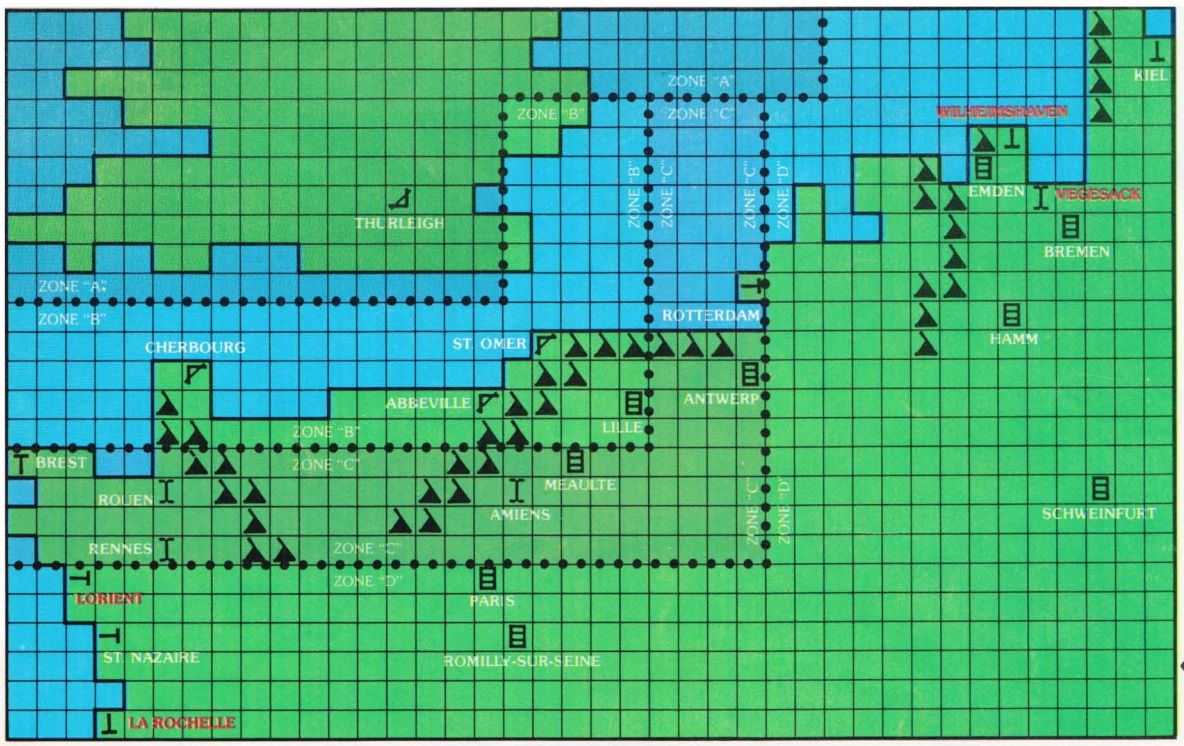
50 MISSION CRUSH



▤ = INDUSTRY
I = RAILROAD CENTER
= AIR BASE
⊣ = SUB PEN
= A-A BATTERY

This row does not exist in the APPLE® and ATARI® versions. Subsequently, consider the last two rows to be moved up one row.

ABSOLUTE MINIMUM FUEL NEEDED FOR ROUND TRIP AT 5000 FT. ASSUMING BOMB LOAD DROPPED ON TARGET

	ROUEN	760		CHERBOURG	550		PARIS	810		ANTWERP	830
	BREST	960		RENNES	880		ROMILLY-S-S	940	(HF)	**WILHEIMSHAVEN**	**1220**
(HF)	**LORIENT**	**1010**		ABBEVILLE	470		LILLE	630		EMDEN	1140
	ST. NAZAIRE	1090		ST. OMER	410		MEAULTE	660		KIEL	1580
(HF)	**LA ROCHELLE**	**1260**		AMIENS	660		ROTTERDAM	750	(HF)	**VEGESACK**	**1230**

	BREMEN	1310
	HAMM	1270
	SCHWEINFURT	1590

(HF) = Heavy Flak

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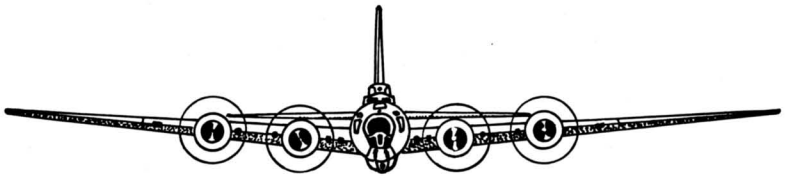

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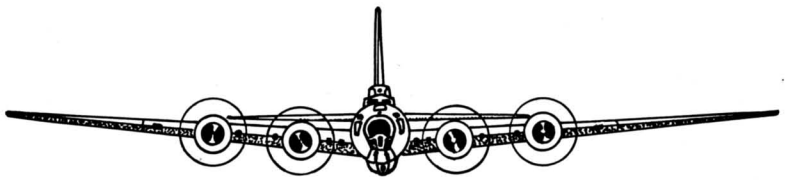


RULES AND INSTRUCTIONS

INTRODUCTION

Fifty Mission Crush, a role playing game, is designed to provide you the player, insight into the frustrations, excitement, boredom, and sometimes terror that made up the life of a B-17F pilot in the 8th Air Force from November 1942 to December 1943.

During this time the 306th bomb group flew 95 effective missions, consisting of 1472 sorties, averaging 15.5 aircraft per effective mission. Aircraft losses were 92, while crew losses were 803 killed or missing in action and 119 wounded. This set an average life of an aircraft at 16 missions and the average life of a crew member at 18.33 missions. Surviving 50 missions was not easy.

You start as a young first lieutenant arriving at Thurleigh air force base just north of London, home of the 306th bomb group. You will remain with this group during your tour of assignment of twenty-five missions, and then out of necessity, your tour will be extended to fifty missions (if you survive). If you are lucky and prove yourself a resourceful pilot, you will be promoted and decorated. It is possible to complete fifty missions and ZI (return home) as a highly decorated Brigadier General if you are able to make the most out of any situation, if you are aggressive but not foolish, and last but not least, if lady luck smiles on you.

