

MANUAL

Work in Progress



GAME MANUAL

WORK IN PROGRESS!

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0. TL;DR

PRO TIPS

So, you've jumped straight into the game and some things are not working as intended. Use this guide to ensure everything is set up properly.

CONFIGURE THE JOYSTICK AND CONTROLS

A joystick (or controller) is **essential** to play this game as it was intended. Before playing any mission, *ensure* you have configured the joystick controls.

ASSIGNING JOYSTICK AXIS

If you want to assign a control that's based on the joystick axis movement, highlight the control (for example Pitch (Nose Up/Down) and, in the right hand panel click on the line below 'Axis'.)

Notice that the software is 'scanning' for a control input and that the two small panels in the lower left/right of the screen are showing Down and Up. Move the Joystick forward and back and the central dial should react moving to the extreme left for Down and the extreme right for Up. Let go of the joystick and this control will be assigned.

> ### SET RUDDER CONTROL WITH STEERING BRAKES
>
> Set your Rudder (Yaw) controls and Steering Brake controls to the same joystick axis; this way turning will be seamless.

SET ALL THROTTLES TO SAME AXIS

If you are having issues with your engine Throttle controls, make sure you set *ALL* of the following engine controls to the *SAME* joystick axis:

- Engine 1 Throttle
- Engine 2 Throttle
- Engine 3 Throttle
- Engine 4 Throttle
- Port Throttles
- Starboard Throttles
- All Throttles

CUSTOMISING CONTROL KEYS

You can also customise the B-17 keys in UNSHIFTED/SHIFT/CTRL/ SHIFT+CTRL combinations in the same way as above.

Note: The right hand main panel also allows you to assign other types of controls for appropriate items. For example Yaw (Rudder Left/Right) has Slow/Medium/Fast Non-Centring or Centring options. Click on the line to toggle through the options.

FLY THE TRAINING MISSIONS

You're lucky, you bought this game on Steam, downloaded it within minutes and can directly face combat in the skies over Occupied Europe. The original air crews you are roleplaying were not as lucky. They had *years* of training prior to combat experience. Do yourself a favour, and honor the air crews, by playing through each Training Mission before jumping into a campaign.

Read the detailed instructions here.

1: PILOT CHECKOUT

This first training mission will show you how to navigate the basic B-17 controls. This includes accessing the interior screens as well as the exterior camera controls.

1. Click the inside the red circle, under Start Time, to begin.
2. Pan left and right around the aircraft by using the mouse Left Click or key pad 0 and .
3. Pan up and down, the full way.
4. Zoom in and out by using the mouse Right Click or key pad + and -
5. Press F1 to enter the flight deck.
6. Select the Bombardier from the menu at the top of the screen.
7. Now you're in the nose compartment, with the Bombardier selected. Press I to enter the Instrument view. Then press Space to view the alternate instruments.
8. Press A to view through the Norden bomb sight.
9. Press W to view through the window.
10. The Navigator has collapsed! The Bombardier needs to revive him. Press the C key or use the right-side menu to go back to Compartment view.
11. Right click the Bombardier and select the Move To button in the middle of the circle menu. Then select the First Aid button for the Navigator. The Bombardier will leave his station and revive the Navigator. When he's finished, he will move back to his original position.
12. Select the Flight Engineer from the top-menu. This will take you to view the bomb bay compartment.
13. Press A to enter action view, and you will be in the Top Turret, where the Engineer is located.
14. Pan around the turret using your joystick or controller.
15. This will conclude your check out! To complete the mission, go back to the flight deck and click inside the red circle under Finish Time.

2: GUNNERY

You are in the air above the airbase at an altitude of 12,000 feet and an airspeed of 150mph IAS. The Navigator is in his alternative position on the Cheek gun.

You must shoot at a target B-17. It will come up alongside you in various positions to cover all gun positions. You should experiment with 'leading a target' and the effects of range on bullet arcs. You must hit the bomber with 50 rounds from each position but don't worry about doing any damage – all guns are loaded with special 'paint' rounds.

You will begin in the Top Turret position. Switch your position to the Bombardier [` key]

- Press key M to take control (of Bombardier).

1. Wait for the target B-17 to appear.
2. Aim and fire. When 50 hits are recorded you will not be able to fire anymore and have to move on.
3. Press F2 to get an outside view of the B-17.
4. Press [to select the target B-17 and use the Camera keys to look at the colourful 'damage'.
5. Press [to select your B-17 and press F1 to return to Chin Turret station.
6. Repeat the above for all gun positions in this order:

```
Chin Turret, Cheek Gun, Top Turret, Ball Turret, Left Waist Gun,
Right Waist Gun and Tail Gun.
```

7. When you have succeeded in hitting the B-17 with all guns the mission will end.

3: BOMBING – GOOD CONDITIONS

In this mission you must locate the target and release the bombs as accurately as possible. You will be the Bombardier just at the beginning of the bomb run. The Norden bombsight is already configured with altitude and speed correctly. Altitude is 8,000 feet, and airspeed 155mph (IAS). All engines are running well, gear and flaps are fully raised. The weather is good, altitude is low and there is no flak or fighter opposition to worry about.

- Press key M to take control.

1. Wait for the Bombardier to indicate he is on the bombrun. Then press key A to go to Bombardier's Action View (you will be looking through the bombsight).
2. Enter "Search Mode" by using SHIFT + K (a light will come on).
3. Use your joystick to locate the target, place the crosshair over the target and then hit SHIFT + K to 'lock' the target.
4. The Sight starts in DRIFT tracking mode. Moving the joystick left adjusts the angle of Drift to the left – the target will begin to drift more to the right of the sight picture. Moving the joystick right will alter the angle of Drift to the right – the target will begin to drift more to the left of the sight picture.
5. Press key N to enter the RATE tracking mode. Moving the joystick up makes the rate track more slowly, so the target will move towards the bottom of the sight picture. Moving the joystick down will make the rate track more quickly, hence the target will appear to move back up towards the top of the sight picture. The objective is to freeze any vertical movement of the target.
6. You should adjust DRIFT and RATE until the sight picture shows no movement at all. This is called SYNCHRONISATION, and means the bombsight is correctly allowing for speed, altitude and wind drift.
7. During your alterations, the target may have slipped out from the crosshairs. If you have time, you can enter SEARCH mode, using the SHIFT + K key combination, and place the target directly under the crosshair again. Provided that you have correctly SYNCHRONISED the sight, as described above, the crosshair will remain where you left it.
8. Watch the two markers close towards each other, when they meet the bombs will be dropped automatically by the bombsight – thus ensuring a drop accurate to the millisecond.
9. Watch bombs release from bay and then press F6 to view down from inside the bomb bay and F6 again to view target from ground

level (use mouse left button to zoom in and right hand button to move around target.

4: BOMBING – POOR CONDITIONS

In this mission you must fly a mission to a target and bomb it. The weather is more overcast and more like normal European cloud cover. The altitude is 18,000 feet, which is average for a run on a defended target, but there is no flak or fighter opposition. The bomber mission starts just before the Initial Point of the bomb run so you must carry out the full calibration of the bombsight.

- Press key M to take control.

1. Press the spacebar to go to the Bomb Panel.
2. Click Bomb Indicator button ON.
3. Click ON – Bomb Bay Doors, Bomb Arming and Autopilot switches.
4. Press spacebar to return to Norden bombsight view.
5. Wait for the Bombardier to indicate he is on the bomb run. Then press key A to go to Bombardier's Action View (you will be looking through the bombsight).
6. Enter "Search Mode" by using SHIFT + K (A light will come on).
7. Use your joystick to locate the target, place the crosshair over the target and then hit SHIFT + K to 'lock' the target.
8. The Sight starts in DRIFT tracking mode. Moving the joystick left adjusts the angle of Drift to the left – the target will begin to drift more to the right of the sight picture. Moving the joystick right will alter the angle of Drift to the right – the target will begin to drift more to the left of the sight picture.
9. Press key N to enter the RATE tracking mode. Moving the joystick up makes the rate track more slowly, so the target will move towards the bottom of the sight picture. Moving the joystick down will make the rate track more quickly, hence the target will appear to move back up towards the top of the sight picture. The objective is to freeze any vertical movement of the target.

10. You should adjust DRIFT and RATE until the sight picture shows no movement at all. This is called SYNCHRONISATION, and means the bombsight is correctly allowing for speed, altitude and wind drift.
11. During your alterations, the target may have slipped out from the crosshairs. If you have time, you can enter SEARCH mode, using the SHIFT + K key combination, and place the target directly under the crosshair again. Provided that you have correctly SYNCHRONISED the sight, as described above, the crosshair will remain where you left it.
12. Watch the two markers close towards each other. When they meet, the bombs will be dropped automatically by the bombsight, thus ensuring a drop accurate to the millisecond.
13. Watch bombs release from bay and then press F6 to view down from inside the bomb bay and F6 again to view target from ground level (use mouse left button to zoom in and right hand button to move around target.

5: APPROACH AND LANDING

You are on approach to the main runway of the airfield. All engines are running, gear and flaps are fully raised. You are in the Pilot's seat behind the controls of the B-17 as it turns onto final approach. You will need to follow the correct approach and ease the bomber onto the runway. The mission ends once you've landed and brought the aircraft to a complete halt.

- Press key M to take control.

1. Use the external camera views for maximum visibility.
2. Locate the main runway where you will land (it should be lined up in front of you).
3. Drop your landing gear (Shift + Up Arrow).
4. Ease up on the all engine throttles.
5. Lower flaps (Shift + F).
6. Glide in to the runway and land all three wheels.

7. Cut throttle as plane rolls (- minus key).
8. Put Wheel Brakes on (Insert key) to stop aircraft moving.

6: FEATHERING / RESTARTING AN ENGINE

An engine that is not feathered when it has stopped will add severe drag. This could cause a fire or even break the propshaft, so it's very important to learn how to feather an engine. You are flying above the airfield at an altitude of 5,000 feet and airspeed of 155mph (IAS). The engines are running, gear and flaps are fully raised. You must feather engine number 1 and then restart it, all while maintaining speed and altitude. If you drop below 1,000 feet you will fail this mission.

- Press key M to take control.

1. Go to the Pilot's Instruments view in the cockpit (key I).
2. Click on the large, round red button marked "1".
3. Find the fuel system switches above the pedestal and turn off the left-most column.
4. Click and move the Turbo- Supercharger and Throttle to zero for Engine 1.
    - Number One Engine should now be feathered.
5. Locate the fuel system switches above the pedestal and turn on the leftmost column.
6. Click on the large, round red button marked "1".
7. Set the throttle and Turbo speeds to match the other three engines.

At this point the engine *should* start.

7: TAXI AND TAKE OFF

This is simply an exercise in taxiing the B-17 to the main runway and then carrying out a take off. It's here that you will learn basic ground handling skills and take off procedures.

The mission will end once you get to 1,000 feet pull, raise landing gear and flaps.

Your aircraft is on a hardstand at an airfield with engines running, parking and tail brakes set and flaps fully lowered. You start in the Pilot's position, Action view.

TAKING CONTROL

1. Press F2 to enter exterior view. Move your view to behind the aircraft.
2. Press M to enter Manual mode.

If the aircraft begins moving forward, your throttle controls may need to be reconfigured (see above tips).
For now, hold Shift and press - [minus key] to reduce throttle and stop moving.

MOVING THE AIRCRAFT:

When you are ready to depart the hard stand:

3. Press + (plus key) to increase throttle slowly. Tap the key, don't hold it.
4. Unlock your Tailwheel [Shift + T]
5. Unlock Parking Brake [Shift + P]
6. Turn to the right by holding the Rudder to the starboard.
7. If you need to stop, engage the Parking Brake with the P key.

DIRECTIONS:

- Turn slight right off the hard stand on the taxiway.
- Stay to the right until the taxi-way turns to the left.
- Turn left and align with the center of the runway.

DO NOT leave the concrete taxiway or runway; you will instantly fail the mission and must restart.

4. Use all camera views (especially the zoom in/out functions) to see where the main runway is.
5. Move very slowly and steer left- right using the Rudder controls (keyboard or joystick).
6. Stop at the top of the main runway (Wheel Brakes On - Insert key), lock your tail wheel (T).
7. Throttle up full using keyboard or joystick controls.
8. Wheel Brakes Off (Delete key) and as the aircraft speeds up over the runway, ease it gently into the air and perform a shallow climb.
9. Raise all landing gear (Up Arrow).
10. Raise flaps (key F).

All Training Missions will be debriefed. You will be told in the Debriefing File if you have achieved the required competence.

STARTING A MISSION

STEP BY STEP:

1. Press F1 to view interior of the B-17.
2. Press 6 to switch to Radio Operator position.
3. Press I to switch to Instrument view.
4. Click on the left red "Outgoing Messages" book.
5. Press M to set Manual mode.
6. Click "Begin Mission" at top of the page.
7. When you hear engines starting, press F2 to return to external view.
8. Carry on!

More detailed instructions found here.

QUIT MISSION

The default key bind to quit a mission is to hold Ctrl and Shift then press Q key.

1: TECHNICAL

OVERVIEW

Technical Requirements for operating the game.

SYSTEM REQUIREMENTS

MINIMUM

```
OS: Windows 10 or later
Processor: Intel® Core™ i5
Memory: 8 GB RAM
Graphics: NVIDIA® GeForce GTX 1070 or AMD equivalent
DirectX: Version 12
Storage: 1 GB available space
```

RECOMMENDED

```
Requires a 64-bit processor and operating system
OS: Windows 11
Processor: Intel® Core™ i5
Memory: 8 GB RAM
Graphics: NVIDIA® GeForce GTX 2060 or AMD equivalent
DirectX: Version 12
Storage: 1 GB available space
```

Starting January 1st, 2024, the Steam Client will only support Windows 10 and later versions.

2: GETTING STARTED GUIDE

THE GAME TUTORIAL

Well, you've successfully installed and loaded the game and you're itching to get into the air in that big bomber and see some WWII action. This tutorial will get you up and running in a Bomber Commander campaign game, but it will **not** teach you the complete simulation (manual flying, bombing etc). For that you will need to try the specific Training and Quickstart Missions using the Training School sections later in this manual.

STARTING OFF

After the Early Access disclaimer, you will see the Main Menu screen.



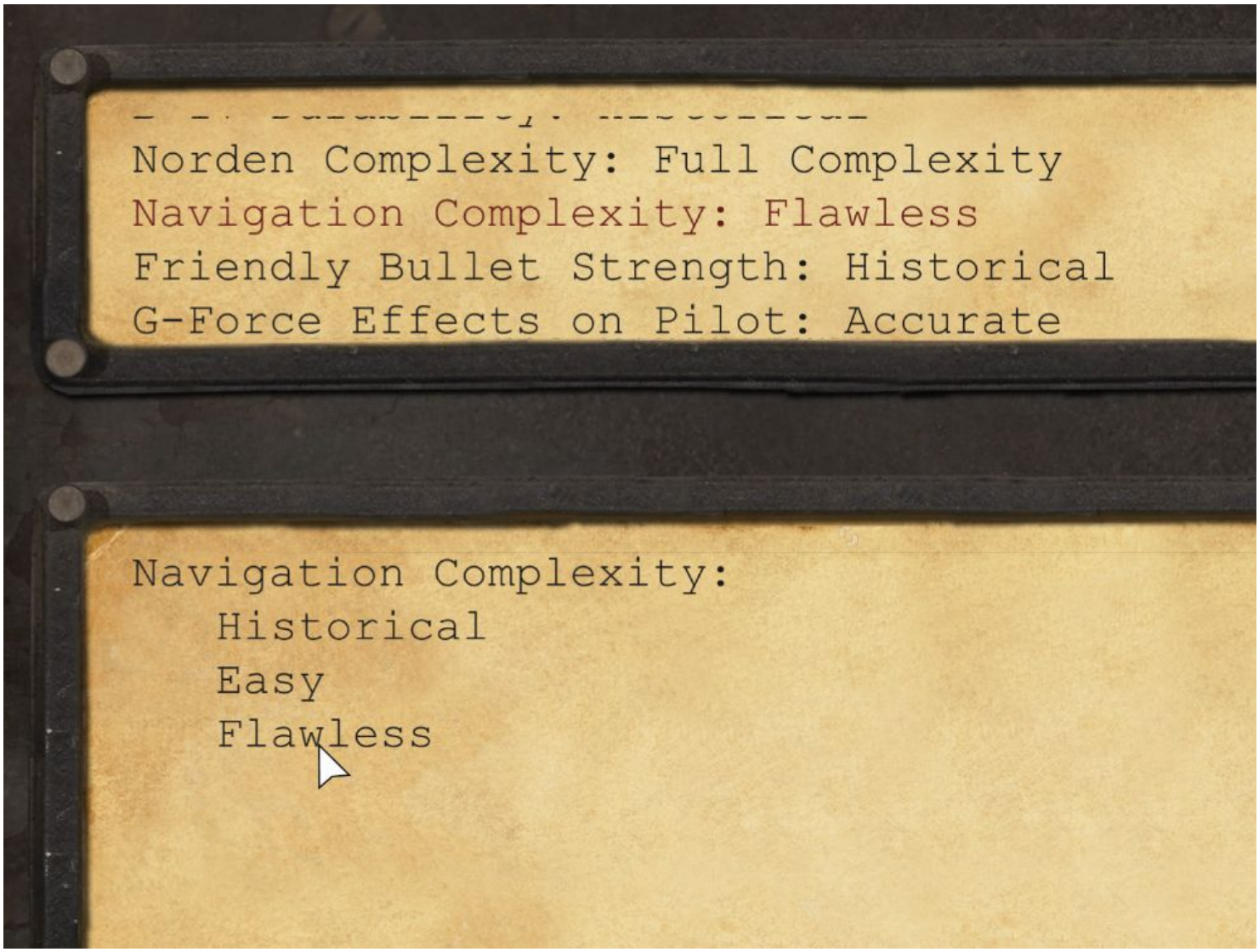
Before you do anything else you must check the status of the Navigation realism. Navigation is an important factor in the simulation and the aircraft can fly at three levels of Navigation Complexity: *Historical*, *Easy* or *Flawless*. For this guide we don't want you to get lost so you will be flying with Flawless navigation.

- Click on the Game Option icon (bottom left) - a red light will switch on when selected.
- Click on the Forward button (bottom right).



You will be taken to the Game Difficulty/Realism menu screen.

- Select the second icon down on the left (marked 1, 2, 3) and click on the Continue switch (lower right).
- Scroll down the list to Navigation Complexity and make sure this is set at 'Flawless'.



If it isn't, click on the line and click on Flawless in the lower panel.

While you're in the Realism option menu, also adjust the Collision Damage setting to "Ground only" - this will prevent any mid-air collisions with friendly (or enemy) aircraft. However, if you want a more realistic experience, do not change this setting.

- Click on the Continue switch (lower right).
- Click on the return to previous screen switch (lower left) to return to the Main Menu screen.

NEW GAME



Now we want to play a New Game (the icon of the B-17 - lower left).

- Click on the icon (a red light will switch on when selected) and then click on the Continue button (bottom right).

GAME TYPE



You will be taken to the Game Type screen.

- Select to Play a Single Bomber Commander Campaign (the single aircraft icon - top left) and flip the Continue switch.

BOMB GROUP SELECTION

You will now be taken to the 8th Air Force Division screen. Here you can choose which Bombardment group and which Squadron in that Group you want to join. Different Bombing Groups are based at different airfields across England.



- Select the 401st Bombing Group from the left-hand panel.

- Select the 612th Squadron from the right-hand panel.

The lower graphic panels will show the insignia of the Bombing Group and the specific Squadron you have chosen.

At the bottom of the screen is a Campaign Start panel (covering the period December 1st 1943 to February 10th 1945). This is where you choose the campaign length.

- Click in the panel until it shows the date March 1st 1944.
- Flip the Continue switch (lower right).

BOMBER NAME AND NOSE ART

You will now be taken to your bomber Name and Nose Art selection screen.



- Click on a ‘nose art’ name for your bomber (click and drag the scroll bar to view all options in the left panel).

The picture will be shown on the right-hand panel.

- Now click on the Bomber Name panel (top), delete the default name with the Backspace key and type in your own choice of name for your bomber and press Return/Enter.

Try to match the name to the nose art you have chosen.

- Flip the Continue switch (lower right).

CREW SCREEN

Your next stop is your Crew screen. This shows the current crew for your B-17. Remember that in a Bomber Commander campaign you are in overall charge of the ten-man crew and the one bomber.

- Click on the top left portrait (the Bombardier) and the bombardier’s name will appear in the central panel.

- Click inside the name panel and delete the name using the Backspace key.
- Type in a new name (it could be your own) in the two panels and press Return/Enter.
- Flip the Continue switch (lower right) and you will be taken to the HQ Corridor screen.



THE HQ CORRIDOR



The HQ Corridor gives access to various mission planning and briefing screens. If you were playing the Squadron Commander game you would be able to plan all strategic operations in the Operations Room but as Bomber Commander you will NOT have access to mission planning.

But you do have your own office.

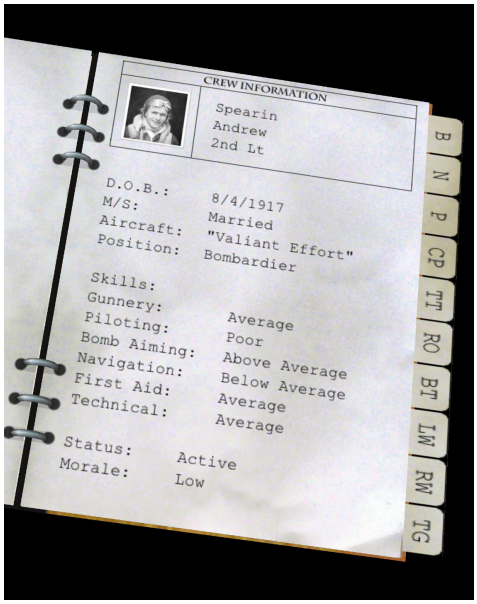
- Click on the door on the far left of the HQ Corridor and you will enter your office (you must try to be a bit more tidy!).

Here you will find information about your crew and your bomber.



CREW INFORMATION FILE

- Click on the book on the left of your desk and you will open the Crew Information File. The first page will open on the Bombardier details and will show the name you inserted in the Crew screen. Clicking on the tabs along the side of the book will show details for all ten crew (coded by position: TG - Tail Gunner, N - Navigator etc).
- Click away from the pages and the book will close.



BOMBER INFORMATION FILE

- Click on the book on the right of the desk and the Bomber Information File will open.
- This shows the details of the bomber you renamed. This is a new campaign so there will not be details of any previous missions.
- Click anywhere away from the book to close the file.

INSPECT BOMBER

- Click on the windows to go outside to Inspect Bomber and you will be taken to your Jeep.

- A clipboard will show the name of your bomber.
- Click on the B-17's name on the clipboard.
- This will take you to the aircraft waiting at its dispersal point (in the 3D world). Inspection is particularly useful when you have returned from a mission and want to see the damage your bomber has sustained.

Full camera views are available:

CONTROLS: KEYPAD

- Plus + and Minus - : Zoom in/Zoom out.
- Arrow keys: Move the view left/right/up/down.
- PageUp/PageDown: Tip view up/down.
- Ins/Delete: Rotate view left and right.

CONTROLS: MOUSE

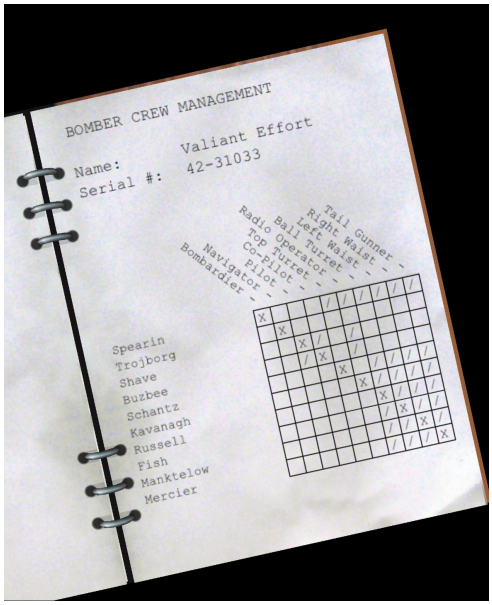
- Alternately, you can use the mouse (with the right mouse button pressed in to zoom in/out and the left mouse button pressed in to rotate view).
- Press ESC to return to the jeep bonnet - this contains the Crew Management File.

CREW MANAGEMENT FILE

- Click on the Crew Management File.
- This shows a summary of the crew's abilities. A cross ‘X’ shows the job of each crew member, a slash '/' shows a competence in another job. It's here that you can reassign your crew and manage their abilities as the campaign begins to take its toll and injuries or KIAs accumulate. To change a crewman's job, click on the slash and it will become a cross. Note: Other crew positions will be automatically adjusted to fit in with your choices.
- Click on the right-hand page to turn it over and you will see details of each crewman's skills.

- These will improve as each man gets more and more mission experience.
- Click away to close the book and click on the bunch of keys to return to the airbase.

Now you have examined all aspects of your crew and bomber, you'd best get a briefing about your first mission.

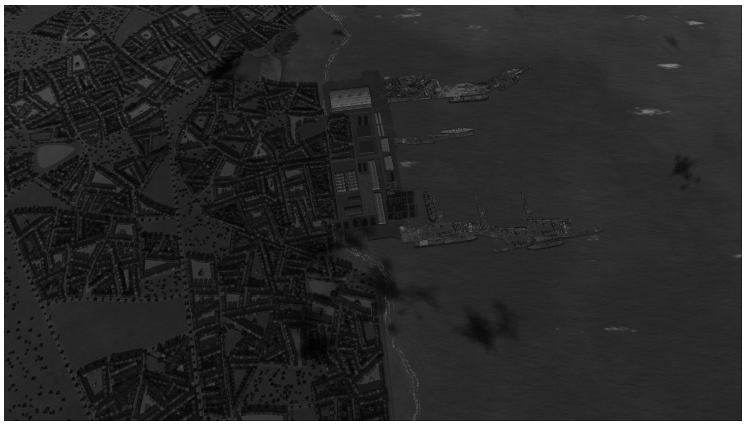




THE BRIEFING ROOM

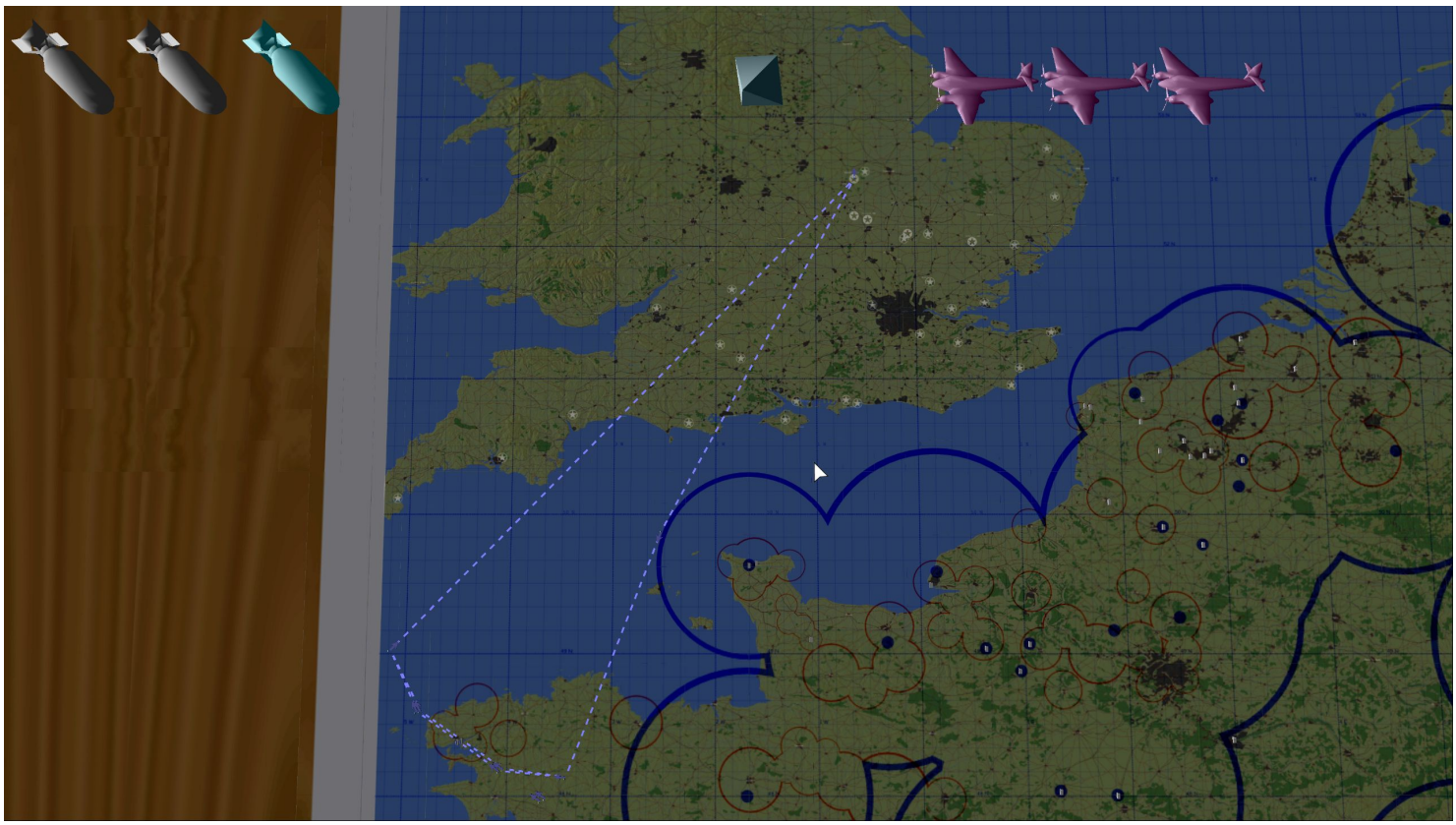


The Briefing Room gives you all the current information available about your target (or targets) and the routes there and back.



- In the centre of the stage there are facilities to see a fly-over film of your target, as it will appear to the Bombardier.
- Click on the film screen and watch the film carefully.
- In this tutorial guide you'll be sitting in the Bombardier's seat during the bomb run so it'll help if you recognise the target.
- When the film has finished or when you have pressed ESC, you will return to the Mission Briefing room.
- Click on the Map on the right of the stage to see bomber route, the target and the route back.

MAP CONTROLS



The Map can be controlled by using the numeric keypad keys:

- Mouse scroll wheel OR Plus and Minus (+/-): Zoom in/Zoom out.
- Arrow keys: Move the map left/right/up/down.
- PageUp/PageDown: Tip map up/down.
- Ins/Delete: Rotate map left and right.
- Alternately, you can use the mouse (with the right mouse button pressed in) to move the map in all directions. *Note: The map will not move when zoomed out too far, so if it's not moving, zoom in more.*

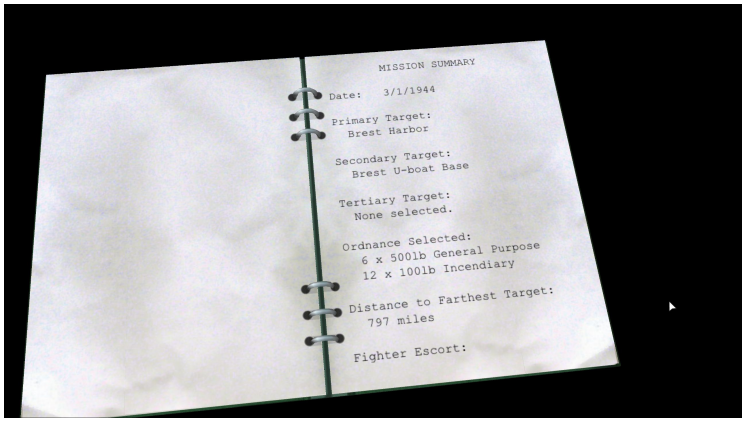
The map shows Waypoints, Initial Points, Primary, Secondary, Tertiary targets (if available) and Rally Points. The red arrows show the direction of travel along the route.

- Place your mouse cursor on a gold pyramid waypoint marker (you might have to tip the map view) and you will see the height the

bomber formation should be flying at when it hits that particular waypoint (you might also have to zoom in with numeric keypad + key).

