns the brakes on and off.)

Once you're safely over your stall speed, go ahead and retract your flaps gradually by pressing the **V** key repeatedly. Then you're off to your mission.

## ***Landing on a carrier***

Takeoffs are a breeze compared to landings, but if you keep the following rules and practices in mind, you'll live a long time, and have the confidence of an old pro.

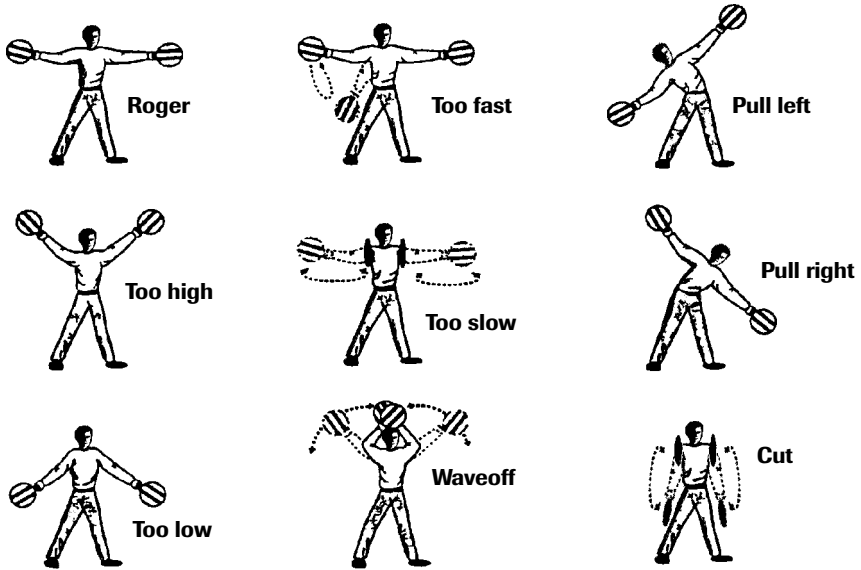
Landing on a carrier deck is like landing on any short runway, provided that runway has a tailhook cable and is moving up and down on 20-foot swells some of the time. Fortunately, the carrier deck also has a landing signal officer (LSO) to help you. Paying attention to him is the one general landing tip you can't live without. When you get in close enough, the LSO will appear and assist you.

***"LIKE A BAD EGG, A BAD LANDING IS BAD ANY PLACE. GOOD LANDING PROCEDURE WILL GET YOU ABOARD ANY CARRIER—JUST FOLLOW THE CORRECT FORMULA, WHICH YOU'VE PRACTICED HUNDREDS OF TIMES, AND WATCH THE LANDING SIGNAL OFFICER. THAT WILL GET YOU IN, ON ANY CARRIER."***

***—FROM AVIATION TRAINING DIVISION, OFFICE OF THE CHIEF OF NAVAL OPERATIONS, "CARRIER SENSE"***

### The landing signal officer (LSO)

The landing signal officer is not just the guy on the deck waving those paddles to give you a breeze. He can see your landing pattern better than you can, so pay attention to him.



### LSO laws and suggestions

There are only two landing signals that are *orders*: **Cut** and **Waveoff**. All other signals are in the way of good advice, to get you into the best position to land.

- ◉ **The Cut.** This is the one you want to see: the LSO holds his paddles out at shoulder height, then quickly lowers his arms to his sides (CFS2 uses the Japanese signal for both air forces). When he does this, cut your throttle, watch for the deck, and land. If you don't get this signal from the LSO, don't land.

- ◉ **The Waveoff.** If the LSO waves both paddles over his head, increase throttle and go around again. Remember, this is not a suggestion—**do it**.

As you settle into “the Groove”—the track from where you can first see the LSO to the landing ramp—you should be flying a few knots above stall speed, with just enough power to maintain altitude. Now is the time to correct any errors in speed, altitude, position, or preparedness to land, and it's the LSO's job to help you make those corrections.

**Remember:** The LSO only has so much time to help you land. At that critical moment when you're over the stern of the carrier, he'll give you a mandatory cut or a waveoff signal. No matter how you think you're doing on this approach, if he

signals cut, you must land immediately. If he gives you a waveoff, throttle up and go around again.

You know how to fly now. Do you know how to get around in the Pacific? Study the next chapter and you will!

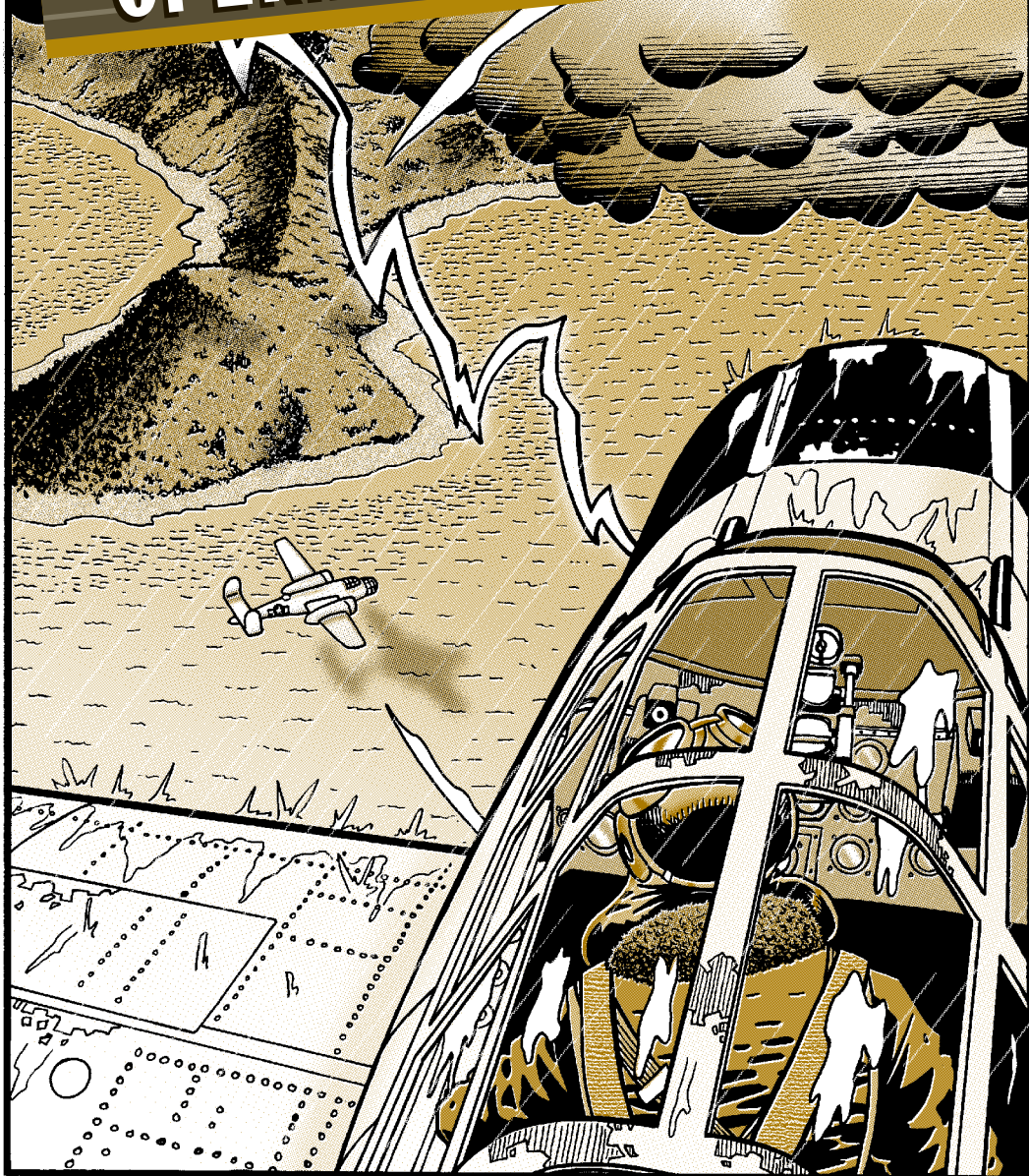


*Pappy Boyington briefs his "Black Sheep." (U.S. Navy)*

# COMBAT OPERATIONS

4

CHAPTER

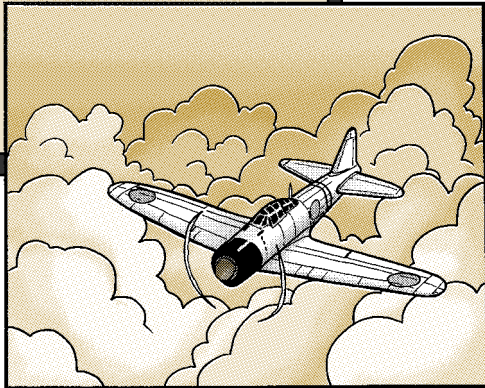




***NO MATTER HOW TOUGH OR TERRIFYING COMBAT IS, GETTING HOME CAN BE WORSE. JUST FINDING THE TINY DECK OF A MOVING CARRIER OR A SMALL ISLAND CAN BE A DAUNTING TASK. BE PREPARED.***

***IN THIS CHAPTER***

- ***THE PACIFIC THEATER OF OPERATIONS***
- ***DIFFERENT TYPES OF WEATHER***
- ***JAPANESE AND U.S. FIGHTER OPERATIONS***
- ***COMMUNICATIONS***
- ***NAVIGATION***
- ***GAMEPLAY***



## ***UNDERSTANDING THE PACIFIC THEATER OF OPERATIONS***

The Pacific theater challenged pilots in a very different way from the dangers of the European Theater. In 1940, during the Battle of Britain, German fighter pilots feared the 26-mile width of the English Channel, and with good reason. If they spent more than 20 minutes over England—less time if they found combat—

they risked running out of fuel and ditching in the frigid waters of the Channel. A downed pilot couldn't last long in these conditions, but stood a good chance of being rescued or captured.

The dangers of the Channel paled in comparison to what pilots were up against in the Pacific.

***Q: WHAT WAS THE MOST EXCITING  
EXPERIENCE OF YOUR WAR IN  
THE PACIFIC?***

***A: SEEING LAND.***

***—ROBERT STAGG,  
NAVAL AIR TRANSPORT SERVICE,  
1999 INTERVIEW***

aircraft. If it was in friendly territory, so much the better, but if you landed safely even in hostile territory, the worst you faced was falling into enemy hands. But in the Pacific all you'd find were dense jungle and steep ravines—or endless expanses of salt water, a burning sun, and sharks for company.

Pilots in the PTO left an island base or a carrier deck behind them, headed out across a couple of hundred miles of open water, faced all the dangers of a combat mission, then had to retrace their steps back to an island base, or navigate to find their carrier, which had been following its own course. Flying through an immense blue sky, from which squalls and storms could brew up with surprising suddenness, and over an ocean in which you could see gigantic sharks swimming, your biggest desire in life was to see land, or that carrier deck, again. If you were still up in the air as night came on, the difficulty and the tension increased. In wartime, airbases and carriers didn't advertise themselves by lighting beacons to guide friend or foe.

Compared to the south Pacific, Europe was full of roads and plowed fields—plenty of places to put down a crippled

### ***Combat at lower altitudes***

Another big difference in the Pacific air war was the overall shape of the theater. Because so much fighter activity in Europe was based on escorting or attacking heavy bombers, the European theater was “smaller but taller.” Heavy bombers and their escorts tried to stay above the heavy flak that blackened the skies over European targets, and a lot of combat took place at 20,000–30,000 feet.

The Pacific theater, on the other hand, is larger and flatter. Distances over this oceanic front are much greater, but most air combat took place at lower altitudes. London and Berlin are some 600 miles apart, and Moscow is another thousand miles east of Berlin. By contrast, Tokyo is 3,800 miles from Honolulu. Guadalcanal in the Solomon Islands, so important to Japan and the U.S., is 3,300 miles from Tokyo. Island bases and carriers had to be situated close enough to enemy targets to fit within fighter planes' combat radius—usually 150 to 350 miles. Because most of the strategic targets in the theater were the airbases or carriers themselves, and

because tactical bombing against these small, isolated targets was more effective than European-style strategic bombing, most air combat in the PTO took place below 20,000 feet, often right down to the water.

### ***A hostile environment***

A tour of duty in the south Pacific may sound like a trip to paradise, but conditions at most bases were a lot more like hell than heaven. Temperatures that seldom fell far below 90 degrees, a spectacular assortment of insects including malaria-bearing mosquitoes, and frequent, sudden, and torrential rains that left everything damp and rotting made the time between missions hard to bear for pilots on both sides.

While those onboard ship had a lower risk of malaria, dysentery, and jungle rot, the pervasive heat, especially belowdecks, was hard to take. Carrier-based flight crews suffered some additional challenges. Read on to learn more about these challenges.

### ***Landing on small islands and smaller carriers***

Finding that remote airfield or carrier deck was quite an achievement—but now the pilot had to land on it. Some island runways were just a minuscule scar gouged out of jungle, stretched from one side of a tiny atoll to the other. Sure, they were bigger than the biggest carrier deck, but their surface alternated between blinding, choking, engine-killing dust and churning mud that could grab at landing gear and flip a fighter on its back. You could find the field and land on it, and then it was welcome home to the heat, humidity, insects, disease, and boredom.

### ***Your landing challenge***

You've watched wind and wave, studied your chart, and sweated your way back to that moving speck in the sea you call home. Now it's time to get back aboard. Presuming you've got ample light, it's a matter of settling into the pattern and taking your turn to be guided in by the landing signal officer (LSO). If the weather and sea are calm, it's not too

***"(WHEN YOU ATTACK SHIPS) YOU KNOW THAT THE WHOLE OUTFIT'S GOING TO SHOOT AT YOU, AND EVERYBODY'S MAD AT YOU, THEY JUST BLAST AWAY YOU KNOW? YOU COULD WALK ON LEAD UP THERE."***

***—CFS2 ADVISOR JOE FOSS, PRIVATE INTERVIEW, MARCH 2000***





*Landing signal officer guides a Corsair to a safe landing. (U.S. Navy)*

## **FLYING IN DIFFERENT TYPES OF WEATHER**

While you've heard that the clearest air is near the equator, you'll also find some of the most unpredictable weather. You can't let the endless blue sky lull you into a false sense of security. If you do, you'll end up swimming with the sharks, not flying over them.

tricky, but the risk is always there that you'll take a bad bounce and wind up in the barrier, go over the side, or foul up in some unforeseen way (maybe by ignoring the LSO). Especially if you're landing on a small carrier, the action is even scarier. One moment you're ready to drop onto the deck 40 feet below you, and the next moment conditions change and the LSO is waving you off. It's all part of air combat in the Pacific theater.

You've read about carrier landings and studied all the LSO signals in Chapter 3, **Flight School**. Make sure you don't forget them.

### ***Conditions being normal...***

...but they never are. While you wait for takeoff, it's sweltering and you're sweating bullets. More than anything, you wish you'd worn that pair of shorts you left on your bunk. Then you start to gain altitude, the heat disappears and the chill sets in. This is just the beginning of the sudden changes that characterize flight in the Pacific. Don't let them dull your wits.

You might see those clouds on the horizon as the perfect cover for a blazing attack on the enemy. But scrutinize those clouds closely, you might be heading into a weather trap. That's a fight you can't win.

**Q. WHAT ARE THE AVERAGE CONDITIONS OF WEATHER, CEILING AND VISIBILITY ENCOUNTERED?**

**A. IN THE SOUTH PACIFIC YOU EITHER HAVE GOOD WEATHER WITH SCATTERED CLOUDS OR ELSE THERE ARE HEAVY LOCAL RAIN SQUALLS. I THINK THAT HOLDS GOOD MOST OF THE YEAR ROUND.**

*-INTERVIEW OF LT. CMDR. JOHN S. THACH (BUREAU OF AERONAUTICS, 26 AUG 1942),  
(FROM FIGHTING SQUADRON SIX (VF-6) OFFICIAL HISTORY)*

In the Pacific, squalls and storms are as volatile and quick as an enemy attack; avoid both at all costs.

### **Your waypoints are your advantage**

When you're in flight over the Pacific, there's one thing you can rely on: your waypoints. No matter what the weather, keep a clear head and trust your course. Don't get so caught up in what's going on outside the cockpit that you forget to watch those instruments. Keep an eye on the Tactical Display. Watch your compass and clock for course and location; watch

your altimeter and attitude indicator to make sure you stay right side up and out of the drink. Whether the ocean is smooth or churning, you'll rely on your instruments to orient you.

In Combat Flight Simulator, Cockpit view is the default view. But if you've switched to another view, there's a quick way to get your head and your eyes back to the controls.



#### **Get to Cockpit view—fast**

- Right-click anywhere on your aircraft's panel, then choose **Cockpit View** from the menu that appears.

**"THURSDAY, 5 MARCH, 1942: BEAUTIFUL WEATHER! A STORM. SO ALL HANDS SLEPT ALL DAY. WHAT A BREAK! THE SHIP IS STILL RUNNING AT 25 KNOTS. JOINED BY OUR SIX DD'S AT DUSK. ALL NEWS FROM THE ORIENT BAD. TOKYO SAYS WE KILLED EIGHT PEOPLE AND WRECKED A SHANTY AT MARCUS."**

*-FROM FIGHTING SQUADRON SIX (VF-6) OFFICIAL HISTORY*

## **DIFFERENCES BETWEEN JAPANESE AND U.S. FIGHTER OPERATIONS**

When you get into the air and meet the enemy, you'll soon find that the two fighter forces tend to do things differently. You'd better know what to expect from your adversary, and how to counter any move he makes. You may think your planes and tactics are superior, but you'll soon learn to respect your opponents; cockiness can put you off your guard—and into their sights.

### **Aircraft dictate tactics**

Japan began the war with the Mitsubishi A6M Zero as its best fighter, and improved versions of the Zero were the mainstay of the Japanese Navy Air Force throughout the war. Their most experienced fighter pilots were given a lot of

influence in the design of the Zero, and they wanted a pilot's plane—a nimble dogfighter that traded strength and pilot safety for outstanding agility. The Japanese pilots weren't worried—they had a plane that, at low to medium speeds and altitudes, could out-turn, out-climb, and generally out-maneuver any fighter in the Allied arsenal. It was a *samurai* weapon, the ideal plane for young men seeking to perform deeds of personal valor.

The U.S. entered the war with the Grumman F4F Wildcat as its best carrier-borne fighter. Built tough, well-armed, and armored to preserve the Navy's heavy investment in pilot training, the relatively heavy and sluggish Wildcat couldn't compete with the Zero using classic one-on-one dogfighting tactics. The U.S. instead developed team tactics that could

***"...IRONICALLY DURING WORLD WAR II IN THE SOUTHWEST PACIFIC THE FIGHTER PILOTS OF JAPAN AND THE UNITED STATES TRADED PLACES RELATIVE TO THEIR NATIONAL CHARACTER. JAPANESE PILOTS, GROWING UP DURING A TIME WHEN A MILITARISTIC REGIME POUNDED A GROUP ETHIC INTO THE NATIONAL CONSCIOUSNESS, DEVELOPED TACTICS THAT EMPHASIZED THE INDIVIDUAL IN AIR COMBAT.***

***THEIR AMERICAN OPPONENTS, COMING FROM A LAND THAT PRIDED ITSELF ON RESPECT FOR INDIVIDUALISM, MADE A MILITARY ART FORM OUT OF DEADLY BUT WELL ORGANIZED AND DISCIPLINED SMALL-GROUP TACTICS."***

***—ERIC M. BERGERUD,  
FIRE IN THE SKY: THE AIR WAR IN THE SOUTH PACIFIC***

turn the tables on the would-be knights of the Rising Sun. Two two-plane elements combined to form the “Finger Four,” a formation that made it possible for pilots to guard one another’s tails. Teamwork like that allowed pilots in the inferior planes to overcome superior enemy aircraft.

As the war went on, both sides developed superior fighters, but even for pilots flying a P-38, Corsair, or Hellcat (or the latest P-47 or P-51), it was risky to take on the Zero on its own terms—at speeds below 300 mph and altitudes lower than 15,000–20,000 feet. The Japanese finally produced faster, heavier, more powerful fighters, including the Kawanishi N1K2-J *Shiden-kai*, but they couldn’t make enough of them to turn the tide, and their pool of experienced pilots was nearly exhausted.

### **Teamwork makes the difference**

Both sides spent a lot of time teaching combat maneuvers, formation flying, and aerial communication, but the two sides tended to operate differently when they made contact with the enemy.

For most of the war the **Japanese** small-unit formation was the three-plane “Vic” or a nine-plane “Vic of Vics.” Bigger formations were hard to define; the Americans called them “gaggles.” The problem was that when they spotted Allied fighters, these formations tended to break up as each pilot went looking for trouble on his own. Without teamwork, it was easy to find trouble, but not so easy to survive it.

***“(THE JAPANESE PILOTS) ALL WANTED TO WIN. COMBAT MAKES THE PILOT’S WILL TO WIN STRONGER. WITH EVERY FIGHT THEY BECOME MUCH STRONGER. I GOT STRONGER WITH EACH VICTORY. THE FIRST FIGHT I DIDN’T REMEMBER ANYTHING OR UNDERSTAND ANYTHING. MY FIRST KILL, THERE WERE MANY THINGS THAT I SHOULD HAVE DONE BUT I FORGOT EVERYTHING. I DIDN’T KNOW WHAT I SHOULD DO.***

***AFTER COMING BACK I WAS NOT REWARDED; I WAS DISCIPLINED. I BROKE ALL THE RULES I SHOULD HAVE RESPECTED, AND BECAUSE THE OTHER PILOTS SUPPORTED ME, THAT’S THE REASON WHY I WAS ABLE TO SURVIVE. I WAS HEAVILY DISCIPLINED—THEY HIT ME WITH A WOODEN STICK—A VERY HEAVY BLOW. BUT AS I GOT MORE KILLS I BEGAN TO HAVE THE CONFIDENCE THAT I WOULD NEVER BE DEFEATED AS LONG AS I WAS IN A ZERO.”***

***—CFS2 ADVISOR SABURO SAKAI,  
PRIVATE INTERVIEW, APRIL 2000***



*Landing signal officer at the stern of a U.S. carrier “wig-wags” in an incoming plane. The “talker” in the foreground relays orders from the captain to the signal officer. (Corbis)*

**American** training emphasized coordination and teamwork, with the two-plane element—a leader and his wingman—as the smallest acceptable unit. Larger formations, from the Finger Four to a 36-plane squadron flying in stepped echelon, rarely disintegrated entirely under the pressure of combat. The wingman may not have been Ace-caliber, but he was still some of the best insurance a pilot had.

### ***What matters in combat?***

If you’re flying a **Japanese** fighter, use its strengths to your advantage. With a Zero, you’ve got the most maneuverable carrier-based fighter in the Pacific, but you’ve got to lure the enemy into a turning fight at speeds and altitudes that suit your aircraft—under 300 mph and below 20,000 feet. Do that, and you’ll use the Zero’s superior maneuverability to carve up your adversary. If you’re flying a *Shiden*, use its excellent maneuverability—as well as its power, speed, armor, and armament—to engage any Allied fighter at any speed or altitude with confidence.

If you’re flying an **American** fighter, try to use its characteristics to play the game your way. Even the tubby Wildcat has some advantages: its greater weight and toughness let you dive away from a Zero, then zoom up to come out on top. In the more advanced P-38, F6F, and F4U, use their superior power and performance to dictate the terms of the engagement. Start at superior altitude and, keeping your airspeed above 300 mph at all times, boom through enemy formations in a diving attack with guns blazing, then zoom to gain altitude and repeat the process. Don’t be lured to lower altitudes, and don’t be suckered into a low-speed

turning fight. In a heavy, high-powered plane, speed and altitude are your best assets. Fixating on following an enemy at low speed and altitude is a good way to get your personal effects sent home to your folks.

## COMMUNICATIONS

Confusion is a dangerous ingredient in air combat—communication is the antidote. Microsoft® Combat Flight Simulator 2 gives you limited two-way radio communication with your wingman for use in emergencies. You can also maneuver your aircraft to convey commands.

Whenever you're flying a mission, your radio is on by default. It can give you vital information before, during, or after combat; pay attention to what you hear!



### To turn the radio off or on

- While in flight, press **SHIFT+R**.



*Japanese kamikaze pilot tries to crash his plane loaded with bombs onto the deck of a U.S. warship, 1/1/45. (Hulton Getty/Liaison Agency)*

**"MY RADIO WAS DEAD. THEY HIT MY RADIO. I'D GOTTEN HIT A COUPLE OF TIMES; I DON'T KNOW HOW MANY BULLET HOLES, BUT I HAD ENOUGH THAT THE RADIO WAS BLOWN. AND SO I SWUNG BACK TO GO ON BACK THE OTHER WAY. WHEN I DID, I JUST CAUGHT THIS OIL STREAK, IT JUST WENT IN FROM RIGHT IN THE FLEET, AND JUST WENT IN THE DIRECTION OF GUADALCANAL, SEE?"**

**—CFS2 ADVISOR JOE FOSS,  
PRIVATE INTERVIEW, MARCH 2000**

### **Receiving radio transmissions**

Here are some typical radio transmissions you'll hear during a mission:

#### **"Bandits! Nine o'clock low!"**

Picture your airplane sitting on the face of a clock, with its nose pointing at 12. This transmission means that the enemy is to your left and below, possibly hidden beneath your left wing.

#### **"That's a clean kill!"**

One of your squad-mates is confirming that you've shot down an enemy aircraft and can now pursue others.

#### **"Need help!" or "I'm taking hits!"**

One of your squad-mates is being attacked by an enemy aircraft; he needs your help!

#### **"We're clear of bandits."**

There are no more enemies in the vicinity; proceed with your mission.

### **"BINKY" SQUADRON MEETS THE ENEMY IN THE AIR—AND ON THE RADIO**

*"... (BINKY' SQUADRON) SPOTTED A SMALL FLIGHT OF ZEKES... EVERYONE STARTED CALLING THEM IN: 'BINKY LEADER, BANDITS IN THE SUN.' 'BINKY, BINKY, HAVE YOU GOT THE BANDITS? ELEVEN HIGH; ELEVEN HIGH...' AND SO ON. AND BINKY LEADER WAS SAYING, 'OKAY, BINKY, OKAY. DON'T DROP YOUR TANKS YET. I SEE THEM, I SEE THEM.' AND A NEW VOICE CAME INTO THE HEADSETS AT THAT MOMENT: 'WE SEE YOU, TOO, BINKY.'"*

*—EDWARDS PARK, NANETTE*

***Sending commands to your wingman by radio***

In an emergency, your radio is the best way to communicate with your wingman. You can use keystrokes to send standardized messages that call in your wingman to help, request your wingman to rejoin formation, order your flight to split in two, or call for your wingman with the **Help**

**Me! (H key)** command. To find out more, see Chapter 7, **The Missions**.

***Nonverbal communications***

In multiplayer mode you can avoid risky radio chatter by using your own aircraft to send prearranged signals.

***AILERON AND OTHER AIRCRAFT SIGNALS***

Aircraft signals for use in daytime, from the U.S. Navy  
*Current Tactical Orders and Doctrine for Carrier Aircraft (USF 74B).*

Signal	Meaning
Shake ailerons	Execution signal
Series of small zooms	Form vee or close up
Series of pronounced zooms	Join up
Swish tail	Form column
Succession of pronounced zooms followed by circling	Rendezvous scouting line
Shake wings and elevators by rotary motion of stick	Break up formation
Rock wings from side to side	Attack
Rocking of wings by following plane	We are being or are about to be attacked
Violent dip of right or left wing—down and up	Following plane or section take beam defense position to side indicated by wing dip

***Landing signal officer***

The communication between you and your landing signal officer (LSO) is what

really matters when you’re landing on a carrier. See Chapter 3, **Flight School**, for details.





*Hellicat pilot about to get the signal to take off. Note drop tank and flaps in full “down” position. (Corbis)*

## NAVIGATING IN THE PACIFIC THEATER

In your Mission Briefing, which you see right before you fly, you receive any navigation instructions that are relevant.

- ◉ Vector information is always given in three-digit compass settings.
- ◉ Altitude is always given in angels, or thousands of feet.

You will also see a map with the waypoints plotted out graphically. To view this map in flight, press the **M** key.

We recommend you turn on your Tactical Display to see the heading information for your next mission waypoint. The Tactical Display doubles as an enemy locator if there are any bandits nearby.

Most of the navigation you will do in the Pacific theater will be over water, so pay close attention to the next section.

## ***Navigating over water***

Navigating over water is pretty tough. You don't have any ground references to rely on, so you have to use a few tools and use them well.

Here are your tools:

- ◉ Compass
- ◉ In-flight map
- ◉ Recon photos
- ◉ Waypoints (given in your Mission Briefing)
- ◉ Tactical Display



### **How to see the in-flight map**

Press the **M** key to toggle the display of the in-flight map.

The in-flight map shows you where your aircraft is, where your mission waypoints are, and where the boundaries of friendly and hostile territory are drawn. This is critical if you have to bail out. (For details, see Chapter 5, **Emergency Procedures**.)



*Vought Corsair propeller makes a corkscrew contrail in humid air. (Corbis)*

## NAVIGATING OVER WATER

*"IT WAS DIFFERENT, FLYING OVER WATER THERE, FROM WHAT IT HAD BEEN AT PENSACOLA OR AT SANTA BARBARA. AT THOSE BASES YOU COULDN'T REALLY GET LOST, OR NOT FOR LONG; THERE WAS ALWAYS A DIRECTION TO FLY THAT WOULD TAKE YOU BACK TO LAND. BUT WHEN THE LAND IS AN ISLAND THREE THOUSAND FEET LONG, IN THE MIDDLE OF THE WORLD'S LARGEST OCEAN, NO COURSE IS SURE. EVEN IN THE BEST WEATHER ULITHI WAS HARD TO SEE (IT WAS MAYBE TEN FEET OUT OF THE WATER AT ITS HIGHEST POINT); IN THE WORST WEATHER IT WAS IMPOSSIBLE. I WOULD WORK OUT MY NAVIGATION, FLY OUT ALONG THE CHARTED TRACK, TURN AT THE PROPER TIME, FLY, TURN AGAIN, AND THEN AT THE PREDICTED MOMENT I WOULD LOOK ROUND FOR HOME. OCCASIONALLY I MISSED, DROPPED DOWN THROUGH CLOUD COVER WHERE THE ISLAND SHOULD HAVE BEEN, AND FOUND THE OCEAN EMPTY, THE ISLAND ANYWHERE BUT THERE. THEN I'D TURN TO EDWARDS FOR HELP--'FIND ME A COURSE!'--AND EDWARDS WOULD USE HIS RADAR, OFFER A HEADING, AND LEAD US HOME."*

*—FROM SAMUEL HYNES*

*FLIGHTS OF PASSAGE: REFLECTIONS OF A WORLD WAR II AVIATOR*



### How to view recon photos while flying

Reconnaissance photos aren't always going to be available, but when they are, you'll find them on the map.

1. Press the **M** key to display the map.
2. Click **Recon photo**.

When you see something on the horizon that looks like what's in the recon photo, that's your target. Shoot it or bomb it with everything you've got.

### Destroy the evidence!

Write waypoint information on the back of your hand. The reason is two-fold:  
1) You can lose a piece of paper, and  
2) if you should be captured, you can

destroy the information with one lick of your tongue. It sure beats chewing up written notations.

### **Using the Tactical Display**

When the Tactical Display is on (press the **T** key to toggle, or on the Views menu, select **Tactical Display**) and you're not engaged in combat, waypoint information appears. You'll see a line extending from the symbol that represents your aircraft toward the next waypoint. If you are on course to your next waypoint, the line will be green. If you are slightly off-course, the line will be blue, and you should check your heading and make a small correction.

Under the Tactical Display, you'll see the distance and magnetic bearing to the next waypoint or action sequence.

Using waypoint information to navigate in real time is simple: just turn your aircraft so that the line points to the top of the screen and your heading matches the suggested bearing. You'll see the distance to the waypoint decrease as you fly toward it. Waypoint information turns off when you're engaged in combat so that the Tactical Display is easier to read. Waypoint information turns back on when combat is over.

**Note:** By default, distance is shown in nautical miles. To change the measurement units to kilometers, press the **U** key.



### **How to skip to the next waypoint**

To move your plane instantly to your next mission waypoint, press the **X** key. There will not necessarily be conflict there; it could just be a navigational turning point.

When you arrive at a new waypoint, assess the situation before warping to the next point. If you warp too fast, you could miss important mission events.



### **How to view your next target in combat**

When you are engaged in combat, the Enemy Indicator (a 3-D green cone) appears and points toward your closest bandit.

- To toggle the Enemy Indicator off or on, press the **I** key.

You can also see a two-dimensional top view of the battle area around your plane on the Tactical Display.

- Press the **T** key to show the Tactical Display.



*Marine F4U fighters silhouetted against AA tracers off Okinawa, 1945. (Naval Historical Center)*

## GAMEPLAY

### ***Skipping to next action***

If you're itching to get into a fight and you don't want to find your way to the mission objective by flying in real time, you can skip right to the next action. Just press the **X** key.

### ***Slewing in Free Flight and Quick Combat modes***

In Free Flight and Quick Combat, you can slew to rapidly change your aircraft's position, direction, location, or altitude without flying. Slewing is a good way to speed up a long flight, or to reposition yourself quickly. When you're in slew mode, you can use a joystick, the keyboard, or the mouse to change your aircraft's position, heading, and altitude.

To turn on slewing, press the **Y** key, or on the Aircraft menu, select **Slew Mode**. Your current latitude, longitude, and altitude will appear in the upper-left corner of the view window and the word "Slew" will appear to the right. Use the mouse, keyboard, or joystick to change your position.



*Japanese war art painting: "Takeoff From Carrier."  
Artist: Arai Shori. (National Archives)*

**Note:** If your aircraft is on the ground and you slew up, you may drop like a rock when you switch back to normal flight. Once you gain airspeed, you can pull out of the dive.

Here are the basic key commands for slewing.

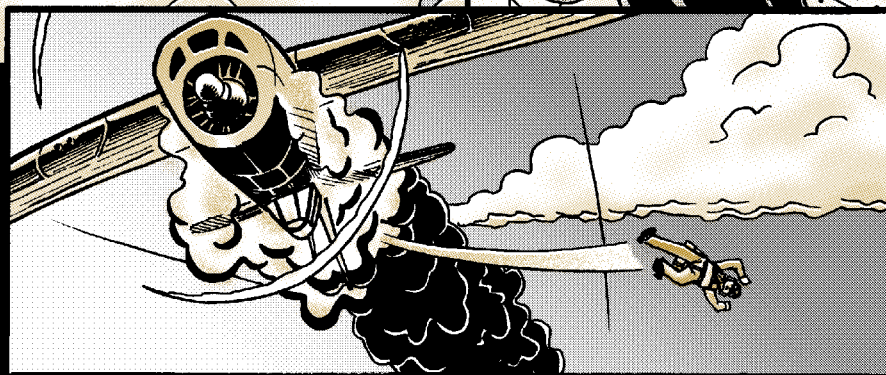
Action	Command
Turn Slew mode on/off	<b>Y</b> key
Set aircraft position to north heading, level pitch, level bank	<b>SPACEBAR</b>
Display coordinates/Frame rate (toggle)	<b>SHIFT+Z</b>
Move forward	Num Pad <b>8</b>
Move backward	Num Pad <b>2</b>
Move left	Num Pad <b>4</b>
Move right	Num Pad <b>6</b>
Move up slowly	<b>Q</b> key
Move up quickly	<b>F4</b>
Move down slowly	<b>A</b> key
Move down quickly	<b>F1</b>
Freeze vertical movement	<b>F2</b> or <b>F3</b>
Rotate left	Num Pad <b>1</b> or <b>END</b> key
Rotate right	Num Pad <b>3</b> or <b>PAGE DOWN</b> key
Move nose up	<b>9</b> key (keyboard)
Move nose up quickly	<b>F5</b>
Move nose down	<b>0</b> key
Move nose down quickly	<b>F8</b>
Bank left	Num Pad <b>7</b>
Bank right	Num Pad <b>9</b>
Freeze all movement	Num Pad <b>5</b>



5

CHAPTER

# EMERGENCY PROCEDURES





*THERE ARE TWO KINDS OF DAMAGE IN AIR COMBAT: THE KIND YOU INFLICT AND THE KIND YOU SUSTAIN. IF YOU CAN TELL EXACTLY WHAT KIND OF DAMAGE YOU'VE INFLICTED ON ENEMY AIRCRAFT—AND HOW MUCH DAMAGE YOUR OWN AIRCRAFT HAS SUFFERED—YOU WILL INCREASE YOUR LIKELIHOOD OF SURVIVAL.*

*IN THIS CHAPTER*

- *DAMAGE*
- *EMERGENCY PROCEDURES*

## DAMAGE

In this section we'll talk about what causes damage, interpreting damage, and what to do if you're hit. If you want to live to be an old flight instructor, you'll pay attention.

### What causes damage

Damage can be caused by three things:

- **Getting hit by a weapon.** How badly it hurts you or your airplane depends on what kind of weapon it is, where it hits, and how fast it's moving.
- **Exceeding your aircraft's performance limitations.** Your plane is designed for combat and can withstand incredible amounts of



stress. But there are limits. Maneuvers that exceed your aircraft's performance limitations can cause damage. It's bad enough that people up there are trying to hurt you. Don't do it to yourself.

- **Collision with another aircraft, the ground, or a structure.** Let's put it simply: if you hit something in flight, you may not be around long enough to feel embarrassed.

It's your responsibility to assess damage to your own or an enemy aircraft and to decide what course of action to take. If you know the damage to your own plane is so great that you cannot fight effectively or complete your mission, don't tempt fate. Disengage and return to base or bail out (press the letter **O** key three times).

## Interpreting damage

When you damage another aircraft, you may see:

- ◉ Sparks as bullets hit the aircraft.
- ◉ Pieces of the aircraft fall off.
- ◉ An explosion.
- ◉ Smoke.

## Sparks and pieces of aircraft

Sparks on the enemy aircraft are good indications that you're making hits, but they could be doing only minor damage. Sparks alone won't tell you whether or not to keep fighting.

Watch for pieces of the aircraft coming off of enemy planes, especially if you are following closely. If you do see pieces flying off, remember:

- ◉ The enemy is probably damaged enough so that the fight is over.
- ◉ Don't get hit by the pieces of the enemy plane. They can damage your plane, too.

## Smoke

You can make some educated guesses about the damage to a plane by observing

the smoke color and behavior. Memorize this list. It applies to both your observations of your own plane and of enemy planes.



*Navy aircraft carrier Saratoga battled for three years without being hit, but while operating off Iwo Jima, her luck finally ran out and she suffered seven hits, 2/21/45. (Corbis)*

<b>Smoke characteristics</b>	<b>Probable meaning</b>	<b>Your aircraft</b>	<b>Enemy's aircraft</b>
White smoke	Damage to coolant or fuel systems.	Might be minor damage. If fight is critical, continue to fight. If smoke turns black, damage is more serious—head for home.	Your enemy isn't down yet. Keep shooting.
Black smoke	Burning oil or damage to engine.	Your time in air is limited. Try to nurse plane home, without combat. Bailing out is recommended.	If he is not immediately threatening a target, move on. His plane is as good as gone.
Black smoke with flames	Aircraft seriously damaged, may explode at any time.	<i>Bail out immediately.</i> You may have only a few seconds left in the air.	The fight is over. Move on.
Sputtering smoke	Aircraft slightly damaged.	It might be only minor damage. If fight is critical, continue to fight or fly. If smoke becomes a steady stream, consider bailing out.	Your enemy isn't down yet. Keep shooting.
Intermittent smoke	Aircraft moderately damaged.	If fight is critical, continue to fight or fly. If smoke becomes a steady stream, consider bailing out.	Your enemy isn't down yet. Keep shooting.
Steady stream of smoke	Aircraft seriously damaged.	Your time in air is limited. Try to nurse plane home, without combat. <i>Bailing out recommended.</i>	If the enemy plane is not immediately threatening a target, move on. Enemy plane is as good as gone.

## **Sustaining damage**

Explosions, shrapnel, bullets, smoke, and fire can all hurt you and seriously affect your ability to fly. If you are wounded, you'll be rewarded for your courage. (See Chapter 9, **For Exceptional Service...**) Here are steps you can take to contain the damage.

### **Fire**

If your aircraft is on fire you're in big trouble, and there's not much you can do to stop it. The flames will rapidly eat away at your ship.

**What to do:** Keep your speed up to keep things cool, but make sure you bail out (press **O** key three times) before the flames enter the cockpit!

### **Explosions**

A well-placed cannon round or another bad turn of fate may cause your crate to spontaneously explode.

**What to do:** Nothing. You'll be dead before you know what hit you.

### **Airframe damage**

Shredded wings and stabilizers will change your airplane's flight characteristics. Because a damaged airframe is highly susceptible to structural failure, getting home in one piece requires intense concentration and a steady hand.

**What to do:** Slow down and maneuver gently to avoid putting additional stress on the airframe. Very tight turns or steep dives are not advised.

## **Control surface damage**

If you notice the controls sticking, or becoming significantly less responsive to your movements, suspect damage to a primary or secondary control surface (rudder, elevator, ailerons, flaps, trim tabs).

**What to do:** Do your best to maintain control and avoid lowering the flaps or landing gear unless absolutely necessary.

## **Engine damage/failure**

When your engine is damaged, you'll notice roughness, vibrations, and r.p.m. variations. Smoke and flames may spout from the nose. Monitor the tachometer, oil pressure, manifold pressure, oil temperature, and engine temperature gauges for changes. Engine damage will likely turn into engine failure.

**What to do:** Buy yourself some time by nursing the engine with a low throttle setting. If the engine stops or seizes, maintain your airplane's best glide speed (see chart below), then make an emergency landing or bail out. Also see the more detailed "Emergency Procedures" section later in this chapter.

Note the best glide speed for each aircraft in the following table. These numbers may vary with atmospheric conditions and ordnance.

<b>Aircraft</b>	<b>Best glide speed</b>
Wildcat	100 knots
Hellcat	130 knots
Corsair	140 knots
P-38	160 mph
A6M2 Zero	90 knots
A6M5 Zero	90 knots
Shiden-kai	110 knots

### **Gun/cannon/rocket/bomb damage**

A fighter plane is an airborne weapons platform. If the weapons stop working, you can't accomplish your mission or defend yourself effectively.

**What to do:** If the damage is so significant that you can't fight, make a run for it.

### **Coolant/oil leak**

If your cooling system is punctured, your engine temperature will increase. If the temperature increases too much, the engine will seize. If it starts running rough after a sharp temperature increase, beware: that may mean your engine's about to quit.

**What to do:** Monitor the coolant temperature, engine temperature, oil temperature, and oil pressure gauges for abnormal readings. Try to keep temperatures down by flying with a lower throttle setting and lowering the nose to increase airspeed. Open the cowl flaps by pressing **SHIFT+E** on your keyboard. This will maximize the amount of air flowing over your engine and keep it cool.

### **Fuel leak**

A punctured fuel system means that fuel is either leaving the aircraft in a vapor trail or not flowing properly. Either way, you'll run out of gas sooner than expected.

**What to do:** Monitor the fuel gauges and fuel warning light, but don't trust them. Get home as soon as you can. If you're hit, a fuel leak can easily turn you into a fireball.

### Hydraulic leak

A damaged hydraulic system means that hydraulically operated parts (like the landing gear and flaps on some aircraft) will move sluggishly until they stop responding entirely.

**What to do:** Keep an eye on the hydraulic pressure indicator. If necessary, use the manual controls as backup for hydraulic landing gear, which are described next.

### Landing gear damage

There's nothing worse than completing your mission, then finding out that your gear doesn't work or that it's been shot off.

**What to do:** Try to manually pump the hydraulic landing gear down (press **SHIFT+G** in the CFS2 combat keyboard layout). If the gear won't lower, your choices are to bail out or slide your ship in. A belly landing isn't easy, but it's possible.

### Radio damage

Bullets or flames that find their way into the cockpit may render your radio useless.



*After spinning his Wildcat into the drink and being rescued by a destroyer, CFS2 advisor Bob Campbell is returned to the escort carrier Saginaw Bay. (U.S. Navy photo, courtesy of Bob Campbell.)*

**What to do:** If the radio goes dead, you're on your own. This failure won't bring your plane down, but you should use your other navigational tools (such as your compass and your Tactical Display) to get back to base as soon as possible. A lone wolf in the sky is a dead wolf before long.



### How to display damage messages on your screen

All aircraft come with damage display systems that you can turn on for damage messages. When you cause or receive damage you'll see a text message describing what's been damaged (to toggle the damage text on and off, press **SHIFT+D**). This will give you important details about the changes you may notice in aircraft performance.

### What to do if you're hit

1. **KEEP FLYING THE AIRPLANE.** Your job as a pilot just got harder. Control surfaces may be damaged, and you may have limited control over your craft. Also, something might explode at any time. But there's nothing you can do about it, except concentrate and get that baby home.
2. **Assess the damage.** The big question is, "Do I have to turn back to my base?" Use the damage information above to answer this question.
3. **Take appropriate action.** Sometimes you're in a situation where you have to stay and fight, but most of the time, you just need to get the heck home. If you can't because your ship won't make it, you'll need to follow emergency procedures.

## EMERGENCY PROCEDURES

### Engine failure during takeoff

Your engine can fail even during takeoff, so be advised.

#### Takeoff from a carrier

If your engine fails while you take off from a carrier deck, there's not much you can do. If you find yourself in the drink, it's all over.

*"ANOTHER MISTAKE I MADE: I FAILED TO IMPRESS ON THE PILOTS THE NECESSITY OF COMING BACK TO THE CARRIER SOON ENOUGH AFTER ATTACKING AN ENEMY FORCE. IN OTHER WORDS DON'T CHASE THEM TOO FAR AWAY. IT'S DIFFICULT TO STOP A PILOT AFTER HE HAS SHOT DOWN A PLANE. HE GETS A SORT OF BLOODTHIRSTY EXHILARATION WHICH MAKES HIM WANT TO COMPLETE THE DESTRUCTION OF EVERY ENEMY AIRCRAFT IN THE AIR."*

*-INTERVIEW OF LT. CMDR. JOHN S. THACH  
(BUREAU OF AERONAUTICS, 8/26/42)*



**Takeoff from a land base**

If the engine should fail before leaving the ground, close the throttle immediately and use the brakes as required.

In the event of engine failure immediately after leaving the ground, close the throttle and land straight ahead. **DO NOT ATTEMPT TO TURN THE PLANE.**

Observe as many of the following procedures as you can, in the order given.

1. Release auxiliary tanks or bombs.
2. Raise your landing gear, unless you have sufficient room to land on the same runway.
3. Lower wing-flaps fully.
4. Turn switches (power control and ignition) to **OFF**.
5. Turn Fuel Selector **OFF**.
6. Find a place to land that's straight in front of you and get the plane down as well as you can.

**Engine failure during flight**

There are certain obvious signs of engine failure during flight: it becomes very quiet, and the propeller stops moving. A more subtle sign of engine failure is a drop in altitude and a loss of speed, so pay attention to your instruments for any such irregularities.

If altitude permits, attempt to find the cause of the engine failure by checking the fuel supply and fuel tank selector immediately. If your currently selected tank is empty, switch to a tank with fuel and restart the engine.

If this fails, however, you will have to think about bailing out or ditching your plane.

**TRAVEL LIGHT**

Whether you're trying to get home or you're ditching your plane, step one is always to **drop your load**. If you're carrying any kind of ordnance, whether bombs or rockets, get rid of them in a way that won't blow up your plane or any friendly planes, ships, or installations. Same goes for extra fuel tanks. Drop those babies, unless you actually need the fuel to get home.

## Bailing out, ditching, and survival

These are the situations in which it is best to bail out:

- ⊙ You know you can't make it home.
- ⊙ You have the sufficient altitude (at the very least, 1,000 feet).

Ideally you'll want a place to land in your parachute, but that can't always be an absolute requirement. Sometimes you have to bail anyway.



### How to bail out

1. Reduce airspeed as much as possible without losing too much altitude. If your engine is still running, pull back on the stick rather than reducing power, so you can slow down while still at a good height. *If you exceed 250 mph (402.25 km/h), it will kill you.*
2. Bail out by **pressing the O key three times** (that's the letter O.)



*Little boat, big ocean: American pilot in his rubber life raft. (National Archives)*

**Note:** Pressing the **O** key twice will open your canopy and eject you from the cockpit. Pressing **O** a third time will open your chute. If you are pulling too many Gs, ejection won't work.

## Ditching your plane in the water

Here's when you ditch your plane:

- ⊙ You know you can't make it home.
- ⊙ You're too low to bail out and survive.
- ⊙ There's no place suitable to make an emergency landing.

Ditching is never going to be pleasant, but here are the things that can make a difference between living and dying.



### How to ditch your plane

1. Come in to the water as slowly as you can, but not so slowly that you stall. Your vertical speed on impact is more important than your forward speed.
2. Keep your landing gear up. This may seem obvious, but lots of us put our wheels down instinctively when we land. They'll just get in the way if you're on water, and can even flip your plane over.
3. Set up a powered descent at a normal approach speed and fly the aircraft down to the water. Flare your aircraft just before you hit, but not nearly as much as you would in a carrier landing. Not only will flaring cut your airspeed, you're in danger of landing on your nose. It's bad enough that all of the engine's weight up front is going to sink your plane within seconds of landing; if you flip over on your head, there's no way you're getting out alive.

*"THE RADIO WAS USELESS. WE KNEW A WEEK BEFORE THE OPENING OF THE WAR THAT IT WAS USELESS. IT JUST MADE A BUNCH OF NOISE. YOU COULDN'T HEAR ANYTHING AT ALL. CLOSE TO THE OPENING OF THE WAR, WE PILOTS REALIZED THE RADIO WAS HEAVY AND USELESS SO I REMOVED MINE TO SAVE WEIGHT, AS WELL AS THE WOODEN ANTENNA POLE. I CUT THAT OFF. MY COMMANDER, A VERY DIFFICULT MAN, SAW THIS AND YELLED, 'WHAT DID YOU DO WITH THIS AIRPLANE?' I TOLD HIM, 'I NEED TO MAKE MY AIRPLANE LIGHTER TO FLY TO MANILA. IT'S MUCH BETTER.' HE REPLIED, 'PLEASE, TAKE MINE OUT, TOO!'"*

*—CFS2 ADVISOR SABURO SAKAI, PRIVATE INTERVIEW, APRIL 2000*

### Tips on crash landing

If you've got a smooth surface to land on, great. But on jungle islands, you're likely to run into craggy rocks and a lot of trees. If you don't have a lot a room to land, it's tempting to come down hard. Keep your forward momentum as low as possible, but it's your **vertical speed** and your **aircraft orientation** that determine your survival.

Your vertical speed should be as low as possible, especially if you have to make a belly landing. (See the following section for details on landing with your wheels up.)

### Wheels up or down?

If you can find a clear patch of land, you must decide whether to land with your landing gear up or down. This decision depends on the smoothness or roughness of the terrain.

If the terrain is rough, a wheels-up landing can result in the fuselage hitting rocks and stumps and causing the plane to nose over violently.

If the terrain is smooth, make a forced landing with the gear up. On soft ground, your wheels dig in, which can flip you on your nose and kill you.

Sometimes you can't tell how smooth the land is from the air. That is why it's always best to **bail out** if you have sufficient altitude and you are unsure of the landing area. Don't be so concerned about saving your plane that you forget pilots are a valuable resource, too.

### **Landing gear and flap deployment speeds**

In the online Help you'll find a table of maximum speeds at which you can deploy landing gear or various increments

of flap on each player-flyable aircraft. Damage to your aircraft will begin at the listed speed or within a random percentage above that speed. The damage begins sooner and the amount of damage increases faster in proportion to the speed at which you deploy your landing gear or flaps. In addition, dropping more flap at high speed causes damage to begin sooner, and results in greater total damage to your aircraft.

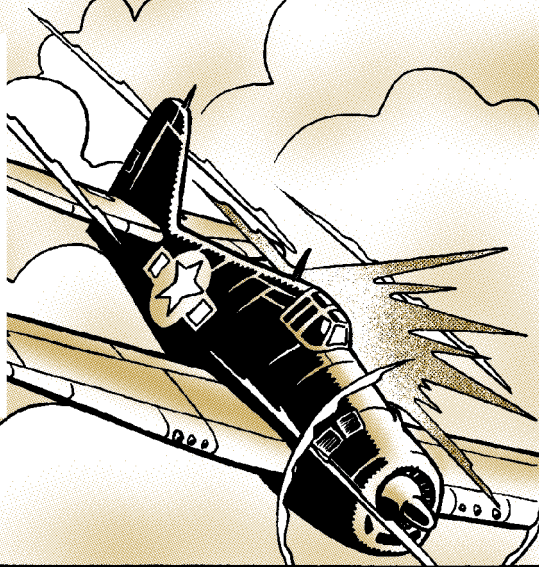
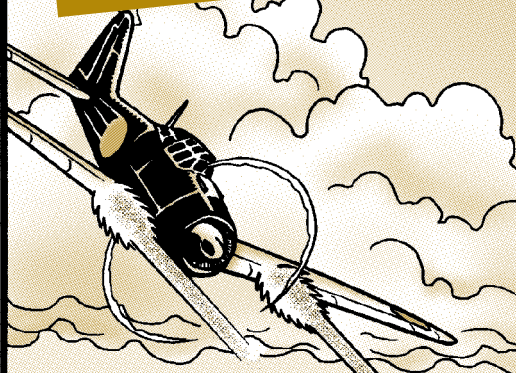
*"THE JAPANESE ARE IMPROVING ALL THE TIME. THEIR TACTICS WERE BETTER AT MIDWAY. THIS WAS SHOWN BY THE MANNER IN WHICH THEY ATTACKED OUR TORPEDO PLANES. IN VT-3 THE TORPEDO PLANE SQUADRON COMMANDER WAS THE FIRST TO GO DOWN, IN FLAMES. THEY PICKED THE LEADER, WHICH IS, OF COURSE, THE RIGHT THING TO DO. THEIR APPROACHES SEEM BETTER COORDINATED, AND THEY WERE MADE FROM ALL ANGLES INSTEAD OF JUST ASTERN AS THEY HAD BEEN DOING."*

*-INTERVIEW OF LT. CMDR. JOHN S. THACH (BUREAU OF AERONAUTICS, 8/26/42)*

6

CHAPTER

# AIR COMBAT





*YOU'VE PRACTICED AND TESTED, AND STILL CAN'T HIT THE TARGET, EVEN WHEN IT'S CLEARLY IN YOUR SIGHTS. MAYBE THE ENEMY EVEN CLAMPS ONTO YOUR TAIL TO SHOOT YOU DOWN. WHAT CAN YOU DO? PLENTY!*

### **IN THIS CHAPTER**

- **TOOLS OF THE TRADE**
- **JAPANESE FIGHTER TACTICS**
- **AMERICAN FIGHTER TACTICS**
- **AIR COMBAT MANEUVERS**
- **A FEW TIPS...**
- **FRIEND FROM FOE**



## **TOOLS OF THE TRADE**

### **Using views**

You can use a joystick, keyboard commands, and the items on the Views menu to see everything you'd see from the cockpit of a real airplane—and more. Different views serve different purposes. Experiment with them in Quick Combat and learn your favorites to keep track of where the enemy is. For a detailed list of all the views and view commands available, see the **Key Commands table** in the back of this book.