FIFTY MISSION CRUSH

A "fifty mission crush" is an Army Air Corps, or Air Force, service cap that has the stiffening ring removed, and is worn crushed and battered. This cap is obviously out of uniform, however steeped in tradition. This tradition was started by the 8th Air Force flying personnel as a mark that separates the fledgling from the battle hardened survivor of 25+ combat missions. This mangled cap was frowned upon, but tolerated for those who earned the right to wear it. If you survive, we will look the other way as you will have earned the right to wear the fifty mission crush.

GETTING STARTED (Apple)

To begin the game, boot your game disk and the game will begin automatically. If you are using an Apple II with Pascal, you must first use your BASICS disk. If you are using an Apple III, you must first go into Apple II emulation mode. If you are using an Apple IIe, be sure to depress your CAPS LOCK key. You will need to initialize a disk for SSI use before you begin a game (follow the instructions given in the program). You will need one disk for each pilot (i.e. a disk may only contain information for one pilot).

GETTING STARTED (Atari)

First format a blank disk for use with your Atari system (any properly formatted Atari disk will do). Note that one disk must be formatted for each pilot (i.e. a disk may only contain information for one pilot).

Next, begin the game by inserting the game disk into your disk drive; be sure that your Basic cartridge is plugged into your computer. Turn on the computer and the game will begin automatically.

GETTING STARTED (Commodore 64)

Insert a **BLANK** disk in the drive and type OPEN 15,8,15 (return). Then type PRINT #15, "NO:SAVE,01" (return). When the red light on the disk drive is off remove this disk from the drive and mark it pilot #1. Note that one disk must be formatted for each pilot (i.e. a disk may only contain information for one pilot). Next place the program disk in the drive and type LOAD "*",8 (return). When the computer returns a READY prompt type RUN (return).

WARNING: When the computer asks you to assign a name to each of your crew members, make sure you enter at least one character for the name. If you do not, you may encounter difficulties later in the game.

SETTING UP

1) After the program loads, you will be asked if you wish to play with more than one player. If you elect to play with more than one player, each will control a pilot and the players will take turns flying missions (the players must decide on the order of play). If a pilot is killed during a multi-player game, the computer will once again ask if you wish to play a game with more than one player. If the players so desire, new pilots may be started to replace pilots that have been killed.

2) Remove the program disk and insert your player pilot disk as instructed. This disk will continue to update your pilot's records after each mission. You can quit playing after any mission and resume later where you left off, but only if you answer "yes" when asked if you wish to save the game. **Be sure not to stop a game in the middle of a mission, as this will automatically kill your pilot (only stop a game after you have responded "yes" to whether you wish to save the game).**

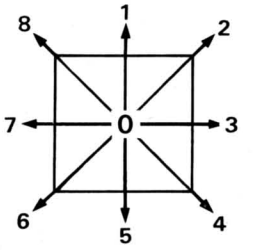
3) You will be asked if this is your first mission. If "yes," then you will be asked to enter the pilot's name. If "no," then the game will continue with your current pilot. At this time, you will be asked to enter the names of your crew members.

PLAYING THE GAME

1) You will be assigned a target and assembly altitude and will be asked how much fuel you wish to take. The more fuel you take, the less bomb load you will have. Type a number between 1 and 100 to represent the percentage of maximum fuel you wish to take on your mission. Entering a "1" will get you 1% of your maximum fuel (25 gallons), entering "50" will get you 50% of your maximum fuel (1260 gallons), entering "100" will get you 100% of your maximum fuel (2520 gallons), etc. After you have entered your fuel allocation, you will be given the option to fly overloaded. Flying overloaded will increase your bombload by 20%, but causes you problems if you lose an engine on takeoff.

2) Upon takeoff, the map will be displayed. Your B-17F will be a small flashing dot over your home base in England. Your plane will be at 5000 feet. You may move your plane by typing in the appropriate number:

1 = North
2 = NE
3 = E
4 = SE
5 = S
6 = SW
7 = W
8 = NW
0 = Hold position



3) After each move, you will be presented with a view of your plane. A menu listing your options can be found on the upper left of the screen; and below this, the computer will display the terrain you are currently flying over and the name of your aircraft. (If you lose your aircraft the computer will automatically assign you a new one; but if you lose more than 10 aircraft, you will be sent home in disgrace, so be kind to your equipment.) At the bottom of the screen you will find a row of seven digits. Each digit informs you of the weather at each 5000 foot increment up to 35000 feet. The leftmost digit represents 5000 feet, while the rightmost digit represents 35000 feet. A "0" indicates that there are no clouds at that altitude, while a "1" equals light clouds. Numbers over 1 represent increasingly heavy layers of clouds. The weather is generally better towards the southern end of the map. A weather of "1" at 5000 feet indicates ground fog. Ground fog will not hamper take-offs, but it is better not to land during fog. Enemy fighters will not attack you if fog is present, or if you have any clouds (weather >0) at your altitude. In addition, if you have clouds between you and the ground, flak will not fire and you will be unable to hit your target.

4) The menu items are explained below:

ALT xxxx = The altitude you are currently flying at.

Fule xxxx GAL = Fuel remaining in gallons.

ENG FIRE EXT 1-4 = To activate an engine fire extinguisher, type the number of the appropriate engine (you have two per engine).

HAND FIRE EXT 5 = To activate a portable fire extinguisher inside the plane, type "5" (you have 5 of these).

ALT U/D = Type U to climb 5000 feet or D to dive 5000 feet.

SALVO S = Type S to drop your bombs on the target.

MAP M = Type M when you are ready to move again.

TARGET POINTS = this will always be −1000 until you hit your target or abort your mission; otherwise, it will show the number of victory points gained from bombing the target.

TOTAL POINTS = Accumulated victory points excluding target points from this mission.

ABORT A = Type A to abort the mission. This will leave you alone (the other bombers will continue to the target), but will save you 1000 points by setting the target points to 0.