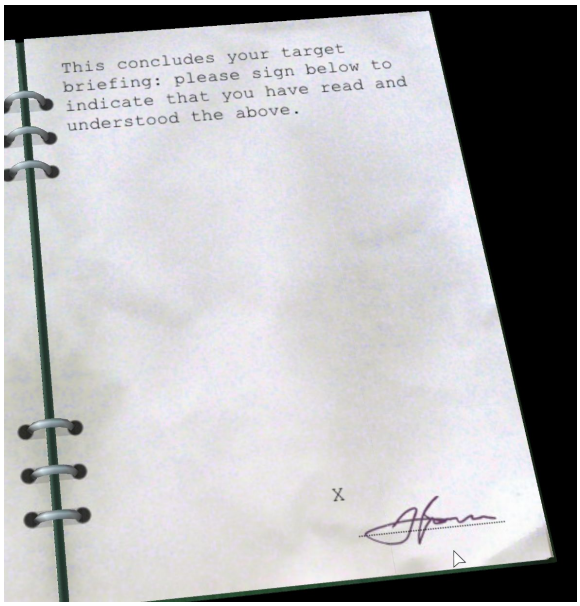
- Press ESC to leave the map and return to the Briefing Room.

TARGET DETAILS



You've now seen a reconnaissance film and the route to the target but you've still to read all the target details.

- Click on the green Mission Briefing file on the desk in front of you.
- This opens on the Mission Summary page that includes details on the Primary and Secondary targets, type of bomb selected, distance to travel and fighter escort details.
- Click on the right-hand page of the Mission Briefing file and it will turn the page to show the Primary Target details including Flak Strength, Fighter Strength and Target Intelligence.
- Click again on the right-hand page to view details of the Secondary Target.



- When you have read about the mission targets click on the right-hand page again.
- You will now have to sign that you have read and understood the target/mission details.
- Click on the line (marked by an X) and a signature will appear.
- Click away from the book to close the Mission Briefing file and return to the Mission Briefing room.

Now let's start the mission.

- Click on the door on the right of the Mission Briefing hut (Start Mission) to enter the 3D simulation.



STARTING THE MISSION

AT THE AIRCRAFT DISPERSAL POINT



Now you've made it to the aircraft dispersal point. The B-17 has bombs loaded, fuel tanks are full and all the crew are ready for the off.

- You will see an outside view of the aircraft and the game will be in computer-controlled mode (a small computer icon will be shown on the lower right of the screen).

Note: The default is always computer control whenever a view or crew position is changed.

Use the numeric keypad controls +/- to zoom in and out on the B-17, the arrow keys to move left/right/up/down. PageUp to tip up and PageDown to tip down the view. Ins and Del will rotate the view left/right. Or you can move the mouse, with the right mouse button pressed in for zooming in/out or the left mouse button pressed in to tip or rotate the view.

ORDERS TO BEGIN MISSION

Before you can do anything you must give the orders to begin the mission.

- Press F1 to go inside the aircraft.

You will now be on the flight deck just behind the Pilot/Co-Pilot seats on the flight deck. **To give the Begin Mission order you must go to the Radio Operator station.**

- Press keyboard key 7 and you will jump to the Radio Operator's Compartment view. You will now see the Radio Operator sitting at his station with a highlight around him.

ACCESSING THE RADIO OPERATOR'S INSTRUMENT VIEW



You now need to go to the Radio Operator's instrument view and can do this in one of two ways:

- Either move your mouse cursor to the extreme right side of the screen (in the middle) to reveal a bank of five view icons. The current view is lit with a red light (the figure icon). Click on the fourth icon down (the dial icon).
- Or with the Radio Operator selected (highlighted) press key I.

This will bring up the Radio Operator’s Instrument View (a radio set and two message books).

MANUAL CONTROL AND ORDERS

- Click on the ‘Outgoing Messages’ book (on the left) and it will open.
- Look for the Begin Mission order.

Before you can do anything you must take control away from the computer AI. This is a feature of B-17: everything will work on computer control but if you want to influence a position or character, you must take manual control.

- Press key M and the ‘computer controlled’ icon will disappear and be replaced by the manual control symbol (a ‘hand’ icon).

You are now in control of the Radio Operator.

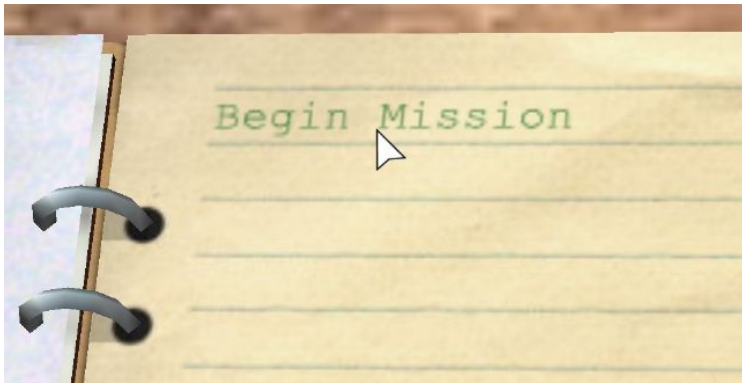


- Find the Begin Mission order and click on it.

The order to start engines will be issued and Begin Mission will disappear from the messages list (you will not need to use it again on this mission).

- Click away from the book and you will return to the Radio Operator's Instrument View.

You should hear the engines starting.



OBSERVING THE START



- Hover the mouse pointer to the extreme right of the screen (near the centre) to open the View Menu panel.
- Select the second icon down on the View Menu panel and you will return to the Compartment View (or press key C).
- Press keyboard key 3 to go to the Pilot's Compartment view.
- Press F2 to go to an outside view to see the aircraft taxiing to its take off position.

Note: If you return to the Radio Operator's position he will now be back in computer control – this applies to all crew management positions in the simulation.

TAXIING AND TAKEOFF

The B-17 will now taxi to the main runway, followed by the rest of the squadron.

- Watch this from the outside view (using the mouse or numeric keypad controls).

Use the camera keys especially the zoom out feature to see the whole airfield.

The bomber will taxi to the main runway followed by the rest of the squadron and take up a position at the head of the take off runway.



The simulation also has a Pilot Helper key (H) that can guide you in various aspects of the simulation. In take off, if you press key H you will see a large green cone take up position in front of the aircraft. This leads you to the main take off runway. Press key H to switch off Pilot Helper.

Eventually when you get to the take off runway, the B-17 will stop briefly for the final checks to be carried out. It will then speed up and take off. The landing gear will retract and the other aircraft in the squadron will follow the leader. Your B-17 will circle until the other bombers in the squadron form up with it.

When taking off in manual mode the Pilot Helper key (H) also comes into play here. When you hear the command ‘Join Formation' press H and you will see a white formation box appear (you might have to look for it with view keys). This box is where you should be for all the squadron to form up with you.



TIME CONTROLS

- You can ‘pause’ the simulation at any time by pressing the Pause/Break key (toggle).
- The Home key will speed up the simulation 2, 4 or 8 times.
- The End key will slow down the simulation (if things are happening too quickly) 2, 4, 8 times.

Once in the air and in formation, the B-17 will head for the target, perform the mission to the best of the crew's current ability/initiative, defend itself against any attack, and try to return home and land.

If you want to skip large chunks of time when nothing important is happening, press the Return/Enter key to Time Skip. You Skip time as much as you can to speed up the ‘getting there’ procedure. If you are unable to skip time that means that a ‘game event' is happening, such as escort fighters scrambling, flak firing or enemy fighters engaging you in combat.

You need not do anything if you don’t want to. But the fun of this simulation is that you can jump into any position and take over manual control of that job! Similarly, you can jump into the escort and enemy fighter cockpits and dogfight with your enemy. Or, you can simply admire the views of the aircraft crossing a fully mapped Northern Europe!

WARNING RED TEXT

- Throughout the mission you will hear speech from the crew calling out messages to each other, giving headings (Navigator to Pilot), etc.
- This will be shown at the bottom of the screen in ordinary text.
- You have merely to note what is being said. However, there will be times when you will be prompted to perform a task (such as during an enemy fighter attack) to man the machine guns etc - in this case Red Text will appear when the message is heard.
- If you click on the red text (or press SHIFT + H) you will jump immediately to the action station most associated with that message. For example, if you see red text message ‘Bandits at 6

o'clock, level' and you click on the text, you will jump to the Tail Gunner's station in Action view.

CREW POSITIONS



In this tutorial guide, we'll jump into a variety of positions. You should still be in external view, in the B-17 squadron formation.

There are various ways to navigate around the aircraft positions:

1. At the top of the screen is a Crew Portrait pop-up panel that allows you to jump to any member of the crew by clicking on his portrait.
2. To the left of the screen is a Crew Position pop-up panel that allows you to jump to any crew task (Navigation, Bomb Aiming/Dropping, Flying (as Pilot), etc.).
3. At the bottom of the screen is a panel that pops-up only in Compartment View that allows you to jump into the six B-17 compartments.

All crew positions in the simulation have a pre-set keyboard key:

Bombardier

2 Navigation

3 Cheek Gun

4 Pilot

5 Co-Pilot

6 Engineer/Top Turret Gun

7 Radio

8 Ball Turret Gun

9 Left Waist Gun

0 Right Waist Gun

- Tail Gun

PILOT AND CO-PILOT CONTROLS

- Return to the Pilots' Compartment view by pressing Fl.



You should be on the flight deck just behind the Pilot and Co-Pilot. (If you are not press key 3 and select Compartment View from the right-hand pop-up menu.)

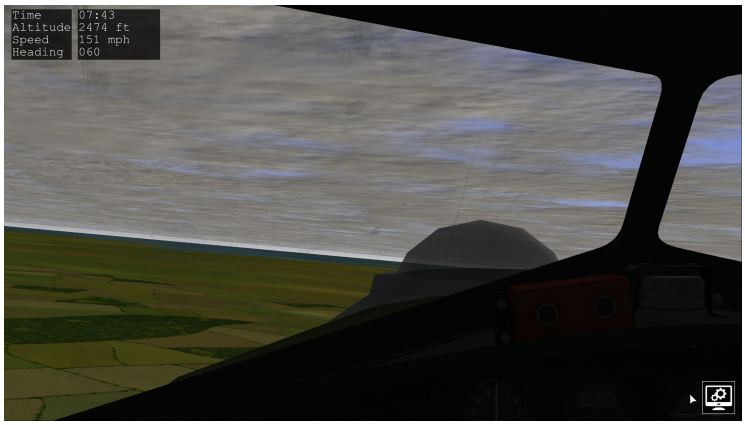
- Select the Pilot (if he's not already selected) by clicking on the figure on the left.

PILOT'S ACTION AND INSTRUMENT VIEW

All members of the crew have their own set of specific views. The Pilot has an Action view (accessed by pressing key A) which drops you into his seat looking out of the front window (and left/right in the cockpit), and an Instrument view (press key I) showing the fully functioning cockpit dials and switches/levers. All these views can also be accessed via the View Menu panel by hovering the mouse cursor on the central right edge of the screen.

In addition, some crew positions have additional instrument views that relate to their jobs. The Pilot and Co-Pilot have specific zoomed-in instrument views (F5, F6, F7, F8 and F9).

- Press key A to access the Pilot's Action view.
    - Look left/right in the cockpit using the joystick 'hat' or Camera view keys.
- Press key I to access the Instrument view.



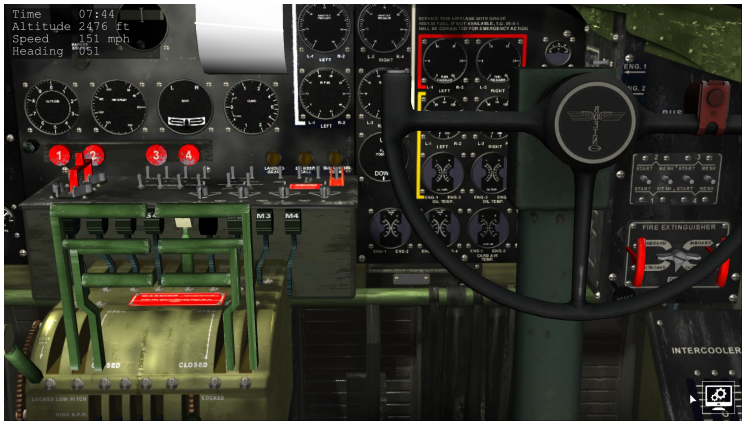
This is a fully functioning B-17 cockpit with dials, switches, levers etc all working. Hover the mouse pointer on a switch or lever to see what it does.



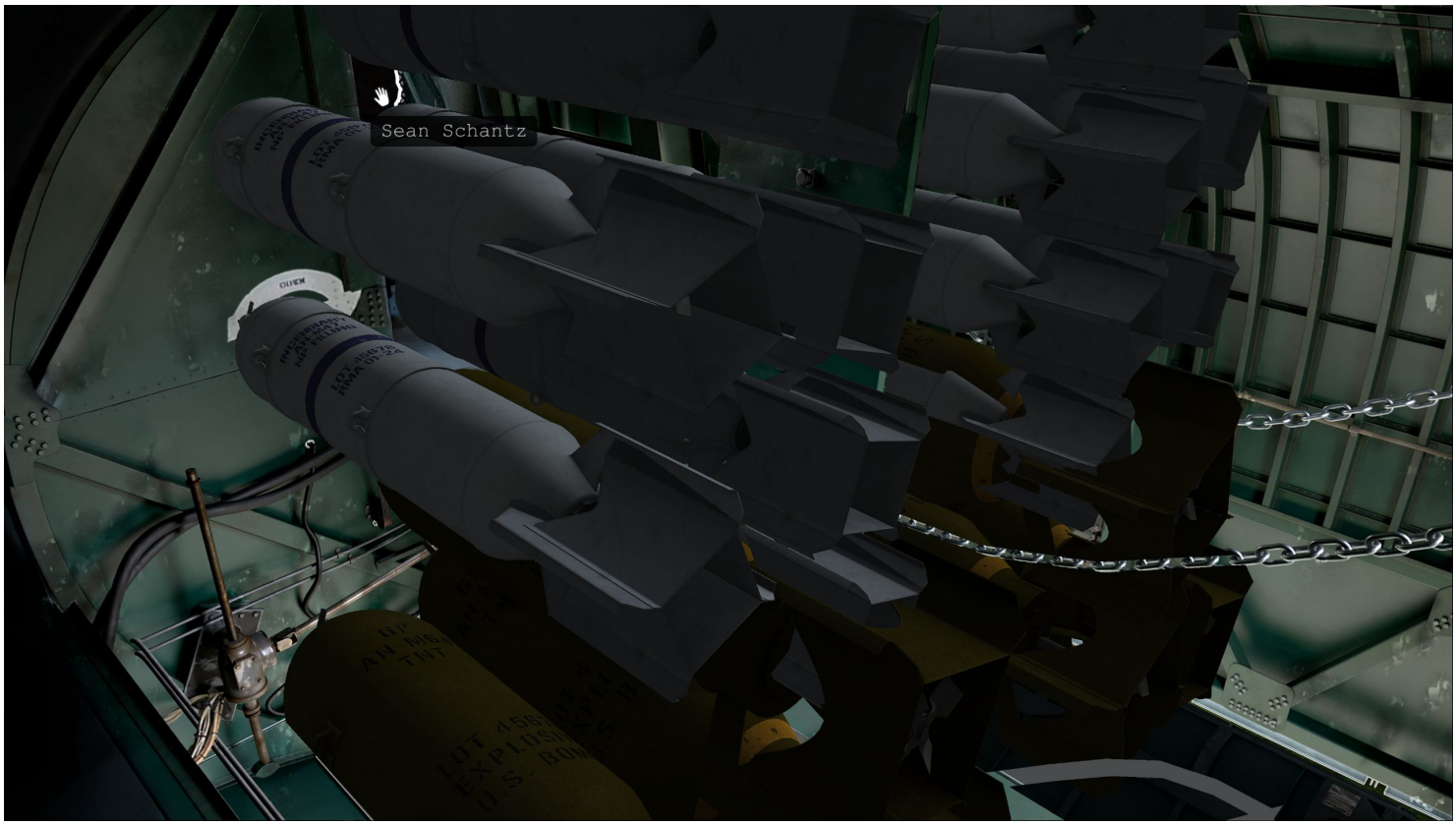
- Press F5 or F9 to see the Co-Pilot's instruments.
- Press F6 to see the close-up engine dials.
- Press F7 or F8 to see the close-up Pilot's dials/switches.

DO NOT OPERATE ANY OF THESE INSTRUMENTS UNTIL YOU UNDERSTAND MORE ABOUT THE B-17 SIMULATION CONTROLS (see the Training Schools later in this manual).

- Return to the Pilot's Compartment view (key C or use the View Menu panel).



ENGINEER / TOP GUN TURRET

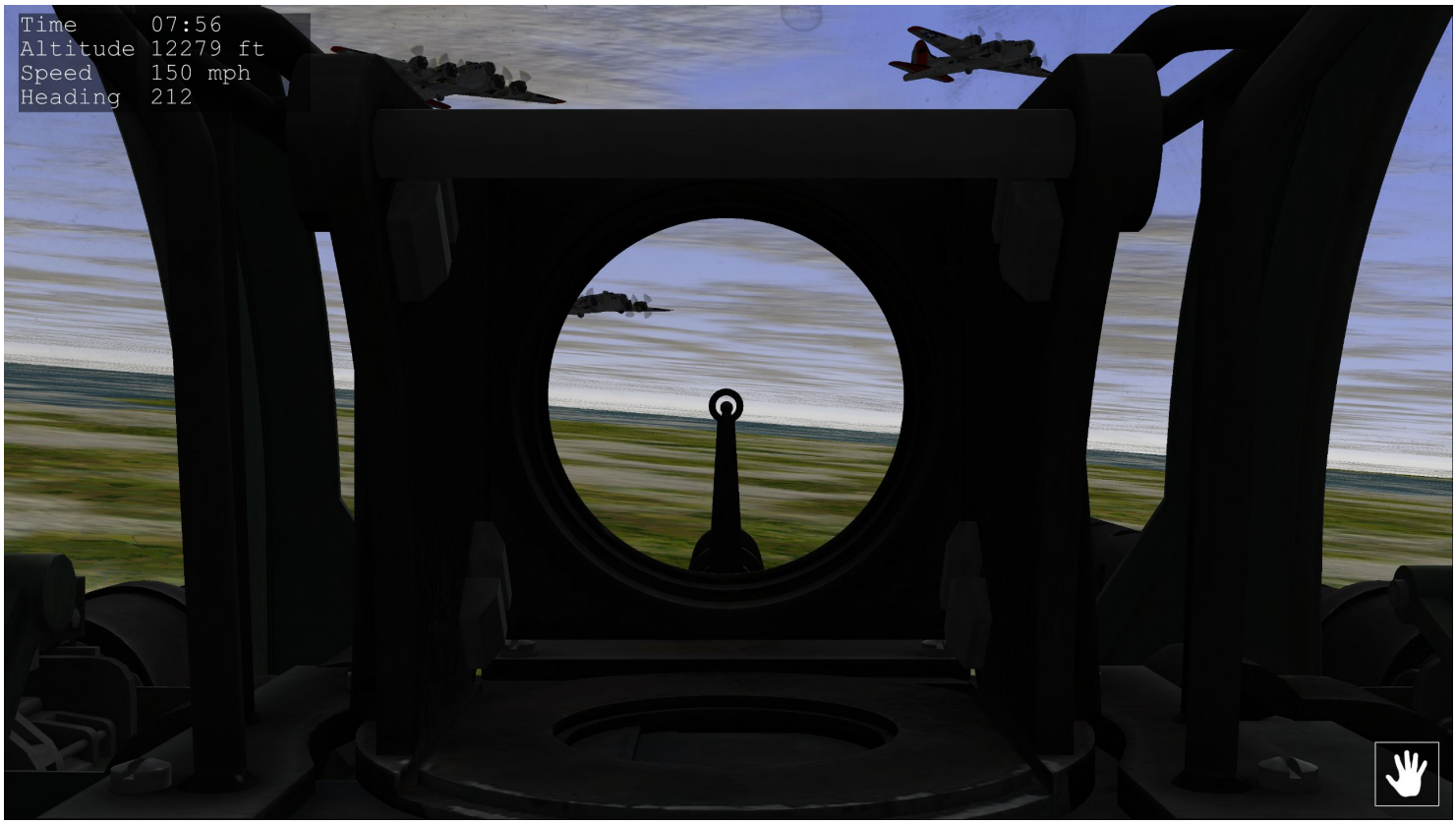


We've already seen the Pilots' Compartment (see earlier) so let's continue with the tour.

- Press key 6

This will take you to the Engineer/Top Turret Gun compartment next to the bomb bay.

Note: Because of his position the Engineer/Top Turret gunner is obscured by the bombs and is not shown fully, but you can just see his legs highlighted.

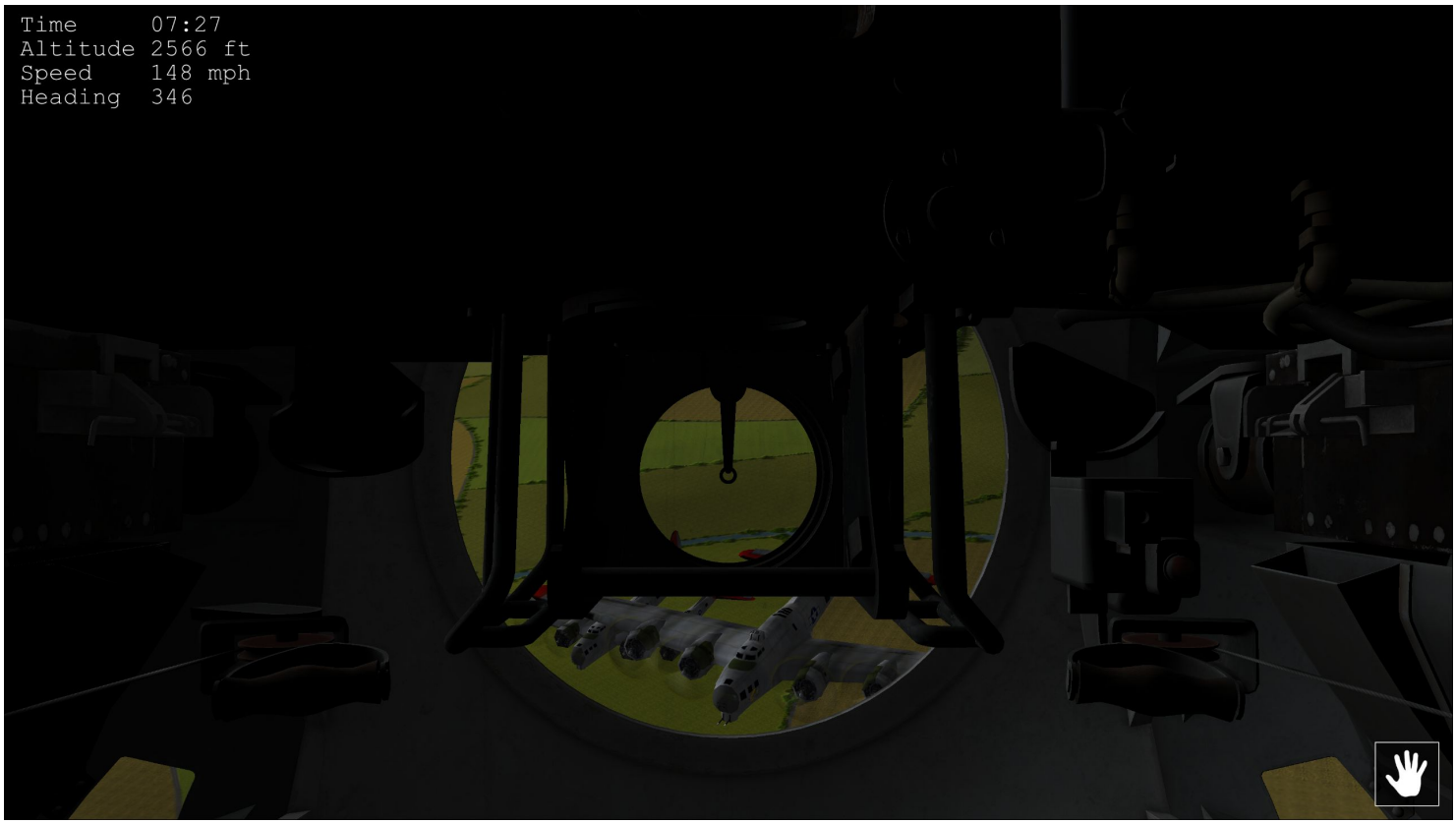


- Press the Action view (key A) and you will see the Top Turret view.
- Press key M to take control of the top turret and rotate/fire the guns using your keyboard or joystick.

Notice the realistic tracer path but **do not** shoot at your own aircraft!

BALL TURRET AND WAIST GUNNERS

- You've already seen the Radio Operator's Compartment (key 7) so try pressing key 8 and note that because you were in the Top Turret Gunner's Action view, you have jumped immediately into the Ball Turret Gunner's Action view.



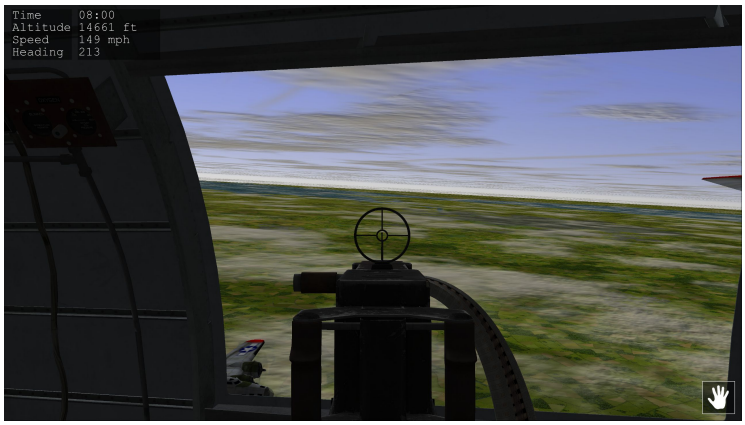
- Press key C or click on the second icon down on the View Menu panel to see the Compartment view.

You will now see the two waist gunners with an almost obscured highlight of the Ball Turret gunner's position close to the feet of the Right Waist Gunner.



- Now select one of the Waist Gunners (click on one of them or press key 8 or 9), and go to his Action view (key A or View Menu panel third icon down).

You will be in position in front of the machine gun.



- Select manual control (key M) and fire the machine gun.
- Now return to the Compartment view by pressing key C.

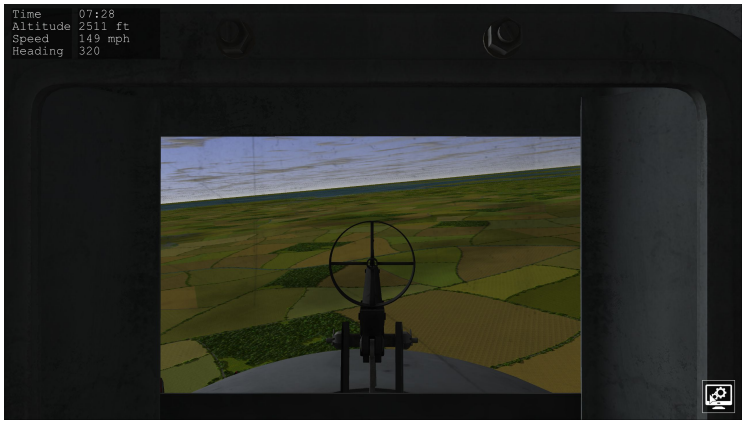
TAIL GUNNER



The last compartment is where the Tail Gunner lives.

- Select keyboard key zero 0 and key A to view the Tail Gunner's action view.

Press key M to take over control and try firing the machine guns.



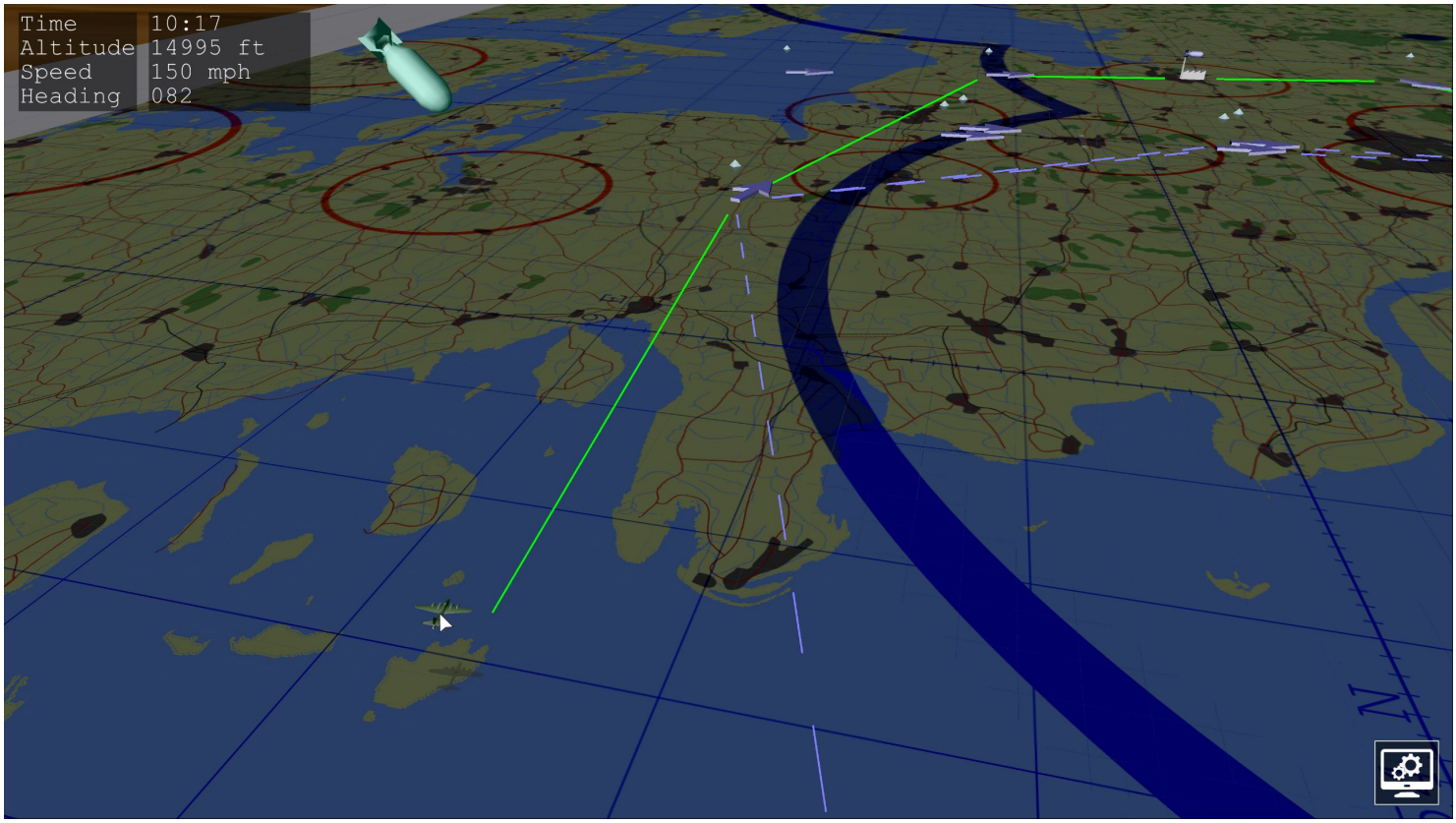
NAVIGATOR'S STATION



Now let’s look at where the aircraft is headed and jump to the Navigator’s station.

- Open the top panel and click on the second portrait from the left - this is the Navigator. You are currently in Compartment view, so you will jump to the aircraft nose section (where the Bombardier also lives). The Navigator will be highlighted to show that he is the selected crewman.
- Press key I to access the Navigator's Instrument view. This will show his desk and instruments: the Radio Compass, the Drift Meter, and the Map.





- Click on the Map (on the left of the screen), or press the Spacebar, and you will jump to the Map screen.

USING THE MAP

This map is very similar to the Mission Briefing map but also has a track of the plane's position (a green aircraft icon at the correct height and an aircraft shadow to show its position across the ground), its projected course (a broken blue line) and its actual course across the map (a solid colored line).

The solid line is colored green when there is ample fuel left, amber if the fuel status is becoming critical, and red if the fuel is calculated to run out.

All map controls are the same as for the map in the Briefing Room. You are flying on Flawless Navigation level so the actual course flown by the aircraft will not differ from the mission briefing, but if you were to fly Easy or Historical navigation complexity you would have to adjust position by constantly referring to the map and what you can see outside.

- Exit the Map screen by pressing key C to go to the Compartment view.
- Select the Bombardier by clicking on him (the crewman sitting right in the nose of the Compartment) and he will be highlighted.

BOMBARDIER



CHIN TURRET

The Bombardier is also the Chin Turret operator when he is not busy with the bombsight. You may have to get him to change from Chin Turret to Bombsight. In this case, right-click on him to open the Icon Rose.

- Look at the topmost icon (at 12 o'clock), if this is a bombsight left-click on it and he will change jobs. If it's a Chin Turret, simply click away.



NORDEN BOMB SIGHT



- Now press the Instrument key I to view the Norden bombsight. This is a complex piece of equipment that Bombardiers use to locate and lock on to targets as long as the correct data is input properly.
- Press the Action View key A. You will be looking at the ground (or the sea) through the bombsight.