**Note:** All keys referred to in this chapter are the CFS2 combat key commands. If you want to change your key commands

to Flight Simulator settings or your own customized keystrokes, go to the Settings screen (click **Settings** from the Main screen).

For more information about keyboard commands, see Chapter 1, **Before You Fly**.

In combat, you'll probably use a combination of views:

#### **Cockpit view**

Cockpit view is the default view; it puts you right in the pilot's seat.

**Full view**

This view provides the best visibility by getting the instrument panel out of the way. When used with the Heads Up Display (HUD) it gives you most of the important information you need. (When you press **F3** you cycle through three views: Full view, Full view with HUD, and Cockpit view.)

**Bomb/rocket view**

Bomb/rocket view (press **F6** to toggle on and off) puts you at the front of the bomb or rocket you've launched. To cycle through the views from each launched bomb and/or rocket, press the **TAB** key.

**Padlock view**

Padlock view (press ` on the TILDE key or button **2** on your joystick to toggle on and off) locks your view onto the closest enemy and puts yellow brackets around the plane for easy identification. The padlocked aircraft will also appear as a yellow dot on the Tactical Display (see "Using the Tactical Display" later in this chapter). To lock onto a different target, press the **TAB** key or button **3** on your

joystick. **SHIFT+TAB** cycles backward through the available targets.

Although it takes some practice to use Padlock view effectively, it's a good way to stay on the enemy's tail once you're there. When you exit Padlock view, the last padlocked target will still appear as a yellow dot on the Tactical Display, and the Enemy Indicator (see "Using the Enemy Indicator" later in this chapter) will point toward it. To cancel the target, press **SHIFT+`** (on the TILDE key).

**Virtual cockpit view**

With this view (press **F4** once) you can pan around the inside of a three-dimensional cockpit.

**Spot view**

Spot view (press **F4** twice if you start in Cockpit view) shows you an outside view of your aircraft. You can position the spot plane anywhere around your own aircraft. Use the View commands in the appendix at the back of this book to adjust the spot plane's views.

*"NATURALLY, THE CHARACTERISTICS OF THE PLANE DETERMINE THE TACTICS. THE ZERO COULD OUT-MANEUVER, OUT-CLIMB, OUT-SPEED US. ONE ZERO AGAINST ONE GRUMMAN IS NOT AN EVEN FIGHT, BUT WITH MUTUAL SUPPORT TWO GRUMMANS ARE WORTH BETWEEN FOUR AND FIVE ZEROS, AND SO ON UP."*

*—FROM BUREAU OF AERONAUTICS INTERVIEW OF  
MAJ. J.N. RENNER, USMC (COMMANDING OFFICER, VMO-251;  
OPERATIONS OFFICER, MAG-11), 7/17/43*



### Chase view

Chase view (press **CTRL+F4** to toggle on and off) puts you behind your aircraft. Press the **TAB** key to cycle behind other aircraft.

### Getting a good look

You can use the controls on a joystick or the numeric keypad to look around as you fly. Experiment with the numeric keypad view commands—they're easy to use.

### When in Cockpit or Full view

Use your joystick's hat switch—on top of the joystick—or the number keys on the numeric keypad. Make sure **Num Lock**

is off. The default view is straight ahead. When you press **SHIFT+8** you can look forward and up 45 degrees. Pressing **SHIFT+5** shows you the view directly overhead. When you press **SHIFT+** the other number keys you can look to the side and behind you. Pressing **SHIFT+5** and any of the other number keys at the same time allows you to look around you and up at a 45-degree angle. For a detailed list of all these commands, see the **Key Command table** in the back of this manual.

### When in Virtual cockpit or Spot view

Use your joystick's hat switch (top button) or the following keyboard commands:

Action	Command
Pan left	<b>CTRL+SHIFT+BACKSPACE</b>
Pan right	<b>CTRL+SHIFT+ENTER</b>
Pan up	<b>SHIFT+BACKSPACE</b>
Pan down	<b>SHIFT+ENTER</b>
Snap to front view	<b>SHIFT+Num Pad 0</b>

### Using the Heads Up Display (HUD)

Pressing **F3** cycles through Cockpit view, Full view with the HUD, and Full view without the HUD. In Full view, the Heads Up Display gives you important information without your needing to look at the instrument panel. Your pitch and bank status displays, and you will see information about your heading, altitude, speed,

flap and gear positions, available ammunition (guns, cannon, rockets, bombs), and fuel. There is also an indicator that displays the position of your flight controls. To change the color of the HUD, press **SHIFT+F3** until you see the color you want. To change the measurement system the HUD uses (between meters and feet), press the **U** key.

## ***Using the Enemy Indicator***

The Enemy Indicator is on by default (press the **I** key to toggle on or off). It's a three-dimensional arrow that points to the nearest enemy aircraft or to an aircraft you have "padlocked" in Padlock view (see "Using views" earlier in this chapter). To find the plane, turn in the direction the Enemy Indicator is pointing. When an enemy aircraft is visible through the front windscreen, the Enemy Indicator disappears.

## ***Using the Tactical Display***

Tactical Display helps you keep track of both friendly and enemy aircraft, ships, or vehicles. It appears in the upper-left corner of the screen and is on by default (press **SHIFT+T** to toggle it on or off). With this feature you can see the tactical situations of four areas: Ground, Ship, Vehicle, and Air. Press the **T** key to cycle through the views. You can move the Tactical Display anywhere on the screen and you can resize it.

In the Tactical Display, your aircraft is represented by a yellow or white aircraft outline in the center of the screen, while other aircraft are represented by colored dots. A padlocked aircraft will appear as a yellow dot (see "Using views" earlier in this chapter). If you're not engaged in combat, the Tactical Display shows information about waypoints in the mission.

## ***Displaying aircraft labels***

With labels turned on, it's much easier to spot and keep track of other planes. By watching the distance change you can tell whether an enemy aircraft is getting closer to you or farther away and if it's within range of your guns.

To display or hide a label next to each aircraft, press **CTRL+SHIFT+L**. When labels are displayed, you'll see the name of each pilot in your formation, as well as the type of each enemy aircraft you see. You'll also see the distance between you and the other aircraft, in meters or feet, depending on the settings you chose on the Preferences screen. (Press the **U** key to toggle between meters and feet.)

Get within about 300 yards to get a good shot. (See "A Few Tips" later in this chapter.)

## ***Using gunsights***

The aircraft in Microsoft® Combat Flight Simulator 2 feature a reflector gunsight that consists of a circle with crosshairs and a center aiming point—all projected in yellow light onto a glass screen. To hit the target, take your own aircraft's movement and that of the enemy's into account: once you're within range, position the center of the gunsight where you figure the enemy will be when the bullets land. Then fire!

## Using weapons

The types of aircraft and missions that you fly determine the variety of weapons at your disposal. To change the weapons loadout, go to the **Player aircraft** screen. Note that these weapons aren't guided. You have to aim carefully, and it takes a lot of practice to hit the target.

You can also choose Unlimited ammunition from the Player aircraft screen.

This option is handy while you're learning—once you get to be a better shot, you might want to change this loadout to a more realistic level.

- ◉ **Guns** are used for attacking other aircraft and for strafing ground targets, including parked aircraft and “soft-skinned” vehicles.

- ◉ **Cannon** pack a heavier punch and have less range than guns, but they are used for the same purposes—air-to-air combat and strafing. The weight and explosive force of their projectiles make ships and armored vehicles, including tanks, vulnerable.
- ◉ **Rockets** are used in air-to-air attacks on bombers, or against tough ground targets, including structures and tanks.
- ◉ **Bombs** are used in fighter-bomber attacks against bridges, ships, airfields, tanks, and other ground targets.

Here are the commands you need to fire your weapons.

Action	Command
Fire guns	<b>SHIFT+SPACEBAR</b>
Fire cannon	<b>CTRL+SPACEBAR</b> / Joystick Button <b>2</b>
Cycle ordnance type	<b>BACKSPACE</b> key
Drop/fire ordnance (bomb, rocket or torpedo)	<b>ENTER</b> key
Fire guns and cannon	<b>SPACEBAR</b> / Joystick Button <b>1</b>
Bomb/rocket view	<b>F6</b>

## MISTAKING ZEROS FOR DAUNTLESSES

*"... HERE WAS WHERE THE SBDS SHOULD BE STARTING THEIR DIVES. SURE ENOUGH, HERE CAME A STRING OF EIGHT OR TEN PLANES, STRING OUT IN BOMBING APPROACH FORMATION ABOUT FIFTY YARDS APART, HEADED DOWNWIND TOWARD THE TARGET. I APPROACHED THEM SLOWLY, WATCHING ABOVE AND AROUND ME TO MAKE SURE THAT NO ENEMY FIGHTERS POUNCED ON THEM FROM ABOVE... IN THE DIM LIGHT THEIR OUTLINES WERE HARDLY DISTINGUISHABLE.*

*I EASED IN CLOSER TO MAKE SURE THAT THEY WERE SBDS AND NOT SOME OF OUR OWN HELLCATS. IT WAS NOT UNTIL I WAS LESS THAN A HUNDRED YARDS FROM THE NEAREST PLANE THAT I SAW THE BIG RED DISCS PAINTED ON ITS DARK BROWN WINGS—THE RISING SUN INSIGNIA OF JAPAN. INSTEAD OF COVERING OUR OWN SBDS, I HAD BEEN FLYING COVER FOR A BUNCH OF JAPANESE ZEROS!"*

*-ROBERT WINSTON,  
FIGHTING SQUADRON*

## JAPANESE FIGHTER TACTICS

*Imperial Japanese Navy Air Force  
(Navy Combined Air  
Training Command)\**

### *U.S. Military editor's note*

This document is one section from a [Japanese] basic training manual dealing principally with single-plane fighter tactics. It stresses the necessity for gaining the dominant position above and behind the enemy through surprise or by the use of tight turns. The document also contains a few suggestions for formation fighting involving the old three-plane tactical unit in which each man fought almost exclusively for himself. There is no indication of the organization of tactical units to permit workable fighter teams of two mutually supporting planes.

### **The five stages of aerial combat:**

#### **1. Detecting**

Find the enemy before he finds you, so that you have the advantage of surprise. Most pilots who are shot down never see their attackers.

#### **2. Closing**

Once you've detected the enemy, move into a position close enough to shoot him down—without being discovered.

\* Dec. 1943, captured by U.S. forces on Saipan

### **3. Attacking**

When you're close enough to shoot the enemy, commence the attack. If you fire too soon you'll waste ammunition, and he might see you coming. Remember: your weapons don't move. To aim, you must move your entire plane and use a deflection angle. If you fail to defeat your enemy, you'll need to maneuver.

### **4. Maneuvering**

Dogfighting is a test of skill in which each opponent tries to get into a position to fire. Maneuvering means dogfighting. Many novice combat pilots think that dogfighting is the way all aerial combat occurs, but combat veterans will tell you that dogfighting *should be avoided* if possible. If you're successful at detecting, closing in on, and attacking your enemy,

you won't need to dogfight with him. You should maneuver when any of the following occurs after the attack:

- ⊙ Neither side has gained an advantage during detection.
- ⊙ The enemy sees and successfully evades during your closing.
- ⊙ Your attack fails to down the enemy aircraft.

### **5. Disengaging**

Disengaging means putting space between you and the enemy so you're out of the fight. You can disengage on purpose or by accident. Be careful though: just because you want to leave doesn't mean the fight will end.



*U.S. AA batteries repel attack—Battle of Santa Cruz, 10/25/42. (U.S. National Archives)*



*Japanese Zeros fly in formation. (Maru magazine)*

### **Section 8: Air combat in general**

1. Generally it is best in the **first pass** to make an overhead attack from behind. In a situation where you can make an overhead attack from behind, but carry out an overhead attack from the front for which there is no justification, maneuvering for the second pass will be comparatively difficult and you may end up in a disadvantageous position. Furthermore, in the head-on approach, if your altitude is insufficient, no matter with what power you climb, after attacking from under the nose while looking out for the enemy's line of fire, it is best to pursue from the lower rear.
2. In **close combat** achieve mastery of those tactics which are your own strong points. After gradually reaching proficiency, you will discover your own characteristics in battle. When you fight with your favorite tactics, victory will be easy. When you become aware of these tactics, study and master them at once. When in battle, it is important to entice the enemy into your favorite battle tactics.
3. **Head-on Attack:** When you are suddenly head-on with the enemy, resolutely plan a head-on attack; you should expect a collision and attack. Never abandon the line of fire too soon in order to start maneuvering for the second pass. (In the training period, for safety's sake do not execute a head-on attack.)
4. During air combat it is essential to maintain **altitude**. However, do not needlessly maintain only the altitude, thereby making essential maneuvers impossible because you have lowered the speed. It is particularly important to pay attention to selecting the opportune time to make changes of altitude and speed while approaching the enemy.

5. Battle against an enemy who is fighting and losing altitude is generally easy. The enemy who fights while maintaining his altitude by skill in maneuvering at **lower speed** is formidable. (In a rough and tumble fight it is essential to maintain all your speed.) When you advance on a second enemy or when you go to the aid of an ally, keep in mind the fact that altitude is better than a stout heart.

### **Counter-attack**

1. When you have been attacked by the enemy plane first, unless the performance of the enemy plane is inferior or the pilot's ability very poor, it is difficult to regain your position in one counter-attack. However, always try to regain your position while continuing your counter-attacks. For example, against the enemy's overhead attack from behind, avoid the first pass by turns or abrupt maneuvers. Pass underneath the enemy, attempt to recover the altitude difference, and maneuver into pursuit if there is an opportunity.
  - ⊙ Counter-attack against the overhead attack from behind. When the enemy tries to make a run at you, gun your engine, avoid the line of fire by turns or abrupt maneuvers, just before the approaching enemy reaches effective distance, and strive to regain gradually the advantage.
  - ⊙ Counter-attack against the belly attack from behind. Though you can counter-attack by means of a slanting loop (*shachugaeri*), since you are often a good firing target for a long period when in a climbing position, twist away as soon as possible.
  - ⊙ Counter-attack against overhead attack from the front.
2. Depress the firing line of the enemy as much as you can by diving. After avoiding the first pass, maneuver so that you will be under the enemy.
  3. As soon as the enemy plane starts his run, start a steep dive immediately and cause the enemy's firing angle to be depressed. The enemy will break off the attack because his speed is excessive and firing is difficult; as soon as you see him pulling out, turn the tail toward him, and after making a chandelle, maneuver so that you are in pursuit.
  4. Counter-attack against belly attack from the front. By utilizing your utmost climbing power, seize the dominant position above the enemy and counter-attack with an overhead attack from behind.

***"ALWAYS KEEP IN MIND BLACKBURN'S FIRST RULE OF SURVIVAL: 'IT'S THE GUY YOU DON'T SEE WHO'S MOST LIKELY TO CREAM YOU.'"***

*-TOM BLACKBURN, THE JOLLY ROGERS*



*Japanese pilots scramble to planes. (Maru magazine)*

a position beneath the enemy (almost directly below), and combine your flight pattern with the enemy's flight. By following the enemy's maneuvers you can ordinarily make it impossible for the enemy to half-roll and attack, and recover the altitude difference gradually. When the enemy turns, maneuver by flying somewhat to his outside so that

5. When you have received an attack from the enemy, and although you have tried to counter-attack you have been unsuccessful because of the enemy's maneuvering skill, or when as in training, ideal counter-attacks cannot be made because of their danger, it is important that you hang on, and strive with your utmost to regain the advantage while keeping the enemy from attacking and then make a sound counter-attack.

## **Tactics of coming in under the enemy**

When there is a large altitude difference, make attack impossible by climbing; take

he cannot see you. You can also recover the altitude difference by heading the same way.

- ⊙ **Recovery tactics by means of counter-attack when in inferior position.** Turn toward the enemy while heeding the enemy's line of fire. For a period of time try gradually to put the situation on an equal footing, discern his turning directions, strive to keep him under your thumb, and slowly recover altitude. At this time be careful not to incur the enemy's counter-fire.

***"I ALSO IMPARTED A SIMPLE PHILOSOPHY BASED ON ACTION. I ENCOURAGED ALL MY PILOTS TO TRY NEW THINGS WHENEVER POSSIBLE, ALBEIT WITHIN THE CONSTRAINTS OF THE GUIDELINES THAT HAD BEEN CLEARLY SET FORTH. MORE TO THE POINT, ALL HANDS LEARNED VERY EARLY THAT A WRONG ACTION WAS MUCH PREFERRED TO NO ACTION AT ALL."***

***—TOM BLACKBURN, THE JOLLY ROGERS***



### Measures to take when you are being closely (*kanzen*) pursued

1. First, always have as your principal object the avoidance of the line of fire, and by the manifestation of your total capacities and abilities strive as much as possible to extend the interval between the planes gradually. At these times straight line maneuvers should be absolutely avoided.
2. Ordinary acrobatics will have little effect. By making particularly good use of the rudder, maneuver exaggeratedly and confuse the enemy.
3. Even if you gradually extend the interval, consider the turning radius and do not plan to pursue until the situation is such that an even battle can be expected from the start.

#### 4. **Level dogfighting (*suihei hasen*)**

- ⊙ In this type of battle particularly, incompleteness of turning maneuvers has a fatal consequence. The plane, which is perfectly controlled while it turns continuously a countless number of times, will step by step close in on the enemy and finally be able to seize the dominant position.
- ⊙ Abrupt changes of turning direction to break out of a situation are most dangerous. Keep in mind that although you have been pounced upon from somewhere to the rear, you will never be fired upon when the sights and eyes of the enemy are not aligned.

- ⊙ When you are about to shift to vertical dogfighting from level dogfighting, lower the plane's nose slowly, accelerate, and maintain your turn. When the enemy plane follows and starts to dive, still maintain your turn, climb steeply and make a slanting loop. In case the turns become very sharp when you are wide open, there are many situations where you must pull back on the control column with both hands and increase the turning speed. At these times measures which change the angle of inclination of the tail elevator (trim tabs), that is, putting them at "down" position, generally make piloting easier.

- ⊙ During turns, continuation of aiming and firing is usually difficult, but when you get an opportunity, shift to aiming and shoot immediately. When it is difficult to fire, shift your attention to turning maneuvers without letting the enemy plane escape.

#### 5. **Vertical dogfighting**

- ⊙ Your fighting ability will be shown for what it is in this type of combat. The so-called "ace" is often manifested in this type of warfare. It is easy to get into a disadvantageous position and lose altitude because you maneuvered clumsily and were fooled by the deceptive maneuvers of the enemy.
- ⊙ When you try to shoot down the enemy plane with one pass, do not be anxious to pursue the track of the enemy plane too strictly. Keep in mind that the quickest method of shooting down the enemy is to wait for a firing opportunity by maneuvering little by little into a superior position.



*Four U.S. Grumman F6F Hellcats in flight.  
(U.S. Navy)*

- ⊙ Although it is difficult to size up a situation instantly, do not yield a foot when coming face to face with the enemy.
- ⊙ Getting out of a bad situation by means of a true loop is generally difficult. You should use the slanting loop. A skillful “twist” in the middle of a slanting loop is extremely effective. It is important that you understand it through practice and experimentation.
- ⊙ The key to vertical dogfighting lies in closing in on the enemy’s rear by degrees while deceiving the enemy with changes of the plane’s fore and aft line, and banking.

### **“THE BAUER SYSTEM”**

1. Get altitude on the other fellow if you can.
2. Try to use surprise, by coming out of the sun or a cloud.
3. Be on the alert with your eyes. Trouble may be coming from either side, above, or below, so keep your head mounted on a swivel. Remember that absolutely nothing can be heard over the roar of the motor except your radio earphones; the eyes have to tell you everything else. To look directly below, drop your wing.
4. When he has the jump on you by being above you, the best thing you can do is to keep him off your tail, where he’s going to try to be. So keep below if you have to, but at any rate stay behind him. This is hard because extra altitude can be turned into speed at any moment, and speed can mean quick maneuvers. But try to bring your guns to bear on him whenever he brings his to bear on you.

5. As he turns into you, you are turning into him, keeping your head to him. You can't out-climb him in this way unless you're very careful, but you're apt to hurt him as much as he hurts you. This system of turning up against each pass of the enemy is called scissoring.
6. In scissoring, the [enemy], being in a faster and more maneuverable plane, ought to be able to work out of the scissors and get on your tail. So you simply have to out-think him a bit.
7. In this business you have to guess one move ahead. If you guess wrong, you may be brushed right out of the sky. But the [enemy] is not inventive or resourceful in the air. Once you learn his pattern of flying, you can be fairly sure that he will stick to the same system of maneuvers. Then you can take liberties and cut a few corners.

*—Harold William "Joe" Bauer,  
1908–1942 (USMC; 11 victories)*

## **AMERICAN FIGHTER TACTICS**

### ***United States Navy Training Manual CAA-NRC Committee on Selection and Training of Aircraft Pilots, 1942***

#### **Know your airplane**

Every aircraft has strengths and weaknesses. Make sure you know yours and those of the enemy aircraft you're most likely to encounter. Knowing you can out-climb, out-accelerate, out-turn, or out-gun your foe changes the way you fly. So does knowing your own plane's vulnerabilities. For plane specs, see the "Planes" section of Chapter 11, **Machines of War**.

#### **Keep your head on a swivel**

Visualizing the positions and movements of fast-moving objects in a three-dimensional space is difficult. But it's what separates fighter pilots from fighter aces. Being a good shot is a useless skill if you can't keep track of the enemy. [In Combat Flight Simulator, you can use joystick and keyboard commands to scan the sky rapidly. To learn more, see "Using views" at the beginning of this chapter.]

#### **Use the element of surprise**

When you come in from behind or below the enemy he can't see you. But dropping in from above gives you the potential for greater speed. While you're closing in, use the enemy's blind spots to your advantage. Come out of the sun or the clouds with your guns blazing so you can shoot him down before he even knows you're there.



*Late-model U.S. Wildcats in formation. (U.S. Navy)*

### **Stay one move ahead of the enemy**

A good fighter pilot's actions in the present are dictated by his prediction of the future. If you merely react to your opponent's actions you will be shot down. If you anticipate his actions and respond intuitively without hesitation, you will emerge the victor.

### **Trade altitude and airspeed**

Are you flying too fast? Pull back on the stick and you'll slow down as you climb. Be careful though: pulling up to shake the enemy off your tail is a dangerous move! Your airspeed will drop quickly, and a slow ship under fire is a sitting duck.

Are you flying too slowly? Nose your ship over into a dive to gain some airspeed. Trading altitude and airspeed is an essential part of all aerial combat maneuvers.

### **Fly slower to turn faster**

When you ride a bicycle around a corner quickly you want to go fast, but not too fast—it's the same with your aircraft. At fast speeds, centrifugal force causes the plane's turn *radius* to increase and its turn *rate* to decrease. Every ship has a speed at which maximum-performance turns are possible. In general, though, a slower-flying aircraft

will out-turn a faster-flying one.

### **Turn into your opponent**

Turning into the enemy's direction of movement increases the angle between your movement and his guns, making you harder to hit. Turning away decreases the angle, making you an easier target—and making it much easier for him to get on your tail.

### **Use "deflection shooting"**

Attacking an enemy aircraft from in front or behind is easy. Just aim and shoot when you're close enough to hit the target. Attacking from other angles is more complicated. You must coordinate your shooting with your speed, and fire ahead of the target so that he runs into your bullets. This difficult skill is called "deflection shooting," and it is the mark of a good combat pilot. Learning it is essential to your success.

**Don't shoot until he fills your windscreen**

Wait until you're so close that you're sure you'll hit him—you'll save ammunition. This strategy takes less concentration than deflection shooting, but it isn't always practical—especially if you're meeting the enemy head on!

**Never stop an attack once you've initiated it**

If you run away when you're within range of the enemy, it's easier for him to get a shot at you. Courage is not the absence of fear; it's action in the face of fear. If you've decided to attack, be courageous and follow through. Cowardice at close range will get you killed.

**AIR COMBAT MANEUVERS**

The following maneuvers have been in use since pilots started trying to shoot each other down. Study them and know how to use them automatically.

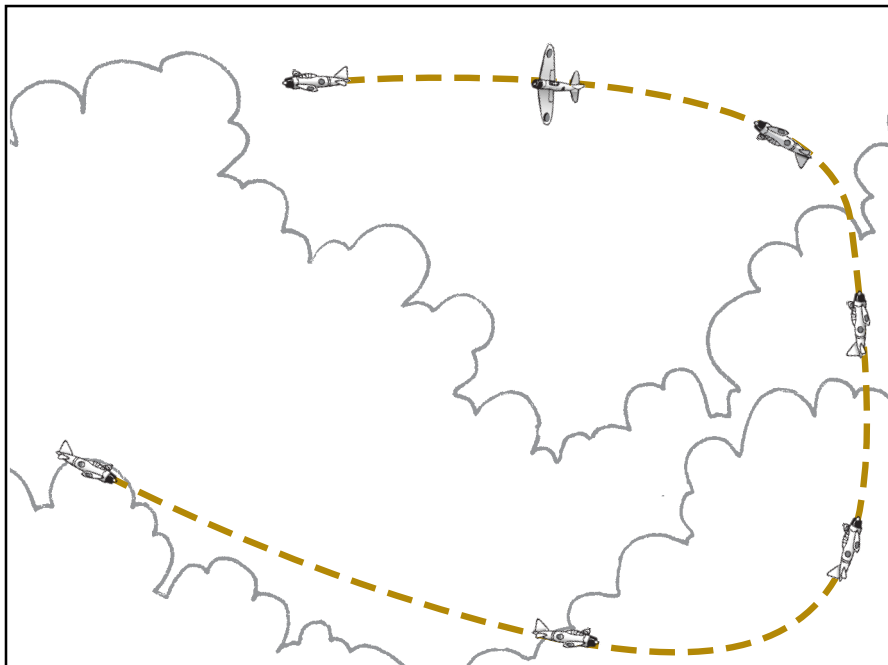
**Training Missions**

You don't have to figure out all air combat maneuvers and strategies by yourself. Give yourself some solid preparation by completing a couple of training missions. Just click **Training Missions** on the Main screen. For more information about the training missions, see Chapter 7, **The Missions**.

**A CHECKLIST FOR AEROBATICS**

*United States Navy Patter—Flight Maneuvers for Primary Training (First Edition). Prepared with the aid of the CAA-NRC Committee on Selection and Training of Aircraft Pilots, 1942*

- 1. Safety belt.** Belt should be fastened snugly but not so tight as to interfere with your leg movements.
- 2. Parachute.** Are both the leg straps and the chest straps buckled?
- 3. Loose gear.** Make sure there is nothing on the deck or on your lap that might "fall up" and hit you!
- 4. Altitude.** Regardless of what happens, altitude and safety go hand in hand. You will need altitude in which to recover if you foul up a maneuver.
- 5. Traffic.** Aerobatics require lots of airspace. Be sure you have a clear title to enough airspace to allow not only for the maneuver, but for errors you may make in executing it. Look up, down, ahead, behind, to the right and to the left, i.e., all around. Get into the habit of looking for other planes as you execute a maneuver so you will not have to take time to clear between them.



## ***Immelmann***

### **Purpose**

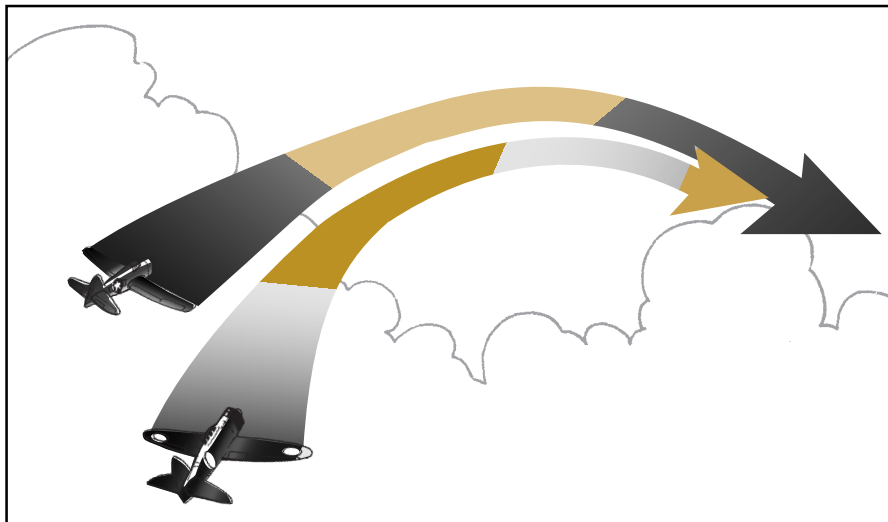
The Immelmann maneuver is a good way to gain altitude over an enemy while turning toward him, and a good move to pull after performing a high-speed pass.

### **Drawbacks**

Because of the loss of speed toward the top of the maneuver, avoid using the Immelmann when you are within an enemy pilot's gun range—you'll be a "stalling" duck if you're not careful.

### **To perform**

The Immelmann is basically a half loop with a half roll on top. After you've passed the enemy, pull back gently on the stick, apply full throttle, and start climbing straight up. Make sure you have plenty of speed. Meanwhile, look behind you to see what the bandit is doing and start planning your turn toward him. Before you enter a stall, do a half-aileron roll toward the enemy and look for the chance to drop in toward him. If you time it right, you'll get in his six o'clock position (right behind him) or you should be able to get a decent deflection shot at him.



## Lead Turn

### Purpose

The Lead Turn is a “first move” to gain an advantage on your opponent by out-turning him. A couple of factors should determine when to use the Lead Turn:

- ⊙ Is your plane a tighter-turning plane than the enemy's? Know that before engaging. If your plane can out-manuever the enemy's, then a Lead Turn is a good move for you to get a shot. Don't try this maneuver if his plane can out-turn yours!
- ⊙ Is your target carrying more speed than you are? If he is, it he won't be able to turn as tightly. If you're moving faster, then you may not be able to turn inside him.

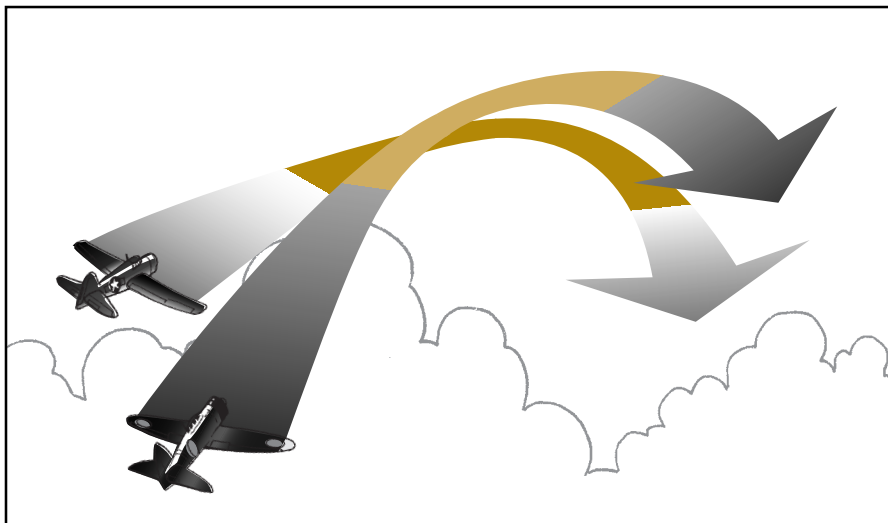
### Drawbacks

Begun too soon, the Lead Turn can put you in front of the enemy. Also, the maneuver is somewhat predictable, easy to counter, and does not present you with an immediate shot. Timing is key.

### To perform

As you are merging, begin turning early into the enemy to gain a “snap shot,” then follow through with the turn to put yourself on his six o'clock. Ease off the throttle to maintain a tight turn. Keep an eye on the enemy using View commands—Cockpit view is best so you can get perspective. When you're in the tightest turn possible, apply full throttle while keeping the stick back as far as you can get it without stalling.





## **Lag Turn**

### **Purpose**

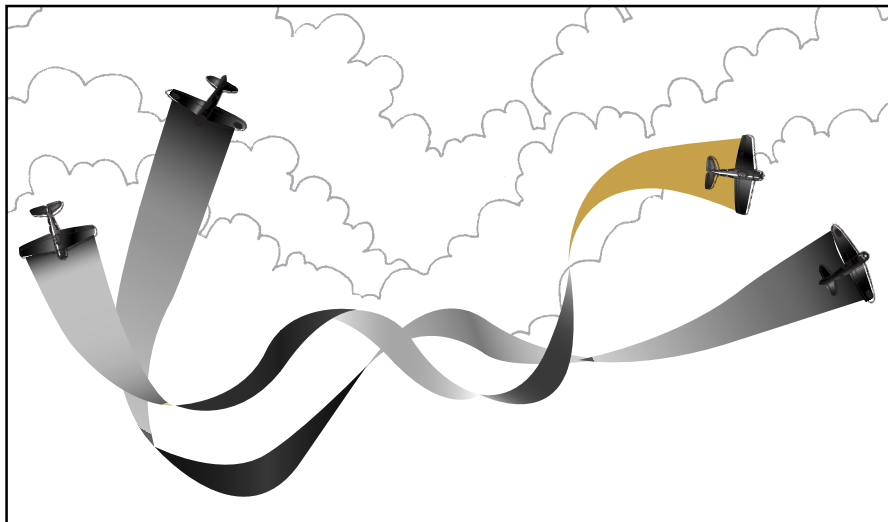
The opposite of a Lead Turn, the Lag Turn is used after a merge to gain an advantage on your foe and to place your plane in his six o'clock position. The Lag Turn is useful if you are moving faster than he is or if your plane can't out-turn his.

### **Drawbacks**

This move may allow your foe to gain more distance over you if you bleed off too much speed in the turn. The window of opportunity for performing the maneuver is small and allows for little error.

### **To perform**

Turn into the enemy, but not tightly, and allow your plane to drift wide. As you lose momentum, begin tightening your turn, throttling up as you go. Never lose sight of your enemy—keep him in view at all times! Drop airspeed to just above stalling to maintain the tightest turn possible, pulling all the way back on the stick. Then apply full throttle to stay above stalling, and keep the stick back.



## **Scissors**

### **Purpose**

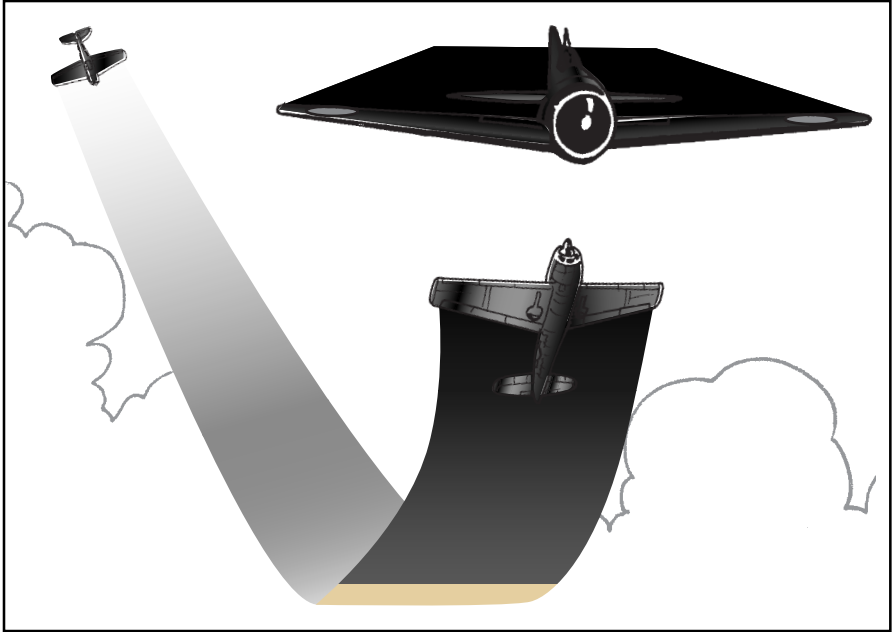
The Scissors is a series of turns forcing your plane closer to your enemy's. The Scissors tends to happen when both planes are parallel, moving in the same direction. Each plane attempts to turn into the other.

### **Drawbacks**

The slower, more agile plane usually wins this fight. The maneuver can be very disorienting, though, and it is dangerous to perform at low altitudes.

### **To perform**

As your foe turns into you, you turn into him, and then roll back as your flight paths cross. Once he clears to the other side of you, roll back into him, turning as tightly as you can. Throttle back if you have to—to keep a tight turn—but beware of stalling. Keep an eye on your enemy and roll your plane so that you can track him. If you can get to his six o'clock, roll into the direction he's moving.



## ***Up and Under***

### **Purpose**

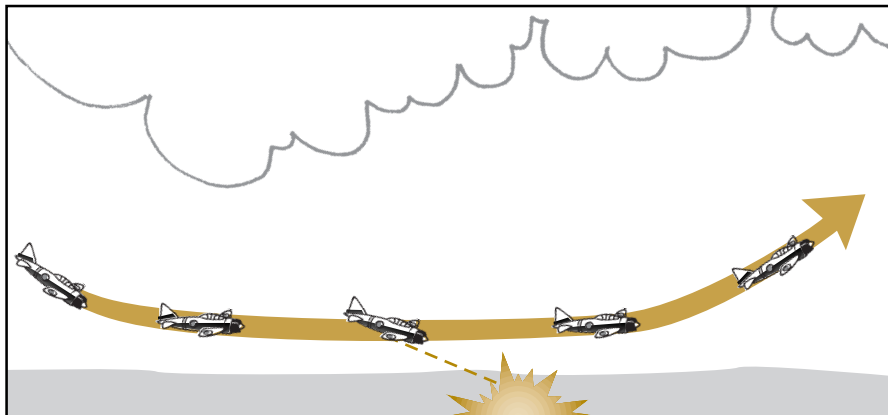
This maneuver puts your fighter in the best position to attack a bomber in its most vulnerable area—the belly. It's also effective for bouncing unsuspecting fighters.

### **Drawbacks**

Climbing reduces your airspeed and makes you more of a target yourself. Pilots attacking bombers are vulnerable to the bombers' defensive fire.

### **To perform**

From a point at or above and behind the bomber, dive to gather speed. Once under the enemy aircraft, pull your nose up into the belly of the target and attempt to stay in the target's blind spot.



## ***Strafing***

### **Purpose**

Strafe to attack ground targets and avoid ground fire. With so many “targets of opportunity” in the Pacific theater, you’ll be called on quite often to make strafing runs against enemy ground and water targets.

### **Drawbacks**

Strafing is very dangerous because you’re so low to the ground. The margin for error is small—you could get hit by ground fire or crash.

### **To perform**

The key to strafing is to stay as low as possible, giving the enemy very little to shoot at. Stay under a hundred feet if you can, and start firing when your target comes into range. You may need to pop up slightly before shooting. Stay low until you’re clear of ground fire. Fly as fast as your plane will go!

## Dive-bombing

### Purpose

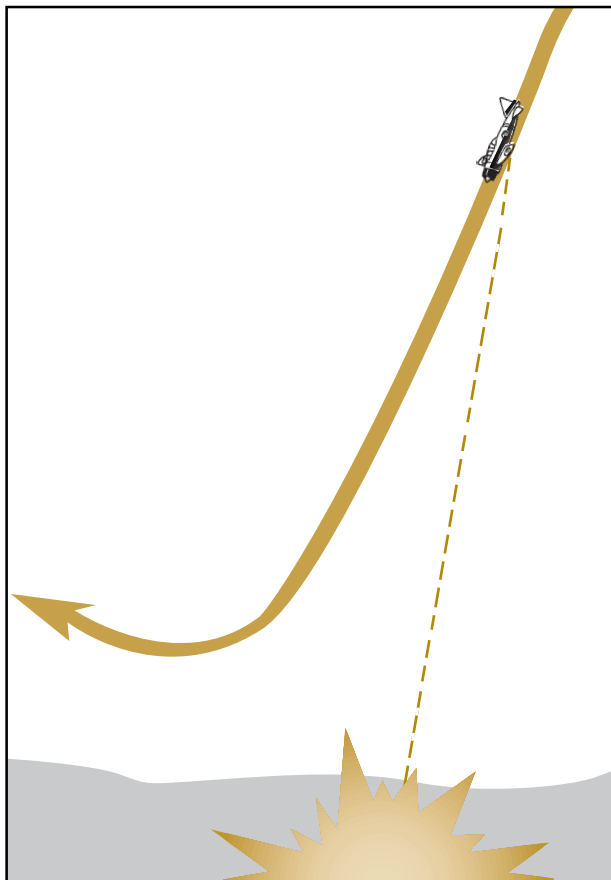
Dive-bombing is how you attack ground or water units. This maneuver is the most accurate way to put your bomb on target.

### Drawbacks

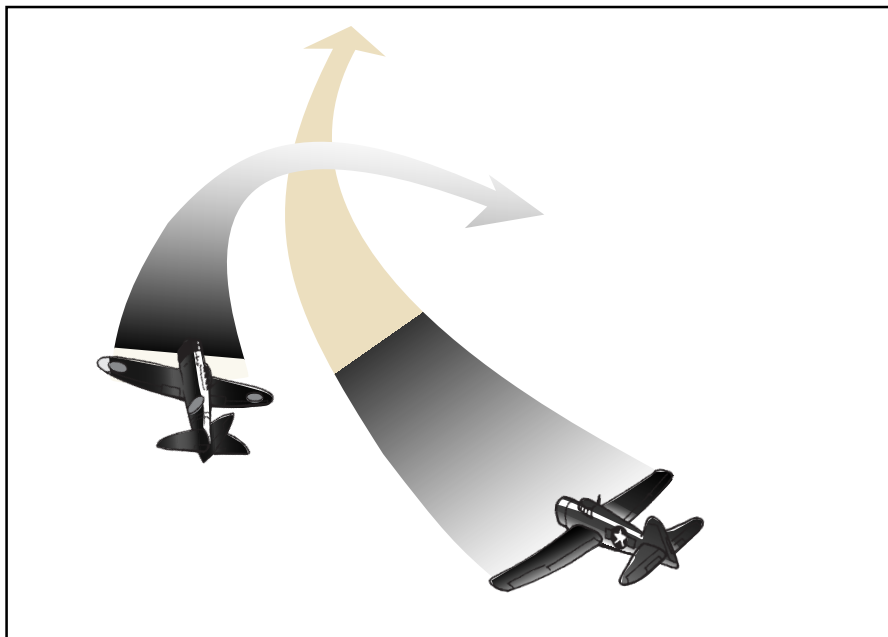
Fighters can carry bombs, but their performance is hampered by the additional weight. While on the crucial bombing run, the fighter (or any plane for that matter) is vulnerable to ground fire, and is an easier target to hit.

### To perform

From 10,000 to 15,000 feet, put your plane in a dive toward the target. You should be at an angle between 45 and 70 degrees. Be careful not to dive too steeply—if you get your plane inverted your bomb may not release correctly. As you pick up airspeed, make gentle turns to stay on target, and throttle back as necessary to avoid excessive speed. At around 3,000 feet, release the bomb—visualize dropping it straight onto the target, like a “pickle into a pickle barrel.” Because you’re not diving straight down, you may need to compensate by aiming slightly behind the target. Once you



release the bomb, pull back on the stick gently to pull out of the dive, and ease off the throttle if your airspeed is high. Be careful—if you pull back too hard too quickly, you may stall or damage your plane. After you pull out of the dive, add power and either level out or climb away from the target. Don’t get careless checking to see if your bomb hit—enemy fighters or flak could catch you in this vulnerable moment.



## ***The Break***

### **Purpose**

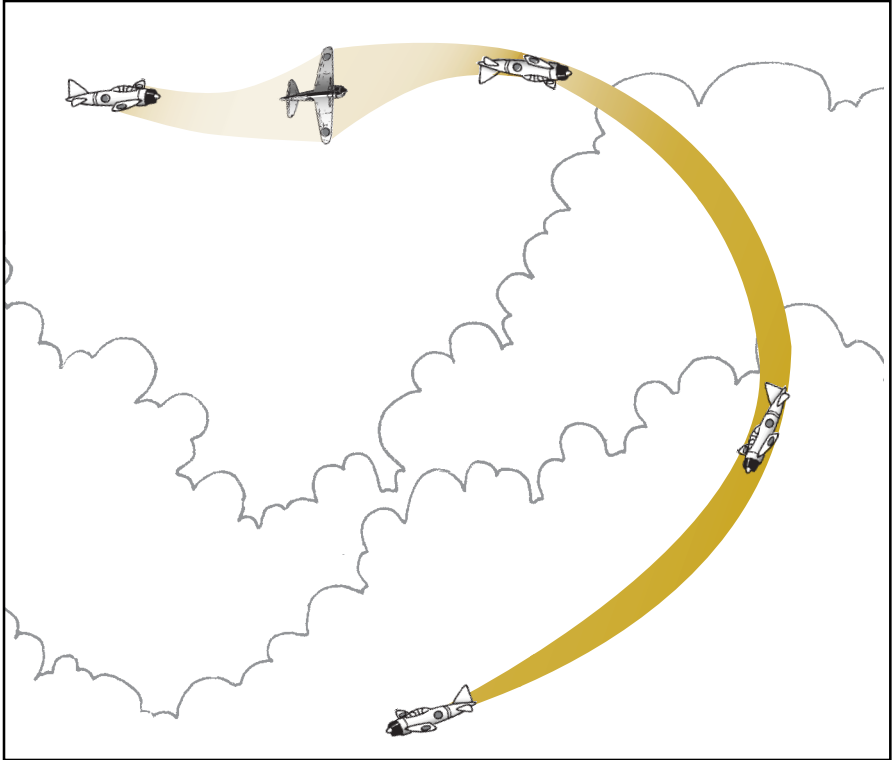
Pure and simple, the purpose of the Break is to get out of the way of the bullets coming from your six o'clock. The Break works best when your attacker is carrying lots of speed and can't make a turn into you.

### **Drawbacks**

This move is a momentary solution to getting out of harm's way, but it drains your plane of any airspeed, making you a sitting duck if you're not careful. Also, if your attacker can turn into you, breaking does you no good. If your attacker is in a more maneuverable aircraft than yours, the break is a temporary solution at best.

### **To perform**

Throttle back so you can turn tighter, roll toward the direction of your attacker (if he's coming from your right, roll right) and turn as tightly as you can into him. Pour on the gas if you lose too much airspeed. If you find that you've lost momentum after the sharp turn, lower your nose to gain more speed. Keep turning into your attacker if you have to.



## ***The Split-S***

### **Purpose**

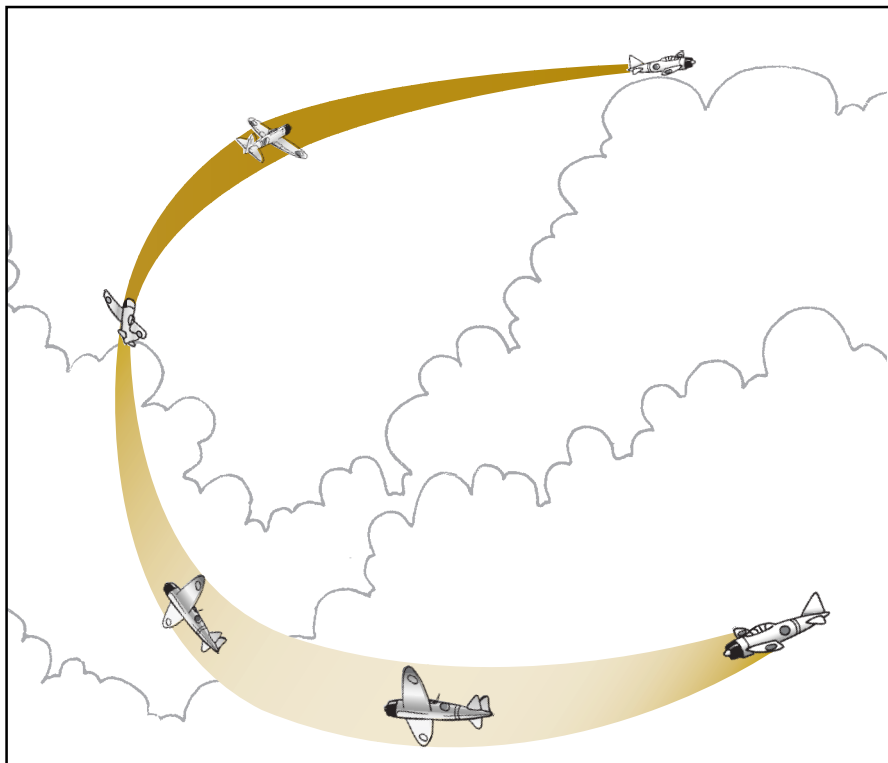
The Split-S is a vertical break. You roll inverted and perform a half-loop. Difficult to follow, this maneuver is a very strong defensive move in a pinch.

### **Drawbacks**

You need altitude to perform the Split-S, and if you dive too fast, you might damage your control surfaces or overstress the aircraft as you pull out of the dive.

### **To perform**

If you find an attacker on your six o'clock, roll inverted and pull back hard on the stick. To avoid gaining too much airspeed, throttle back as your plane dives. As you follow through the half-loop and the horizon appears in front of you, increase power and be ready to turn back into your attacker. If you find that you're still at a disadvantage, consider performing another Split-S or, if you have the momentum, use your superior speed to put distance between you and your attacker. But whatever you do, don't fly straight-and-level!



## ***The Chandelle***

### **Purpose**

A Chandelle is a maximum-performance, climbing turn that results in a 180-degree change in direction. It's a very fast way of changing direction and climbing quickly. The enemy must change direction abruptly to catch you.

### **Drawbacks**

Make sure you have enough airspeed before performing the maneuver. Because of the very real possibility of stalling or

spinning out while performing them, Chandelles should never be started at an altitude of less than 3,000 feet. Many good pilots have been killed trying to execute a Chandelle immediately after takeoff. Don't try it.

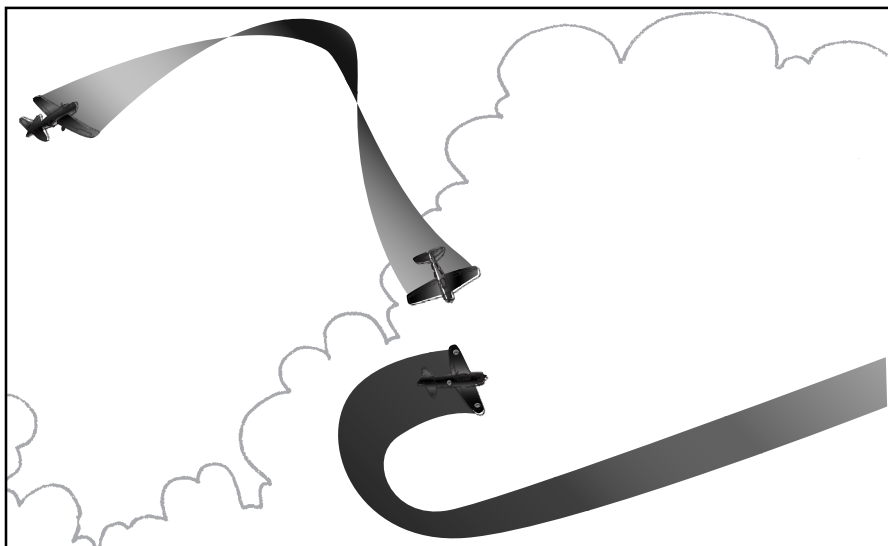
### **To perform**

At the proper entry speed, establish a bank angle (usually 15–30 degrees) and begin raising the nose. During the first 90 degrees of turn, the bank angle remains constant as you slowly increase the pitch



attitude. The nose reaches its maximum pitch above the horizon at 90 degrees of turn. During the second 90 degrees of turn, the pitch attitude remains constant (nose relatively high) and you slowly start leveling the wings. At 180 degrees of turn,

the wings are level, the nose remains above the horizon, and the airspeed is just above stalling speed.



## ***Overhead Attack***

### **Purpose**

The overhead attack gives you the best chance of hitting your enemy without taking any damage yourself. The slashing attack requires precision and a proper setup before you make your run.

### **Drawbacks**

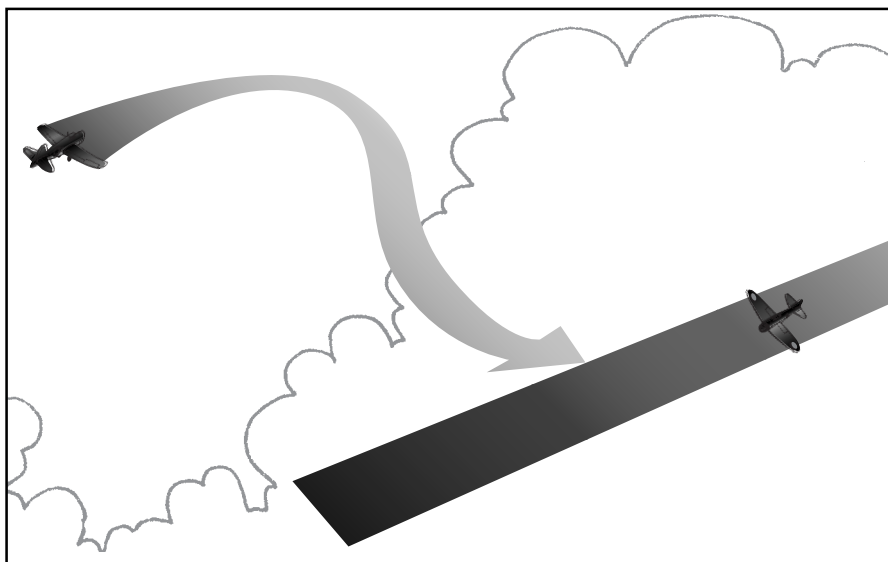
Getting set up above your enemy is key. A smart opponent won't let you do this easily, and he may climb toward you. Once you make this run, you'll have a

second or two at most to get your shot off before you get by him. You need to fly this maneuver quickly—a slow or tentative overhead attack gives an opponent a chance to turn onto your tail. Also, make sure you don't dive and pull out too fast. Your controls can lock up, and you can black out if you pull up too quickly. If you find yourself blacking out or losing control of the aircraft, relax the back-pressure, and reduce throttle to reduce your airspeed.

### **To perform**

Climb to at least 2,000 feet above the enemy, and then roll onto your back before pulling through into a vertical dive. At about 600 feet, open fire, making sure you lead your target as necessary. Then

pull out smoothly to get back above your target. Don't pull up so quickly as to give your opponent a quick shot at you—remember to get clear of his guns before pulling up.



## **High Side Attack**

### **Purpose**

This maneuver gets you very close to your target and forces your opponent to dip his nose to return fire, thus risking a head-on collision.

### **Drawbacks**

Start with lots of room to execute your dive, and maintain a fast speed so that he won't get a shot at you before and after the attack.