5) When you type M, the map will be displayed and you will be able to make your next move. If your plane marker is a large dot (●), then you are at mission altitude and have joined up with your bomber group. When you are flying in formation, you will have the added protection of your comrades and will be confronted with significantly less enemy fighters. If you are flying alone, your location will be shown by a small dot (·).

6) You will continue to cycle through steps 2-5 until you have completed your mission and returned to base.

ENEMY FIGHTERS

1) As you move, you may encounter enemy fighters. The chance of facing enemy fighters

varies depending upon your location, formation, and mission number. The map is divided into 4 zones A, B, C, and D (refer to the map on the back of this manual). No fighters will oppose you in zone A. In zone B, you may encounter light fighter opposition, but you will be protected well by your fighter escort. In zone C, you will encounter more enemy fighters and will only have a small amount of protection from your limited escort fighters. In zone D, you will encounter the most enemy fighters and will have no fighter escort (long range fighter escort did not become a reality until later in the war). In zones B, C and D you will encounter more enemy fighters if you are not flying in formation with your bomber group. As the mission number increases (i.e. as time goes by), the amount of German fighter opposition will increase, as will the amount of friendly fighter protection.

2) Each time an enemy fighter begins a firing pass you will be presented with a tactical display. A list of all weapons capable of returning fire and the amount of ammo remaining in each weapon will be listed at the upper left corner of the display. Below is a list of all weapons available on your plane.

3) There are up to 7 rounds of fire during each fighter pass. If you wish to fire a weapon during the round, type the letter of the available weapon. If you do not wish to fire, press any other key. If you fire a weapon, one ammo point will be subtracted from its ammo remaining (this will not be shown immediately on the screen). If your fire did not destroy (or at least claim to destroy) or drive off the enemy fighter, it will fire at you and then move closer to your bomber; and you will once again be given a chance to fire. As the enemy fighter moves closer to your B-17, it will be easier for both planes to hit the other with its weapons. The ability of your gunners to hit or drive away enemy aircraft will improve as they gain experience.

4) Your 30 caliber weapons are much less effective than your 50 caliber weapons at long range. As the range closes the difference in ability of your weapons decreases. There are 3 types of German fighters each with the abilities given below:

FW-190 — This plane is the hardest to hit and has average firepower.
ME-109 — This plane is average on defense and has the weakest firepower.
ME-110 — This plane is the easiest to hit but has the greatest firepower.

FLAK

1) If you fly over a target or an A-A battery while at an altitude under 30000 feet, you will receive flak if there are no clouds between you and the ground. The flak intensity will vary based on your altitude (the lower you are the heavier the flak). Four targets are protected by extra flak concentrations and will fire heavier flak than normal. The four heavy flak targets are La Rochelle, Lorient, Vegesack, and Wilhelmshaven.

2) If during flak a fire is started on your aircraft, you will receive additional flak (the flak batteries have seen that they have the range and will begin to concentrate on you).

BOMBING THE TARGET

1) Once over the target, you may encounter enemy fighters and then flak before you may drop your bombs. Once you have dropped your bombs, you will be subject to more flak and fighters.

2) You will not be able to hit your target if there are clouds between you and the target.

3) When you drop your bombs on target you will first receive 1000 points to counteract the −1000 points you begin with each mission; and then you will receive up to an additional 1000 points based on the size of the bombload, the altitude of the bombing run, the experience of the key crew members, and the effect of any applicable damage to the plane and crew.

4) You may choose to bomb a target other than the one assigned to you; however, the points received for the bombing will be significantly less than those you would receive for bombing the assigned target.

Identifier	Name	Type	Ammo	Crew Member
N	Nose Gun	Single 30 cal.*	15	Bombardier
R	Right Cheek Gun	Single 30 cal.*	10	Navigator
L	Left Cheek Gun	Single 30 cal.*	10	Navigator
E	Top Turret Guns	Twin 50 cal.	20	Engineer
P	Port Waist Gun	Single 50 cal.	10	Port Gunner
S	Starboard Waist Gun	Single 50 cal.	10	Starboard Gunner
B	Ball Turret Guns	Twin 50 cal.	20	Ball Gunner
T	Tail Guns	Twin 50 cal.	20	Tail Gunner

* There is a 5% chance after each mission that your 30 caliber guns will be upgraded to 50 caliber guns. If you lose your plane, your new plane will begin with 30 caliber guns, but the chance will increase to 10%. When upgraded, all three 30 caliber guns will become 50 caliber guns.

ABORTING THE MISSION

At any time prior to dropping your bombs on target, you may opt to abort your mission. If you abort the mission, your bombs will be released and your Target Points will be set to 0. However, since you have elected to drop your bombs and return home, you will no longer be allowed to fly in formation with your bomber group. Although you can wait to abort until you have returned to the safety of England (in effect recalling the entire bomber group), don't forget that as long as you have not dropped your bombs there is always a chance that an enemy fighter will detonate them and destroy the plane. You will also use more fuel while carrying your bombs.

FORCED LANDINGS AND BAILING OUT

1) If you are forced to land in water, you may be rescued. Your chance of being rescued will be lowered by certain types of damage to your plane and crew (see the section on damage). Ditching always causes the loss of the plane.

2) If you are forced to land on land other than your airbase, you may crash into a building. If you land in England and do not crash, your crew and plane will be available for your next mission (it is assumed that you landed at an emergency field). If you crash in England, your plane will be destroyed and you may lose some of your crew (including yourself). If you land on the continent, you will always lose your plane but you may escape capture and return to England (sometimes with your crew).

3) Occasionally you will be forced to bail out of your plane. If you bail out over water, you may be rescued (but don't count on it). If you bail out over the continent, you may be captured. Your plane will always be destroyed when you bail out.

