Market Scan

Rising Iron Costs Spell Tough Year For Steel Makers

Forbes.com staff 02.22.08, 7:16 AM ET

Popular Videos
Oscar's Leading Ladies
Oscar Night Extravaganza
Extreme Travel: Antarctica
Inside The One Percent
Recession Billionaires

Related Quotes

ANGGF	1.96	+ 0.00
JFEEF	43.45	+ 0.00
NISTY	54.49	+ 0.00
PKX	128.64	- 2.59
RIO	34.69	- 0.10
TYEKF	52.75	+ 0.00

get quotes

Related Stories
Baosteel Steps Away From Talks With Iron Ore Miners
The Fab 50

HONG KONG - Chinese and Japanese steel makers are bracing for a tough year amid steadily rising raw materials prices, particularly iron ore. After negotiating a new round of price hikes with suppliers, they will attempt to pass on the added costs to customers.

Many small and mid-sized Chinese steel makers, including Jiangsu Shagang Group, **Laiwu Steel** and **Baotou Steel,** have already raised prices on a range of various products in anticipation of a similar move by China's largest steel maker, **Baoshan Iron & Steel,** or Baosteel, for short.

A price hike by Baosteel looks inevitable, as it was reported on Friday to have accepted a 65% yearly increase in the benchmark price of iron ore from Brazil's **Vale** (nyse: RIO - news - people), the world's biggest iron ore producer, in negotiations taking place on the Chinese island of Hainan. The terms would be similar to those Vale reached earlier this week with seven steel makers in Japan, South Korea and Europe, including **POSCO** (nyse: PKX -

Subj: **Re: Second Question**
Date: 2/24/2008 5:17:37 A.M. Pacific Standard Time
From: hwcoulee@btinet.net
To: Baytown68@aol.com

Dear John, I am afraid I am not able to answer your questions very well-- all so far ago and long away!! As I told you I was on b24s (the flying boxcar) and not on b17s- the flying fortress. We could carry a heavier load than the 17s ie eight 250 pounders on 24s. I believe only six on 17s. We would sometimes carry four 500 pounders-- or two 1000 pounders. I don' recall ever hearing of a 2000 pounders! Of course, the b17s would carry only six 250 pounders, etc. I don't recall the calculations for the weight of the 50 caliber shells which were dispensed from cans about the size of a moderate sized suitcase, in hermetically (soldered) sealed. Each gun station had a full ammo can. None to spare.

The new German Fighter came after I had done my tour so can't tell you about that.
The Eighth Air Force appellation, I assume, predated the establishment of the branch of the armed serves know of as the Air Force (without any mention of "army") Everyone at my time in the Eight Air Force started out in basic in the Army. It was later that one would go directly into the Air Force when he put on his uniform and discarded his civilian clothes.

I hope this answers some of your questions- but memory is dim- and perhaps being only an enlisted man I did not know everything ever!. Oh yes, there were plenty of control that the bombs did not accidentally get armed and go off before they should. I can remember going back in the bomb bay some time after takeoff but before we reached altitude and taking out each little "pin" from the detonator apparatus on the nose of the bomb. This precision device was equipped with a miniature propeller which had to spin a hundred or more revolutions before the bomb was armed. As for the controls up front that prevented accidental bomb dropping there was a safety switch which had to be activated before the "toggle switch" would actually release the not as yet armed bomb... and then there was the bomb sight-- a Sperry at first- later a new model called the Nordon- the two complicated instruments were radically different from each other. All planned bomb dropping was to be done in formation and the lead ship would have the lead bombardier who would do the sighting and the bomb release---then this in all the other planes would be accomplished by the man in the nose (usually an officer- but sometimes a GI such as myself) releasing the bombs as he saw the "bombaway" in the lead ship. I was know of as a toggleer (?sp- has three sylables)

Well, I hope this answers some of your questions. I have probably written more than you bargained for-- and still have not satisfactorily answered. Cheers (for the 8th Air Force)

Dear J&J--

You will recall Mister Dooley's version of what Teddy Roosevelt had to say about cartels and trusts: "They are a hideous monster and I would stomp them underfoot. On the other hand, not so fast." I have to be somewhat that way about verisimilitude in this novel: I want it to be generally in line with reality's law of gravity, but on the other hand, I'm busy making up a story for the reader here. So, I'd ask the two of you, and particularly John, to zero in on anything that sounds too unlikely, particularly in the flying sequences. All of them actually are based on oral history accounts I've found, even the one about trying to get the seaplane off the gravel runway.