### **To perform**

Start your attack from well above and ahead of the bandit. The dive starts about 1,000 feet to one side of the target. Get in a steep dive abeam of the target so that you're shooting at a 45-degree deflection angle both in the vertical plane and at the four o'clock or eight o'clock position (figure your target's nose is pointed at twelve o'clock.) You should be above and to one side of your target. After firing, make your recovery beneath the target, using the speed you got from the dive to zoom back up to get ahead—and in position—for the next run.

## A FEW TIPS...

Maybe you've practiced and tested, and you still can't hit the target, even when it's clearly in your sights. Not only does the enemy get away, but he clamps onto your tail to shoot you down.

What can you do?

First, a question: Are you flying **Single Missions** or just **Quick Combat**? Quick Combat is a good place to practice before attempting Single Missions.

- ⊙ Check your six—make sure there's no enemy behind you! You've heard this over and over again, but you really **HAVE** to check it—at least every five seconds.
- ⊙ If you're having trouble with visibility, try flying in HUD view for a while (cycle through the views with the **F3** key). This improves not only your lower 12 o'clock position view

(normally blocked by the panel), but also lets you see behind you *much* better.

- ⊙ Have the Tactical Display on (toggle **SHIFT+T**): that's another great way to tell if enemy planes are behind you.
- ⊙ If you have enemy planes in your sights and they seem to slip away, a few things could be going on:

### Consider these factors

1. If you're not directly behind them, you have to lead them: shoot a little in front of the plane so your bullets arrive at the same time the plane does and meet the target.
2. Sometimes, when you're flying at a steep upward angle toward a plane above you and concentrating on the enemy plane, you don't realize your own plane stalls and points downward. Remember, your plane is not a jet or a rocket. You have to fly the plane while you're fighting.



*Japanese Zero taking off from carrier. (Maru magazine)*

3. Yes, you DO have to get very close before you shoot. The bullets from your wing guns are angled so they converge at 300 yards, though sometimes you can still hit targets from two or three times that range. But that's where they do the most damage.

Not easy, is it? But if you keep these things in mind, and practice in Quick Combat until they become second nature, you won't be so frustrated, and you'll definitely have more fun.

**Note:** Since you don't have the physical feedback a real pilot had, use the HUD and Tactical Display to help you!

## **TIPS AND TRICKS FOR SPECIFIC AIRCRAFT**

All the planes in Combat Flight Simulator are great fighter aircraft, but it takes pilot skill and experience to capitalize on the best traits of each one and to overcome the strengths or to capitalize on the weaknesses of enemy aircraft. For more specific information about each aircraft, see Chapter 11, **Machines of War**.

## **TELLING FRIEND FROM FOE**

No matter how much you study aircraft recognition manuals, it's easy to make mistakes in the heat of battle. Take a second look at planes you're about to escort or attack to make sure they're friend or foe. Here are a few common aircraft recognition problems to keep in mind:



*U.S. Marine PBJ bombers (North American B-25 Mitchells) raid Rabaul. (U.S. Navy)*

### **Japanese pilots**

- ⊙ If you spot a group of what looks like **Wildcats** and plan to attack from behind, make sure they're not **Avengers** with rear-firing turrets. Especially from a distance and in low light, the difference in size and fuselage shape may not be apparent until the rear gunners are spraying you with .50-cal machine gun fire. This mistake almost killed famed Zero ace Saburo Sakai.

### **American pilots**

- ⊙ Don't mistake SBD **Dauntless** divebombers for **Zeros**; from a distance and in the excitement of battle the size difference may not become apparent until too late.
- ⊙ On the other hand, if you're flying the American side and spot SBDs that might like to have an escort, don't sidele up in a friendly way until you make sure you won't be escorting Zeros! (See sidebar page 102.)

7

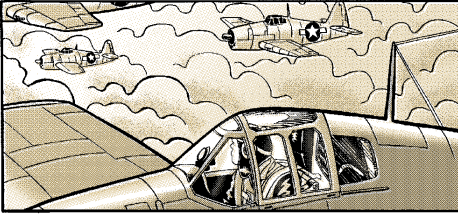
CHAPTER

# THE MISSIONS





**KNOW YOUR MISSIONS, FIND OUT THE  
SCHUTTLEBUTT, AND LEARN HOW TO  
BUILD YOUR OWN MISSIONS!**



**IN THIS CHAPTER**

- **MISSION TYPES**
- **AND YOUR MISSION IS...**
- **MANAGING YOUR WING**
- **TRAINING MISSIONS**
- **THE MISSION BUILDER**

## MISSION TYPES

There are two places in Combat Flight Simulator 2 where you can fly missions:

**Single Missions** and **Campaigns**. (In Quick Combat, you just get to fly and shoot at enemy planes.)

**"THERE WERE NO SAFE MISSIONS  
IN WORLD WAR II."**

—(FROM ERIC M. BERGERUD,  
*FIRE IN THE SKY*)

## Campaigns

When you click **Campaigns** on the Main screen, you'll be prompted to create a pilot to fly a *series* of missions over a

longer, protracted conflict, and be rewarded with medals, promotions, and other awards if successful. (See Chapter 8, **The Campaigns**, for more details.)

Your missions will be assigned to you within the context of the campaign.

## Missions

When you click **Single Missions** on the Main screen, you will see a list of missions you can fly.

The types of missions fall roughly into two categories:

- ◉ Air-to-air
- ◉ Air-to-ground (Attacks on water-borne vehicles are also air-to-ground. If it doesn't fly, it's a ground target.)

Some air-to-ground missions can turn into air-to-air conflicts. For example, if the enemy sees you coming, a strike against a convoy of ships is likely to meet resistance from supporting fighter planes.

These missions describe the *intent* of the assignment. But in battle, everything can change in an instant, so keep on your toes.

## **Air-to-air missions**

Some of these missions are more routine than others, some more dangerous. None of them are completely safe.

### **Combat air patrol (CAP)**

Patrol a specific area and when enemy aircraft get within a certain range, intercept and shoot them down. These CAP flights are the most common types of missions, and the least likely to lead to an engagement with the enemy. But never assume a mission will be a milk run, or you'll be in for a nasty surprise.

The goal of CAP is to prevent harassing attacks on bases and detect enemy

reconnaissance and enemy naval action. Your carrier's fighter group will fly a standing patrol to look for submarines and snooping enemy aircraft.



*Japanese war art painting: "Sea Battle off Isabel Island" [Guadalcanal area].  
Artist: Kobori Yasue. (National Archives)*

### **Fighter interception**

Fly to intercept inbound enemy fighters and shoot them down. You'll have to take off and get altitude in a hurry, as you'll be on the ground or on your carrier deck while the enemy is already airborne. You will be sent up on an intercept only when threatening aircraft have been sighted.

### **Bomber interception**

Fly to intercept inbound enemy bombers and shoot them down. Bomber interceptions can get complicated, because they may or may not be escorted by fighters. You'll find out when you get up there whether you're fighting big, slow planes or their nimble, quick escorts.

### **Fighter sweep**

Fly through an area searching out and destroying any enemy aircraft. Enemy can be airborne or on the ground.

### **Bomber escorts**

Escort friendly bombers to their target, defending them against any inbound enemy fighters. In the Pacific theater, all escorts are *close escorts*, so the fighters must remain close to the bombers they escort, and not search out enemy fighters.

## **ON MAINTAINING FORMATION**

***"NEVER BREAK YOUR FORMATION INTO LESS THAN TWO SHIP ELEMENTS. STAY IN PAIRS. A MAN BY HIMSELF IS A LIABILITY, A TWO-SHIP TEAM IS AN ASSET. IF YOU ARE SEPARATED, JOIN UP IMMEDIATELY WITH OTHER FRIENDLY AIRPLANES."***

***—MAJ. THOMAS MCGHIRE, USAAF  
(FROM ROBERT L. SHAW, FIGHTER COMBAT:  
TACTICS AND MANEUVERING)***

## **Air-to-ground missions (strikes)**

In any kind of air-to-ground mission, or "strike," you proceed to a target or target area and drop one or more bombs or rockets from a low- or high-altitude dive. Guns can also be used for strafing.

### **Search and destroy**

Proceed to the designated target area and search for targets to destroy with bombs, rockets, and/or guns.





*Kamikaze attack in the Marianas, 6/44. (Naval Historical Center)*

### Strike

A strike is an attack against a strategic target, like a bridge or a rail line that, if destroyed, would interrupt the enemy's ability to reinforce supplies. The strategic target is sometimes a mobile one, as in an **anti-ship** strike, when ships are being used to resupply troops or to transport reinforcements.

### Strafing

While not technically a separate mission type, many missions call for strafing attacks on ground targets with guns, cannon, rockets, or some combination thereof. Strafing involves fighter planes flying very low to the ground in a parallel formation like a chorus line. Fly 50–100

feet above the ground starting at your Initial Point, and then pop up to about 200–300 feet just before you start shooting. In this way you can shoot with the nose of your plane pointing down without crashing. Surprise is crucial, so you'll only get one pass at the target. If you go in twice, the antiaircraft guns will be waiting.

## AND YOUR MISSION IS...

Before you fly into the fray, take a few minutes to go over your Mission Briefing. Understanding the goal of your mission is critical to your, and your squadron's, success. Whether the mission goes as smoothly as your mom's cheesecake or rough as the ocean below, understanding your mission goals—and planning your in-flight strategy—makes the difference between a successful mission and a medal on your uniform and a last-ditch bailout. Once you take to the skies, you're not on your own. Your in-flight briefing clarifies the mission, and after it's all over, so does your Mission Debriefing.

### The Mission Briefing

You can expect your Mission Briefing to include the specific goals of your mission. Whether your mandate is to fly an escort or bomb a base to bits, you'll find the details here.



### To see your Mission Briefing

- On the Single Mission or Squadron screen, click **Next**.

You'll notice that your briefing screen includes the basics of your mission and three buttons that you can click to find out a different category of mission:

- **Recon photo:** Click this option to get visual details on exactly what you're getting into.
- **Advanced info** (not always available): Click this option to get the intelligence report on your mission, including suggestions that'll help you put together an educated plan of attack.

### Getting information while you're flying

Once you're in the sky, everything you've read in your Mission Briefing can change in the turn of a prop. Luckily for you, you can take a look at your in-flight briefing map to get the latest details—details that affect your strategy and might save your tail section.



### To see your in-flight briefing map

- While in flight, press the **M** key.

### Mission Debriefing

When you've completed a mission, a Mission Debriefing displays all the details about what went right up there, and what didn't. When you click **Advanced info**, you'll see your actual route, as opposed to the waypoint route assigned in the Mission Briefing.



### The Mission Debriefing display

The Mission Debriefing displays when you:

- End the mission by clicking **End Flight** on the Flight menu.

—Or—

- Press the **X** key when you reach the last waypoint before your home airfield. Pressing **X** at this point lands your aircraft for you, but you won't score as high as if you'd put it down on your own.

Your debriefing tells you the mission outcome—why you've succeeded or failed in terms of achieving the goals of your mission.

**"ALL FIGHTERS MUST REALIZE THE CRITICAL IMPORTANCE OF RECOGNITION IN ORDER TO DISTINGUISH OUR PLANES FROM THOSE OF THE ENEMY, IN ORDER TO IDENTIFY THE ENEMY'S DIFFERENT TYPES SO THAT HIS PARTICULAR POINTS OF WEAKNESS CAN BE EXPLOITED AND HIS PARTICULAR POINTS OF STRENGTH RESPECTED."**

—FROM VMF-214 ("BLACK SHEEP") OFFICIAL HISTORY, APPENDIX E: MAJOR BOYINGTON'S COMBAT TACTICS

## MANAGING YOUR WING

The members of your squadron are your best friends. That's one reason to keep them alive. Another is that if anything happens to them, they're replaced with fresh, inexperienced recruits, which makes things risky for all of you.

### Wingmen commands

Giving clear signals to your wingmen can make the difference between a good old war story and a pile of smoldering rubble. Know these signals like they were part of your native language so you can use them instantly in the heat of battle.

Issue your commands to your wingmen with keystrokes. This will save you a lot of

yelling. Your wingmen communicate with you via radio (you will receive both audio and message text).



### To communicate with your wingmen

- **Attack—Unpadlocked** (no target selected) (press the **A** key): This command releases two planes at a time from your flight to attack the target specified in your Mission Briefing (attack bombers, attack ships, etc.). Your wingmen confirm the order with a radio call.

The **Attack** command also prompts your wingmen to jettison their drop tanks, if they haven't done so already.

- **Attack—Padlocked** (press the **A** key): This command releases two planes in your flight to attack the

padlocked target. The command works for all targets types that can be padlocked (ships, aircraft, buildings, and vehicles). Your wingmen will confirm your order with an affirmative radio call. Before you give the **Attack** command, the planes in your flight will not leave the formation unless they are directly



*F4U Corsair fires its rockets to support U.S. ground troops on Peleliu. (U.S. Navy)*

attacked by enemy aircraft. Padlocking means you lock onto a particular plane as your target, and keep it in your sights no matter what. To padlock the nearest enemy plane, press ` (on the **TILDE** key) on the upper-left corner of your keyboard.

- ⊙ **Flight Attack** (press the **A** key two times within three seconds): If you're padlocked on a target, the entire flight will attack that target. If you're not padlocked onto a target, the flight pursues its directive from the Mission Briefing and attacks the specified targets. Your wingmen confirm your order with an affirmative radio call.
- ⊙ **Rejoin** (press the **R** key): Use this command after an **Attack** command to bring the aircraft in your original flight back into formation.

When your wingmen receive the **Rejoin** command, they break off their attacks or escape from an attacker. If a wingman is unable to disengage, he will tell you over the radio.

- ⊙ **Help Me!** (press the **H** key): Issue this command if you just can't get the upper hand on your attacker on your

own. This command brings in your wingmen to attack whatever target is attacking you.

The nearest unengaged wingman will come to your aid. If no wingmen are free then you will hear a radio call informing you that no one is available to assist.

- ⊙ **Split** (press the **S** key): Issue this command to split your flight in two. This command doesn't create two flights, it just offsets the current formation. Half the flight stays in its current formation and half moves out laterally 1,000 feet, back 500 feet, and up 200 feet.

If you want to increase the lateral separation of your formation, issue this command more than once. (The other half of your flight won't move back and up more, just farther off to the side.) You can give this command up to eight times. To move the planes in closer to you, give the **Rejoin** command.

#### Wingmen command quick reference

Here are your wingmen commands at a glance.

Command	Press
Attack (toggled padlocked and unpadlocked)	<b>A</b> key
Flight Attack	<b>A</b> key two times within three seconds
Rejoin	<b>R</b> key
Help Me!	<b>H</b> key
Split	<b>S</b> key

### Combinations of commands

Once you learn all of the wingmen commands, the next step is to learn to use them in combination.

For example, you can use the **Split** and **Rejoin** commands to perform various team maneuvers.

To study maneuvers and to see what patterns you can create with these commands, see Chapter 6, **Air Combat**.

## TRAINING MISSIONS

Before you engage in fast and furious combat with the enemy, give yourself some solid preparation by completing a couple of training missions. It's up to you. If you're confident that you're well prepared, and you've got the maneuvers down, head straight into combat. But if your in-flight skills could stand a little practice and polish, take advantage of the training missions.

To fine-tune *all* your flight skills, take the complete

in-flight training **course**. If you decide to go this route, you'll go through all the training missions, in sequence. When you graduate, you'll get a combat flight certificate that's testament to your in-flight mettle and persistence.

If you want to polish only certain maneuvers by flying individual training missions, choose them **separately**.

### To select your Training Missions

1. On the main screen, click **Training Missions**.
2. Choose either **Training mission** or **Training course**.
3. Depending on your choice in step 2, choose a training mission or start in on your flight curriculum.



*U.S. raid on Marcus Island, 9/1/43. (National Archives)*

On the left, you'll see a diagram of the flight maneuver that's featured in the mission. Once you click **Fly Now!**, a helpful flight instructor will guide you through the flight, giving correcting advice if you make an error.

Training missions are divided into three basic categories:

- ⊙ Basic maneuvers such as taking off and landing.
- ⊙ Aerobatic maneuvers like the Split-S and the Immelman.
- ⊙ Combat maneuvers like dive-bombing and strafing.

Mastering the flight maneuvers in all three basic categories is critical to your success and survival. Examine the following categories and the test flights that they include.

### ***Basic maneuvers***

This category is where you'll find the basics of flight, the moves that'll get you off the runway. You'll find the following missions in this category.

- ⊙ **Take off and climb:** Learn pre-takeoff and takeoff procedures, make a climbing turn, and then throttle back to cruising.

- ⊙ **Landing:** Learn how to nail your landing approaches, including finding the key position for your aircraft, and then gliding smoothly in.

### ***Aerobatics***

This is the category that includes the maneuvers that will soon become routine.

- ⊙ **Loop:** Learn how to perform a loop, a maneuver in which the airplane follows the path of a closed curve, perpendicular to the ground.
- ⊙ **Immelman:** In this maneuver, you combine both the loop and the roll. The Immelman is a half loop followed by a half roll, just before you reach the inverted position. A complete Immelman involves a 180-degree change of direction ending in a slight climb.
- ⊙ **Split S:** This maneuver further hones your in-flight coordination skills. Start with a half roll to inverted followed by the second half of a loop downward.

## Combat maneuvers

This category includes the maneuvers you'll use time and time again in the heat of combat.

- ⦿ **High-side attack:** Use this maneuver to set up a shot on your enemy from an angle above and to the side, and then shoot in front of the enemy's path as you converge.
- ⦿ **Overhead attack:** This is an excellent maneuver if you're above your enemy and approaching to make a head-on attack. If you learn this maneuver effectively, you'll be able to make small adjustments to keep enemies in sight if they try to evade your attack.
- ⦿ **Dive-bombing:** This dramatic maneuver involves diving your aircraft straight towards the earth, and then releasing your bomb at the target.
- ⦿ **Strafing/rocket attack:** The trick to this maneuver is to identify your target while you're still out of range of their guns, and then drop in as low as possible when you make your run.
- ⦿ **Carrier approach and landing:** Get into the landing circle, get ready to land, and get your aircraft aboard ASAP with the help of the landing signal officer.

For more detailed descriptions of air combat maneuvers, see Chapter 6, **Air Combat**. When you get these moves down, you'll literally have a fighting chance. Good luck!

## THE MISSION BUILDER

With the Mission Builder, you've got an incredibly powerful tool for designing and creating missions at your fingertips. The Mission Builder is a stand-alone application included with Combat Flight Simulator—with its own Help system. You launch the Mission Builder from the **Start** menu or from the Single Missions screen in Combat Flight Simulator. Use the Mission Builder to:

- ⦿ Create and edit your own missions; you can even edit missions from Combat Flight Simulator, version 1, and other sources.
- ⦿ Use aircraft and scenery from other sources in the missions you create; you can even create missions and campaigns outside the Pacific theater.
- ⦿ Make the missions "active": set up triggers and events to create elements that react to the player's performance in the game.

**Note:** Keep in mind that the **Mission Builder** requires that your screen resolution be set to 1024 x 768.



### To launch the Mission Builder

1. On the Windows® Start menu, click Programs/ Microsoft Games/ Combat Flight Simulator 2/ Mission Builder.
2. Click **Mission Builder**.

**Note:** Because the Mission Builder is so powerful, it's fairly complex and aimed at the advanced user. If

you don't have a lot of experience designing missions, it'll take some practice to design complex missions. Start by designing simple missions, practice using the Mission Builder's features, and hone your mission building skills. If you accidentally overwrite an important file, there are a couple of ways to recover:

- Always make a backup of a file you intend to replace by renaming it to something like **originalfile\_old.mis**. This way, if you need to use the original file you'll still have it.



*Japanese war art painting: "Departure of Special Attack Corps, Kamikaze, from Base on Home Island, Tachikawa Airfield." Artist: Iwata Sentoro. (National Archives)*

—Or—

- Uninstall and then reinstall Combat Flight Simulator from the CD-ROM. Make backups of the files you want to keep before you uninstall the product. When you are prompted as to whether you want to remove your personal files, answer **Yes**. Otherwise the install procedure will not overwrite files you have modified. This will remove any downloaded aircraft, missions, campaign saves, and any other modifications you've made to Combat Flight Simulator. The Mission Builder is not supported by Microsoft Product Support.



## ***Taking advantage of the easy-to-use graphical interface***

With the graphical interface of the Mission Builder you can see exactly what you're creating represented on the chart area that mirrors the geographical layout of your chosen theater of operations. The object placement buttons are just above the chart area; use them to place aircraft, ship, and ground unit objects and waypoints. Also, drag-and-drop placement makes it easy to move objects around once you've created them. For example, placing objects is as simple as a click of the mouse.



### **To place an object and create its waypoints**

1. On the toolbar above the chart area, click the object's **icon** (aircraft, ship, or ground unit).
2. Click the **area** in the chart where you want to place the object.
3. Move the mouse on the chart area and click the mouse to create additional waypoints. When you're finished creating a waypoint, right-click the mouse to "release" it.

**Note:** You can edit the properties of an object by clicking it, and then fine-tuning its properties in the Properties area, on the left. In this area, you can specify properties related to the object, its route, and object information.

The information area to the left of the chart area gives you exact heading and bearing information as you place your objects.

Use the other icons on the toolbar above the chart area to create infrastructure, front lines, and event areas on the map, then use the dialog boxes to fine-tune the scenario you've created. You'll also see icons you can use to create chart labels, select objects, change settings, and get online Help.

With the toolbar at the bottom of the chart area you can change your chart view; zoom in, pan, find the player aircraft, and so on, at the click of a button. With the icons on the right side of this toolbar you can undo and redo actions as well as delete elements you've placed on the chart and want to get rid of. The toolbar also includes the Fly Now! button, so you can launch Combat Flight Simulator and test the mission you've just created.

Use the toolbar at the top of the Properties Area for the following design tasks:

- ⦿ Create a new mission.
- ⦿ Open an existing mission file.
- ⦿ Save your mission.
- ⦿ Define your mission's setup.
- ⦿ Go to a specific chart location.
- ⦿ Create triggers.
- ⦿ Create events.

## Creating different types of missions

You can create the following types of missions using the Mission Builder. These are the broad categories of missions you can create; for more detailed information on mission types, see “Mission Types” earlier in this chapter.

- ◉ **Escort:** Aircraft escorts a specific flight of aircraft of any type you choose.
- ◉ **Combat Air Patrol (CAP):** Aircraft flies between two or more CAP waypoints until fuel is dwindling, then returns home. Aircraft will abandon CAP waypoints to intercept enemy aircraft.
- ◉ **Intercept:** Aircraft intercepts any enemy aircraft near an intercept waypoint.
- ◉ **Fighter Sweep (Default):** Aircraft follows defined waypoints; if any enemy aircraft are detected on the ground or air close to the defined route, they'll be engaged in combat.
- ◉ **Strike:** Aircraft attacks a pre-assigned stationary target (with the exception of moving ships).
- ◉ **Anti-Ship:** Aircraft attacks only ships that are defined as targets for a given flight.
- ◉ **Search and Destroy:** Aircraft follows its defined waypoint route and attacks any enemy (air, sea, or ground) discovered near that route.
- ◉ **CAS (Close Air Support):** CAS is the use of planes to support troops on the ground.

You choose the type of mission you want to create on the Flight tab of the Properties area to the left of the Mission Builder's chart area.



### To choose the mission type for an aircraft

1. Select the aircraft.
2. Next to Mission on the aircraft's property sheet, click the **arrow** to the right of the box and choose the mission type you want.

Mission types act as a framework for your missions. The types give you a wide variety of mission parameters, but the infinite complexity (or simplicity) of the mission is left to your design. The mission type that you designate doesn't really affect the player's aircraft in gameplay, but it does have a significant impact on computer-controlled aircraft, including the player's wingman. For example, if you've designated a mission as an intercept mission and the waypoint action is “intercept bombers,” the computer-controlled aircraft will engage all airborne bombers. Conversely, the computer-controlled aircraft will not engage fighters (unless directly attacked) or bombers on the ground.

### ***Mission Builder shortcut keys***

When you're designing a mission, you can use the following shortcut keys to pick up the design pace, and save yourself a few keystrokes.

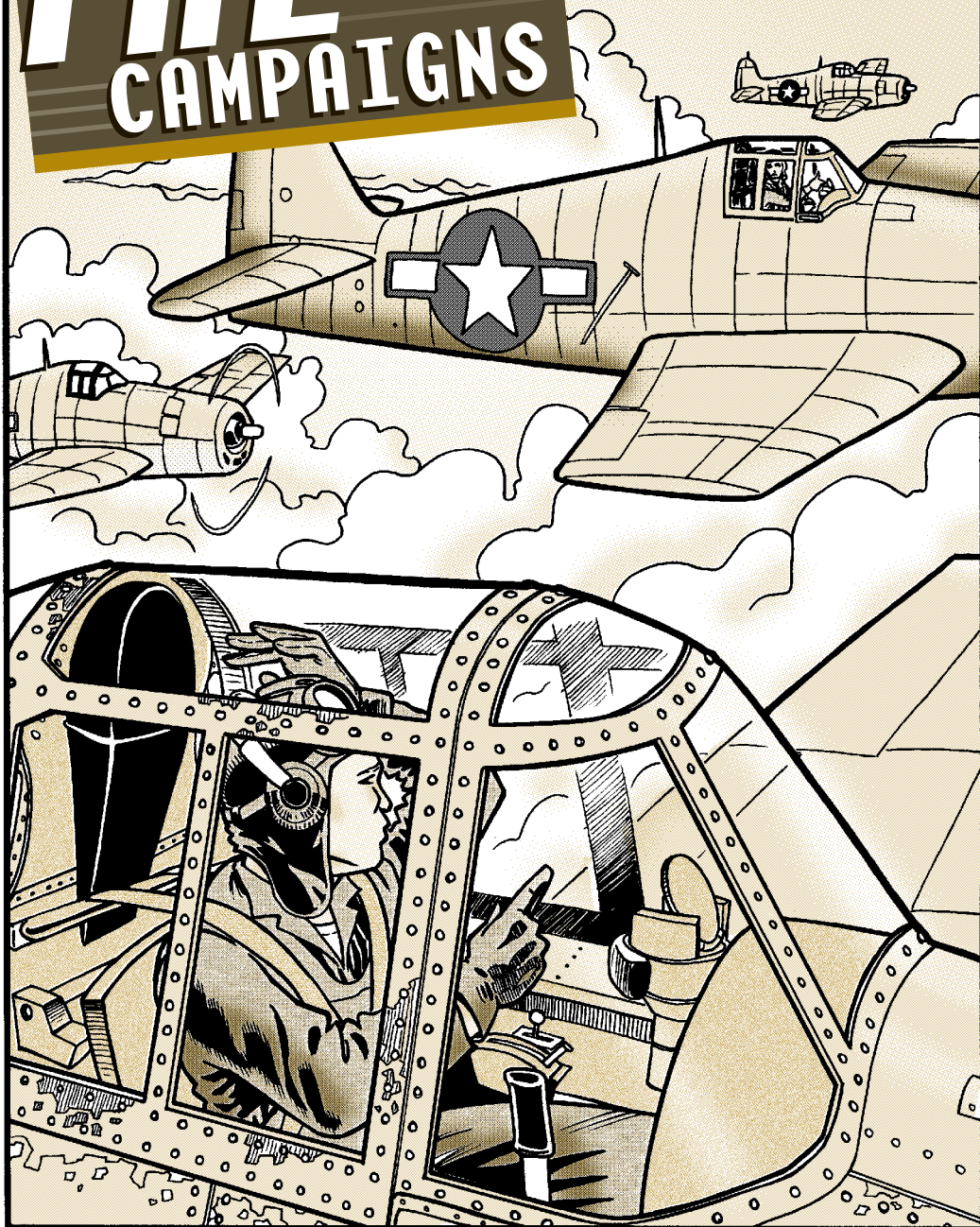
For more information and specific procedures (including importing and adapting missions from the first version of

Combat Flight Simulator), see the online Help included with the Mission Builder itself. For the most up-to-date information on the Mission Builder and creating, editing, and importing missions, go to the Combat Flight Simulator Web site: [www.microsoft.com/games/combatfs](http://www.microsoft.com/games/combatfs)

<b>Action</b>	<b>Press/Click</b>
Select all objects	<b>CTRL+A</b>
Delete current selection (If you delete an object with waypoints, deletes from last-placed to first-placed waypoint, and then the object.)	<b>CTRL+D</b>
Open Chart Filters dialog box	<b>CTRL+F</b>
Go to a specific location, airbase, or area of operations	<b>CTRL+G</b>
Create new mission	<b>CTRL+N</b>
Open mission	<b>CTRL+O</b>
Save mission	<b>CTRL+S</b>
Exit the Mission Builder	<b>CTRL+Q</b> or <b>CTRL+BACKSPACE</b>
Undo	<b>CTRL+Z</b>
Redo	<b>CTRL+Y</b>
Select an object or waypoint	Click object
Deselect object or waypoint	Click "empty space" on Chart Area
Zoom In	Zoom in region (click, and then drag a surrounding box in Zoom mode)
Complete current waypoint route	Right-click
End Insert mode	Right-click

Action	Press/Click
End Zoom or Pan mode	Right-click any “empty space” on Chart Area
Display context-sensitive menu	Right-click object
Display menu that includes all objects in a “stack” (overlapping objects/icons)	Right-click object stack, then choose the object that you want to “bring to the front” from the menu
Add/delete object from current selection	<b>SHIFT+LEFT-CLICK</b>
Cycle through all objects with overlapping icons	<b>SHIFT+LEFT-CLICK</b>
Select all objects in a region	<b>SHIFT+LEFT-CLICK</b> , and then drag a surrounding box
Copy selection	<b>CTRL+LEFT-CLICK</b> , and then drag to location you want
Place new rotation center	<b>ALT+LEFT-CLICK</b>
Rotate current selection (once rotation center is placed)	<b>ALT+LEFT-CLICK</b> , then drag the selection
Zoom in	<b>+ (PLUS SIGN) (NUMLOCK off)</b> on the numeric keypad
Zoom out	<b>– (MINUS SIGN) (NUMLOCK off)</b> on the numeric keypad
Max. zoom out (view entire theater)	<b>/ (FORWARD SLASH)</b> on the numeric keypad
Zoom to fit	<b>SHIFT+NUMLOCK</b> key
Save selected static objects as layout	<b>CTRL+W</b> key
Load layouts	<b>CTRL+L</b> key

# THE CAMPAIGNS

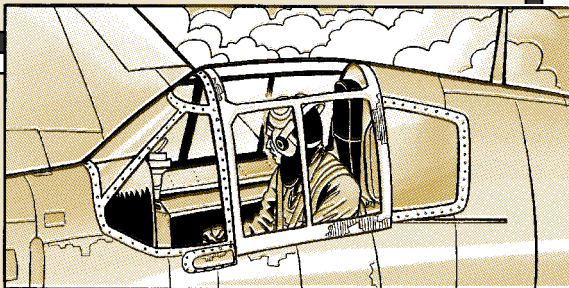




**THE PHRASE "PACIFIC WAR" IS ONE OF THE CRUELEST CONTRADICTIONS IN THE HISTORY OF THE TWENTIETH CENTURY. IT WAS A BRUTAL WAR, FOUGHT ACROSS THE GIANT AND INDIFFERENT FACE OF THE WORLD'S BIGGEST OCEAN.**

**IN THIS CHAPTER**

- **FLYING A CAMPAIGN**
- **CAMPAIGN PARAMETERS**
- **MANAGING YOUR WING**
- **YOUR STRATEGY**
- **WHO WILL CONTROL THE PACIFIC?**
- **THE BATTLES**



## **FLYING A CAMPAIGN**

Campaigns are the most complex feature of Microsoft® Combat Flight Simulator 2, and therefore the most rewarding. Quick Combat is, well, quick, and Single Missions obviously have a limited scope. But in a campaign, you create a pilot's persona for yourself, one who has a career, trains for service, and participates in the war. You are aided by squad-mates who live or die partly as the result of your leadership and skill.

### **Active campaigns**

The campaigns are "active," meaning that the missions you fly vary, depending on the events in the missions themselves. As in any war, the results of one battle determine the ground rules (or in this case, air rules) for the next battle. So you could fly an entire campaign as one pilot and then fly the same campaign as another pilot and, since the missions are determined by how well you do, wind up with many different missions between the two campaigns.



American barracks on Guadalcanal, 1943.  
(National Archives)

But these campaigns mean more than mere variety. *Everything you do in a mission has consequences.*

For example, in a Mission Briefing you might have orders to destroy a fleet of enemy submarines. If you fail to accomplish that particular goal, those submarines could torpedo your transport ships, which would directly affect your supplies and your ability to reinforce your squadron several missions later.

These missions are not strung together as isolated events; they are all affected by the events that have come before. Success or failure in one mission might have a ripple effect through your entire campaign.

## THE PILOT'S CAREER

First, you must sign your pilot up for duty. You do this on the **Add Pilot** screen.



### To create a pilot

1. On the main screen, click **Campaigns**.
2. On the Nationality screen, select **American** or **Japanese**.
3. Click **Next**.
4. On the Select Pilot screen, click **Add pilot...**
5. On the Add Pilot screen, type in the **Pilot name** you want and select your campaign and starting point.
6. Click **OK**.

Every pilot's career begins with training. Training missions prepare you for everything you will encounter in the airfields of conflict. You can find training details in the "Training Missions" section in Chapter 7, **The Missions**.

As much as you train, you can never be completely prepared for your first combat missions. If training missions are about skills and testing techniques, real combat is about chaos, confusion, pain, and the ultimate bottom line—life and death. You do what you have to in combat, but the things you learn in your training still maximize your chances of surviving. Don't forget them.



American ships burning near Guadalcanal after an attack by Japanese aircraft, 1942. (Naval Historical Center)

## Squadron dynamics

You and your squadron mates are drawn together by a simple bond: your life depends on them, and their lives depend on you.

You meet your squad-mates on the Squadron screen.



### To view your squadron mates

- After you've selected a pilot on the Select Pilot screen, click **Next** to move to the Squadron screen.

Your squadron mates are listed beneath your name, along with their ranks and their number of kills, so you can see which are the most aggressive.

There are a total of eight pilots (including yourself) in a squadron. The squadron is further divided into **sections** of four pilots each.

As squadron leader, you can change the order of the pilots in your squadron as you see fit. It might pay to promote the pilot with the most kills to lead the second

section, while you lead the first. At any time before a mission, you can switch the formation order of the pilots.



### To change the order of the pilots in your squadron

1. On the Squadron screen, highlight the name of the pilot you want to switch.
2. Drag the name to the position you'd like it to be, then release the mouse button.
3. Repeat for each pilot.

While you're looking at the kill tallies of your pilots, remember the importance of keeping them alive. This point can't be emphasized enough: if one of your squad-mates is killed, you'll get a fresh recruit with a kill number of 0, and experience to match. This will seriously affect the course of your campaign.



## Success and failure

Mission success is more than just racking up kills. Getting kills is important, but you must never lose sight of your mission goals. For example, if the mission is to escort bombers safely to their target, and you fly off with your fighter buddies to kill a hundred enemy planes but abandon your bombers (which are then shot down), is your mission a success or a failure?

It's a complete and dismal failure, no matter how many kills you scored elsewhere.

This is not to say that kills are unimportant. They're crucial for winning medals, just as mission success is crucial for earning promotions. But never sacrifice your mission goals for the sake of personal glory. See Chapter 9, **For Exceptional Service...** for details on the award systems for each fighting force.

Mission goals are stated clearly in each Mission Briefing, which appears just before you take off. It's a good idea to write down the crucial details of a mission. Pilots of WWII often scribbled notes on the back of their hands. Do whatever it takes to keep you and your squadron focused on that one goal.

***"WHEN THE ENEMY STARTS TO COLLAPSE YOU MUST PURSUE HIM WITHOUT LETTING THE CHANCE GO. IF YOU FAIL TO TAKE ADVANTAGE OF YOUR ENEMY'S COLLAPSE, HE MAY RECOVER."***

*—MIYAMOTO MUSASHI, SAMURAI AND PHILOSOPHER WHO LIVED FROM 1584 TO 1645*

## CAMPAIGN PARAMETERS

The campaigns include battles in the South Pacific, including Wake Island, the Solomon Islands area, Midway, the Marshall Islands, the Gilbert Islands, and the Philippine Sea. You can see the detailed area you'll fly in on the map in your Mission Briefing.

You don't necessarily have to fly the campaign from the beginning; you can choose a battle that starts in 1944, for example. On the Add Pilot screen is a **Play from** list where you can choose your first mission. After you've chosen the campaign you want, choose the battle you want to start from.

**Note:** Pilots with shorter careers have fewer opportunities for promotion; the highest ranks can only be attained by career longevity.



*U.S. troops battle in the jungle on New Guinea. (National Archives)*

## **YOUR STRATEGY**

### ***What to do when you lose pilots***

If squad-mates are killed in action, they'll automatically be replaced with fresh recruits with no combat experience. You can rearrange their position in the formation, and you will always be able to see their names and total number of kills when you are doing that. So put the guy with the most kills as your second element leader. (You will always lead the squadron.)

### ***Short-term success (a mission within a campaign)***

The most obvious goal of success within a mission is personal survival. That alone is not enough, however. Below is a list of success tips you can't really live without.

**Accomplish the goals stated in your mission briefing.** These are the ultimate definition of your success.

**Look for targets of opportunity during the mission,** as long as they don't distract from your stated goals. This is tricky. Situations arise in combat that no admiral can plan for. A flight of enemy planes might appear without warning, attacking you if you don't attack them



*U.S. aircraft go up in flames during Japanese attack on Pearl Harbor. (U.S. Navy)*

(now or later). But don't let those bandits distract you from your current orders. If you're escorting bombers, for example, those enemy fighters could be decoys; chasing them could bring on disaster.

**Practice carrier landings.** Sooner or later, you'll get a mission that requires you to land on a carrier. It would really ruin your previous accomplishments if you ended the mission in the water.

### ***Long-term success (winning the entire campaign)***

There are actions you can take to span a larger scope than a single campaign mission. Pay attention to these if you value your career. Note that while you can win a campaign, you cannot change the outcome of the war.

**Promote your better pilots.** Some of your squad-mates will perform better than others; promote them to Section Leaders in your formation.

**Keep your fellow pilots alive as long as possible.** The longer they're alive, the more skilled they are.

**Beware of continued failure.** Failure to accomplish mission goals has consequences beyond a single letter of reprimand. Failure in three missions in

a row can put you (that particular pilot) out of the flying business permanently.

**Don't lose all of your wingmen.** If you fail that dismally in a single mission, your superior officers won't wait for you to fail in three. Your career will be over, period.

**Know where the front lines are.** If you have to bail out, do it over friendly territory—there's a high likelihood that you'll be rescued (a text message indicates you've been rescued). If you're over enemy territory, your pilot's career is most likely over. Study your in-flight map if you don't know where you are.



#### **To display the in-flight map**

- Display the in-flight map by pressing the **M** key.

## **WHO WILL CONTROL THE PACIFIC?**

Since the end of the 19<sup>th</sup> century it had been clear that eventually one nation would dominate the Pacific Ocean. When the Japanese defeated Russia in a battle of dreadnoughts in 1905, it became obvious that the United States and Japan were the leading contenders.

In the 1930s, Japan planned to supplant the western colonial powers in Asia—the British, the French, and the Dutch—and to counter the threat of American sea power. Japan proposed to create a “Greater East Asia Co-Prosperity Sphere,” that is, an East Asian empire dominated by Japan and fueled by resources once controlled by the European nations. In challenging the Allied powers, Japan took a huge gamble, much the same one Germany had taken by going to war against an alliance with an overwhelming superiority in population and resources.

### ***The opening assault***

Japan chose to start its involvement with America with a stunning attack against the U.S. Pacific Fleet at Pearl Harbor on the Hawaiian island of Oahu, on December 7, 1941. Two waves of Japanese carrier-based aircraft did their destructive work, sinking six American battleships and damaging two more. The attack also sank or damaged ten lesser ships,

reduced nearly 200 military aircraft (parked wing-to-wing to discourage sabotage) to twisted junk, and left 2,403 American servicemen and civilians dead.

This devastating attack was an enormous psychological blow to those Americans who still saw the battleship as the ultimate symbol of military power and national pride, but there was an almost miraculous silver lining in the pall of smoke over Pearl Harbor. The American fleet aircraft carriers and heavy cruisers were all at sea during the attack, and the Japanese decision not to extend the attack with a third wave of aircraft left vital dockyard and oil storage facilities intact. While six of the damaged American battleships eventually rejoined the fight, the aircraft carriers of both nations determined the winner in this long and bloody war.

### **Japanese strategy**

The Japanese strategy early in the war was to expand its control to the south and east as rapidly as possible to create a defensive perimeter covering as much of the Pacific as possible. Within hours on either side of the attack on Pearl Harbor, the Japanese also struck at American and European holdings in Malaya, the Philippines, Thailand, Burma (now Myanmar), Hong Kong, the Dutch East Indies, Wake Island, and Guam in the Mariana Islands. Inside this perimeter Japan built bases from which its military could repel any attempted invasion far

from the Japanese home islands.

Japanese success was so thorough that the nation, its fleet, its pilots, and aircraft all appeared invincible to the reeling Allies. Japan's future looked bright.

### **Allied counter-offensive**

With its own resources intact, the United States directed Allied strategy and set its goals against Japan, but the war effort was a joint one involving America, Britain, the Netherlands, Canada, and the heavy and sustained contribution of Australia and New Zealand. The task was overwhelming: stop further Japanese

### **THREE STAGES IN A FIGHTER PILOT'S CAREER**

*"(CMDR. DAVID) MCCAMPBELL (IN CHARGE OF THE ESSEX'S AIR GROUP 15) LEARNED THAT HE, LIKE OTHER FIGHTER PILOTS WHO SURVIVED COMBAT, HAD GONE THROUGH THREE STAGES. AT FIRST, HE HAD BEEN TOO EAGER, TOO ANXIOUS, AND HAD MISSED WITH HIS GUNS MORE OFTEN THAN HE CONNECTED. THEN, AFTER SHOOTING DOWN SEVERAL JAPANESE PLANES, HE HAD ARROGANTLY ASSUMED THAT THE JAPANESE PILOTS WERE INFERIOR.*

*HE LEFT THAT IMPRESSION BEHIND AFTER HE WAS CHASED BY EXPERIENCED JAPANESE PILOTS WHO SHOT UP HIS PLANE. NOW HIS OPERATIONS WERE METHODOICAL; HE TOOK RISKS ONLY WHEN ABSOLUTELY NECESSARY AND BALANCED MILITARY NECESSITY AGAINST THE CHANCE OF SURVIVING FOR THE NEXT MISSION. MCCAMPBELL, WHO HAD BEEN TURNED DOWN FOR PILOT TRAINING BECAUSE OF EYE TROUBLE, ENDED THE WAR AS THE NAVY'S LEADING ACE."*

*—FROM WILBUR MORRISON, ABOVE AND BEYOND: 1941-1945*



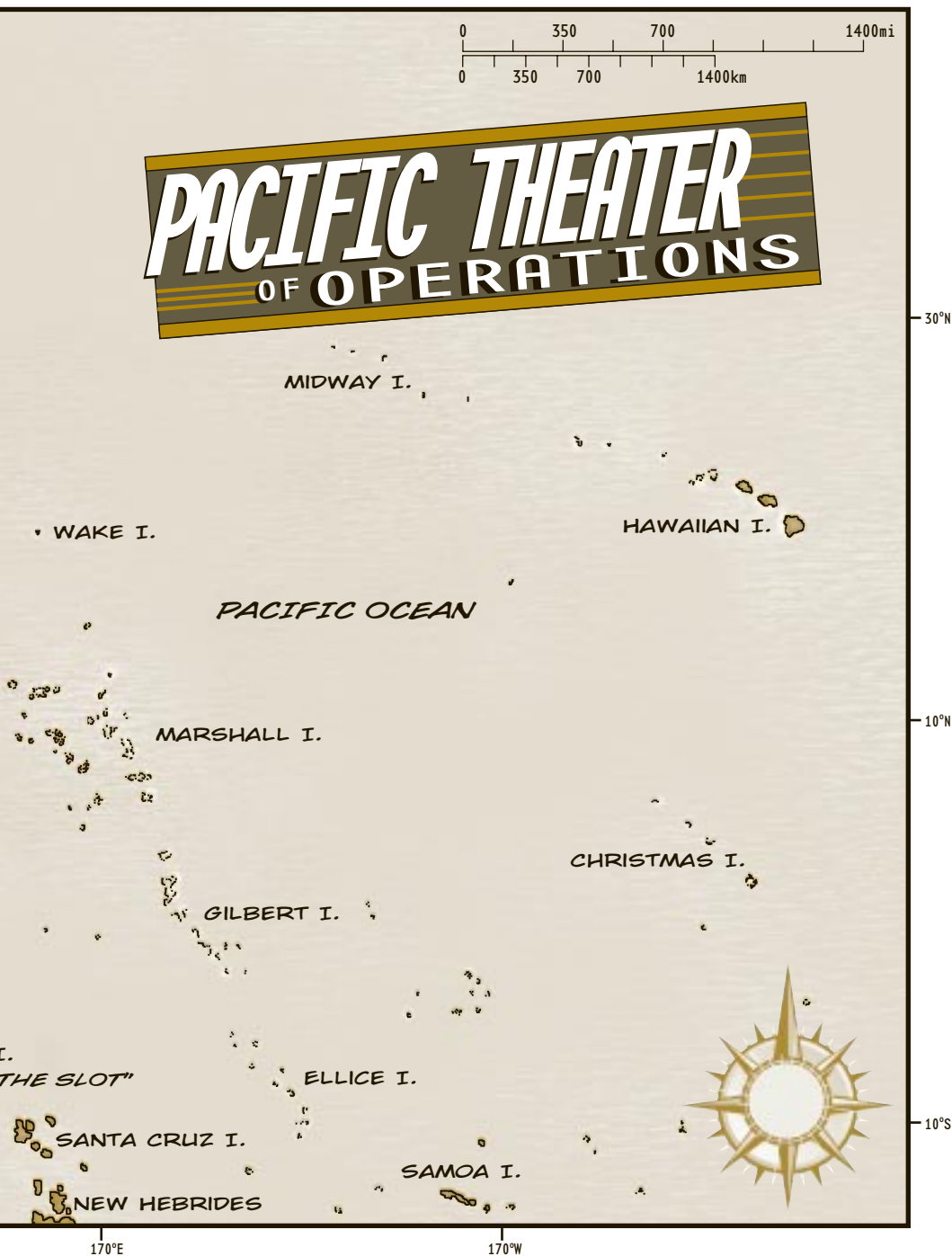
*Aerial view of U.S. hospital at Owi, Dutch New Guinea, 12/21/44. (National Archives)*

expansion, gain the initiative, and push relentlessly north and west across the Pacific. The long-term goal was to capture and fortify bases from which an assault could be launched against Japan itself. This was a very tall order in early 1942, with Japan triumphantly taking whatever it wanted in the Pacific. Eventually the Americans were able to implement an

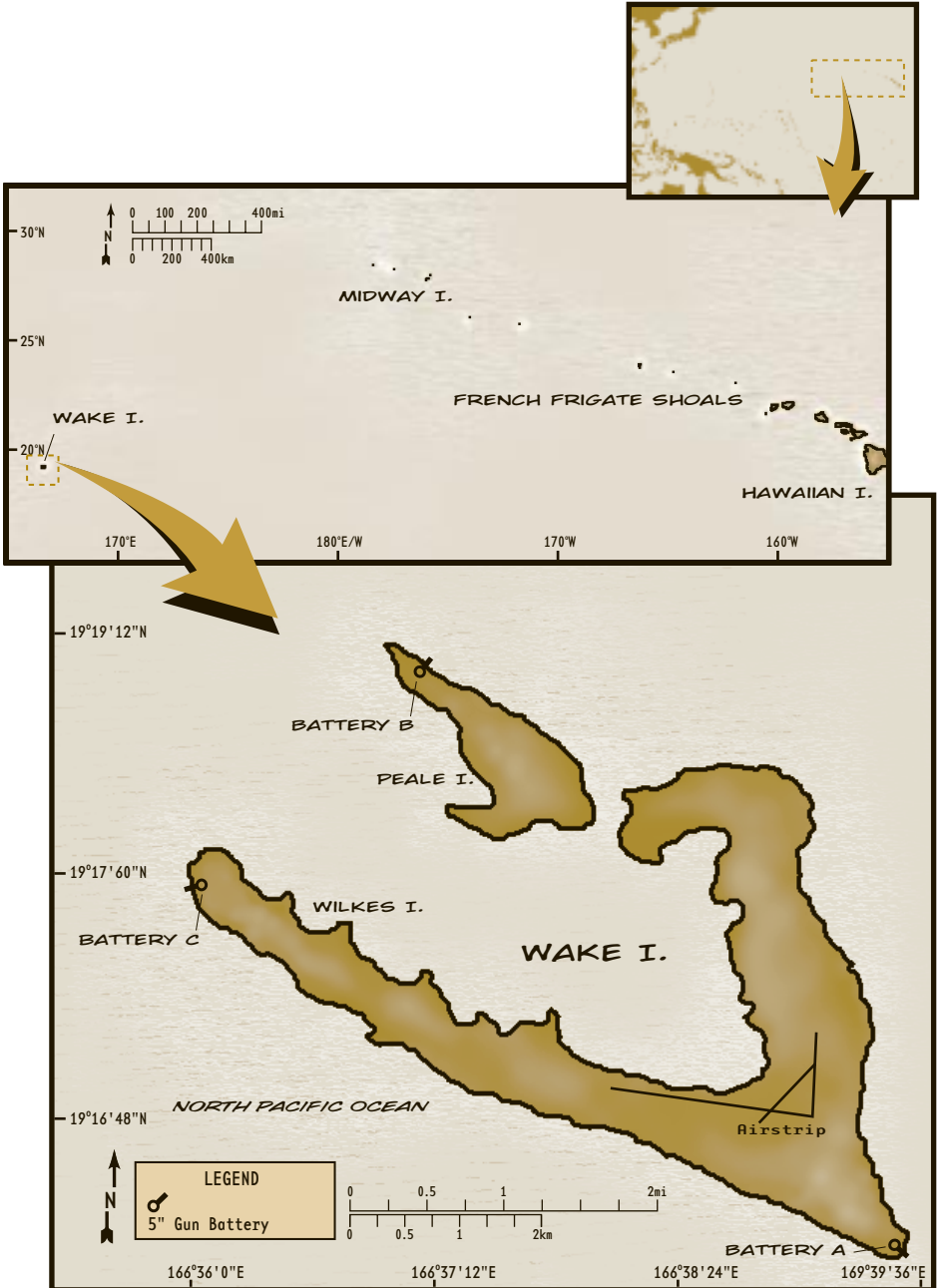
“island-hopping” strategy—launching amphibious assaults to take key island bases, bypassing and isolating Japanese forces on others. But in early 1942 all the Allies knew for sure was that they were in for a long struggle, with many hard and bloody battles to fight.











## THE BATTLES

To know what's at stake, and to keep your perspective while flying these missions, it's good to know a little background.

The 44 months of the Pacific war saw thousands of major battles and minor skirmishes—and countless acts of individual heroism and sacrifice on both sides. The Pacific theater version of Combat Flight Simulator recreates some of the intense battles of 1942-1944. Pilots on both sides flew into combat knowing only that they had to do their best to win the day, leaving the grand scheme of things to the generals and admirals.

**Note:** All location names in maps are from the wartime period of 1941-45.

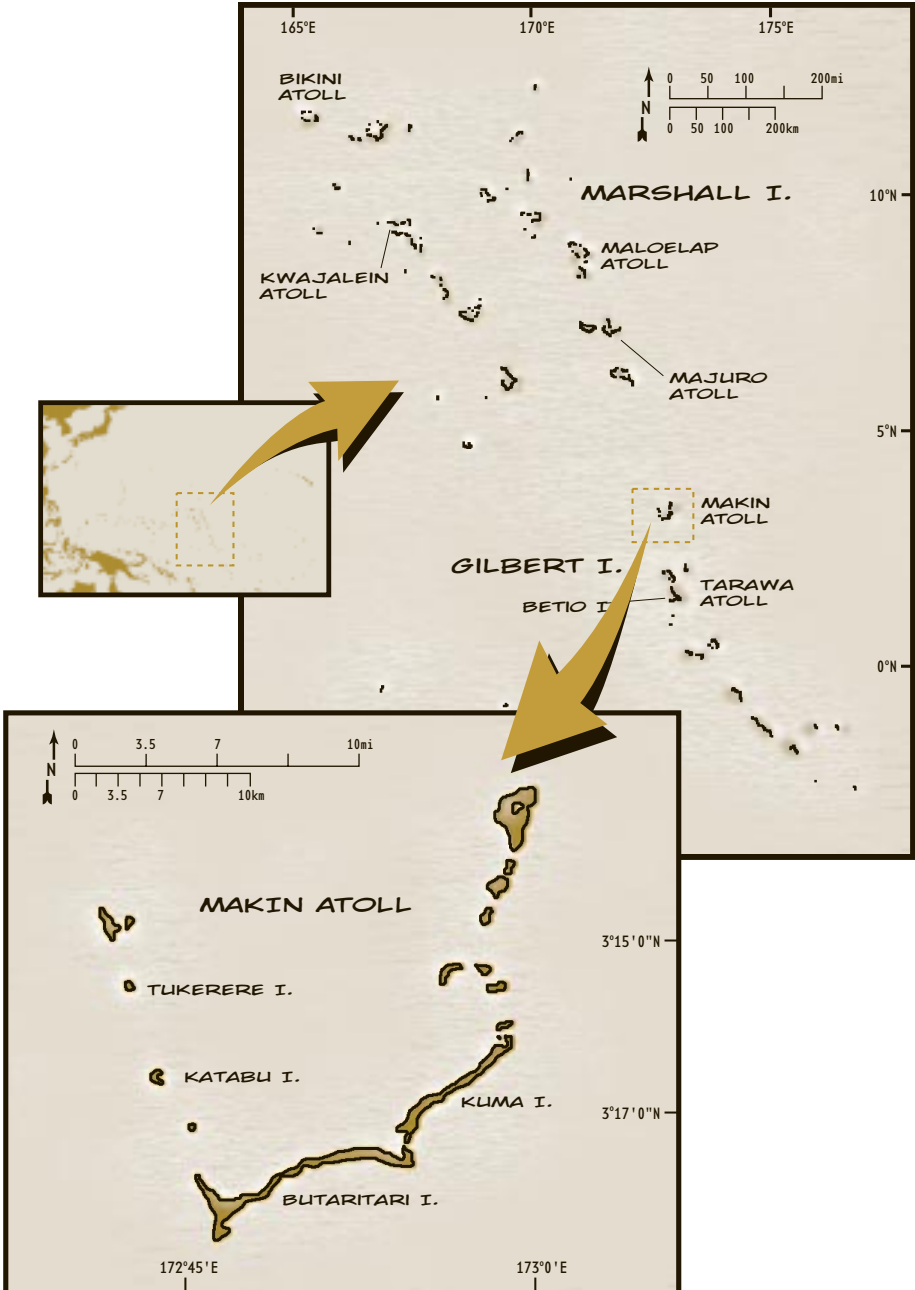


*Babelthup airfield in the Palau Islands, 10/23/44. Bypassed by U.S. forces, Japanese personnel scratched "Welcome Yankee" into the airfield; American bombers cratered the airfield, leaving the sentiment intact. (Naval Historical Center)*

## Wake Island (December 9 1941)

On December 8 1941, the day after the air attack on Pearl Harbor, the Japanese struck at Wake Island, the westernmost American base in the Pacific. Its small contingent of Marines manned shore batteries while pilots of Marine squadron VMF-211 rose to meet the attackers. They flew in Grumman F4F Wildcat fighters just delivered to Wake by one of the American aircraft carriers the Japanese had hoped to destroy at Pearl Harbor. The Americans held the invading Japanese at bay for four days, but the main event couldn't be postponed for long. By December 22 the Japanese had destroyed all of VMF-211's remaining aircraft, and the few aviators and flight crew left on Wake became

infantrymen. On December 23 a strengthened Japanese task force, supplemented by carriers fresh from the attack on Pearl Harbor, overwhelmed the garrison and occupied Wake.