BOMB RUN

In this tutorial, you will not drop bombs manually; you will leave the crew Bombardier to do this for you.

- Return to Compartment view by pressing key C.

SKIP & ACCELERATE TIME

- The simulation allows you to skip large chunks of time by pressing the Return/Enter key but you might not be allowed to ‘skip’ if a game event is happening.
- You can also accelerate time by pressing the Home key (3 levels of speed up) or slow down time by pressing the End key (3 levels of slow down).

Throughout the mission, the Navigator will give the Pilot instructions about new turn headings and waypoints, and the pilot will respond. You need do nothing in this guide but let them get on with it!

Eventually, you will reach the last turn before the target (the Initial Point). Check this on the Navigator’s map. This is the straight line run to the target.



Now control of the aircraft is passed to the Bombardier. You may hear him call out “We’re on the bomb run” or “I have the plane”. Now make sure the Bombardier is selected and jump into the Bombardier’s Action view (key A).

You might have to be patient here depending on the length of the bomb run but watch carefully as the target is sought out by the AI-controlled Bombardier, then acquired and locked into position.

You'll notice two marker blocks on the right of the bombsight that are slowly approaching each other. When they meet, the red release light will come on and the bombs will be dropped. The view will then switch automatically to the bomb bay where you will see the bombs dropping.

- When this happens press F6 (to see the bombs in the air) and F6 again to view the bombs hitting the target.
- Use the mouse with left/right buttons pressed in to view the target from various angles or zoom.
- Press Fl to return to the Bomb Bay.



FLY THE FIGHTER AIRCRAFT



You've now looked at all the B-17 positions. Why don't you take a flight in one of the many fighters available in the simulation?

- Press key F2 to get an exterior view of the B-17. In Bomber Commander mode, only one bomber can be selected out of the six in the squadron. In the Squadron Commander game, you can select all six bombers.
- Your B-17 will be centred in the middle of the screen.
- To access the fighters, hover your mouse pointer on the extreme right side of the mid-screen.

This area will show a pop-up menu with a white icon representing your B-17, your fighters (if there are any on your mission) and the enemy fighters types

(if there are any around).

- If there are any friendly fighters around, click on the icon to jump to an outside view of the fighter.
- Press F1 to enter the cockpit of the fighter.



- Press key M to take control of the fighter and fly around (be careful and check the keyboard/joystick controls on the Reference Card).

Take a moment to examine the detailed cockpit and fully functioning dials, levers, and joystick.

- Press the camera keys to view the virtual cockpit.
- Press key F2 to go to the outside view (you'll still be in control!)
- Press key M to return to AI control.

- Return to your B-17 by accessing the B-17 icon in the pop-up panel.
- Press F1 to go back into your B-17.

CREW MANAGEMENT

You've now looked over the basic areas of the bomber simulation. Now let’s look at aspects of crew management that you'll need to know when things get rough and you experience casualties or emergencies such as fires.

Depending on their level of initiative set up, crew can be told to takeover other crew positions, and made to perform certain actions in emergencies (apply first aid, unjam guns, take over in case someone panics, etc.). If all else fails, they can be ordered to bail out!

Make sure you're in the nose section in the Compartment view (you can see the figures of the Bombardier and the Navigator).

- Select the Bombardier by clicking on him and check that he is highlighted.
- Place your mouse cursor on the Bombardier and right-click.



This will open an ‘Icon Rose’. All the icons in the circle are instructions you can issue to individuals; all 10 crew in the B-17 can be given these types of orders (but they do vary depending on the job).

- Place your mouse cursor on a few of the icons and read the pop-up tooltips associated with these icons.

The central icon is the instruction you are issuing (such as ‘Move To’ a different position). If you click on the central icon the instruction will change (Give First Aid, Repair, Use, Bail Out etc).

If you select Give First Aid and you see a portrait (or portraits) with a red cross on – that means there is a crewman who requires first aid.

Click on the injured crew portrait and the selected crewman will go to him and help.

If there is a fire additional icons with pop-up tooltips will show which fire extinguishers can be used in what compartments. Remember to put out fires as soon as you get a warning (or see smoke). Fire is your worst enemy aboard the B-17!

The Bombardier also has control of the Chin Turret that's located just under his bombsight station. This is useful when he has completed the bomb run and can function as a defensive gunner on the dangerous journey back home.



Now, let's change his 'job' to that of a chin turret gunner.

- Right click on the Bombardier and open the icon rose.

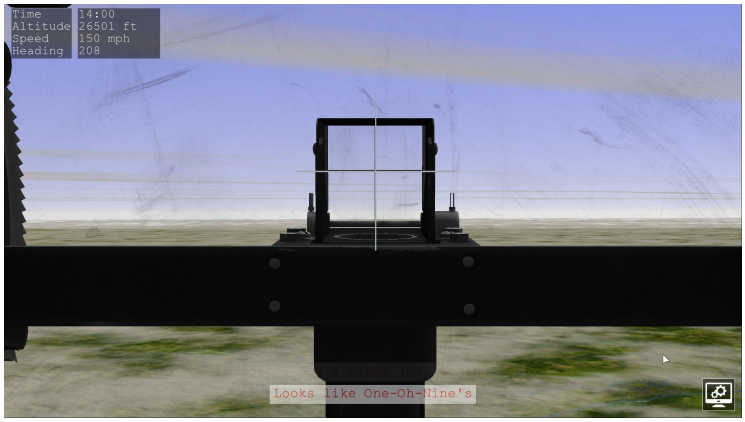


The central icon will be the Move To (walking man) order (if it isn't then right click on it until it is).

- Move your mouse cursor to the top of the 'rose' and click on the Chin Turret icon (the pop-up tooltips will confirm this) and left click.

The Bombardier will now move the chin turret controls over the bombsight.

- Press key A to access the Chin Turret Action view and you will see the chin turret sight.
- Press key M to get manual control of the Chin Turret and fire off a few rounds.
- Now, with what you've already learnt, try to make the Bombardier return to his Bombsight. Note: The Norden Bombsight icon will have replaced the chin turret icon in the topmost position of the icon 'rose'.



RETURNING HOME

After releasing their bombs, the aircraft will go to the Rally Point and then take the route marked on the mission map home (check this on the Navigator's map view). This is a

dangerous time when all gunners have to be alert; you may be attacked by fighters or flak. This is a good opportunity to try out the Gunners' stations and to get an understanding for the zones around the B-17 that each Gunner can defend.



Be careful not to shoot at your own aircraft in the formation and note that, if the guns jam, you can attempt to unjam them in the following way:

- Return to compartment view (key C).
- Right click on the gunner figure to open his 'Icon Rose'.
- Right click on the icon in the middle until you see the 'Repair' spanner and click on the 'Unjam' guns icon that appears above it.

Gunners will call out bandits on the Clock System with 12 o'clock in front of the aircraft, six o'clock behind, and nine o'clock on the left etc. Level means level with the aircraft high and low are relative to the B-17's level flight.

Unless something happens to the Pilot, the B-17 will be flown back to base and landed.

MISSION DEBRIEFING

At the end of the mission, the aircraft will be landed and you will be taken to the Mission Debriefing hut. Here in manual mode you could also use the Pilot Helper key (key H). This will show a cone that you should fly towards to get to your base and to the landing runway. When the B-17 has landed the green cone will help you taxi back to the hard- standing dispersal point you will be taken to the Mission Debriefing hut.

- Double-click on the Mission Debriefing file to view details of your recent mission performance (click on the page to turn it).

Here you'll find all details of the mission analyzed and you may be informed of any medals and promotions.

SAVING THE GAME

- To save the game at this point, press ESC. This will open the Options screen.
- Click on the Load/Save Menu (the floppy disc icon) and flip the continue switch (lower right).
- Select and type in a name for the file in the panel.
- Click on the right-hand button (Save the Current Game).
- Return to the Options menu (flip switch lower left).
- Flip the switch (lower left) to resume the game.

This concludes the Getting Started Guide for "B-17 Flying Fortress: The Mighty 8th". Follow these steps to familiarize yourself with the game mechanics and controls, and enjoy your flight experience!

3: TRAINING MISSIONS

PRACTICE TIME

If you have completed the tutorial, you will have already been on a complete mission and had a quick taster of action. The more complex levels of the simulation however depends on your own skills and so, to improve these skills, the game provides a set of Training Missions (use of bombsight etc.). Remember to have the Reference Card to hand when attempting these missions.

- Select New Game.
- Select Choose a Training Mission (the middle panel on the right) and you will go to the mission selection screen.
- Look at the panel at the top of the screen to access a training mission topic (you can scroll down the list by clicking on, holding down and dragging the right hand slider).
- Select the training topic you want to practice and the mission brief or set of tasks will be shown in the lower panel.
- Scroll this panel to read full details of what you have to do.
- Flip the Continue switch (lower right) to jump into a Training Mission.

You will be taken into the 3D world so that you can perform the training exercise without risk to life and limb.

1: PILOT CHECKOUT

This first training mission will show you how to navigate the basic B-17 controls. This includes accessing the interior screens as well as the exterior camera controls.

1. Click the inside the red circle, under Start Time, to begin.

2. Pan left and right around the aircraft by using the mouse Left Click or key pad 0 and .
3. Pan up and down, the full way.
4. Zoom in and out by using the mouse Right Click or key pad + and -
5. Press F1 to enter the flight deck.
6. Select the Bombardier from the menu at the top of the screen.
7. Now you're in the nose compartment, with the Bombardier selected. Press I to enter the Instrument view. Then press Space to view the alternate instruments.
8. Press A to view through the Norden bomb sight.
9. Press W to view through the window.
10. The Navigator has collapsed! The Bombardier needs to revive him. Press the C key or use the right-side menu to go back to Compartment view.
11. Right click the Bombardier and select the Move To button in the middle of the circle menu. Then select the First Aid button for the Navigator. The Bombardier will leave his station and revive the Navigator. When he's finished, he will move back to his original position.
12. Select the Flight Engineer from the top-menu. This will take you to view the bomb bay compartment.
13. Press A to enter action view, and you will be in the Top Turret, where the Engineer is located.
14. Pan around the turret using your joystick or controller.
15. This will conclude your check out! To complete the mission, go back to the flight deck and click inside the red circle under Finish Time.

2: GUNNERY

You are in the air above the airbase at an altitude of 12,000 feet and an airspeed of 150mph IAS. The Navigator is in his alternative position on the Cheek gun.

You must shoot at a target B-17. It will come up alongside you in various positions to cover all gun positions. You should experiment with 'leading a target' and the effects of range on bullet arcs. You must hit the bomber with 50 rounds from each position but don't worry about doing any damage – all guns are loaded with special 'paint' rounds.

You will begin in the Top Turret position.

- Press key M to take control (of Bombardier).

1. Wait for the target B-17 to appear.
2. Aim and fire. When 50 hits are recorded you will not be able to fire anymore and have to move on.
3. Press F2 to get an outside view of the B-17.
4. Press [to select the target B-17 and use the Camera keys to look at the colourful 'damage'.
5. Press [to select your B-17 and press F1 to return to Chin Turret station.
6. Repeat the above for all gun positions in this order:

```
Chin Turret, Cheek Gun, Top Turret, Ball Turret, Left Waist Gun,
Right Waist Gun and Tail Gun.
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7. When you have succeeded in hitting the B-17 with all guns the mission will end.

3: BOMBING – GOOD CONDITIONS

In this mission you must locate the target and release the bombs as accurately as possible. You will be the Bombardier just at the beginning of the bomb run. The Norden bombsight is already configured with altitude and speed correctly. Altitude is 8,000 feet, and airspeed 155mph (IAS). All engines are running well, gear and flaps are fully raised. The weather is good, altitude is low and there is no flak or fighter opposition to worry about.

- Press key M to take control.

1. Wait for the Bombardier to indicate he is on the bombrun. Then press key A to go to Bombardier's Action View (you will be looking

through the bombsight).

2. Enter “Search Mode” by using SHIFT + K (a light will come on).
3. Use your joystick to locate the target, place the crosshair over the target and then hit SHIFT + K to ‘lock’ the target.
4. The Sight starts in DRIFT tracking mode. Moving the joystick left adjusts the angle of Drift to the left – the target will begin to drift more to the right of the sight picture. Moving the joystick right will alter the angle of Drift to the right – the target will begin to drift more to the left of the sight picture.
5. Press key N to enter the RATE tracking mode. Moving the joystick up makes the rate track more slowly, so the target will move towards the bottom of the sight picture. Moving the joystick down will make the rate track more quickly, hence the target will appear to move back up towards the top of the sight picture. The objective is to freeze any vertical movement of the target.
6. You should adjust DRIFT and RATE until the sight picture shows no movement at all. This is called SYNCHRONISATION, and means the bombsight is correctly allowing for speed, altitude and wind drift.
7. During your alterations, the target may have slipped out from the crosshairs. If you have time, you can enter SEARCH mode, using the SHIFT + K key combination, and place the target directly under the crosshair again. Provided that you have correctly SYNCHRONISED the sight, as described above, the crosshair will remain where you left it.
8. Watch the two markers close towards each other, when they meet the bombs will be dropped automatically by the bombsight – thus ensuring a drop accurate to the millisecond.
9. Watch bombs release from bay and then press F6 to view down from inside the bomb bay and F6 again to view target from ground level (use mouse left button to zoom in and right hand button to move around target.

4: BOMBING – POOR CONDITIONS

In this mission you must fly a mission to a target and bomb it. The weather is more overcast and more like normal European cloud cover. The altitude is 18,000 feet, which is average for a run on a defended target, but there is no flak or fighter opposition. The bomber mission starts just before the Initial Point of the bomb run so you must carry out the full calibration of the bombsight.

- Press key M to take control.

1. Press the spacebar to go to the Bomb Panel.
2. Click Bomb Indicator button ON.
3. Click ON – Bomb Bay Doors, Bomb Arming and Autopilot switches.
4. Press spacebar to return to Norden bombsight view.
5. Wait for the Bombardier to indicate he is on the bomb run. Then press key A to go to Bombardier's Action View (you will be looking through the bombsight).
6. Enter "Search Mode" by using SHIFT + K (A light will come on).
7. Use your joystick to locate the target, place the crosshair over the target and then hit SHIFT + K to 'lock' the target.
8. The Sight starts in DRIFT tracking mode. Moving the joystick left adjusts the angle of Drift to the left – the target will begin to drift more to the right of the sight picture. Moving the joystick right will alter the angle of Drift to the right – the target will begin to drift more to the left of the sight picture.
9. Press key N to enter the RATE tracking mode. Moving the joystick up makes the rate track more slowly, so the target will move towards the bottom of the sight picture. Moving the joystick down will make the rate track more quickly, hence the target will appear to move back up towards the top of the sight picture. The objective is to freeze any vertical movement of the target.
10. You should adjust DRIFT and RATE until the sight picture shows no movement at all. This is called SYNCHRONISATION, and means the bombsight is correctly allowing for speed, altitude and wind drift.

11. During your alterations, the target may have slipped out from the crosshairs. If you have time, you can enter SEARCH mode, using the SHIFT + K key combination, and place the target directly under the crosshair again. Provided that you have correctly SYNCHRONISED the sight, as described above, the crosshair will remain where you left it.
12. Watch the two markers close towards each other. When they meet, the bombs will be dropped automatically by the bombsight, thus ensuring a drop accurate to the millisecond.
13. Watch bombs release from bay and then press F6 to view down from inside the bomb bay and F6 again to view target from ground level (use mouse left button to zoom in and right hand button to move around target.

5: APPROACH AND LANDING

You are on approach to the main runway of the airfield. All engines are running, gear and flaps are fully raised. You are in the Pilot's seat behind the controls of the B-17 as it turns onto final approach. You will need to follow the correct approach and ease the bomber onto the runway. The mission ends once you've landed and brought the aircraft to a complete halt.

- Press key M to take control.

1. Use the external camera views for maximum visibility.
2. Locate the main runway where you will land (it should be lined up in front of you).
3. Drop your landing gear (Shift + Up Arrow).
4. Ease up on the all engine throttles.
5. Lower flaps (Shift + F).
6. Glide in to the runway and land all three wheels.
7. Cut throttle as plane rolls (- minus key).
8. Put Wheel Brakes on (Insert key) to stop aircraft moving.

6: FEATHERING / RESTARTING AN ENGINE

An engine that is not feathered when it has stopped will add severe drag. This could cause a fire or even break the propshaft, so it's very important to learn how to feather an engine. You are flying above the airfield at an altitude of 5,000 feet and airspeed of 155mph (IAS). The engines are running, gear and flaps are fully raised. You must feather engine number 1 and then restart it, all while maintaining speed and altitude. If you drop below 1,000 feet you will fail this mission.

- Press key M to take control.

1. Go to the Pilot's Instruments view in the cockpit (key I).
2. Click on the large, round red button marked "1".
3. Find the fuel system switches above the pedestal and turn off the left-most column.
4. Click and move the Turbo- Supercharger and Throttle to zero for Engine 1.
    - Number One Engine should now be feathered.
5. Locate the fuel system switches above the pedestal and turn on the leftmost column.
6. Click on the large, round red button marked "1".
7. Set the throttle and Turbo speeds to match the other three engines.

At this point the engine should start.

7: TAXI AND TAKE OFF

Your aircraft is on a hardstand at an airfield with engines running, wheel brakes set and flaps fully lowered.

This is simply an exercise in taxiing the B-17 to the main runway and then carrying out a take off. It's here that you will learn basic ground handling skills and take off procedures. The mission will end once you get to 1,000 feet pull in your gear and raise your flaps.

- Press key M to take control. The four engines will start automatically.

1. You will not be able to see much of the runway from the pilot's position (just like the real thing) so you're advised to stay in outside view when manoeuvring the B-17 to the runway.
2. Throttle slowly up (+).
3. Unlock your Tailwheel (Shift + T).
4. Use all camera views (especially the zoom in/out functions) to see where the main runway is.
5. Move very slowly and steer left- right using the Rudder controls (keyboard or joystick).
6. Stop at the top of the main runway (Wheel Brakes On - Insert key), lock your tail wheel (T).
7. Throttle up full using keyboard or joystick controls.
8. Wheel Brakes Off (Delete key) and as the aircraft speeds up over the runway, ease it gently into the air and perform a shallow climb.
9. Raise all landing gear (Up Arrow).
10. Raise flaps (key F).

All Training Missions will be debriefed. You will be told in the Debriefing File if you have achieved the required competence.

4: SINGLE MISSIONS

INSTANT ACTION

These Quickstart and Historical missions all have limited objectives and are specially designed for a ‘quick blast’ of realistic flight combat action when time is short.

QUICKSTART MISSIONS

- Select New Game.
- Select Choose a Quickstart Mission (the top panel on the right) and flip the Continue switch.

You will be shown a list of missions in the panel at the top of the screen. Scroll down the list (by clicking and dragging the slider on the right) to review all the missions available.

- To select a mission click on the name and study the mission briefing (scroll down by clicking and dragging on the slider to the right of the panel).
- Flip the Continue switch (lower right) to jump into the mission. You will be thrown into the 3D world.

Get ready for action!

1: LIMPING HOME



You are flying a B-17 as part of the low element of your squadron on a mission to Berlin. Over the target you were hit by flak, damaging you quite badly. Limping home you were savaged by a group of Bf-109's who were driven away by your faithful fighter escort. You made it home to your airbase and are just performing the flight checks for landing when you realise that your undercarriage has been badly shot up! You now have to plan and execute an emergency landing.

2: ATTACK OF THE AXIS



In this mission you must endure a savage attack by German fighters against your formation. Luckily you have ‘little friends’ along for the ride, but they will be outnumbered and in many cases the only thing between you and the long drop will be the guns of your formation.

A full formation of B-17’s, minus one that has been shot down, accompanies your bomber.

A formation of P-51’s is riding ‘shotgun’, in their usual position about 1,000 feet higher than the bombers. They have just arrived and none have been engaged so they have their drop tanks and full ammo loads.

3: WHERE ARE THE ‘LITTLE FRIENDS’?

As the war progressed the ‘little friends’ cut a safe path through German airspace for the bomber formations. US losses dropped sharply as the German fighters turned from the hunters to the hunted. From time to time, however, bad weather or navigational errors led to the fighters and bombers missing each other. In this mission, exactly this has happened and the bomber formation must rely on its own guns to drive off the German fighters. A full formation of B-17’s, less one bomber that has been shot down, accompanies your aircraft.



4: OPPORTUNITY FOR THE AXIS (LUFTWAFFE)

The American fighters have been making your job very difficult of late. Finally your fighters have found a formation of B-17 bombers that are unaccompanied by their escorts, making them easy meat for you! This is your chance to inflict heavy losses on the bombers and win a battle for the Luftwaffe. Two bombers are already missing from the formation.



5: FIGHTER SWEEP OVER FRANCE



In this mission you have finished an uneventful escort mission in a flight of P-47s and are now performing a sweep of northern France. A passing flight of P-51s reports a formation of Bf-109s to the northeast that they did not engage because of lack of fuel. This being the only action in the area you turn to engage. Your orders are to sweep the area clean of German fighters.

6: DEFENCE OF THE REICH (LUFTWAFFE)



The B-17 bombers are coming again and, as usual the 8th Air Force is trying to clear the Luftwaffe defenders with an advance sweep of P-51s just before the bombers arrive. Formations of Luftwaffe fighters are waiting to savage the bomber stream if you can knock down this advance wave. You should be able to do the job with your Fw-190s, but a small formation of flight instructors in jet powered Me-262s is standing by in case you need the help.

You are part of a full formation of Fw-190s, already in the air and closing. There is a formation of three Me-262s on the ground, ready to scramble.

HISTORICAL MISSIONS

Historical Missions are actual missions flown during the real bomber campaign.

In the New Game menu, click on the lowest icon on the right to play a choice of historical missions.

Flip the Continue switch (bottom right) to go to the Historical Mission screen.

The top panel on this screen shows a scrollable list of six ‘real’ historical missions.

MISSION ONE: BREMEN ON 20/12/43



- On the 20th of December 1943, the 381st Bombardment Group (Heavy) had a tough assignment. The target was Bremen, a feared target due to its numerous flak batteries. The group had been there on the previous day and made it back with no losses, but this time it was to be a rather different story. The Group took off at 08:15 and by the time they made it back to Ridgewell they had lost four bombers, victims of the punishing flak.

MISSION TWO: OSNABRUCK ON 22/12/43



- On the 22nd of December 1943 the 381st Bombardment Group (Heavy) set off for Osnabruck to attack its vital industrial centre. On this mission flak wasn't so troublesome, but the 381st had more than its fair share of fighter attention. Due to excellent escort fighters, the 381st made it back home with no losses.

MISSION THREE: LUDWIGSHAFEN ON 07/01/44



- On the 7th of January 1944 the 381st Bombardment Group (Heavy) set off to the vital industrial centre of Ludwigshafen on the bank of the Rhine River. Through bad weather the fortresses dropped their bombs on target and turned for home. The escorting fighters drove off heavy fighter attacks, but one bomber fell to flak before the group got back home.

MISSION FOUR: FRANKFURT ON 29/01/44



- On the 29th of January 1944 the 381st Bombardment Group (Heavy) targeted the industrial centre of Frankfurt. The target was bombed through heavy cloud for the loss of two Fortresses and all agreed that losses would have been higher had the fighter escort not performed so valiantly. As it was, the flak was very intense, and the result of the bombing was believed to be good.

MISSION FIVE: BRUNSWICK ON 30/01/44



- On the 30th of January 1944 the 381st Bombardment Group (Heavy) was sent on a mission to bomb Brunswick. The target was largely obscured by cloud, but the Group found a hole and achieved success. The German defence was described as ‘frequent but not persistent’ with fighter attacks and intense but inaccurate flak. Despite this, three of the Group’s Fortresses failed to return.

MISSION SIX: HAMBURG ON 18/06/44



- On the 18th of June 1944 the 381st Bombardment Group (Heavy) broke from its pattern of hitting ‘invasion priority’ targets and was sent to bomb Germany’s oil industry centre in Hamburg. The enemy fighters didn’t prove to be too much of a problem, thanks to the escort provided and, even with the heavy flak, the 381st managed not to lose a single bomber.

Click on a mission name and study the mission details in the lower panel. If it’s a mission you want to undertake, flip the Continue switch to go to the Mission Briefing room (see Mission Briefing below). The game will play as if you had been assigned this mission as part of a regular campaign. You will be debriefed on your return from the mission.

5: CREW/BOMBER MANAGEMENT

TRENCH WARFARE IN THE SKY

Protect your air crew, as they are vital to the operation of your aircraft!

MOVING CREW TO NEW POSITIONS

All the B-17 crew can be re-allocated to other positions on board. This is crucial if you are attacked, suffer injury (or panic) and are short of a key crew (such as the Navigator). If you know your crew well enough you will be able to assign a substitute who has some level of skill in that key task. Note: If a crew station is not manned that station is unavailable to you to jump to. You must send a man to takeover before you can assume manual control.

The crew of the B-17 are specialists in their particular skill but have to be prepared to do each other's jobs in the event of injury. You must be able to manage the crew and re-allocate them to other positions in any emergency.

At the start of any mission, the 10-man crew will be in their correct compartments. You can view them in their compartments by pressing the keyboard keys ` to 0. A white highlight will appear around the selected figure.

- Right click on a highlighted figure to open the Crew Management Icon Rose: a circular display of all other crew positions with a command icon in the centre.
- To move your selected crewman to another position click on the appropriate positional icon (making sure the Move To icon order is in the middle of the display).

The selected crewmember will leave his position and make his way to the nominated location.

If you have moved the crew member to a position that's still occupied, the crew member who is still occupying the position will stand aside and let his replacement take over then

await orders from you.

Remember that the move will take place in real time, so if you choose to relocate the Bombardier as, say a Tail Gunner, he will have to make his way to the end of the airplane (and you can follow him through all the compartments using the Compartment view pop-up menu if you so wish).

RED TEXT WARNING

All messages you hear will be shown on the screen as text but if there is an emergency such as a fire, crew injury, jammed guns this text will appear in red. By clicking directly on the text you will jump immediately to the source of the message and be able to deal with the problem more quickly.

INJURED CREW

It always pays to keep your crew healthy. If a crewman is unconscious you cannot 'jump' into his shoes and, if that position is important to the success of the mission, you will have to find someone else to take over. Remember to consult all available files in your office so that you know the strengths and weaknesses of each crew member.

FIRST AID

Wounded crew will react realistically when they are injured. Their portrait in the pop-up panel at the top of the screen will show a red cross and you may hear a message telling you that someone is hit. You must select a crewman to administer First Aid. In this case:

- Click on the crewman then right click to open the Icon Rose.
- Select the First Aid icon and click on the portrait of the wounded crewman.

The man you have selected will make his way to the wounded man's station and do the best he can. The injured man will not heal 'automatically' but can be stabilised or even after a period of time helped back to man his station at a reduced level of skill.

PANIC

In the event of extreme stress caused by fire, bullet strikes or fighter attacks some crew members may panic and not be able to carry out their tasks at their usual efficiency. You can overcome the worst effects of this by jumping into their seat and doing their job for them. After a period of time they may calm down and be able to perform their job at a normal level of skill.

REPAIRING ITEMS

Things can go wrong on a large complex bomber (depending on the reality levels you have chosen) and you may have to order crew members to fix things.

You may find that guns will jam if they get too hot (or too cold). A gunner will call out 'Guns jammed!' and may try to un-jam them (depending on the level of autonomy set).

- If you are in control of the gunner, right click on the figure to open the Icon Rose and click on the Unjam Guns icon.

You may also find that the bombs are jammed on their racks and may require freeing by a member of the crew – the sequence is similar to 'unjam guns' (above).

FIGHTING FIRES

If there is a fire onboard, you will either see it immediately in the compartment or hear a message from one of the crew (red text). Crew will make attempts to put the fire out, but you can also order crew members to lend a hand using the Icon Rose system.

BAILING OUT



If all else fails and you know that the aircraft is going to crash, you must order your crew to 'bail out'. It's better to try and save the crew to return home to fight another day rather than let them die in a crash. Select the crew member and right click to open the icon rose then click on the Bail Out Icon. Alternately, you can press CTRL + SHIFT + B to order everyone to bail out. Remember, once all crew have left the aircraft you will not be able to go back inside – it will be out of your control.

BOMBER MANAGEMENT

This section deals with aspects of the simulation when you are up in the air in external camera views and heading for your target.

EXTERNAL VIEWS

The simulation has a wealth of external camera views that you can use to look all around your bomber and at the stunning 3D. If nothing much is happening and you can spare the time from your flying or navigating tasks why not have a good look around.

- Press F2 from any interior position and you will go to external view and then use Camera Controls in the Reference Card.

FLIGHT

You can take over control of flying the aircraft from the external view. This is often a good way to get a 'feel' for the large bomber and appreciate the flight dynamics.

- Press key M and the AI control symbol (Computer) on the lower right of the screen will change to the manual control symbol (Hand). You will immediately be in control of the aircraft.

FORMATION

The bombers must fly in squadron formation to the target for greater safety so when you are controlling the aircraft in manual mode you must try to stay in formation. Use the camera keys to best effect and if you find that's too difficult use the Pilot Helper key (H). This will create a white box to show you where you should be flying to stay in formation. If you lose formation find this box with the outside views and try to fly close to it.

ACCELERATE TIME (HOME)

There will be periods in the simulation when you will need to speed things up; you might be itching to get to a target or a particular waypoint or airfield. In this case you can use the accelerate time feature (Home key). You can accelerate time 2x, 4x and 8x by pressing the Home key (cycle through). Press End to return to previous time.

DECELERATE TIME (END)

There may be times when you actually want to slow down the action; things may be happening too fast for you to see them (such as in air combat or a tricky landing). In this case you can choose to decelerate time by pressing the End key (cycle through) this will give you three speeds – half, quarter or eighth.

SKIP TIME (RETURN/ENTER)

If you want to cut out large chunks of time and want to get on with the action, press the Return/Enter key and the simulation will skip to the next time period. Note:You can also skip time from within the bomber. So that you don't miss any of the action when you skip time the feature will not work when there is something important happening in the game world. You may receive a message that the Skip Time feature is halted and be given a reason such as Fighters are scrambling, Bomber on Bomb Run etc.

MINI-TIME SKIP

You can also Time Skip short periods of time by holding down the CTRL key and pressing Return/Enter. This gives you more control over the time skip period (if you are approaching a vital waypoint etc.)

PAUSE SIMULATION (PAUSE/BREAK)

There may be times when you just need to call a break and stop the action in this case press the Pause/Break key. A Pause icon will appear on the lower left of the screen and all action will be frozen until you press the Pause/Break key again.

JUMP TO OTHER BOMBERS

When you are in external view you can also choose to view the other bombers in the squadron. You will not however be allowed on board to manage the crew unless you are playing the Squadron Commander game.

- Press the Close Square Bracket key] to jump to the next plane in the sequence.
- Press the Open Square Bracket key [to jump to the previous plane in the sequence.

- Press Backspace to jump back to your B-17 (or lead B-17).

AIRCRAFT SELECT POP-UP MENU

When you are in external aircraft view you can also choose to jump into the fighters (both US and German) in the 3D world.

- Hover your mouse pointer on the extreme right of the screen (around the middle of the screen and the white pop-up menu will appear showing various icons and symbols.)

The top symbol is always the B-17 you are watching.

The other symbols below it are the accessible fighters with the US planes first then the Luftwaffe. This pop-up menu will vary depending on what is being used for escort or interception in a particular mission.

- Hover the mouse pointer over the icon to see pop-up help text to confirm the type of aircraft.
- Click on the aircraft symbol to jump to an external view of that aircraft.

From here on that is your selected aircraft. You can use all the standard control keys (see earlier) to enter the fighter (F1) and fly it from within the cockpit. All dials, switches and levers will function under manual control.

The [and] keys will allow you to cycle through other aircraft in a particular flight.

- To return to your B-17 go to an external view (F2) and open the Aircraft Select Pop-Up menu and click on the B-17 symbol.

EMERGENCIES

RED TEXT WARNINGS

All red text warnings will appear in external 3D views. You may hear that a crew member is injured and needs attention. Red Text works in exactly the same way – click on the text and you will jump to the compartment the message came from.

ENGINE FIRE EXTINGUISHER

When you are in external view you may see one of the B-17 engines on fire. This is one of the few emergencies that you can deal with from external view.

- Take Manual control (M).
- Select the Engine Q – 1, W – 2, E – 3, or R – 4.
- Press key J.
- Look to see if the fire extinguisher has any effect.

However, if you want to use the cockpit controls:

1. Head to the Co-Pilot's Instrument View (key 4 and then key I).
2. Select the Co-Pilot's Engine Startup and Cooling panel by pressing F9.
3. The Fire Extinguisher panel is located above the Intercoolers, turn the dial to point to the engine that needs extinguishing (inboard engines at the top, outboard at the bottom).
4. Pull one of the red handles to fire one of the two extinguisher charges fitted.

MISSION DEBRIEFING

At the end of the mission you will be taken to the Briefing Hut where you will be fully debriefed. You will be able to access all details of the mission and an indication of your success in the Debriefing File. In addition, when you are back in your office you will be able to read about the effect your mission has had on the progress of the war plus all other general war news for that time period.

MEDALS, PROMOTIONS AND WIA

After the debriefing, certain crew members will be recommended for Medals or Promotions. If the crew member has been wounded in action he will receive the Purple Heart.

The game tracks the actions of crewmembers across the course of the mission, awarding medals and promotions on a point based system. This system takes into account things like giving first aid, remaining at a station whilst wounded and how the crewmember dealt with panic: in addition to the more traditional metrics of aircraft kills, bomb damage assessments and the safe return of the crew to the home airbase.

When a mission is over you will return to your office.

6: REFERENCE

GAME MENUS IN DEPTH

Learn about each user interface menu, how to change game settings, getting around the air base, mission planning with the map, how to operate all crew positions, commanding missions and more!

THE MAIN MENU SCREEN

After the opening sequences you will enter the Main Menu screen. This allows you to select Game Options, the type of game you want to play, load in previously saved games and watch the opening sequences again.

- Player Options

  Click on the icon to get access to Controls, Realism, Difficulty, Sound, Graphics and Save Menus. You can also access this Options screen by pressing ESC at any time.

- New Game

  Click on the icon to play a new game. A red warning light will be lit to show your selection.

- Load Game

  Click on the icon to load a previously saved game. A red warning light will be lit to show your selection.

- Replay Intro

  Click on the icon to view the initial screen sequences. After the animations are over you will return to this menu.

You can also select the icons by clicking and dragging on the on-screen central dial.

- Continue Switch

  Once you have made your selection flip the Continue Switch (lower right) to carry on with the game set up.

- Quit Switch

  Click on the Quit switch (lower left) to exit the game.

PLAYER OPTIONS MENU

The Player Options menu gives you access to Controls, Realism, Difficulty, Sound, Graphics and Save menus.

CONTROLS MENU

The simulation will automatically detect if you have a joystick attached to your PC and will make this the intelligent default. Some joysticks have extra controls (R-axis or throttle) if these exist on your joystick they will be in force. You can of course re-assign most controls to suit your style of play.

CONTROL KEYS ASSIGNED

The panel on the left shows a complete list of simulation controls. If you select one of the items (for example, Parking Brake On) the panel on the right shows the key or key combination required to activate that item. If other types of controls are possible (such as Joystick Buttons or Joystick Axis) then these are shown. Assigning Joystick Buttons To assign a joystick button, highlight ‘Activate: (Not Assigned)’ and click. The software will scan for a control input. Press the joystick button you want to use and this will be detected and shown.

ASSIGNING JOYSTICK AXIS

If you want to assign a control that’s based on the joystick axis movement, highlight the control (for example Pitch (Nose Up/Down) and, in the right hand panel click on the line

below ‘Axis’.

Notice that the software is ‘scanning’ for a control input and that the two small panels in the lower left/right of the screen are showing Down and Up. Move the Joystick forward and back and the central dial should react moving to the extreme left for Down and the extreme right for Up. Let go of the joystick and this control will be assigned.

CUSTOMISING CONTROL KEYS

You can also customise the B-17 keys in UNSHIFTED/SHIFT/CTRL/ SHIFT+CTRL combinations in the same way as above.

Note:The right hand main panel also allows you to assign other types of controls for appropriate items. For example Yaw (Rudder Left/Right) has Slow/Medium/Fast Non-Centring or Centring options. Click on the line to toggle through the options.

THE USE OF OTHER CONTROLLERS

B-17 should accept any controller supported by Direct Input under DirectX. Check the operation of any Axes or Buttons carefully to ensure the game is accepting input in the correct way. Remember you can opt to reverse axes or change how controls handle such issues as speed of movement and centring.

- Click on the lower right hand switch to accept the changes and return to the Options Screen.
- Click on the lower left hand switch to cancel all control changes.

REALISM / DIFFICULTY MENU

Click to select levels of Realism/Difficulty throughout the game. The top panel shows the current state (scroll to view full details).

- Click on an item and various options will appear in the lower panel.
- Click on an option to select.

FLAK ACCURACY

The general level of German flak concentration against the bomber formation. Choose from Rookie, Veteran or Elite.

'ENEMY' FIGHTER SKILL

The general opposition fighter pilot skill from Rookie, Veteran or Elite.

FRIENDLY FIGHTER SKILL

The general friendly fighter pilot skill from Rookie, Veteran or Elite.

AMMUNITION QUANTITY

Choose a quantity of ammo held by your side (B-17 machine guns, Allied fighters etc) from Historical, Double the historical amount or Unlimited.

FUEL QUANTITY

Choose the quantity of fuel on board your aircraft from Historical, Double the historical amount or Unlimited.

BOMB DAMAGE

Select the amount of damage your B-17 bombs can inflict on a target from Historical, Historical without Duds/Double the damage without Duds. Duds are damaged or defective bombs that hit the target but do not explode.

B-17 DURABILITY

How tough do you want your bomber(s) to be? Choose from Historical, Enhanced or Invulnerable.

NORDEN (BOMBSIGHT) COMPLEXITY

Set how realistic you want your bombsight to react and function from Full Complexity or Simplified.

NAVIGATION COMPLEXITY

Set how realistic you want Navigation to be from Historical, Easy or Flawless.

FRIENDLY BULLET STRENGTH

How effective do you want your machine gun bullets to be? Choose from Historical, Increased or Double strength.

G-FORCE EFFECTS ON PILOT

Set what level of G-force effects you want acting on the pilots (this applies more to fighter pilots when they are in tight turns) from Accurate, Reduced or None.

COLLISION DAMAGE

Set parameters for any collision damage your aircraft may suffer. Choose from Ground/Other Aircraft, Ground Only or No Collision Damage.

GENERAL DIFFICULTY

Choose an overall difficulty level for the simulation from Low, Medium or High.

WEATHER SEVERITY

Set a level for bad weather encountered from Light, Moderate or Severe.

CREW AUTONOMY

Set how much initiative you want your crew to have when not directly in your control from:

None – they will show no initiative without your prompting. Limited – they will show initiative in only essential tasks. Normal – they will behave like an average crew. Superior – they will show above average initiative.

Note: The crews of aircraft not currently possessed by the player in Squadron Commander mode will always count as being on Superior Autonomy. This setting covers the autonomy of a player-occupied bomber only.

FIGHTER GUN CONVERGENCE RANGE

Select a convergence range for your fighter plane guns between 150 (rookie shot) to 600 yards (good shot).

- Click on the lower right hand switch to accept the changes and return to the Options Screen.
- Click on the lower left hand switch to cancel all control changes.

Note: Beyond the convergence range, the bullet pattern will spread again. This may be useful if you are intending to “spray” the aircraft.

GRAPHICS MENU

The Graphics options allow you to select a suitable set-up for your machine: a ‘Speed’ setting will give you the lowest and less ‘high spec’ machine settings; a ‘Detail’ setting will give you the highest graphic quality and a Balanced setting will give you a cross between the two. The top panel shows the current settings.

- Click on an option and details will appear in the lower panel.
- Click to select the option in the lower panel.

OBJECT COMPLEXITY

How detailed do you want your 3D game objects? Choose from Speed (the fastest but less detailed level), Balanced or Detail.

ENVIRONMENTAL EFFECT

This gives a level for items such as Particles, Clouds and Smoke effects. Choose from Speed, Balanced or Detail.

INTERIOR SHADOWS

Interior shadows make the flying experience more realistic. Choose from Speed (the fastest but less detailed level), Balanced or Detail.

SPECIAL EFFECTS

Select a level for in-game special effects such as explosions from Speed, Balanced or Detail.

LANDSCAPE TEXTURES

Choose the landscape texture detail that suit your machine spec from Speed, Balanced or Detail.

NON-PLAYER B-17S

How detailed and numerous do you want the non-player B-17s to appear in-game? Choose from Speed, Balanced or Detail.

DAMAGE MODELLING

What grade of damage and ancillary damage do you want? Choose from Speed, Balanced or Detail.

Note:This controls only the visibilityof the damage; any damage inflicted will still affect the flight model.

GENERAL QUALITY

Set a general overriding level for game 3D graphics from Speed, Balanced or Detail.

- Click on the lower right hand switch to accept the changes and return to the Options Screen.
- Click on the lower left hand switch to cancel all control changes.

SOUND MENU

Click to select a number of in-game sound options. The higher panel shows the current state.

- Click on an option and details will appear in the lower panel.
- Click to select in the lower panel.

AMBIENT DETAIL

What level of ambient sound (Wind, Bird Song, Foghorns, etc.) do you want Choose from Low, Medium or High.

ENGINE VOLUME

Select an engine volume setting from Off, Level 1 to Level 5.

GUN VOLUME

Select a Gun volume setting from Off, Level 1 to Level 5.

SPEECH VOLUME

Select a Speech volume setting from Off, Level 1 to Level 5.

MECHANICAL VOLUME

Select a Mechanical objects volume setting from Off, Level 1 to Level 5.

BOMB AND FLAK VOLUME

Select Bomb and Flak volume setting from Off, Level 1 to Level 5.

OVERALL VOLUME

A general setting for all volume levels in the game from Off, Level 1 to Level 5.

- Click on the lower right hand switch to accept the changes and return to the Options Screen.
- Click on the lower left hand switch to cancel all control changes.

LOAD/SAVE MENU

This allows you to Save the current game state or Load in any previously saved games.

SAVING THE CURRENT GAME

•Type in a name for your current game.

- Click on the right-hand button at the bottom of the screen.

The saved game name will appear in the lower panel.

LOADING GAMES

The lower panel shows a list of saved games.

- Click to select and it will appear on the top panel.
- Click on the Load a Saved Game button (on the left).

THE GAME OPTIONS SCREEN

- Click on New Game in the Main Menu screen.

The Game Options screen allows you to select what sort of mission or campaign you want to take part in. As in the previous menu screens you can either click on the icon or on the dial. A red warning light indicates your selection and you must click on the Continue switch to implement your choice.

THE CAMPAIGN GAME

Playing a Campaign Game will give you a complete tour of duty, meaning that you will have to complete the 25 missions for the scenario time period you are flying:

THE BOMBER COMMANDER CAMPAIGN

Click on the top left icon (one aircraft) to participate in a full tour campaign in command of just one bomber and its ten-man crew. Command the bomber and crew throughout the entire period of the tour. Define your crew's success with medals/promotions, and nurture your ten 'flyboys' to get the best out of everyone from rookies to veterans. Your ultimate goal is to get everyone to complete their tour of duty and back to the US as quickly and safely as possible!

THE SQUADRON COMMANDER CAMPAIGN

Click on the lower left icon (multi-aircraft) to participate in a full tour campaign as the Commander in charge of a squadron of B-17s; each one with a complete ten-man crew. Plan your own missions to fulfil a long-term strategy and use reconnaissance opportunities to strike at key enemy installations as they are developed.

Manage your bombers and their crew using all your available resources to best effect. You are a career officer in this campaign – your ultimate goal is progression up the chain of command. This is achieved by managing your Squadron as effectively as possible.

THE SINGLE MISSION GAME

There are three single mission options available on this menu. These allow you to jump into the simulation for specific and limited single missions. You can choose between Quickstart Missions, Training Missions or specific Historical Missions.

THE QUICKSTART MISSION

Click on the top right icon to launch a Quickstart mission. The red light will indicate your choice. (See earlier in this manual for full mission details).

Now, flip the Continue switch and you will go to the Quickstart mission screen.

To select a mission, click on its name and read the briefing (scroll down by clicking and dragging on the slider to the right of the panel).

Flip the Continue switch on the right to go into the mission. Quickstart missions represent definite areas of experience within the broader scope of a mission. You will have to be ready for the situation described in your text, as no further briefing will be given! When the situation has passed, you will be debriefed on your performance.

The left hand switch will return you to the Game Options screen.

THE TRAINING MISSION

Click on the middle icon on the right of the Game Options screen if you want to carry out a Training mission. The red light will confirm your choice. See earlier in the manual for full details. Now flip the Continue switch (on the lower right of the screen) to access the Training mission screen.

Flip the right hand Continue switch to jump into the selected training mission. You will be taken into the 3D world so that you can perform the training exercise without risk to life and limb.

The left hand switch will return you to the Game Options screen.

BOMBARDMENT DIVISION / GROUP SCREEN

If you have chosen to play a Single Bomber Campaign you will be taken to this screen to choose your Bombardment Group (left panel) based at different airfields and Squadron (right panel). Select the Group/Squadron you want from the list. Note:The specific insignia will be shown.

CAMPAIGN START

The lowest panel on this screen shows when the campaign will begin. Click on the date to alter the start date of the campaign. Start between December 1st 1943 and February 10th 1945.

When you have made your selection, click on the Continue Switch (lower right) to go to the Customise Bomber screen.

CUSTOMISE BOMBER SCREEN

It's here where you can personalise your B-17 by giving it your choice of name and nose art.

NEW BOMBER NAME

The top panel shows a default B-17 name. To change a name, click on it to access a text cursor. Delete the existing name with the Backspace key, type in your own choice of name and press Return/Enter.

CHOOSE NOSE ART

On the left-hand side of the two central panels, you will see a list of 'nose art' names. Click on one of the names and you will see the nose art in the right hand panel. Use the scroll button to view the rest (if necessary) and click on your choice.

Your B-17 will now be painted with your choice of nose art. If you are playing the Squadron Commander game, you can customise each one of your squadron's aircraft.

Click on the Continue switch (lower right) to go to the Bomber Crew Screen.

BOMBER CREW SCREEN

If you have chosen to play a Single Bomber Commander Campaign you will be taken to the Bomber Crew screen. This shows portraits of all 10 crew that are now your responsibility.