FUEL

In this game, time and distance are measured by the amount of fuel used (Example: since moving northeast (diagonal) uses more fuel than moving north, it is assumed that it also takes more time and thus allows more opportunities for enemy fighter attacks). Standard fuel consumption figures are given below (rounded down):

move diagonal	25
move non-diagonal	37
hold present position	20

These figures are assuming no bomb load. If you are carrying a bomb load, you will consume 5 additional gallons of fuel each turn. Each windmilling engine will consume an additional 7 gallons each turn. Each fuel leak will cause the loss of an additional 12 gallons each turn. Each time you climb 5000 feet you will use 15 gallons of fuel; while each time you dive 5000 feet, you will receive 10 gallons of fuel (to account for the use of less fuel during the dive). These consumption figures are displayed below:

windmilling engine	7
fuel leak	12
bomb load	5
climb 5000 feet	15
dive 5000 feet	−10

DRAG POINTS

The combination of damaged engines and carrying a bomb load may restrict the ability of your aircraft and are accounted for by the use of drag points. The following adds drag points to your plane:

Carrying a bomb load = .5 drag points
Engine feathering = 1 drag point
Engine windmilling = 1.5 drag points

The effects of drag points are as follows:

1 drag point : No effect.
1.5 or 2 drag points : Speed reduced, cannot fly in formation with bomber group, and chance of additional German fighters intercepting.
2.5 drag points : Even greater chance of additional German fighters intercepting.
3 drag points : Aircraft will lose 5000 feet per turn, and even greater chance of additional German fighters intercepting.
3.5 or more drag points : Aircraft forced to land.

CREW EXPERIENCE

Before each mission the computer will list the names of your crew along with the number of missions each crew member has survived; the greater the number of missions, the greater the experience of the crew member. As a crew member's experience increases, so does his ability to perform his job. Thus an experienced radio operator will be able to increase your chances of rescue after ditching (he can quickly radio the proper SOS), while

a gunner will be more likely to destroy or drive away an enemy plane. All crew members have specific functions that will improve as they gain expereince.

CALCULATING TARGET POINTS

The following formula determines the number of points received for bombing a target:

(OT * BOMB LOAD * BOMB LOAD * RANDOM NUMBER BETWEEN 1 AND 100) / (ALTITUDE / 100)

The bomb load in the formula is equal to 100 times the bomb load percentage. OT is a reflection of the amount of plane and crew damage and is a number between 0 and 1 (a value of 1 reflects no damage to the plane or crew). When bombing any target other than that which was assigned the value of OT begins at .2 instead of 1. If the formula results in a number greater than 1000, the target points will be set to 1000.

DAMAGE

Some of the effects of damage are listed below.

Crew

Oxygen hit: The aircraft will lose 5000 feet a turn until it reaches 15000 feet. You will be unable to climb.
Heater hit: Each turn if you are at an altitude above 10000 feet the crew member may incur frostbite. The higher the altitude and the longer you remain above 10000 feet the greater the chance of frostbite. Frostbite will cause the crew member to become incapacitated for the remainder of the mission and will cost you mission points.
Light wound: No effect on crew member, however 2 light wounds on the same mission will cause a serious wound.
Serious wound: Incapacitates crew member and costs you mission points. Will be the last mission for all crew members except the pilot who may recover from his wounds to fly again.
Killed in Action (kia): Costs you mission points and if the pilot is killed ends the game.
Loss of Navigator: Increases fuel usage when not flying in formation. Also reduces chance of survival after ditching.
Loss of Radioman: Reduces chance of survival after ditching.
Loss of Bombardier: Reduces bombing effectiveness.
Loss of Copilot: Increases the chance of a crash on landing.

General Aircraft Damage

Norden sight: Reduces bombing effectiveness.
Gun hit: Makes the gun inoperable.
Fire in fuselage: If put out causes no problem. The plane carries 5 portable fire extinguishers.
Bomb controls: Reduces bombing effectiveness.
Auto pilot: Reduces bombing effectivness and increases the chance of a crash on landing due to pilot fatigue.
Control damage: Increases the chance of a crash on landing.
Wing root hit: Accumulated damage will destroy the aircraft.
Stabilizer root hit: Accumulated damage will destroy the aircraft.
Fuel tank leak: Loss of 12 gallons of fuel each turn for each fuel leak.
Landing gear hit: Increases the chance of a crash on landing.
Raft destroyed: Reduces the chance of survival after ditching.
Bomb release damage: Reduces bombing effectiveness.
Bomb bay doors damaged: Unable to drop bombs.
Bomb hit: Bombs detonate and kills entire crew.
Radio hit: Reduces the chance of survival after ditching.

Engine Hits

Engine runaway: Causes immediate bail out of crew.
Engine feathered: Adds 1 drag point.
Engine windmilling: Adds 1.5 drag points and consumes an additional 7 gallons of fuel each turn.
Engine fire: If put out causes no problem. There are 2 fire extinguishers per engine.
Engine oil leak: Will cause the engine to feather when the engine runs out of oil.

REWARDS

Your rank will increase as your total points increase as follows:

7000 points — Captain
15000 points — Major
25000 points — Lieutenant Colonel
38000 points — Colonel
55000 points — Brigadier General

Each mission you will be given mission evaluation points based on the mission difficulty, your ability to follow orders, and your ability to perform your mission. These points are added to your total score and will aid in gaining promotion. If you receive enough ME points in a mission you will be awarded a medal. The following medals are possible:

The Legion of Merit
The Distinguished Service Medal
The Air Medal
The Distinguished Flying Cross
Oakleaf Cluster

You will be awarded a *purple heart* if you are wounded during a mission.

If you've survived fifty missions and made General — no mean feat, indeed — we'd like to congratulate you on a job well done by awarding you a special Certificate of Achievement.

Just send a photo of the screen display showing your accomplishment to:

STRATEGIC SIMULATIONS INC
883 Stierlin Road, Bldg. A-200
Mountain View, CA 94043-1983

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Mighty Eighth War Diary by Roger A. Freeman
In the Cockpit by Robinson

LONELY FORTRESS IN THE SKY

By Robert S. Billings

White contrails streaming out behind them in the sky, the B-17s would leave the safety of the English coast and set out across the cold slate-gray waters of the English Channel, shimmering far below them. Each crew was part of a big parade in the sky that might extend for many miles. A glance out of the already frosting windows might well bring a proud surge in the chest. They could feel part of a mighty machine which had been assembled with thousands of hours of production, training, and planning — all leading to this moment of truth. The parade in the sky was protected by hundreds, even thousands of heavy 50-caliber machine guns, each with its long belts of hundreds of shells. And on the flanks of the parade they could see scores of protecting fighters shepherding them on their way.