### ***Counterattack in the Marshall and Gilbert Islands (February 1 1942)***

At this early stage in the war the Japanese Navy, led by the brilliant Admiral Yamamoto, was dominant, and Allied plans for grand operations had to wait. U.S. forces could manage only hit-and-run tactics and diversionary raids against Japanese targets of opportunity. As the Japanese Army and Navy hurried to strengthen their newly occupied territory, Admiral Nimitz authorized attacks against bases where the Japanese might be most overextended, at the eastern edge of their defense perimeter.

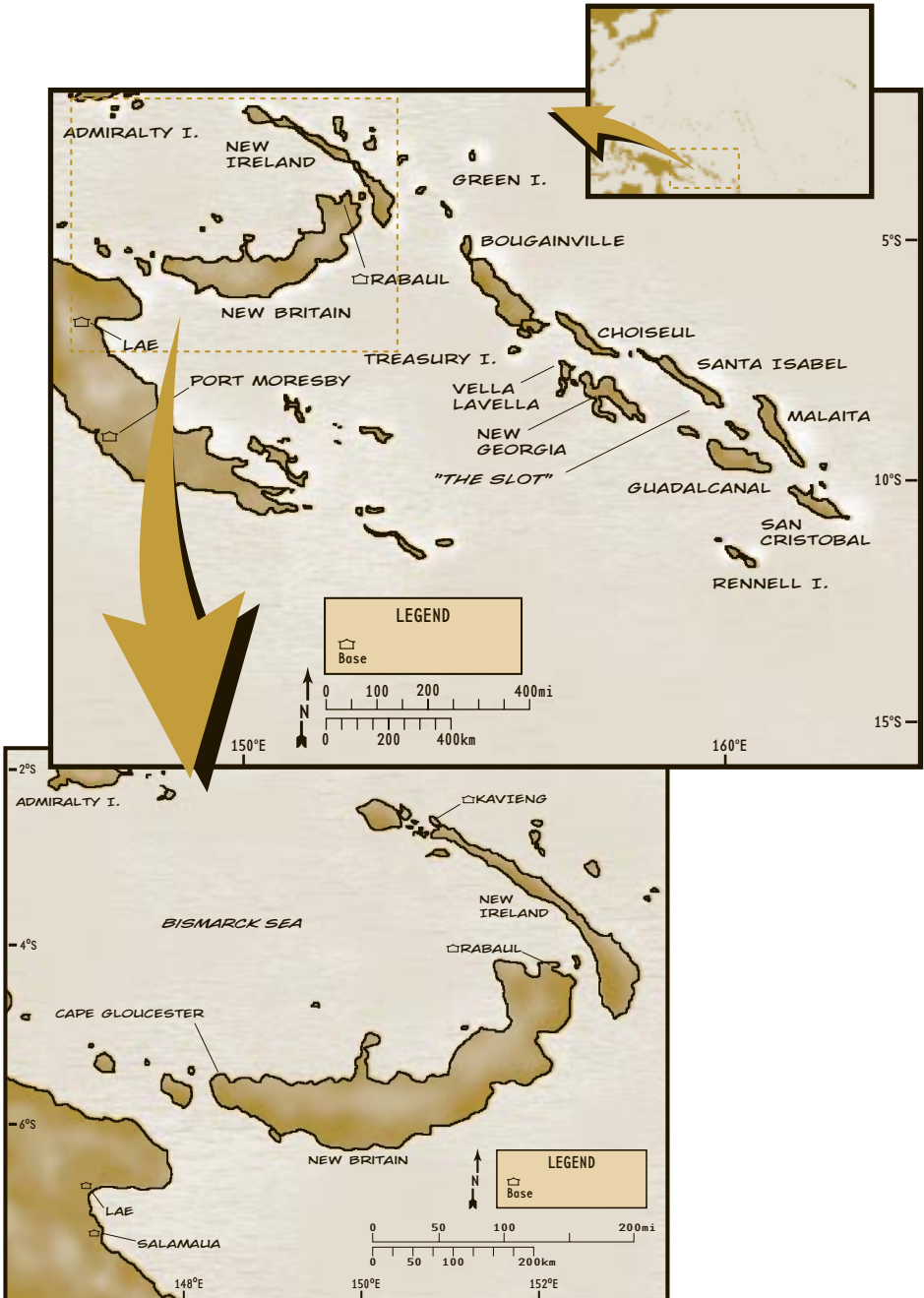
On February 1 1942 Admirals Halsey and Fletcher, aboard the carriers *Enterprise* and *Yorktown*, led task forces on the first American carrier offensive of the war, launching raids on Japanese installations in the Marshall and Gilbert islands.

Targets included Wotje, Kwajalein, Jaluit, Makin, and Mili. Aircraft from the *Enterprise* were especially successful, doing serious damage to Japanese ships and port installations on Maloelap Atoll in the Marshalls. On the same day, the *Yorktown* launched less productive strikes against Japanese targets at Makin Atoll in the Gilberts.

These early efforts helped bolster American morale, but it took three months for the U.S. to strike significantly harder blows, and almost three years before the Americans returned to the Gilberts and Marshalls in force.



USS Yorktown, damaged at the Battle of Midway. (National Archives)



## **Approaching Rabaul (February 20 1942)**

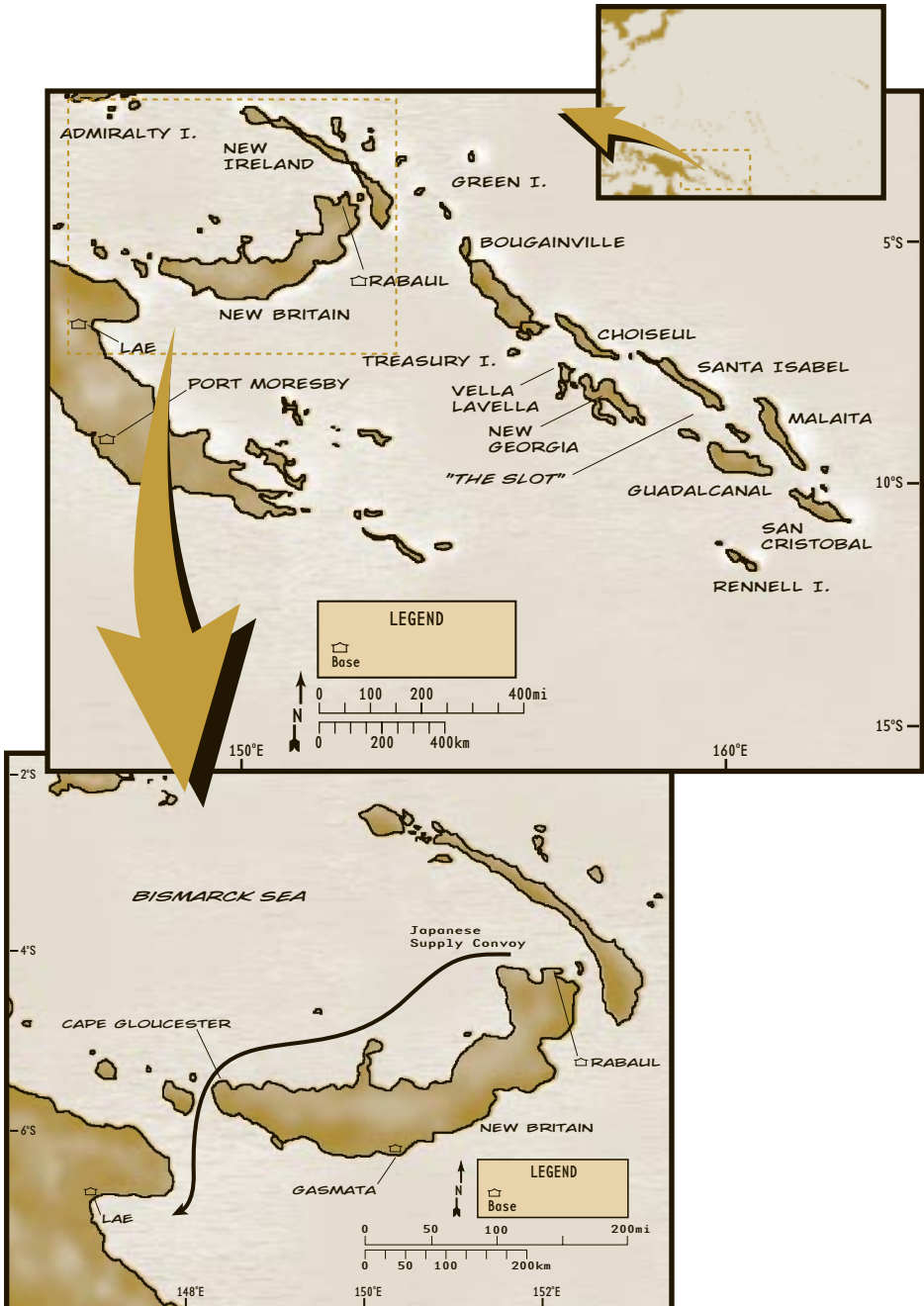
The Japanese took Rabaul in New Guinea in early February and were turning it into the biggest and most formidable air and naval base in the southeast Pacific. The U.S. *Lexington* task force was determined to take Rabaul, but found it impossible to approach, let alone take.

The Japanese attacked the *Lexington* task force with waves of land-based G4M “Betty” bombers. Wildcat pilots took on the first wave and shot down two of the bombers before noon. Five hours later, nine more bombers bored in toward the fleet, but Wildcats intercepted and shot down four attackers. The rest headed for home. While most of the F4F pilots chased and caught the fleeing Bettys, two Wildcat pilots intercepted another attack by nine more bombers. One of the American pilots, Lt. Edward “Butch” O’Hare, became the U.S. Navy’s first Ace when he shot down five of the attackers. (To learn more about O’Hare, see Chapter 10, **Hall of Fame**.)

### **RABAUL: NATURAL BEAUTY—AND DEADLY ANTIAIRCRAFT ACCURACY**

***“(MAY 22, 1944) RABAUL LIES ON THE EDGE OF A BEAUTIFUL VOLCANIC HARBOR. THE CITY DOES NOT SHOW THE EFFECTS OF BOMBARDMENT FROM A DISTANCE, AND IT IS HARD TO REALIZE THAT A PLACE OF SUCH NATURAL BEAUTY IS THE SCENE OF SUCH DESTRUCTION AND DEATH. AS ONE FIRST APPROACHES IT LOOKS TRANQUIL AND HARMLESS... THE JAPANESE ANTIAIRCRAFT GUNNERS AT RABAUL ARE CONSIDERED THE MOST ACCURATE IN THE SOUTH PACIFIC. THEY SHOULD BE; THEY HAVE HAD CONSTANT PRACTICE.”***

***—FROM CHARLES A. LINDBERGH,  
THE WARTIME JOURNALS  
OF CHARLES A. LINDBERGH***





***The New Guinea campaign  
(1942–1945) and the Battle  
of the Bismarck Sea  
(March 2–4 1943)***

The Japanese occupied the island of New Guinea, just north of Australia, and the nearby Bismarck archipelago. This move put them in position to advance on Australia, since the Allies maintained just a toehold at Port Moresby in southeast New Guinea. The Japanese had consolidated their position in the area by fortifying their naval and air base at Rabaul, on the northern end of New Britain in the Bismarck Archipelago.

The first Japanese attempt to take Port Moresby ended with the Battle of the Coral Sea in May 1942. Their next attempt that summer fell short when pilots of the U.S. Fifth Army Air Force attacked Japanese supply lines. Throughout this period Allied fighters based at Port Moresby and Japanese fighters based at Lae crossed the Owen Stanley mountains to batter each other's bases. Bloody fighting on the ground in early 1943 failed to dislodge the Japanese from their positions at Salamaua and Lae in the northeast.

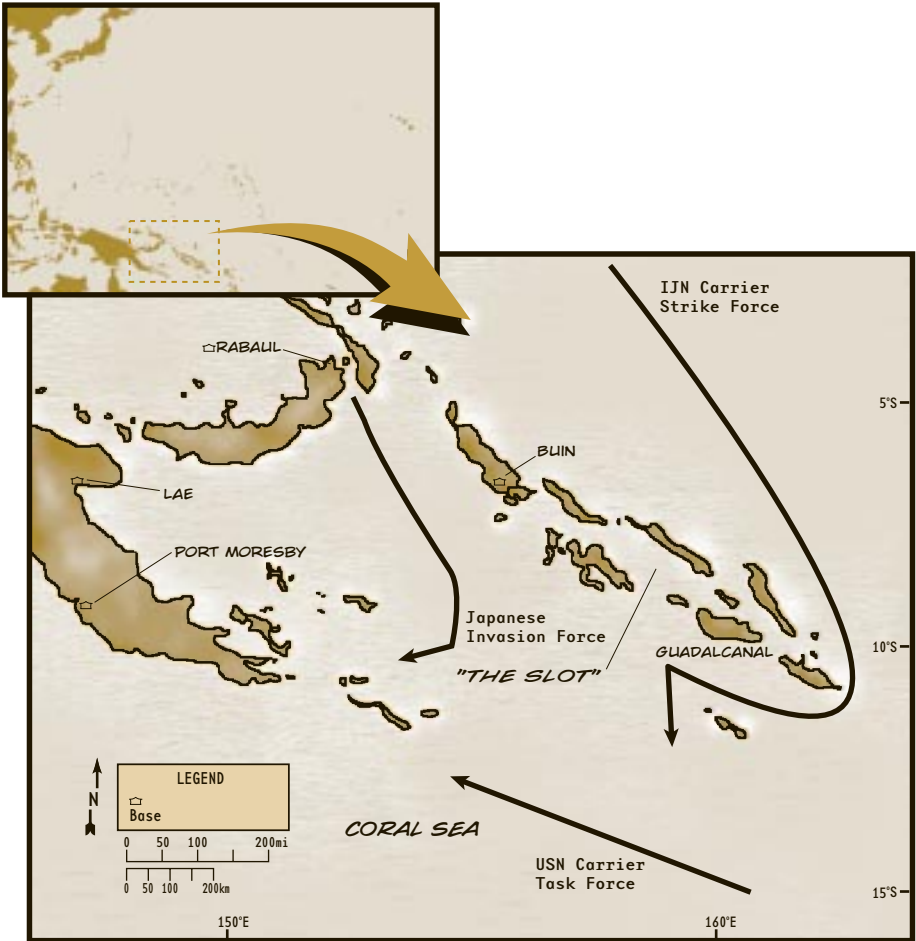
With the loss of Guadalcanal (see section below), the Japanese were intent on holding New Guinea. On February 28 1943 they sent eight transports with 7,000 troops and eight destroyers from Rabaul

to reinforce Salamaua and Lae. On March 2 U.S. Army Air Force bombers intercepted the convoy, sank one transport, and set others ablaze. The next day Australian fighter-bombers joined their American counterparts. This combined force came in low and bombed and strafed the doomed convoy. Japanese fighters covering the convoy could do little to protect their charges. When night descended, PT boats joined the attack.

On March 4 the attacks continued near shore, until all of the transports had to be abandoned. Surviving Japanese infantrymen in lifeboats or in the water headed for the beach, but American and Australian pilots strafed them to thwart a prolonged and vicious fight against enemy soldiers who survived to reinforce New Guinea. When the carnage ended, half the soldiers from the convoy had been killed in the water.

The Japanese fought on in New Guinea, but they never again tried to bring in reinforcements on a similar scale, and they ceased to be a serious threat to Australia.





## ***Battle of the Coral Sea (May 8 1942)***

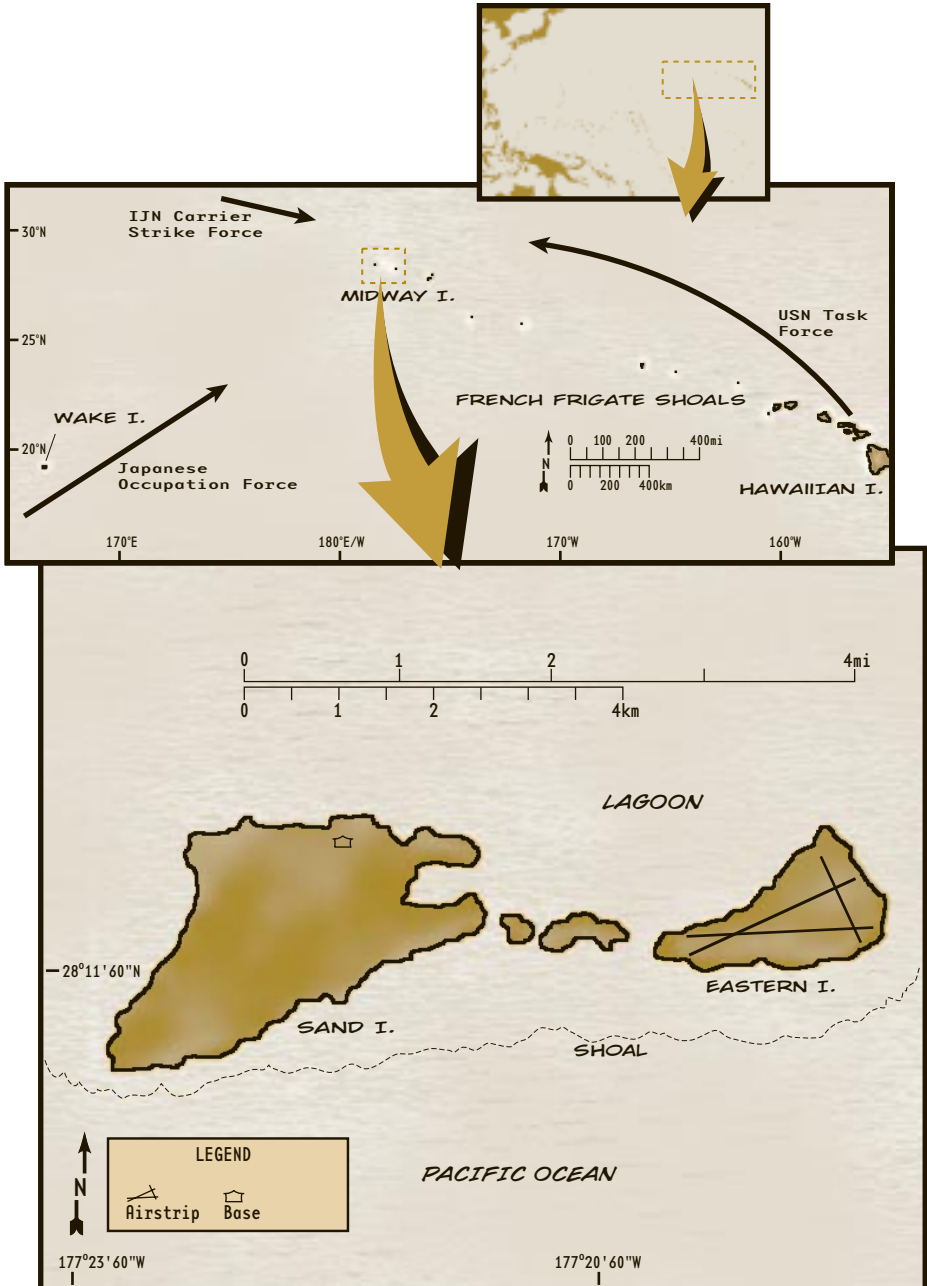
The Coral Sea, located between New Guinea to the north, Australia to the southwest, and the Solomon Islands to the east, provided a path to further Japanese expansion, threatening the Allied bastion in Australia.

The Battle of the Coral Sea, fought from May 4 to May 8 1942, was history's first carrier-against-carrier battle, with opponents 175 miles apart who never saw one another's ships. The stakes were high: if the Japanese succeeded, they could set up air bases on Tulagi in the Solomons and on other islands, and occupy Port Moresby on the southern coast of New Guinea. From these locations they could possibly isolate northern Australia.

For the U.S. this battle represented an opportunity to check Japanese expansion

less than six months after the disaster at Pearl Harbor. Admiral Nimitz, aware of Japanese plans through decryption of the Japanese naval code, dispatched his fleet carriers *Lexington* and *Yorktown* to intercept this invasion.

On May 4 Wildcat fighters from the *Yorktown* attacked Japanese ships at Tulagi. On May 7 aircraft from both American carriers bombed and sank the light carrier *Shoho*. On the 8<sup>th</sup> the opposing forces found each other. The two Japanese fleet carriers—the *Shokaku* and the *Zuikaku*—launched 121 aircraft, while the *Lexington* and the *Yorktown* dispatched 122. In the ensuing battle the *Yorktown* and the *Shokaku* were damaged, and the *Lexington* was set afire and abandoned. This result was a tactical success for the Japanese, but the *Shokaku* and the *Zuikaku* were heavily damaged.



## ***Battle of Midway (June 4 1942)***

Fought just a month after the Battle of the Coral Sea, Midway was the classic carrier battle, in which skill, daring, and luck all played a part. It started with a Japanese attempt to take Midway Island to deny the U.S. its westernmost base in the Pacific.

At dawn on June 4 Japanese carrier aircraft bombed and heavily damaged the base on Midway. U.S. carrier forces had the advantage of knowing, through decryption of Japanese communications, what the enemy was up to.

When the Japanese aircraft returned to their carriers, Admiral Nagumo decided to re-arm them with bombs for a second strike at Midway. They were to attack Admiral Spruance's carrier group, which had at last been detected and was rapidly approaching. With torpedoes and bombs stacked and fuel hoses snaked across their decks, the Japanese carriers made vulnerable and highly volatile targets.

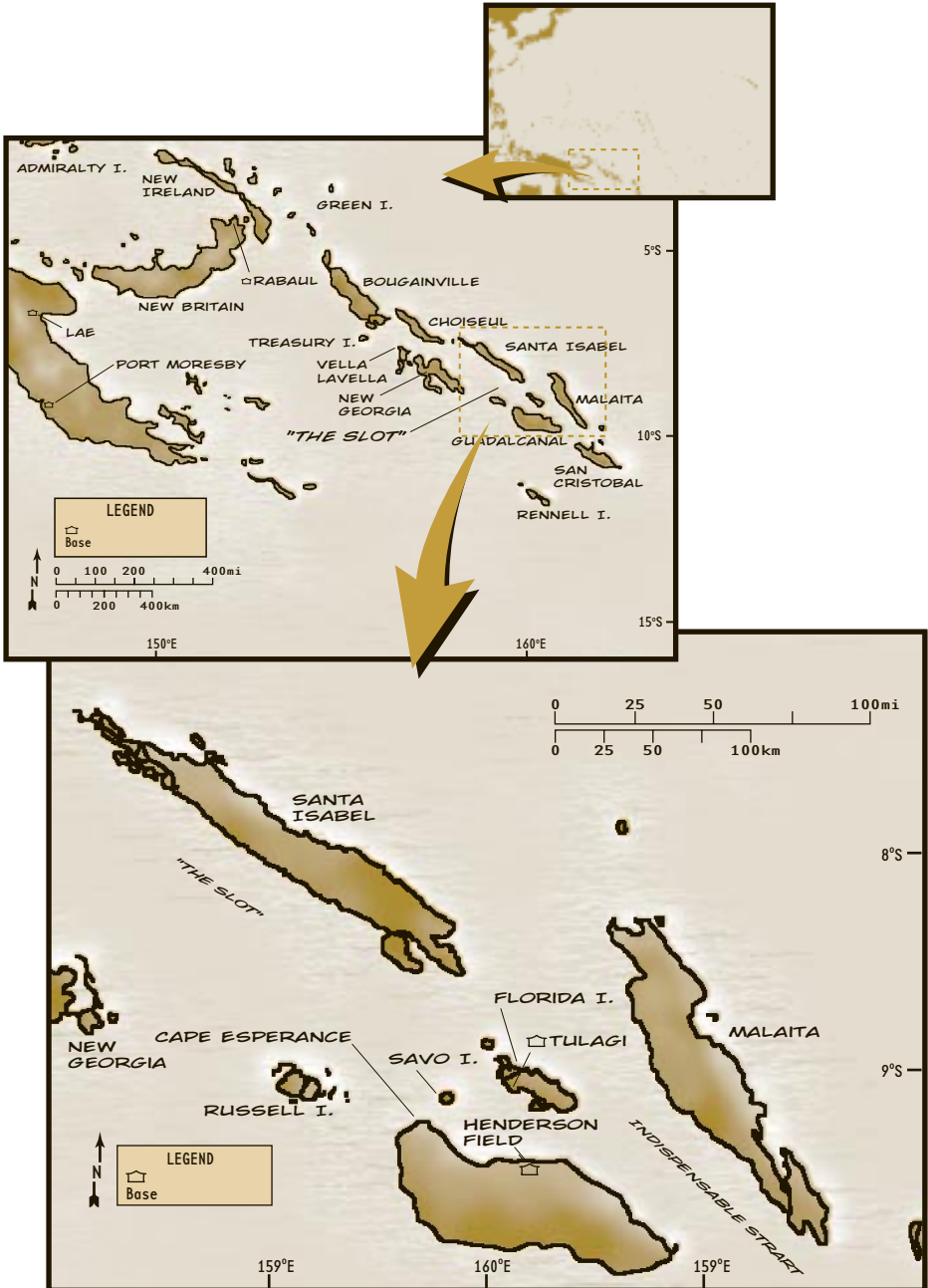
Spruance immediately launched an attack from the carriers *Enterprise* and *Hornet*. Antiaircraft fire and fighters shot down 35 of 41 torpedo bombers, but this action brought the Zeros

down so low that the American dive-bombers could attack almost without opposition. Five minutes later three Japanese carriers—the *Akagi*, the *Kaga*, and the *Soryu*—were ablaze, abandoned, or crippled.

Aircraft from the Japanese carrier *Hiryu* struck the *Yorktown*, which survived this and a second attack, only to be sunk by a Japanese submarine on June 7. Aircraft from the *Enterprise* in turn attacked the *Hiryu* and set her ablaze. Having scored a decisive victory, American forces retired. The loss of four carriers stopped the expansion of the Japanese empire in the Pacific and put Japan on the defensive. It had been six months to the day since the attack on Pearl Harbor, vindicating Admiral Yamamoto in a way he cannot have welcomed. Yamamoto had predicted that Japan could prevail for only six months to a year against the Allies.



*Douglas TBD Devastator torpedo bombers on carrier deck before the Battle of Midway. These outmoded aircraft were decimated by Japanese Zero fighters. (National Archives)*



## **Guadalcanal campaign (August 7 1942–February 21 1943)**

From August 1942 to February 1943 Guadalcanal in the Solomons was the scene of the first major confrontation between American and Japanese land forces. The Japanese had started to construct a forward airfield there, because Guadalcanal was the door to southern expansion—and to Australia.

On August 7 the 19,000 men of the 1st U.S. Marine Division landed on Guadalcanal (codenamed CACTUS), and prepared to repel any Japanese attempt to retake the island. The Japanese reacted quickly, defeating a U.S. Navy screening force near Savo Island on August 9. Under this threat, the Navy withdrew its carriers, leaving the U.S. force on Guadalcanal short of supplies and spares.

Within two weeks fighters and torpedo bombers of the 23rd Marine Air Group began to operate from the captured Japanese airstrip, renamed Henderson Field. They become the nucleus of what

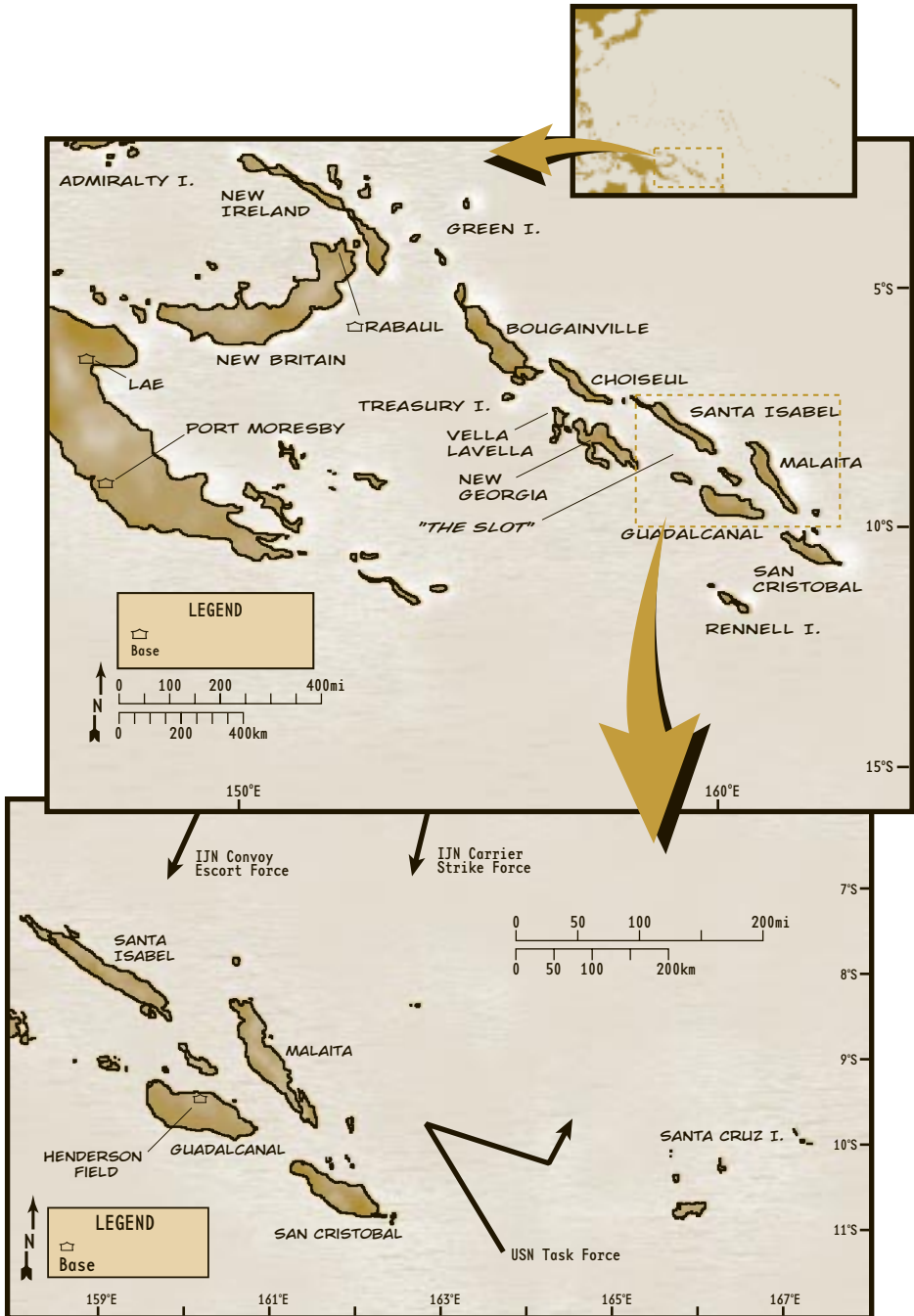
would be called the “Cactus Air Force”; planes and pilots from American carriers sunk or damaged over the next several months swelled its ranks.

Meanwhile the Japanese landed large numbers of troops and engaged in a long series of battles, many of them centered on Henderson Field. Japanese warships intermittently shelled the airfield, but the Americans gradually widened their perimeter around it. When the Japanese attempted to land a fresh infantry division, the Americans gained the advantage in a fierce naval battle on November 12–13. The Cactus Air Force devastated the Japanese fleet and its troop transports.

By the beginning of 1943, with fresh reinforcements, U.S. forces on Guadalcanal enjoyed increasing superiority, while the Japanese forces dwindled without adequate reinforcements and supplies. At the end of January Japan quietly withdrew its forces from Guadalcanal, its southern expansion stopped for once and for all.

***"...DURING THE GUADALCANAL CAMPAIGN CACTUS HAD TWO SIMPLE JOBS: TO MAKE THINGS HOT FOR JAPANESE SURFACE SHIPS... AND TO SHOOT DOWN JAPANESE BOMBERS. IF THE BOMBERS WERE SHOT DOWN ... CACTUS WOULD SURVIVE. IF CACTUS SURVIVED, THE JAPANESE TROOPSHIPS WERE NOT SAFE NEAR GUADALCANAL AND THE JAPANESE ARMY HAD TO RELY ON PITIFUL REPLACEMENTS AND SUPPLIES DELIVERED ON INFERIOR VESSELS LIKE CONVERTED ... BARGES. EVERYONE WITHIN A THOUSAND MILES OF GUADALCANAL UNDERSTOOD THE EQUATION, AND SUCH KNOWLEDGE EXPLAINED THE FIERCE FIGHT FOR THE FIELD."***

***—FROM ERIC M. BERGERUD, FIRE IN THE SKY***



## ***Battle of the Eastern Solomons (August 23–25 1942)***

By August 1942 the Americans had consolidated their toehold on Guadalcanal in the Solomons. The Cactus Air Force based at Henderson Field and supported by the U.S. Pacific Fleet made it dangerous for Japanese convoys steaming down “the Slot”—the preferred route for Japanese transports—to approach Guadalcanal with supplies or reinforcements. The presence of the American Fleet made it nearly impossible.

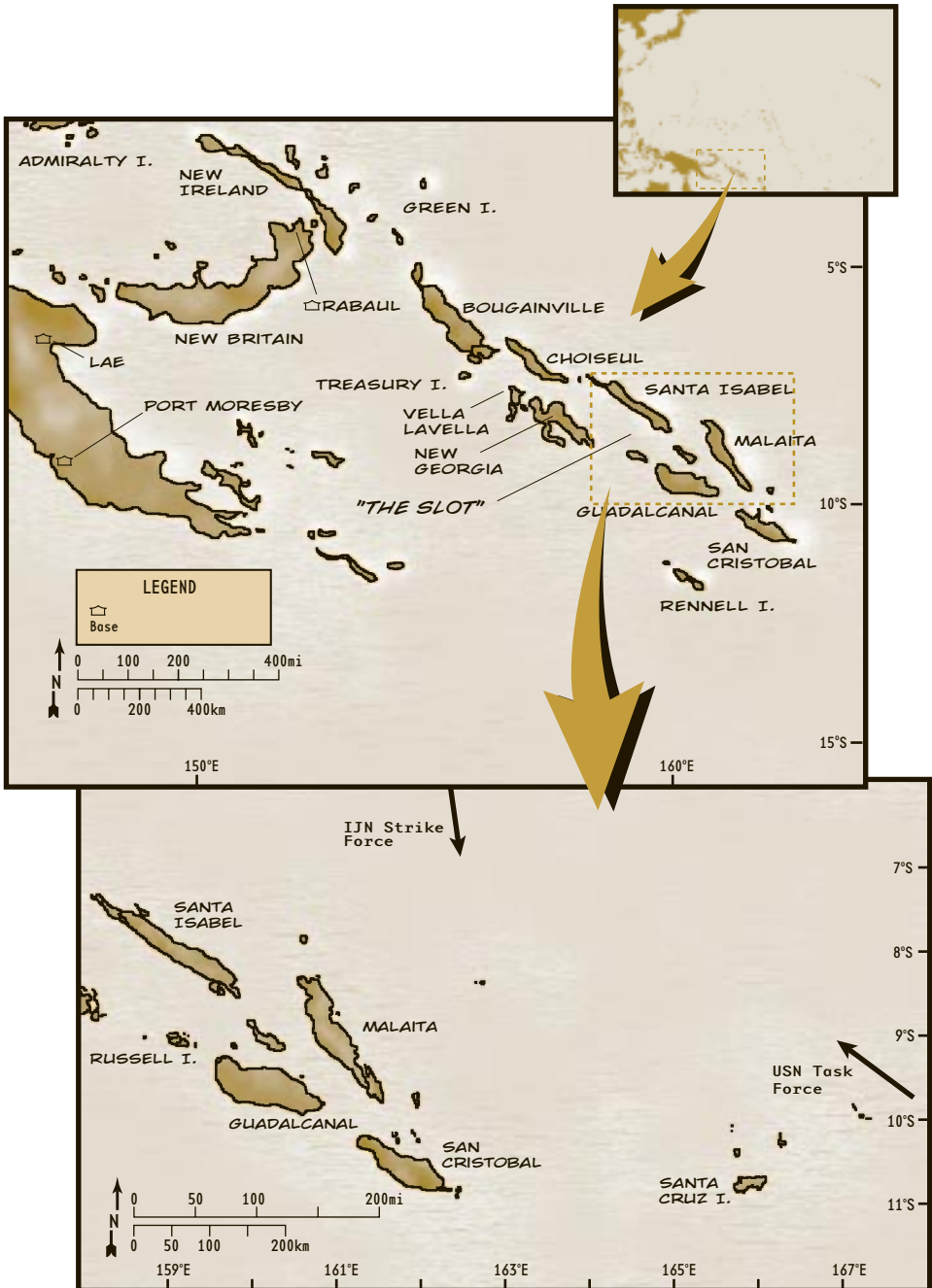
The Japanese launched the Second Battle of the Solomon Sea (which Americans called the Battle of the Eastern Solomons) to remove the twin threats of U.S. naval and air power in the area. Having fought the battles of the Coral Sea and Midway a few months earlier, both sides were wary. Admiral Yamamoto sortied a powerful fleet and convoy escort from bases at Truk and Rabaul, but he divided his force, sending the light carrier *Ryujo* and her aircraft to harass Henderson Field and to protect a reinforcement convoy headed through the Slot toward Guadalcanal. The rest of the Japanese force, with the heavy carriers *Shokaku* and *Zuikaku*, more than

50 ships, and 150 aircraft, headed southeast to intercept the U.S. Pacific Fleet’s carriers *Saratoga* and *Enterprise*, about 30 additional ships and 176 aircraft.

The opposing forces groped toward each other on the 23rd, but despite sightings by scout aircraft, failed to make contact. On the next day the *Ryujo*, which had launched an air strike against Henderson Field, was sighted by aircraft from the *Enterprise*, and soon became the target of bombs and torpedoes. Aircraft from the Japanese heavy carriers soon found their American counterparts, and inflicted heavy but not terminal damage on the *Enterprise*.

With both sides bloodied, the main body of the Japanese fleet retired to the North, leaving the convoy to its own devices. On the 25th U.S. aircraft attacked the hapless convoy, sinking one transport and a destroyer, and damaging other escorts. The surviving convoy vessels abandoned their mission. Yamamoto soon dispatched a convoy of smaller, faster ships to reinforce Guadalcanal, but the inconclusive Battle of the Eastern Solomons, marked by caution on both sides, was over.





## ***Battle of Santa Cruz Islands (October 26 1942)***

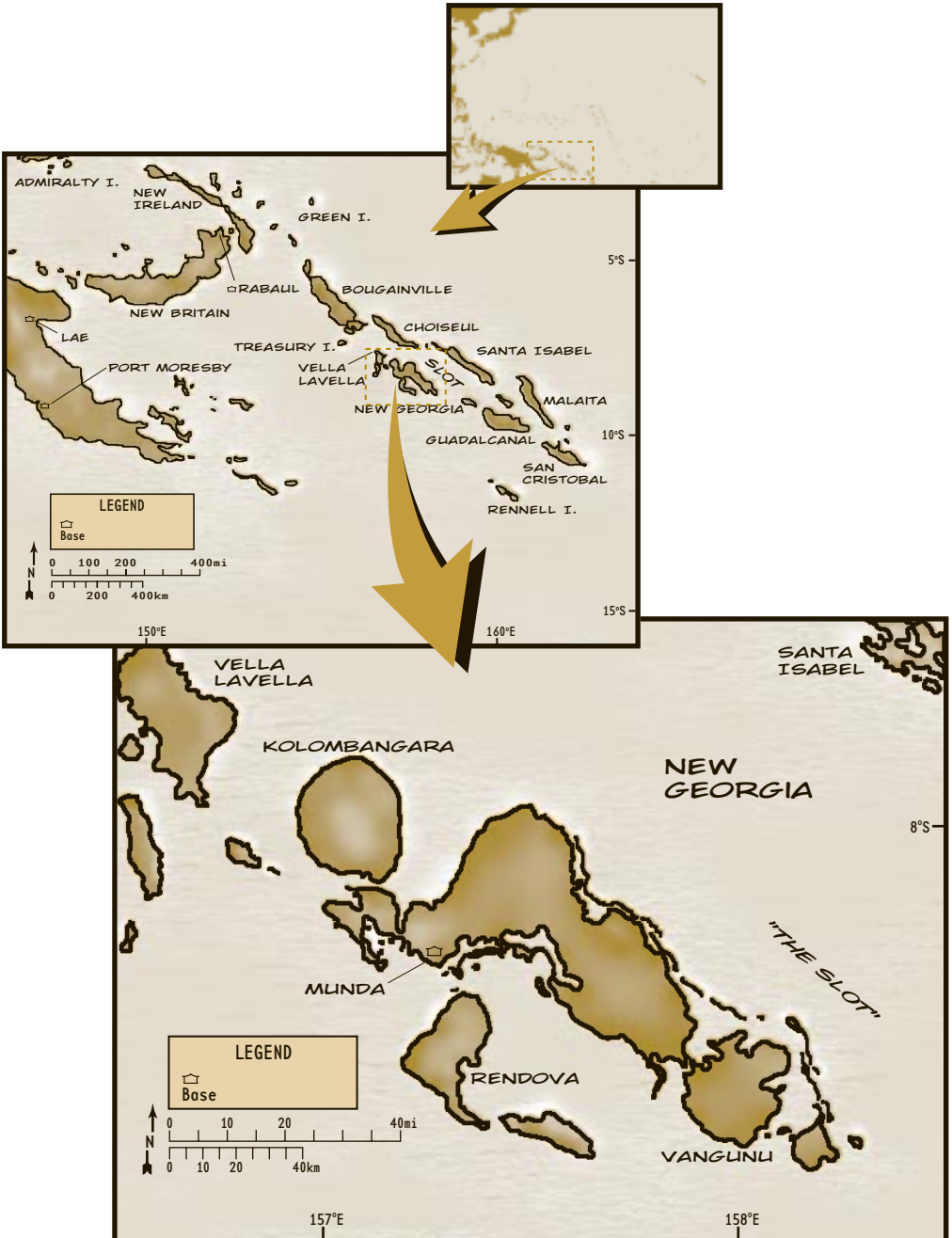
In this carrier battle, the U.S. paid a heavy price for a strategic advantage. After a Japanese scout plane spotted the *Hornet*, Admiral Kondo launched nearly 70 aircraft from his three carriers, *Shokaku*, *Zuikaku*, and *Zuiho*. Soon the *Hornet* and the *Enterprise* launched 61 of their aircraft, and the two air groups passed within sight of each other in the air on the way toward their targets.

The Japanese dive- and torpedo-bombers pounded the *Hornet* relentlessly. Twenty-seven Japanese aircraft rained bombs and torpedoes on her, leaving her burning and helplessly adrift.

Meanwhile, a team of search aircraft from the *Enterprise* found the *Zuiho* and scored a hit on her flight deck that put the Japanese carrier out of action, and the *Hornet's* air group soon took its revenge, inflicting bomb damage on the *Shokaku* that would keep her out of action until the following summer.

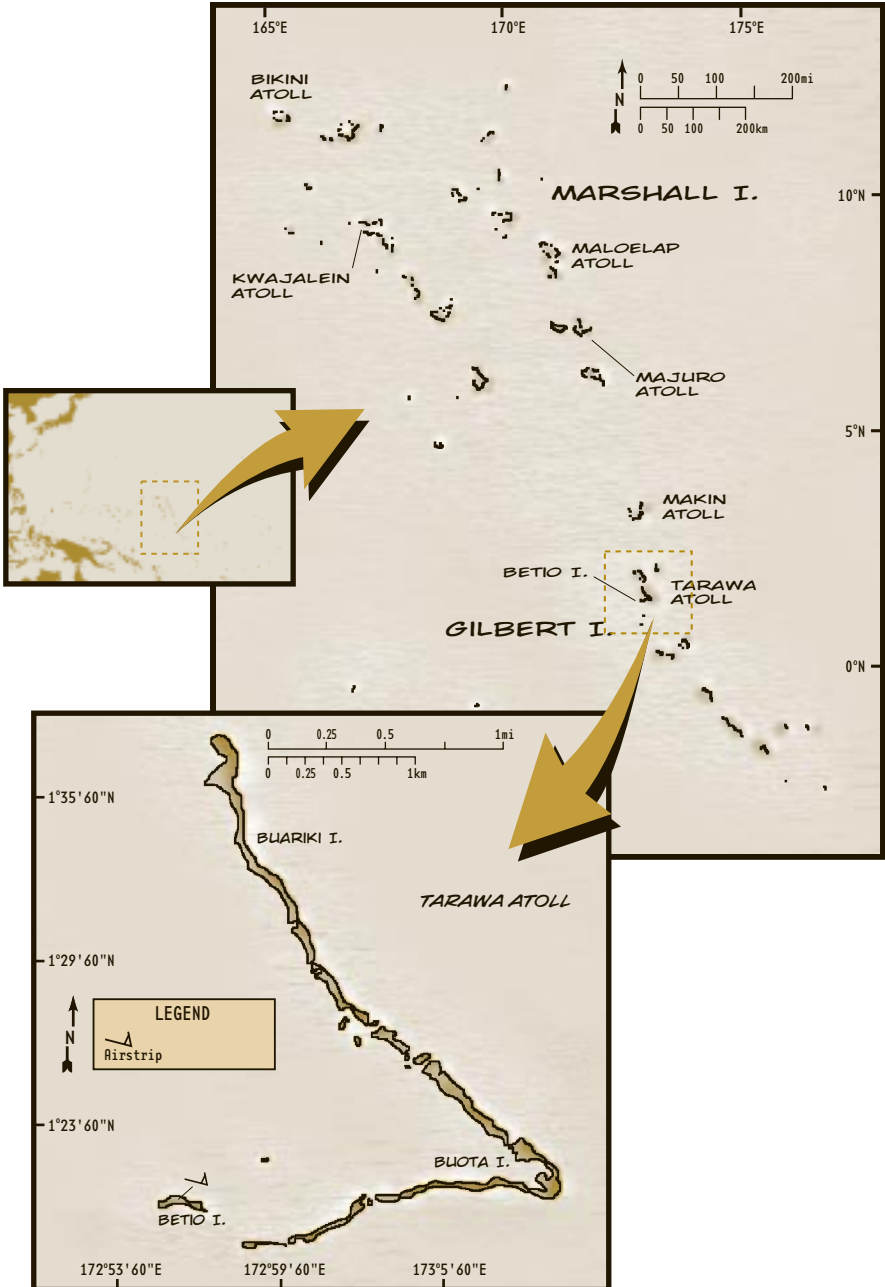
At this point the *Zuikaku* and the light carrier the *Junyo* launched aircraft against the *Enterprise* and the crippled *Hornet*.

They scored three bomb hits on the big American carrier, which escaped without major damage, but scored three more hits on the *Hornet*, then in tow. She had to be abandoned, and Japanese destroyers finished her off. The *Enterprise* recovered what aircraft she could, but many American pilots ended this eventful day by ditching for lack of fuel.



***The Fight for Munda in the  
Central Solomons  
(January–June 1943)***

The first Allied offensive in the Solomon Islands focused on the Japanese airfield at Munda on New Georgia. Control of the Munda airfield meant control of the air over the central Solomons. If the Japanese could hold it, they would stall the U.S. offensive. If the Americans could take Munda or make it too hot for the Japanese to stay there, they could drive the enemy north to Bougainville. It took a six-month series of raids by USN and Cactus Air Force planes to weaken Japanese air opposition at Munda. It took months more, and hard fighting on the ground, for the U.S. to secure control of the Solomons.



## ***Gilbert Islands (November 18–23 1943)***

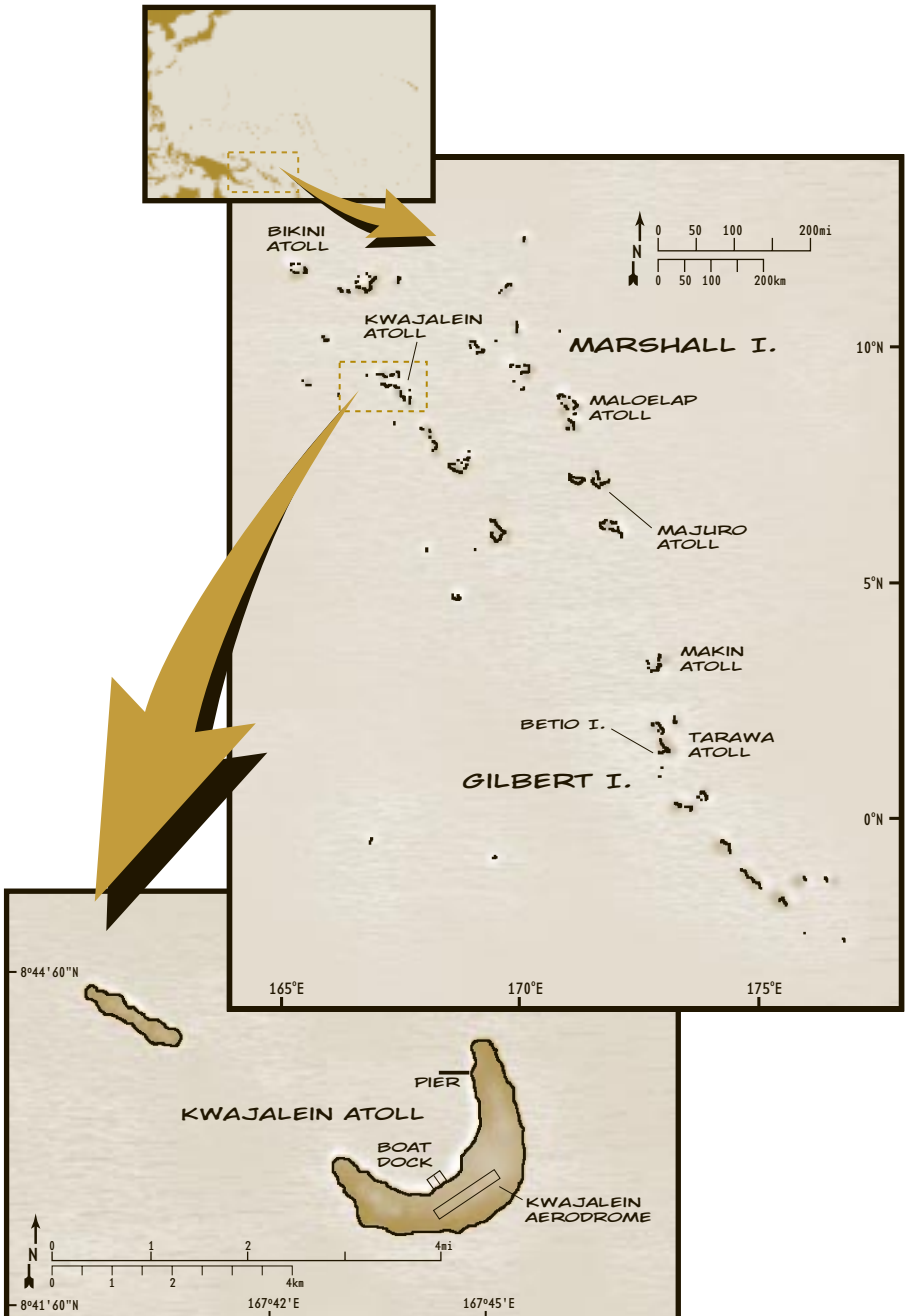
Japan occupied the Gilbert Islands, located between the Solomons to the south and the Marshalls to the north.

As long as the Japanese held the Gilberts, their aircraft could harass Allied shipping headed for Australia. The Allies needed to protect the sea route. They also needed to take the Gilberts to keep up the momentum of their island-hopping drive across the central Pacific, with the long-term goal of getting into range of the Japanese home islands.

The Japanese had fortified the Gilberts, including Makin and Apamama islands, but they made the tiny atoll of Tarawa, and Betio, its even tinier main island, the biggest obstacle. Packed onto Betio's 2.5-mile length, 4,500 well-armed troops were dug in, ready to repel any assault. On November 18–19 American airpower flying from six heavy and five light carriers hammered airfields and facilities on the Gilberts. On November 20 U.S. warships bombarded Betio, then the Marines headed toward the beach in their landing craft, covered by fighters from the carriers. Some never made it to shore,

stuck on reefs and riddled with enemy fire. For three days the fight on the ground raged, with American fighters flying close support, vectored onto targets by radiomen on the ground.

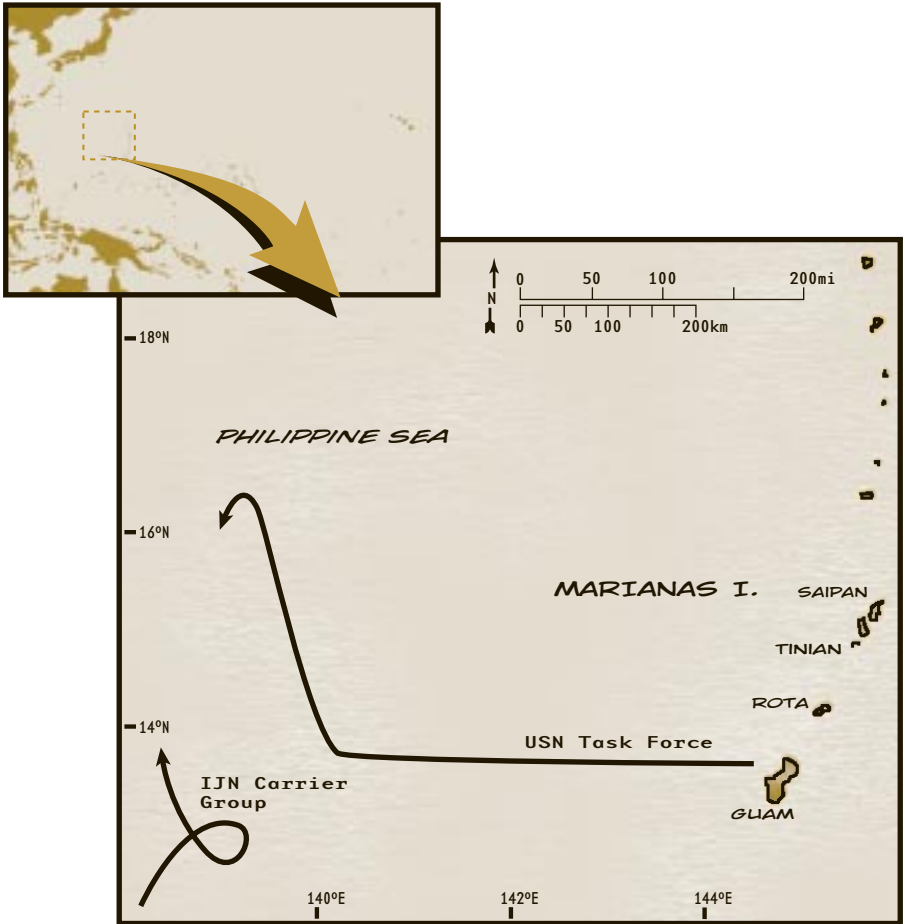
By November 23 Betio had fallen, but the price for this patch of real estate was high: most of the Japanese garrison died in the battle, and American troops suffered heavily as well, with more than a thousand killed, and more than two thousand wounded. The toughness of Tarawa was a rude shock to the U.S., and the Japanese provided more hard lessons in the school of amphibious warfare as the war moved across the Pacific.