```
The crew from top left to top
right are:
Bombardier
Navigator
Pilot
Co-Pilot
Engineer/Top Turret Gunner
The crew from bottom left to
bottom right are:
Radio Operator
Ball Turret Gunner
Left Waist Gunner
Right Waist Gunner
Tail Gunner
```

By clicking on each portrait you see his name in the display panel.

RENAMING THE CREW

You can rename any or all members of your crew. Click on the name in the two display panels, delete it using the Backspace key and re-type your choice of name (first name and surname) then press Return/Enter. Your choice of crew names will be used throughout the campaign.

REPLACE ENTIRE CREW

In the middle of the screen you will see a red button that allows you to replace the entire crew line up. All portraits will change but any crew already named by you will retain their identities – gaining new faces.

SELECTOR DIAL

As in most B-17 Flying Fortress menu screens, clicking and dragging the Selector Dial Indicator will also perform crew selection.

CONTINUE SWITCH

When you have made your choice flip the Continue Switch (lower right) to enter the HQ Corridor.

RETURN TO PREVIOUS SCREEN SWITCH

Flip the Return to Previous Screen switch (left) if you want to change any previous selection.

SQUADRON BOMBER NAMES/NOSE ART

If you are playing the Squadron Commander Campaign you will be able to name and customise each bomber in your squadron.

When you have made your choice flip the Continue Switch to enter the Squadron Crew Screen.

SQUADRON CREW SCREEN

The Squadron Crew screen is similar to the Bomber Crew screen (see above) but it also has an extra panel that shows all of the aircraft in your squadron formation. By clicking on the individual bombers (or the dial), you can access the entire 10-man crew for each bomber, rename them, or generate entirely new crews.

When you have made your choice flip the Continue Switch to enter the HQ Corridor.

THE HQ CORRIDOR

Once you have made all your game selections, you will enter the HQ Corridor. This is the planning hub of the airbase, which will allow you access to the following areas: Bomber

Inspection- the windows.

- **The Bomber Commander's Office** – the furthest door on the left (for the Bomber Commander only).
- **The Briefing Room** – the nearest door on the left.
- **The Squadron Commander's Office** – the furthest door on the right (for the Squadron Commander only).
- **The Operations Room** – the nearest door on the right (for the Squadron Commander only).

THE OPERATIONS ROOM

The Operations Room will only be available when you have chosen to play the Squadron Commander campaign game. This is the where all mission planning takes place; where you can send out reconnaissance missions, select strategic targets, check what S2 (Intelligence) has to say about them and plan your bombing route using waypoints to avoid as much flak and enemy fighters as possible. Here you can also set mission altitude and the type of bombs to be dropped (for best target effectiveness).

THE MAP – PLANNING THE MISSION

First, let's have a look at the operations map. This will give you an idea of the area in which the Squadron will be operating and the number of strategic targets you currently have information about.

- Left click the map on the Ops room table to open the Operations Map screen.

MAP CONTROLS

```
You can scroll around the map
by using either the mouse
and/or
the keyboard.
```

Mouse Control:

- Move around the map by holding down the right mouse button and moving the mouse.
- Tilt and rotate the map by holding down the Shift key plus the right mouse button and moving the mouse.

Numeric Keypad Controls: Use numeric keypad ‘Ins’ and ‘Del’ to rotate the map horizontally left and right.

Use numeric keypad 9 and 3 to rotate the map vertically (from 0° to 90° degrees).

Use numeric keypad 4 and 6 to move the map left and right.

Use numeric keypad 8 and 2 to move the map forward and backwards.

Use numeric keypad + and – to Zoom In/Out.

Fine-tune all the above map control movement by holding down CTRL as you press the keys.

THE MAP ICONS

At the top of the map screen are a number of icons that will allow you to assign targets, set waypoints and reconnaissance missions. All 3D buildings shown on the map represent the targets currently available.

Red Bomb – this will designate the Primary Target for the mission.

Orange Bomb – this will designate a Secondary Target for the mission (if appropriate).

Yellow Bomb – this will designate a Tertiary Target for the mission (if appropriate).

Gold Pyramid – this will set the vertical heights of any Waypoint.

Red Arrow – (once a target is assigned) will set a waypoint horizontal position.

Purple Aircraft – these three icons allow you to set up Reconnaissance Missions.

THE MAP SYMBOLS

The map shows standard features such as:

- Urban Areas

- Lakes
- Rivers
- Forests
- Minor and Major Roads
- Railways

It is also marked with Allied fighter (White Star) and bomber (Grey-out Star) Airbases, Luftwaffe airbases (Blue filled circle)

The following is important mission information:

Light Red Circles (or arcs) – areas of light flak concentrations.

Red Circles (or arcs) – areas of medium flak concentrations.

Dark Red Circles (or arcs) – areas of heavy flak concentrations.

Factory Icon – Target location.

Blue Circles (or arcs) – areas that have strong enemy fighter concentrations.

The map also shows the shifting front line (thick red line) throughout the years of the campaign.

SETTING UP A RECONNAISSANCE MISSION

Reconnaissance missions will provide you with more accurate information about a potential target so it's important (if you are the Squadron Commander) to request recon missions of the next set of potential targets before sending the whole squadron on a full mission. Recon missions will also give you black and white film of the target for the Mission Briefing (see below).

Note: If you are playing the Bomber Commander recon footage will be shown to you automatically for the current mission primary target.

- Click on the purple aircraft icon, hold down the left mouse button and drag it above a potential target. A recon mission will provide target details for the next mission and if one of those targets is chosen as the Primary, you will have access to film footage of it in the Briefing Room.

- Press ESC to exit the Map screen.

SETTING UP A BOMBING MISSION

TARGET INTELLIGENCE

- Study the map and the targets carefully. Check all available details in the Target Intelligence File (see below), and then decide where you think your Squadron would be most effective.
- Decide on the Primary Target and choose a Secondary Target close by (in case the Primary is unavailable or obscured). You could also set a Tertiary Target (if a third target is also close).

THE PRIMARY TARGET

- To assign a Primary Target, make sure it is shown on the map, click on the red bomb at the top of the map screen, hold down the left mouse button and drag the bomb on to the target icon and release.

  The target will now have a small red bomb above it and the suggested mission route will be clearly shown. The route will be a blue broken line route from your airbase, via several waypoints (red arrows) at appropriate heights (gold pyramids) to the Initial Point (the last turn before the bomb run), the target, the Rally Point (the first waypoint and forming up point after the bomb run) and then back home.

THE SECONDARY TARGET

- To assign a Secondary repeat the above procedure using the orange bomb icon on your choice of Secondary Target.

SETTING WAYPOINTS

Apart from your home airbase and the assigned targets, you can adjust all other aspects of waypoints, the initial point and rally point, including ground location and waypoint/bombing height. Tooltips on the waypoint gold pyramid markers will indicate the altitude for any particular waypoint.

- To move a waypoint, click on the red arrow, hold down the left mouse button and drag it to its new position.
- To de-select a target, click on the bomb icon and drag it up away from the ground until it disappears.

This map is very similar to the Mission Briefing Map and the Navigator's map on the B-17 (see Navigation below). Remember that, depending on what Navigation complexity you are playing (Historical, Easy or Flawless) you might choose to place waypoints on recognisable geographical features so that visual sightings can be made by the Navigator to confirm aircraft position.

When you have finished setting waypoints, press ESC to exit the Map screen and return to the Operations Room.

INTELLIGENCE FILE – TARGET DETAILS

Now you've decided on the target(s) for the bombing mission, you should check all intelligence about the target(s).

Note: Intelligence is only provided for targets that have current reconnaissance information. To add a target to this file, make sure it is assigned to a reconnaissance flight (see above) and fly your next mission. When you return, the target will be included for as long as the information you have remains current. Periodic reconnaissance flights are needed to keep target information current.

- Click on the Intelligence File on the right of the desk.
- When the file opens flip through the targets (if appropriate) by clicking on the right hand page. The page will turn and show the next target.
- Locate your chosen target(s) in the book and check details on: Flak Strength, Fighter Strength, Strategic Priority and Damage Already Inflicted.

THE BLACKBOARD

If you've forgotten which targets you selected in the Map screen, click away from the File and click on the blackboard at the back of the Ops Room. This will give you full details.

Click away from the blackboard to get back to the room and continue to study the Target Intelligence File.

OUTSIDE – INSPECT THE BOMBERS

Before you send your entire squadron on a bombing mission you must first check the status of each bomber and their crew. It would be foolish to send out a badly damaged aircraft or one that did not have a complete crew.

- So in order to check each of your bombers, click on the office window to get into the jeep to take you on your tour of inspection.

BOMBER CLIPBOARD

The clipboard shows your squadron bomber strength.

- Point to one of the bomber names and left click. You will be taken into the 3D world with the selected bomber on its hardstand.

Use the camera keys to look around the bomber. If this is your first mission it will have no visible damage.

Now press ESC to go to the jeep bonnet.

- Click on the files to go to read the specific reports.

Each B-17 has the following files associated with it:

MECHANICAL FILE

- Click on the file to open it.

Here you will see bomber details including summaries of essential/ recommended repairs and maintenance. If you click on the right hand page you will see a form that allows you to order the aircraft to be scrapped for parts and to replace it with a new aircraft. If the B-17 is in a bad state of repair you will have to sign it off and ask for a replacement. You must click on the signature line at the bottom of the page.

- Click on the bonnet to close the file.

CREW MANAGEMENT FILE

- Click on the file to open the file.

This will give you all details about that bomber's crew. On the front page is a summary of crew names and their specific positions (marked as Xs) with an indication of other specialist crew positions they could be assigned to successfully.

- Click on the right hand page to turn the page and you will see more details of the first member of the crew, including 'morale' and skill levels for the key emergency tasks Gunnery, Piloting, Bomb Aiming, Navigation, First Aid and Technical.

Get to know your crew and understand their strengths and weaknesses; particularly who would be useful to double up on a crew position and who is good at Technical or First Aid.

You can also assign a crewmember to Ground Duties (for example, you might think his morale is too low).

- Click on the Ground Duties box to make the slash into a cross. A rookie will take his place and he will be shown in the Crew Replacement File.
- Click on the bonnet to close the file.

CREW REPLACEMENT FILE

- Click on the file cover to open.

This file only contains ex-flight crew that you have put there – rookie replacements will always be provided to fill in any gaps but will leave when crew member is recovered.

- Click on the bonnet to close the file.

NEXT BOMBER

When you have finished inspecting the first bomber, click on the Keys/Hat/Gloves to return to the Clipboard and inspect the other bombers in the Squadron in the same way.

- When you have finished inspecting all the B-17s, click away from the Clipboard to return to the HQ Corridor. From the HQ corridor,

return to the Operations room to continue planning the mission.

CLIPBOARD – CHOOSE BOMBERS FOR THE MISSION

- Click on the left-hand clipboard to assign the 6 aircraft for the bombing mission. You will see be shown a list of the bombers available. The other bombers not chosen will have crews who are being rested or are too badly damaged to take part (after a number of missions).
- Click on the 'selected' column for the B-17s you want to go on that mission (the slash/symbol will become a cross).
- Click away from the clipboard to return to the Ops Room.

ORDNANCE – SELECT MUNITIONS FOR THE MISSION

Now you'll need to select the type of bombs to drop on the selected target(s).

- Click on the Ordnance File (the book in the middle of the desk) to open the Mission Ordnance Selection.

This will determine what type of bomb load the B-17s will be carrying on this mission. Most of the targets can be hit with General Purpose Bombs but some will need Incendiary, Armour Piercing or Anti-Personnel ordnance.

General Purpose bombs are the most commonly carried ordnance on 8th Airforce missions. Also known as "Demolition" bombs, they are used to break open multi-storey buildings and destroy other structures. GP bombs come in a variety of sizes – in general harder targets require larger bombs.

As a target becomes more armoured, General Purpose bombs achieve less and less, soon the size of bomb required to damage a target becomes prohibitive. This is when Armour Piercing and Semi-Armour Piercing bombs come into play. Both these types of bombs devote more of their weight to heavy casing, sacrificing explosive charge for the ability to penetrate far more steel and concrete.

Armour Piercing bombs should be saved for heavily armoured targets, such as Submarine Pens or the largest factories. Much of their explosive weight has been converted to steel penetrator, so although they inflict massive damage to armoured targets, they have little explosive radius in relation to their overall weight.

Semi-Armour Piercing bombs represent a halfway house. Roughly between General Purpose and Armour Piercing, they represent a good compromise solution if, for example, your Primary target is armoured, but your secondary target is not, and you wish to hedge your bets.

As well as the explosive bombs, there are other types that the 8th Airforce uses to good effect in its campaigns. Incendiary bombs are especially useful in areas such as Oil Refineries or Factories, where flammable objects can burn for many hours after a raid. Anti Personnel cluster bombs are especially useful against airbases and troop concentrations, where they cause casualties amongst vital personnel and can hinder the clean up process.

- Click away from the file to return to the Ops Room

BLACKBOARD – VIEW MISSION SUMMARY

Finally, before you leave the Ops Room check the Blackboard on the back wall of the Ops Room to remind yourself of the basic mission details.

- Click away from the blackboard to return to the Ops Room.
- Click on the left hand door to return to the HQ Corridor.

THE SQUADRON COMMANDER'S OFFICE

(The furthest door on the right.)

If you have chosen to play the Squadron Commander campaign game, this is where you come to for complete information about your bomber squadron. All information is contained in files arranged on the desk or on the bookshelves.

IN-TRAY 'READ NEW MAIL'

The 'in-tray' is where you will read all new mail that relates to the latest mission flown by your bombers and crew.

- Click on the sheets of paper to view details of missions flown, enemy aircraft 'kills', mechanical status, targets, bomb damage inflicted, aircraft shot down, injuries incurred and medals awarded.

OUT-TRAY 'READ OLD MAIL'

- Click on the 'out-tray' to examine old mail about previously completed missions.

CREW INFORMATION FILE

- Click the book on the left to see a complete dossier of all crews in the Squadron. Different bombers are 'tabbed' along the edge of the file.
- Click on a tab to open at the marked point.
- Click away to shut the book.

BOMBER INFORMATION FILE

- Click the book in the middle to open the bomber dossier for all B-17s in the Squadron. Bombers are 'tabbed' along the edge of the file.
- Click on a tab to open at the marked point.
- Click away to shut the book.

MEDICAL FILE

The Medical File (on the right of the desk) shows the list of personnel wounded in action and details of when they can return to the aircraft or be given a possible discharge. When a crew member is fully recovered from being wounded in action, he will be moved from this file and be made available for air duties.

- Click away to shut the book.

INSPECT THE BOMBERS (WINDOW)

Click on the window to carry out a full inspection of all your bombers. Details are similar to the Inspect Bombers section from the Operations Room (above).

- Click on the left hand door to return to the HQ Corridor.

THE BOMBER COMMANDER'S OFFICE

If you have selected the Bomber Commander Campaign game, you will have access to the Bomber Commander's Office (the furthest door on the left). Remember, you will not be able to go to the Operations Room or the Squadron Commander's Office - you do not have a high enough rank.

This office is where you keep all information about your specific bomber, your crew, read any mail (old and new) and where you can go to inspect your B-17. It deals specifically with your bomber but in most other respects is similar to the Squadron Commander's Office.

IN-TRAY 'READ NEW MAIL'

The in-tray is the place where you read your new mail that's relevant to the latest mission flown by your bomber and crew.

- Click on the top sheet to flick through details of missions flown, enemy aircraft 'kills', mechanical status, targets, bomb damage inflicted, aircraft shot down, injuries incurred and medals awarded (if applicable).

OUT-TRAY 'READ OLD MAIL'

- Click on the out-tray to read details of previously completed missions.

CREW INFORMATION FILE

- Click to open complete personnel dossiers for all members of your crew. Crew positions are 'tabbed' along the edge of the file.

INSPECT THE B-17

- Click on your office window to take the jeep to inspect your bomber and access the Bomber Crew Management Files where you can assign personnel in correct or different positions.
- Click the Keys/Hat/Gloves on the jeep bonnet to exit the screen and return to the HQ Corridor.

THE MISSION BRIEFING ROOM

When all preparations have been made (and whether you are playing Squadron or Bomber Commander) you will have to go to the Mission Briefing Room. This is where all the details of the mission are revealed to the crews and all the formalities are completed before a mission is undertaken.

- Click on the nearest door on the left of the HQ Corridor to enter the Mission Briefing Room.

VIEW ROUTE MAP

Click on the Map on the right of the stage to look at the route to and from the targets. If you are not playing the Squadron Commander this will be the first time that you will see details of the mission. The controls are the same as those in the Operations Room. Press ESC to return to the Mission Briefing Room.

VIEW RECONNAISSANCE FILM

Click on the Movie Screen at the centre of the stage to view any reconnaissance film of the target gathered by your Intelligence Section and pay particular attention if you are planning to ‘act’ as bombardier. This will show you what the target looks like from the air.

Reconnaissance film will be shown only for the highest priority target that has current reconnaissance information. If the Primary target has no reconnaissance then the Secondary target will be shown. If the Secondary target has none, then the Tertiary target will be shown. If no targets have reconnaissance information, then no film will be shown.

In a Bomber Commander campaign, Group HQ will ensure you ALWAYS have reconnaissance information for your Primary target.