It was enough to give a man a glow of confidence. For the moment, that is — if one could forget what was soon to come.

All too soon those fighters would turn back, only enough fuel in their tanks to get them to their home bases. And then the German fighters would be on them — FW-190s, Me-109s and 110s, their wings glittering with little sparks where their machine guns and 20-millimeter cannon were firing at the bombers. And then, after what seemed and often were long hours of battle, the German fighters would disappear and the target would be below the parade in the sky — no longer in full formation but shot through with gaps where there had been the planes that were now only a part of that trail of fires and explosions that extended behind them for hundreds of miles. Then the black flak would start to blossom around them, each burst spreading lethal metal in all directions. And when welcome "Bombs away!" finally came and they could take evasive action and pray to make it through the rest of the flak, there was the certain knowledge that if they did, the enemy fighters would be waiting, wingtips winking their little sparks at them in greeting.

So there was not long for the glow of confidence to warm them — once they had been through it and knew what to expect. They were no longer parts of a mighty machine, welded together to strike terror to the hearts of the enemy. Each B-17 became a lonely little fortress in the sky, lost in its own battle of survival.

The men huddled over machine guns and instruments within these heavy bombers were, for the most part, civilians recently enlisted into the Army Air Force, hurriedly trained as specialists, and then flown overseas to take on the air force that Hitler and Goering had created and made the greatest combat air power ever to exist — the Luftwaffe. In each plane there were ten men — four officers and six enlisted men. There was the pilot (who was the commanding officer of the unit) and the co-pilot (the only other man in the plane who could fly it if the pilot became wounded). But what happened if both pilot and co-pilot were disabled? The first choice was to bail out and hope all the parachutes opened (and this was no hundred-percent certainty, by the way). But on many occasions one or more of the wounded could not jump and their comrades would not want to leave them to be killed in the inevitable crash. Then there was only one hope.

The Air Force had found the best way to get sufficient numbers of qualified men to fill its many specialist roles was to let every minimally qualified applicant be admitted to pilot training. Then the "washing-out" started. At any period during the training a candidate could be disqualified for one of countless reasons. And they were — by the hundreds.

These men were not lost to the Air Force, however. They were the source for the many thousands of other specialists needed. Consequently it was fairly common for at least one of those other eight men in the plane to have received some flying training before "washing out" and becoming a gunner, radio man, or bombardier. Thus it was that the "washed-out" specialist could, if he had sufficient courage and confidence, try to bring the plane home and land it. If he succeeded, he was a hero and his badly wounded comrades were saved. If not there would be another burning pile of rubble on the runway and any medals for heroism would be awarded posthumously.

The other two officers in the plane (the ones most likely to have had some pilot training) were the bombardier and the navigator. It was the bombardier's primary responsibility to line up the target in the famous Norden bombsight during the bombing run. The instruments were so arranged that, usually, the bombardier actually controlled the flying of the plane until he had pressed the button which released the bombs. During those few (but to the men in the plane, surrounded by flak in the bomb run, interminable) seconds, the bombardier was the most important man in the plane. For all ten men in the plane were there for one purpose, finally — to put those bombs on the target. During all the other flying hours necessary to get to the target (and to get home again afterward) the bombardier served as a gunner in the front of the plane.

The navigator was the officer who plotted the course all the way. He was the one to know where they were at any given moment, the one to tell the pilot where to fly if they became separated from their formation (as happened many times, either because of a mechanical failure requiring them to abort the mission or because damage to the plane made it impossible for them to keep up). The navigator also was the plane's "record keeper," noting down everything of significance that happened on the mission and exactly when it had happened. The gunners especially relied on him to note their claims of planes shot down. And in his spare time, the navigator was expected to man one of the guns in the forward section of the plane.

The other man in the forward section was the engineer. He was an enlisted man — usually a sergeant with training in the technical aspects of the bomber. But when they came under attack from enemy fighters he manned the turret on the top of the fuselage.

Back in the midsection of the plane were the waist gunners, enlisted men manning single 50-caliber machine guns, one on each side of the plane. Behind them in a separate compartment was the radio operator. Below them in the ball turret (a little plexiglass bubble sticking out of the belly of the plane) hunched the belly gunner over his twin fifties. Shut off from all the others, crammed into his few feet of space like a fetus, and hanging in space with only a thin sheet of plexiglass between him and thirty thousand feet of nothingness below, he had a right to feel the loneliest man in the plane.

Finally, the tenth man crouched behind his twin fifties at the very tail of the plane. Early versions of the heavy bomber had left him out, but he had been quickly included when it was seen how vulnerable the plane was without him. He had a perfect view of any attack from the rear, and the fire of his guns quickly taught enemy fighters to seek some less well defended avenue of approach.

Thus, the B-17 was indeed a flying fortress, with guns pointed in all directions. All told there would be seven gunners manning ten machine guns — a turret with two guns pointed at the

rear, another in the top, a third in the belly, single machine guns on each side in the waist, and single guns manned by the bombardier and the navigator in the forward section. (Later in the war the bombardier's firepower was increased by building a twin-gunned turret into the nose, giving the plane a "double-chinned" effect).

But desite this heavy firepower, the planes were far from invulnerable. In the first place, there was no sure-fire defense against antiaircraft fire. And Hitler had mustered thousands of antiaircraft guns and clustered them about all the potential industrial targets in Germany and the countries its forces occupied. And the Germans had an excellent antiaircraft weapon in the eighty-eight. But even more than the flak, the German fighters proved to be the greatest menace. Until the Allies could provide fighter escorts all the way to the target (and they managed to do this only in the latter stages of the war), the bombers would have to run a gauntlet of fighter planes — sometimes for hundreds of miles.