## ***Marshall Islands (January 29–31 1944)***

The Marshall Islands, north of the Gilberts, was the next bastion on the Japanese defense perimeter, and the next stepping stone in the American push toward Japan. Kwajalein atoll, with its naval base and airbase, was the primary target of the invasion. Three days of naval bombardment and concentrated air attacks by U.S. Navy fighters paved the way for the American landing, and continuous close air support ensured its success. By January 31 all 83 aircraft of the Japanese air garrison based at Roi Airdrome had been damaged or destroyed, and the Marshalls fell into American hands. With the Marshalls taken, the Japanese naval base at Truk in the Carolines came under increasing threat and was soon abandoned. Japan's shrinking perimeter made the Mariana Islands, 1,200 miles closer to Japan, vulnerable to invasion.





## ***Battle of the Philippine Sea (June 19–21 1944)***

When American forces entered the Philippine Sea on their approach to the Marianas, the Japanese were ready with a plan (called A-GO) to use their submarines, carrier aircraft, and land-based bombers in the Marianas to destroy the U.S. fleet. The idea was to lure the unsuspecting Americans into a trap, but the U.S. had already intercepted and decoded the A-GO plan, and had destroyed the land-based aircraft it depended on. Instead of sailing into a trap, Vice-Admiral Marc Mitscher waited for Vice-Admiral Jisaburo Ozawa's First Mobile Fleet to approach his own Task Force 58.

When Ozawa launched his first strike, the Americans quickly detected it and launched a cloud of Hellcats that ripped into the Japanese air flotilla before most of it could get close. At this point in the war, most remaining Japanese fighter pilots had little training and less experience, and the result was a debacle, a fight so uneven that American pilots soon uncharitably dubbed it "The Great Marianas Turkey Shoot." Two-thirds of the aircraft in the first wave were shot

down by American fighters or antiaircraft fire. Nearly 100 more Japanese fighters in the second wave were shot down. Ozawa launched two more strikes near Guam and lost still more fighters. In a single day the Japanese lost at least 350 planes while destroying less than 30 enemy aircraft. U.S. submarines compounded the disaster by sinking two Japanese carriers, the *Shokaku* and Ozawa's flagship, the *Taiho*. At the same time, American carrier aircraft attacked airfields and other targets in the Marianas. The next day a massive U.S. strike caught the retreating Japanese fleet, destroyed the bulk of Ozawa's remaining aircraft, and sank another carrier. Ozawa retired with the remnant of his fleet, but the Japanese carrier air arm was finished as a fighting force.

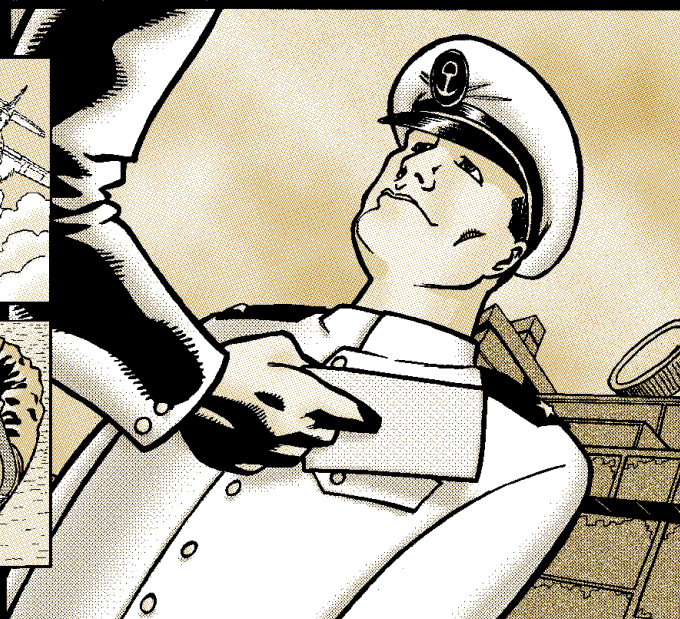
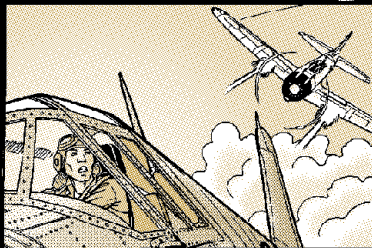
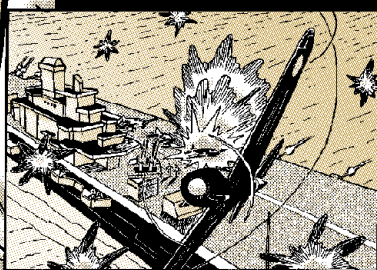
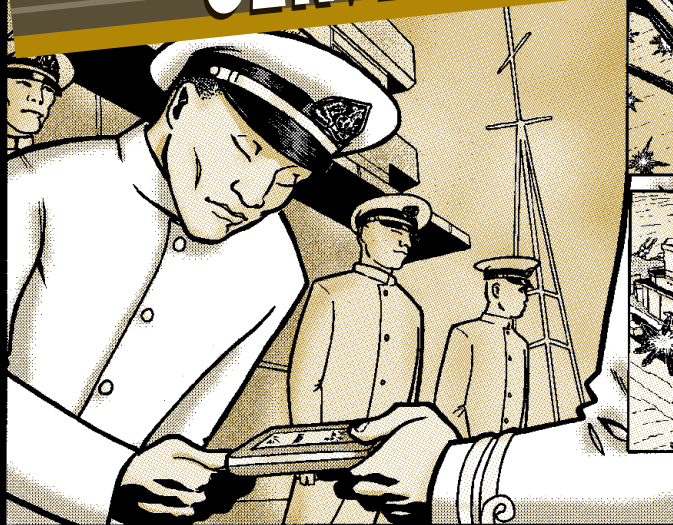


*USS Shaw explodes during the Japanese attack on Pearl Harbor.  
(National Archives)*

# FOR EXCEPTIONAL SERVICE...

9

CHAPTER



*THERE ARE SEVERAL WAYS WE AWARD PILOTS FOR THEIR ACHIEVEMENTS IN COMBAT. BEYOND THE BENEFITS OF A SOLDIER'S HONOR AND THE GROWING COURAGE YOU WILL EXPERIENCE AS A SURVIVOR OF THESE BATTLES, THERE ARE TANGIBLE REWARDS YOUR COUNTRY WILL BESTOW TO EXPRESS ITS GRATITUDE.*

*IN THIS CHAPTER*

- *THE REWARD SYSTEM*
- *MEDALS, PROMOTIONS, AWARDS*

## **THE REWARD SYSTEM**

Medals, promotions, and awards are awarded only in campaigns. You may experience all kinds of danger and exhilaration in Single Missions and Quick Combat, but if you want to be a decorated soldier, you have to commit to a campaign.

**Medals** are awarded for aircraft kill tallies.

**Promotions in Rank** are awarded for consistently completing mission goals.

**Additional awards** are given when a pilot performs exceptionally in a mission. For example, if you were to shoot down an entire enemy squadron, or complete all

of your mission goals without taking any losses, there may well be a special commendation waiting for you after you land.

Nothing you do in your career as a fighter pilot will be forgotten. Of course, the high honors that may be bestowed on you will be accompanied by greater combat responsibilities. Once you have proven yourself capable, more difficult tasks will be assigned to you in the course of future missions.

PROMOTIONS, MEDALS,  
AND AWARDS

Promotions

Promotions are dispensed for achieving mission goals consistently. Pilots are evaluated for promotion after every mission. If your total number of mission goals achieved at that point exceeds the

promotion threshold, you will receive the next promotion.

**Note:** Some campaigns may have different promotion requirements than others, but use the table below for a general rule of thumb.

The ranks, by service, are as follows:

Achievements	Japan	United States
Rank at start of game	Ensign ( <i>Sho-i</i> )	Ensign
At least four mission goals	Lt. JG ( <i>Chu-i</i> )	Lt. JG
At least ten mission goals	Lieutenant ( <i>Tai-i</i> )	Lieutenant
At least fifteen mission goals	Lt. Cmdr. ( <i>Shosa</i> )	Lt. Cmdr.
At least twenty mission goals	Commander ( <i>Chusa</i> )	Cmdr.

Remember: only those pilots involved in very long campaigns are likely to be promoted to the highest ranks.



Through enemy sniper fire a soldier brings water to a fallen buddy in the early moments of the 9/14 landing on Peleliu. (Corbis)



**"THE NAVY ANNOUNCED THE SYSTEM BY WHICH WE WOULD BE RETURNED TO THE STATES. IT INVOLVED AN ELABORATE COUNTING OF POINTS—SO MANY FOR EACH MONTH OVERSEAS, SO MANY FOR EACH MEDAL, SO MANY FOR EACH DEPENDENT. THE JUNIOR OFFICERS IN THE SQUADRON HAD ALL COME TO THE WAR TOGETHER, SO THERE WAS NO COMPETITION THERE. AND WE ALL HAD THE SAME MEDALS, EARNED THE SAME WAY—FIVE STRIKES FOR AN AIR MEDAL, TWENTY FOR A DISTINGUISHED FLYING CROSS...**

**EACH MEDAL WAS WORTH FIVE POINTS IN THE SYSTEM. THE ONLY VARIABLE AMONG US WAS THE NUMBER OF DEPENDENTS. SOME OF US WERE MARRIED AND GOT POINTS FOR THAT. IT SEEMED A GOOD ENOUGH SYSTEM, AND NOBODY COMPLAINED. WE JUST CALCULATED OUR SCORES, FIGURED THE ORDER OF DEPARTURE, AND WAITED."**

**—SAMUEL HYNES, *FLIGHTS OF PASSAGE: REFLECTIONS OF A WORLD WAR II AVIATOR***

## **Awards**

Awards are given to reward a pilot's aggressiveness and flying performance . They are bestowed for one of three general criteria:

- ⊙ Kills in a single mission
- ⊙ Total number of kills
- ⊙ Special events

You can earn up to six awards during your career. You receive each award only once during your career, with the exception of the "wounds" award, which

you can receive multiple times. You will be notified of any award you receive during the Mission Debriefing.

### **What counts as a kill?**

You may wonder if you get credit for destroying enemy aircraft on the ground, or about successful strikes against other targets, like a building, refueling station, hangar, or a ship at sea.



*Combat Flight Simulator advisor Mike Weide (right) receives one of his five Air Medals.  
(U.S. Navy, courtesy of Mike Weide)*

Some guidelines:

- ⊙ Only air-to-air kills of other aircraft count towards medals.
- ⊙ Completing mission goals (which is how you get promoted) can include all kinds of targets, depending on what you read in your Mission Briefing. Shooting up aircraft on the ground may not get you a medal, but it may help you complete your mission.

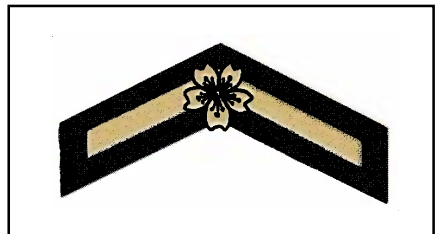
So, if you want to be an Ace, shoot down other airplanes. If you want to be a Commander, complete all of your mission goals faithfully. If you're really good, you'll do both.

### ***Japanese medals and awards***

Here are the medals you can earn flying for Japan, listed from the easiest to most difficult to earn.

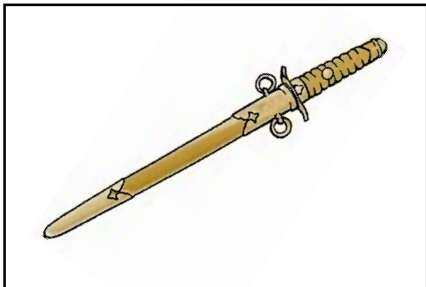
#### **Special Conduct Badge**

This badge is granted to anyone who, as a result of being wounded in action, is entitled to an increase in pension.



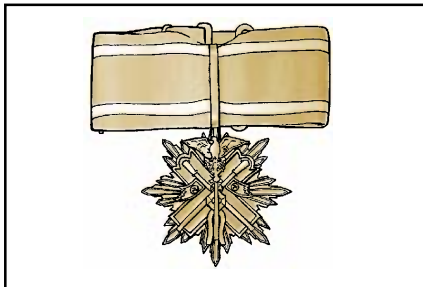
### **Tanken (Dagger)**

This dagger is awarded after your first kill in combat.



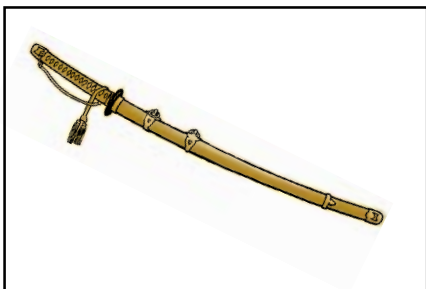
### **The Order of the Golden Kite**

This is given to any individual Japanese pilot who achieves Ace status.



### **Kaiguntou Sword (Navy Sword)**

This sword is awarded to any person who has distinguished himself by meritorious action while participating in airborne action. Multiple aerial kills are necessary to receive this award.



### **The Order of the Rising Sun**

This decoration is not limited to the military, and is awarded to those who have rendered meritorious services for Japan. It is awarded to airborne military personnel for achievements above and beyond Ace status.





**"...WHEN IT COMES TO PERFORMANCE, AIRPLANES AND AUTOMOBILES ARE SIMPLY MACHINES AND THEY CANNOT RUN OR FLY ON THEIR OWN. THE PILOT WHO OPERATES IT BRINGS OUT THE COMBINED COMBAT POTENTIAL OF THESE MACHINES, AND ENABLES THE PERFORMANCE TO BE MEASURED.**

**...THE ABILITIES OF A HUMAN PILOT RANGE FROM THE SUPERB TO THE APPALLING, AND IT ALWAYS ALL DEPENDS ON HOW THE PILOT CAN BRING OUT THE PERFORMANCE OF THE AIRPLANE. THE PILOT WHO IS CAPABLE OF BRINGING OUT THE BEST OF THE AIRPLANE'S PERFORMANCE IS AN EXTREMELY GOOD AND STRONG PILOT."**

*-SABURO SAKAI, CFS2 ADVISOR, PRIVATE INTERVIEW, APRIL 2000*

### **The Order of the Sacred Treasure**

This decoration is awarded for conspicuous service in operations against a foreign country. This order is the highest, most prestigious award a pilot can receive for combat, and includes a lifetime annuity.



*Japanese Premier Hideki Tojo reviewing troops. (Hulton-Getty)*

## **American medals and awards**

Here are the American medals you can earn, listed from the easiest to most difficult to earn.

### **Purple Heart**

The Purple Heart is given to anyone wounded in action while serving in the armed forces. Originally established by George Washington during the Revolutionary War, it fell out of use until it was re-established in 1932.



*American flag is raised on Guam for the first time in two and half years, 6/3/44. (Hulton Getty/Liaison Agency)*

Great Seal of the United States. It is awarded to American officers or enlisted men after their first kill in combat.

### **Air Medal**

This medal is awarded to any person who has distinguished himself by meritorious action while participating in airborne action.

### **Legion of Merit**

This decoration is derived from the Badge for Military Merit, America's oldest military decoration, established by General George Washington in 1782, and resembles the





*Gilbert islands. Crosses mark the burial place of Americans who fell in the invasion of Tarawa 11/20/43. (Corbis)*

### **Letter of Commendation**

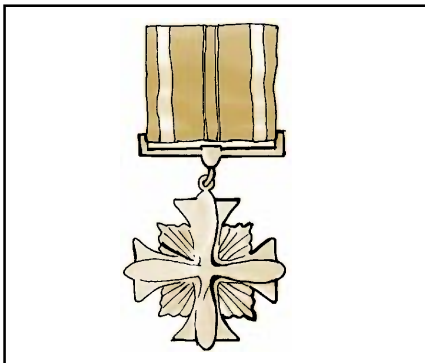
Letters of Commendation are given with all other medals, and are sometimes given on their own when no medal is awarded, such as when a pilot achieves Ace status. They are given for a wide range of accomplishments.

***"BUT EVERYBODY WAS DEDICATED, REAL DEDICATION. I DON'T CARE WHETHER YOU WERE A GROUND POUNDER OR WHAT JOB YOU HAD. THEY ASK, 'HOW DID YOU GET THE CONGRESSIONAL MEDAL OF HONOR,' AND I SAY, 'I WAS JUST SURROUNDED BY GOOD PEOPLE.'"***

***-CFS2 ADVISOR JOE FOSS,  
PRIVATE INTERVIEW, MARCH 2000***

### **Distinguished Flying Cross**

Established in World War I, this medal is awarded to any person who, while serving in any capacity with the Navy Air Forces, has distinguished himself by heroism or extraordinary achievement while participating in an aerial flight. In wartime, it is also awarded to members of allied armed forces.



### **Distinguished Service Cross**

Established in 1918, this medal is awarded to persons who, while serving in any capacity, distinguish themselves by extraordinary heroism in connection with military operations against an armed enemy. This is the highest American honor you can receive in Combat Flight Simulator 2.



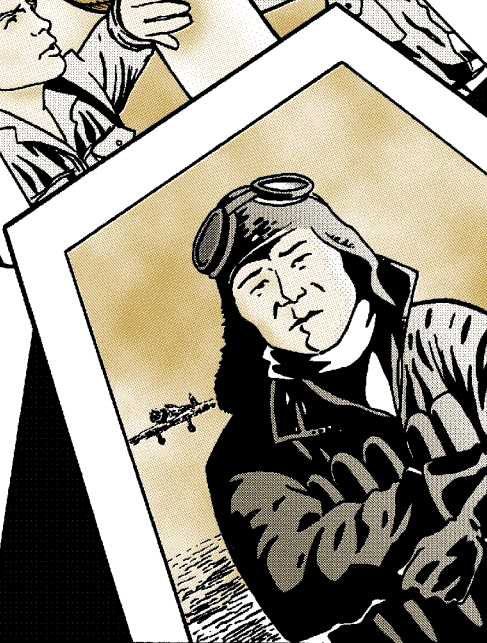
### ***WHY DO JAPANESE AIRCRAFT HAVE AMERICAN NICKNAMES?***

During WWII the Allies devised a series of code names for Japanese aircraft. In many cases they did not initially know the manufacturer and model designation of enemy aircraft appearing in combat, so code names were convenient. And because most American pilots did not understand Japanese, they found Japanese manufacturer names (Kawanishi, Kawasaki, Mitsubishi, Nakajima, etc.) and aircraft model names (*Shiden*, *Hayabusa*, *Hayate*, etc.) confusing. Thus the aircraft code name system evolved, with fighters generally given masculine names (George, Tony, Zeke, Oscar, Frank, etc.), and bombers and other large aircraft given feminine names (Betty, Kate, Dinah, Emily, Mavis, etc.).

10

CHAPTER

# HALL OF FAME





*MANY THOUSANDS OF PILOTS ON BOTH SIDES FOUGHT IN THE PACIFIC, AND A FEW HUNDRED OF THEM ACHIEVED ACE STATUS. WHILE THIS CHAPTER DISCUSSES ONLY A HANDFUL OF PILOTS AND COMMANDERS, IT HONORS ALL OF THOSE WHO FOUGHT FOR THEIR COUNTRY IN THE PACIFIC THEATER.*

## JAPANESE ACES

### **Tetsuzo Iwamoto, 1916–1955 (IJN; ≈ 80 victories)**

Born in 1916, Iwamoto became the top-scoring Japanese Navy Ace in operations against China and in the Pacific war. On December 7 1941 he flew a Zero from the carrier *Zuikaku* to cover the Pearl Harbor strike force. After service at the Coral Sea battle in early 1942 he became an instructor, and then joined the 253rd Air Group on Rabaul in November 1942. In February 1943, he led the group to Truk and flew missions against raiding



*Japanese Ace Tetsuzo Iwamoto.  
(Maru magazine)*

### *IN THIS CHAPTER*

- JAPANESE ACES
- AMERICAN ACES
- KEY PLAYERS OF THE WAR
- SABURO SAKAI, JOE FOSS:  
HISTORICAL ADVISORS

American heavy bombers. In late 1944 he was stationed in the Philippines, and then returned to Japan in early 1945 to participate in Home Defense operations against U.S. B-29s. Iwamoto, who sometimes referred to himself as “Kotetsu” (a renowned swordsmith of the sixteenth century), finished the war training kamikaze pilots for the final defense of Japan.



*Japanese Ace Kaneyoshi Muto.  
(Maru magazine)*

### **Kaneyoshi Muto, 1916–1945 (IJN; ≈ 30 victories)**

Muto's career as a fighter pilot began in China in the 1930s. When the Pacific war began, he flew missions in the Philippines and Dutch East Indies before being sent to Rabaul in November 1942. For a year he flew combat missions over the Solomons and New Guinea. During the latter half of 1944 he was stationed on Iwo Jima, flying to defend against or to attack American naval task forces. In 1945 he was transferred to a home defense unit, flying the advanced Kawanishi *Shiden-kai* fighter. Over Tokyo in mid-February his group (some say it was Muto alone) took on twelve F6Fs, and downed four of them. Muto died in combat over the Bungo Strait on July 24 1945.

### **TOP SECRET– UNITED STATES FLEET, EXCERPT**

A Japanese Army manual outlining suicide procedures recommends that planes take off in the following order: First the guide planes, then the intermediate escort force, the direct escort force, and finally the suicide force. The rendezvous is carried out with the suicide planes as the nucleus over a point near the airfield of departure. If enemy planes are in the area, the [Japanese] force is advised to take off especially rapidly and fly at extremely low altitude to a rendezvous point.

*—Anti-Suicide Action Summary, August 1945, Cominch P-0011,  
Headquarters of the Commander-In-Chief*

***Q. WHAT WAS THE MOST FUN THING ON THE CARRIERS?***

***A. CREW QUARTERS IN THE EVENING.***

***Q. WHAT WAS THE MOST DIFFICULT THING?***

***A. WHEN AIR ENGAGEMENTS WENT AGAINST US AND WE LOST PEOPLE IN THOSE ENGAGEMENTS.***

*—CFS2 ADVISOR SABURO SAKAI, PRIVATE INTERVIEW, APRIL 2000*

### **Shigeo Nango, 1917–1944 (IJA; 15 victories)**

Nango was born in Tokyo and graduated from the Army Military Academy in 1939. His war began in the Dutch East Indies. In July 1943 he was sent to But airfield in New Guinea, where he scored all of his 15 victories over American fighters, flying a Ki-43 *Hayabusa*. On two consecutive days in August he was in dramatic confrontations over Tsili Tsili airbase in New Guinea, first with P-39s, then with P-38s and P-47s. In the first he shot down a C-47 transport, which covered his windshield with oil. Nango was killed in January 1944 by fighters escorting B-24s over Wewak.



*Japanese Army Ace Shigeo Nango.  
(Maru magazine)*



*IJN Ace Hiroyoshi Nishizawa. (Maru magazine)*

### **Hiroyoshi Nishizawa, 1920–1944 (IJN; 86 victories)**

In mid-1942 Nishizawa found himself in the same squadron as Saburo Sakai and Toshio Ota (2nd Squadron, Tainan Air Group), where Sakai helped his new squad-mates to fulfill their potential. Together these three pilots shot down almost 200 enemy aircraft and came to be called “the Cleanup Trio.”

On August 7 1942 Nishizawa had his first tangle with U.S. Navy F4Fs while escorting bombers to Guadalcanal. He claimed six of VF-5’s Wildcats. In 1943 he added P-38s, P-40s, and Corsairs to his list of victories. In the Russells and Solomons



that summer he enjoyed so much success that the Imperial Navy gave him a rare honor: a presentation sword, inscribed "*Buko Batsugun*"—For Conspicuous Military Valor. In the Philippines at Leyte in the autumn of 1944, he downed two Hellcats while flying cover for kamikazes, but near the end of October he died in a transport plane caught by Hellcats over Mindoro.

Of Nishizawa, top Ace Saburo Sakai said, "To all who flew with him he became the Devil. He was unpredictable in the air, a genius, a poet who seemed to make his fighter respond obediently to his gentle, sure touch at the controls. Never have I seen a man with a fighter plane do what Nishizawa would do with his Zero. His aerobatics were all at once breathtaking, brilliant, totally unpredictable, impossible, and heart-stirring to witness."

***"... THE JAPANESE NAVY PLACED TOO MUCH EMPHASIS ON THE WARSHIP. THEY THOUGHT THE NAVIES WOULD FIGHT EACH OTHER BY HUGE WAR VESSELS SO THEY DIDN'T PLACE MUCH EMPHASIS ON THE AIRPLANE. THE AMERICANS HAD A MUCH BETTER PHILOSOPHY—AMERICA PRODUCED MORE AIRCRAFT AND TRAINED MORE, EVENTUALLY CATCHING UP WITH THE JAPANESE. IT WAS FIGHTER AGAINST FIGHTER IN WWI, BUT IN WWII IT WAS GROUP AGAINST GROUP."***

*—CFS2 ADVISOR SABURO SAKAI, PRIVATE INTERVIEW, APRIL 2000*

***"IN CONTESTS OF (TACTICS) IT IS BAD TO BE LED ABOUT BY THE ENEMY. YOU MUST ALWAYS BE ABLE TO LEAD THE ENEMY ABOUT."***

*—MIYAMOTO MUSASHI, SAMURAI AND PHILOSOPHER WHO LIVED FROM 1548–1645*



*IJN Ace Toshio Ota. (Maru magazine)*

"I can think of Nishizawa and Ota only as pilots of genius," said Saburo Sakai. "They did not fly their airplanes, they became a part of the Zero, welded into the fiber of the fighter, an automaton which functioned, it seemed, as a machine capable of intelligent thought. They were among the greatest of all Japanese fliers. ... Both men were devoted solely to their roles as fighter pilots. Everything was subordinated to their fighting function."

### ***Toshio Ota, 1919–1942 (IJN; 34 victories)***

Along with Sakai and Nishizawa, Ota was stationed at Rabaul to fly missions against Guadalcanal. As part of the famous "Cleanup Trio," he racked up 34 victories against U.S. Army and Navy aircraft in the six months from April to October 1942. In August he shot down four Wildcats in a single mission, but died in combat three months later.



*IJN Ace Saburo Sakai. (Maru magazine)*

### **Saburo Sakai, 1916– (IJN; 64 victories)**

The most famous living Japanese veteran of the air war in the Pacific, Saburo Sakai scored his first aerial victory in China in 1938. His first actions when the war began were in the Philippines and Dutch East Indies. Transferred to the base at Rabaul, he flew long-range missions to Guadalcanal before moving on to Lae in New Guinea, where he scored most of his 64 kills. He became the senior pilot in his division and mentored fellow pilots,

including Nishizawa and Ota, who accompanied him on a quirky and audacious mission over Port Moresby (see sidebar, “Airshow Over Port Moresby”). Sakai quickly ran up a string of victories, but over Guadalcanal in August 1942 the backseat gunner in a Dauntless dive-bomber creased his skull. He managed to fly back to base, and was sent home for a lengthy recuperation. After service in the Marianas, in June 1944 he saw action over Iwo Jima, but soon became an instructor as vision problems from his wounds worsened. Author of a memoir titled *Samurai*, Mr. Sakai lives in Japan, and graciously agreed to be interviewed in order to help make the Pacific theater edition of *Combat Flight Simulator* as compelling as possible. (See the “Historical Advisors” section later in this chapter.)

***"I HAVE A SHRINE—I PRAY FOR THE PILOTS.  
THERE ARE MANY WHO SHOULDN'T HAVE DIED SO  
YOUNG. THOSE WHO DIED WERE REWARDED, BUT  
SURVIVORS WERE NOT RECOGNIZED."***

*—CFS2 ADVISOR SABURO SAKAI, PRIVATE INTERVIEW,  
APRIL 2000*

## AIRSHOW OVER PORT MORESBY

"DURING THE JAPAN-CHINA WAR, I WAS ON A BOMBING MISSION WHEN I SAW ONE OF OUR PILOTS LAND ON THE ENEMY'S FIELD BURNING. HE BLEW UP ON THE FIELD. LATER AT RABAU AND LAE, WE WERE FIGHTING EVERY DAY AND I KNEW I WOULDN'T LIVE LONG. I WANTED TO DO SOMETHING BEFORE I DIED... SO WE DECIDED TO DO SOMETHING AS PILOTS-FLY A GREAT, BEAUTIFUL FLIGHT TO DEMONSTRATE OUR SKILLS. THAT WAS OUR PROMISE TO EACH OTHER.

NISHIZAWA AND OTA-I CALLED THEM AND SAID, IF WE HAVE TIME...AND...ENOUGH AMMO AND FUEL, WE CAN FLY AS A TEAM AND PERFORM THESE AEROBATICS. SO WHEN THE REST OF THE FLIGHT TURNED FOR HOME, NISHIZAWA AND OTA JOINED ME ON MY WING AS NUMBER TWO AND NUMBER THREE. I SIGNALLED, 'LET'S START.' AND WE STARTED.

SO WE DID A BEAUTIFUL LOOP OVER THE AMERICAN BASE, BUT NISHIZAWA SIGNALLED THAT OUR ALTITUDE MUST BE MUCH LOWER! SO WE LOWERED OUR ALTITUDE TO LESS THAN 1,000 METERS-700 OR 800 METERS. I SIGNALLED THREE TIMES. SO WE DID A LOOP THREE TIMES. I RAISED MY ARM IN TRIUMPH: 'AH, WE DID IT!' AND WE FLEW BACK. THIS WAS A SECRET BETWEEN THE THREE OF US. BECAUSE WE KNEW WE COULD DIE AT ANY TIME, WE DID WHAT WE WANTED TO DO.

THE NEXT DAY WAS CLOUDY AND A P-40 DOVE FROM THE CLOUDS AND DROPPED A BAG WITH A STREAMER ATTACHED TO IT...WE OPENED IT AND FOUND A NOTE IN ENGLISH. SASAI-SAN CONFRONTED US, READING IT TO US: 'YESTERDAY YOU PERFORMED AEROBATICS OVER OUR BASE AND IT WAS REALLY EXCITING. WE APPLAUDED. NEXT TIME YOU COME WE'LL BE READY TO DOGFIGHT-PLEASE COME WEARING A GREEN MUFFLER-WE'LL BE WAITING FOR YOU, WEARING A GREEN MUFFLER AS WELL.' SASAI READ THIS TO US AND YELLED, 'WHAT IS THE MEANING OF THIS!?' WE APOLOGIZED PROFUSELY. BUT I'M SORRY I NEVER WAS ABLE TO HAVE THAT DOGFIGHT.

AFTER THE WAR, I MET SOME OF THE U.S. SOLDIERS WHO WERE (THERE)-THEY TOLD ME THEY STOPPED FIRING THEIR GUNS AS WE DID OUR MANEUVER, AND STOPPED TO APPLAUD US."

-CFS2 ADVISOR SABURO SAKAI, PRIVATE INTERVIEW, APRIL 2000



*IJN Ace Junichi Sasai. (Maru magazine)*

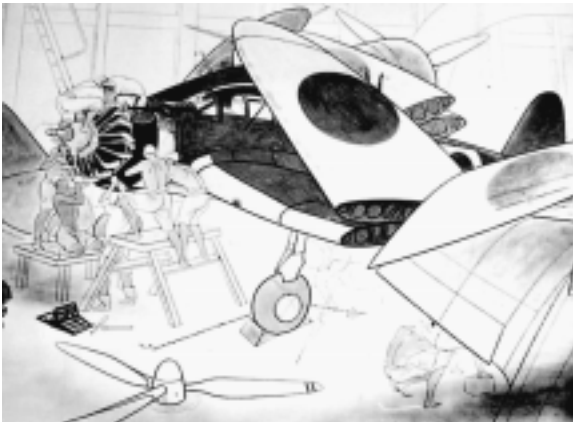
### **Junichi Sasai, 1918–1942 (IJN; 27 victories)**

In a brief four-month career, Sasai ran up an impressive tally of victories and earned the respect of his fellow pilots, who called him “the Richthofen of Rabaul.” He arrived at Rabaul in April 1942. On May 4 he bounced three P-39s and shot all three down within 20 seconds. On August 7, on a mission in which Saburo Sakai was

wounded, he shot down five U.S. fighters. By August 26 he had scored at least 27 victories (making him at the very least the Rickenbacker of Rabaul), but his stellar career ended on that day, when he led eight other Zero pilots to Guadalcanal and engaged 15 F4Fs. He never returned, and it is believed that he met his fate at the hands of USMC Ace Marion Carl.

Said Saburo Sakai in his book, *Samurai!*, “To us [Sasai] became almost legendary. Men who did not hesitate to kill and who lusted for battle wept shamelessly when they witnessed Sasai’s deeds, and pledged eternal loyalty to the young officer...Sasai treated the men almost like children when he discovered them ignoring their quinine doses. He would take several of the bitter pills in his mouth, chew them, and lick his lips... No man who watched his own squadron commander go through this routine would dare to complain of the quinine’s

bitterness! ...Sasai explained quietly, ‘I hate them just as badly as anyone. But my men must be kept from malaria. Actually, I’m doing for them exactly what my mother did for me when I was ill as a child.’”



*Japanese war art painting: “Maintenance work aboard aircraft carrier.” Artist: Arai Shori. (National Archives)*



*Japanese Ace Shoichi Sugita. (Maru magazine)*

**Shoichi Sugita, 1924–1945  
(IJN; 30+ victories)**

Sugita joined the Navy in 1940, when he was just 15. During the war he ran up an impressive string of victories, but never lived to see his 21st birthday. His career began in late 1942 at Buin in the Solomons. For his first victory he rammed a B-17, but managed to keep flying and

shot down the crippled bomber. In April 1943 he was one of six Zero pilots escorting the Mitsubishi G4M bomber transporting Admiral Yamamoto on an inspection tour. He shot down two of the attacking P-38s, but couldn't keep the remainder from shooting Yamamoto's plane down. Near the end of 1943, he had to bail out of his badly damaged Zero, but suffered burns that sent him home for treatment. In 1944 he served in the Marianas and Caroline Islands, then in the Philippines. In 1945 he returned home to fly the *Shiden-kai* fighter in Okinawa and in a home defense unit. On April 15, while taking off, his fighter crashed and he died in the resulting fire.

**MAN'S TRAINING**

*THERE MAY BE WHAT TORTURES YOU.  
THERE MAY BE WHAT REDUCES YOU TO SILENCE.  
THERE MAY BE WHAT FAILS TO SATISFY YOU.  
THERE MAY BE WHAT IRRITATES YOU.  
AND THERE MAY BE WHAT GRIEVES YOU.  
BUT MAN HAS TO TRAIN HIMSELF BY ENDURING THESE  
THINGS.*

*—ISOROKU YAMAMOTO, JAPANESE ADMIRAL*

## AMERICAN ACES

### **Harold William "Joe" Bauer, 1908–1942 (USMC; 11 victories)**

"Joe" Bauer was one of the early heroes—and victims—of the Pacific air war. As leader of VMF-212 he not only downed four enemy aircraft on each of two single missions, but also provided outstanding leadership to his pilots in the early months of the war, when U.S. forces were outnumbered and frequently out-flown by their Japanese adversaries. Early encounters with Zeros and *Hayabusas* had shown that American aircraft could not out-maneuver those nimble, lightweight fighters, so hit-and-run tactics became the preferred method of taking on the opposition. Bauer taught his pilots to take advantage of the fragile, unarmored Japanese fighters' weaknesses, and to capitalize on the Wildcat's ruggedness and heavy armament. His approach was to aggressively turn in to any Japanese attack to meet it head-on, close the range, and let the Wildcat's big .50s do the rest. If a pilot could get an altitude advantage against the fast-climbing Zero, the overhead attack gave the slower Wildcat the extra speed needed to close and destroy the enemy. More importantly, Bauer emphasized out-thinking the enemy in order to out-fly him, even in an inferior aircraft. Between May and

November 1942, Bauer downed 11 Japanese aircraft. On November 15 1942 while flying from Henderson Field on Guadalcanal, Bauer was shot down. Though briefly spotted in the water in his life preserver, air and sea searches proved futile, and Bauer was never seen again. For his courage and leadership he was posthumously awarded the Congressional Medal of Honor.

**"HE'S A TALL, HIGH CHEEK-BONED INDIVIDUAL. HE WAS JUST A 24-KARAT MAN. IT WAS A SORRY DAY (WHEN HE DISAPPEARED). EVERYBODY LOVED JOE BAUER. ...TO THINK THAT WE COULDN'T FIND HIM. EVIDENTLY, EITHER A SHARK GOT HIM, OR (THE JAPANESE) SAW (HIM) AND THEY WERE SO MAD BECAUSE OF WHAT WE HAD DONE, AND WERE DOING, THAT THEY WENT OVER THERE, TOOK HIM OUT OF THE WATER AND THEY GOT HIM. LORD KNOWS WHAT HAPPENED TO HIM."**

**—CFS2 ADVISOR JOE FOSS, PRIVATE  
INTERVIEW, MARCH 2000**



*USMC Ace Joe Foss. (Bettmann/Corbis)*

### **Joseph Jacob “Joe” Foss, 1915– (USMC; 26 victories)**

Joe Foss was born in South Dakota, completed a bachelor’s degree and civilian flight training in 1940, and immediately enlisted in the Marine Corps. Shortly after the Pearl Harbor attack he became executive officer of VMF–121. On October 9 1942 he flew his F4F Wildcat from the aircraft carrier *Long Island* to Henderson Field on Guadalcanal to become part of the “Cactus Air Force.” He quickly absorbed VMF–212 leader Joe Bauer’s tactics, boring in close before firing at the enemy. Four days after his arrival he scored his first

victory, a Zero, and by October 18 he was an Ace. Despite six weeks out of combat with malaria, by early 1943 Foss tied Eddie Rickenbacker’s WWI record of 26 enemy aircraft shot down, and was returned to the States for a war bond tour. In May 1943 he received the Congressional Medal of Honor from President Roosevelt. After a stateside stint training new pilots, he returned to the Pacific as commander of VMF–115 flying Corsairs. Foss, whose autobiography, *A Proud American: Joe Foss*, includes an excellent account of his career in the Cactus Air Force, now lives in Scottsdale, Arizona. He graciously agreed to be interviewed in order to help make the Pacific theater edition of Combat Flight Simulator as compelling as possible. (See the “Historical Advisors” section later in this chapter.)



*A Grumman Wildcat prepares to take off from a U.S. carrier. (National Archives)*



***"JAPANESE FIGHTER PILOTS AT FIRST REFUSED TO COME UP SO (BOYINGTON) CIRCLED THEIR AIRFIELD AND CHALLENGED THEM. THEY SHOULD HAVE STAYED ON THE GROUND. ONCE THEY WERE AIRBORNE, TWENTY AIRCRAFT WERE SHOT DOWN BY BOYINGTON AND HIS PILOTS WITHOUT THE LOSS OF A SINGLE MARINE PLANE."***

*—MAX BRAND, FIGHTER SQUADRON AT GUADALCANAL (1943)*

**Gregory "Pappy" Boyington,  
1912–1988 (USMC; 28 victories)**

"Pappy" Boyington—more often called "Greg," "Skipper," or "Gramps" by his men—didn't fit the clean-cut image usually pushed by the wartime press. He was older, rougher, and harder-drinking than most of his fighter pilot peers, and whatever he did, he did his way. Born in 1912, by 1935 he was a Marine Corps flight instructor. In 1941 he joined the American Volunteer Group, better known as the Flying Tigers, flying P-40s against the Japanese in China. He returned to the Marine Corps in 1942. Given the chance

to form a fighter squadron in 1943, he pulled together a collection of pilots, some of whom had had disciplinary problems, and forged them into the famous "Black Sheep" squadron (originally dubbed "Boyington's Bastards," rejected when it became clear that it would never appear in the newspapers).

In the Solomons campaign the Black Sheep ran up an impressive record using Boyington's aggressive tactics—diving from superior altitude, firing at close range—and Boyington himself ultimately surpassed Rickenbacker's record with 28 kills. In October 1943 he led 26 Corsairs to Kahili. When the 60 Japanese fighter pilots based there refused to rise to the challenge, he taunted them on his radio. This brought them up, and the Black Sheep sent 20 of them crashing back to earth without suffering a single loss. In January 1944, after scoring his last victory, Boyington was shot down, and spent 20 months as a prisoner of the Japanese. After the war he received the Medal of Honor.



*U.S. Marine Corps Ace Gregory "Pappy" Boyington with President Harry Truman. (Corbis)*

## BOYINGTON AT HIS BEST

*"I CAN SAY THIS WITH CONVICTION, THAT WHEN COUNTRIES ARE FACING A CRISIS SUCH AS WAR, INEVITABLY SOME MEN STEP FORWARD AND LEAD WHEN LEADERSHIP IS MOST NEEDED. GREG BOYINGTON WAS SUCH A MAN."*

*—MARK STYLING,  
CORSAIR ACES OF WORLD WAR II  
FROM AN INTERVIEW WITH  
EDWIN OLANDER, ONE OF  
BOYINGTON'S "BLACK SHEEP"*



*USMC Ace Marion Carl. (U.S. Navy)*

## **Marion Carl, 1915–1998 (USMC; 18.5 victories)**

Commissioned in 1939, Marion Carl became the first Marine Corps fighter Ace, scoring his first victory at Midway in June 1942. Soon he was part of the “Cactus Air Force” on Guadalcanal, where he ran his score up to 11.5 victories, getting shot down once in the process. He served in combat until November 1944, when he was sent home with a final tally of 18.5 enemy aircraft. Carl was a graduate of the Navy Test Pilot School’s premier class in 1945; he became the first Marine to fly helicopters, and the second U.S. pilot to make a carrier landing in a jet aircraft. He also set a short-lived aircraft speed record of 651 mph in 1947, soon

surpassed by Chuck Yeager, and an altitude record (83,225 feet) in 1953. He flew high-altitude U-2 reconnaissance missions over China in the fifties, and led the First Marine Brigade in Vietnam, where he flew combat missions in helicopters and jet fighters. On his return he was promoted to Major General, and finished his 34-year military career as Inspector-General of the Marine Corps, with a pair of Navy Crosses, five Distinguished Flying Crosses, 14 Air Medals, and numerous other citations and awards.

## WILDCAT VS. ZERO

***"BAUER WAS THE FIRST TO TEACH THE VALUE OF CLOSING WITH A ZERO AND THEN HANGING ON TO IT LIKE A BULLDOG, TURNING INTO IT HEAD-ON NO MATTER HOW IT FLIPPED AROUND IN THE AIR. IN THE RING, YOU COULD CALL HIM AN EXPONENT OF INFIGHTING."***

*—MAX BRAND, FIGHTER SQUADRON AT GUADALCANAL (1943)*

### **Richard Bong, 1920–1945 (USAAF; 40 victories)**

Bong, a P-38 pilot in the Pacific theater, became the top-scoring American fighter pilot of WWII—and of all time—with 40 kills. He was by most accounts a naïve Midwestern farm boy; a certain lack of imagination may have been his greatest asset as a fighter pilot. General George Kenney said of Bong, "I had predicted a long while ago that if he ever found out that he was not shooting clay pigeons, I would have to take him out of combat. This was a nice kid. He was no killer, and his pet peeve against the newspapermen was that they kept referring to him as the 'pilot with the most kills.'"

The big, heavy, and heavily armed P-38 couldn't win in a turning fight against more nimble Zeros and Oscars, but Bong preferred the head-on attack, against which the Oscar was especially vulnerable. Bong used this method for at least 10 of 21 kills on his first tour. Like many top-scoring Aces, he relied more on closing with his opponent and firing from very close range than on fancy deflection shooting. Officially assigned a training role

after he surpassed Eddie Rickenbacker's WWI record of 26 victories, Bong managed to run his score up to 40 before Gen. Kenney sent him home. After his wedding and honeymoon, Bong reported to Lockheed in California to test the new P-80 jet fighter. Bong died on August 6, 1945—the day the atom bomb was dropped on Hiroshima—when his P-80 jet flamed out and stalled on takeoff.



*U.S. Army Air Force Aces Richard Bong (left) & Thomas McGuire. (Bettmann/Corbis)*

**Thomas McGuire, 1920–1944  
(USAAF; 38 victories)**

McGuire entered combat in the south Pacific in March 1943 as a 23-year-old P-38 pilot. He didn't see an enemy aircraft for five months, but became an Ace by scoring five kills in his first two engagements near Wewak, New Guinea, on two consecutive days in August. McGuire made his ambitious goals clear: he wanted to be America's top-scoring Ace, and he wanted to win the Congressional Medal of Honor. Eighteen months later he was the second most successful American fighter pilot in history with 38 kills—and a posthumous recipient of the Medal of Honor. On January 7 1945 McGuire led four P-38s on a mission to the Japanese airfield on Los Negros island in the Philippines. When an IJA fighter pilot shot down one of the P-38s, McGuire flew to the rescue. His plane, still laden with drop tanks, simply ran out of speed and altitude and stalled, then crashed.



*U.S. Navy Ace David McCampbell. (U.S. Navy)*

**David McCampbell, 1910–1996  
(USN; 34 victories)**

With 34 victories, David McCampbell was the Navy's top Ace of WWII, and the fourth American Ace of all time. Remarkably, he scored nearly half his victories in just two missions. As Commander of Air Group 15 aboard the carrier *Essex*, he led his fighters in the first and second battles of the Philippine Sea. On June 19 1944, during the "Great Marianas Turkey Shoot," McCampbell and five more VF-15 Hellcat pilots led the attack on 80 Japanese carrier aircraft headed toward the U.S. fleet, and he personally downed five bombers and two fighters. On October 24 1944, accompanied by just one other F6F, McCampbell intercepted 40 fighters, downed nine of them (out of a total of 15 shot down), and disrupted their attack on the fleet. For these two actions he was awarded the Medal of Honor. By the end of the war he had also been awarded the Navy Cross, the Silver Star, and the Distinguished Flying Cross.



*U.S. Navy Ace Edward "Butch" O'Hare.  
(U.S. Navy)*

### **Edward "Butch" O'Hare, 1914–1943 (USN; 7 victories)**

A 1937 graduate of the Naval Academy, O'Hare joined the Navy's Fighting Squadron 3 in 1940. "Jimmy" Thach was the squadron's executive officer, and later became its CO. O'Hare absorbed Thach's aggressive fighter tactics, and put them to good use aboard the *Lexington* in February 1942. Some 400 miles from Rabaul the American carrier was attacked by nine Mitsubishi G4M Betty bombers. O'Hare and five more Wildcat pilots took off to intercept them. O'Hare and his

wingman made contact with the enemy aircraft. When his wingman's guns jammed, O'Hare became the sole defender of his ship. He single-handedly downed five of the bombers before Thach and other Wildcat pilots joined him and downed or drove off the remaining attackers. For this feat O'Hare received the Medal of Honor.

In 1943, as commander of the Enterprise air group, O'Hare developed night fighter tactics for Hellcats, and put them into practice. On November 27, O'Hare failed to return from a night operation directed against marauding Bettys. Some believe he was shot down by a lucky enemy gunner; others think that he fell to friendly fire. O'Hare International Airport in Chicago is named after him.



U.S. Navy Ace John S. Thach. (Corbis)

### **John S. "Jimmy" Thach, 1905–1981 (USN; 7 victories)**

Thach is best remembered as the inventor of a defensive maneuver still used by fighter pilots and now called the "Thach Weave" (in WWII it was officially called the "Beam Defense Maneuver"). It enabled pilots in the out-classed Grumman Wildcat to take on far more maneuverable Japanese fighters because they could count on mutual protection. This alone would have assured his place in the history of naval aviation, but he also put his theories into practice. Thach became a naval aviator in 1930, and began the war leading Wildcat squadron

VF-3 aboard the carrier *Lexington*. In the same mission in which his disciple "Butch" O'Hare won the Medal of Honor, Thach assisted in mopping up attacking bombers. Four months later, during the Battle of Midway, Thach showed what this new maneuver could do against skilled and aggressive opposition. When one fighter in Thach's four-aircraft flight was shot down, he led the remaining three against 15 to 20 Zeros, using the Thach Weave to evade enemy attacks and protect friendly dive-bombers. The three weaving Wildcats shot down four Zeros in the process.

Thach finished the war as Operations Officer in the fast carrier forces commanded by Adm. John S. McCain. He commanded carriers during the Korean war, became an Admiral in 1955, and retired as commander of U.S. Naval forces in Europe in 1967.

**"FIGHTER AIRCRAFT ARE DESIGNED-AND  
FIGHTER PILOTS ARE TRAINED-TO FIGHT. IF  
THERE ARE ENEMY AIRCRAFT IN THE AIR, AND  
CONTACT IS NOT MADE, SOMETHING IS WRONG."**

**-FROM VMF-214 ("BLACK SHEEP") OFFICIAL HISTORY, APPENDIX E:  
MAJOR BOYINGTON'S COMBAT TACTICS**



Admiral Isoroku Yamamoto. (U.S. National Archives)

## KEY PLAYERS OF THE WAR

### **Isoroku Yamamoto (1884–1943)**

Admiral Isoroku Yamamoto, architect of the attack on Pearl Harbor and Commander-in-Chief of the Combined Fleet, knew well what the stakes—and the odds—were for Japan in the Pacific war.

Like Robert E. Lee, whose allegiance to his home state of Virginia and to the southern cause in the American Civil War overrode his doubts about the outcome, Yamamoto accepted command in a war he opposed.

Yamamoto had lived and studied in the U.S. between the wars, and had seen firsthand the resources and industrial capacity of this potential enemy. He opposed the Japanese militarists who pushed for alliance with Germany and Italy, and for war against the U.S. and Great Britain. His opposition was so firm that there were factions in Japan plotting his assassination in 1939. Ironically, Yamamoto was assassinated four years later, but not by his own people. American codebreakers learned of his itinerary and dispatched P-38 pilots to intercept his aircraft.

In 1940 the prime minister of Japan asked Yamamoto how the nation might fare in a war against the U.S. and Great Britain. Yamamoto's reply was prophetic. (See box, below.)

***"IF I AM TOLD TO FIGHT REGARDLESS OF THE CONSEQUENCES, I SHALL RUN WILD FOR THE FIRST SIX MONTHS OR A YEAR, BUT I HAVE UTTERLY NO CONFIDENCE FOR THE SECOND OR THIRD YEAR. I HOPE THAT YOU WILL ENDEAVOR TO AVOID WAR WITH AMERICA."***

***—ADMIRAL ISOROKU YAMAMOTO, 1940 (FROM JOHN KEEGAN, THE SECOND WORLD WAR)***

When war did come, Yamamoto served his nation to the best of his impressive ability. He had believed in the future of aviation throughout his career, and helped to prepare the Japanese Navy's carrier forces for the coming struggle, but his doubts were justified. The tide of war began to turn against Japan six months to the day after Pearl Harbor, near a small island called Midway. Few realized the battle's significance at the time, for the war would last three and a half years longer, and millions would be dead, wounded, or homeless before this gigantic struggle ended.

About Yamamoto, the *Oxford Companion to WWII* notes, "He was a fervent supporter of air power and had, unlike some of his colleagues, little faith in battleships. 'They are like elaborate religious scrolls which old people hang in their homes, a matter of faith, not reality... In modern warfare battleships will be as useful to Japan as a samurai sword.'"



*Admiral Chester W. Nimitz, Commander in Chief of the U.S. Pacific Fleet, 1/1/44. (Hulton Getty/Liaison Agency)*

### ***Chester Nimitz (1885-1966)***

As Commander-in-Chief of the U.S. Pacific Fleet throughout the war, Nimitz inherited a fleet in disarray after Pearl Harbor, though its carriers were intact. He directed the rapid expansion of his fleet; built around carrier-led task forces; and picked aggressive commanders, including Halsey, Mitscher, and Spruance, who would take the fight to the enemy. Nimitz also devised the island-hopping strategy (taking key island bases, bypassing and isolating Japanese forces on others) that led his fleet across the Pacific to Japan.

Nimitz served in submarines from 1907 to 1918. He used his submarine forces in the Pacific war to destroy the Japanese merchant marine and create an effective embargo on supplies vital to the Japanese war effort. He could have supervised these efforts from the bridge of a



battleship, but he chose a submarine for that honor, because he was an old submariner from way back and wanted to emphasize their importance in the big picture.

Nimitz demonstrated his willingness to attack early in the war, when many Allied leaders were demoralized by the successes of the apparently unstoppable Japanese military. Unable to mount major operations, from February to April 1942 he ordered Halsey's hit-and-run attacks on outlying Japanese bases in the Gilbert and Marshall Islands, and authorized "Jimmy" Doolittle's daring B-25 raid on Tokyo. These minor operations may have been pinpricks to the triumphant Japanese, but they maintained American morale until Nimitz could implement more ambitious plans.

With substantial successes at the Battle of Midway in 1942 and on Guadalcanal in early 1943 (see Chapter 8, **The Campaigns** for details), Nimitz directed a series of powerful amphibious assaults across the Central Pacific, starting with a bloody battle in the Gilberts at Tarawa. These operations led to the Marshalls, the Philippines, Iwo Jima, Okinawa, and ultimately to Tokyo Bay in the summer of 1945.



*Admiral Chuichi Nagumo. (Maru magazine)*

### ***Chuichi Nagumo (1887–1944)***

Although Nagumo was the foremost Japanese carrier commander in the first half of the war, he had little faith in carriers, which he felt were too vulnerable, and was more interested in torpedoes than in aircraft. Despite these attitudes he commanded the Pearl Harbor attack force that dealt Japan's first stunning blow against American sea power in the Pacific. This major success could have been even more brilliant, but Nagumo's caution kept him from launching a third strike that would have destroyed the oil storage and port facilities at Pearl Harbor.

Nagumo was a major player in Yamamoto's plan to "run wild" for the first six months of the war, scoring additional successes in raids on the Dutch East Indies, on Darwin in Australia, and in the Indian Ocean. However, as commander of the Japanese carrier force at the Battle of Midway he suffered a resounding defeat.

Despite lesser victories in the Solomons and the Philippines during 1942, Nagumo was replaced as carrier commander in 1943 and sent to the Marianas to organize defenses on Saipan.