Who these characters are and what this is about:

--It's autumn of 1943, and Ben Reinking is a non-flying Army Air ~~Force~~ CORPS * lieutenant. He was yanked out of fighter pilot training to serve as a military war correspondent for a shadowy outfit called the Threshhold Press War Project--TPWP, known unhappily to Ben as Tepee Weepy. His primary assignment, besides some combat coverage, is to write the month-by-month story of his college football teammates, **all** of whom went into the war. Three of them have been killed by now, which has Ben grimly wondering whether the law of averages has been repealed.

* USAF formed off Abt 1947 or '48

--The guy who played fullback, Jake Eisman, is flying B-17 bombers from East Base in Great Falls to Fairbanks in the Lend-Lease pipeline of aircraft to Russia. Jake is Jewish, with a family from a history of pogroms in Russia and elsewhere, and in this war against Hitler he wants to get to the European theatre to bomb the balls off the Germans, as he puts it. But he's stuck on this Alaska delivery run, and Ben is riding along to write about him in the flight in the opening scene.

--There's a brief mid-air mention of Ben's love interest, a WASP ferry squadron leader, Captain Cass Standish. Cass is married, unfortunately not to Ben, and they're desperately keeping their affair a secret lest they be busted in rank, handed Section 8 discharges, whatever. Cass and her flying women are piloting P-39 Airacobra fighter planes from Great Falls to Edmonton.

** But I don't know exactly what these WASPS may have been called but I doubt it was "Leader"

Not likely officer & officer — or enlisted to enlisted — but off to enlisted — death to career for rank

--On pp. 130-132 there's an interlude about Ben's father, editor of the *Gros Ventre Weekly Gleaner* that has shown up in English Creek etc.; he's musing on his son and some other things, you needn't pay much attention to this part.

Some background: The Russians did have their own contingents at Fairbanks and Nome, even unto ground crews; the USSR did not want Americans on Soviet soil, so Russian pilots took over the planes in Alaska and flew them across Siberia for use in the Eastern Front. Nearly 8,000 American-built aircraft went through Great Falls to Alaska in this pipeline; the Lend-Lease planes did have the Soviet red star painted on them before they ever left Great Falls, as I mention.

--They hedgehopped these planes from Great Falls to Edmonton to a series of Canadian bush-country airfields; Newbride is one I made up, to get the treacherous fallen-timber country I wanted for the scene.

--I've photocopied the various aircraft for you. In the opening scene, Ben is in the vacant bombardier's seat in the nose of the B-17.

Thanks again, sweeties.

Alvan

** Squad. "Leader" in the RAF but "Squad. Commander" in U.S. Army Air Corps more vernacular, the "CO" (for "Commanding Officer, typically a Lt Col. Major or Major, Never a Captain - but the WASPS I don't know

Ben had to resist yanking his feet off the floor of the Plexiglass nose cone as the bomber shuddered across acres of unforgiving concrete in what seemed to be a never-ending takeoff. Then, like an elevator going up, the B-17 Flying Fortress lifted, turned its tail to the smelter stack, and began the long climb north.

Beneath and on all sides of him, old known earth mapped itself on the underside of the plastic shell where he huddled in fascinated suspension. Wheatfields winter-sown and fallow stretched below like checkered linoleum laid to the wall of the Rockies. There to the west he could pick out the long straight brink of Roman Reef and its dusky cliff, and the snakeline of watercourse that would be

English Creek. Gros Ventre, though, held itself out of sight beneath its cover of trees. The four big engines drummed loud enough he regretted he had not brought earplugs. However, that would have denied him the company of Jake and the crew via the earphones. Good typical lingo I don't recall ever hearing a word like this.

"Everybody (copacetic?) Navigator, the pseudo bomb jockey still with us? Make sure he doesn't touch anything that can go off."

"I'll slap his hands, skipper." (How could he doubt it?)

Ben was pretty sure they were kidding. On the other hand, twin half-inch guns poked up from the cheeks of the plane just on the other side of the plastic from him and he made a hurried inventory of switches not to bump. OVER

Jake got back to business. "Sparks, how's that weather by now?"