The American generals desperately tried to develop formations which would make the heavy bombers less vulnerable. Large groups of planes were clustered together to mass tremendous amounts of firepower in each direction. This helped some — but not much. The German fighters could hang back until Allied fighters had reached the end of their range and had turned back, and then pounce in overwhelming numbers on any part of the bomber formation they wished. For since a bomber formation could extend for ten miles or longer, all guns in the formation could not be brought to bear on the point of attack at one time. And though there might be more than one of these long ten-mile bomber processions in the air, there was no way one could support the other. Experience had shown there was a definite limit to the number of bombers that could be grouped together in flight without making impossible adequate control of the larger number of planes.

Thus it was that, until long-range fighter escort could be provided, the heavy bombers, if they were going to achieve the goal for which they had been created, had no other choice but to fight their way against these heavy odds. One can easily understand why the crews would groan when the morning briefing indicated they were to proceed to a distant target within Germany — and why there was an inner rejoicing when they were told the target was close to the French coast. There might be heavy flak over these closer targets. But there would not be the long minutes or even hours under constant fighter attack.

Of course the Army Air Forces' public relations personnel made it look much better for the home front. There were exorbitant claims of the number of German fighters claimed by the omnipotent "Flying Fortresses." And losses were glossed over and never fully reported to the public. But the flying crews, even though they were partly responsible for the exaggeration in the claims of German fighter losses, could not be fooled about their own losses. They actually saw the bombers exploding in the air, or going slowly into their final, flaming dive while their comrades watched and counted parachutes — if indeed there were any.

Each airman within each ten-member crew had to come to grips with the reality of his situation and find a way to live with it. He found himself at the center of three separate wars, and usually he concluded that it was the smallest of these that mattered most to him.

The largest of these wars — the war in which he had enlisted to fight, the war which the "home front" thought he was fighting — was the war against the Axis. To those in England it was the war against Hitler and all that he had come to stand for. And certainly that was enough war for anyone. In 1942 Hitler and the country he led had successfully conquered almost all of Europe, had nearly swept the British out of North Africa, and her ally, Japan, had effectively taken over the rule of most of Asia and the islands of the South Pacific. German and Japanese armies appeared to be unconquerable. Their morale was high and they were provided with the finest war machines for battle on land or sea — and especially in the air. And Germany was increasing its production of airplanes as the months progressed. In this war she seemed supreme on all fronts.

Before the year was out, however, there would be some changes which would seem more and more important as the war progressed. There would be the British victory at El Alamein, the stubborn Russian defense of Stalingrad, and the apparently miraculous American victory over the Japanese at Midway. Yet in Europe little seemed to have changed. Hitler still occupied almost the entire continent, with only his eastern divisions on the Russian front meeting any challenge. And Russia was thought by most to be hanging on the ropes and barely able to stay in the fight.

This was the "big" war the American airman was in. But it was not the war uppermost in the minds of most of his leaders. They were fighting another war — a war which had been going on since World War I and in which they had suffered many nearly disastrous defeats. It was the war of the Army Air Corps against the Army and the Navy — a war to force acceptance of air power as the supreme force in modern warfare.

This war had had its heroes and its martyred saints. Chief among this latter group had been Billy Mitchell, who had bravely asserted the claims of air supremacy and had been court-martialed and run out of the service for his pains. Officers (later to become the generals of the World War II Army Air Force) had come to see their primary mission as always the same: to prove the claim of their early prophets — that strategic bombing was the war of the future and must take precedence over all operations on the ground or at sea.

Now, with the B-17s and B-24s beginning to arrive in England in large numbers, the justification of the prophets of air power was thought to be at hand. General Henry H. Arnold, commander of all American air forces, would see that the war, so far as he could control it, was fought with this goal uppermost in mind.

In one sense Europe was a perfect theater for this war. In theaters where there were large ground or sea forces in action there would be the strident competing claims of the other services, claims for the use of air power to support their attacks on the ground.

But here in Europe there were no forces in action on the ground to support. If there was to be any action against the enemy now, any action to help relieve the pressure against the Russians — who were clamoring for a "second front" in some form as quickly as possible — it would have to be action in the form of strategic bombing. So the true-believers of air power nervously awaited the arrival of the heavy bombers and argued against any diversion of them to the Pacific or to the North African front. Generals of ground force units might argue that close support of their units should always take precedence, but those prophets who had dwelt so long in the wilderness, shouting their claims to an uncaring world, knew their moment was at hand. If they could just keep the heavy bombers from being diverted, they would soon be there by the hundreds, and Germany would be bombed until she was knocked out of the war — without any "invasion" with its thousands of casualties and tremendous waste of the weapons of war.

There were three points the proponents of strategic air power had to demonstrate to the satisfaction of their superiors if the airmen were to be allowed to fight the war their way: they had to show that daylight bombing from heavy bombers was accurate enough to be effective, that it could be achieved without unacceptable losses, and that this bombing would be sufficient to destroy the enemy's ability to wage war.

The last of these was most impor-

tant but impossible to demonstrate, at least while the enemy continued to fight, so proponents of air power merely assumed it was so — and to some considerable extent got away with it. But it was not so easy with the first two. Bombing accuracy was difficult to show perfectly, but at least photos of the bombs landing in the target area could be taken — and they were in large numbers. From there it was a matter of argument — if twenty per cent of the bombs landed close enough to be considered hits (within 1,000 feet of the aiming point), was that enough to make the mission a success? Since twenty per cent was better than some of the missions demonstrated, and greater than twenty per cent was rare, the Army Air Force had to argue that it was. And on that point nobody really had enough information from the enemy to prove them wrong.

But on the matter of our own losses the figures could not be fudged or assumed away. At the end of each mission a definite number of missing planes and crews could be counted and had to be reported. Little wonder, then, that higher headquarters was extremely sensitive to these loss figures. It was only simple prudence that, whenever there were losses of as many as sixty heavy bombers (perhaps one out of every four) on a mission deep into Germany, there would follow a number of "milk runs" to the coast of France until the huge losses were rendered somewhat more "acceptable" by being diluted and submerged in the "averages." And if such devices should be considered dishonest, who could be concerned with such fine points of ethics when there was a genuine war on — in this case the war of the Army Air Force against the other two services.