*U.S. Admiral William F. Halsey. (Corbis)*

### ***William F. Halsey (1882–1959)***

The most aggressive of Nimitz's admirals, Halsey's bulldog features and demeanor earned him the nickname "Bull," but no one used it to his face. A member of the Annapolis class of 1900, Halsey understood sooner than most that aircraft and aircraft carriers would become war-winning weapons. He learned to fly after WWI, and rose to admiral commanding the U.S. Navy's Pacific carrier division before the Second World War.

Halsey's carriers were at sea during the Japanese attack on Pearl Harbor, and he chafed to get them into action against the

enemy as soon as possible. Nimitz agreed, and Halsey launched a series of attacks on island bases at the eastern edge of the Japanese defense perimeter less than 60 days after the debacle at Pearl Harbor. He was soon promoted to Commander of Carriers, Pacific Fleet. In April 1942 his flagship, the *Hornet*, carried Doolittle's B-25s within 700 miles of Tokyo and launched them to strike America's first aerial blow against Japan. Seven months later, after missing the Battle of Midway due to illness, he led operations that helped the U.S. take Guadalcanal. Over the next year his carriers were instrumental in the Solomons campaign.

Halsey hated inaction and was always ready for a fight, but these military virtues can become vices when an enemy knows how to exploit them. In the fall of 1944 Halsey jeopardized U.S. landings on Leyte in the Philippines by impulsively pursuing a Japanese decoy fleet when he should have stayed to cover the operation. He may have been a better tactician than a strategist, but his hard-talking, hard-fighting style combined well with Nimitz's strategic vision to win victory in the Pacific.

## THE HISTORICAL ADVISORS

During our research for Microsoft® Combat Flight Simulator 2 WW II Pacific Theater, we had the privilege of interviewing two principals of the air war in the Pacific, **Saburo Sakai** and **Joe Foss**. We have gathered a collection of quotes from our interviews with these famous aviators.



*Saburo Sakai. (Courtesy of the Confederate Air Force)*

### Saburo Sakai

#### On dogfighting

"I strove to shoot down my enemy in the first pass or attack, tried not to open fire too soon, never followed an enemy into a dive, and tried to get behind my enemy and stay there.

1. Attack from above and behind is the most important rule; one should always strive for this.
2. Always attack in ways that will keep you behind the enemy.

3. Attacking from below and behind: always try to shoot them down in the first attack.
4. Do not chase the enemy when they dive or evade using other vertical movement."

#### On first impressions of the Mitsubishi Zero

"Good things about the Zero in flight were the very long range, and the good visibility all around the plane. In combat [good points] were the responsiveness of the control stick, the tight turns it could make (to the left), the ability to climb quickly, and the reliability of the 7.7mm fixed-machine guns."

#### On pilots and their training

"When I was a trainee the instructors were kind. However, the quality of instruction gradually decreased. Later instructors didn't understand how to teach and became stricter."

#### On Japanese vs. U.S. teamwork

"I am confident that Japanese pilots were superior on a one-on-one basis. But the ability to work as a team both offensively and defensively that the Americans had was very impressive. Perhaps this comes from the team spirit and thinking [that] they developed [in] playing American football. This hit us particularly hard in the air engagements from the middle war onwards..."

**On carriers and life at sea**

- Q.** What was life like about a Japanese carrier? What were the men like?
- A.** Officers and enlisted pilots were treated differently. There was an incredible amount of discrimination between officers and enlisted pilots. This included differences in food, alcohol, cigarettes, and even the briefing rooms where they waited before flights at airbases.
- Q.** What was the most fun thing on the carriers?
- A.** Crew quarters in the evening.
- Q.** What was the most difficult thing?
- A.** When air engagements went against us and we lost people in those engagements.
- Q.** What were the men like?
- A.** The most senior person in the crew quarters was in charge of that room. There were no officers stationed there. 90% of the pilots were enlisted men.
- Q.** What did you do for entertainment?
- A.** There was hardly any entertainment. The senior crewmembers in each quarter were like your father or your elder brother. Officers never visited the quarters.
- Q.** How did you deal with the pressure of upcoming air engagements?
- A.** We didn't do anything special.



*Joe Foss. (Courtesy of Donna Wild Foss)*

**Joe Foss**

**On dogfighting**

"Dogfights are normally over in a matter of seconds. If you blink, you could miss the fight. If you blink during the fight, you could die."

—From Foss' autobiography, [A Proud American: Joe Foss](#)

**On what it takes to be a fighter pilot**

"The impulse and the act must be one. Skilled fighter pilots have one thing in common: They are fast. The airplane becomes an extension of your body, like an arm or a leg. If somebody's coming at you with a red-hot poker, you instinctively get out of the way. You don't have to think about it. You just do it. In the air, whoever acts smartest and fastest is going to be the survivor. As the Red Baron said, 'It's not the crate, it's the man sitting in it.' If it were not so, the Grumman Wildcat would have been a flying coffin."

—From Foss' autobiography, [A Proud American: Joe Foss](#)

### **On Saburo Sakai**

“Saburo Sakai, the top surviving Japanese Ace, with whom I often share platforms at university symposiums, recently told me that I am his best friend in America.”

—From Foss’ autobiography, A Proud American: Joe Foss

### **On the truth about combat (Foss to fighter pilot trainees)**

“If you’re planning on this being an easy job, you’ve got another think coming. You can end up dead in this line of work. War is dangerous! If you have any thought of chickening out, now’s the time to do it. Being any kind of pilot in enemy territory means having your life threatened on every mission.’... After one of my talks... thirty-six fliers bailed out of the program. I didn’t lose any sleep over that; in fact, I was glad my strategy had gotten results.”

—From Foss’ autobiography, A Proud American: Joe Foss

### **On wingmen**

“That’s the toughest job, to be a wingman. You’ve got to watch what the guy ahead of you is doing. You’d try to stay as close as you could, but of course we were madly scissoring.”

—From Foss’ autobiography, A Proud American: Joe Foss

### **On his Japanese opponents at Guadalcanal**

“I thought the [Japanese pilots] were pretty good. You know, the maneuvers they’d do as far as doing slow rolls, going straight up, that would tee me off, knowing that they could do that and had enough power and speed advantage to do that kind of stuff. Naturally it would really grouse me that they would do that. I’ll say that they were a cocky group.”

—From private interview, March 2000

### **On the Grumman Wildcat**

“I loved the Grumman F4F Wildcat. I just loved it. It was like a brother to me. It was tough, and I could destroy the enemy with it, and I couldn’t blame it for the speed it didn’t have, but I felt at home. I felt protected in there because of the durability, and it was like a part of my body.”

—From private interview, March 2000

### **On using the radio in combat**

"You didn't do a lot of talking on the radio for two reasons. One, a high percentage of the time they didn't work. And the other is you just didn't want a lot of extra blat on the air. ... If somebody got on there telling their life story, we'd say, 'SHUT UP!'"

—From private interview, March 2000

### **Bob Campbell & Mike Weide**

Bob Campbell and Mike Weide were members of composite squadron VC-78 in 1944-45, flying Grumman Wildcats from the escort carrier *Saginaw Bay* (CVE-82). They saw action at Peleliu in the Palau Islands, and at Leyte, Mindoro, and Lingayen in the Philippines.

Their missions included combat air patrols over the fleet, patrols over targets struck by the squadron's dive- and torpedo-bombers, strafing missions against surface targets, and close air support for troops on the ground. Both won the Air Medal for their performance in the Pacific; indeed, Mike Weide won the medal five times, one of them for shooting down a Japanese Army *Hayabusa* ("Oscar") fighter.

Bob Campbell is the lucky survivor of an almost disastrous carrier landing in heavy seas on the edge of a typhoon. His Wildcat hit the water nose-first at 80 knots and sank like a stone, but Bob got clear of the cockpit, was rescued by Navy divers, taken aboard a destroyer, and returned to the *Saginaw Bay* in exchange for the traditional reward of five gallons of ice cream.

Both pilots provided a wealth of information about their planes, their ship, and the operations they participated in. Their patience, good humor, and willingness to share their experience and memorabilia made them a major asset in the preparation of Combat Flight Simulator 2.

***From Bob Campbell's WWII Diary  
(unpublished)***

"16<sup>th</sup> September, 1944: ... One of the targets which we worked over today was a group of buildings north of the airfield [on Peleliu] which housed enemy machine gun and mortar emplacements. The Marines were having a rough time with it, but we hated to knock it out as it had fine possibilities as an officer's club."

"27<sup>th</sup> September, 1944: Ran into the most accurate AA is this area today, I believe, on Malakal Island. Either the [Japanese] can't take a joke or they don't like the color of our planes."

"15<sup>th</sup> October, 1944: Circle, circle, circle the ship all day long on C.A.P."

"16<sup>th</sup> October, 1944: Ditto!"

"25<sup>th</sup> October, 1944: Our day of leisure on the way down to Morotai was a bad day for the remainder of our carrier group that we left behind. At 0500 this morning four [Japanese] BBs, eight CAs, four CLs and seven DDs hit our CVE units and were supported by [Japanese] land-based planes. Our group consisted of sixteen CVEs, many of which were damaged. The [Japanese] made suicide dive-bombing raids which helped sink the *Gambier Bay* and *St. Lo*. The [Japanese] ships were also at point-blank range then and were really pouring the shells into us. The only thing the CVEs could do was turn into the wind

and launch their planes, their only protection. This they did, and in doing so had to turn directly into the [Japanese] fleet. The last we saw of the *Gambier* and *St. Lo* was then, as they steamed right between [Japanese] BBs and cruisers, which were throwing everything they had at them. The CVEs launched, landed and re-launched all of their planes while under fire. ... In the heat of the battle TBMs had to make dummy attacks when they expended their torpedoes to hold off the enemy until others came back with a load. Fighters did the same thing. It must have taken a lot of guts to make a run on a battleship with no ammo."

"14<sup>th</sup> January 1945: [After crashing into the water the previous day:] Today I was transferred back to the *Saginaw Bay* by a breeches buoy. Came out of this with merely a few cuts and bruises—guess I'm very lucky."

"2 February 1945: Crossed the date line today, consequently we have two February 2nds. The trip is the duller I have ever been on—nothing to do but read—everyone's tired of reading, sleep. After a few days and nights of nothing else we are pretty well slept out. And talk—we've all heard each others' stories and experiences so many times we know them by heart. So we just spend our time on deck in the sun and think about home and leave."

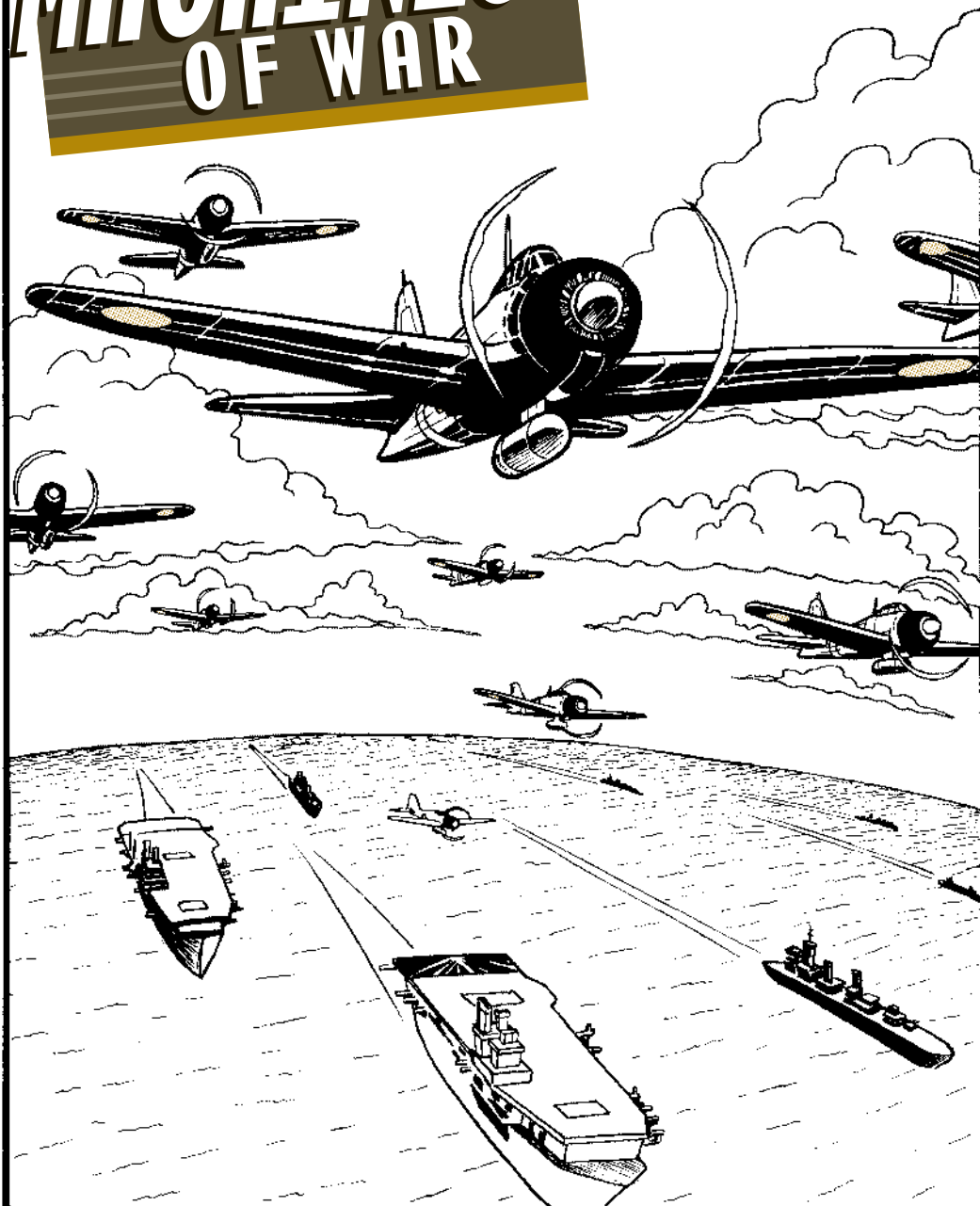




# MACHINES OF WAR

11

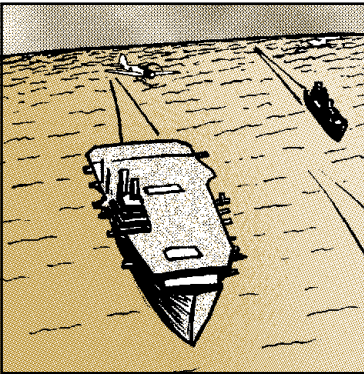
CHAPTER



***THE PACIFIC THEATER WAS AN INTENSE CONTRAST TO THE EUROPEAN THEATER: IMMENSE DISTANCES, THE DANGER OF FLYING OVER THE OPEN OCEAN, THE RUGGEDNESS THAT CARRIER LANDINGS REQUIRED, AND A LOWER ALTITUDE FOR COMBAT. PREPARE YOURSELF!***

***IN THIS CHAPTER  
THE SPECS:***

- ***THE FIGHTER PLANES***
- ***PLAYER-FLYABLE AIRCRAFT***
- ***OTHER (NON-PLAYER-FLYABLE) AIRCRAFT***
- ***THE WARSHIPS***
- ***OTHER VESSELS AND VEHICLES***



## ***THE FIGHTER PLANES***

Some of the most famous fighter planes of the European air war wrapped their sleek shapes around inline, liquid-cooled engines. But in the Pacific, especially for Navy aircraft, the extra durability and ease of maintenance of the air-cooled radial engine made it the engine of choice. That's because a single lucky shot from a soldier's rifle could puncture the radiator or coolant lines in a liquid-cooled engine, putting plane and pilot into the drink. The radial engine could take major damage, even the loss of whole cylinders, and still

get you back to base. The most successful fighters of the Pacific war—the Mitsubishi Zero, Grumman Hellcat, and Vought Corsair—were radial-powered.

Aircraft designers on both sides had to solve the same problems, but the approaches they took were quite different. Through much of the war the Japanese relied on nimble, lightweight fighters that were more maneuverable and faster-climbing at low speeds and altitudes than anything in the Allied arsenal. Their superior range meant they could also fly

further and fight longer than their opponents. Japanese pilots used these strengths to win aerial battles throughout the Pacific theater, flying maneuvers that their opponents had never seen or imagined. The phenomenal performance of the Japanese planes and pilots made them seem invincible, and at first their American opponents could hope to stay alive only by using team tactics, since their fighters couldn't compete head-to-head with the enemy. But this apparent invincibility came at a high price: Japanese Zeros and Oscars were too fragile to take much battle damage, often burning or exploding after very few hits.

American fighter design, especially for the Navy, took a different path. The most successful American fighters in the Pacific were heavier, more rugged, faster, and more powerful than their Japanese counterparts. They carried armor protection for pilot and fuel tanks and could absorb far more battle damage. And because they were less maneuverable, the pilots who flew them learned quickly not to try to out-turn the nimble Japanese fighters.

No matter which fighter you choose to fly, to come out alive you've got to understand the strengths and weaknesses of your plane and the enemy's. You've got to have the guts and the skill to use everything you've learned.



### To take a plane tour

1. From the Main screen, click the flight mode you prefer (Free Flight, Quick Combat, etc.).
2. Click **Player aircraft**.
3. Click **Plane Tours**.

This displays the Player aircraft screen.

This displays the list of player-flyable aircraft with the currently selected aircraft highlighted, and plane tour information for the aircraft selected in the **Player aircraft** list.



### To take a tour of a different aircraft

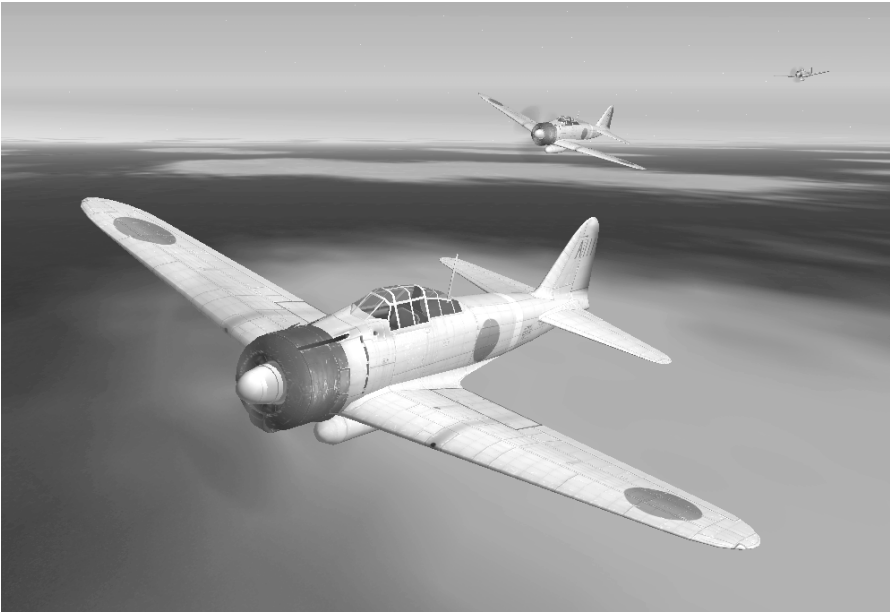
- Click a different plane in the list on the bottom of the Plane Tours screen.

**Note:** The U.S. and Japanese navies used **knots** as their unit of measurement for airspeed. Miles/kilometers per hour were used by the U.S. and Japanese Army. All player-flyable planes in CFS2 except the P-38 (an Army plane) feature airspeed indicators in knots. While in flight, check your airspeed indicator to see what the unit of measurement is.



*Aircraft carrier USS Randolph, shown in an operation off the Japanese coast during the final weeks of WWII. (Corbis)*

PLAYER-FLYABLE AIRCRAFT



**Mitsubishi A6M2 (Model 21) Reisen (Type Zero Fighter) “Zeke” (IJN)**

Empty/Max Weight & Dimensions:

**Weight:** 3,704 / 5,313 lbs (1,680 / 2,410 kg) **Span:** 39' 4.5" (12 m)

**Length:** 29' 8.75" (9.0 m)

**Engine:** Nakajima NK1C Sakae 12 14-cyl. air-cooled radial, 950 hp

**Armament:** Two 7.7 mm (.303-cal) Type 97 machine guns with 500 r.p.g. on nose, and two 20 mm Type 99 (Oerlikon) cannon with 60 r.p.g. in wings, plus two 66-lb (30 kg) or 132-lb (60 kg) bombs

**Max speed @ altitude:** 288 knots/331.5 mph (533.4 km/h) @ 14,930 ft (4,550 m)

**Ceiling:** 32,810 ft (10,000 m) **Initial climb rate:** 4,517 ft (1,376 m)/min

**Range:** 1,160 mi (1,866 km) at 132 knots/152 mph; with drop tanks, 1,930 mi (3,105 km)

Strengths	Weaknesses
Excellent maneuverability up to 261 knots	Light construction, low survivability
Superior climb rate up to 15,000 feet	No armor or self-sealing tanks
Very long range at low speeds	Poor dive characteristics

***Q. I HAVE READ A LOT THAT THE BETTY WAS THIS THING...THAT GOT BLOWN UP, BUT YOU ACTUALLY HAVE HIGH PRAISE FOR THE BOMBER.***

***A. THE THING DOESN'T SEEM TO BLOW UP THAT EASY.***

*-CFS2 ADVISOR JOE FOSS, PRIVATE INTERVIEW, MARCH 2000*

When the war began, the Zero gave enemy pilots a rude shock. No Allied fighter could match the Zero's phenomenal maneuverability and climb, or its range. Some thought the Zero was invincible, but the Zero got its performance through light construction—and a lack of armor or self-sealing tanks. The Zero pilot learned to use the plane's outstanding maneuverability to out-turn and—in some cases—out-climb Allied aircraft. Even when the U.S. introduced faster and more powerful fighters, pilots could never underestimate the Zero—in the hands of a skilled pilot, it was always a dangerous adversary against any American fighter.

The Zero's lightly loaded, high-lift wing and low weight made it a dream to fly at speeds below 250 mph, with a simply jaw-dropping ability to execute the wildest gyrations and zoom climbs at the whim of its pilot. However, the Zero became hard to handle as its speed approached 300 mph. Although it could reach an altitude

of more than 32,000 feet, its climb rate and maneuverability fell off between 15,000 and 20,000 feet. Light weight, relatively low horsepower, and that high-lift wing made the Zero a reluctant diver.

Designed by the brilliant Jiro Horikoshi, the Zero got its name from the Japanese Navy Air Force numbering system, based on the final digits of the year in which the aircraft entered production. For the A6M, the year was 1940, (the year 2600 in the Japanese calendar), so it was called the "Type 0 (zero) fighter."

### ***Tips for combat—Zero A6M2***

- ⊙ Force an enemy pilot into a dogfight at 230-250 mph and below 20,000 feet. At this speed and altitude, no enemy fighter can out-maneuver or out-climb you.
- ⊙ Jump cruising enemy aircraft from above. Fasten onto the tail of the bandit, use your superior maneuverability to match his evasive moves, and put enough rounds into him to bring him down.
- ⊙ Use your machine guns first to “boresight” the enemy—once you get hits on him, finish him off with your cannon.
- ⊙ Below 300 mph you can fling the Zero all over the sky to get on an enemy’s tail or to shake off all but the most determined attacker.
- ⊙ Climb away from most enemy aircraft, hanging on your prop in a near-vertical climb. Maneuvers like the Immelmann are easy, and heavier Allied fighters can’t stay with you.
- ⊙ The Zero rolls faster to the left than to the right. Roll left to tighten your turn and get onto the enemy’s six.
- ⊙ Don’t dive away from attackers—your plane doesn’t have the power or weight to out-run most U.S. fighters in a dive.
- ⊙ At speeds above 300 mph, the Zero’s controls stiffen and don’t respond well to the sudden, violent maneuvers that it does so well at lower speeds.
- ⊙ To exploit your plane’s best performance, force the enemy lower and slow down the pace of the engagement.

***"THE ONLY INFORMATION WE WERE GIVEN ON ENEMY PLANES WAS A SINGLE PAGE OF SPECIFICATIONS OF PRE-WAR AMERICAN, BRITISH, AND DUTCH PLANES. AS THE WAR WENT ON WE WERE ALSO NOT GIVEN ANY INFORMATION ABOUT NEW ENEMY AIRCRAFT, AND WERE FORCED JUST TO DEAL WITH THEM AS WE COULD WHEN WE ENCOUNTERED THEM."***

***—CFS2 ADVISOR SABURO SAKAI, PRIVATE INTERVIEW, APRIL 2000***



### ***Mitsubishi A6M5 (Model 52) Reisen (Type Zero Fighter) "Zeke" (IJN)***

Empty/Max Weight & Dimensions:

**Weight:** 4,136 / 6,025 lbs (1,876 / 2,733 kg) **Span:** 36' 1" (11 m)

**Length:** 29' 11.1" (9 m)

**Engine:** Nakajima NK1F Sakae 21 14-cyl. air-cooled radial, 1,130 hp

**Armament:** Same as A6M2.

**Max speed @ altitude:** 305 knots/351 mph (565 km/h) @ 19,685 ft (6,000 m)

**Ceiling:** 38,520 ft (11,740 m) **Initial climb rate:** 3,150 ft (1,372 m)/min

**Range:** with drop tanks, 1,194 mi (1,921 km)

Strengths	Weaknesses
Excellent maneuverability up to 261 knots	Light construction, low survivability
Superior climb rate up to 15,000 feet	No armor or self-sealing tanks
Very long range at low speeds	Better, but not stellar, dive characteristics

The Japanese Navy had started flying this improved version of the Zero in late 1943. Its added horsepower, speed, and armament made it even more dangerous than the A6M2. Its slightly smaller, thicker-skinned wing gave it better diving qualities, but it still suffered from some of the A6M2's old problems. While slightly more maneuverable than a Hellcat at low to medium speeds, it was still lightly built and more vulnerable to battle damage than the Grumman. Despite these problems, the Zero could be very dangerous, especially if its pilot could draw his enemy into a turning fight below 15,000 feet. The Zero remained in production and continued to evolve. Anyone who thinks a Zero was an easy kill had better think twice.

### ***Tips for combat—Zero A6M5***

This improved Zero retained most of the combat strengths and weaknesses of the earlier models. It was a little faster, and the added weight of its thicker-skinned wing improved diving ability. Finesse is still the name of the game for Zero pilots. Most of the "Tips for combat" for the A6M2 model still apply here.

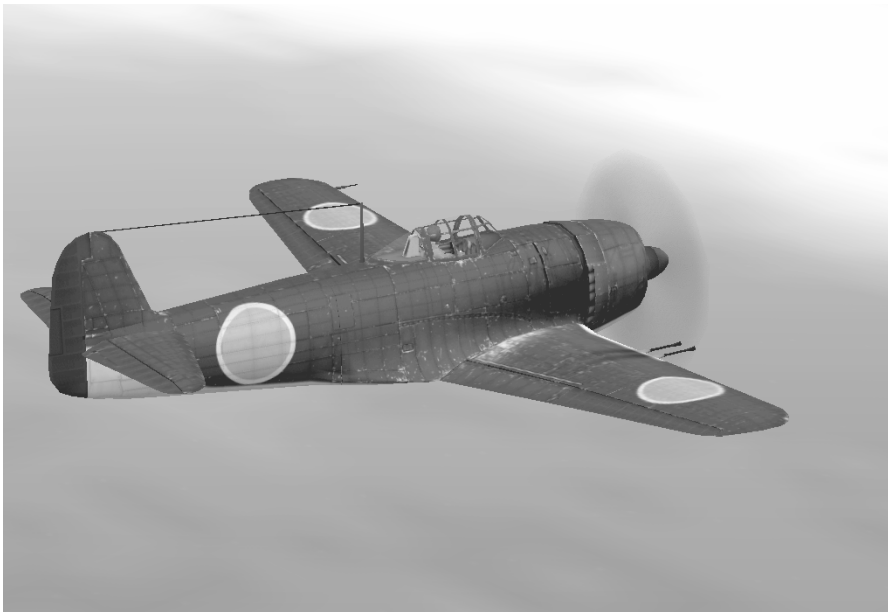


*The American battleship Pennsylvania, accompanied by another battleship and cruisers. (Naval Historical Center)*

***"WE WERE LEARNING AS MUCH ABOUT THEM EVERY DAY AS THEY WERE ABOUT US, AND IT WAS JUST ABOUT EVEN. WE WERE STILL SCARED OF EACH OTHER."***

***- FROM BUREAU OF AERONAUTICS INTERVIEW OF MAJ. JOHN SMITH, VMF-223, GUADALCANAL, 11/10/42***





***Kawanishi N1K2-J Shiden-kai (Violet Lightning, improved)  
"George" (IJN)***

Empty/Max Weight & Dimensions:

**Weight:** 5,858 / 9,039 lbs (2,663 / 4,109 kg) **Span:** 39' 3.75" (12 m)

**Length:** 30' 8" (9.3 m)

**Engine:** Nakajima NK9H Homare 21 18-cyl. radial air-cooled, 1,990 hp

**Armament:** Four 20 mm Type 99 (Oerlikon) cannon plus wing racks for four 132-lb or two 550-lb bombs

**Max speed @ altitude:** 322 knots/370 mph (595 km/h) @ 18,370 ft (5,599 m)

**Ceiling:** 39,698 ft (12,100 m) **Initial climb rate:** 3,300 ft (1,000 m)/min

**Range:** 1,069 mi (1,720 km)

Strengths	Weaknesses
Excellent speed and maneuverability	Poor engine reliability
Four 20 mm cannon provide very heavy firepower	

One of the best late-war Japanese Navy fighters, the *Shiden* could match the performance of any Allied fighter in terms of speed, maneuverability, and armament. In the original N1K1 *Shiden*, engine reliability problems and a mid-wing configuration with long, collapse-prone landing gear were balanced by these elements. Mass production plans for the improved N1K2-J *Shiden-kai* came to naught as the Allies closed in on Japan, and a total of just 400 of these advanced fighters had been built. Because of the lack of experienced pilots, some of these excellent aircraft had been expended in the kamikaze role. Any pilot who met this improved “George” in combat had his hands full.

### ***Tips for combat–Shiden-kai***

The heavily armed and highly maneuverable *Shiden* could match any of the big and powerful late-war U.S. aircraft.

- ⊙ With almost 2,000 hp, your plane can engage at higher speeds and altitudes.
- ⊙ Use your weight and power to dive away from an attacker.
- ⊙ Score heavy hits with *Shiden-kai*’s four 20 mm cannon.



### ***Grumman F4F-4 Wildcat (USN)***

Empty/Max Weight & Dimensions:

**Weight:** 5,785 / 7,951 lbs (2,630 / 3,614 kg) **Span:** 38' (11.6 m) **Length:** 28' 9" (8.8 m)

**Engine:** Pratt & Whitney R-1830-86 Twin Wasp 14-cyl. radial, 1,200 hp

**Armament:** Six .50-cal Browning M2 machine guns plus two 100-lb bombs

**Max speed @ altitude:** 277 knots/318 mph (512 km/h) @ 19,400 ft (5,913 m)

**Ceiling:** 34,900 ft (10,637 m) **Initial climb rate:** 1,950 ft (594 m)/min

**Range:** 770 miles (1,239 km)

Strengths	Weaknesses
Tough and rugged construction	Slow climb rate
Six .50-cal guns provide good firepower	Limited speed, maneuverability, and range
Good armor protection & self-sealing tanks	Narrow landing gear makes non-carrier takeoffs and landings tricky—and dangerous.
Easy, even fun to fly	

## WILDCAT VS. ZERO

**"...THE GRUMMAN F4F-3 WILDCAT WAS A STUBBY, COMPACT AFFAIR WITH A PERSONALITY OF ITS OWN. IT LOOKED MEAN—REMINDED ME OF MY BULL TERRIER THAT GROWLED A BIT EVEN WHEN HIS BOSS WENT BY."**

—MAX BRAND, FIGHTER SQUADRON AT GUADALCANAL (1943)

This tubby little carrier fighter was easy, forgiving, and even fun to fly. The Wildcat was Grumman's first modern all-metal monoplane fighter, but in some ways its design looked back to a simpler time. To raise and lower the landing gear the pilot had to hold the stick in his left hand while he used his right to turn a crank—attached to bicycle chains and sprockets—33 times. For the first year of the war the Wildcat took the brunt of the air battle against the Japanese, but its deficiencies meant that it could compete only if pilots used team tactics—especially the "Thach Weave"—to defeat tighter-turning, faster-climbing Zeros and Oscars. The Wildcat was stoutly constructed, well-armored, and well-armed, with the same six .50-caliber Brownings carried by the Hellcat, Corsair, and Mustang. While its greater weight and less efficient wing were liabilities in a dogfight, the Wildcat's larger, more powerful engine combined with these traits to give the Wildcat superior diving ability. Although larger, heavier, faster, and more maneuverable fighters came into service, the Wildcat remained in production, mostly because of its compactness. The growing U.S. fleet of small CVE "Jeep" carriers carried a larger number of Wildcats than of any other fighter type.

### Tips for combat—Wildcat

The Wildcat is a competent fighter with some excellent strengths and some glaring weaknesses. Dogfighting in the Wildcat can get you killed. Teamwork and team tactics make all the difference.

- ⊙ Stick together with your squad-mates. Four—or even two—Wildcats can provide mutual protection; a single Wildcat is a tempting target for marauding enemy fighters.
- ⊙ Use team tactics to defeat harder-turning, faster-climbing Zeros and *Hayabusas* ("Oscars").
- ⊙ Use the weight and power of your plane to dive away from trouble. Lightweight Zeros and *Hayabusas* can't keep up with you in a dive, but trying this move against a *Shiden-kai* is very risky.
- ⊙ If an enemy fighter latches onto your tail, you probably can't evade by maneuvering or out-climbing him, so turn into him to go head-to-head. You've got the firepower to do a lot of damage and the armor to withstand more hits, so playing "chicken" isn't as crazy as it sounds.
- ⊙ If you score hits on the enemy's fuel tanks and you can see unignited fuel vapor leaking out, fire at the plume to ignite it with your tracers.



### ***Grumman F6F-3 Hellcat (USN)***

Empty/Max Weight & Dimensions:

**Weight:** 9,042/11,381 lbs (4,110 / 5,173kg) **Span:** 42' 10" (13.0 m) **Length:** 33' 7" (10.2 m)

**Engine:** Pratt & Whitney R-2800-10 Double Wasp 18-cyl. radial air-cooled, 2,000 hp

**Armament:** Six .50-cal Browning M2 machine guns with 400 r.p.g., plus two 1,000-lb bombs or six 5-in rockets

**Max speed @ altitude:** 327 knots/376 mph (605 km/h) @ 17,300 ft (5,273 m)

**Ceiling:** 38,400 ft (11,704 m) **Initial climb rate:** 3,500 ft (1,067 m)/min

**Range:** 1,090 mi (1,753 km)

Strengths	Weaknesses
Rugged Grumman construction	Not the fastest American fighter
Easy to fly	Still not as nimble as the Zero
Competitive speed and maneuverability	
Six .50-cal guns, serious firepower	
Armor and self-sealing tanks increase survivability	

Simple, rugged, and deadly, yet easy to fly, the Hellcat was another product of the “Grumman Iron Works.” It was a larger, heavier, faster, and more powerful refinement of Grumman’s F4F Wildcat, and the first American fighter to exceed the performance of the Mitsubishi Zero. Its immense 18-cylinder, 2,000 horsepower radial engine gave it the power to dictate the terms of engagement. Its speed, maneuverability, high-altitude capability, and typical Grumman toughness made it a winner against all comers. The 12,000+ Hellcats produced accounted for three-fourths of all U.S. Navy air-to-air kills. Its combination of performance and survivability put the Hellcat in the top rank of American fighters in the Pacific theater, along with the Vought Corsair.

### ***Tips for combat–Hellcat***

The Hellcat combines strength and power with agility.

- ⊙ At 20,000 or 25,000 feet the Hellcat can out-maneuver Zeros and *Hayabusas*, but below 20,000 it remains very dangerous to dogfight against them.
- ⊙ The Hellcat is far from the fastest U.S. fighter, but it’s faster than the Zero. Use the power of its 2,000 hp engine to keep combat in the zone where your plane performs best.
- ⊙ The Grumman is well-armored, very tough, and has heavy firepower. Use these advantages to bore in on the attack. If attacked, turn into the enemy and use your firepower for a devastating head-on attack.
- ⊙ Stick together; team tactics are still excellent insurance for Hellcat pilots.

Don’t assume that you can count on the F6F to keep you safe if you go off on your own, especially against late-model Japanese fighters like the *Shiden-kai*.



*Army P-40Fs stand by on the flight deck ready to take off in a joint Army-Navy assignment. (Corbis)*



### ***Lockheed P-38F Lightning (USAAF)***

Empty/Max Weight & Dimensions:

**Weight:** 12,264 / 15,900 lbs (5,575 / 7,227 kg) **Span:** 52' (15.9 m)

**Length:** 37'10" (11.5 m)

**Engine:** Two Allison V-1710-49/53 liquid-cooled V-12, 1,325 hp each

**Armament:** One 20mm Hispano M1 cannon with 150 rounds + four .50-cal Browning machine guns with 500 r.p.g., plus up to 2,000 lbs of bombs

**Max speed @ altitude:** 343 knots/395 mph (635 km/h) @ 25,000 ft (7,620 m)

**Ceiling:** 39,000 ft (11,887 m) **Initial climb rate:** 2,500 ft (762 m)/min

**Range:** 900 miles (1,448 km); with drop tanks, 1,750 mi (2,815 km)

Strengths	Weaknesses
Fast, good climb rate, excellent dive	Slow turning; not as maneuverable as smaller, lighter single-engine fighters
Heavy armament centralized in nose	“F” model can break up in a long power dive from high altitude due to “compressibility”
Counter-rotating props eliminate torque effects	Turbocharged Allison engines suffered in cold climates
Long range with twin-engine safety	Getting low and slow in a dogfight can be dangerous

The striking appearance and high performance of the U.S. Army’s Lockheed P-38 Lightning made a powerful first impression. It used liquid-cooled engines, but its twin Allison V-12s made you feel a lot better about flying long distances over water. Twin-engine reliability and long range were big assets, particularly in the Pacific theater, where the top-scoring American aces, including Richard Bong and Thomas McGuire, were flying it to record numbers of victories. Its counter-rotating propellers neutralized torque effects and made the P-38 a smooth aircraft to fly. Heavy firepower concentrated in the nose, and modern tricycle landing gear, also made the P-38 popular with pilots. Big, heavy, and fast, the Lightning could out-dive any fighter except the P-47 Thunderbolt, but a long, fast dive from high altitude could cause its twin tail booms to oscillate. Unchecked, the booms could break. You had to limit your dive speed, or auger in.

The P-38’s size and weight meant that it couldn’t turn with more nimble fighters, but they combined with its twin-engine power to give the Lightning an excellent zoom climb. Pilots had to keep their speed at 300 mph or better to slam this big, impressive bird through enemy formations, then climb away from Zeros and Oscars to make another diving pass. If you get low and slow with a Zero or Oscar, the folks back home will be getting a telegram from Uncle Sam.



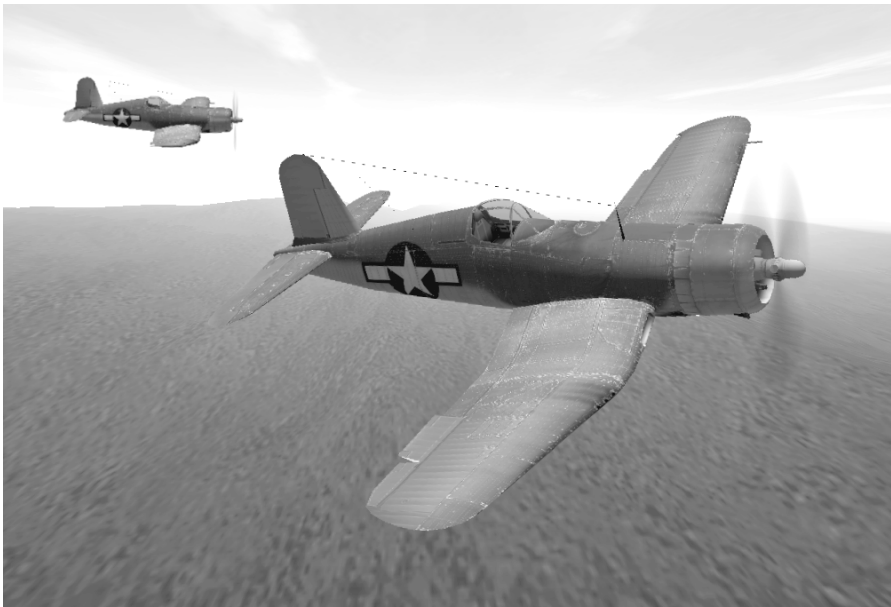
### ***Tips for combat—Lightning***

Big, fast, and well-armed, the Lightning is also heavy and slow-turning. Speed and altitude are life to the P-38 pilot. Don't try to out-turn the enemy in low-and-slow mode.

- ⊙ Use the P-38's weight, power, and diving qualities to dictate the terms of engagement with "Boom and Zoom" tactics. Attack from above, engage at more than 300 mph, slash through the enemy formation with guns blazing, and then zoom back up in a shallow climb at a rate the enemy can't match.
- ⊙ Don't dogfight against more nimble adversaries; they'll out-turn you every time, especially at low to medium speeds and altitudes.
- ⊙ The P-38 can out-dive enemy fighters, so dive away from trouble if you have to—but don't do this from extreme altitude. You may risk locking up your control surfaces and not be able to pull out of the dive.



*Iwo Jima, Bonin Island. Airstrip showing North American P-51s, Northrop P-61s, Douglas C-47s, and Curtiss C-46s, taken shortly after arrival of the Mustangs and Black Widows, 3/6/45. (Corbis)*



***Vought F4U-1A Corsair (USN, USMC)***

Empty/Max Weight & Dimensions:

**Weight:** 8,892/14,000 lbs (4,041/6,364 kg) **Span:** 41' (12.5 m) **Length:** 33' 4" (10.2 m)

**Engine:** Pratt & Whitney R-2800-8 Double Wasp 18-cyl. radial air-cooled, 2,000 hp

**Armament:** Six .50-cal Browning M2 machine guns

**Max speed @ altitude:** 363 knots/417 mph (671 km/h) @ 19,900 ft (6,065 m)

**Ceiling:** 36,900 ft (11,247 m) **Initial climb rate:** 2,890 ft (880 m)/min

**Range:** 1,015 miles (1,633 km); with drop tanks, 1,562 mi (2,513 km)

Strengths	Weaknesses
High speed, excellent maneuverability	Limited forward makes taxiing and carrier landings more risky than other fighters
Heavy armament (six .50-cal guns)	Spin characteristics can be dangerous for the unwary, as nose drops and spin tends to tighten

**"ON THE FLIGHT DECK, IT WAS NOT ONLY HOT, BUT SULFUR FUMES FROM THE CARRIER'S STACKS WAFTED INTO THE COCKPIT, MAKING YOU FEEL SICK. THEN YOU WENT UP TO ALTITUDE AND FROZE."**

*—WAYNE COLLEY, USN DAUNTLESS DIVE BOMBER "BACKSEAT ACE"*

Big, tough, and fast, the gull-winged Corsair was a formidable fighter against any opposition. The Corsair's signature gull wing prevented its immense propeller from chewing up the deck while keeping the landing gear struts short enough not to buckle in rough carrier landings. Initially the Corsair's shock absorbers were too stiff, causing a disastrous bounce on landing that could catapult this heavy fighter right over arresting cables on the deck. This defect relegated the Corsair to land-based operations until April 1944. Then Navy and Marine Corps aviators operated the "Bent-Wing Bird" from carriers and land bases, dominating the Pacific skies along with the Grumman F6F Hellcat. Like their comrades flying the Hellcat and the Army P-38, Corsair pilots could use the power of their fighters to engage the Zero at higher speeds and altitudes where the legendary Mitsubishi fighter struggled to compete. The Corsair did pose some problems for pilots: its long nose limited forward vision on the ground and also made it hard to see the Landing signal officer on final approach

to a carrier landing. Its spin characteristics made recovery difficult as the nose dropped and the spin tended to tighten. Nevertheless, the Corsair was a thoroughbred with top-notch acceleration, speed, and maneuverability, respected and feared by its opponents. Some Japanese pilots called the Corsair "Whistling Death" because in a dive the wind whistled through the big fighter's wing-mounted oil coolers.

### ***Tips for combat–Corsair***

The Corsair is very big, very tough, and very fast. Like most other advanced fighters in the Pacific, it is at its best at high speeds and altitudes.

- ⊙ Use the Corsair's power, acceleration, and maneuverability to engage enemy fighters at higher speeds and altitudes where the Zero and *Hayabusa* struggle to compete and where the *Shiden* will find it hard to out-fly you.
- ⊙ If attacked, turn in to the enemy for a head-on attack or, altitude permitting, use the Corsair's mass and power to dive away from attackers.

## **OTHER (NON-PLAYER-FLYABLE) AIRCRAFT**

In addition to the seven player-flyable aircraft, Combat Flight Simulator populates the skies of the Pacific theater with 13 computer-controlled planes for you to defend or attack.



### ***Bell P-39D Airacobra (USAAF)***

Empty/Max Weight & Dimensions:

**Weight:** 5,642 / 7,650 lbs (2,564 / 3,477 kg) **Span:** 34' (10.3 m) **Length:** 30' 9" (9.2 m)

**Engine:** Allison V-1710-35 liquid-cooled V-12, 1,150 hp

**Armament:** One 37 mm M4 cannon w/30 rds and two .50-cal machine guns w/300 r.p.g. in nose, four .30-cal machine guns w/1,000 r.p.g. in wings, + one bomb up to 500 lbs

**Max speed @ altitude:** 313 knots/360 mph (579 km/h) @ 15,000 ft (4,572 m)

**Ceiling:** 32,100 ft (9,784 m) **Initial climb rate:** 2,630 ft (802 m)/min

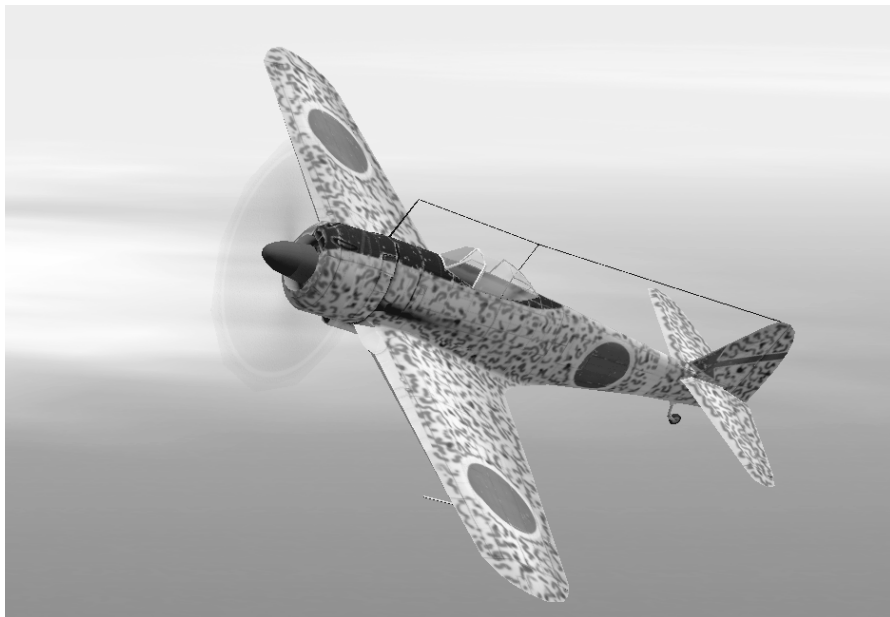
**Range:** 600 miles (965 km); w/drop tank, 1,100 mi (1,770 km)

After Pearl Harbor, the P-39, along with the Curtiss P-40, was pressed into service in the Pacific until more competitive fighters became available. The P-39 was a radical design originally intended as a high-altitude, high-speed interceptor with a turbocharged Allison V-12 engine mounted amidships, behind the pilot. A 37-mm cannon firing through the propeller hub, car-type doors, and a modern tricycle undercarriage all marked the Airacobra as a forward-thinking

design, but the Allison V-12 proved more reliable without a turbocharger, so the production P-39 got the downgraded engine. This change made the P-39 a sitting duck for Japanese fighters, but it performed well at lower altitudes and was a formidable ground attack aircraft. Its big, nose-mounted cannon and twin .50-caliber guns more than made up for the limited punch of its four wing-mounted .30-caliber machine guns.



*P-39 Airacobra: a marginal fighter, but a great machine for ground attack. (Corbis)*



***Nakajima Ki-43-IIb Hayabusa (Peregrine falcon) "Oscar" (Japanese Army)***

Empty/Max Weight & Dimensions:

**Weight:** 4,211 / 5,710 lbs (1,910 / 2,590 kg) **Span:** 35' 6.75" (10.8 m)

**Length:** 29' 3.3" (8.9 m)

**Engine:** Nakajima Sakae 21 14-cyl. air-cooled radial, 1,130 hp

**Armament:** Two 12.7 mm (.50-cal) Type 1 machine guns on nose w/250 r.p.g. and two 550-lb (250 kg) bombs

**Max speed @ altitude:** 286 knots/329 mph (530 km/h) @ 13,125 ft (4,000 m)

**Ceiling:** 36,750 ft (11,200 m) **Initial climb rate:** 3,250 ft (990 m)/min

**Range:** 1,095 mi (1,760 km); w/drop tanks, 1,990 mi (3,200 km)

The *Hayabusa* was Japan's most numerous fighter. This Army equivalent of the Mitsubishi Zero was even lighter and more maneuverable than its Navy counterpart, and it shared many of the same strengths and weaknesses. Japanese Army Air Force pilots used its superb low-speed maneuverability to good effect, but its Spad-like armament

of two nose-mounted machine guns delivered comparatively little punch even when uprated in the IIb model from 7.7 mm to 12.7 mm. Hellcats, Corsairs, and P-38s could use their superior speed and firepower to engage the Oscar successfully, and it took very few hits to reduce this nimble but fragile fighter to flaming wreckage.



### ***Aichi D3A1 "Val" dive-bomber (IJN)***

Empty/Max Weight & Dimensions:

**Weight:** 5,309 / 8,047 lbs (2,408 / 3,650 kg) **Span:** 47' 1.5" (14.4 m)

**Length:** 33' 5.5" (10.2 m)

**Engine:** Mitsubishi Kinsei 44 14-cyl. air-cooled radial, 1,075 hp

**Armament:** Three 7.7 mm (.303-cal) machine guns (two in wings, one in rear cockpit on flexible mount)

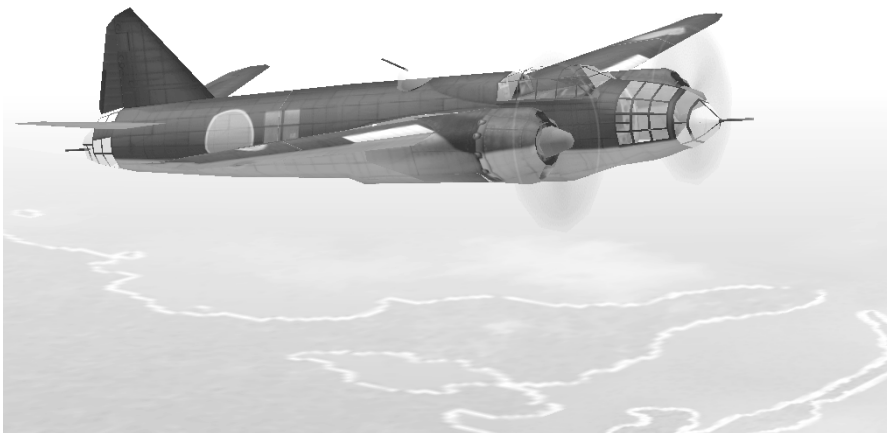
**Max speed @ altitude:** 210 knots/242 mph (389 km/h) @ 9,840 ft (3,000 m)

**Ceiling:** 31,170 ft (9,500 m) **Initial climb rate:** 1,525 ft (465 m)/min

**Range:** 1,131 mi (1,820 km)

Fixed landing gear made the Val look obsolete, but like the German *Stuka*, the Val was a highly accurate and successful dive-bomber. It was also very maneuverable and not an easy target for early-war American fighters. It served with deadly

distinction at Pearl Harbor, the Coral Sea, and Midway. Although Vals became increasingly vulnerable to Allied fighters, they remained in service and posed a serious threat to the U.S. fleet.



### ***Mitsubishi G4M2 "Betty" medium bomber (IJN)***

Empty/Max Weight & Dimensions:

**Weight:** 17,623 / 33,070 lbs (7,994 / 15,000 kg) **Span:** 81' 7.75" (25.0 m)

**Length:** 64' 4.75" (19.6 m)

**Engine:** Two Kasei 22 14-cyl. air-cooled radials, 1,850 hp each

**Armament:** Three 7.7 mm (.303-cal) machine guns in nose, dorsal, and ventral positions, and one 20 mm cannon in tail. Bomb load: 2,205 lb (1,000 kg) or one 1,764-lb (800 kg) torpedo

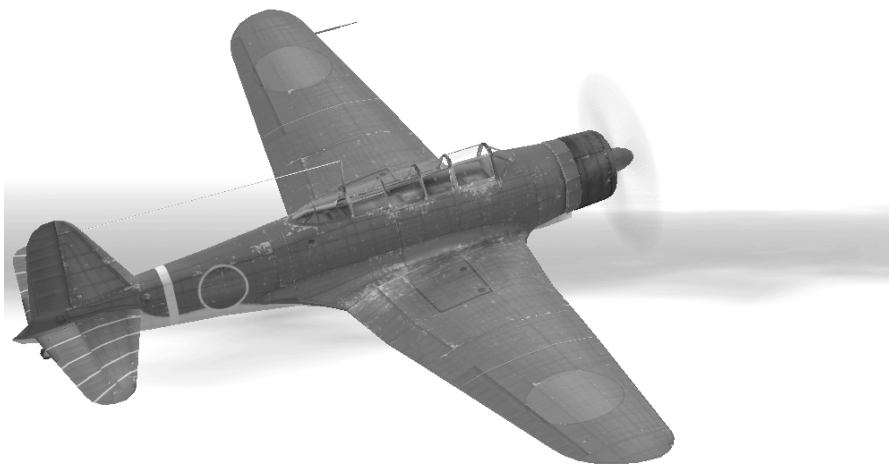
**Max speed @ altitude:** 236 knots/271 mph (437 km/h) @ 16,895 ft (5,150 m)

**Ceiling:** 30,000 ft (9,144 m) **Initial climb rate:** 1,380 ft (420 m)/min **Range:** 2,982 mi (4,800 km)

The major Japanese bomber of WWII, the G4M2 could carry one ton of bombs over a very long range. The Americans called it the "Betty" and knew it meant trouble when it approached ships or bases. The Japanese often used Bettys to attack Allied warships, flying in from altitudes of 50 feet or less to bomb slow-moving vessels. U.S. fighter pilots soon learned that the Mitsubishi lacked a rugged

structure, armor, and self-sealing tanks. Some called it "the flying Zippo," because so many went down in flames. Its most famous passenger, Admiral Isoroku Yamamoto, died in one, shot down by American P-38s. Despite its problems, the Betty remained in production and was still a threat when it could elude U.S. combat air patrols and get in close to drop its bombs.