"Clear at Edmonton. It starts to heavy up after that. Cumulo-nimbus to thirty thousand, the whole ball of horseshit."

"Hear that, Ben? Arranged a ceiling flight for you."

Christ and a bear, that's seven miles up in one of these things. "Just don't drop me, Lieutenant Eisman."

"Haven't lost a scribbler yet."

Soon the Sweetgrass Hills crouched beneath the plane, their three ancient summits the only sentinel points in uncountable miles of prairie. For a fleeting moment aligned with the bomb-aiming panel of plexiglass directly in front of Ben, Devil's Chimney looked like the front sight of a rifle zeroed in. He thought back to Toussaint Rennie and hoped a dressed-out elk was hanging in that windsprung barn on the Two Medicine. Scanning the passing geography and jotting frantically, crystals of detail for the Tepee Weepy piece, snatches to write to Vic, his thinking as ever quickened with the vantage point of defied gravity. *Maybe I was meant for thin air. Or is that birdbrain logic?* Either way, he had the giddy feeling of being on top of it all. The colossal modern warp of time claimed everywhere below him;

Don't know anything about the B-17, but typically anything important like A bomb release would have two switches somewhat removed one from the other - one of a certain color and size which might be labeled "ARM" or "Bomb Arm" and the other saying something like "Bomb Rel" You'd have to switch both of them. But of course Ben might not know anything abt this. And even if he did, he'd probably be cautious. As I say, I don't know abt. the B-17. But imagine what it might mean if there was an inadvertant release. A waste of bomb load, to be sure, and perhaps a bombed out town or something* But isn't this just a ferry mission? There would almost surely have been no bombs aboard in that case

* Also suppose something were to set off the bombs in the plane - They almost certainly would not explode if the "bomb arm" switch was not on.

Have passed this whole thing to Herbert Wilson in Bismarck ND - He had many bombardier missions in the 8th Air Corps in the UK.

only a man's puny lifetime ago, the swiftest things on this shoulder of the planet were buffalo and Indian ponies. B-17s annihilated every pace of the past and along with it substituted sky for high ground. 'Space is the bride of time.' Elemental Gaussian physics, weirdly brilliant even back there in the stolid print of the college textbook, the blindered genius Carl Friedrich Gauss sitting in Gottingen unaware of the Napoleonic Wars going on around him while he figured out basics of the universe. The goddamn Germans, too bad they were born with brains.

The intercom interrupted. "Friendlies at three o'clock, skipper."

"I see them. Our sisters in arms."

"Not in mine," moaned another voice on the intercom.

Ben reached behind him to the airframe and grabbed binoculars out of their wall pouch. Sleek as the four points of a prong, the formation of Cobras was overtaking them as if the bomber was a lumberwagon. Flying tight and right. He knew, he just knew. Cass in her element.

"Bruiser at nine o'clock, captain, fifteen hundred yards, same heading as ours."

There could not be a better wingman than Beryl. Cass radioed back, "~~Acknowledged~~. Hold course, everyone, it's enough elbow room." *And our route just as much as theirs, now.* She grease-penciled this portion of the Edmonton hop onto the flight plan map strapped to the right thigh of her flying suit; the Canadian border stood out down there like the edge of a new jigsaw puzzle, the patterns of its fields contrasting with the American side. Automatically she checked how the rest of her pilots were doing. The other wingman, Mary Catherine, was perfectly in place, smooth as a mirror reflection. Even Della, bringing up the rear, matched up with the formation without wandering today. *Damn. You just get something going good and it starts coming apart.* She was going to hate to lose Beryl if her transfer

Roger

There's plenty elbow room?

Good - Right on

hanging in

John: should she say "Roger" and "Over" here? These are pilots who have flown together ever since training school in Texas.

Almost surely Roger + with her identification like "Roger" or Ferry one" or something like that - Roger, over means I have your msg and I stand by to hear anything else you might want to say

came through. Couldn't blame her, wanting in on the Wichita factory run, closer to her husband. And getting to ferry B-17s like that one, now that the high brass had decided women of a certain height and heft could possibly handle the controls of a bomber in the most wide-open airspace in the country. Cass had to laugh. There wouldn't be all this half-step stuff if it had been the Wright sisters at Kitty Hawk.