```
Film
Reconnaissance

View Map

Begin the
Mission
```

READ MISSION BRIEFING

At the desk in front of you is the Mission Briefing File. Click on the cover to open it. This gives you a full written Mission Summary including:

Date of Mission Primary Target Details Secondary Target Details Ordnance Selected Distance to Farthest Target Fighter Escort

- Click the page to turn over.

On the final page of the summary you must signthat you have read and understood the briefing.

- Click on the line to sign, then click away from the file and you will return to the Briefing Room.

BEGINNING THE MISSION

Now all preparations are completed you're ready to get set off on your mission. Click on the door on the far right of the room to leave the Briefing and be taken to the aircraft to start the mission.

INSIDE THE AIRCRAFT

YOUR MISSION RESPONSIBILITIES

THE SQUADRON COMMANDER

Taking the role of the Squadron Commander in the simulation is the ultimate test of your abilities, not only to command but also to set in place operations and missions that will have a positive effect on the war effort. It's not just one crew and one bomber you are nurturing but the whole squadron. But all this doesn't mean you can't fly the complete mission as the tail gunner (if you so wish) and let the computer control the rest. In short, you must fly the same mission as the Bomber Commander, but also bear the responsibility for 5 other aircraft and 50 other aircrew – in addition to having planned the whole show in the first place!

THE BOMBER COMMANDER

In the Bomber Commander game, you are in charge of a B-17 with all the duties and responsibilities that come with a ten-man bomber crew. You are responsible for the aircraft and the crew, their safety and efficiency, not just when you are flying a mission but at all times. Your crew is made up of specialists: Pilot, Co-Pilot, Navigator, Bombardier, Engineer, Radio Operator and four Gunners. Each must play a part in an effective combat team who reflect your ability as commander.

You must get to know members of your crew, their character, capabilities and shortcomings. Take an interest in their problems, ambitions, and need for extra training. Be aware of their morale. Your crew should be trained to work as a team. Get to know each one's duties and any difficulties experienced. To succeed, you must have a thorough knowledge of each job and the likely problems that will be encountered.

STARTING OFF

Once you have left the Mission Briefing room, you will begin all campaign missions with all your crew inside the bomber in their assigned positions ready for take off. You will see your B-17 (or lead B-17) in external view positioned at its dispersal point awaiting orders. If you are playing Squadron Commander the game will centre on an outside view of the lead bomber in the squadron or, if you are playing the Bomber Commander game, it will centre on 'your' B-17 – the lead bomber.

THE CREW

Let's take a tour of the B-17 crew positions and compartments.

- Press F1 to move from exterior view to the B-17 interior view.

You will begin in the Pilot's compartment view looking at the Pilot and Co-Pilot.

There are several different ways to select your crew and their specific views. On most internal screens you will be able to access the following:

CREW PORTRAIT PANEL (POP UP MENU)

- Hover the mouse pointer at the top of the screen and the Crew Portrait Panel will pop up. This shows the portraits

of the ten crew positioned in the B-17. If you hover the mouse pointer over a picture you will see a name.

- Click on a portrait to select and jump to that crewman.

CREW POSITION PANEL (POP-UP MENU)

This is another pop-up menu but this time it accesses the B-17 station notthe man but if the position is not filled (for example, there's no one manning the Cheek Gun) you will notbe able to access it. Note:Positions filled by wounded crewmen will also vanish from this panel – making it an excellent way to judge the gaps in your gun coverage.

- Hover the mouse pointer to the left of the screen and the Crew Position Panel will appear showing icons of all ten jobs on board.
- Click on one of these jobs to jump to the action view for this crew position. This is very useful if you want to jump to different action stations quickly (for example in air combat).

Note:These positions (plus an eleventhCheek Gun action position) are also accessible from the keyboard keys:

```
`. Bombardier;
1. Navigation;
2. Cheek Gun;
3. Pilot;
4. Co-Pilot;
5. Top Turret Gun/Engineer;
6. Radio Operator;
7. Left Waist Gun;
8. Right Waist Gun;
9. Ball Turret Gun;
0. Tail Gun.
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CREW VIEWS PANEL (POP-UP MENU)

All crew positions in B-17 have a number of different 'views' available. These are accessible through the Crew Views pop-up menu and keyboard shortcuts. If there are two or more crew shown in the compartment, the views will refer to the selected crew member (highlighted by a white border).

- Hover the mouse pointer on the extreme right side of the screen (about mid-screen) and a panel of icons will pop-up that allow you to access those views for a specific crewmember. Note: Some crew will not have all of these views available to them.

The Aircraft Icon – External View (key F2) By clicking on the top icon (or pressing key F2) you will jump to the external view of the aircraft and be able to access all the 3D camera controls (see Reference Card). Press F1 to return to the internal crew position.

The Crew Icon – Compartment View (key C) Clicking on the crew icon (or pressing key C) will show the Compartment View. This is a general view of the section of the B-17 that your selected crewman is located in. There may be another crewman shown but the one selected will be highlighted with a white border.

The Sight Icon – Action View (key A) By clicking on the sight icon you will enter the Action View for that crewman. For example, for the pilot this will be looking through the front windshield; for the Gunners it will be the sight/machine gun view etc.

The Dial Icon – Instrument View (key I) This will show any 'instrument' view and will vary depending on the crewman selected. For example, the Bombardier will have a general view of his Norden bombsight with adjustable dials. Note:Additional Instrument Views also exist for some crew that can be accessed by pressing the spacebar.

Window Icon – Window View (key W) This shows a view of the external world seen by the crewman through the nearest window.

THE PILOT AND CO-PILOT

The Pilot and Co-Pilot must be able to take off and land equally well. They are the senior officers on board and are also responsible for flying the aircraft. The B-17 is a big plane, more than any one Pilot can handle, you must make sure the Pilot and Co-Pilot do an equal share of flying, take-offs, landings, and instrument work. Do not allow one pilot to increase in skill to the detriment of the other. That pilot may get injured or be re-assigned to another position and you may have to rely on the skills of an inferior pilot to get the plane safely back to base.

This is how the Pilot/Co-Pilot can make effective use of their specific Crew views:

Aircraft Icon – External View (key F2) The external aircraft view allows you to look around your bomber. When you jump to external view you need not fly the aircraft - it will be

controlled by the AI in Computer Mode, but by pressing key M you will toggle Manual Mode, effectively allowing you to fly the aircraft from the outside view. This view is also important when taxiing from the dispersal point to the runway because the pilot's normal view (Action View) on the ground is extremely limited (as in the real thing!).

Crew Icon – Compartment View (key C)

This is the general compartment view and allows you to select whether you want to control the Pilot (left seat) or the Co-Pilot (right seat). Click once on the figure you want to select with the left mouse button (or press the relevant crew key 3 or 4) and he will be highlighted. All further actions will then concern only the selected crew member.

This view also allows you to carry out full crew management, for instance, if the Pilot is injured and you want him to change places with the Co-Pilot (or any other crew member who can fly the aircraft), right click on the figure and you will open the main crew management device, the Icon Rose. The compartment view will also show any damage inflicted on that part of the aircraft.

The Icon Rose By clicking on any of the position icons shown (in the circle) you can make the Pilot/ Co-Pilot exchange positions with any other crewman. In the centre of the menu you can left click on a number of other icons that allow the Pilot/ Co-Pilot to perform other functions: Use Item, First Aid, Repair, Fire Extinguish, or Bale Out.

Sight Icon – Action View (key A)

The Pilot's and Co-Pilot's Action View is the view they have out the front of the aircraft. They can see out of their own side of the windshield but can also look left and right using Camera keys. The flight instrument/dials panel is not seen from this view.

Dial Icon – Instrument View (key I)

The Pilot's and Co-Pilot's Instrument View shows the complete Pilot's instrument panel with fully working dials and switches (enabling you to fly the aircraft manually if you want to). Note: The plane is flown jointly by the Pilot and Co-Pilot and the instruments in front of each are different.

So, for example, you may be the Pilot but you will need to 'become' the Co-Pilot to fire up the engines because they are on the Co-Pilot's side.

Once in Instrument View the following additional instrument views come into play:

F4 – Pilot's Instrument View (general). F5 – Co-Pilot's Instrument View (general). F6 – Close Up Engine Instruments. F7 – Close Up Pilot's Directional Instruments. F8 – Close Up Pilot's Fuel and Electrics Instruments. F9 – Close Up Co-Pilot's Engine Start Up and Cooling Instruments. Window Icon – Window View (key W)

The Pilot/Co-Pilot do not have a separate Window View (see Action View above).

From within the aircraft the Pilot can be accessed with key 3 and the Co-Pilot by pressing key 4.

THE NAVIGATOR



The Navigator must direct your airplane from take off to the target and back again. He must know the precise position of the airplane at every moment that it is in the air. Even though his work requires accuracy and concentration he must be able to use the .50 calibre cheek-mounted machine gun sited close to his station, and must be familiar with bomber systems and learn how to operate turrets and radio equipment.

Aircraft Icon – External View (key F2)

Jump to the external aircraft view. Press key F1 to return.

Crew Icon – Compartment View (key C)

Shows the nose compartment view of the Navigator (left) and Bombardier (right). Click once on either figure to select. Like all compartment views this allows you to perform various tasks by right clicking on the figure and accessing the crew management icons.

Note:This compartment has two additional positions available: Chin Turret Gunner (usually controlled by the Bombardier) and a Cheek Gun (usually controlled by the Navigator).

Sight Icon – Action View (key A)

The Navigator's Action View accesses the Drift Meter that must be used to calculate wind drift. In the Action View you will be looking through the meter. You must try to align the dotted scale lines (using joystick left and right) so that a fixed ground point will travel along one of them for a period of time. Then you can read off the wind drift value (in degrees) from the scale to the right. You can use the drift scale value as the initial wind drift value in the bombsight.

Note:When in computer control, the Navigator will set the wind drift as best he can. If you correct the drift scale for the Navigator you will be helping to improve the navigator's skills for future missions.

Dial Icon – Instrument View (key I)

The Navigator's Instrument View shows the Radio Compass dial, the Navigator's Map and the Drift Meter.

The Radio Compass has a needle that shows the compass heading of the aircraft:

0/360 = North; 90 = East; 180 = South; 270 = West.

On his table is the Navigator's map. This is accessible by clicking on it and is controlled in much the same way as the as Mission Planning and Mission Briefing maps. You can also select this map by pressing the Spacebar from the Navigator's Instruments view, as with every other alternate instrument view.

The Navigator's Map All controls and icons are the same as the Operation Room map but with the addition of a third type of target bomb icon (a green one). This allows the setting up of 'opportunity targets' in the event of Primary, Secondary and Tertiary targets being unavailable.

- Click on the bomb icon and drag it over a suitable target on the map. A course will be plotted to the target, and waypoints set up for the bomb run.

The map is obviously a very important tool for you to use – it's where you get your information of where you are and how you are progressing on the mission. It also details areas of flak concentration and areas of fighter concentration.

Unless you select Flawless navigation, you will have to concentrate to keep the aircraft on track to and from the target. This means looking at the terrain and checking where you think you are on the map (for more information check out the Navigation Schoolsection).

Window Icon – Window View (key W)

The Navigator's Window view is a simple view of the 3D world looking out over the port engines (1, 2).

THE BOMBARDIER

The ultimate aim of any mission is effective and accurate bombing of a strategic target. Mission success depends on the Bombardier and what he achieves in a short space of time over the target. When he takes over control of the aircraft on the bombing run he is the ‘commander’ and remains so until he signals ‘bombs away’. The Bombardier must understand his bombsight, all his bombing equipment and instruments, and must be thoroughly trained in target identification.

During a bomb run the Bombardier looks through a sighting telescope to locate the target. The bombardier inputs bomb load and altitude data, then sets the telescope sight over the target. The base of the sight is gyro- stabilised and, by keeping the telescope on the target, aircraft movement information is fed into the sighting computer. The computer produces course correction signals that are channelled into the pilot’s panel. When the bomber is close to the target, the sight telescope is almost vertical and the computer calculates that the release angle has been reached, a series of electronic contacts are closed and the drop bombs signal lights automatically. When the angle is exactlyright, the bombs will be dropped automatically. The Norden bombsight channels data directly into the autopilot and the bomb aimer effectively flies the plane by fine adjustment of the sighting telescope. The main disadvantage of this sight is that it needs at least 20 seconds of non-deviational flight and loses accuracy if fire and smoke obscure the target.

Aircraft Icon – External View (F2 key) Jump to the external aircraft view. Press key F1 to return.

Crew Icon – Compartment View (key C)

The Bombardier’s Compartment View is the same as the Navigator’s (see above).

Sight Icon – Action View (key A)

The Bombardier’s Action View is that of the Norden sighting telescope, search/release indicators and scales (for details see the section on Bombardier School). It’s from this view that the search for target, fine- tuning flying and bomb release is controlled.

Dial Icon – Instrument View (key I)

This is a view of the complete Norden bombsight allowing you to input the wind drift details (from the Navigator) and the mission altitude.

Bombing Panel (Spacebar) The Instrument View has an additional screen that shows the Bombing Panel accessed by pressing the Spacebar. The Bombing Panel gives you full control over the bomb bay doors, bomb arming, auto pilot and the way the bombs are released (trail or salvo). Press the Spacebar again to return to Instrument View.

Window Icon – Window View (key W)

The Bombardier has a clear view from the front of the aircraft through the plexi-glass dome.

Note: Cheek Gun and the Chin Turret – In the nose section there are also two extra (and key) gun positions. The Cheek gun is to the right side of the nose and is usually operated by the Navigator (where appropriate) and the Chin Turret sits under the plexiglass nose and is usually operated by the Bombardier (where appropriate).

THE ENGINEER/TOP TURRET GUNNER

Located just behind the flight deck in front of the Bomb Bay is the Engineer/Top Turret station. A good combat Engineer knows his aircraft, engines and armaments like the back of his hand. He is responsible for all equipment and therefore the lives of all the crew flying in the airplane. The Engineer also can regulate the flow of fuel between the four engines (for example, if one engine seizes up he can direct fuel to the other engines). He must also be an outstanding gunner.

Aircraft Icon – External View (key F2) Jump to the external aircraft view. Press key F1 to return.

Crew Icon – Compartment View (key C)

The Engineer is only partially visible in the top left of the screen (it's easier to see when he's highlighted in this view). The Engineer's compartment view also allows a view of the bombs and if you're watching from here when they're dropped you'll see them drop off their mountings.

Sight Icon – Action View (key A) Selecting the Engineer's/Top Turret Action View will access full control of the Top Turret twin machine guns. Click key M to take manual control, traverse left right up down using your controller option (joystick recommended) and fire using your primary button.

Dial Icon – Instrument View (key I) Selecting the Instrument View will access a screen showing the ammo boxes. Hover your mouse pointer over the boxes to see how much ammo remains.

Fuel Control Panel (Spacebar) The Instrument View has an additional screen accessed by pressing the Spacebar. This allows the Engineer to move fuel from engine tank to engine tank by clicking on the red levers (starboard engine 1, 2) and (port engines 1, 2) to select and the control switch to carry out the transfer. Note:You can only see the effects of the transfer in the Co-Pilot's close up Instrument View (key F8).

- Press Spacebar again to return to Instrument View.

Window Icon – Window View (key W)

The Engineer has no Window View.

THE RADIO OPERATOR

The Radio Operator must know everything about his radio equipment. He must provide position reports, upkeep the tuning of the radio sets and maintain a comprehensive log of Messages Outward and Inward. He is the source of all orders transmitted to the crew. It's also advisable for him to gain experience of guns and turrets.

Aircraft Icon – External View (key F3)

Jump to the external aircraft view.

Crew Icon – Compartment View (key C)

A view of the Radio Compartment showing the Radio Operator at work

Sight Icon – Action View (key A) A view through the Radio Operator's window located on the left side of the aircraft

Dial Icon – Instrument View (key I)

A view of the radio set plus the Outgoing Messages log and the Mission Messages log.

- Click on the book covers to open the logs. When in manual mode (key M) click on the message to implement it and it will disappear.

Window Icon – Window View (key W) The Radio Operator has no Window view.

THE GUNNERS (BALL TURRET, WAIST 1 AND 2, TAIL)

The B-17 is designed to be a defensive gun platform. The way your Gunners perform establishes the effectiveness of the Flying Fortress. All Gunners must understand the ‘zones’ covered by their guns and be able to bring the armaments to bear quickly and accurately. Gunners should be experts in aircraft identification and familiar with the operation of their machine guns. They must be able to use sights correctly and to fire accurately from all the other gun positions on the aircraft.

Aircraft Icon – External View (key F2)

Jump to the external aircraft view.

Crew Icon – Compartment View (key C) The Waist and Ball Turret gunners share a Compartment view looking towards the front of the aircraft. The Left Waist gunner is on the left, the Right Waist gunner on the right; the Ball Turret gunner is tucked in on the floor between the two (inside his Sperry turret).

As well as the standard Icon Rose orders system (Move To, First Aid, Fire Extinguish etc.) Gunners also have an Unjam Guns icon option when a gun is jammed.

The Tail Gunner has his own Compartment View.

Sight Icon – Action View (key A)

Action View will access full control of the machine gun or guns. Press key M to take manual control of the guns; aim, move and fire using your controller option.

Dial Icon – Instrument View (key I)

Selecting the Instrument View will access the Ammo screen. Leave the mouse pointer over the ammo box and a pop-up message will show how many rounds of ammo remain in the boxes.

Window Icon – Window View (key W)

Gunners do not have a separate window view.

COMPARTMENT SELECTION (POP UP MENU)

When you are in any Compartment view (see above) you can easily jump to any of the other six B-17 compartment views.

- Hover the mouse pointer at the bottom of the screen.

This will open the Compartment Selection pop-up menu showing an outline of the aircraft divided up into the six different compartments.

- Click on the section you want, a red indicator light will confirm your selection and you will jump to that Compartment view. Click on a figure to select.

7: THE TRAINING SCHOOLS

EARN YOUR WINGS!

The Training Schools are here to give you detailed instruction on performing the basic functions for each of the ten man crew positions manually. Remember that, if you wish to let the AI control these functions the mission will still be carried out but it may not be as successful without your input. Or, if the realism settings are too high you may never get to the target!

BASICS OF FLIGHT

THE FORCES

The only way to really be in control of your aircraft is to understand the forces acting on it and the way that the control surfaces manipulate those forces. There are five basic physical forces that are important to you when flying an aircraft that you must understand in order to be in full command of your aircraft.



GRAVITY

Your airplane and everything in it are attracted to the surface of the Earth. The more weight (or mass) on your craft, the greater the attraction. If there were no other forces acting on your aircraft it would simply stay on the ground.

LIFT

This is what keeps your aircraft in the air. The design of the wings uses a side effect of the law of conservation of energy. The shape of the wing makes the air move faster going over the top of the wing than it does going under the wing. Faster moving air has a lower pressure than the slower air and the difference in pressure between the bottom surface and the top surface of the wing lifts it up. When the lift force on both wings is high enough, the aircraft is held up in the air. In combination with Thrust this makes the aircraft fly. The amount of lift produced is governed by the angle at which the wings meet the airflow (known as the ‘angle of attack’).

THRUST

Thrust provided by the engine (jet or propeller) pushes the air backwards which, through an equal and opposite reaction, provides forward motion on the entire aircraft. The jet engine provides much more thrust than the propeller because the air is taken in through the front intake and the oxygen is burned with fuel creating an exhaust which leaves the engine at great speed.

DRAG

Drag is the resistance that the air puts up to anything that is travelling through it. Without thrust a moving aircraft will slow down and stop because of the drag of the air around it.

TORQUE

In prop driven aircraft the engine rotates in only one direction. This coincides with the roll axis of the plane, so as the engine turns it transfers some of the torque to the body of the aircraft making the plane try to rotate in the opposite direction as the engine (usually counter-clockwise) making the left wing drop. At low speeds and during landings the pilot must counter this force or it could prove very dangerous. Note:The P-38 has two props which counter rotate (they rotate in different directions) cancelling out each others torque.

THE THREE AXES

Although an aircraft can move in an unlimited number of directions, there are three axes of motion that you can control.

Roll is the rotation of the aircraft around its length (tipping the aircraft left or right).

Pitch is the rotation of the aircraft around the line of its wings (tilting the nose up or down).

Yaw is the rotation of the aircraft around its middle (so if you were looking from above the nose would move left/right and the tail right/left).

THE CONTROL SURFACES

You control the movement of your plane by manipulating the basic forces (see above).

Thrust is provided by the engine and you can control its level by slowing it down or speeding it up.

Gravity always pulls at the aircraft and you cannot affect this.

Drag and **Lift** however, do not affect all parts of the aircraft equally and this permits the introduction of 'control surfaces' that enable you to control those two forces' effect on the plane.

ELEVATORS

These are vertically tilting sections of the horizontal part of the tail. Through Drag they affect the pitch of the plane and the pilot controls them with the forward/back movement of the stick (or column). If you push the stick forward the elevators drop down creating an imbalance in the Drag the nose tilts down and this makes the plane dive (lessening the angle of attack). If you pull the stick back, the elevators go up and have the affect of tilting the nose up making the plane climb (increasing the angle of attack).

AILERONS

These are located on the wings and act in the same way as the elevators. Moving the stick/column to either side makes one aileron go up and the other go down which means one wing gains extra lift (rises) and the other gets more Drag (drops). The aircraft will roll as it banks in the direction you moved the stick.

FLAPS

Flaps are located in the backs of the wings. They can be extended or retracted and are particularly useful when landing.

'Flaps down' means extending the flaps resulting in extra lift (the plane rises), increased drag (the plane slows down). Generally this lowers the speed at which the aircraft will stall, so on landing you can approach more slowly or dive to a landing more steeply (because you are moving at a slower speed).

'Flaps up' means retracting the flaps making the plane faster but losing some lift (the plane will drop a little).

'Partial flaps' are sometimes used on take off to provide extra lift.

RUDDER

The rudder is located in the back of the vertical part of the tail and through its action on drag affects the yaw of the aircraft. When the rudder is moved left/right, the nose 'yaws' left/right. The rudder is used to smooth out turns, lining up an accurate position for firing (in a fighter) and landing or recovering from a spin.

WINGS

Your aircraft wings can also be used indirectly as control surfaces to manipulate lift. Use the elevators to increase the plane'sangle of attack and the airflow over the wings changes giving more lift (up to a point) as long as airspeed is high enough. Beware that too big an AoA without a corresponding increase in airspeed will create turbulence, stall and spin. Similarly, reducing the AoA creates less lift.

INERTIA

If your aircraft is sitting still it wants to stay that way, resisting a change to its state of motion. If it is moving in a particular direction at a particular speed, it 'wants' to retain that speed and heading.

In flight, inertia tends to make manoeuvres more difficult at higher speeds. The faster your plane is moving, the more inertia it has in the direction of movement and so the engine and control surfaces have to do more work to get the plane to change direction.

G forces are the most obvious problem caused by inertia. G is the acceleration due to gravity (any acceleration experienced by the plane and pilot). When you change direction you are subject to G's, inertia tries to keep you moving in your original direction. Side turns cause transverse G's pushing you sideways in the opposite direction; downward turns

cause negative G's making you feel lighter; upward turns cause positive G's pushing you into your seat

Note:Positive G's can cause blackouts and negative G's can cause redouts.

LEVEL FLIGHT

Level flight is achieved when all the forces are in balance and the aircraft moves at a constant speed without changing altitude. Pilots make level flight easier by setting the trim of the aircraft (this is akin to calibrating a joystick). By trimming you calibrate the elevators to compensate for lift and the ailerons and rudder to compensate for roll.

LEVEL CLIMB AND LEVEL DESCENT

To gain or lose altitude without changing the pitch of the aircraft is done by changing the amount of lift generated by the wings. So to begin a level climb, increase the throttle. Speed will increase and add more lift making the aircraft climb gradually. To lose altitude (without diving and gaining speed), simply cut back on the throttle, reducing speed and creating less lift making the plane descend gradually. Do not fly at full throttle all the time, you will use up fuel and overheat your engines. Keep to cruising speed until you need to go into combat.

CLIMBS AND DIVES

To climb, pull back on the stick, the farther you pull, the steeper the climb you get although this depends on the capabilities of your aircraft and your airspeed. The most efficient full throttle angle of climb is about 20 degrees above the horizon.

To dive, push forward on the stick, the farther you push, the steeper the dive will be (and the faster your airspeed gain).

BANKING

To carry out a simple turn, push the stick to either side and the aircraft will roll in that direction redirecting the wings' lift, making the plane bank to that side and turn in that direction. By pulling back on the stick you can tighten the turn you are making but you will also lose speed as you turn (nose dips and altitude drops). You must add throttle and pull back on the stick.

FLYING SCHOOL (PILOT AND CO-PILOT)

Note: You can fly/control the aircraft with a combination of keyboard, mouse and joystick. Most of the flight deck controls are fully functioning and can be clicked, dragged, switched on and operated like the real thing. You can also reconfigure most controls for both controllers in the Controls section of the Player Options Menu (see earlier).

CONTROL KEYS

```
Flight Controls Key(s)
Pitch (Nose Up).
Pitch (Nose Down) ;
Roll (Bank Left) Z
Roll (Bank Right) X
Yaw (Rudder Left) B
Yaw (Rudder Right) N
Flaps Up F
Flaps Down SHIFT + F

Steering/Brake Controls
Left Steering Brake B
Right Steering Brake N
Parking Brake On P
Parking Brake Off SHIFT + P
Wheel Brakes On INSERT
Wheel Brakes Off DELETE
Tailwheel Lock On T
Tailwheel Lock Off SHIFT + T

Landing Gear Controls
Landing Gear (All) Raise Up Arrow
Landing Gear (All) Lower SHIFT + Up Arrow
Landing Gear (Left Main) Raise Left Arrow
Landing Gear (Left Main) Lower SHIFT + Left Arrow
Landing Gear (Right Main) Raise Right Arrow
Landing Gear (Right Main) Lower SHIFT + Right Arrow
Landing Gear (Tail/Nose) Raise Down Arrow
Landing Gear (Tail/Nose) Lower SHIFT + Down Arrow
```

In-Flight Trim Controls
Trim Positive Elevator – Fine CTRL + END
Trim Negative Elevator – Fine CTRL + HOME
Trim Left Aileron – Fine CTRL + DELETE
Trim Right Aileron – Fine CTRL + PAGE DOWN
Trim Left Rudder – Fine CTRL + INSERT

Trim Right Rudder – Fine CTRL + PAGE UP
Trim Positive Elevator – Coarse SHIFT + END
Trim Negative Elevator – Coarse SHIFT + HOME
Trim Left Aileron – Coarse SHIFT + DELETE
Trim Right Aileron – Coarse SHIFT + PAGE DOWN
Trim Left Rudder – Coarse SHIFT + INSERT
Trim Right Rudder – Coarse SHIFT + PAGE UP
Trim – Neutral CTRL + Backspace

Engine Controls
Select Engine 1 Q
Select Engine 2 W
Select Engine 3 E
Select Engine 4 R
Start Engine A (or Engine key + A)
Stop Engine S (or Engine key + S)
Feather Engine D (or Engine key + D)
Engine 1 Throttle (Up/Down) No Default
Engine 2 Throttle (Up/Down) No Default
Engine 3 Throttle (Up/Down) No Default
Engine 4 Throttle (Up/Down) No Default
Port Engines Throttles (Up/Down) No Default
Starboard Engines Throttles (Up/Down) No Default
Throttle Step Up = (or Engine key + =)
Throttle Step Down - (or Engine key + -)
Throttle Step Up – Fine CTRL + =
Throttle Step Down – Fine CTRL + -
Throttle Maximum SHIFT + =
Throttle Minimum SHIFT + -
Lock Out AI Engine Control L (or Engine key + L)

War Emergency Power (WEP) Enable K (or Engine key + K)
Engine Fire Extinguisher J (or Engine key + J)

Game Controls
Computer/Manual Control (Toggle) M
Accelerate Time 2x, 4x, 8x (Cycle Through) Home
Decelerate Time 2x, 4x, 8x (Cycle Through) End
Pause (Toggle) Pause
Time Skip Return
Mini-Time Skip CTRL + Return
Jump to Next Plane (in sequence)]
Jump to Previous Plane (in sequence) [
Jump to Own B-17 Backspace

B-17 Controls
Pilot Helper (Toggle) H
Switch to Action SHIFT + H
Start Mission CTRL + B
Instruments View I
Action View A
Window (Miscellaneous) View W
Compartment View C
Bombardier’s station (if occupied) `
Navigator’s station (if occupied) 1
Cheek Gunner’s station (if occupied) 2
Pilot’s station (if occupied) 3
Co-Pilot’s station (if occupied) 4
Top Turret Gunner’s station. (if occupied) 5
Radio Operator’s station (if occupied) 6
Ball Turret Gunner (if occupied) 7
Left Waist Gunner (if occupied) 8
Right Waist Gunner (if occupied) 9
Tail Gunners Station (if occupied) 0
Any Alternative View Spacebar

Flight Instruments
Pilot Instruments
(Pilot/Co-Pilot Instrument View) F4

Co-Pilot Instruments
(Pilot/Co-Pilot Instrument View) F5
Engine Instruments Zoom
(Pilot/Co-Pilot Instrument View) F6
Directional Instruments Zoom
(Pilot/Co-Pilot Instrument View) F7
Fuel & Electrics Instruments Zoom
(Pilot/Co-Pilot Instrument View) F8
Startup & Cooling Instruments Zoom
(Pilot/Co-Pilot Instrument View) F9

Bombsight Controls
Bombsight Fine Correction Adjuster B
Bombsight Search/Track Mode SHIFT + K
Bombsight Rate Correction Adjuster N

Weapon Controls
Machine Guns ’
Cannons ’
Eject Drop Tanks CTRL + D

Padlock Targeting Controls
Padlock Nearest Enemy Y
Padlock Nearest B-17 CTRL + Y
Padlock Nearest Airfield SHIFT + Y
Padlock Target Nearest Centre of View U
Clear/Restore Padlock View SHIFT + U

Cockpit Views
Instrument Snap CTRL + I
Snap View (Toggle) CTRL + P

Other Views
Internal View F1
External View F2
Chase View Spacebar
(from External view)
Bomb Release and Target View F6

```
Camera Controls
Zoom In (Coarse) Numpad +
Zoom Out (Coarse) Numpad -
Zoom In (Fine) CTRL + Numpad +
Zoom Out (Fine) CTRL + Numpad -
Reset Camera Numpad 5
Camera Up (Coarse) Numpad 7
Camera Down (Coarse) Numpad 1
Camera Left (Coarse) Numpad 4
Camera Right (Coarse) Numpad 6
Camera Forward (Coarse) Numpad 8
Camera Backward (Coarse) Numpad 2
Camera Pan Left (Coarse) Numpad 0
Camera Pan Right (Coarse) Numpad.
Camera Pan Up (Coarse) Numpad 9
Camera Pan Down (Coarse) Numpad 3
Camera Up (Fine) CTRL + Numpad 7
Camera Down (Fine) CTRL + Numpad 1
Camera Left (Fine) CTRL + Numpad 4
Camera Right (Fine) CTRL + Numpad 6
Camera Forward (Fine) CTRL + Numpad 8
Camera Backward (Fine) CTRL + Numpad 2
Camera Pan Up (Fine) CTRL + Numpad 3
Camera Pan Down (Fine) CTRL + Numpad 9
Camera Pan Left (Fine) CTRL + Numpad 0
Camera Pan Right (Fine) CTRL + Numpad.

Miscellaneous Controls
Console Mode ESC
Bail Out CTRL + SHIFT + B
Quit Mission CTRL + SHIFT + Q
Quit to Desktop ALT + F4
```

PILOT'S AND CO-PILOT'S INSTRUMENT PANEL

- Select the Pilot and begin your mission in the Pilot's seat (on the left of the flight deck).

Before you begin flying, study the instrument panel and make sure you are familiar with the location of all dials and switches. If you are new to the simulation keep your Reference Card in front of you. The most important dials are:

ALTIMETER

This shows the height of the aircraft above sea level. The long needle shows hundreds of feet and the shorter needle shows thousands of feet. Always be aware of your flying height by keeping an eye on this dial.

DIRECTIONAL GYRO

This dial shows your heading. A heading of 0° (or 360°) is North, 90° is East, 180° is South and 270° is West.

AIRSPEED INDICATOR

This shows the speed of the aircraft through the air in mph (from 0 to 500mph).

RATE OF CLIMB INDICATOR

This is a visual indication of your climb/dive angle shown as hundreds of feet per minute. When the indicator points to 0 this means you have achieved level flight.

LANDING GEAR INDICATOR

A visual indicator that the Landing Gear has been raised (Up Arrow) or lowered (SHIFT + Up Arrow).

FLAPS INDICATOR

Shows the position of the Flaps (Up = key F, Down = SHIFT + F). When lowered, flaps give the aircraft extra lift at take off and slow it down for landings.

THE YOKE WHEEL / CONTROL COLUMN

The Yoke Wheel/Control column is the Pilot's and Co-Pilot's method of controlling the aircraft direction in flight. In this simulation this is controlled by a joystick or the keyboard.

TURNING LEFT/RIGHT

Ailerons are lateral control flaps at the rear of the airplane's main wing tips. Turning the wheel/control column left/right will raise/lower these flaps making the aircraft bank left/right.

DIVING AND CLIMBING

Elevators are horizontal portions of the tail and these are moved up/down by pushing/pulling the control column. This makes the plane climb or dive.

RUDDER CONTROLS

Pressing the rudder controls left (key B) or right (key N) will swing the nose of the plane left/right (Yaw) by moving the trailing edge of the vertical segment of the tail left/right. The rudder will centre automatically or manually depending on the keyboard/Joystick options in Player set up.

THE FOUR ENGINES

The B-17 is a large four-engine bomber and this simulation gives you full control of all four engines including setting individual throttle levels, fire extinguishers and feathering the props. Engine number 1 is the left outer from the Pilot's position followed by 2, 3 and 4 in sequence.

Engines can also be boosted with War Emergency Power (key K) for a short space of time to get you out of tricky situations.

THE TAKE OFF

You will begin the mission in the Pilot's seat under AI control (the icon in the lower right will show the computer symbol). You are the lead bomber in a squadron formation and will be taking off first. Once you have taken off you will climb and circle waiting for the other aircraft in your squadron to join you. The squadron will then form up before heading out to the target.

Make sure you are in the Pilot's Compartment.

- Select the Pilot (on the left).

- Perform all pre-flight checks. If you are in AI mode you will hear the pre-flight checks taking place. If you are the Pilot you will have to perform the checks yourself from the list shown:
- For take off you will also need to access all the other Instrument views in this mode:

Pilot's Instrument View F4.

Co-Pilot's Instrument View F5.

Instrument Close Up Views [F6, F7, F8, F9].