But to the ten crew members, whose own possible loss could never be "averaged out" and remained always the difference between life and death, neither of these two larger wars were what mattered. These men were the actual pawns who would have to shake the sleep from their brains in the predawn darkness and stumble into the briefing room, where the odds of their living or dying that day would go up or down on the basis of some remote target-selection officer's choice. Why that target had to be hit was of no real concern. Others in high places could worry about the larger wars — they were concerned with only one. Day after day they fought only one war — the war of their own survival. If they could make it home to base that day, that was one more mission to add to their total. And that total was the only real battle statistic that mattered. If they could only make it through to the magic number that meant they had completed their present tour of duty, the rest would all be quiet pastures and loving sighs.

So they lived at the whim of higher headquarters and the weather. Days and missions blended together in their minds, and they sought for ways to suppress their fear, counted their missions and waited.

Not all did, of course. Not every man's breaking point could be set according to the goals of the Army Air Force. Some middle-grade officers, who had the power to decide which of the missions they would accompany, would somehow always be present on the milk runs and absent on bitterly contested, unescorted forays deep into Germany. Some pilots, who as commanders of their planes had the power of decision, would hear non-existent faults in their engines and pull out of formation and return to their bases. "Abortions" had to be allowed; some planes would develop real mechanical problems on each mission, and to insist they continue would lead to needless waste of planes and crews. But how many of the abortion problems were genuine and how many existed only in the human frailty of a pilot we can never know.

Probably the Army Air Force never knew. Perhaps they didn't want to know. To admit there was such a problem would let the wrong image of the American airman get back to the home front.

After all, more than the war against Germany was at stake. The existence of the Army Air Force as a competing organization, with needs equal to those of the ground forces and the Navy, hung in the balance. Much better to keep things quiet within the family. A milk-run major could be reassigned, made officer in charge of the PX, say. Plane commanders could be demoted, the power of making the abortion decision taken out of their hands. And if a lowly gunner simply refused to fly, much better to assign him to permanent KP duty than to start court martial proceedings, with all the unfortunate publicity that would entail. And it must be admitted there was a certain wisdom to this apparent hypocrisy. After all, the great majority of airmen continued to fly, to take their chances on the odds. Most men did not want to admit the fear which lay behind their cocky fly-boy facade, so they mocked it, painted pretty girls or cartoon characters on their planes, gave them jaunty names and turned out in the early-morning darkness for their briefings.

So they came clumping into the briefing room, some swaggering and making jokes about the fear under their facade, some quietly taking notes and trying to keep their minds on the mission at hand and away from visions of themselves going down in flames. Then there would be the briefing officer's cheery "Good luck," and a few moments later they would be piling into the trucks taking them out to the planes. Once there they might spend hours waiting for the order to load up and take off. No one could be sure when the morning fog, present more often that not, would lift. Perhaps they would spend the whole morning and part of the afternoon sitting there and waiting.

But if the weather was right they would soon be clambering into their planes, bombs loaded, thousands of machine-gun rounds packed into their compartments, and the lead plane headed down the runway. Then they would climb, often through low clouds or the remnants of fog, until they broke through into blue sky and bright sunlight.

As they climbed they could feel no warmth from the sun. At twenty-five or thirty thousand feet the temperature would be well below zero, and despite many layers of flying clothes the cold would creep through to add to their misery. They would have many minutes, possibly even an hour or two of flying while their group formed up and sought the other elements of the larger formation of which they would be a part. Finally, the whole aerial parade assembled, they would turn out over the English Channel. This was the easy part. Friendly fighters would join them and fly alongside or above them. Gunners would test their guns. Most planes that were going to abort would have done so by now. The rest were as ready as they could be. So the crews would wait by their guns, scanning the sky around them.

If it was a mission to the sub-pens on the coast of France, they could probably count on fighter support for the whole trip. But it was those long forays, hundreds of miles into Germany, that brought the sweat of fear despite the bitter cold. For then, all to soon, the friendly fighters would have to waggle their wings and turn back. Now the bombers were on their own.

The German fighters would hang back until the escort had left. Then they would come in. At first the Luftwaffe had attacked from the rear. But they soon had learned that this was not a point of weakness for the B-17s, that the best avenue of approach was from the front and at the same altitude as the bomber. Then the bomber's top turret could not depress its guns enough to take them on, and the belly turret could not elevate sufficiently to fire at them. There was only the hand-held single machine gun of the bombardier to worry about, and the fighters' machine guns or cannon could outnumber that single gun many times over.

But there was not always the opportunity for such an ideal attack, and in the heat of the action attacks would often come from nearly every direction. Then the intercom would sputter with

warnings. "Bandits at 12 o'clock!" "ME-109 at three o'clock!" FW-190 — six o'clock high!"

If the German warning system had worked well and there were no shortage of fighters (and in the days of '42 and '43 that almost always seemed to be the case), the attacks might last for hours. As soon as one group of fighters had used up their gas and expended their ammunition, a new group would take over while the first group returned to refuel and rearm. Then this first group would go aloft again to catch the bombers coming back.

Usually the fighters would pull back only over the target. Then the antiaircraft would take over. While it is true that losses from enemy fighters were much greater than those from antiaircraft guns, that was probably in large part because the bombers would spend so much time, often hours, under attack by fighters — and perhaps only a very few minutes, sometimes merely seconds, flying through flak over the target. For the bombers were carefully routed to by-pass all other flak areas (unless lack of fuel made it impossible to do so). And though at high altitudes the likelihood of many direct hits over the target was not great, a direct hit would almost certainly destroy a plane. Even near misses would riddle a plane and perhaps cause serious casualties.

As soon as the bombers had finished their bomb run and were clear of the target area, the fighters would come in again. The gunners would stand by their guns or hunch in their turrets, hoping the ammunition would last, praying for the moment when P-38s or Spitfires would appear out of the west.

Along the way they would have seen many of their comrades go down. Sometimes a bomber would start to trail smoke, lose altitude, then begin a long, slow glide earthward. If there was a free moment someone would count the parachutes that blossomed below it. Or a bomber might be flying alongside one moment and suddenly explode the next. Then there would be no parachutes, only flaming debris plummeting past them toward the earth far below.