### ***Nakajima B5N2 "Kate" torpedo bomber (IJN)***

Empty/Max Weight & Dimensions:

**Weight:** 5,024 / 9,039 lbs (2,279 / 4,100 kg) **Span:** 50' 11" (15.5 m)

**Length:** 33' 9.5" (10.3 m)

**Engine:** Nakajima Sakae 21 14-cyl. air-cooled radial, 1,115 hp

**Armament:** Four 7.7 mm (.303-cal) machine guns (two on nose, two in rear cockpit). Centerline rack for one 1,764-lb (800 kg) torpedo or three 551-lb (250 kg) bombs

**Max speed @ altitude:** 204 knots/235 mph (378 km/h) @ 11,810 ft (3,600 m)

**Ceiling:** 25,000 ft (7,640 m) **Initial climb rate:** 1,378 ft (420 m)/min

**Range:** 609 mi (980 km)

This slow-flying Japanese torpedo bomber delivered a mighty blow against the U.S. Pacific Fleet at Pearl Harbor and served successfully in the battles of the Coral Sea and Midway. It was vulnerable to fighter attack, particularly when making

a torpedo run. The Nakajima B6N "Jill" was starting to replace it, but the "Kate" remained in service as a long-range reconnaissance and antisubmarine aircraft and in the kamikaze role.



***Douglas TBD-1 Devastator torpedo bomber (USN)***

Empty/Max Weight & Dimensions:

**Weight:** 6,182 / 10,194 lbs (2,810 /4,633 kg) **Span:** 50' (15.2 m) **Length:** 35' (10.7 m)

**Engine:** Pratt & Whitney R-1830-64 9-cyl. air-cooled radial, 900 hp

**Armament:** One fixed, forward-firing .30-cal plus one flexible dorsal .30-cal, plus one 1,000-lb torpedo (external)

**Max speed @ altitude:** 179 knots/206 mph (331 km/h) @ 8,000 ft (2,438 m)

**Ceiling:** 19,700 ft (6,004 m) **Initial climb rate:** 720 ft (219 m)/min

**Range:** 716 miles (1,152 km)

In service with the U.S. Navy since 1937, the Devastator was successful early in the war against Japanese forces in the Gilbert and Marshall Islands. But by June 1942 obsolete Devastators, flying low and slow

to drop their torpedoes, were slaughtered by Japanese fighters at the Battle of Midway. They were quickly withdrawn from combat, replaced by the Grumman TBF Avenger.



### ***Grumman TBF-1 Avenger torpedo bomber (USN)***

Empty/Max Weight & Dimensions:

**Weight:** 10,080 / 13,667 lbs (4,576 / 6,205 kg) **Span:** 54' 2" (16.5 m) **Length:** 40' (12.2 m)

**Engine:** Wright R-2600-8 Double Cyclone 14-cyl.. air-cooled radial, 1,700 hp

**Armament:** One forward firing .30-cal machine gun, one .50-cal machine gun in aft turret; one ventral (belly-mounted) .30-cal machine gun on flexible mount, plus 2,000 lb (908 kg) of bombs, depth charges, or torpedo

**Max speed @ altitude:** 236 knots/271 mph (436 km/h) @ 15,000 ft (4,572 m)

**Ceiling:** 21,400 ft (6,527 m) **Initial climb rate:** 1430 ft (436 m)/min

**Range:** 1,215 mi (1,955 km)

Dubbed the “Pregnant Turkey” by naval aviators, the Avenger took on one of the most dangerous flying missions of the war—low, slow, straight runs toward ships blazing with antiaircraft armament. Like all aircraft produced by the Grumman

“Iron Works,” the Avenger was stoutly constructed and brought many a crew home safely. It was also versatile, performing well in bombing and ground attack missions throughout the Pacific theater.



***Douglas SBD-2 Dauntless dive-bomber (USN)***

Empty/Max Weight & Dimensions:

**Weight:** 6,675 / 10,855 lbs (3,030 / 4,928 kg) **Span:** 41' 6.25" (12.7 m) **Length:** 33' (10 m)

**Engine:** Wright R-1820-52 Cyclone 9-cyl. air-cooled radial, 1,000 hp

**Armament:** Two forward-firing .50-cal machine guns, two rear-firing .30-cal guns in flexible mounts. Bomb load: 1,200 lbs (545 kg)

**Max speed @ altitude:** 213 knots/245 mph (394 km/h) @ 14,000 ft (4,267 m)

**Ceiling:** 24,300 ft (7,412 m) **Initial climb rate:** 1,190 ft (363 m)/min

**Range:** 1,100 mi (1,770 km)

The Dauntless, or SBD (Scout Bomber, Douglas, but dubbed "Slow But Deadly" by some crews) was the primary U.S. dive-bomber. Dauntless crews destroyed much of the Japanese fleet in early battles, and the aircraft's maneuverability allowed its pilots and rear gunners greater versatility.

From a distance the Dauntless was often mistaken for a Zero by both friend and foe. This endangered SBD crews, but also brought some enemy fighters within range.



### ***North American B-25D/PBJ Mitchell medium bomber (USN)***

Empty/Max Weight & Dimensions:

**Weight:** 19,480 / 35,000 lbs (8,836 / 15,876 kg) **Span:** 67'7" (20.6 m) **Length:** 52'11" (16.1 m)

**Engine:** Two Wright R-2600-92 radials, 1,700 hp each

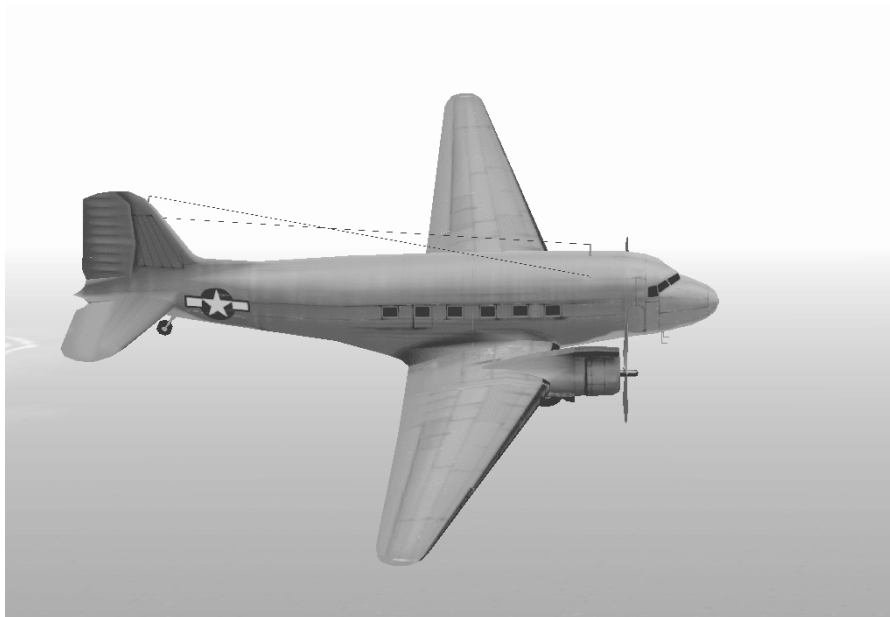
**Armament:** 12 .50-cal machine guns plus eight 5-inch rockets under wings and 3,000 lbs of bombs

**Max speed @ altitude:** 236 knots/272 mph (438 km/h) @ 13,000 ft (3,960 m)

**Ceiling:** 24,200 ft (7,375 m) **Initial climb rate:** 860 ft (265 m)/min **Range:** 1,350 mi (2,173 km)

First flown in 1940, the B-25 may have been the best medium bomber of the war. It was named, appropriately, for General William "Billy" Mitchell, one of the earliest and most persistent American advocates of air power. B-25s struck America's first retaliatory blow against Japan after the attack on Pearl Harbor—the carrier-based raid on Tokyo led by "Jimmy" Doolittle. The Mitchell was also a formidable weapon against surface targets. In the Pacific,

some Army and Marine Corps B-25s replaced the plane's Plexiglas nose with a weapons compartment crammed with eight .50-caliber Brownings. They also mounted four or more additional guns on the sides of the nose. A dozen forward-firing .50s made almost any surface target vulnerable, up to and including destroyers and light cruisers. In whatever role it was used, the Mitchell was stable, easy to fly, maneuverable, and highly effective.



### ***Douglas C-47 Skytrain (USAAF)/R4D (USN) Transport***

Empty/Max Weight & Dimensions:

**Weight:** 18,200 / 26,000 lbs (8,256 / 11,805 kg) **Span:** 95' 6" (29.1 m)

**Length:** 63' 9" (19.4 m)

**Engine:** Two Pratt & Whitney R-1839-92 radials, 1,200 hp each

**Max speed @ altitude:** 200 knots/230 mph (370 km/h) @ 8,500 ft (2,590 m)

**Ceiling:** 24,000 ft (7,315 m) **Initial climb rate:** 1,040 ft (645 m)/min

**Range:** 1,600 mi (2,575 km)

The Douglas DC-3 commercial airliner became the single most important Allied military transport aircraft of the war. More than 10,000 were built for military service. It delivered uncountable tons of supplies and ferried personnel in every theater of

the war. According to General Eisenhower, three vehicles were instrumental in achieving Allied victory: the landing craft, the Jeep—and the military version of the DC-3.



### ***Consolidated PB4Y/B-24D Liberator heavy bomber (USN)***

Empty/Max Weight & Dimensions:

**Weight:** 37,000 / 65,000 lbs (16,783 / 29,484 kg) **Span:** 110' (33.5 m) **Length:** 67' 2" (20.5 m)

**Engine:** Four Pratt & Whitney R-1830-65 Twin Wasp 14-cyl. two-row radial, 1,200 hp each

**Armament:** Ten .50 Browning machine guns (four two-gun turrets plus two in waist).  
Bomb load: 8,000 lb (3,629 kg) internal or two 4,000-lb (1814 kg) bombs external

**Max speed @ altitude:** 252 knots/290 mph (467 km/h) @ 25,000 ft (7,620 m)

**Ceiling:** 28,000 ft (8,534 m) **Initial climb rate:** 900 ft (274 m)/min

**Range:** 2,200 miles (3,450 km)

The B-24 Liberator was produced in greater numbers than any other American military aircraft, with 18,000 of these big bombers rolling off the assembly lines. The slab-sided Liberator looked and handled like a big truck, but it could carry four tons of bombs internally and carry them much farther than the Boeing B-17. On the other hand, its thin Davis wing

made the Liberator a handful to hold in formation at high altitudes. It couldn't fly as high as the B-17, and wasn't as resistant to battle damage. Nevertheless, the Liberator was well armed and as tough for fighters to attack as the Flying Fortress. Its superior range made it an exceptional maritime patrol aircraft and a formidable ship and submarine killer.





## FIGHTER AIRCRAFT STRENGTHS & WEAKNESSES

Aircraft	Strengths	Weaknesses
<b>Mitsubishi A6M2/A6M5 Zero (JNAF)</b>	Excellent climb rate and maneuverability Very long range at low speeds	Light construction, low survivability No armor or self-sealing tanks
<b>Nakajima N1K2-J <i>Shiden</i> Kai (JNAF)</b>	Excellent speed and maneuverability Four 20 mm cannon provide very heavy firepower	Poor engine reliability
<b>Grumman F4F-3 Wildcat (USN)</b>	Typical Grumman construction—tough and rugged Four, later six .50-cal guns provide good firepower Good armor protection & self-sealing tanks Easy, even fun to fly	Slow climb rate Limited speed, maneuverability, and range Narrow, hand-cranked landing gear
<b>Grumman F6F-3 Hellcat (USN)</b>	Rugged Grumman construction, excellent survivability Armor and self-sealing tanks increase survivability Competitive speed and excellent maneuverability Six .50-cal guns mean serious firepower Robust hydraulic wide-track landing gear Easy to fly and to maintain	Not as fast as other first-rate American fighters Not as maneuverable as some Japanese fighters

<b>Aircraft</b>	<b>Strengths</b>	<b>Weaknesses</b>
<b>Lockheed P-38F Lightning (USAAF)</b>	<p>Fast, good climb rate, and, except for the P-47, unbeatable in a dive</p> <p>Heavy armament, centralized in nose</p> <p>Counter-rotating props eliminate torque effects</p> <p>Long range with twin-engine safety</p>	<p>Not as maneuverable as smaller, lighter single-engine fighters</p> <p>Can break up in a power dive due to “compressibility” (corrected by adding dive brakes in later models)</p> <p>Turbocharged Allison engines suffered in the climate of northwest Europe, but thrived in the Pacific</p>
<b>Vought F4U-1A Corsair (USN, USMC)</b>	<p>High speed, excellent maneuverability</p> <p>Heavy armament (six .50-cal guns)</p>	<p>Limited forward visibility</p> <p>Spin characteristics can surprise the unwary pilot</p>
<b>Bell P-39D Airacobra (non-player-flyable)</b>	<p>Cannon and heavy machine guns in nose make up for rifle-caliber wing guns. Combined armament makes Airacobra an excellent ground-attack aircraft.</p> <p>Tricycle landing gear avoids “tail-dragger” landing problems</p>	<p>No turbocharger means anemic performance above 15,000 feet</p>
<b>Nakajima Ki-43 IIb Hayabusa (non-player flyable)</b>	<p>Even more maneuverable than the Zero</p>	<p>Even lighter construction than the Zero, poor survivability</p> <p>No armor or self-sealing tanks</p> <p>Light armament, even with the two nose guns upgraded to 12.7 mm (.50 cal)</p>

## THE WARSHIPS

The Pacific war was first and foremost a war of ships. No fighter aircraft, no tank, no soldier, rifle, or can of beans arrived in the Pacific theater except aboard a ship. And the huge expanses of ocean, sprinkled with few sites suitable for land bases, changed naval thinking on both sides. Before the war the battleship and its big guns ruled the sea. Now it was the aircraft carrier and its planes that would win or lose the war.



*Carrier: Soryu class*

### Japanese capital ships

**Carrier: Soryu class**

(1937-1939, 2 ships): *Soryu* (Green Dragon) & *Hiryu* (Flying Dragon)

(Specifications apply to Hiryu)

**Displacement:** 17,300 tons

**Length (overall):** 746 ft

**Beam (flight deck):** 88.5 ft

**Speed:** 34.33 knots

**Number of aircraft:** 73

**Armament:** 12 x 5-in. (127 mm),  
31 x 25 mm

Launched in 1937, the *Soryu* included a number of compromises to get around the tonnage requirements of the Washington Naval Treaty. This design resulted in stability, seaworthiness, and range

problems addressed to some extent in the *Hiryu*, completed two years later. The improved design included additional tonnage of ballast and a taller forecastle. However, her port-side island and starboard exhaust uptakes caused turbulence across the flight deck, her deck layout limited the space available for landing aircraft, and she still had less range than similar American carriers. Both the

*Soryu* and the *Hiryu* were lost in the Battle of Midway on June 4 and June 5 1942, when bombs penetrated their unarmored flight decks.



*Battleship: Kongo class*

**Battleship: *Kongo* class**

(1913-1915, 4 ships): *Kongo* (sunk 21 Nov 1944) *Hiei* (scuttled 13 Nov 1942), *Haruna* (sunk 19 March 1945), and *Kirishima* (sunk 15 Nov 1942)

**Displacement:** 32,156 tons

**Length (overall):** 723.5 ft

**Beam:** 95.25 ft

**Speed:** 30 knots

**Armament:** 8 x 14-in (356 mm), 8 x 6-in (152 mm), 118 x 25 mm

The *Kongo*, the lead ship in this class, was built by Vickers in England as a battle cruiser. The other three ships were built in Japan, using many British-made parts. Reconstructed twice between the wars, they got greatly increased anti-aircraft armament and were classified as fast battleships, suitable for escorting carrier

task forces. Their origin as British battle cruisers involved an inherent weakness: thin armor gave them speed but made them vulnerable to heavy gunfire, bombs, and torpedoes. The *Hiei* and the *Kirishima* were sunk less than a week apart in November 1942 during battles around Guadalcanal. While the *Hiei* succumbed to a combined attack by enemy ships and aircraft, the *Kirishima* was

destroyed in a big-gun duel with American battleships. In late 1944 the *Kongo* was sunk by a British submarine, and a few months later the last of the class, the *Haruna*, was sunk by U.S. carrier-based aircraft.

**Heavy cruiser:**

***Mogami* class**

(1934-36, 4 ships):

*Mogami* (sunk 25 Oct 1944),

*Mikuma* (sunk 6 June 1942),

*Kumano* (sunk 25 Nov 1944),

& *Suzuya* (sunk 25 Oct 1944).

**Displacement:** 12,400 tons

**Length (overall):** 661.1 ft

**Beam:** 66.3 ft

**Speed:** 34.5 knots

**Armament (1943):** 6 x 7.9-in (200 mm), 8 x 5-in (127 mm), 30 x 25 mm



*Heavy cruiser: Mogami class*

Originally conceived as light cruisers, the *Mogami*-class ships stretched the definition of the class with increased armament and tonnage. The original version was overburdened and required changes to increase hull strength and stability. As modified, the fast and heavily armed *Mogamis* spurred construction of similar vessels in Great Britain and the

United States. The *Mikuma* was sunk and the *Mogami* badly damaged at the Battle of Midway in June 1942. Rebuilt, the *Mogami* was sunk after sustaining terminal damage in the Battle of Surigao Strait in October 1944. The *Suzuya* was sunk the next day off Samar, and a month later the *Kumano* at Dasol Bay in the Philippines.

**"NATURALLY, THE CHARACTERISTICS OF THE PLANE DETERMINE THE TACTICS. THE ZERO COULD OUT-MANEUVER, OUT-CLIMB, OUT-SPEED US. ONE ZERO AGAINST ONE GRUMMAN IS NOT AN EVEN FIGHT, BUT WITH MUTUAL SUPPORT TWO GRUMMANS ARE WORTH BETWEEN FOUR AND FIVE ZEROS, AND SO ON UP."**

**-FROM BUREAU OF AERONAUTICS INTERVIEW OF  
MAJ. J.N. RENNER, USMC (COMMANDING OFFICER, VMO-25;  
OPERATIONS OFFICER, MAG-11), 7/17/43**

## U.S. capital ships

### Carrier: *Yorktown* class

(1937-1941, 3 ships):

*Yorktown* (CV-5), *Enterprise* (CV-6) & *Hornet* (CV-8)

**Displacement:** 19,900 tons

**Length (overall):** 810 ft

**Beam (flight deck):** 114 ft

**Speed:** 32.5 knots

**Number of aircraft:** 85

**Armament:** 8 x 5-in., 16 x 1.1-in (28 mm), 23 x 20 mm

Completed in the years just before WWII, the three

*Yorktown* class ships were the largest purpose-built American carriers laid down before the war. They carried about 75 aircraft and were highly maneuverable, with about half the turning radius of the even larger *Lexington*-class carriers. Despite their unarmored decks, these ships could take a lot of damage. The *Yorktown*, damaged in the Battle of the Coral Sea, was repaired, only to be even more badly damaged by Japanese aircraft at Midway, and then torpedoed and sunk by a Japanese submarine.



Carrier: *Yorktown* class

The *Hornet*, which gained fame as the ship that took “Jimmy” Doolittle’s 16 B-25 bombers within range of Tokyo in April 1942 (escorted by her sister ship *Enterprise*), was sunk six months later at Santa Cruz Island in the Solomons. The *Enterprise* remained in service throughout the war.



*Carrier: Essex class*

**Carrier: Essex class**

(1942-1945, 24 ships) including *Essex* (CV-9), *Franklin* (CV-13), *Hancock* (CV-19), and *Oriskany* (CV-34)

**Displacement:** 36,380 tons

**Length (overall):** 899 ft

**Beam (flight deck):** 147.5 ft

**Speed:** 33 knots

**Number of aircraft:** 80-100

**Armament:** 12 x 5-in., 68 x 40 mm, 52 x 20 mm

The *Essex* class carriers were based on lessons learned with the *Yorktown* class and became the most numerous and most successful of all WWII American carriers. Better armed and armored than their predecessors, many ships of this

class sustained major damage from air attacks, but none was ever sunk. The *Franklin* (CV-13) survived a kamikaze attack in October 1944 that ripped a 40-foot hole in her flight deck. Five months later, two bomb hits caused far greater damage and ended her war. With 80 to 100 aircraft, *Essex*-class ships could launch devastating raids on enemy targets.

With their ability to sustain 20 knots astern for more than an hour, they could retrieve their aircraft over the bow if battle damage made it impossible to use the landing ramp on the stern.



*Battleship: South Dakota class*

**Battleship: *South Dakota* class**

(1942, 4 ships): *South Dakota*, *Alabama*, *Indiana*, and *Massachusetts*.

**Displacement:** 39,000 tons

**Length (overall):** 681 ft

**Beam:** 108 ft **Speed:** 28 knots

**Armament:** 9 x 16-in. (406 mm),  
20 x 5-in (127 mm), 32-68 x 40 mm,  
30-78 x 20 mm

The *South Dakota*-class battleships were based on the preceding *North Carolina* class, carrying roughly the same equipment in a more compact package. Like their predecessors (and the *Iowa*-class ships to follow) the *South Dakotas* carried the massive firepower of three triple batteries of 16-inch guns. They also shared the same relatively low top speed of 28 knots, inadequate for escorting fast carrier groups.

**"THERE WERE MANY PILOTS I KNEW WHO HONESTLY LOVED WHAT THEY WERE DOING, WHO COULD NOT REST EASY UNTIL THEY FELT THEY HAD FLAILED THE SKIES AND LOOSED A HAIL OF BULLETS AT EVERY PLANE THAT EVER FLEW. THEY WOULD COMPLAIN WHEN THEY HAD A DAY OFF; THEY WOULD MOAN WHEN THEIR MISSION DID NOT INVITE COMBAT."**

**-EDWARDS PARKS, NANETTE**





*Heavy cruiser: Portland class*

**Heavy cruiser: *Portland* class**

(1931-32, 2 ships): *Portland* (CA-33, scrapped 1959), and *Indianapolis* (CA-35, sunk by submarine 30 July 1945).

**Displacement:** 9,850 tons (*Portland*) / 9,950 tons (*Indianapolis*)

**Length (overall):** 610 ft

**Beam:** 66 ft

**Speed:** 32.75 knots

**Armament:** (after 5/43) 9 x 8-in (203 mm), 8 x 5-in. (127 mm), 24 x 40 mm, 16 x 20 mm

The *Portland*-class cruisers were based on lessons learned from experience with the earlier *Pensacola*- and *Northampton*-class cruisers. Carrying thicker armor and heavier armament, they were the heaviest of the treaty-class heavy cruisers built before the Washington Naval Treaty

lapsed and ships of all classes gained tonnage. The *Indianapolis*, refitted as a flagship in 1943, gained increased antiaircraft armament, a new bridge, updated radar and electronics, and a modern combat information center. She supported American landings on Tarawa, Kwajalein, Saipan, Guam, Palau, Iwo Jima, and Okinawa. Her last mission was to deliver the atomic

bomb to be dropped on Hiroshima from the U.S. to the airbase on Tinian in the Marianas. During her return voyage, she was torpedoed by a Japanese submarine.

## **OTHER VESSELS & VEHICLES**

These are some of the vessels and vehicles you will encounter in your missions. Be prepared for them.

### ***Japanese vessels & vehicles***



#### **Destroyer: *Kagero* class**

This formidable “heavy destroyer” is fast, heavily armed, and definitely dangerous to ships and aircraft alike. Its heavy 5-inch (127 mm) and light 25 mm guns make it risky to approach too closely, and it carries the long-range Type 93 oxygen-powered 24-inch torpedo.



#### **Torpedo boat: *Tidori* class**

This is one big torpedo boat. At 254 feet it's like a small destroyer, but its minimal antiaircraft armament make it a tempting target. Its two torpedo tubes make it a much bigger threat to ships.



#### **Submarine: I201 class**

The I201-class submarine is similar to the German Type XXI boat. It is very dangerous to ships, and on the surface a small target for aircraft.



#### **Troop ship**

This ship is a slow-moving, easy target if caught alone, but is often heavily defended by warships and aircraft flying combat air patrol.



#### **Merchant ship**

Like the troop ship, this large, slow-moving vessel is an easy target, but getting to it means avoiding flak from warships and bullets from fighter air cover. It can contain anything, from rice to bombs, so it can explode in a big way.



**Tanker/Oiler**

Hitting a tanker hard enough may yield a big explosion, but watch out for flak-firing warships and patrolling fighters.



**Barge**

These small, slow vessels make relatively easy (if small) targets, but they tend to hide along the overgrown shores of small bays and inlets by day, and they can be hard to spot. They may be carrying anything, from troops to food, fuel, and ammo, so hitting them may cause unexpected results.

## ***U.S. vessels & vehicles***



### **Destroyer: *Fletcher* class**

The *Fletcher*-class is one of the largest and most heavily armed American destroyers, carrying serious light and heavy anti-aircraft armament. Attacking one from the air can be very dangerous.



### **Submarine: *Gato* class**

When not sinking enemy ships, many of these American subs perform rescue duty, picking up pilots who have ditched. When surfaced, this is a small target for aircraft.

### **Transport, attack type**

This is a slow-moving, easy target if caught alone, but is often heavily defended by warships and aircraft flying combat air patrol.

### **PT Boat: Higgins Type (PT 71 class)**

The torpedoes and depth charges these fast, nimble boats carry make them very dangerous to larger vessels and submarines. They're a tougher target with increasing numbers of .50-cal machine guns added to their single 40 mm and twin 20 mm defensive armament.



USS Enterprise. (U.S. Navy)



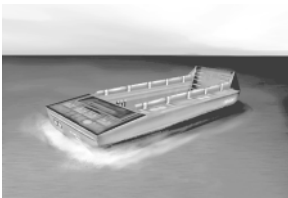
### **Cargo ship**

This large, slow-moving vessel is an easy target, but getting to it may mean avoiding flak from warships and bullets from covering fighters.



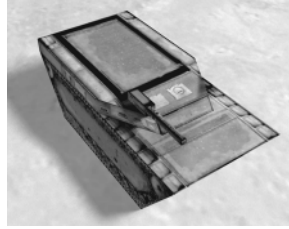
### **Tanker**

Hitting a tanker hard enough may yield a big explosion, but watch out for flak-firing warships and patrolling fighters.



### **LCI (landing craft, Infantry)**

The LCI is a small, slow-moving, unarmed target, protected only by AA guns on nearby vessels.



### **LVT-4 (landing vehicle, tracked)**

A small, slow-moving target that may shoot back, its two .30-cal or .50-cal machine guns can hit low-flying aircraft.



### **M5A1 Stuart light tank**

A small, vulnerable target, but some versions carry a .50-cal machine gun that with luck can take a piece out of low-flying aircraft.



### **M4A1 Sherman medium tank**

The biggest tank in the Pacific theater, it's still a small target for aircraft. Attacking with 7.7 mm machine guns is a waste of time, but larger guns and cannon can slow down or destroy it. With a lot of luck, its turret-mounted .50-cal machine gun can bring down low-flying aircraft.



### **M3A1 halftrack**

A small, usually vulnerable target. But depending on its armament, this utility vehicle may make attack from the air a dangerous proposition. Usually limited to a single .30- or .50-cal machine gun, some special versions carry multiple .50s, or even 20 mm or 40 mm AA guns.



### **2.5-ton ("Deuce-and-a-Half") 6 x 6 Truck**

Depending on what it's carrying, this truck could explode in a fairly big way.



### **Wilys MB Jeep**

This small, nimble vehicle may carry a .50-caliber Browning machine gun, which gives the humble Jeep a long reach and a powerful punch.

## AIRCRAFT ARMAMENTS

### Rifle-Caliber (Light) Machine Guns

Type 97 7.7 mm/.303-cal (Zero)

**Projectile weight:** 0.4 oz. (11.3g)

**Muzzle velocity:** 2,460 ft/sec (750 m/sec)

**Rate of fire:** 1,000 rpm

**Ammo types:** Armor piercing, incendiary, tracer

**High lethality requires:** >30 hits

Strengths	Weaknesses
High rate of fire.	Rifle-caliber round lacks range and hitting power of larger guns and cannon.
Numerous hits can do major damage.	If none of your hits strike a vital spot, a well-armored adversary can still get home.

Browning M2 .30-in./7.62 mm (Airacobra)

**Projectile weight:** 0.344 oz. (9.73g)

**Muzzle velocity:** 2,800 ft (854m)/sec

**Rate of fire:** 1,200 rpm

**Ammo types:** Armor-piercing, incendiary, tracer

**High lethality requires:** >30 hits

Strengths	Weaknesses
High rate of fire.	Rifle-caliber round lacks range and hitting power of larger guns and cannon.
Numerous hits can do major damage.	

Heavy Machine Guns

Browning M2 .50-in./12.7 mm  
(Wildcat, Hellcat, Corsair, Lightning, Airacobra)

**Projectile weight:** 1.7 oz. (48.5g)

**Muzzle velocity:** 2,750 ft/sec (838 m/sec)

**Rate of fire:** >800 rpm

**Ammo types:** Armor piercing, incendiary, tracer, and API (armor-piercing incendiary)

**High lethality requires:** 15-20 hits

Strengths	Weaknesses
Flat trajectory, long reach, good hitting power.	Lacks destructive power of larger cannon.
Short, well-aimed burst can tear a lightweight fighter apart or cause it to explode.	
API round pierces aircraft skin, then explodes inside structure for maximum damage.	
Can destroy surface targets such as tanks or small ships.	

HO-103 12.7 mm/.50-cal (Hayabusa IIb)

**Projectile weight:** 1.34 oz. (38g)

**Muzzle velocity:** 2,610 ft/sec (796 m/sec)

**Rate of fire:** 900 rpm

**Ammo types:** Armor piercing, incendiary, tracer

**High lethality requires:** >20 hits

Strengths	Weaknesses
Flat trajectory, long reach, hitting power.	Lacks destructive power of larger cannon.
Short, well-aimed burst can do major damage.	
Can destroy surface targets such as light tanks or small ships.	



### ***Aircraft Cannon***

Type 99–1 20 mm (A6M2)

**Projectile weight:** 4.55 oz. (129g)

**Muzzle velocity:** 1,722 ft/sec (525 m/sec)

**Rate of fire:** 520 rpm

**Ammo types:** Incendiary and high-explosive

**High lethality requires:** >10 hits on fighter, >15 hits on medium bomber

Strengths	Weaknesses
Heavy projectile hits hard.	Slow rate of fire.
	Low velocity, drooping trajectory.

Type 99–2 20 mm (A6M5, Shiden)

**Projectile weight:** 4.55 oz. (129g)

**Muzzle velocity:** 2,050 ft/sec (625 m/sec)

**Rate of fire:** 490 rpm

**Ammo types:** Incendiary and high-explosive

**High lethality requires:** >10 hits on fighter, >15 hits on medium bomber

Strengths	Weaknesses
Heavy projectile hits hard.	Slow rate of fire.
	Relatively low velocity, drooping trajectory.

Hispano M1 20 mm (P-38 Lightning)

**Projectile weight:** 4.58 oz. (130g)

**Muzzle velocity:** 2,500 ft/sec

**Rate of fire:** 750 rpm

**Ammo types:** Incendiary and high-explosive

**High lethality requires:** >10 hits on fighter, >15 hits on medium bomber

Strengths	Weaknesses
Fires hefty 1/4-lb projectile at high velocity; can inflict major damage.	Bulky ammo limits load to 150 rounds.
Combines with four .50-cal guns to give the P-38 very heavy firepower.	

American Armament Corp. M4 37 mm (Airacobra)

**Projectile weight:** 21.4 oz. (608g)

**Muzzle velocity:** 2,000 ft/sec (610 m/sec)

**Rate of fire:** 140 rpm

**Ammo types:** High-explosive

**High lethality requires:** 1 hit

Strengths	Weaknesses
Extremely heavy round with high destructive power makes this an excellent surface-attack weapon.	Very low rate of fire.
A lucky hit with its big, heavy round can knock an airplane out of the sky.	Bulky ammo limits load to 30 rounds.
	Low velocity and excessively drooping trajectory makes it a poor air-to-air weapon.

**ROCKETS**

5-in./12.7 cm air-to-ground rocket (Wildcat, Hellcat, Corsair)

**Projectile weight:** >50 lbs. (22.7 kg)

**Max. velocity:** 1,050 ft/sec (320 m/sec)

**High lethality requires:** Detonation within <15 yds.

Strengths	Weaknesses
Warhead packs a lot of explosive power.	Not very accurate.
Effective against ground/surface targets; can destroy tanks, trucks, small vessels, structures.	Drooping trajectory makes it ineffective as an air-to-air weapon.



## JOYSTICK COMMANDS

Here are the main commands you can make with your joystick.

Action	Command
Bank left (ailerons)	Move stick left
Bank right (ailerons)	Move stick right
Pitch down (elevator)	Move stick forward
Pitch up (elevator)	Move stick backward
Yaw left (rudder)	Twist stick left (Not all joysticks can do this)
Yaw right (rudder)	Twist stick right (Not all joysticks can do this)
View up 45 degrees	Hat up
View left 45 degrees	Hat up/left
View left	Hat left
View left 135 degrees	Hat down/left
View right 45 degrees	Hat up/right
View right	Hat right
View right 135 degrees	Hat down/right
View rear	Hat down
Fire guns	Button <b>1</b> (Trigger)
Fire cannons	Button <b>2</b>
Next target	Button <b>3</b>
Previous target	Button <b>4</b>
Fire rocket	Button <b>5</b>
Release bomb	Button <b>6</b>
Engage WEP or W/M-W injection (toggle)	Button <b>7</b>
Padlock view (toggle)	Button <b>8</b>



## KEYBOARD COMMANDS

Here are the keyboard commands for Combat Flight Simulator. While you're flying, press the **F2** key to bring up the keyboard commands Quick Reference screen, which lists the basic commands you'll use the most. These are also listed on the back cover of this manual.

**Note:** All keyboard commands noted in this manual are the CFS2 combat keyboard commands. If you want to change your settings to your own keyboard commands, click **Settings** on the Main screen and follow the prompts.

Action	CFS2 Combat Command	Flight Sim/CFS1 Command
In-game menu (toggle when in full screen mode)	<b>ALT</b> key	<b>ALT</b> key
Open online Help	<b>F1</b>	<b>F1</b>
Keyboard commands Quick Reference	<b>F2</b>	<b>F2</b>
Pause	<b>P</b> key	<b>P</b> key
Skip to next waypoint	<b>X</b> key	<b>X</b> key
Bail out	<b>O</b> key (press three times)	<b>O</b> key (press three times)
Select time compression (toggle)	<b>CTRL+T</b>	<b>R</b> key
Sound (toggle)	<b>Q</b> key	<b>Q</b> key
End Training Mission	<b>CTRL+SHIFT+M</b>	<b>CTRL+U</b>
Reset Training Mission	<b>CTRL+M</b>	<b>CTRL+R</b>
Exit game	<b>CTRL+Q</b>	<b>CTRL+Q</b>
Exit game immediately	<b>CTRL+BREAK</b>	<b>CTRL+BREAK</b>

## FLIGHT COMMANDS

These commands are the ones you'll use primarily to fly your airplane. For details, see Chapter 3, **Flight School**.

Action	CFS2 Combat Command	Flight Sim/CFS1 Command
Bank left (ailerons)	Num Pad <b>4</b>	Num Pad <b>4</b>
Bank right (ailerons)	Num Pad <b>6</b>	Num Pad <b>6</b>
Aileron trim left	<b>CTRL</b> +Num Pad <b>4</b>	<b>CTRL</b> +Num Pad <b>4</b>
Aileron trim right	<b>CTRL</b> +Num Pad <b>6</b>	<b>CTRL</b> +Num Pad <b>6</b>
Yaw left (rudder)	Num Pad <b>0</b>	Num Pad <b>0</b>
Yaw right (rudder)	Num Pad <b>ENTER</b>	Num Pad <b>ENTER</b>
Rudder trim left	<b>CTRL</b> +Num Pad <b>0</b>	<b>CTRL</b> +Num Pad <b>0</b>
Rudder trim right	<b>CTRL</b> +Num Pad <b>ENTER</b>	<b>CTRL</b> +Num Pad <b>ENTER</b>
Bank/Yaw center (ailerons/rudder)	Num Pad <b>5</b>	Num Pad <b>5</b>
Pitch down (elevator)	Num Pad <b>8</b>	Num Pad <b>8</b>
Pitch up (elevator)	Num pad <b>2</b>	Num pad <b>2</b>
Elevator trim up	Num Pad <b>1</b>	Num Pad <b>1</b>
Elevator trim down	Num Pad <b>7</b>	Num Pad <b>7</b>
Retract flaps fully	<b>SHIFT</b> + <b>V</b>	<b>F5</b>
Retract flaps in increments	<b>V</b> key	<b>F6</b>
Extend flaps in increments	<b>F</b> key	<b>F7</b>
Extend flaps fully	<b>SHIFT</b> + <b>F</b>	<b>F8</b>
Spoilers/Dive brakes (toggle)	<b>D</b> key	<b>/</b> key <b>(FORWARD SLASH)</b>
Tailhook (toggle)	<b>SHIFT</b> + <b>H</b>	<b>SHIFT</b> + <b>G</b>

## ENGINE COMMANDS

These commands help you make the most efficient use of your aircraft's engine. To learn more about using engine controls, see "Engine Controls" in Chapter 3, **Flight School**.

Action	CFS2 Combat Command	Flight Sim/CFS1 Command
Display/Hide engine controls	<b>F5</b>	<b>SHIFT+2</b>
Auto engine start	<b>E</b> key	<b>E</b> key
Decrease throttle	<b>- (MINUS SIGN)</b>	<b>F3</b>
Increase throttle	<b>= (EQUAL SIGN)</b>	<b>F4</b>
50% throttle	<b>5</b> (keyboard)	<b>5</b> (keyboard)
60% throttle	<b>6</b> (keyboard)	<b>6</b> (keyboard)
70% throttle	<b>7</b> (keyboard)	<b>7</b> (keyboard)
80% throttle	<b>8</b> (keyboard)	<b>8</b> (keyboard)
90% throttle	<b>9</b> (keyboard)	<b>9</b> (keyboard)
100% throttle	<b>0</b> (keyboard)	<b>0</b> (keyboard)
Decrease prop RPM	<b>SHIFT+- (MINUS SIGN)</b>	<b>CTRL+F2</b>
Increase prop RPM	<b>SHIFT+= (EQUAL SIGN)</b>	<b>CTRL+F3</b>
Lean mixture	<b>CTRL+- (MINUS SIGN)</b>	<b>CTRL+SHIFT+F2</b>
Enrich mixture	<b>CTRL+= (EQUAL SIGN)</b>	<b>CTRL+SHIFT+F3</b>
Full rich mixture	<b>SHIFT+4</b>	<b>CTRL+SHIFT+F4</b>
Engage War Emergency Power or Water/Methanol-Water injection (toggle)	<b>W</b> key	<b>F10</b>



## OTHER AIRCRAFT COMMANDS

You'll use these commands less frequently than Flight and Engine commands, but they're still important.

Action	CFS2 Combat Command	Flight Sim/CFS1 Command
Landing gear (toggle)	<b>G</b> key	<b>G</b> key
Manually pump gear	<b>SHIFT+G</b>	<b>CTRL+G</b>
Parking brakes	<b>SHIFT+B</b>	<b>CTRL+ . (PERIOD)</b>
Brakes	<b>B</b> key	<b>. (PERIOD)</b>
Left brake	<b>, (COMMA)</b>	<b>F11</b>
Right brake	<b>. (PERIOD)</b>	<b>F12</b>
Radio (toggle)	<b>SHIFT+R</b>	<b>B</b> key
Pitot tube heat (toggle)	<b>CTRL+SHIFT+H</b>	<b>SHIFT+H</b>
All lights (toggle—imported FS aircraft only)	<b>L</b> key	<b>L</b> key
Landing lights (toggle—imported FS aircraft only)	<b>CTRL+L</b>	<b>CTRL+L</b>

## WEAPONRY COMMANDS

Once you have a target in your sights, you can destroy it. The following commands will help you. See Chapter 6, **Air Combat**, to learn how to win a fight.

Action	CFS2 Combat Command	Flight Sim/CFS1 Command
Fire guns	<b>SHIFT+SPACEBAR</b>	<b>1</b> key (keyboard)
Fire cannon	<b>CTRL+ SPACEBAR</b>	<b>2</b> key (keyboard)
Fire ordnance	<b>ENTER</b>	<b>3</b> key (keyboard)
Cycle ordnance type	<b>BACKSPACE</b>	<b>SHIFT+3</b>
Fire guns and cannon	<b>SPACEBAR</b>	<b>SPACEBAR</b>

## BASIC VIEW COMMANDS

In a real airplane you can look around by turning your head. In Combat Flight Simulator 2 you'll need to use views. **Cockpit view** is the default view with the instrument panel.

**Full view** provides the best visibility and a useful Heads Up Display. **Virtual cockpit view** lets you pan around the inside of a three-dimensional cockpit. **Spot view** gives you an outside view of your aircraft. **Padlock view** locks your view onto the closest enemy, as if your head is always looking at the enemy aircraft. **Chase view** puts you behind your own aircraft or any other. **Bomb/rocket view** puts you at the front of a bomb or rocket that you launch. To learn more about views, see "Using Views" in Chapter 6, **Air Combat**.

Action	CFS2 Combat Command	Flight Sim/CFS1 Command
Forward	Default view	Default view
Left 45 degrees	<b>SHIFT+Num pad 7</b>	<b>SHIFT+Num pad 7</b>
Left 90 degrees	<b>SHIFT+Num Pad 4</b>	<b>SHIFT+Num Pad 4</b>
Left 135 degrees	<b>SHIFT+Num Pad 1</b>	<b>SHIFT+Num Pad 1</b>
Right 45 degrees	<b>SHIFT+Num Pad 9</b>	<b>SHIFT+Num Pad 9</b>
Right 90 degrees	<b>SHIFT+Num Pad 6</b>	<b>SHIFT+Num Pad 6</b>
Right 135 degrees	<b>SHIFT+Num Pad 3</b>	<b>SHIFT+Num Pad 3</b>
Up 45 degrees	<b>SHIFT+Num Pad 8</b>	<b>SHIFT+Num Pad 8</b>
Up 90 degrees	<b>SHIFT+Num Pad 5</b>	<b>SHIFT+Num Pad 5</b>
Rear	<b>SHIFT+Num Pad 2</b>	<b>SHIFT+Num Pad 2</b>
Rear, up 45 degrees	<b>SHIFT+Num Pad 2+5</b>	<b>SHIFT+Num Pad 2+5</b>
Left 45, Up 45 degrees	<b>SHIFT+Num Pad 7+5</b>	<b>SHIFT+Num Pad 7+5</b>
Left 90, Up 45 degrees	<b>SHIFT+Num Pad 4+5</b>	<b>SHIFT+Num Pad 4+5</b>
Left 135, Up 45 degrees	<b>SHIFT+Num Pad 1+5</b>	<b>SHIFT+Num Pad 1+5</b>
Right 45, Up 45 degrees	<b>SHIFT+Num Pad 9+5</b>	<b>SHIFT+Num Pad 9+5</b>
Right 90, Up 45 degrees	<b>SHIFT+Num Pad 6+5</b>	<b>SHIFT+Num Pad 6+5</b>
Right 135, Up 45 degrees	<b>SHIFT+Num Pad 3+5</b>	<b>SHIFT+Num Pad 3+5</b>

*Continued, see next page*

**BASIC VIEW COMMANDS, continued**

Action	CFS2 Combat Command	Flight Sim/CFS1 Command
Full view (cycle through Cockpit view: forward, Full view with HUD, and Full view without HUD)	<b>F3</b>	<b>W</b> key
Cycle views (Cockpit, Virtual Cockpit, Spot)	<b>F4</b>	<b>S</b> key
Cycle views backwards	<b>SHIFT+F4</b>	<b>SHIFT+S</b>
Padlock view (toggle)	<b>`</b> (on the TILDE key)	<b>`</b> (on the TILDE key)
Next target	<b>TAB</b>	<b>TAB</b>
Previous target	<b>SHIFT+TAB</b>	<b>SHIFT+TAB</b>
Cancel target	<b>SHIFT+`</b> (on the TILDE key)	<b>SHIFT+`</b> (on the TILDE key)
Chase view (toggle)	<b>CTRL+F4</b>	<b>C</b> key
Chase view: next aircraft	<b>TAB</b>	<b>TAB</b>
Chase view: previous aircraft	<b>SHIFT+TAB</b>	<b>SHIFT+TAB</b>
Bomb/rocket view (toggle)	<b>F6</b>	<b>A</b> key
Bomb/rocket view: next bomb/rocket	<b>TAB</b>	<b>TAB</b>
Bomb/rocket view: previous bomb/rocket	<b>SHIFT+TAB</b>	<b>SHIFT+TAB</b>

## PANNING VIEW COMMANDS

In Virtual cockpit and Spot views you can use keyboard commands to “pan around” like a camera and look at things from different perspectives.

Action	CFS2 Combat Command	Flight Sim/ CFS1 Command
Pan left	<b>CTRL+SHIFT+BACKSPACE</b>	<b>CTRL+SHIFT+BACKSPACE</b>
Pan right	<b>CTRL+SHIFT+ENTER</b>	<b>CTRL+SHIFT+ENTER</b>
Pan UP	<b>SHIFT+BACKSPACE</b>	<b>SHIFT+BACKSPACE</b>
Pan DOWN	<b>SHIFT+ENTER</b>	<b>SHIFT+ENTER</b>
Snap to front view	<b>CTRL+SPACEBAR</b>	<b>CTRL+SPACEBAR</b>
Snap to rear view	<b>CTRL+SHIFT+SPACEBAR</b>	<b>CTRL+SHIFT+SPACEBAR</b>

## DISPLAY COMMANDS

You can use these commands to view or hide valuable information as you fly. Checklists help you during takeoff, cruise, descent, and landing. The **Tactical Display** shows your position relative to other aircraft, and provides waypoint navigational information. The **Enemy Indicator** is a three-dimensional arrow that points to the nearest enemy. In **Full view**, the Heads Up Display (HUD) provides information you'd normally find on the instrument panel. **Aircraft labels** make other aircraft easier to see. **Damage** text lets you know what sort of damage you're inflicting or receiving. **Display coordinates/frame rate** shows exactly where you are and how well your computer is performing. For more information about these features, see the **Flight School** and **Air Combat** chapters.

Action	CFS2 Combat Command	Flight Sim/ CFS1 Command
Cycle through checklists	<b>C</b> key	<b>SHIFT+C</b>
Tactical Display (toggle)	<b>SHIFT+T</b>	<b>F9</b>
Enemy Indicator (toggle)	<b>I</b> key	<b>U</b> key
HUD (cycle through Cockpit view: forward, Full view with HUD, and Full view without HUD)	<b>F3</b>	<b>W</b> key
HUD colors (toggle)	<b>SHIFT+F3</b>	<b>SHIFT+W</b>
Measurement system for HUD (toggle)	<b>U</b> key	<b>CTRL+W</b>
Aircraft labels (toggle)	<b>CTRL+SHIFT+L</b>	<b>N</b> key
Damage/Status messages (toggle)	<b>SHIFT+D</b>	<b>F</b> key
Display coordinates/ frame rate (toggle)	<b>SHIFT+Z</b>	<b>SHIFT+Z</b>

## WINDOWS

The flexibility of the Combat Flight Simulator 2 window system gives you many options. You can use the commands below to manipulate the windows. To learn more, press **F1** on your keyboard for online Help.

Action	CFS2 Combat Command	Flight Sim/ CFS1 Command
Full screen (toggle)	<b>ALT+ENTER</b>	<b>ALT+ENTER</b>
Create new view window	<b>F11</b>	<b>[ (LEFT BRACKET)</b>
Close view window	<b>SHIFT+F11</b>	<b>] (RIGHT BRACKET)</b>
Panel window 1 on/off (toggle)	<b>F7</b>	<b>CTRL+1</b>
Panel window 2 on/off (toggle)	<b>F8</b>	<b>CTRL+2</b>
Panel window 3 on/off (toggle)	<b>F9</b>	<b>CTRL+3</b>
Bring window to front	<b>F10</b>	<b>' (APOSTROPHE)</b>
Switch to next view window	<b>F12</b>	<b>CTRL+TAB</b>
Switch to previous view window	<b>SHIFT+F12</b>	<b>CTRL+SHIFT+TAB</b>
Zoom in	<b>] (RIGHT BRACKET)</b>	<b>= (EQUAL SIGN)</b>
Zoom out	<b>[ (LEFT BRACKET)</b>	<b>- (MINUS SIGN)</b>
Zoom normal (1x)	<b>\ (BACKSLASH)</b>	<b>BACKSPACE</b>
Bring up chat window (multiplayer)	<b>CTRL+C</b>	<b>ENTER</b>

## ***SLEWING IN FREE FLIGHT AND QUICK COMBAT***

In Free Flight and Quick Combat modes, you can “slew” to change rapidly your aircraft position, direction, location, or altitude without actually flying there in real time. Use these commands to slew. Experiment a bit to see what they do.

<b>Action</b>	<b>Command (CFS1, CFS2 and FS)</b>
Turn Slew mode on/off	<b>Y</b> key
Set aircraft position to north heading, level pitch, level bank	<b>SPACEBAR</b>
Display coordinates/ frame rate (toggle)	<b>SHIFT+Z</b>
Move forward	Num Pad <b>8</b>
Move backward	Num Pad <b>2</b>
Move left	Num Pad <b>4</b>
Move right	Num Pad <b>6</b>
Move up slowly	<b>Q</b> key
Move up quickly	<b>F4</b>
Move down slowly	<b>A</b> key
Move down quickly	<b>F1</b>
Freeze vertical movement	<b>F2</b> or <b>F3</b>
Rotate left	Num Pad <b>1</b>
Rotate right	Num Pad <b>3</b>
Move nose up	<b>9</b> (keyboard)
Move nose up quickly	<b>F5</b>
Move nose down	<b>0</b> (keyboard)
Move nose down quickly	<b>F8</b>
Bank left	Num Pad <b>7</b>
Bank right	Num Pad <b>9</b>
Freeze all movement	Num Pad <b>5</b>





# RECOMMENDED READING

**Bergerud, Eric, *Fire in the Sky: The Air War in the South Pacific*. Boulder, CO: Westview Press, 2000.**

A balanced and lucid overview of the Pacific air war, including the strategic perspective of both sides, their air combat tactics, machines, and men.

**Blackburn, Tom, *The Jolly Rogers*. New York: Pocket Books, 1989.**

This memoir not only provides fascinating accounts of air combat, but also clearly and concisely discusses every aspect of a U.S. Navy combat pilot's training, tactics, and daily life in the war zone.

**Boyington, Gregory, *Baa Baa Black Sheep*. New York: Bantam Books, 1977.**

Boyington's book captures the flavor and style of his unique character, but it goes beyond the gruff loner to show the air war through the eyes of a natural leader. A gripping account of his career as leader of VMF-214, the description of his captivity in Japan and the lessons he learned from it is surprisingly moving.

**Brand, Max, *Fighter Squadron at Guadalcanal*. New York: Pocket Books, 1997.**

"Max Brand" was the pen name of Frederick Faust, who wrote the *Dr. Kildare*

stories and the screenplay *Destry Rides Again*. He wrote *Fighter Squadron at Guadalcanal* in 1943, based on interviews with Marine fighter pilots just returned from the Pacific theater. It vividly conveys the point of view of those in the thick of the action, without the hindsight that colors many combat histories. Faust was killed in 1944 while covering the U.S. campaign in Italy, and the book remained unpublished for more than 50 years.

**Dull, Paul, *A Battle History of the Imperial Japanese Navy (1941-1945)*. Annapolis: Naval Institute Press, 1978.**

The definitive scholarly study of the Japanese Navy in WWII, and one of the few available accounts of the war at sea from the Japanese perspective.

**Foss, Joe, with Foss, Donna Wild, *A Proud American: The Autobiography of Joe Foss*. New York: Pocket Books, 1992.**

Captures the true flavor and style of Joe Foss. Its account of the crucial battle fought by the "Cactus Air Force" based at Henderson Field on Guadalcanal puts the reader in the scene better than most.

**Francillon, René, *Japanese Aircraft of the Pacific War*. Annapolis, MD: Naval Institute Press, 1979.**

This is the best single volume on Japanese combat aircraft of WWII available in English today. It provides complete development history, comprehensive specifications, and excellent planview drawings and photographs of every Imperial Japanese Army and Navy aircraft that played a role in the Pacific war.

**Grossnick, Roy A., *United States Naval Aviation 1910-1995*. Washington, D.C.: Naval Historical Center, 1997.**

The chapter on U.S. naval aviation in WWII includes some excellent and seldom-seen photos, and a comprehensive discussion of the role of American carrier aviation in every phase of the Pacific war.

**Hammel, Eric, *Aces Against Japan: The American Aces Speak*. New York: Pocket Books, 1992.**

Hammel puts you into the cockpit with real pilots who describe key missions in their own words. These accounts form a powerful and personal picture of air combat in the Pacific theater.

**Hata, Ikuhiko and Izawa, Yasuho, *Japanese Naval Aces and Fighter Units in World War II*. Annapolis: Naval Institute Press, 1989.**

Originally published in Japan, this is one of the most comprehensive books available on the Japanese naval fighter force in WWII. It provides detailed information on the aircraft, the pilots, and the air groups in which they flew. The lack of a general index is its only significant flaw.

**Horikoshi, Jiro, *Eagles of Mitsubishi: The Story of the Zero Fighter*. Seattle: University of Washington Press, 1992.**

This detailed account of the development of Japan's most famous fighter aircraft provides insight into the design process, and the judgments that gave the Zero its most outstanding strengths and weaknesses.

**Hynes, Samuel, *Flights of Passage: Reflections of a World War II Aviator*. New York & Annapolis, MD: Frederic C. Beil & Naval Institute Press, 1988.**

Now a literature professor at Princeton, in WWII Hynes was the pilot of a Dauntless dive bomber. He captures the mindset of the young men who fought this war, and the life they led. His point of view is worldly wise, somewhat cynical, and often very amusing.

**Lundstrom, John B., *The First Team: Pacific Naval Air Combat from Pearl Harbor to Midway*. Annapolis: Naval Institute Press, 1984.**

This excellent and detailed account of the first six months of the Pacific war provides a wealth of information about combatants, strategy and tactics, and the men and machines that shaped this crucial opening phase of the Pacific war.

**Mikesh, Robert, *Zero: Combat & Development History of Japan's Legendary Mitsubishi A6M Zero Fighter*. Osceola, WI: Motorbooks International Publishers & Wholesalers, 1994.**

Bob Mikesh is probably the foremost American expert on Japanese aircraft of WWII. His detailed and heavily illustrated history of this famous Japanese fighter provides an excellent companion to Horikoshi's *Eagles of Mitsubishi*.