CHECKLIST BEFORE STARTING THE ENGINES

1. Fuel transfer valves and switch – These switches (the alternate instrument view for the Top Turret gunner) must be off or else they will waste fuel and pump one engine tank dry.
2. Intercoolers – These are visible from the B-17 Instrument Panel (press F9). Check that Intercoolers are in the Cold position.
3. Fuel shut off switches – These are the upper bank of four switches, above the throttle quadrant. Make sure these are open (Up) at all times except in emergencies.
4. Landing Gear Switch – Make sure this is in the neutral position (unless you left or right click on the switch – it will always be neutral).
5. Cowl Flaps (Open) – These are four wingnut type switches above the throttles. They must be must be open before starting the engines in the Locked position (check visually by pressing "A", then looking left and right from the cockpit).
6. Turbos – Turbos are always off (Up) during engine starting.
7. Fuel Mixture – AUTO RICH – Fuel mixture controls (M1-M4) must be in the AUTO-RICH position (as far down as possible).
8. Throttles – Move them up to 1000rpm setting (approx 1/3 the way up from the bottom).
9. Propeller Controls in High RPM – Puts Prop Pitch controls to 'High RPM'.

10. The Master switch (the big red bar next to the Magneto's) must be in the "On" (forward) position.
11. Set the Parking Brakes using the P key (or press F9 and pull out the brake lock stalk).
12. Ensure the four Fuel Booster pumps (the lower bank of Four switches, under the Fuel Shut off switches) are in the "ON" (Up) position.

STARTING YOUR ENGINES

You must start your engines in the correct sequence: Engine 1 (left outer), Engine 2 (left inner), Engine 3 (right inner), and Engine 4 (right outer).

Engine One

1. Turn the Ignition Switch (Magneto) for Engine 1 ON.
2. Press F9 to go to the Co-pilot's Auxiliary Panel.
3. Locate the Starter Panel above the Intercoolers (and the Fire Extinguisher control panel).

The Starter Panel has four switches: two Starter and two Mesh switches. These switches each have three positions, a neutral (central) position, an up and a down position.

- Place the leftmost START switch in its downward position, by left clicking on it.
- Count for 10 seconds.
- Move to the next switch (the leftmost Mesh switch), and left click on it, holding it down for about 6 seconds. Judge by ear when the engine has successfully started.
- Return both the Starter and the Mesh switches to their Neutral positions by left clicking.
- Press F4 to return to the Pilot's Instrument View.

Engine Two

- Turn the Magneto for Engine 2 ON.
- Press F9 to go to the Co-pilot's Auxiliary Panel.

- Place the leftmost START switch in its up position, by RIGHT clicking on it.
- Count for 10 seconds.
- Move to the next switch (the leftmost Mesh switch), and RIGHT click on it, holding it down for about 6 seconds. Judge by ear when the engine has successfully started.
- Return both the Starter and the Mesh switches to their Neutral positions by left clicking.
- Press F4 to return to the Pilots Instrument view.

Engine Three

- Turn the Magneto for Engine 3 ON.
- Press F9 to go to the Co-pilot's Auxiliary Panel.
- Place the centre right START switch of the Panel in its upward position, by right clicking.
- Count 10 seconds.
- Move to the next switch to the right (the rightmost Mesh switch), and right click on it, holding it down for about 6 seconds. Judge by ear when the engine has successfully started.
- Return both the Starter and the Mesh switches to their neutral positions.
- Press F4 to return to the Pilots Instrument view.

Engine Four

- Turn the Magneto for Engine 4 ON.
- Press F9 to go to the Co-pilot's Auxiliary Panel.
- Place the centre right switch of the Starter Panel in its downward position, by left clicking.
- Count 10 seconds.
- Move to the next switch to the right, the rightmost Mesh switch, and left click on it, holding it down for about 6 seconds. Judge by ear when the engine has successfully started.

- Return both the Starter and the Mesh switch to their neutral positions.
- Press F4 to return to the Pilot's Instrument view.

All four engines should now have started!

Note: You MUST right click on the throttle lever for each of the four engines to allow the AI access to the engines again. If you fail to do this, the pilot AI will not be able to fly the plane, and the engines will not respond to your joystick's throttle.

TAXIING

Taxiing must be carried out very slowly (about the speed of a running man). You must be able to stop easily without heavy use of the brakes. You can use Left/Right Brakes for steering (keys B + N).

As in the real thing the cockpit view of the airfield is very limited on the B-17 and as Pilot you cannot crane your head out of one side of the window so you will have to taxi so you can either use an External (F2)/ Chase View (Spacebar) to see the B-17 from outside, or you can use the Pilot Helper (key H) to guide you in Action view.

THE PILOT HELPER

When you are in Pilot's Action view, press H to activate the Pilot Helper. This will set up a cone (red when you are parked and green when you start to move) that you can see through the small windshield, This cone will direct you to the main runway.

You can turn the aircraft using the Rudder control (key B – left, key N – right). If you have a joystick with an R-Axis (such as a Sidewinder™) you can use the twist control to turn the rudder.

Make sure you are still in Pilot's Instrument View (F4).

- Increase the throttle slightly for all four engines (using the Plus + key) or by clicking on and dragging up the throttles for all four engines.
- Release the Parking Brake (SHIFT + P) and the B-17 will begin to move.

When taxiing the tail wheel must be unlocked (SHIFT + T).

- Stay on the correct path and DO NOT stray onto the grass. Check which runway you are heading for by using appropriate outside camera views and zoom up (Numeric keypad - minus key).
- From the outside Chase View (Spacebar) steer the B-17 carefully to the edge of the take off runway and try to line up its nose with the white dotted line and stop (Insert key).

Note: As you become more proficient in taxiing and can gauge the turns to get to the runway you may prefer to steer the B-17 from the Pilot's Action view (to increase the realism).

GETTING INTO THE AIR

- Make sure flaps are down (SHIFT + F).
- Lock the tail wheel (key T).
- Advance the throttles (key +).
- Apply power gradually to the throttles and you will begin to move forward.
- Use the Steering Brakes (keys B + N or Joystick R-axis) and throttles to give you directional control. Do not use the Ailerons but keep them in a 'neutral' position.

The takeoff must be from a 2-point 'tail low' attitude (the tail wheel should be off the ground). Do not try to pull the plane into the air.

- When you reach an airspeed of 110 to 115mph, a gentle pulling back on the control column (joystick or keyboard controller) will enable the B-17 to lift itself off the ground.

If you are in the Co-Pilot's seat you will be watching crucial engine instruments such as Manifold Pressure, RPM, Temperature and Pressure gauges.

- After the aircraft has left the ground and you are sure you have sufficient flying speed to continue your climb, raise the landing gear (Up Arrow) and check that this has happened.
- When an airspeed of 140mph is reached, reduce power (minus key -) so that you stay at that airspeed as you climb and obtain a normal

climb attitude by reducing the throttles to a Manifold Pressure of 35 and an RPM of 2300.

- Cowl flaps should now be closed. Click on Cowl Flaps switches 1, 2, 3, 4.

CLIMBING

- Make sure the Rate of Climb indicator is at 200 to 300 feet per minute and check that the Altimeter is rising gently.

The rate at which an aircraft will climb is obtained directly from the difference between the power required for level flight and the power available from the engines. This is the 'reserve power' available for climbing.

- Make you climb at between 130 and 150mph, but remember that decreasing atmospheric pressure as you climb causes the Airspeed Indicator to show an airspeed lowerthan your true airspeed.

As you climb you will notice the engines will get hotter (increasing cylinder head and oil temperatures).

- Open the Cowl Flaps to keep the engine cylinder head temperatures at about 205 degrees.

Note: Cowl Flaps will affect your climb rate by adding 'drag' and upsetting the airflow – so use the minimum settings you can get away with.

- Oil temperature can be reduced quickly by decreasing the engine RPM and Manifold Pressure.
- The Airspeed Indicator will show an airspeed lower than the true airspeed (e.g. at 20,000 feet, 150mph is indicated, while the actual airspeed is 207mph).
- Manifold pressure will now decrease and full throttles cannot keep the required level so you must use the turbo-superchargers to boost this level.

Note: As you climb your fuel pump may be subject to 'vapour lock' so you must use the booster pumps above 10,000 feet. These remain on until you drop below this altitude.

Sequence of power panel changes if you want to increase power:

1. Set Mixture Controls to ‘Auto Rich’ (down).
2. Set Propellers to desired RPM (up).
3. Increase Throttles (up).
4. Advance Superchargers one at a time (up).

If you want to decrease power, you must reverse this sequence:

1. Return Superchargers one at a time (down).
2. Decrease Throttles (down).
3. Set Propellers to desired RPM (down).
4. Set Mixture Controls to ‘Auto Lean’ (up).

LEVELLING THE B-17

Once you have climbed to the correct height, you must level off to achieve your cruising altitude. Levelling off properly builds up full momentum for cruising. If you change immediately from climb to level flight and reduce power the aircraft will have a high angle of attack (AoA) and hence high ‘drag’ and will be flying inefficiently.

- After achieving the correct cruising altitude, continue to climb for another 300 feet.
- Level the B-17 and drop the nose a little to pick up speed.
- Reduce power to desired levels (2400 rpm and 42" max) and slowly descend to the correct altitude.
- Your Co-Pilot will carry out propeller synchronisation and now you will be able to trim the aircraft.

TRIMMING AND CRUISING

Correct trim will give you a better airspeed, more efficient fuel use, and will increase the efficiency of the aircraft, making it easier to keep in formation. It can be hard work trying to control a ‘poorly trimmed’ heavy bomber.

- Make sure you have equal Manifold Pressure on all 4 engines to balance the power.

- Check the Altimeter, the Flight Indicator and Rate of Climb Indicator are correctly showing level flight.
- Watch the Directional Gyro to see if the aircraft is turning.
- Correct any turn with the rudder until it shows a steady course.

TRIM CONTROLS

The aim of trim controls is to achieve level flight without having to fight the controls. You should be able to take your hands off the controls for a moment and the aircraft should continue on a level flight.

Explanation of Terms: Elevator Positive – you want the nose of the aircraft to stay up. Elevator Negative – you want the nose of the aircraft to drop down.

Left Aileron – you want the left wing to level out. Right Aileron – you want the right wing to level out.

Left Rudder – you want the aircraft to stop left 'yaw'. Right Rudder – you want the aircraft to stop right 'yaw'.

- Carry out 'Coarse' trim first and then 'Fine' trim.

```
In-Flight Trim Controls
Trim Positive Elevator – Coarse SHIFT + END
Trim Negative Elevator – Coarse SHIFT + HOME
Trim Left Aileron – Coarse SHIFT + DELETE
Trim Right Aileron – Coarse SHIFT + PAGE DOWN
Trim Left Rudder – Coarse SHIFT + INSERT
Trim Right Rudder – Coarse SHIFT + PAGE UP
Trim Positive Elevator – Fine CTRL + END
Trim Negative Elevator – Fine CTRL + HOME
Trim Left Aileron – Fine CTRL + DELETE
Trim Right Aileron – Fine CTRL + PAGE DOWN
Trim Left Rudder – Fine CTRL + INSERT
Trim Right Rudder – Fine CTRL + PAGE UP
```

- When you have finished trimming, try going to an outside view (F2) and taking your hands (and feet, if appropriate) off all controls for a

moment, the aircraft should not need any heavy handed control and be ‘flying itself’.

- Once you are in cruise mode you can set the Mixture Controls to Auto–Lean (move all four levers up).

TURNS

The B-17 has good directional stability, so just by dropping one wing (joystick/yoke left or right) you will get an effective turn.

TURNS AND LOAD FACTORS

When making shallow turns, ‘load factors’ will be small but will increase as the turn gets steeper. Banking at 10 degrees produces a ‘load factor’ of 1.5, but banking at 70 degrees will make this 3.0 and, in a heavily laden aircraft, this could cause structural failure.

STALLS AND SPINS

The B-17 has good stall characteristics with the large vertical tail reducing the tendency to roll. To recover from a stall, dive smoothly at about 30 degrees and regain airspeed for normal flight. It’s extremely difficult to make the B-17 go into a spin because of its superior directional stability.

FORMING UP

When you have got sufficient height you should begin to form up with the other aircraft in the squadron. This is never an easy task but for the purposes of this simulation we have provided a Pilot Helper function for forming up (key H).

- After you have heard the command ‘Join Formation’ press the Pilot Helper key H and a large white box will appear in the sky at the place where you should be in formation (you may have to look around you with outside views to find it).

You may have to climb or drop in height to achieve the correct position.

- Manoeuvre the aircraft as gently as possible close to the white box.

The other B-17s of the squadron will form up on you.

THE WAYPOINTS

Check the Map in the Navigator's station to remind you of the route selected to the target, the individual waypoints and the return leg. The Navigator will tell you when you have reached specific waypoints and a turn is coming up. He will also give you compass headings and may also warn you that he's hopelessly lost! The Radio Operator will log the key messages. If you miss any radio messages, go to the Radio Operator's compartment and consult his Messages log.

Each mission will have a different number of waypoints depending on operational factors and the target (i.e. if you want to avoid heavy flak or enemy fighter concentrations).

THE INITIAL POINT

This is the last waypoint before the bomb run. When you reach the Initial Point you must line up the aircraft on the bomb run and fly without deviation or change of height (no matter what's been thrown at you!) to give the Bombardier a good chance of finding or lining up the target.

FLYING OVER THE TARGET

The Bombardier will be in control of the aircraft during the bomb run. He will open the bomb bay doors, then look for the target and effectively be 'flying' the aircraft. When he locks the bombsight on the target the aircraft will be flying on autopilot towards the correctly computed release point. After the 'Bombs Away' signal the aircraft will return to your control.

Now you can take any evasive action you see fit.Note:Failing to drop the bombs on the Primary may need you to 'go around again' to repeat the bomb run or going to a Secondary, Tertiary or Opportunity target.

THE RALLY POINT

The Rally Point is the waypoint after the target. When the squadron have all released their bombs they will head for the designated Rally Point where they will reform for the journey back to base.

THE RETURN HOME

Take note of any damage to the aircraft and perform all necessary crew management tasks (First Aid, Repairs etc.). The flight home will require you to fly to a series of defined waypoints. Your Navigator will be keeping track of your geographical/map position.

FEATHERING THE ENGINE(S)

The propellers on the B-17 can be feathered in case of emergency when it's necessary to continue with 2 or 3 engines. Feathering will turn the blades at 90° and stop the propeller from turning, reducing drag and eliminating vibration that might weaken the aircraft structure.

The easiest way to feather an engine is to select the engine (Q – 1, W – 2, E – 3 or R – 4) press key D. Press D again to unfeather.

However, if you want to use the cockpit controls:

ENGINE FEATHERING (EXAMPLE ENGINE 1)

- Go to the Pilot's Instruments view in the cockpit.
- Click on the large, round red button marked "1".
- Find the fuel system switches above the pedestal and turn off the leftmost column.
- Click and move the Turbo-Supercharger and Throttle to zero for Engine 1.

The engine is Feathered.

ENGINE UN-FEATHERING (EXAMPLE ENGINE 1)

- Locate the fuel system switches above the pedestal and turn on the leftmost column.
- Click on the large, round red button marked "1".

You might need to set the Throttle and Turbo speeds to match the other three engines manually.

At this point the engine should start, but if you're not developing power from that engine, or if the power is erratic, you should run through the startup sequence on the starter panel (see earlier).

ENGINE FIRE EXTINGUISHERS

Each of the four engines on the B-17 has a built in fire extinguishing system. If you notice an engine on fire:

- Select the Engine (Q, W, E, or R).
- Press key J.

Alternatively, if you want to use the cockpit controls:

1. Head to the Co-Pilot's Instrument View (key 4 and then key I).
2. Select the Co-Pilot's Engine Startup and Cooling panel by pressing F9.
3. The Fire Extinguisher panel is located above the Intercoolers, turn the dial to point to the engine that needs extinguishing (inboard engines at the top, outboard at the bottom).
4. Pull one of the red handles to fire one of the two extinguisher charges fitted.

WAR EMERGENCY POWER

You have at your disposal a limited amount of WEP. Press key K and this will give the engines a short power boost to get out dangerous situations. Note: The B-17 does not include WEP – most fighters, however, have some form of it.

LOCK OUT AI ENGINE CONTROL

There may be occasions when you need to adjust Engine settings without the AI cutting in. Select the engine first (Q, W, E, or R) and press key L.

LANDING THE B-17

PRE-LANDING CHECKS

Note: All pre-landing checks are performed automatically.

- The Radio Operator will call the airbase control tower to get the altimeter setting for the landing field.
- The Pilot checks all the crew and makes sure they are in their correct positions for landing.

PILOT CHECKS

- Put the Landing Gear in the down position (SHIFT + Up Arrow) and make sure that this has happened with a visual check either from the Ball Turret gunner or an external view (F2). Remember, that your gear may have been damaged on the mission. If all is well the landing gear warning light on the Instrument Panel should be On.
- If gear is not responding and you need to use manual gear controls, you can issue an order using the Icon Rose (ask the Engineer to help).

Note: If the gear is totally unusable you will have to attempt a belly landing (You can try this out in Quickstart Mission 1).

THE TRAFFIC PATTERN

On most B-17 airfields the traffic pattern (the flight path to line up for final approach) is rectangular in shape.

- Fly a large rectangular path over the airfield at an altitude of about 800 to 1000 feet.
- Fly the pattern at 130 to 150mph IAS.
- Increase RPM to 2100.
- Decrease Manifold Pressure to 23".
- Lower your flaps (SHIFT + F) when you turn on the base leg (the last turn before final approach).

- Keep airspeed between 110 to 120mph.

You may have to go around again if there are aircraft that are in trouble ahead of you. If this is necessary, the tower will inform you.

PILOT HELPER

The Pilot Helper is also available to help you on the correct approach to the airfield. Press key H and you will see a marker to help you line up your final approach. The marker will respond to all turns and waypoints called out by the Navigator. Keep this marker lined up in pilot's Action view (through the windshield) or in external view (F2) or Chase view (Spacebar).

THE FINAL APPROACH

Important points to bear in mind when making your final approach.

- Maintain a constant altitude on the base leg turn.
- Maintain constant airspeed and angle of glide.
- Put the flaps fully down (SHIFT + F).
- Reduce power to all engines gradually (Minus - key).
- Glide in to the runway at a speed of 120mph.
- Make a 3-point landing.

If the B-17 is not on the ground within the first third of the runway you might decide to go around again.

THE LANDING ROLL

- When you have landed, make sure you use the entire runway for the landing roll.
- Do not apply brakes too early but try to time them when you feel the aircraft is slowing down from its roll then apply the brakes (Insert key).

TAXI TO HARDSTAND

(Using Pilot Helper H) – If you still have the Pilot Helper key on you will see a large green inverted cone close to the static aircraft. This is your guide to take you to your B-17 hardstanding. You can use it from the Pilot's Action View or from an outside view.

- Taxi in the same way as for take off using throttle/steering brake and try to keep the cone in the centre of your windshield view and edge slowly towards it.

The cone will move to another position, repeat this process until the cone guides you to your bomber position. It will then turn red.

- Slow down and stop (throttle down).
- Apply the Parking Brake (key P).

Once you have parked the aircraft in its correct position the mission is effectively over. You will then be taken to the Mission Debriefing.

BOMBARDIER SCHOOL

If you want to be the Bombardier give yourself plenty of time to get into position from whatever view or location you are in and re-familiarise yourself with the bombing controls.

Remember the mission has only one aim: to drop the bombs on the correct target accurately and promptly. You must be sure of your target identification and you must set the sight correctly to hit that target.

Whilst the Norden bombsight is an incredibly flexible and accurate instrument, it can be brutally punishing to inexperienced users – make sure you have flown both Training Missions, and are well acquainted with the skills of displacing and synchronising.

THE TARGETS

The Primary target is your main objective. If the Primary is impossible or unavailable due to weather or other unhelpful conditions, you must switch to Secondary – this is usually a lower order target that is within close range of the Primary. If you have to switch to

secondary you must issue the ‘Select Secondary Target’ message in the radio compartment. The Pilot will fly a new heading set by the Navigator.

You may also have another option of a Tertiary target.

If all three mission targets are unavailable to you (for whatever reason) then you may set an Opportunity target from the Navigator’s Map station. Click on a green bomb icon and drag it to a likely target on the map. The waypoints will appear automatically.

Remember that random, ill-directed bombing will be penalised. However, if bombs are jettisoned to preserve the safety of the crew and the bomber, there will be no penalty imposed by Bomber Group. A mission is deemed to be successful by the amount of damage done to the target. If you fail to drop the bombs on the correct target the mission will be classed as a failure.

BOMBARDIER SKILLS

The Bombardier must know his bombsight, what it does and how it works.

The Bombardier must understand the automatic pilot and how it works in the bomb run.

The Bombardier must know how to operate all gun positions on the aircraft.

The Bombardier must understand the destructive power of the bombs his aircraft is carrying and the vulnerability of the targets he is seeking.

The Bombardier must be fully conversant with target and aircraft identification.

The Bombardier is in effective command of the aircraft on the bomb run. He should be mindful of this responsibility.

BOMBING FACTORS

The following bombing factors will come into play when dropping bombs from a heavy bomber:

ALTITUDE

Altitude determines the length of time the bomb is in flight and therefore the time the bombs can be affected by the atmospheric conditions. This in turn affects the range (the

forward travel of the bomb from launch) and deflection (the distance the bomb drifts in a crosswind).

TRUE AIRSPEED

True Airspeed is a measure of the speed of the airplane through the air. It's this speed that gives the bomb its initial forward velocity and thus affects the trail (see below) of the bomb (the distance the bomb lags behind the airplane at the moment of impact).

BOMB BALLISTICS

This is the size, shape and density of the bomb - factors that give it an air resistance value.

TRAIL

This is the horizontal distance the bomb is behind the airplane at the moment of impact and is therefore affected by altitude, airspeed, bomb ballistics and air density. A value is obtained from bombing tables and is pre-set into the bombsight.

ACTUAL TIME OF FALL

This is the length of time the bomb stays in the air from the point of release to impact.

GROUNDSPEED

This is the speed of the aircraft in relation to the earth's surface and has an effect on the range of the bomb. Groundspeed is entered into the bombsight through synchronisation on the target while the pilot maintains constant airspeed and the correct altitude.

DRIFT

This is the speed and direction of the wind that determines the distance the bomb will travel downwind from the airplane from release point to impact. This value is set on the bombsight by the Bombardier and is given to him by the Navigator.

THE BOMB RUN

- As the bomber approaches the Initial Point (IP) select the Bombardier position (key ` or click the bombsight icon in the Crew Position pop-up menu).

- The Bombardier will announce ‘We’re on the Bomb Run!’.
- Press key I to view the Bombardier’s Instrument Panel (the Norden Bombsight).
- Check that the Mission Altitude is correct on the Bombsight.
- Set Mission Altitude on the large dial on the right of the bombsight (a tooltip will give you details of the setting).
- Set the Course Drift by clicking on and moving the indicator at the bottom of the sight. The Course (or Wind) Drift is calculated at the Navigator’s station (see later).
- Access the Bomb Sight action panel by pressing the spacebar.
- Press key M to assume manual control of the Bomb Sight Panel (BSP).
- Click on the switch at the top of the panel to activate the BSP.

Below the topmost switch is a bank of three switches.

1. The first on the left opens the bomb bay doors.
2. The second arms the bomb delivery system.
3. The third enables the autopilot giving the bombardier control of the aircraft.

- Click all of these switches to ‘On’.

By clicking on the autopilot switch you will be sending a message to the pilot that you have control of the aircraft.

Below the mid bank switches are another set of four switches that select the bomb racks in the bomb bay. If you have ordnance on all four racks, arm all four by flicking the switches. Red lights will confirm all ‘On’ switches.

On the left of the BSP are two controls that affect the bomb release mechanism.

SALVO SWITCH

The first is the ‘Salvo Switch’. This control switches between Salvo Mode (all the bombs drop at once) or Train Mode (bombs drop one at a time with an interval set by an Intervalometer).

INTERVALOMETER

The second control is the Intervalometer.

- Click to set the interval between bombs dropped in train (by milliseconds) up to 1 second maximum.

You have now set the bombsight and are ready to release your bombs.

- Switch to the Bombardier ‘Action View’ by pressing key A.
- Make sure you have manual control set (key M).
- Enter “Search Mode” by using SHIFT + K (A light will come on).
- Use your joystick to locate the target, place the crosshair over the target and then hit SHIFT + K to ‘lock’ the target.
- The Sight starts in DRIFT Correction mode. Moving the joystick left adjusts the angle of Drift to the left – the target will begin to drift more to the right of the sight picture. Moving the joystick right will alter the angle of Drift to the right – the target will begin to drift more to the left of the sight picture.
- Press key N to enter RATE Correction mode. Moving the joystick up makes the rate track more slowly, so the target will move towards the bottom of the sight picture. Moving the joystick down will make the rate track more quickly, hence the target will appear to move back up towards the top of the sight picture. The objective is to freeze any vertical movement of the target.
- You should adjust DRIFT and RATE until the sight picture shows no movement at all. This is called SYNCHRONISATION, and means the bombsight is correctly allowing for speed, altitude and wind drift.

- During your alterations, the target may have slipped out from the crosshairs. If you have time, you can enter SEARCH mode, using the SHIFT + K key combination, and place the target directly under the crosshair again. Provided that you have correctly SYNCHRONISED the sight, as described above, the crosshair will remain where you left it.
- Watch the two markers close towards each other. When they meet, the bombs will be dropped automatically by the bombsight, thus ensuring a drop accurate to the millisecond.
- Watch bombs release from bay and then press F6 to view down from inside the bomb bay and F6 again to view target from ground level (use mouse left button to zoom in and right hand button to move around target).

BOMBING RESULTS

Full details of your bomb drop pattern and reconnaissance film of the damage to the target will be shown when you are in the Mission Debriefing.

THE CHIN TURRET

It's highly likely that enemy fighters will attack you on your journey back to your home base. Before and after the Bombardier has completed his bombing tasks he should man the powered Chin Turret (unless otherwise assigned by the Commander), to fend off any attacks from the front of the B-17.

NAVIGATOR SCHOOL

It's the job of the Navigator to direct your flight from the moment of take off to landing back at base (or any other airfield). Navigation is the skill of knowing where your bomber is geographically by means of either pilotage or 'dead reckoning'. The skilled Navigator will use a combination of these methods.

PILOTAGE

This is the method of working out the aircraft's position by visual reference to the ground. This requires accuracy to within 400 metres. The Navigator performs this by referring constantly to groundspeeds and ETAs for points ahead, on the ground, and on maps and charts. As long as a Navigator can keep visual contact with the ground he can work out pinpoint positions and plot the exact track of the airplane.

DEAD RECKONING

This is the basis of all other types of navigation and, essentially, is the way the Navigator works out the position of the aircraft at any given time by keeping track of the distance flown from the take off point or the last known position. DR can be sub-divided into:

DR using a series of known positions– the Navigator uses pilotage (see above) until the airplane goes into cloud and loses contact with the ground. Then he uses Dead Reckoning from the last pilotage point to determine the position of the airplane; using wind speed prevalent at that altitude and the track and groundspeed being made. By working out track and distance from the last known point he can always tell his position and if the airplane comes out of cloud he'll be able to search for and pick up pilotage points quickly.

THE NAVIGATOR'S MAP

- Select the Navigator position.
- Press key I to access Navigation instruments.
- Click on the map on the desk, or press the Spacebar, to open the Map screen.

The map is similar to the Operations Room and Briefing Room maps and is controlled in a similar fashion.

MAP CONTROLS

You can scroll around the map by using either the mouse and/or the keyboard.

Mouse Control:

- Move around the map by holding down the right mouse button and moving the mouse.

- Tilt and rotate the map by holding down the Shift key plus the right mouse button and moving the mouse.

Numeric Keypad Controls:

Use numeric keypad ‘Ins’ and ‘Del’ to rotate the map horizontally left and right.

Use numeric keypad 9 and 3 to rotate the map vertically (from 0° to 90° degrees).

Use numeric keypad 4 and 6 to move the map left and right.

Use numeric keypad 8 and 2 to move the map forward and backwards.

Use numeric keypad + and – to Zoom In/Out.

Fine-tune all the above map control movement by holding down CTRL as you press the keys.

THE MAP ICONS

All 3D buildings shown on the map represent the targets currently available.

Blue broken line – projected route. Green Line – actual route. Aircraft – your B-17 estimated position. Aircraft Shadow – B-17 ground position. Green Bomb Icon – this can be used to designate any Opportunity Target for the mission. Click and drag to a bona fide target on the map and waypoints will be set up. Gold Pyramid – click and drag to adjust vertical heights of any Waypoint. Red Arrow – click and drag to adjust a Waypoint horizontal position.

THE MAP SYMBOLS

The map shows standard features such as:

Urban Areas Lakes Rivers Forests Minor and Major Roads Railways

It is also marked with Allied fighter (white US star) and bomber (grey-out US star) Airbases, and Luftwaffe airbases (Blue filled circle).

The following is important mission information:

Light Red Circles (or arcs) – areas of light flak concentrations. Red Circles (or arcs) – areas of medium flak concentrations. Dark Red Circles (or arcs) – areas of heavy flak

concentrations. Factory Icon – Target location. Blue Circles (or arcs) – areas that have strong enemy fighter concentrations.

The map also shows the shifting front line (thick red line) throughout the years of the campaign.

RE-SETTING WAYPOINTS

Apart from the starting off airbase and the assigned targets you can adjust all other aspects of the waypoints, initial point and rally point, including ground location and waypoint/bombing height. Tooltips on the waypoint Brown Pyramid markers will indicate the altitude for that particular waypoint. Note: You must be in Manual mode to achieve these changes!

- To move a waypoint, simply click on it, hold down the left mouse button and drag it to its new position.
- To de-select a target, click on the bomb icon and drag it up away from the ground until it disappears.

NAVIGATION REALISM

Navigation has three modes of realism in the simulation: Historical, Easy and Flawless. Flawless will follow the route to and from the target without deviation but the other two modes will enable ‘getting lost’. The Navigator must always be tracking the aircraft position. He can adjust waypoints to distinctive geographical features (river mouths, islands, peninsulas etc) that leave no doubt about position.

- From take off you must flip from Map View to external camera views. Look all around for features – rivers, main roads, and cities.
- Take control from the AI (key M), click on the green aircraft on the map and drag it to its ‘correct’ position. Press key M to return to AI control.

If you don’t constantly update your position on the map with visual reference you may get a message from your Navigator that he is completely lost – this will be more difficult to sort out.

THE DRIFT METER

- Press key A to access the Navigator's Action view. Here you will see the Drift Meter screen.

It's important that you can calculate the Wind Drift for the Bombardier, without this crucial information the bombs cannot be dropped precisely on the target.

- In the Action View you will be looking through the Drift Meter. Align the dial on the right (using the mouse click and drag) so that a fixed ground point travels along one of them.
- When this is fairly stable, read off the wind drift from the scale on the top.
- Use the drift scale reading as the initial wind drift value to be input into the Norden bombsight.

ENGINEER SCHOOL

The Engineer should know more about the B-17 than any other member of the crew. He has been specially trained in Air Force technical schools and will know his aircraft, his engines and his armament equipment thoroughly. He works closely with the Co-Pilot to check engine operation, fuel consumption and equipment operation. He must also work with the Bombardier and understand how to cock, lock and load the bomb racks. He must be familiar with the guns and related equipment and be able to strip, clean and reassemble them. He must know how to tune radio transmitters and receivers. The Engineer can operate the fuel transfer equipment and can crank down the landing gear if normal operation methods are unavailable.

FUEL TRANSFER

The two valves direct fuel from any fuel tank on one side of the aircraft to any fuel tank on the other side'

- Select the Engineer station.
- Select Instrument View (key I).

- Press the alternate Instrument View (spacebar). This shows the fuel transfer system left side (Engine Tank 1, 2 and Off) and the right side (Engine Tank 3, 4 and Off).

Above the right hand switch is the transfer control switch. Simply set the main red switches to the relevant tanks and set the control switch by right or left clicking on it. The central position is 'Off'.

However you will not be able to see the fuel transfer in this position. This is shown in the Co-Pilot's Instrument View (F8).

Click on the switch and it will rotate through the four positions. The dial above it will show the amount of fuel in each engine tank.

The Engineer also doubles as the Top Turret Gunner (see below).

RADIO OPERATOR SCHOOL

A B-17 bomber holds a lot of radio equipment and the Radio Operator is the man who should know all about it. He is expected to send positional reports, help the Navigator to take radio fixes, maintain the radio sets, and maintain a log of inward and outward messages. The Radio Operator must also be a competent Gunner and the photographer in reconnaissance missions.

THE RADIO

Communicates with crew, ground control and other aircraft.

MESSAGES INWARD LOG

The Messages Inward Log shows all messages received (from whatever source) written down.