When friendly fighters finally appeared, the worst would be over — for most of the remaining crews. But there would be some for whom there would remain many moments of doubt before they reached base — and some who, even having come so far, would never reach it. These were the crews in crippled bombers, coming in on one or two engines, fighting for altitude, praying for a few more minutes aloft. There were others, especially on missions deep into Germany, whose gauges showed their fuel almost gone and who prayed for it to last just a few minutes, even a few seconds more. Those for whom it did passed over the English coast and made for the nearest emergency landing field.

For those who were not so lucky, it was "ditching" time. The plane was lost — but perhaps the crew could be saved. They could take to their parachutes if they had sufficient altitude. But a man alone in the rough waters of the Channel, with only a Mae West to support him, had the odds badly stacked against him. So if the crew trusted their pilot, they would probably choose to ride the Fortress down. Then their fate was truly in their pilot's hands.

If he was skillful enough, and lucky, he might be able to put the heavy plane down just right — on the crest of a wave rather than head-on into one. Then they would have a few seconds while the plane filled with water. If they had been braced in their proper stations and had stayed there till the plane stopped, if there were no badly wounded aboard who could not be moved quickly, and if they wasted no time getting out of the windows or the hatches, they all might make it before the plane settled below the surface, sucking with it anything or anyone too close alongside.

But if all went well, and someone had had time to release the inflatable boats, their odds were immeasurably improved. Then there would be some emergency supplies, a radio that might work, and — perhaps most important of all — some flares and a flare gun. They could then signal a passing ship or plane (praying all the time it wasn't German). They had to get help quickly. Otherwise the strong current could well sweep them to the coast they had just left — and to long months or years in a POW camp.

But just how successful were these sorties of the strategic bombing force? Did they win the war by themselves, as the true-believers had said they would? Did they at least contribute substantially to that victory? Or was strategic bombing largely a hoax perpetrated by the high priests of Billy Mitchell?

Unfortunately, there is no clear-cut answer. One can find documented statements proving all three of these possibilities true.

Certainly American leaders were convinced a major invasion and ground campaign in Europe was finally necessary. But air power proponents argue that the decision was made before Allied bombers were operating with complete air superiority, that if top political and military leaders had been a bit more patient, more evidence of the effectiveness of the strategic bombers would have appeared. But as it is, the evidence of the effectiveness of the bombing is at best ambiguous.

There is little doubt that heavy bombers played a very crucial role at least twice in the final year of victory — in the breakout of Normandy at St. Lo and in the attacks on German troop formations during the Battle of the Bulge. But that was tactical bombing in support of ground troops — the very type of action the strategic bombing advocates decried as ineffective diversions. Just how effective were the raids of the strategic bombers against the targets chosen by the air-power advocates?

Certainly the British Royal Air Force bombing strategy — using night raids against large cities to destroy civilian morale — did not accomplish their purpose. Even though the intensity of the raids increased, with massive firestorms taking over 50,000 lives in such cities as Hamburg, German war production continued to rise. But the RAF strategy was not that of the Americans. The doctrine of the latter's Army Air Force was to use daylight precision bombing against vital targets whose destruction would drive Germany out of the war. What were the results here?

In the early missions against the coastal sub-pens, evidence at the end of the war shows the bombing was a clear-cut failure. Although bombs were dropped there by the thousands and the surrounding areas were demolished, the pens themselves, sheltered under many feet of concrete, continued their work without any real hindrance. The underwater menace was beaten, it later became clear, because of surface and air attacks directly against the submarines at sea — not by heavy bombers attacking the sub bases.

Against clearly industrial targets — the crux of the matter — the argument still rages. Opponents can point to the very large percentage of bombs that were clearly off their targets. And when they did hit, the damage done was often rectified with little loss of time.

Perhaps the best test-case lies in the Schweinfurt raids. Here was the American strategy in its purest form. From a Swedish contact the American target planners had learned that a large part of the ball bearings used in German military production were manufactured in the city. And ball bearings were certainly essential parts of nearly all war production. Bomb these factories out of existence, the American strategy said, and Germany will truly be driven out of the war — without recourse to messy and costly land battles.

So the famous Schweinfurt raids were undertaken. There were two, one in August of 1943 and a second two months later. Both were extremely costly.

In one 60 bombers went down and 17 came back so badly damaged they could not be flown again. As one observer describes the flight, there was a pathway of burning, crashed bombers all the way to the target. But even though the results of the first raid were not what had been hoped for, prudence did not permit another full-scale attempt for two months — and apparently the losses then were enough to prevent a third such attempt.

Yet the bombing results of the second raid were reported as being excellent. Did that significantly decrease German war production? Perhaps the strongest evidence of the proponents of the raids is given by Albert Speer, the head of production for the German military. He states that the second raid did knock out over sixty percent of Schweinfurt's ball bearing production. For a time desperate measures were required to get the necessary ball bearings to many of the factories engaged in war production. But before long, repairs were made and production was resumed. Speer says, however, that if the raids had been followed up quickly and repetitively — hitting not only Schweinfurt but factories in other cities as well — the results could have been much more disastrous for German production.

But of course they were not followed up. Perhaps they had been too costly for even Billy Mitchell's followers. Or was it that they were willing but feared their military and political leaders would simply chicken out and abandon strategic bombing completely for the rest of the war? No one can now be sure. And so the argument continues.

But to the pilots, bombardiers, navigators, gunners — shivering with cold and fear in their lonely fortresses in the sky — this argument was merely academic. This was not their war. Theirs was a war of diving fighters spitting streams of tracers, of black flak blossoming alongside them and sending hot metal through their plane to seek them out. All other wars for them were forgotten in their simple struggle for survival.

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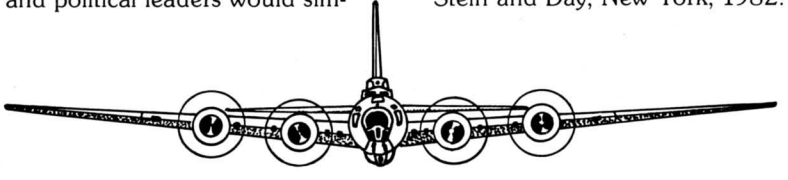

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