**Park, Edwards, *Angels Twenty: A Young American Flyer a Long Way From Home*. New York: McGraw-Hill, 1997.**

Park captures what it was like to be a young U.S. P-39 pilot in New Guinea. His reminiscence is detailed and realistic, at times dramatic, but often droll or downright funny.

**Sakai, Saburo *et al*, *Samurai!* Garden City, NY: Nelson Doubleday, Inc., 1957, 1978**

One of the few memoirs by a top-ranking Japanese combat pilot. It provides valuable insight into the often brutal training and discipline, the multiple dangers, and the increasingly unfavorable odds the pilots of the Imperial Japanese Navy faced.

**Sherrod, Robert, *History of Marine Corps Aviation in World War II*. Washington, D.C.: Combat Forces Press, 1952.**

This comprehensive account of U.S. Marine aviation in WWII is thorough and well-written, and includes outstanding black-and-white photos and maps from every crucial phase of the PTO air war.

**Spector, Ronald, *Eagle Against the Sun: The American War with Japan*. New York: Vintage Books, 1985.**

An excellent one-volume history of the entire Pacific war, from Operation Orange to Hiroshima. Spector manages to cover the lesser-known battles of the Pacific theatre, as well as the politics and personalities on both sides of the conflict.

**Spick, Mike, *Allied Fighter Aces of World War II: The Air Combat Tactics and Techniques of World War II*. London: Greenhill Books, and Mechanicsburg, PA: Stackpole Books, 1997.**

Spick demystifies the tactics and techniques of combat pilots. His discussion of the aircraft and their pilots and his description of air combat maneuvers all contribute to this excellent overview of the air war in the Pacific.

**Swanborough, G. and Bowers, P., *United States Military Aircraft Since 1909*. Washington, D.C.: Smithsonian Institution Press, 1989.**

This volume covers aircraft flown by all American armed forces over an 80-year period. Its drawings, photos and highly detailed text make it an excellent research tool.

**Swanborough, G. and Bowers, P., *United States Navy Aircraft Since 1911*. London: Putnam Aeronautical Books, 1990.**

Like Francillon's book on Japanese aircraft of the Pacific war, this is probably the best one-volume reference on U.S. Navy aircraft. It provides development history, comprehensive specifications, and excellent planview drawings and photographs of every plane the U.S. Navy flew over an 80-year period, including the crucial four years of the Pacific war.

Tillman, Barrett, *Corsair: The F4U in World War II and Korea*. Annapolis, MD: United States Naval Institute, 1979.

Tillman, Barrett, *Hellcat: The F6F in World War II*. Annapolis, MD: United States Naval Institute, 1979.

Tillman, Barrett, *Wildcat: The F4F in WWII*. Annapolis, MD: Naval Institute Press, 1990.

Barrett Tillman is probably the most prolific American author on the subject of WWII carrier aviation. These small volumes on three major U.S. fighter aircraft of the Pacific war provide valuable detail on their development and combat history.

**“Osprey Aircraft of the Aces” series, which includes:**

Sakaida, Henry, *Imperial Japanese Navy Aces 1937-1945*. (Osprey Aircraft of the Aces, vol. 22.) London: Osprey Publishing, 1998.

Sakaida, Henry, *Japanese Army Air Force Aces 1937-1945*. (Osprey Aircraft of the Aces, vol. 13.) London: Osprey Publishing, 1997.

Stanaway, John, *P-38 Lightning Aces of the Pacific and CBI*. (Osprey Aircraft of the Aces, vol. 14.) London: Osprey Publishing, 1997.

Styling, Mark, *Corsair Aces of World War 2*. (Osprey Aircraft of the Aces, vol. 8.) London: Osprey Publishing, 1995.

Tillman, Barrett, *Hellcat Aces of World War 2*. (Osprey Aircraft of the Aces, vol. 10.) London: Osprey Publishing, 1996.

Tillman, Barrett, *Wildcat Aces of World War 2*. (Osprey Aircraft of the Aces, vol. 3.) London: Osprey Publishing, 1995.

This series, published by London-based Osprey Publishing, includes a volume on the aces who flew every major fighter aircraft in each theater of WWII. The authors are leading experts who have published numerous titles; each volume includes excellent drawings, photos, and color plates of the unique aircraft flown by individual aces. These are great reference books, except that they lack an index, so expect your copies to become well-thumbed as you discover, and rediscover, key information.

# GLOSSARY

**AA, AAA:** Antiaircraft fire, Antiaircraft artillery.

**A6M:** Mitsubishi Type Zero fighter; U.S. code name “Zeke.”

**ace:** Since WWI, a pilot who has shot down at least five enemy aircraft.

**Aichi D3A:** Japanese dive-bomber; U.S. code name “Val.”

**ailerons:** Movable control surfaces on the outer trailing edge of an aircraft’s wings that cause it to bank or roll left or right.

**Airacobra:** Bell P-39 fighter.

**airedale:** Flight deck crewman on a U.S. carrier.

**air force:** (USAAF) A fighter unit consisting of 16 fighter groups, ~768 aircraft.

**airspeed:** The rate at which an aircraft moves through the surrounding air. Pilots use several types of airspeed during flight. For example, indicated airspeed (IAS) is the speed shown on the airspeed indicator (usually in knots). Pilots use IAS to control an aircraft and manage its performance. Calibrated airspeed (CAS) is IAS corrected for instrument and installation error. True airspeed (TAS) is IAS corrected for changes in atmospheric

temperature and pressure. Pilots use TAS to solve navigation problems.

**AirSoPac:** Air Forces, South Pacific Force.

**AirSols:** Air Forces, Solomon Islands.

**airspeed indicator:** The instrument that displays an aircraft’s speed relative to the air in which it is moving.

**altimeter:** A highly sensitive barometer which shows an aircraft’s altitude above mean sea level by measuring atmospheric pressure.

**angle of attack:** The angle between the wing and the oncoming airflow—the relative wind. The angle of attack is related to the direction in which an aircraft is moving, not to the angle the wing makes with the horizon. As angle of attack increases, so does the amount of lift a wing produces.

**angels:** Altitude expressed in thousands of feet.

**Anzac:** Military person from Australia or New Zealand.

**API:** Armor-piercing Incendiary ammunition.

**ASDIC:** The early name used for sonar, which was developed by the Allied Submarine Detection Investigation Committee.

**ASP:** Antisubmarine patrol.

**ASW:** Antisubmarine warfare.

**augered in:** Crashed.

**AvCad:** Aviation Cadet.

**Avenger:** Grumman TBF Torpedo bomber.

**B-25:** North American Mitchell twin-engine medium bomber; called PBJ by USN/USMC.

**BBN:** Nakajima torpedo bomber; U.S. code name: “Kate.”

**BB:** Battleship (U.S.)

**bail out:** To jump out of an aircraft.

**bandit:** (USAAF) Enemy fighter.

**bank:** Minor rotation of an aircraft about its longitudinal (nose to tail) axis, causing one wing or the other to dip or rise; controlled by the ailerons. See roll.

**Beast, the:** Nickname for the big Curtiss SB2C Helldiver dive-bomber, which replaced the Douglas SBD Dauntless, but remained unpopular with pilots.

**Betty:** U.S. code name for Mitsubishi G4M twin-engine medium bomber.

**bingo:** The point in a mission at which remaining fuel dictates an immediate return to base.

**blackshoes:** Non-flying Naval officers.

**bluejackets:** (USN) Slang for U.S. Navy sailors.

**bogey:** (USAAF) Slang for an unidentified aircraft.

**boondockers:** U.S. Marine slang for boots.

**boondocks:** U.S. Marine slang for swamps.

**bought the farm:** Crashed. Originated when USAAF pilots were obliged to pay for damages incurred after crashing on private property.

**boresight:** The aligning of guns and gunsights. Having a target in perfect firing position is “boresighting the enemy.”

**bounce:** To attack unsuspecting enemy aircraft, usually from above and behind.

**break!** A warning to friendly fighter aircraft that they are under attack and must break formation to take immediate evasive action.

**brownshoes:** Navy aviators.

**buko batsugun:** (Japan) For Conspicuous Military Valor.

**bunk flying:** Hashing over a mission in the barracks. (see also *hangar flying*.)

**buntaicho:** IJN unit leader.

**buster:** (U.S.) To proceed at best sustained speed.

**butai:** IJN unit.

**C-47:** USAAF designation for “Skytrain” military version of Douglas DC-3 transport; called R4D by USN/USMC.

**CA:** (U.S.) Heavy cruiser

**CAP:** Combat air patrol (over/in vicinity of friendly fleet).

**carrier air group:** All of a carrier’s aircraft, subdivided into squadrons.

**carrier task force:** A group of carriers and support and escort vessels.

**Catalina:** Consolidated PBY Catalina flying boat, nicknamed “Dumbo.”

**CAVU:** Weather term for “ceiling and visibility unlimited.”

**Chandelle:** This evasive maneuver is simply an abrupt climbing turn almost to the point of stalling. It allows the pilot to quickly gain altitude while changing direction.

**chattanooga:** Air-to-ground attacks on rail targets.

**chutai:** (Japan) Squadron, usually six to nine planes.

**CinCPac:** Commander in Chief, Pacific Fleet.

**CL:** Light Cruiser (U.S.).

**circus:** (USAAF, RAF) A ruse, using many fighters and few or no bombers, to decoy enemy fighters.

**close escort:** A fighter mission in which the fighters must remain in close contact with the bombers they are escorting, not searching for or pursuing enemy fighters.

**CO:** Commanding Officer.

**ComAirPac:** Commander Air Force Pacific Fleet.

**ComAirSols:** Commander Air Forces Solomon Islands.

**ComAirSoPac:** Commander, Aircraft, South Pacific.

**ComSoPac:** Commander Southern Pacific Area

**ConForSols:** Confederate Forces, Solomon Islands.

**combat box:** (USAAF) A large, mutually defensive heavy bomber formation, generally consisting of 18, 27, 36, or 54 aircraft; devised by Curtis LeMay.

**Condition I-A:** On shipboard, relaxed general quarters condition (see general quarters).

**Corsair:** Vought F4U fighter.

**crate:** (USAAF) Slang for plane.

**cut:** Signal from landing signal officer for pilot to cut power and land aboard carrier.

**CV:** Aircraft carrier.

**CVE:** Aircraft carrier, escort (smallest class).

**CVL:** Aircraft carrier, light (U.S.).

**Dauntless:** Douglas SBD dive-bomber.

**dead reckoning:** The navigation of an airplane solely by computations based on airspeed, course, heading, wind direction and speed, ground speed, and elapsed time. The term derives from “deduced” reckoning. Also known as “ded reckoning.”

**DD:** Destroyer.

**D-Day:** (USAAF, before the Allied invasion of Europe 6/6/44) Planned day on which a major operation was to be launched (at “H-Hour”). After the successful invasion, D-Day came to mean the famous Sixth of June, when the Allies landed in France to drive the Germans out of the territory they had occupied during 1939–1944.

**deadstick:** Powerless landing.

**deck, the:** Sea-level.

**deflection:** The angle of a target aircraft relative to the aircraft shooting at it.

**Devastator:** Douglas TBD torpedo bomber; replaced by TBF Avenger after Battle of Midway.

**division:** (USAAF) Two sections; also called a flight.

**dope:** U.S. Marine slang for information.

**drink, the:** The ocean.

**Dugout Doug:** Derisive name for Gen. Douglas MacArthur, who spent the battle for the Phillipines in the communications center tunnels on Corrigedor.

**dumbo:** Air-sea rescue aircraft (often a PBY Catalina).

**element:** (USAAF) A two-plane formation.

**elevators:** Movable control surfaces on an aircraft's horizontal tail surface that control its pitch (nose-up or nose-down attitude).

**ETA:** Estimated time of arrival.

**ETD:** Estimated time of departure.

**ETO:** European theater of operations.

**exec:** Executive officer.

**F4F:** Grumman Wildcat Navy (carrier-based) fighter.

**F4U:** Vought Corsair (shore- or carrier-based) fighter.

**F6F:** Grumman Hellcat Navy (carrier-based) fighter.

**feathering:** Aligning one's stopped propeller blades with the flight path to reduce drag and stop rotation.

**FDO:** Fighter directions officer.

**firewall:** The partition immediately aft of the engine. Opening the throttle to maximum position is "going to the firewall."

**fish:** Slang for a torpedo.

**flak:** Antiaircraft fire; acronym from the German *FlugAbwehrKanonen*. Light flak batteries might consist of multiple 20- to 40-mm cannon. Heavy flak guns ranged from 75 to 150 mm, throwing shells that exploded above 20,000 feet, spraying out 15–30 pounds of steel shrapnel.

**flaps:** Movable control surfaces on the inner trailing edge of an aircraft's wings that increase lift when deployed, usually for takeoff or landing.

**flare:** To pull back on the stick just prior to landing. Flaring bleeds off airspeed and makes sure the rear wheel touches first. In carrier landings, flaring also helps put the tailhook low enough to catch the cable.

**flat-hatting:** Making very low, spectacular, unauthorized flights; showing off.

**flight:** (USAAF) A unit consisting of four aircraft (two two-plane elements); also called a division.

**flipper turn:** (U.S.) A sharp, steeply banked turn.

**full bore:** Maximum engine power.

**fuselage:** The body of an airplane that holds the crew and passengers or cargo. From the French *fuselé*, for "spindle-shaped."



**Gs:** A measurement of the load factor, or apparent gravity, experienced by an aircraft during flight. One G represents the force of gravity exerted on a body at rest. When an aircraft climbs, turns, or changes speed, it experiences G forces. For example, a level turn with a 60-degree bank imposes a 2G load on an airplane and its occupants.

**G4M:** Mitsubishi twin-engine medium bomber. (U.S. code name “Betty.”)

**GCI:** Ground control intercept.

**general quarters:** Ship’s crew to battle stations; condition of maximum combat readiness.

**George:** U.S. code name for the Kawanishi N1K2-J *Shiden-kai* fighter.

**gizmo:** U.S. Marine slang for an object without a known name.

**hangar flying:** Pilots comparing ideas and impressions about flying specific aircraft. (See also *bunk flying*.)

**hard charger:** U.S. Marine slang for a motivated individual.

**Hayabusa:** Peregrine Falcon; Nakajima Ki-43 fighter. (U.S. code name “Oscar.”)

**heading:** The direction in which the aircraft is pointed, usually referenced to magnetic north.

**Hellcat:** Grumman F6F fighter.

**Helldiver:** Curtiss SB2C dive bomber; also called “The Beast.”

**hikokitai:** IJN carrier air group.

**hikotaicho:** IJN air group leader.

**hit the silk:** Parachuting ; bailing out.

**hog:** Slang name for the F4U.

**homeplate:** (U.S. slang.) A pilot’s “home” airfield.

**HVAR:** American high-velocity aerial rockets (five-inch diameter).

**IFF:** Identification, friend or foe.

**IJA:** Imperial Japanese Army.

**IJN:** Imperial Japanese Navy.

**Immelmann:** An aerobatic maneuver in which an airplane reverses its direction while gaining altitude (said to have been invented by WWI ace Max Immelmann). The maneuver begins with a half loop, at the top of which the pilot rolls the plane upright.

**in the saddle:** Immediately behind a target aircraft and ready to attack.

**intruder:** Offensive small-scale sorties over enemy territory to destroy enemy aircraft near their own airfields when they were taking off or landing. A secondary aim was to dislocate the enemy defense organizations. Mostly, but not always, flown at night.

**jeep carrier:** Alternate name for a CVE.

**Jill:** U.S. code name for the Nakajima B6N torpedo bomber.

**jjg:** Slang for U.S. Navy Lieutenant, Junior Grade.

**joe:** U.S. Marine slang for coffee. A coffeepot is a “joe-pot.”

**kamikaze:** (Japan). Suicide planes and pilots; literally, “divine wind.”

**Kate:** U.S. code name for the Nakajima B5N torpedo bomber.

**KIA:** Killed in action.

**Kikusui:** Literally, “floating chrysanthemums”; massive gaggles of kamikaze suicide aircraft directed against ships in the American invasion of Okinawa in April 1945.

**Ki-43:** Nakajima Hayabusa (Peregrine Falcon) fighter. (U.S. code name “Oscar.”)

**knot:** Short for nautical miles per hour. One nautical mile (nm or NM) = 6,076 ft (1,852 m) or about 1.15 statute miles per hour. Therefore 100 knots equals about 115 mph (185 km/h), 150 knots equals about 172 mph (278 km/h), and 200 knots equals about 230 mph (370 km/h). Note that “knots” by definition assumes “per hour.”

**kokutai:** (Japan) An air group, often abbreviated *ku*.

**landing gear:** The wheels, struts, and other equipment that an aircraft uses to land or maneuver on the ground.

**LCl:** Landing craft, infantry.

**LCT:** Landing craft, tank.

**Liberator:** Consolidated B-24/PB4Y four-engine heavy bomber.

**lift:** The upward force produced by an airfoil such as a wing interacting with the air. Lift acts at right angles to the relative wind or the aircraft’s flight path. Lift, one of the four fundamental forces in flight, is opposed by weight.

**Lightning:** Lockheed P-38 twin-engine fighter.

**loop:** An aerobatic maneuver in which an aircraft flies in a complete vertical circle. An outside loop, begun at the top of the circle, is considerably more difficult to perform, because the pilot encounters negative G-forces throughout the maneuver.

**LSO:** Landing signal officer, stationed on the stern of an aircraft carrier with semaphore-like paddles to direct approaching pilots to a successful landing, or to wave them off for another try.

**LST:** Landing ship, tank.

**Lufbery:** A WWI defensive maneuver where fighters circled in a ring, protecting each other’s rear position. Because of the power, speed and firepower of WWII aircraft, this maneuver was not very successfully employed in either theater.

**LVT:** Landing vehicle, tracked.

**MAG:** Marine aircraft group.

**magneto:** A device that creates an electric current by rotating a magnet. The crankshaft turns the magnetos, which provide the electrical energy to fire the spark plugs. This arrangement ensures that the spark plugs fire even if the aircraft’s battery and electrical system fail.

**maru:** Japanese transport or cargo ship.

**MASG:** Marine air support group.

**MCGV:** Marine carrier group.

**meatwagon:** Ambulance.

**MIA:** Missing in action.

**Mitchell:** North American B-25/PBJ twin-engine medium bomber.

**NAS:** Naval air station.

**N1K2-J:** Kawanishi Shiden-kai (Violet lightning, improved model) fighter. (U.S. code name “George.”)

**nose over:** To rapidly lower the nose relative to the horizon; decrease pitch. On the ground, nose over refers to an aircraft tipping forward or doing a somersault.

**nugget:** (U.S. slang) A beginning pilot.

**Ops:** Shorthand for “Operations.” “Fighter ops” refers to fighter operations in general. Each mission is called a fighter operation, or “F.O.”

**Oscar:** U.S. code name for the Nakajima Ki-43 *Hayabusa* fighter.

**P-400:** USAAF export variant of Airacobra fighter. Outclassed by the Mitsubishi fighter, the P-400 was described as “a P-40 with a Zero after it.”

**pancake:** U.S. radio code for “land immediately.”

**P-38:** Lockheed Lightning twin-engine fighter.

**P-39:** Bell Airacobra fighter.

**PBJ:** Navy designation for North American Mitchell (B-25) twin-engine medium bomber.

**PBY:** Consolidated Catalina flying boat.

**PB4Y:** Navy designation for Consolidated Liberator (B-24) heavy bomber.

**pitch:** An aircraft’s rotation about its lateral (wing tip to wing tip) axis, determining its nose-up or nose-down attitude; controlled by the elevators.

**pitot tube:** A small metal probe, usually attached to a wing or the nose of an aircraft, that measures ram air pressure as the aircraft moves to indicate aircraft speed. The pitot tube usually has a heater to prevent ice from blocking the device. (Named after Henri Pitot (1695–1771), a French scientist.)

**pollywog:** U.S. Navy slang for one who hasn’t crossed the equator.

**POW:** Prisoner of war.

**PSP:** Pierced steel planking, also known as “Marsden Matting”—what the Seabees used to create airstrips. Notoriously slick in wet conditions.

**PT:** Patrol torpedo boat.

**PTO:** Pacific theater of operations.

**R.A.F.:** Britain’s Royal Air Force.

**ramrod:** (USAAF, RAF) Bomber-escort mission.

**ranger:** Operations of squadron or wing strength (12–36 aircraft), as free-lance intrusions over enemy territory, the main aim being to wear down the enemy fighter force.

**razorback:** Describes early versions of the P-47 and P-51 fighters in which the aft fuselage deck rises behind the pilot's head and the canopy can provide only limited rearward vision. Eventually these were replaced by "bubble canopy" versions in which the aft fuselage deck was cut down to the level of the pilot's shoulders.

**Reisen:** In Japanese: "Type Zero"; the Mitsubishi Type Zero fighter (U.S. code name "Zeke.")

**relative wind:** The speed and direction of air striking an airfoil; that is, the air flow caused by an aircraft or airfoil's movement through the air.

**revetment:** Horseshoe-shaped embankment used for protection against bomb blasts.

**rhubarb:** (USAAF, RAF) Small-scale harassing fighter operation against ground targets.

**roadstead:** Operations by fighters, or bombers escorted by fighters, to attack by dive-bombing or low-level bombing attacks on ships at sea or in harbor.

**ROTC:** (U.S.) Reserve Officers' Training Corps, which officers attended before becoming pilots.

**rodeo:** (USAAF) Offensive sortie without escort responsibilities, used to draw up enemy fighters.

**roll:** An aircraft's rotation about its longitudinal (nose to tail) axis, controlled by the ailerons. See bank.

**rudder:** Movable control surface on the vertical portion of an aircraft's tail (attached to the fixed portion, or fin); controls the aircraft's yaw, causing the plane to turn left or right.

**RV:** Rendezvous.

**sandwich:** A tactic by which two fighters turn to keep an attacking fighter between them, making the would-be attacker the target.

**SB2C:** Curtiss Helldiver dive bomber.

**SBD:** Douglas Dauntless dive bomber.

**scoop, the:** U.S. Marine slang for news.

**scuttlebutt:** (U.S. slang.) Gossip, rumors. Historically the place aboard ship where sailors swapped rumors and gossip. Formerly a "scuttled butt," i.e., a lidded cask (or "butt") containing the day's drinking water on a ship; now the drinking fountain on a ship.

**scramble:** To launch aircraft as soon as possible.

**Seabees:** U.S. Navy construction battalion, responsible for building and rebuilding airstrips throughout the Pacific.

**section:** (USAAF) Unit consisting of eight aircraft (two four-plane flights).

**shellback:** U.S. Navy slang for one who has crossed the equator.

**shooting the breeze:** U.S. Marine slang for gossiping.

**Shiden-kai:** Violet lightning, improved model; Kawanishi N1K2-J fighter (U.S. code name "George.")

**shotai:** (Japan) The basic three-aircraft fighter formation. Like the standard British vee-shaped “Vic” formation, when combat was joined, the shotai became an off-set line astern with about 300 feet between aircraft. Three shotai made up a *chutai*, a loose, flexible formation with all pilots weaving, except the leader.

**Skytrain:** Military (C-47R4D) version of Douglas DC-3 transport.

**slewing:** In Microsoft® Combat/Flight Simulator, a method of rapidly changing aircraft position, direction, location, or altitude without flying there in real time.

**Slot, the:** New Georgia Sound, which runs between the Solomon Islands from Bougainville to Guadalcanal; favorite route for Japanese convoys resupplying forces on Guadalcanal.

**sortie:** A flight of a combat aircraft on a mission; armed attack made from a place surrounded by enemy forces.

**splash:** (U.S. slang) Enemy aircraft destroyed (shot down into the water).

**squadron:** British or American fighter unit consisting of 12 (sometimes 16) aircraft.

**strike:** Combat flight against ground or sea targets.

**stud:** (USAAF) Dive-bombing mission.

**sweep:** An offensive formation flight of fighters or fighter bombers, made with the object of drawing the enemy fighter force into combat.

**Tail End Charlie:** The last plane in a formation.

**TBD:** Douglas Devastator dive-bomber, replaced by Douglas TBF Avenger after Battle of Midway.

**TBF:** Grumman Avenger torpedo bomber.

**TF:** U.S. Navy Task Force; consisting of several Task Groups.

**TG:** U.S. Navy Task Group, consisting of carriers and their aircraft, as well as other ships, often including battleships, cruisers, and destroyers.

**Thach Weave:** A maneuver, designed to reverse the advantage of Japanese aircraft early in the war, in which two fighters or two sections of two to four fighters weave toward each other for mutual cover, making an enemy fighter vulnerable to head-on attack. Named for U.S. Navy Lt. Cmdr. John Thach, one of its originators.

**Tin Can:** A destroyer.

**Tokyo Express:** U.S. slang for Japanese high-speed convoys that ran supplies and reinforcements down the Slot to Guadalcanal.

**under hack:** USN/USMC slang for being in trouble or under arrest. Also used: “in hack.”

**USAAF:** The United States Army Air Forces; until 1947 the Air Force was part of the U.S. Army, not a separate service branch.

**USMC:** United States Marine Corps.

**USN:** United States Navy.

**USS:** United States Ship.

**Val:** U.S. code name for the Aichi D3A dive-bomber.

**VB:** Navy bombing squadron.

**VC:** Navy composite squadron (fighters and bombers).

**VE Day:** “Victory in Europe” day, 5/8/45, when the Germans surrendered unconditionally to the Allies.

**VF:** U.S. Navy fighter squadron.

**Vic:** Basic British three-plane formation, in the shape of a “V”; called a *shotai* in the Japanese air forces.

**VJ Day:** “Victory over Japan” day, 8/15/45, when Japan accepted Allied terms of surrender; some make this date 9/2/45, when Japan actually signed the surrender.

**Vmax:** Sustained top speed in level flight.

**VMFB:** U.S. Marine Corps fighter-bomber squadron.

**VMF:** U.S. Marine corps fighter squadron.

**VMF (CVS):** Marine fighter squadron, carrier-based.

**VT:** Navy torpedo squadron.

**VTB:** Navy torpedo-bomber.

**WAFS:** (U.S.) Women’s Auxiliary Ferrying Squadron.

**WASPs:** (U.S.) Women Airforce Service Pilots.

**WIA:** Wounded in action.

**waveoff:** Signal from landing signal officer not to land aboard the carrier, but to go around for another try.

**Wildcat:** Grumman F4F fighter.

**windmilling:** Action of a freely rotating propeller on a dead or stalled engine.

**wing:** (USAAF) Unit consisting of several 48-plane groups.

**wingman:** (RAF, USAAF) Pilot of the trailing aircraft in a two-plane element; required to stick with his leader, following his lead.

**word, the:** U.S. Marine slang for confirmed information.

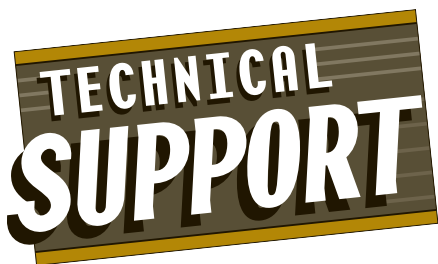
**yaw:** Aircraft’s rotation in the horizontal plane, about its vertical axis (turning left or right); controlled by the rudder.

**YE/ZB:** USN radio homing beacon.

**Zeke:** U.S. code name for the Mitsubishi A6M Type Zero fighter.

**Zero:** Mitsubishi A6M Reisen (Type Zero fighter) (U.S. code name: “Zeke.”)

**zoom:** A steep climb initiated at top speed, usually after diving to pick up speed and accumulate energy.



## GETTING HELP FROM MICROSOFT TECHNICAL SUPPORT

Help is available from many different sources. Please take the time to read the following so we may direct you to the most appropriate help source for you.

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The services and prices listed here are available in the United States and Canada only. Support outside the United States and Canada may vary. Microsoft's support services are subject to Microsoft's then-current prices, terms, and conditions, which are subject to change without notice.

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Connect to Personal Online Support at:  
<http://support.microsoft.com>

### ASSISTED SUPPORT

#### No-Charge Assisted Personal Support

If you acquired this product as a stand-alone retail product, you are eligible for unlimited no-charge assisted Personal Support for this product during regular business hours. You can receive no-charge Personal support via the Web or the telephone. When submitting incidents, please be prepared to provide your Product ID ("PID") number.

For Applications, PID is a 20-digit number that you can find by clicking **About Combat Flight Simulator 2** in the product's Help menu.

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### GETTING ASSISTED SUPPORT

When you contact Product Support Services, you should be at your computer and have the following information at hand:

- ⊙ The version of your Microsoft product
- ⊙ The type of hardware, including network hardware, if applicable
- ⊙ The operating system (e.g., DOS, Windows 98, Windows NT, and so on)
- ⊙ The exact wording of any informational or error messages that appeared on your screen
- ⊙ A description of what happened and what you were doing when the problem occurred
- ⊙ A description of how you tried to solve the problem

### Via the Web

Web-based support on Microsoft's Personal Online Support is available 24 hours a day, 7 days a week. Via the Web, you can submit a no-charge or paid incident to a Microsoft Support Professional any time, day or night.

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### Via the Phone

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Games & Multimedia: (425) 637-9308

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#### *Paid*

In the U.S.: (800) 936-5700

Available 24 hours a day, 7 days a week, including holidays.

In Canada: (800) 668-7975

8AM to 11PM Monday through Friday, Saturday 10AM to 6PM Eastern Time excluding holidays.



# INDEX

## SYMBOLS

2.5-ton ("Deuce-and-a-Half")

6 x 6 Truck 263

3-D card. *See* 3-D graphics card

3-D graphics card 9, 29

## A

Aerial combat 102, 103

Aichi D3A1 11, 240

Aileron controls 272

Aileron roll 58

Aileron trim 38

Ailerons

27, 36, 43, 45, 48, 51, 56, 77, 88

Air combat maneuvers 111, 284

Break, the 119

Chandelle, the 121

Dive-bombing 118

High Side Attack 123

Immelmann 112

Lag Turn 114

Lead Turn 113

Overhead Attack 122

Scissors 115

Split-S, the 120

Strafing 117

Up and Under 116

Air/fuel mixture 39, 42

Airacobra. *See* Bell P-39D Airacobra

## Aircraft

Aichi D3A1 240

Bell P-39D Airacobra 237

Consolidated B-24D Liberator 248

Douglas C-47 Skytrain 247

Douglas SBD-2 Dauntless 245

Douglas TBD-1 Devastator 243

Grumman F4F-4 Wildcat 228

Grumman F6F-3 Hellcat 230

Grumman TBF-1 Avenger 244

Kawanishi N1K2-J Shiden-kai

(Violet Lightning) 226

Lockheed P-38F Lightning 232

Mitsubishi A6M2 Reisen

(Type Zero Fighter) 221

Mitsubishi A6M5 Reisen

(Type Zero Fighter) 224

Mitsubishi G4M2 241

Nakajima B5N2 242

Nakajima Ki-43-lib Hayabusa

(Peregrine) 239

North American B-25D Mitchell 246

Vought F4U-1A Corsair 235

Aircraft Armaments 264

Aircraft carriers

Akagi 165

Hiryu 165, 252

Hornet 211

Junyo 171

Kaga 165

Ryujo 169

Shoho 163

Shokaku 163, 169, 171, 179

Soryu 165, 252

Taiho 179

USS Enterprise

157, 165, 169, 171, 255, 261

USS Essex 205, 256

USS Franklin 256

USS Hancock 256

USS Hornet 165, 171, 255  
 USS Lexington  
     159, 163, 206, 207, 255  
 USS Long Island 201  
 USS Oriskany 256  
 USS Randolph 220  
 USS Saginaw Bay 215, 216  
 USS Saratoga 169  
 USS Yorktown 157, 163, 165, 255  
 Zuiho 171  
 Zuikaku 163, 169, 171, 191  
 Aircraft labels 100, 278  
 Aircraft strengths and weaknesses  
     Grumman F4F-4 Wildcat 228  
     Grumman F6F-3 Hellcat 230  
     Kawanishi N1K2-J Shiden-kai  
         (Violet Lightning) 226  
     Lockheed P-38F Lightning 233  
     Mitsubishi A6M2 Reisen  
         (Type Zero Fighter) 221  
     Mitsubishi A6M5 Reisen  
         (Type Zero Fighter) 224  
     Vought F4U-1A Corsair 235  
 Aircraft/Vehicles Labels 32  
 Airframe damage 88  
 Airspeed 49, 51, 89, 93, 110, 116,  
     118-122, 286  
 Akagi. *See* Aircraft carriers: Akagi  
 Altitude  
     relationship to airspeed 48-49  
     trading with airspeed 48-49  
 Angels, defined 286  
 Angle of attack 49, 50-52, 55-57, 286  
 Asymmetric propeller loading 57  
 Auto-rudder 43, 45, 47, 51  
 Auto-start 41  
 Avenger. *See* Grumman TBF-1 Avenger

## ***B***

Bailing out 87, 93  
 Bandit, defined 287  
 Bank, defined 287  
 Banking 47, 48  
 Barrel Roll 59  
 Basic Aerobatic Maneuvers 58-61  
     Aileron Roll 58  
     Barrel Roll 59  
     Loop Over 60  
     Loop Under 61  
 Basic Flight Maneuvers 46-51  
     Climbing 48  
     Descending 49  
     Flying straight-and-level 46  
     Holding a constant altitude 46  
     Holding a constant heading 46  
     Turning 47  
 Battles  
     Bismark Sea 161  
     Central Solomons 173  
     Coral Sea 163  
     Eastern Solomons 169  
     Gilbert Islands 157, 175  
     Marshall Islands 157, 177  
     Midway 165  
     Phillipine Sea 179  
     Rabaul 159  
     Santa Cruz Islands 171  
     Wake Island 155  
 Bauer, "Joe" 108, 109, 200-201, 204  
 Bell P-39D Airacobra 11, 238, 251,  
     264-265, 267  
 Best climb speed 49  
 Best glide speed 49  
 Betty. *See* Mitsubishi G4M2  
 Bingo, defined 287  
 Black smoke 87  
 Bogey, defined 287

Bomb damage 89  
 Bomb/rocket view 98  
 Bombing, Dive 118  
 Bong, Richard 204  
 Boyington, Gregory "Pappy" 202  
 Break, the 119  
 Bullets 86, 88, 110, 119, 124  
 Bunk flying, defined 287  
 Buster, defined 287

## **C**

Campaigns 12, 21, 23, 31, 143-144, 210  
     Guadalcanal 167  
     New Guinea 161  
 Campbell, Bob 57, 90, 215-216  
 Cannon  
     20 mm 221, 226-227, 241, 250, 255-258, 261, 263, 266-267  
     30 mm 237  
     Hispano M1 232  
     M4 237  
     Type 99 Oerlikon 221, 226  
 Cannon, firing 25, 101, 270, 274  
 Carl, Marion 198, 203  
 Carrier. *See* Aircraft carriers  
 Chandelle, the 121, 288  
 Change views 24  
 Change your settings 9  
 Changing views  
     Keyboard controls 275  
     Using a joystick 25, 270  
 Chase view 99  
 Chat window, displaying 279  
 Checklists 31, 46, 278  
 Climbing 48  
 Close escort 129, 288  
 Close window 32  
 Closing 102-103, 108  
 Cockpit view 9, 71, 97, 275-276, 278  
 Collision 104, 123  
 Combat box, defined 288  
 Combat Flight Simulator  
     exiting 24  
     getting help 7  
     Installing 19  
     Web site 15  
 Commands  
     aircraft 274  
     engine 273  
     joystick 270  
     weaponry 274  
     window manipulation 279  
 Communication 75, 77  
 Consolidated B-24D Liberator 11, 248  
 Constant-speed propeller 42  
 Control pressure 38  
 Control surfaces  
     Ailerons 36  
     Elevator 37  
     Flaps 39  
     Primary 36  
     Rudder 37  
     Secondary 38  
     Trim 38  
 Controllers, customizing 26, 97  
 Coolant leaks 89  
 Coolant/oil leak 89  
 Corsair. *See* Vought F4U-1A Corsair  
 Crate, defined 288  
 Cruising checklist 45

## *D*

Damage effects 85, 87-90  
 Damage text, displaying 91  
 Dauntless. *See* Douglas SBD-2 Dauntless  
 Debriefing 23, 131, 183  
 Deduced reckoning 288  
 Deflection, defined 288  
 Deflection shooting 110  
 Descending 49  
     checklist 45  
 Detecting 102  
 Devastator. *See* Douglas TBD-1 Devastator  
 Difficulty level 22  
 Disengaging 103  
 Display commands 278  
 Displaying  
     aircraft labels 278  
     coordinates/frame rate 278  
     damage text 278  
     in-game menu 271  
     online Help 271  
 Dive-bombing 118, 136, 294  
 Diving 49  
 Division, defined 289  
 Doolittle, "Jimmy" 210, 246, 255  
 Douglas C-47 Skytrain 11, 247  
 Douglas SBD-2 Dauntless  
     11, 33, 44, 102, 125, 196, 245  
 Douglas TBD-1 Devastator 11, 165, 243  
 Drag 39, 52, 55

## *E*

Elevator controls 25, 37, 48  
 Elevator trim 38-39, 46, 272  
 Enemy Indicator 32, 98, 100, 278  
 Engine  
     auto-start 41  
     commands 40  
     controls 39  
     damage or failure 88  
     displaying and hiding controls 40  
     stops or seizures 88  
 Escort, bomber 129  
 Escort, close 129, 288  
 Escort, convoy 68, 253, 257, 288  
 Exit command 271  
 Exiting game 24  
 Explosions 86, 88  
 Extend flaps 39, 272

## *F*

Failure, structural 88  
 Fighter Aces  
     American 200  
     Japanese 191  
 Fighter planes 219-236  
 Fighter squadron 295  
 Fighter-bomber 101, 295  
 Finger Four, defined 73  
 Fire 88  
 Firing guns and cannon 101, 270  
 Firing weapons 274  
 Flaps  
     damage 88  
     described 39  
     extending and retracting 52, 63, 95  
 Flight controls, overview 35-36  
 Flight maneuvers, basic 46-48  
 Flight School 35

Flying  
     getting up 44  
     hands off 38  
     taking off 44  
     taxiing 43  
     using a joystick 24  
     using a keyboard 36, 272  
     using a mouse 27  
 Forces of flight 52-57  
 Forward View 33  
 Foss, Joseph Jacob "Joe"  
     8, 28, 69, 75, 188, 191,  
     200-201, 212-214, 222, 282  
 Free Flight 20  
 Free Flight, slewing in 82  
 Fuel leak 89  
 Fuel-air mixture, adjusting 41  
 Full Screen 30, 32  
 Full screen, keyboard control 32  
 Full view 98  
     keyboard command 98  
     with and without the HUD 99

**G**

G-forces 54  
 Gaining altitude 46  
 Game controller setup 8  
 Game modes  
     Campaigns 23  
     Free Flight 20  
     Quick Combat 20  
     Training Missions 24  
 Gauges 35, 88, 89  
 George. *See* Kawanishi N1K2-J Shiden-kai  
     (Violet Lightning)

Getting help  
     from Microsoft Technical Support 296  
     Key Command Quick Reference screen  
     7  
     Online Help 7  
     What's This? command 7  
 Getting Up and Back 43  
 Glossary 286  
 Go To 31  
 Golden Rule, Pilot's 51  
 Grumman F4F-4 Wildcat  
     10, 72, 74, 90, 155, 159, 163,  
     200-201, 204, 206-207, 213,  
     215, 229, 250  
 Grumman F6F-3 Hellcat  
     8, 10, 73, 78, 88, 102, 108,  
     179, 194, 205-206, 219, 225,  
     229, 231, 236, 239, 250, 265, 268  
 Grumman TBF-1 Avenger  
     11, 47, 125, 243, 244  
 Gun damage 89  
 Guns 129, 264-265  
 Guns, firing 101  
 Gunsights, reflector 100  
 Gyroscopic precession 57

## **H**

Half-aileron roll 112  
 Halsey, William F. 211  
 Hands off flying 38  
 Hardware, maximizing your configuration  
     29  
 Haruna 253  
 Hat switch 99  
 Hayabusa. *See* Nakajima Ki-43-lib  
     Hayabusa (Peregrine)  
 Head-on Attack 104  
 Heading, holding a constant 290  
 Heading indicator 46

Heads Up Display 9, 33, 98-99,  
124-125, 278

Hellcat. *See* Grumman F6F-3 Hellcat

Help  
cockpit help 28  
Combat Flight Simulator Web site 15  
displaying 7  
key command quick reference 28  
menu 33  
online Help 7  
tooltips 28  
What's This? 28  
while you're playing 28

Help Me! 12, 77, 133

Hiei 253

Hiryu. *See* Aircraft carriers: Hiryu

Hold a constant altitude 46

Hold a constant heading 46

Homeplate, defined 290

Horizontal component of lift 48

HUD. *See* Heads Up Display

Hydraulic leak 90

## *I*

Immelmann 112, 223, 290

Importing missions 15, 140

Indicator, Enemy 32, 98, 100

Induced drag 55

Initial Point 130

Installing Combat Flight Simulator 19

Instrument panel 27-28, 32, 35, 41,  
45-46, 98-99

Interception 129

Intruder, defined 290

Iwamoto, Tetsuzo 191

## *J*

Japanese vessels & vehicles 259

Joystick  
aileron controls 25  
commands 25  
elevator controls 25  
firing guns and cannon 25  
rudder controls 25  
view commands 25

## *K*

Kaga. *See* Aircraft carriers: Kaga

Kagero 259

Kate. *See* Nakajima B5N2

Kawanishi N1K2-J Shiden-kai  
(Violet Lightning)  
10, 73, 74, 88, 187, 189, 192,  
199, 204, 226-227, 229, 231,  
236, 250, 266

Key Command Quick Reference 26, 28

Keyboard  
aileron controls 37, 272  
brakes commands 274  
commands 272-280  
display commands 278  
elevator controls 37, 272  
engine commands 273  
engine controls 40  
extending and retracting flaps 39, 272  
flight commands 272  
game commands 271  
other aircraft commands 274  
padlock views 276  
panning view commands 277  
rudder controls 272  
slewing 280  
trim commands 38, 272

view commands 275-276  
 weaponry commands 274  
 windows commands 279  
 Kirishima 253  
 Kongo 253  
 Kumano 254  
**L**  
 Labels, aircraft 100  
 Lag Turn 114  
 Landing 45  
 Landing gear  
   command 274  
   damage 90, 95  
   keyboard control 44  
 Landing lights, command 274  
 Landing signal officer 10, 13, 63-65,  
   69-70, 74, 77, 136, 236  
 Lead Turn 113-114  
 Leaks 89  
 Lean mixture 40, 273  
 Left brake, keyboard control 274  
 Liberator. *See* Consolidated B-24D  
   Liberator  
 Lift  
   effective lift 55  
   experimenting with 52  
   horizontal component 48  
   overview 52-56  
 Lightning. *See* Lockheed P-38F Lightning  
 Lights commands 274  
 Lights, keyboard controls 274  
 Lockheed P-38F Lightning 10, 233-234,  
   251, 265-267  
 Loop Over 60  
 Loop Under 61  
 Losing altitude 49  
 LSO. *See* Landing signal officer  
 LVT-4 (landing vehicle, tracked) 262

**M**

M3A1 halftrack 263  
 M4A1 Sherman medium tank 263  
 M5A1 Stuart light tank 262  
 Machine guns  
   heavy 265  
   light 264  
   strengths and weaknesses 264-265  
 Main commands 270  
 Main screen, The 20  
 Maneuvering 103  
 Manifold pressure  
   gauge 41  
   increasing and decreasing 43  
 Manual gear pumping,  
   keyboard control 90  
 Maximum power, increasing 41  
 McCampbell, David 205  
 McGuire, Thomas 205  
 Measurement system for HUD 99  
 Medals  
   American 187-189  
   award basis 184  
   earning 127  
   Japanese 184-186  
 Merchant ship 259  
 Methanol-Water mix 40  
 Mikuma 254  
 Military transport aircraft 247  
 Mission Briefings 23, 130  
 Mission Builder 9, 10, 14-15, 127,  
   136-140

## Mission types

- anti-ship 139
- combat air patrol 128, 139
- escort 129, 139
- fighter sweep 129, 139
- intercept 129, 139
- search and destroy 129, 139
- strike 130, 139

## Missions, single 21

## Missions, single vs. campaign 21

Mitchell. *See* North American B-25D

## Mitchell

## Mitsubishi A6M Reisen (Type Zero Fighter)

- 20, 22-23, 42, 72-76, 88, 98,
- 102, 104, 124-125, 165, 189,
- 191, 194-195, 198-201, 204,
- 207, 212, 219-220, 229-233,
- 236, 239, 245, 250-251, 254, 264

## Mitsubishi A6M2 Reisen

- (Type Zero Fighter) 10, 221,
- 222-223

## Mitsubishi A6M5 Reisen

- (Type Zero Fighter) 10, 224-225

## Mitsubishi G4M2

- 11, 159, 189, 206, 222, 241

## Mixture 39

## Mixture control lever 42

- default setting 42
- described 42

## Mogami 254

## Mouse, flying with 27

## Mouse Rollover Help 7

## Multiplayer 23

- chat window 279
- described 23

## Muto, Kaneyoshi 192

## N

## Nagumo, Chuichi 210

## Nakajima B5N2 11, 242

## Nakajima Ki-43-lib Hayabusa (Peregrine)

- 11, 204, 215, 220, 229,
- 233, 236, 239, 251, 265

## Nango, Shigeo 193

## Navigating

- Over water 79
- Skipping to the next action 81
- Slewing 82
- Using the in-flight map 79

## Navigating in the Pacific Theater 78

## Negative Gs 55

## New View Window 32

## Nimitz, Chester 209

## Nishizawa, Hiroyoshi 193

## North American B-25D Mitchell

- 11, 125, 246

## Nose, raising and lowering 37

## Numeric keypad 47

## O

## Oerlikon 20 mm cannon 221, 226

## O'Hare, Edward "Butch" 206

## Oil leaks 89

## Online Help

- 7, 20, 23, 24, 29, 30, 33, 46, 95, 138, 140

## Online Help, "What's This?" command 7

## Ops, defined 292

Oscar. *See* Nakajima Ki-43-lib Hayabusa (Peregrine)

## Ota, Toshio 195



**P**

P factor 57  
 Padlock view  
     described 98  
     keyboard controls 98  
     using a joystick 25  
 Paint the horizon 48  
 Pancake, defined 292  
 Panning views  
     command 277  
     keyboard controls 99  
 Parasite drag 55  
 Parking brakes  
     command 274  
 Patrol 128  
 Pause Flight 31  
 Pearl Harbor 148-150, 155, 163,  
     165, 179, 191, 201, 208-211,  
     238, 240, 242, 246, 283  
 Peregrine 239. *See* Nakajima Ki-43-lib  
     Hayabusa (Peregrine) "Oscar"  
 Performance limitations, exceeding 85  
 Pilot, creating 144  
 Pitch  
     changes in 37, 39  
     defined 292  
 Pitch attitude  
     decreasing 37  
     increasing 37  
 Pitching up or down  
     using a joystick 37, 270  
     using the keyboard 37, 272  
 Pitot tube, defined 292  
 Plane Tour 11, 220  
 Power, decreasing or increasing  
     41, 42, 43  
 Precession, gyroscopic 57

Primary control surfaces, described 36-38  
 Product Support. *See* Microsoft Technical  
     Support  
 Promotions  
     award basis 146  
     earning 181-182  
 Prop control lever 43-44.  
     *See* Propeller control lever  
 Prop r.p.m. 41  
 Propeller, adjusting 41-42  
 Propeller control lever 41  
     default setting 42  
     described 41-42  
     recommended settings 42  
 Purple Heart 187

**Q**

Quick Combat  
     described 20  
     Slewing in 82  
 Quick Reference screen, displaying 7

**R**

Radio  
     Communication examples 76  
     damage 90  
     keyboard command 274  
     Turning off and on 75  
 Ramrod, defined 292  
 Ranger, defined 292  
 Razorback, defined 293  
 Reactive force 56  
 Realism 24  
 Reckoning, deduced 288  
 Recommended reading 282  
 Recover promptly 50  
 Reflector gunsight 100  
 Release bomb 25, 118  
 Retract flaps 39

- Rhubarb, defined 293
  - Right brake, keyboard control 274
  - Right-click help 28
  - Roadstead, defined 293
  - Rockets
    - damage caused by 89
    - described 101
    - firing 25, 101, 270
    - strengths and weaknesses 268
    - views 98, 101
  - Rodeo, defined 293
  - Roll, defined 293
  - Rookie 21
  - Roosevelt, Franklin D. 201
  - Rudder
    - auto-rudder 47
    - controls 25, 37, 272
    - damage 88
    - described 37
  - Rudder trim 38
  - RV, defined 293
  - Ryujo. *See* Aircraft carriers: Ryujo
- S**
- Sakai, Saburo
    - 24, 73, 94, 125, 186, 193-198, 212, 214, 223
  - Sandwich, defined 293
  - Sasai, Junichi 198
  - School, flight. *See* Flight School
  - Scissors 115
  - Scramble, defined 293
  - Screen resolution,
    - improving performance 30
  - Screen resolution,
    - minimum requirements 8, 136
  - Screen resolution,
    - setting for a fast system 8-9
  - Scuttlebutt 10-11, 13, 237
  - Secondary control surfaces 38
  - Section, defined 293
  - Settings, described 8, 9
  - Shiden. *See* Kawanishi N1K2-J Shiden-kai (Violet Lightning)
  - Shokaku. *See* Aircraft carriers: Shokaku
  - Shooting, deflection 110
  - Shrapnel 88
  - Silver Star 205
  - Simulation Rate 31
  - Single Missions
    - 21, 31, 124, 127, 136, 143, 181
  - Skip to Next Action 31
  - Skytrain. *See* Douglas C-47 Skytrain
  - Slewing
    - described 31
    - Keyboard controls 83
    - Slew mode 82
  - Slow down 46
  - Smoke, different types of 87
  - Soryu. *See* Aircraft carriers: Soryu
  - Sound 24, 32
  - Speed up 46
  - Spins, avoiding and recovering from 51
  - Spiraling slipstream 57
  - Split-S, the 120
  - Spot view 98
  - Squadron, defined 294
  - Stabilizers, shredded 88
  - Stall speeds 49
  - Stalling 49-50, 52
  - Starting the engine 39, 41
  - Status Messages 32
  - Strafing 130, 136
  - Structural failure 88
  - Stud, defined 294
  - Sugita, Shoichi 199
  - Surprise, the element of 109
  - Sustained climb 49

Sustaining damage 88-91  
 Suzuya 254  
 Sweep, defined 294  
 Sweep, fighter 129  
 Switching among view windows 279  
 Swivel 109

## *T*

Tachometer, described 41  
 Tactical Display 32, 71, 78-81,  
     90, 98, 100, 124-125, 278  
 Taiho. *See* Aircraft carriers: Taiho  
 Takeoff checklist 31  
 Taking off 44  
 Tanks  
     M4A1 Sherman medium tank 263  
     M5A1 Stuart light tank 262  
 Target  
     attacking 132-133  
     cancelling padlocked 98  
     keyboard controls 270, 276  
     Viewing 81  
 Taxiing 43  
 Technical Support 296  
 Telephone support 297  
 Temperature, monitoring 88-89  
 Thach, John S. "Jimmy" 71, 91, 95,  
     206-207, 229, 294  
 Throttle  
     commands 40, 273  
     increasing and decreasing 40  
 Throttle control lever, described 41  
 Thrust 55  
 Tidorí 259  
 Time compression 271  
 Tokyo, raid on 246

Torque, described 56  
 Training Missions 134-136  
 Trim  
     aileron 38  
     commands 38, 272  
     damage to trim tabs 88  
     described 38  
     elevator 38  
     rudder 38  
 Turn indicator, using 46  
 Turn, radius and rate 47  
 Turning 47-48  
 Turning into your opponent 110  
 Turns  
     Lag 114  
     Lead 113

## *U*

U.S. vessels & vehicles 261  
 Undock Window 33  
 Up and Under 116  
 Using  
     checklists 31  
     gunsights 100  
     views 97-100  
     Waypoint information 81  
     weapons 101  
 USS Alabama 257  
 USS Enterprise. *See* Aircraft carriers:  
     USS Enterprise  
 USS Essex. *See* Aircraft carriers:  
     USS Essex  
 USS Fletcher 57  
 USS Gambier Bay 216  
 USS Gato 261  
 USS Hornet. *See* Aircraft carriers:  
     USS Hornet  
 USS Indiana 257  
 USS Indianapolis 258

USS Iowa 257  
 USS Lexington. *See* Aircraft carriers:  
     USS Lexington  
 USS Long Island. *See* Aircraft carriers:  
     USS Long Island  
 USS Massachusetts 257  
 USS North Carolina 257  
 USS Northampton 258  
 USS Pennsylvania 225  
 USS Pensacola 258  
 USS Portland 258  
 USS Randolph. *See* Aircraft carriers:  
     USS Randolph  
 USS Saginaw Bay. *See* Aircraft carriers:  
     USS Saginaw Bay  
 USS Saratoga. *See* Aircraft carriers:  
     USS Saratoga  
 USS Shaw 179  
 USS South Dakota 257  
 USS St. Lo 216  
 USS Yorktown. *See* Aircraft carriers:  
     USS Yorktown

## V

Val. *See* Aichi D3A1  
 VE Day, defined 295  
 Vector information 78  
 Vessels and vehicles  
     American 261  
     Japanese 259  
 Veteran 21  
 View commands 275  
 View Mode 33  
 View windows  
     creating 279  
     switching among 279  
 Viewing  
     outside your aircraft 98

Views  
     cycling through 276, 278  
     described 32-33  
     menu 32  
     panning 277  
     using 97-100  
 Violet Lightning 10, 226  
 Virtual cockpit view 98, 275-276  
 VJ Day, defined 295  
 Vought F4U-1A Corsair  
     10, 70, 79, 132, 203, 236, 251

## W

War Emergency Power 40  
 Water/Methanol-Water Injection 40, 273  
 Waypoint, defined 71  
 Waypoint information, using 81  
 Weaponry commands 274  
 Weapons, using 101  
 Web site, Combat Flight Simulator 15  
 Weide, Mike 184, 215  
 Weight 53  
 What's This? command 28, 35  
 Wildcat. *See* Grumman F4F-4 Wildcat  
 Willys MB Jeep 263  
 Windows manipulation,  
     keyboard controls 279  
 Wing, defined 295  
 Wing, how it works 52  
 Wingman, defined 295  
 Wings  
     banking 48  
     shredded 88  
 Women Airforce Service Pilots (WASP) 17  
 World War II  
     key players 208-211  
 Wound award 183  
 Wounds 88

**Y**

Yamamoto, Isoroku 199, 208, 241

Yaw

counteracting 36

defined 295

during a turn 48

Yawing 270, 272

**Z**

Zeke. *See* Mitsubishi A6M2 Reisen

(Type Zero Fighter); Mitsubishi A6M5

Reisen (Type Zero Fighter)

Zero. *See* Mitsubishi A6M2 Reisen

(Type Zero Fighter); Mitsubishi A6M5

Reisen (Type Zero Fighter)

Zooming

in and out 138

keyboard controls 141, 279

Zuiho. *See* Aircraft carriers: Zuiho

Zuikaku. *See* Aircraft carriers: Zuikaku