- Make sure you are in Manual Mode (key M).
- Click on the Messages Inward Log cover to open the book.
- Review the messages received (with the timing shown).
- Click on the page to turn it over.

MESSAGES OUTWARD LOG

The Messages Outward Log shows a list of messages that can be issued by various members of the crew and can be for internal use for the individual bomber crew or for squadron use. For example, the Bombardier may not have released his bombs over the target in which case he can request the Pilot to 'Go Around Again'. Or, if the Primary Target is unavailable, he can ask for the route to be changed to the Secondary Target.

To send a message:

- Make sure you are in Manual Mode (key M).
- Click on the Message Log cover to open the book.
- Select the message you want by clicking on it.

If the message is a 'one off' – such as 'Return to Base' it will from that point be unavailable.

GUNNERY SCHOOL

Essentially, the B-17 is a moving gun platform that can be very effective in defending the airplane from enemy fighter attacks, but the effectiveness will always depend upon the skill and application of the Gunners.



GUNNER SKILLS

Gunners can be categorised into two types: the flexible gun operators and the turret operators. Power turret gunners need some of the qualities required from good pilots because operating a power turret is much like that of controlling an airplane in flight.

Flexible gunners do not need to have the same ‘touch’ as turret gunners but must have a good sense of timing and an understanding of the basics of exterior ballistics.

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Ball Turret
Cheek Gun
Top Turret
Tail Gun
Right Waist Gun
Chin Turret
Left Waist Gun
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MACHINE GUNS



Originally, most bombers’ defensive armaments were single hand operated machine guns pivoting on a mounting attached to the structure of the craft. The main disadvantage being that it was difficult to turn the gun into a 200mph slipstream and so the field of fire was severely limited. The next development was to give the gunner a rotating mounting so that he could pivot towards the enemy. The slipstream problem was overcome by installing powered gun turrets that traversed the turret and gun-mounting ring, leaving the gunner free to control movement in azimuth and elevation by hand. B-17 machine guns are electrically fired and electrically fed with ammo.

GUNSIGHTS

At the beginning of the war, gunsights were the simple ‘ring and bead’ type in which a gunner had to maintain a constant eye base. Accuracy depended on the gunner’s skill in calculating deflection (the predicted path the target is travelling along) but it was still extremely difficult to hit a moving object. These sights were eventually succeeded by the reflector type; an optical sight that left the gunner free to move his head without creating an error in deflection – the gunner only has the target to watch with the reticule in the optical viewer superimposed on it.

All gunners should understand the ‘zones of fire’ for all gun positions on the B-17 and be expert aircraft identifiers. They should understand the Browning aircraft machine gun, including how to clear jams and using the sights to best effect. For training purposes, gunners should always be operating their turrets and tracking with the flexible guns by sighting on various objects, other aircraft, vehicles etc. Gunners should be competitive and keen to be the best gunner on board, they should all be able to fire each other’s guns efficiently in case of emergency.

THE CLOCK SYSTEM OF DEFENCE

All gunners should be on the look out for enemy fighters. If any member of the crew spots an enemy, he should call out on the intercom giving a clock reading and a level. In the 'clock system', the nose of the plane is pointing to 12 o'clock, the tail is pointing to 6 o'clock, the right-hand (starboard) wing to 3 o'clock and the left-hand (port) wing to 9 o'clock. 'High' means in the 90-degree arc above the aircraft, 'low' means in the 90-degree arc below the aircraft, no mention of level implies on the same plane as the aircraft.

THE ZONE FIRING SYSTEM

Hand held weapons in the B-17 are not always as effective as is hoped. For an average gunner it's a matter of luck if an enemy aircraft was hit, the fact that both the gun platform and the target were moving in different directions and speeds made accurate aiming extremely difficult. The US 8th Air Force implements the Zone System of firing in air combat: pointing the machine guns in the direction of the target and filling the sky with bullets so that a passing enemy fighter would have to fly through several streams of bullets and, with luck, incur damage.

SIGHTING AND FIRING

- Select any Gunner and press key A to access the guns. Make sure that you are in manual control (key M).

For best control of the machine guns make sure you have a joystick fitted, this will give you the freedom of movement you require.

- Sight on the enemy aircraft.
- Press the trigger to fire.

Every 5th round in your ammo is a tracer round. This will flare and show up the path of your bullets giving you a visual guide to the path your bullets are describing. If you are getting low on ammo you will see red tracer appearing.

RED TEXT WARNING

All messages you hear will be shown on the screen in black text but in combat when a member of the crew spots enemy fighters, this text will be in red. By clicking directly on the

text you will be able to jump immediately to the source of the message and be able to take over manual control of the action area.

UNJAMMING MACHINE GUNS

Guns will overheat and/or jam. If this happens, return to Compartment view (C), select the gunner by clicking on him (he will be highlighted) and right-click to access the crew management Icon Rose. Right click on the centre icon until you see the Unjam icon.

- Left click on the icon to unjam the gun(s). You can watch the gunner try to unjam the gun(s).
- The simplest way of dealing with jams is to keep your bursts short and on target. This will also maximise your efficiency as regards ammunition.

AMMO

If you are playing a historical scenario, you will have a limited number of rounds available to you in any mission so do not fire needlessly. Apart from the initial test firing (usually over the Channel) save your ammo for the fighter attacks. Select Instrument View (key I) or the Dial icon in the Crew Views pop-up panel to access the gunner's ammunition box. Hover the pointer over the box to see how many rounds are left.

Note: Space is limited on a B-17 and once you have used up all your ammunition there is no more available to you.

8: FIGHTER SCHOOL

ESCORT OR INTERCEPT

The following section looks at the fighter aircraft in B-17 Flying Fortress ‘The Mighty Eighth’, how to fly them and the instruments on the cockpit. The location of these instruments can be found on the separate Reference Card. Note: The instruments do not vary hugely for each airplane but the performance is based on the real physics model for each one.

FIGHTER COCKPIT INSTRUMENTS

American aircraft dials are calibrated to imperial units (feet/inches etc.) while German aircraft are marked in metric (metres). Each fighter has all the necessary instruments although they might not be located in the same place position. Each fighter cockpit is reproduced with all of the most important instruments but only the basic set of gauges and dials are shown here. Note:Most of these instruments are located below the cockpit ‘head up view’ so you will have to tilt down your view to look at them using the joystick ‘hat’ button (on Sidewinder-types) or the Instrument Snap view (CTRL + I) if playing on keyboard control.

SINGLE-ENGINE AIRCRAFT CONTROLS

P-51 STARTUP SEQUENCE

1. Battery Switch to ON
2. Magnetos to BOTH (3 Clicks)
3. Throttle to ZERO (Use Controller or Keys)
4. Fuel Mixture to Full
5. Left click Starter

Engine starts automatically.

P-47 STARTUP SEQUENCE

1. Master Battery Switch to ON
2. Magnetos to BOTH (3 Clicks)
3. Throttle to ZERO (Use Controller or Keys)
4. Fuel Mixture to one third
5. Left click and hold Starter
6. Wait 6 seconds whilst still holding Starter
7. Click and hold engage switch ‘till engine starts. *Engine should start.*
8. Fuel Mixture to Full

BF-109 STARTUP SEQUENCE

1. Mainline Switch to ON
2. Magnetos to M1+2
3. Throttle to ZERO (Use Controller or Keys)
4. Fuel Cock to Full
5. Lift the Starter Cover
6. Left Click and Hold Starter
7. Whilst holding Starter wait 6 seconds
8. Whilst STILL holding Starter right click and hold to start engine.
   Engine should start.

FW-190 STARTUP SEQUENCE

1. Mainline switch to ON
2. Magnetos to M1+2
3. Throttle to ZERO (Use Controller or Keys)
4. Lift Starter cover
5. Left click starter switch and wait ‘till engine starts. Engine starts automatically.

TWIN-ENGINE/JET AIRCRAFT CONTROLS

P-38 STARTUP SEQUENCE

1. Mainline Switch to ON
2. Both Magnetos to BOTH (3 Clicks)
3. Throttles to ZERO (Use Controller or Keys)
4. Fuel Mixture levers to one third
5. Left click Engine Starter
6. Wait 6 seconds
7. Left click and hold Engine Engage switch until left engine starts.
   Left engine should start.
8. Right click Engine Starter
9. Wait 6 seconds
10. Right click and hold Engine Engage switch until right engine starts.
    Right engine should start.
11. Fuel Mixture levers to Full

ME-262 STARTUP SEQUENCE

1. Mainline Switch to ON
2. Depress Left and Right RPM Scale indicator buttons
3. Throttles to ZERO (Use Controller or Keys)
4. Lift Left Starter cover
5. Click Left Engine Starter Switch
6. Watch RPM. When Revs hit 800 hit Left Engine Starter button.
7. Throttles to 10%
8. Left Fuel Cock to Full. *Left engine should start.*
9. Throttles to ZERO
10. Lift Right Starter Cover
11. Click Right Engine Starter Switch

12. Watch RPM. When Revs hit 800 hit Right Engine Starter button.
13. Throttles to 10%
14. Right Fuel Cock to Full. *Right engine should start.*
15. Throttles to Zero
16. Click on Left and Right RPM Scale Indicator buttons

COMPASS

A simple, magnetic direction indicator, the needle shows the direction the nose of your aircraft is flying in. Headings are numbered 0 to 360 with the indicator moving clockwise. Due North is either 0 or 360, East is 90, South is 180 and West is 270.

ARTIFICIAL HORIZON

The artificial horizon, or attitude indicator, is a floating ball that shows your airplane's relation to the surface of the Earth. This is important in poor visibility when you can't see the actual horizon. In level flight the indicator will be centred and flat. If you are banking or rolling it will be at an angle. In a climb, the light part will cover more of the gauge; in a dive, the dark part will show more. Bear in mind that this dial represents the natural horizon but will NOT take into account irregularities on the surface such as mountains.

AIRSPEED INDICATOR

This registers the speed of the airplane in relation to the air around it shown in miles or kilometres per hour. Airspeed must stay above a specific minimum for each aircraft to keep it in the air. Generally, a lower airspeed gives you better control of horizontal movement but less power for climbing.

TACHOMETER

The tachometer measures the rpm of the aircraft engine. This engine power indicator is relative to the amount of throttle and in level flight can give you a rough guide on how much throttle you have on but this is not exact. Engine rpm is useful when you want to perform a manoeuvre that requires a certain amount of engine power such as climbing or pulling out of a steep dive.

ALTIMETER

This shows you how far above sea level you are. The short needle registers thousands of feet, the long needle hundreds of feet. So if the short needle in on 3 and the long needle on 5 you will be 3,500 feet above sea level. This is not an absolute altitude so it's only correct if flying over the ocean, over land the height of land is not adjusted so if you are flying over a 1000 foot mountain at an altitude of 1500 feet you will actually only be 500 feet from the ground. German aircraft dials are calibrated in metres.

OIL PRESSURE GAUGE

This shows the pumping pressure of the oil that lubricates the aircraft engine. A loss of oil pressure will mean that you have developed a fault or your engine(s) or have been damaged by enemy fire. When all the oil has leaked out the engine will seize up completely and stop working.

ENGINE TEMPERATURE GAUGE

The engine temperature gauge shows the operating temperature of the aircraft engine. When the engine is warm the indicator should hover around the centre of the dial. Performing combat manoeuvres, running the engines without oil, or staying aloft with a damaged engine can cause temperature to rise. If an engine temperature reaches dangerous levels it will cease to function.

FUEL GAUGE

This shows how much fuel is left in the tanks. The level in your 'main' tank is shown by the needle on the dial. If external drop tanks are fitted there may also be a secondary reserve needle.

Eject Drop Tanks – CTRL + D

MANIFOLD PRESSURE GAUGE

This is an approximate measure of the air pressure inside the engine and is used in conjunction with the tachometer to give you an idea of how much horsepower you have available to you.Note: A drop in manifold pressure is an indicator of engine damage. Manifold pressure will lower as you climb reflecting the decrease in ambient air pressure, so at higher altitudes you will tend to get a little less power for the same amount of throttle.

RATE OF CLIMB INDICATOR

This lets you know how quickly your altitude is changing. Though you can get this information from the altimeter, the ROC will give you an at-a-glance indication. If the needle is above the centreline, you are climbing; if it's below you are diving (or falling). Scales will vary but the marks on the dial show the number of feet (or metres) per minute.

FIGHTER CONTROLS

```
Cockpit Views
Instrument Snap CTRL + I
Snap View (Toggle) CTRL + P
```

The Snap View Toggle goes through three states. In the first state the look-around keys snap to Quarter views around the cockpit. In the second state the look-around keys pan around the virtual cockpit, allowing the player to use the mouse pointer to interact with the cockpit controls.

In the third state the mouse pointer disappears and you can look around the cockpit using the mouse.

Fighters are located in their own airfields and will be asked to perform escort duties when a mission is set up or if Luftwaffe will be scrambled to intercept the bomber force. At some point in your B-17 mission you will receive a message that fighters have scrambled. This means that there are fighters accessible to you to fly.

Check with the external pop-up menu to see which aircraft groups are currently accessible to you.

You can choose to jump to the fighters at any point but for this brief guide we will jump into the fighter pilot seat when the aircraft is still on the ground and the pilot has just received instructions.

General Control Keys Remember that most B-17 control keys will also control the fighters. For example, Select Engine key Q (for one engine craft) and Q/W for two engine craft. Appropriate view keys all still apply (F2 external camera views etc).

TAKE OFFS

The same basic principles to B-17 bomber take off apply for take off (see earlier Flying School) and here is a list of the most useful keyboard keys. Sidewinder®-type joysticks will have button equivalents for all flight controls (see Player Options – Controls – for details) and if you have a joystick fitted the simulation will default to that method of control.

```
Pilot Helper (toggle) H
Select Engine (s) Q (W)
Start Selected Engine A
Parking Brake Off Shift + P
Wheel Brakes Off Delete
Rudder Left B
Rudder Right N
Throttle Open =
Throttle Close -
Left Steering Brake B
Right Steering Brake N
Tail Wheel Lock On T
Flaps Up F
External View F2
Cockpit View F1
Landing Gear Up Up Arrow
Cockpit View Instrument Snap CTRL + I
Snap View CTRL + P
```

All Trim Controls still apply (see Flight School).

CHANGING FIGHTERS

You can jump in to fly other fighters in the squadron by simply selecting them.

Jump to next fighter (in sequence) – Close Square Bracket -]

Jump to previous fighter (in sequence) – Open Square Bracket - [

NAVIGATION TO TARGET

ESCORT FIGHTERS

Your main task is to find your B-17 squadron and stay close to them throughout the mission. You must try to avoid early air combat because you will have to eject your drop tanks to manoeuvre effectively. The bomber will be much slower than you so you must learn to zig-zag or circle above the formation so that they can stay with you.

LUFTWAFFE

Your main aim is to slow down (or stop) the bombing force by shooting down as many bombers as possible. You can also achieve your aims by attacking the escort fighters and diverting them from their defensive job so that other Luftwaffe fighters can attack the bombing formation.

```
Padlock Targeting Controls
Padlock Nearest Enemy Y
Padlock Nearest B-17 CTRL + Y
Padlock Nearest Airfield SHIFT + Y
Padlock Target Nearest Centre of View U
Clear/Restore Padlock View SHIFT + U
```

COMBAT

Your armaments will vary depending on the fighter you are flying but the controls are very simple: look through the sight and FIRE!

```
Machine Guns ’
Cannons ’
Eject Drop Tanks CTRL + D
```

Note: If you drop the Drop Tanks whilst your aircraft is using them, your engine will be quickly starved of fuel. The quickest way to resolve this is to quickly transfer to automatic control – the AI will switch to the appropriate tank.

This follows for any manual changes to the controls. Switching quickly between Manual and Auto assigns the controls back to the AI. This is most useful if you manually set the throttle, fuel mixtures, etc on a fighter and want everything controlled from the throttle

again. Note: This only applies to Fighters. B-17 controls are passed back to the AI by right clicking the mouse, due to the added complexity of that aircraft's systems.

LANDINGS

ESCORT FIGHTERS

You must return with the bombers and then access Padlock View of the Nearest Airfield (SHIFT + Y).

LUFTWAFFE

Press SHIFT + Y to get a padlock view of the nearest airfield and follow this until the airfield is in view.

Landings are conducted in the same way as shown in the Flying School (above).

```
Pilot Helper (toggle) H
Landing Gear (lower) SHIFT + Up Arrow
Flaps Down SHIFT + F
Throttle Open =
Throttle Close -
Left Steering Brake B
Right Steering Brake N
Tail Wheel Lock Off SHIFT + T
Wheel Brakes On Insert
Parking Brake On P
```

THE FIGHTER ESCORT

The task of the fighter escort squadrons is to give the heavy bombers maximum protection to and from their target. This means that the fighters have to stay with the bombing force as long as possible. Each fighter squadron has three or four flights stepped down behind the lead flight so that all can keep an eye on the leader. Flights are kept 150 feet apart with individual aircraft 40 feet from each other.

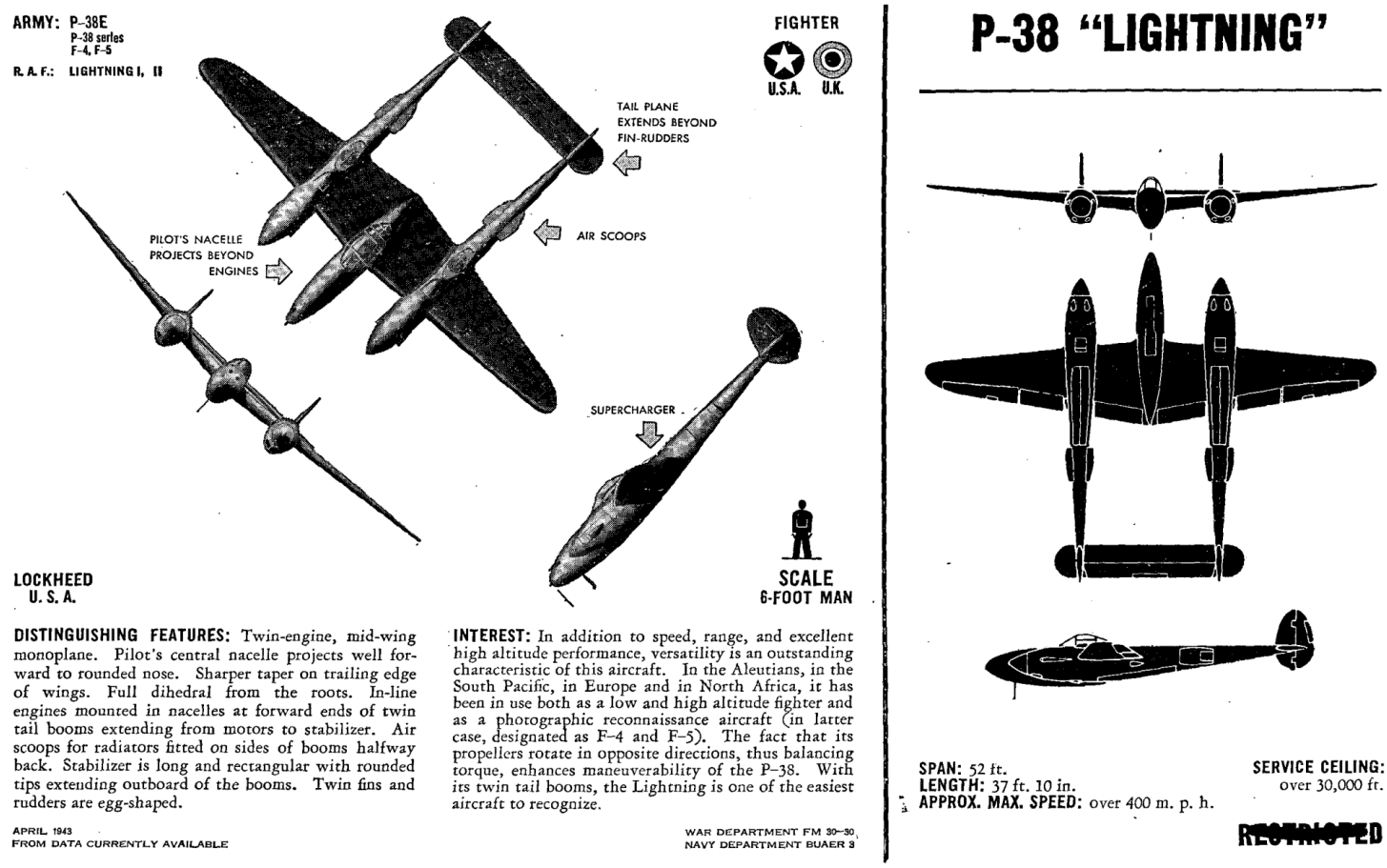
As soon as they achieve formation, P-38 Lightnings and the P-47 Thunderbolts immediately turn on their long distance drop tanks, while the P-51 Mustang uses up about

30 gallons from its main tanks to maintain balance before turning to wing drop tanks.



Pilots have to avoid any supplementary combat activity because this will mean that the long distance drop tanks have to be jettisoned and the bomber fleet abandoned. On rendezvous with the bombers three fighter squadrons are allocated to each combat wing. One squadron is divided and positioned ahead and above the bombers, another squadron also split and takes up position above and about a mile away on either side of the formation. The last squadron climbs 4000 feet directly above the force and ten miles into the sun, trying to anticipate the standard enemy fighter strategy of diving out of the sun's glare.The escort fighters weave or orbit so that they can stay in touch with the slower bombers.

The main fighter combat tactic used by both sides is to use the sun's glare to achieve surprise in diving attacks, turning into an enemy, tightening a turn to get behind him, rolling away and diving to escape a dangerous situation. But as in all things, the tactics depends on the individual aircraft's performance.



Built by: Lockheed
Aircraft Type: Long range fighter/bomber/single-seater
Dimensions: 37′ 10" Length; 52′ 0" Span
Engines: 2 Allison V-1710s-89/91
Max Speed: 402 – 414mph*
Cruise Speed: 250 – 320mph*
Ceiling: 40 – 44,000ft*
Combat Radius: 275 – 350 miles (2,260 miles with drop tanks)*
Fixed Weapons: 4 nose-mounted .50 calibre Browning machine guns
1 nose mounted 20mm Hispano cannon
Models H to J

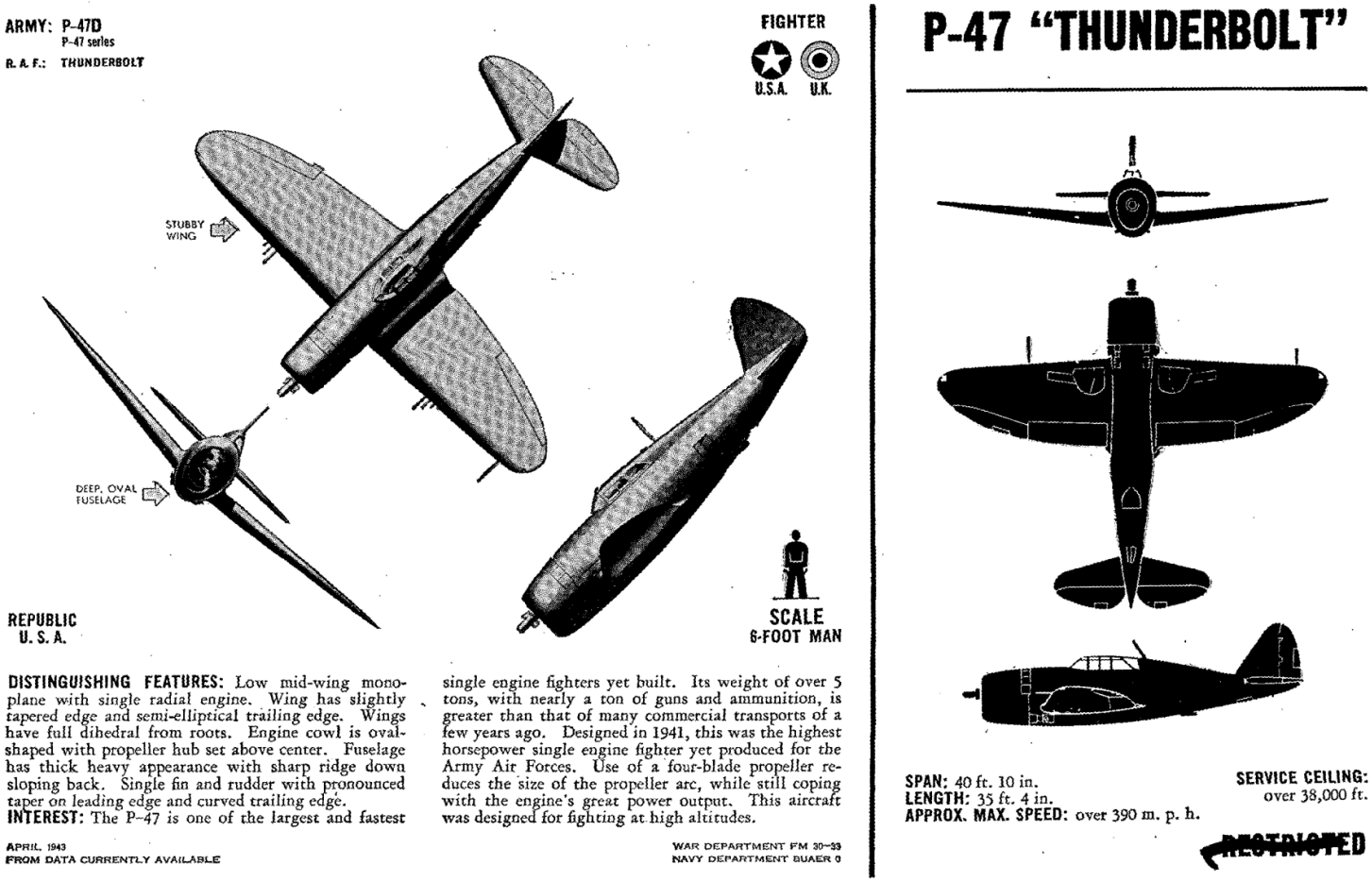
The P-38 Lightning was the first American fighter to be designed as a long-range, high-altitude interceptor. However, due to technical difficulties, it did not achieve its intended role. The P-38 did however perform well when used as a tactical fighter-bomber; it had the

range, the heavy armament and could carry a heavy bomb load. At low altitude the P-38 could manoeuvre well against the best of the German fighters and was often referred to as the ‘Twin-Tailed Devil’ by the German pilots.

The P-38 also proved itself competent for long-range escort and reconnaissance missions and was an effective aircraft for ground support. The Lightning was difficult to destroy – if one engine was taken out, the other engine could easily support it.

This fighter is most vulnerable when alone, so try to avoid one on one dogfights. Try to work with a wingman, using hit and run strategy. If an enemy gets on your tail, try to exploit the P-38s manoeuvrability – ditch the bogey with a series of sharp turns, then head for the clouds. The P-38 will not perform well in a dive because of severe tail buffeting.

P-47 THUNDERBOLT



Built by: Republic Aviation Corporation Aircraft Type: Fighter/Fighter – bomber; Single-seater Dimensions: 36’ 1" Length; 40’ 9" Span Engine: Pratt & Witney R-2800 Double

Wasp Max Speed: 419 – 436mph* Cruise Speed: 210 – 275mph* Ceiling: 41,000ft Combat Radius: 275 – 315 miles* Fixed Weapons: 8 wing-mounted .50 calibre Browning machine guns

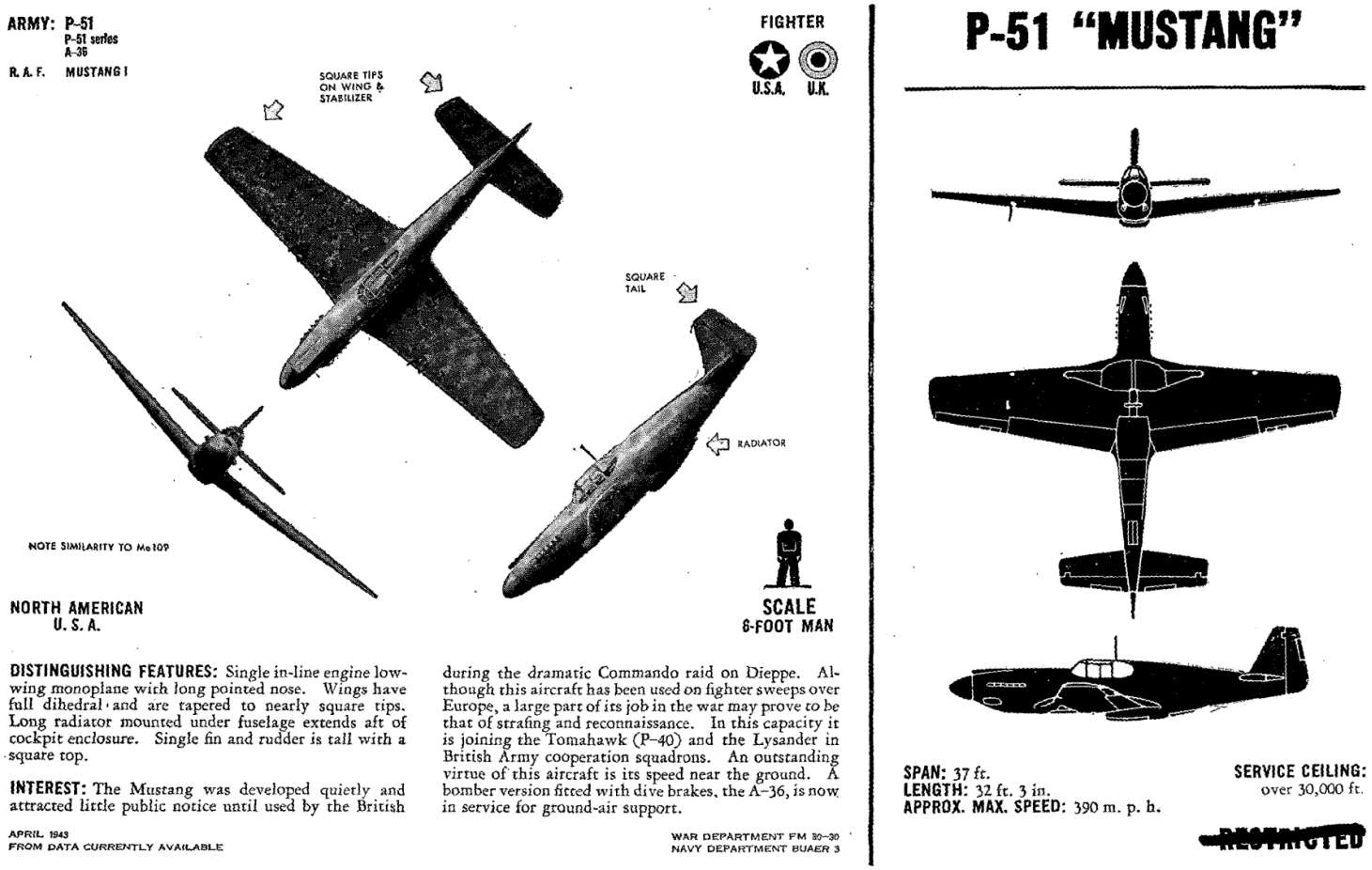
- Models C to D

Often referred to as the ‘Jug’ by its pilots, the P-47 was designed around the new Pratt & Witney R-2800 Double Wasp 2000 hp radial engine – the most powerful at the time. It was also equipped with a turbo supercharger that gave full power even at an altitude of 30,000 feet,allowing the P-47 to outperform all German fighters at high altitude. The aircraft also served as a low altitude fighter-bomber making use of its heavy firepower and its ability to sustain heavy damage.

The P-47’s main weakness is its poor rate of climb but this is more than compensated for by its first class diving ability. Use this feature to regain height rapidly – once you lose momentum from the dive, climb in gentle turns and not in a steep, straight ascent.

Flying the Thunderbolt, your best defence is to initiate the attack. Use the plane’s superior speed and the quickness of its dive to make a pass at an enemy, and then drop sharply away. When threatened in combat, if all else fails and you can’t shake off an attacker, take comfort in the fact that the P-47 can take a lot of punishment before it gives up the ghost.

P-51 MUSTANG



Built by: North American Aviation Aircraft Type: Fighter/Single-seater Dimensions: 32’ 3" Length; 37’ 0" Span Engine: Packard Rolls-Royce Merlin V-1650-3/7* Max Speed: 439 – 437mph* Cruise Speed: 210 – 320mph* Ceiling: 42,000ft Combat Radius: 450 miles (750 miles on drop tanks) Fixed Weapons: 4 – 6* wing-mounted .50 calibre Browning machine guns

- Models B to D

Considered by many to be the best fighter of the war, the Mustang began life with an Allison engine as an underpowered, low-altitude attack aircraft. But when it had the Rolls-Royce Merlin 61 engine installed it was transformed into an excellent high altitude escort fighter. With a pair of drop tanks, the Mustang could escort from England to anywhere in Germany. Entering service in 1944 this was an aircraft that became the vital lifeline for US bomber crews throughout the rest of the war.

With its vast range, great manoeuvrability and a speed no other fighter can beat, the P-51 is the shining star of the USAAF, taking more ‘kills’ than any other plane.

The Merlin engine gives you the power for quick, steep climbs and the Mustang has the firepower to take care of any situation, plus it’s accurate and stable in a dive.

Beware that the P-51’s guns can jam during tight turns (the ammo belts cause the gun breech to block). It’s also very vulnerable to enemy ground fire due to an easily punctured cooling system.

THE LUFTWAFFE

From the earliest days of combat flight, Germany has always been a leader in military aviation technology and during the 1920s and 1930s the country was consumed with a passion for flight. State funded flying and gliding clubs (military aviation was banned under the Treaty of Versailles at the end of WW1) were to be a fertile source of many future pilots and, on the advent of war in 1939, Germany entered with a decided edge in technology and aerial combat skills.

The Germans did not build warplanes in the 1920s but they did organise the personnel and facilities that would slot in when they did. Civilian aircraft models were designed that could easily be converted into a military function. In 1935, the German government announced the formation of a new air force, the Luftwaffe, and began full-scale production of warplanes. State of the art innovations such as beacons and radio stations were developed to help night flights and the Spanish Civil War was used as a proving ground to test out the new planes and strategies. When the war began Germany was the most advanced power in aviation in the world.

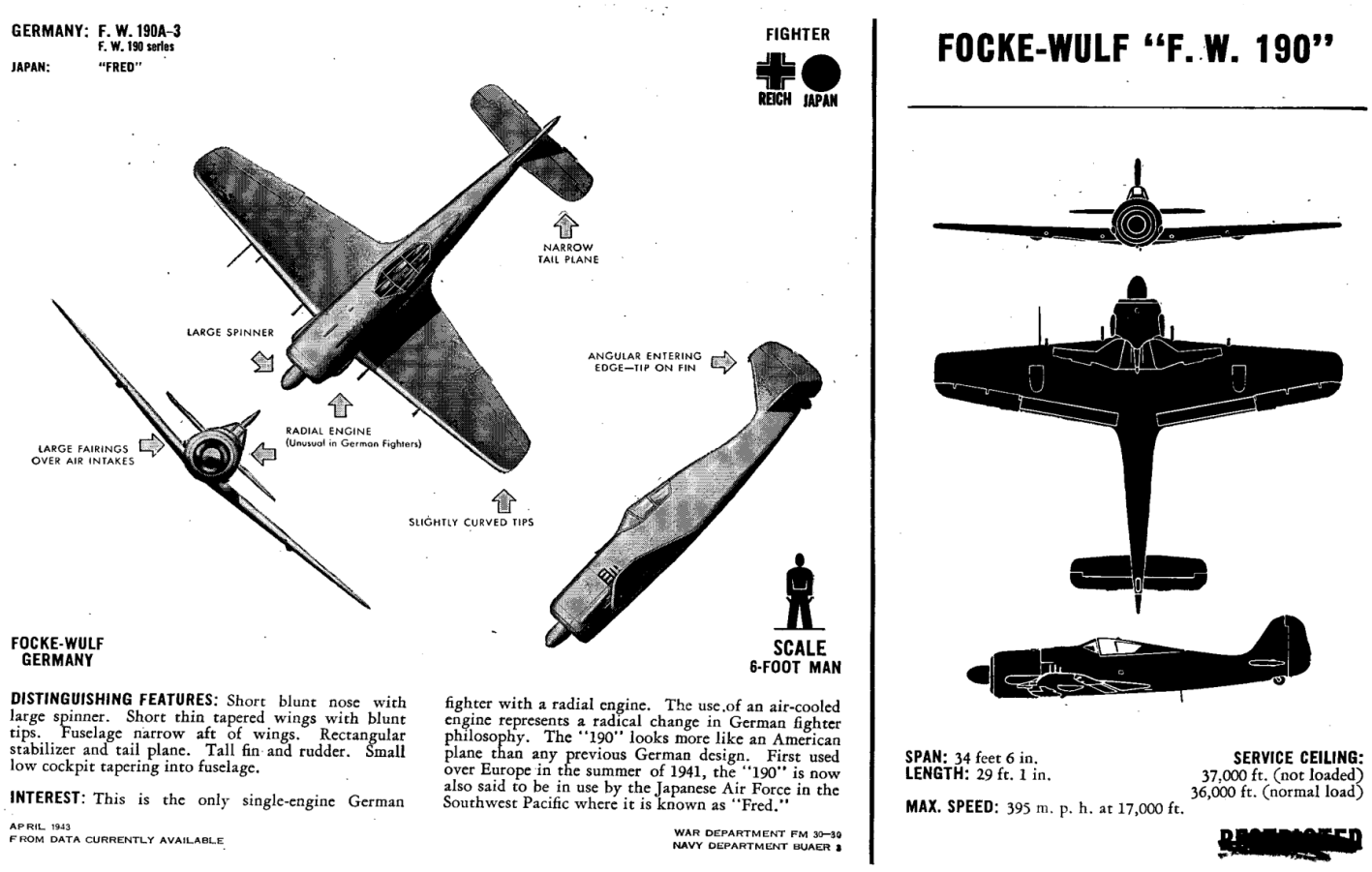
ATTACKING THE BOMBERS

Bombers are really big, slow targets and are easy to gain advantage over, easy to hit and easy to underestimate. The thing to remember is that you can’t approach a bomber like you would a fighter. You do not want to wind up directly behind a B-17 – he’s got a tail gunner waiting for you for that very moment. Before the G appeared the best position was nose on, now with the advent of the Chin turret, it’s a little more difficult although it can still be a profitable position.

Use your speed advantage to the fullest and never give the pilot a chance to turn on you while you're in range. Sweep in, fire as many rounds as possible into the fuselage and tear off to line up another pass. Note:B-17s on a bombing run don't have much room to manoeuvre so take advantage at that point.

The toughest part about attacking a bomber is getting through the escort – if you run into a heavily escorted formation of bombers while being chased by an enemy fighter, you can sometimes use the bombers' firepower to your advantage: head towards a bomber, take a few shots and turn away, with luck, some anxious gunners will hit your tailing fighter before identifying it.

FW-190



Built by: Focke-Wulf Flugzeugbau Aircraft Type: Fighter/Single-seater Dimensions: 8.8m – 10.24m* (29'0" – 33' 5"*) Length; 10.5m (34' 5") Span Engine: BMW 801D/Jumo 213A* Max Speed: 654km/h – 685km/h* (408 – 426mph*) Cruise Speed: 480km/h – 518km/h* (298 – 321mph*) Ceiling: 11,400m – 12,000m (37,403' – 39,372')* Combat Radius:

266km – 282km (165 – 175 miles)* Fixed Weapons: 2 cowling mounted 13mm MG131 cannon 2 wing-mounted (inner) 20mm Mauser MG151 cannon (A8 only) 2 wing-mounted (outer) 20mm Mauser MG151 cannon

- Models A8 - D9

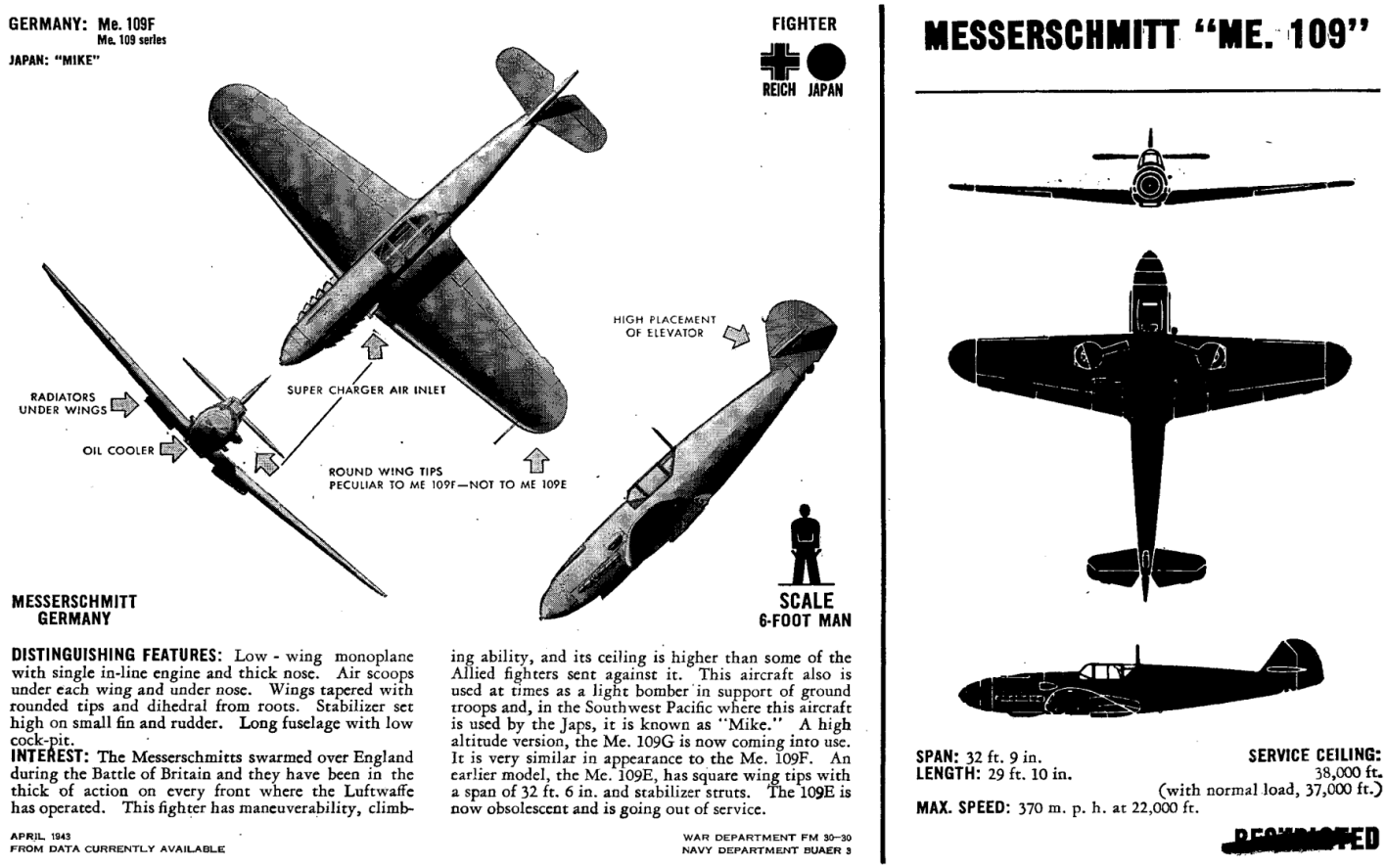
The Focke-Wulf 190 is thought to be Germany's best fighter of the war. When the first version entered service in 1941, it showed marked superiority to its opponents in almost every aspect. The FW 190 could outrun, outturn and out climb anything it encountered. However the later models were mainly intended for bomber interception and so carried more firepower and armour making them considerably heavier and less manoeuvrable. Heavily armed with four 20mm cannons and two machine guns this proved to be the Allied bombers' most feared adversary.

The FW-190 is a great fighter to fly, giving excellent visibility, an unequalled rate of roll and easy take offs and landings. In flight, it reacts quickly to the slightest command and can climb and dive with ease.

The improved turning of the D models, impressive armament, compact shape and superior handling make this an excellent fighter for medium altitudes.

Against the US heavy bombers you must employ a frontal assault strategy by flying high and fast to gain position ahead and above, then turning and diving towards the approaching targets and levelling out at the last minute. Timed right you'll get about 15 seconds to fire before you are forced to dive away. If you are attacked in a turn you can use your superior rate of roll to flick over into a dive.

BF-109 (ME-109)



Built by: Messerschmitt Aircraft Type: Fighter/Single-seater Dimensions: 8.8m – 9.05m* (28’4" – 29’ 8") *Length; 9.9m – 9.92m* (32’ 4" – 32’ 7") Span Engine: Daimler-Benz DB 601N Max Speed: 570km/h – 727km/h* (354 – 450mph*) Cruise Speed: 483km/h – 590km/h* (300 – 366mph*) Ceiling: 11,000m – 12,500m (36,100’ – 41,000’)* Combat Radius: 200km – 240km (125 – 150 miles)* Fixed Weapons: 1 engine-mounted 30mm MK108 cannon 2 cowling-mounted 13mm MG131 cannon 2 gondola mounted 20mm Cannon

*Models E4 – G6 – K4

The Messerschmitt Bf-109 served as the Luftwaffe’s standard single- seater fighter from 1936 to the end of the war. It was the forerunner of all modern combat fighters, completely outclassing all pre-1935 rivals. It was not an easy plane to fly, it had weak landing gear and high wing loading but it benefited from a capacity to take on technological developments to increase engine power, firepower and armour.

Quicker, lighter and more stable than many of its contemporaries this was a very tough aircraft but was always a nightmare to fly.

From take off to landing you have to fight for control as it pulls to the right, requiring a delicate balance between elevators, rudder and throttle on take off. This is made doubly difficult by a high ground angle that makes visibility in taxiing extremely limited. Landings are also perilous because the 109 does not respond well to last minute corrections and may crash when approach speed is too low.

A useful strategy for a Bf-109 pilot is to take advantage of the negative-g roll that leaves Spitfires and Hurricanes shooting at air. However it's a plane that is vulnerable to deflection attacks –the armour is 4 feet behind the pilot's seat - and to fire from below hitting the coolant reservoirs. Use its speed and renown durability to escape from difficult situations.

ME-262

Built by: Messerschmitt Aircraft Type: Fighter/Single-seater Dimensions: 10.6m (34'9") Length; 12.5m (41' 0") Span Engine: 2 Junkers Jumo 109-004B-4 turbojets Max Speed: 868km/h (540mph) Cruise Speed: 670km/h (416mph) Ceiling: 11,448m (37,560') Combat Radius: 241km (150 miles) Fixed Weapons: 2 fuselage-mounted 30mm MK108 cannon (above nose) 2 fuselage-mounted 30mm MK108 cannon (below nose) The first combat jet aircraft to be actively used in World War 2, the Me-262 was faster than anything the Allies could put into the sky in 1944. It could rip through bomber formations and turn well at high speed, out-performing any pursuing escort fighter. However, its development and widespread use was stifled by the lack of competent pilots, the scarcity of fuel and German failure to recognise its full combat potential at an early stage. When it did appear, in October 1944, it was a stunning success.

Heavy bomber gunners did not have time to aim, let alone fire, and even the fastest Allied fighter was left behind. Unfortunately, the Me-262 pilots were also unused to combat at such high speeds and often chose to slow down for the actual attack (and it was then that they were most vulnerable to conventional bomber defences).

Beware that the Me-262 is slow to accelerate and not very manoeuvrable, Allied pilots may try to attack you when you are most vulnerable – during take off and landing.

FLAK

Effective flak coverage generally covers an area the size of a dome 75,000 feet horizontal radius and 40,000 feet vertical height around each AAA emplacement. These 'domes' ideally are placed to overlap and combine to form an almost continuous coverage over a target area.

A flak shell could take over 25 seconds to reach a height of 25,000 feet and in that time a B-17 could travel 1.5 miles. The main AAA gun was the 88mm Flak 36 with a slant range of 8226 metres and a 20,000 feet ceiling. The fired shells are detonated by a clockwork time fuse and are lethal within 30 metres and will cause severe damage within 200 metres.

An AAA gunner doesn't simply shoot shells at random hoping you'll fly through them. Every time a round is fired he's calculated a firing solution based on altitude, direction and relative velocity of the target. Since these shells aren't self-propelled they can take quite a while to cover the distance – so every shell that's flying towards you was aimed several seconds ago based on your current altitude, direction and speed.

An Optical Director uses a mechanical computer to work out the range of the airplane, if it's flying level and at a constant speed, then computes the time the shells will take to get there (to help set the fuses), the elevation and azimuth of each gun in the firing battery.

THE BOMBING MISSION

4am. The sound of heavy trucks on the move can be heard across the slowly awakening base. Ordnance crews are in the process of collecting bombs from the 'dump'. The chief engineer and his ground crew have been awake for several hours and are at work on the aircraft chosen for today's mission. Each plane crew has an auxiliary petrol driven generator called a 'putt-putt' giving them the extra power they require to save them draining the aircrafts' batteries.

The squadron armaments officer appears and climbs into one of the B-17s. He opens the door to the bomb bay, walks along the catwalk and sits in the bomb aimer's seat in the nose of the craft. He switches on the bombardier's panel and opens the bomb bay doors by moving the first of two levers. He checks that the red warning light has come on, then moves the second lever to one of three positions. He sets 'selective' then switches on the 'intervalometer' to set the bomb drop intervals and tests the bomb shackles and electric

firing solenoids by pressing the bomb release located on top of the panel. Test lights flash back at him as he switches the lever from ‘salvo’ (emergency drop of bombs) to ‘lock’. The chief checks the operation of the bomb bay doors from the outside, then removes the canvas windshield cover as the duty mechanic removes the canvas wraps from the engine cowling.

Now it’s the turn of the ordnance crew. They arrive with the bomb loads on service trucks that are positioned under the aircraft, just below the bomb bay. This trailer contains ten M-43 500 lb general-purpose bombs, all marked with two yellow bands front and back (showing that they contain TNT. The ordnance crew attach shackles from the B-17’s racks to two lugs on each bomb and the bombs are then winched into the bay and positioned on their correct station. The tail fins are screwed on and the nose and tail fuses carefully fitted into each bomb. The fuses have a small propeller-like vane that rotates as the bomb drops and arms the bomb. For now the device is made safe by a securing wire that will later be removed after take off.

Meanwhile the ground crew are ‘pre-flighting’ the B-17. The prop blades are pulled and turned through three complete revolutions to remove any excess fuel that may have seeped through the system overnight. The chief performs his own set of checks: he turns on the battery and ignition switches and ensures that the terminals on the voltage connectors are not shorting. The fuel booster pump is turned on, the pressure checked and the throttle set to 1000 rpm. He starts number one engine, then the other three in sequence. The turbo supercharging system, that enables the 1,200 hp engines to run at full power between 20,000 and 30,000 feet, is inspected and the prop pitch controls are checked. Finally, everything that was reported faulty from the previous day’s mission is checked again.

Another truck now appears and begins to unload ten wooden boxes of 0.50-calibre ammo into the rear fuselage door. The 0.50 calibre machine guns are loaded onto the aircraft and installed, each weighing 64 lb sand capable of firing 750 rounds per minute at a maximum range of 3,500 feet. Each magazine holds 365 rounds.

The fuel tanks are now topped up. The B-17G has a maximum capacity of 2,780 US gallons with five filling points on each wing between the two engines. The tanks are self-sealing ‘Tokyo tanks’ constructed from a rubber composite divided up into 18 small cells. The tyres are now inspected and any small oil leaks from the engines are checked for signs of deterioration. The oxygen supplies are now checked: 18 light metal bottles, each one allowing five hours supply to a man at a maximum of 30,000 feet.

The flight crew arrive just as the last major checks are being completed. They are carrying their flight bags and parachute packs, wearing olive coveralls, heavy brown sheepskin jackets and trousers. The ranks and crew positions in this aircraft are:

Pilot/Captain First Lieutenant Co-Pilot Flight Officer Right Waist Gunner Staff Sergeant Left Waist Gunner Staff Sergeant Ball Turret Gunner Staff Sergeant Tail Gunner Staff Sergeant Bombardier/Togglier Second Lieutenant Navigator Second Lieutenant Radio Operator Technical Sergeant Engineer/Top Turret Technical Sergeant

The crew now perform their own set of checks and confirm that they are all in position using their throat microphones. The engines are started up, the altimeter is set to the aerodrome height above sea level and the ‘chocks’ that sit in front of the tyres are signalled away.

The B-17 begins to taxi and joins the other bombers in a pre-set pattern at the edge of the take off runway. The pilot has the task of keeping the 30 tons of aircraft on the tarmac whilst not being able to see directly ahead. He steers by watching the edge of the tarmac paths through a cockpit side window and tries not to overuse the brakes for fear of burning out the brake linings. The engines are revved up to 1,500 rpm to clear out any muck from the spark plugs and all the while the tail gunner keeps an eye on the plane behind, in case it gets closer than the standard 30 yards.

When the aircraft gets to the edge of the 1.25-mile long runway it waits with the other members of the squadron and a ‘take-off check’ is performed. Aileron, elevators and rudder trim tabs controls are zeroed, wing flaps raised and the prop pitch control tested. The generators are turned on, the turbo-superchargers tested, the parking brake and the tail wheel lock turned off. The captain swings the aircraft into position just after the plane in front begins to take off on the 150-foot wide runway. He locks the tail wheel to ‘on’ to keep the B-17 straight during its run. Final checks are made to gyros, generators and fuel booster pumps as the captain waits for the double flash of green light from the black and white chequered runway control van.

The controller looks through the glass roof of the van and signals with an Aldis lamp, trying to time the take offs at one-minute intervals. The captain releases the footbrake and selects the correct manifold pressure and opens the throttles. At 100mph, the aircraft takes off and the pilot eases up on the control column and raises the landing gear.

This is an anxious time for most of the crew as the plane, packed full of bombs and fuel, climbs slowly and builds up speed. At the ‘indicated air speed’ (IAS) if 150mph, the

captain throttles back and reduces the rpm from 2,500 to 2,300 by adjusting the propeller pitch controls. The aircraft should now be climbing at about 300 feet per minute and flying through any overcast to assemble in formation above the clouds. This is the time when there is the greatest risk of collision with another aircraft in the Group.

The captain's next task is to assemble in formation with the other aircraft of the squadron (as requested by orders). A radio compass is used that works with short range radio beacons in selected location. A Morse call sign (called a 'Buncher' signal) is transmitted and the bomber receives it via a small loop aerial located under the nose section. Lead aircraft fire different coloured flares at 10,000 feet to give a visual check for other pilots. Squadrons have to be built into Groups; Groups have to be built into Wings and Combat Wings into Divisional Columns. The process is slow because everyone has to keep up with everyone else.

Above 10,000 feet the crew have to go to oxygen and the heating is fully operational. The two waist gunners wear electrically heated flying suits under their sheepskins but the rest of the crew have warm air ducts that channel heat to their stations.

The ball turret gunner is the last to get into position because the turret is very cramped and always assigned to someone of a small build. He has to spend about five hours curled up, looking down at five miles of sky without the comfort of a parachute (there's no room for it). If something happens to the B-17 it would take him, with help, about a minute to get out of the turret and put his 'chute' on – a long time in a crashing bomber!

At 13,000 feet the aircraft climbs at 200 feet per minute, above 19,000 feet the Ball Turret gunner reports contrails (gases from the hot engine exhaust meeting the frozen air in areas of high humidity producing condensation trails). The formation levels off at 21,000 feet. The navigator, even though they are travelling in formation, keeps an accurate track of their position using his 'Gee' box. The guns are loaded and test fired about 30 miles off the English coast, at the same time the arming pins are removed from the 10 bombs in the bay. The captain looks at the Airspeed Indicator, which registers 150mph. He knows this is not the true airspeed (about 206mph) because working on atmospheric pressure the AI reading reduces with increased altitude.

Over the enemy coast, the crew put on their cumbersome flak suits, worn like body armour made of overlapping thin steel plates inside canvas aprons. They know the German radar and listening posts will have been tracking them for the last hour and the enemy defence controllers will be trying to guess their mission objectives. The gunners in the B-17 look all

around their field of fire re-assured by the sight of the zigzagging ‘little friends’ 6,000 feet above them – P-47s fitted with long distance drop tanks.

Then the flak begins to burst in little black clouds around the bomber formation.

The formation reaches the initial point: the selected point over which the bomber force will begin its turn to make its bomb run on the target. Flares are fired to give visual confirmation. Today, the cloud cover is too thick (undercast) and the leading aircraft from the Pathfinder Force will mark the target using their H2X ground scanning radar sets.

The leading Combat Wing approaches the bombing run. There are four- minute intervals between Wings. Flak intensifies and squadrons of enemy fighters sweep through the formations firing at ‘purple heart corner’ – the lowest, rearmost and therefore most exposed flight in the formation.

The bombardier opens the bomb doors and flips open the safety lever on the bomb release. He doesn’t have a bombsight and is waiting for the bomb leader to drop his bombs. When the lead bombardier is lined up on the Pathfinders’ smoke markers, a red flare is fired and the bombs are released. The group hope to bomb a compact area 500 by 250 yards. The ball-turret gunner confirms that the bombs have been released; the bomb bay is checked to see that all bombs have dropped and the doors are then shut. The immediate weight loss makes the formation speed up to about 160 IAS (224mph) as it heads for the designated rally point.

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9: B-17 MISSION HISTORY

LEARN HERE

What was the day in the life of a bomber crew on a mission like? Read on to find out.

4am. The sound of heavy trucks on the move can be heard across the slowly awakening base. Ordnance crews are in the process of collecting bombs from the ‘dump’. The chief engineer and his ground crew have been awake for several hours and are at work on the aircraft chosen for today’s mission. Each plane crew has an auxiliary petrol driven generator called a ‘putt-putt’ giving them the extra power they require to save them draining the aircrafts’ batteries.

The squadron armaments officer appears and climbs into one of the B-17s. He opens the door to the bomb bay, walks along the catwalk and sits in the bomb aimer’s seat in the nose of the craft. He switches on the bombardier’s panel and opens the bomb bay doors by moving the first of two levers. He checks that the red warning light has come on, then moves the second lever to one of three positions. He sets ‘selective’ then switches on the ‘intervalometer’ to set the bomb drop intervals and tests the bomb shackles and electric firing solenoids by pressing the bomb release located on top of the panel. Test lights flash back at him as he switches the lever from ‘salvo’ (emergency drop of bombs) to ‘lock’. The chief checks the operation of the bomb bay doors from the outside, then removes the canvas windshield cover as the duty mechanic removes the canvas wraps from the engine cowling.

Now it’s the turn of the ordnance crew. They arrive with the bomb loads on service trucks that are positioned under the aircraft, just below the bomb bay. This trailer contains ten M-43 500 lb general-purpose bombs, all marked with two yellow bands front and back (showing that they contain TNT. The ordnance crew attach shackles from the B-17’s racks to two lugs on each bomb and the bombs are then winched into the bay and positioned on their correct station. The tail fins are screwed on and the nose and tail fuses carefully fitted into each bomb. The fuses have a small propeller-like vane that rotates as the bomb drops and arms the bomb. For now the device is made safe by a securing wire that will later be removed after take off.

Meanwhile the ground crew are ‘pre-flighting’ the B-17. The prop blades are pulled and turned through three complete revolutions to remove any excess fuel that may have seeped through the system overnight. The chief performs his own set of checks: he turns on the battery and ignition switches and ensures that the terminals on the voltage connectors are not shorting. The fuel booster pump is turned on, the pressure checked and the throttle set to 1000 rpm. He starts number one engine, then the other three in sequence. The turbo supercharging system, that enables the 1,200 hp engines to run at full power between 20,000 and 30,000 feet, is inspected and the prop pitch controls are checked. Finally, everything that was reported faulty from the previous day’s mission is checked again.

Another truck now appears and begins to unload ten wooden boxes of 0.50-calibre ammo into the rear fuselage door. The 0.50 calibre machine guns are loaded onto the aircraft and installed, each weighing 64 lb sand capable of firing 750 rounds per minute at a maximum range of 3,500 feet. Each magazine holds 365 rounds.

The fuel tanks are now topped up. The B-17G has a maximum capacity of 2,780 US gallons with five filling points on each wing between the two engines. The tanks are self-sealing ‘Tokyo tanks’ constructed from a rubber composite divided up into 18 small cells. The tyres are now inspected and any small oil leaks from the engines are checked for signs of deterioration. The oxygen supplies are now checked: 18 light metal bottles, each one allowing five hours supply to a man at a maximum of 30,000 feet.

The flight crew arrive just as the last major checks are being completed. They are carrying their flight bags and parachute packs, wearing olive coveralls, heavy brown sheepskin jackets and trousers. The ranks and crew positions in this aircraft are:

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Pilot/Captain First Lieutenant
Co-Pilot Flight Officer
Right Waist Gunner Staff Sergeant
Left Waist Gunner Staff Sergeant
Ball Turret Gunner Staff Sergeant
Tail Gunner Staff Sergeant
Bombardier/Togglier Second Lieutenant
Navigator Second Lieutenant
Radio Operator Technical Sergeant
Engineer/Top Turret Technical Sergeant
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The crew now perform their own set of checks and confirm that they are all in position using their throat microphones. The engines are started up, the altimeter is set to the aerodrome height above sea level and the ‘chocks’ that sit in front of the tyres are signalled away.

The B-17 begins to taxi and joins the other bombers in a pre-set pattern at the edge of the take off runway. The pilot has the task of keeping the 30 tons of aircraft on the tarmac whilst not being able to see directly ahead. He steers by watching the edge of the tarmac paths through a cockpit side window and tries not to overuse the brakes for fear of burning out the brake linings. The engines are revved up to 1,500 rpm to clear out any muck from the spark plugs and all the while the tail gunner keeps an eye on the plane behind, in case it gets closer than the standard 30 yards.

When the aircraft gets to the edge of the 1.25-mile long runway it waits with the other members of the squadron and a ‘take-off check’ is performed. Aileron, elevators and rudder trim tabs controls are zeroed, wing flaps raised and the prop pitch control tested. The generators are turned on, the turbo-superchargers tested, the parking brake and the tail wheel lock turned off. The captain swings the aircraft into position just after the plane in front begins to take off on the 150-foot wide runway. He locks the tail wheel to ‘on’ to keep the B-17 straight during its run. Final checks are made to gyros, generators and fuel booster pumps as the captain waits for the double flash of green light from the black and white chequered runway control van.

The controller looks through the glass roof of the van and signals with an Aldis lamp, trying to time the take offs at one-minute intervals. The captain releases the footbrake and selects the correct manifold pressure and opens the throttles. At 100mph, the aircraft takes off and the pilot eases up on the control column and raises the landing gear.

This is an anxious time for most of the crew as the plane, packed full of bombs and fuel, climbs slowly and builds up speed. At the ‘indicated air speed’ (IAS) if 150mph, the captain throttles back and reduces the rpm from 2,500 to 2,300 by adjusting the propeller pitch controls. The aircraft should now be climbing at about 300 feet per minute and flying through any overcast to assemble in formation above the clouds. This is the time when there is the greatest risk of collision with another aircraft in the Group.

The captain’s next task is to assemble in formation with the other aircraft of the squadron (as requested by orders). A radio compass is used that works with short range radio beacons in selected location. A Morse call sign (called a ‘Buncher’ signal) is transmitted and the bomber receives it via a small loop aerial located under the nose section. Lead

aircraft fire different coloured flares at 10,000 feet to give a visual check for other pilots. Squadrons have to be built into Groups; Groups have to be built into Wings and Combat Wings into Divisional Columns. The process is slow because everyone has to keep up with everyone else.

Above 10,000 feet the crew have to go to oxygen and the heating is fully operational. The two waist gunners wear electrically heated flying suits under their sheepskins but the rest of the crew have warm air ducts that channel heat to their stations.

The ball turret gunner is the last to get into position because the turret is very cramped and always assigned to someone of a small build. He has to spend about five hours curled up, looking down at five miles of sky without the comfort of a parachute (there's no room for it). If something happens to the B-17 it would take him, with help, about a minute to get out of the turret and put his 'chute' on – a long time in a crashing bomber!

At 13,000 feet the aircraft climbs at 200 feet per minute, above 19,000 feet the Ball Turret gunner reports contrails (gases from the hot engine exhaust meeting the frozen air in areas of high humidity producing condensation trails). The formation levels off at 21,000 feet. The navigator, even though they are travelling in formation, keeps an accurate track of their position using his 'Gee' box. The guns are loaded and test fired about 30 miles off the English coast, at the same time the arming pins are removed from the 10 bombs in the bay. The captain looks at the Airspeed Indicator, which registers 150mph. He knows this is not the true airspeed (about 206mph) because working on atmospheric pressure the AI reading reduces with increased altitude.

Over the enemy coast, the crew put on their cumbersome flak suits, worn like body armour made of overlapping thin steel plates inside canvas aprons. They know the German radar and listening posts will have been tracking them for the last hour and the enemy defence controllers will be trying to guess their mission objectives. The gunners in the B-17 look all around their field of fire re-assured by the sight of the zigzagging 'little friends' 6,000 feet above them – P-47s fitted with long distance drop tanks.

Then the flak begins to burst in little black clouds around the bomber formation.

The formation reaches the initial point: the selected point over which the bomber force will begin its turn to make its bomb run on the target. Flares are fired to give visual confirmation. Today, the cloud cover is too thick (undercast) and the leading aircraft from the Pathfinder Force will mark the target using their H2X ground scanning radar sets.

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