You didn't ASK About Anything like THIS, BUT VERY good, seems to me good word

As the flight of P-49s pulled away to the north, Jake's voice crackled on the intercom again. "There they go, Grady's Ladies into the Great Canadian Beyond. You happy now, newspaper guy?"

"All God's chillun got the wings they earned, Ice."

The East Base commander is Gen. Grady, hence the WASPs are known as "Grady's Ladies." Ben was instrumental in writing them up into fame and getting them the chance to fly outside the U.S., i.e. to Edmonton.

From Edmonton on, the flight was a relay race from one bush-country airstrip to the next, with malicious weather in the way. Between Watson Lake and Whitehorse, Ben had to abandon the nose cone; he hated losing the vantage point, but riding there had become too much like being the hood ornament on a snow tractor. Shaking with chill, he retreated to the table corner offered by the navigator. Then through the earphones came the further numbing news that the aircraft's heater had frozen up and quit. He'd thought it might be a prank back there in sunny Great Falls when Jake made him put on double layers of long underwear, three pairs of heavy socks, a furlined hooded flying suit over his flight jacket, and a chamois face mask. The Yukon climate was not impressed. The cold, some perverse apex at this altitude, went through fur, fabric, and skin alike. It seemed possible his blood had turned to slush. He not only couldn't take notes, he could not even make a fist. Time seemed frozen to a standstill. What the hell did Jake want missions over Germany for? This was bad enough. Hunched there helplessly in the refrigerated body of the bomber, he could not get beyond wishing he had something to thaw out with. A blowtorch, maybe. When Ladd Field at

Fairbanks at last presented its snowy self, he was hoping the frigid chamois would not take his face off with it when he removed it.

In the warming hut that seemed tropical, Jake drew him aside. "So, Benjamin, the transport from Nome doesn't pick us up until morning. How do you want to celebrate the layover?"

"Thawing out."

"Wallflower." Jake delicately fingered a frost-abused ear as if to make sure none of it had dropped off. "Got a little something I better tell you." He took a circumspect look toward the other end of the hut where the rest of the crew was loudly stomping and rubbing warmth into themselves, then leaned in close to Ben and whispered:

"I'm getting Russian tail."

Still numb enough that he was not sure he had heard right, Ben checked the lusty expression on Jake and saw that he had. "Are you. They owe you some, I guess."

"Yeah, wouldn't the cossacks just cream their britches?" Jake grinned proudly.

"Who's the unlucky woman?"

"She's a pilot."

Ben stared at him.

"Well, was a pilot. She's missing a few parts--got all the right ones, though. But a couple of fingers." Jake waggled a hand with the last two digits down out of sight. "Those pissant Nazis like to shoot back. Now she's a bug driver."

This, Ben found nearly as stupefying as the pilot part. The runway they had just come in on was pulverized ice, gray banks of chips spewed up by metal

grippers in countless plane tires, with furrows that were more like ruts to land into. Buzzing around out there on the equivalent of a skating rink in thirty below on one of the little tow tractors called bugs sounded to him like a job for only the hardiest Eskimo. Or a madwoman. Or worse.

"Jake, or should I just say Dummy--"

"Ben, Ben, hold it down, okay?"

"--get your mind up from between your legs and think about this a little, will you? Anybody the Russians trust enough to station here is apt to be a Red, like those big stars on the sides of these planes, remember? And the United States government does not look kindly on the Communist party."

"What are they going to get me for, consorting with an ally?" Ben's point did cause Jake to reflect. "I wouldn't be surprised if she diddled a commisar or two along the way to get here. She knows her diddling."

"Will you listen a goddamn minute? You and Tractor Woman--"

"Katya. Katya Gyorgovna Zhukova. The Russians really go in for names."

"Jake, we're heading to the mess hall," the co-pilot called. "You two coming?"

"My scribe and me have got matters of national importance to attend to. You're in charge, Charlie, see you at breakfast."

The co-pilot gave a wave and was on his way. "What happens when you get famous."

Ben was furiously fumbling out of the last of his layers of flying gear. "Do you have a lick of sense left at all? Maybe you're living on love, but I need chow."

"You're going to get it, don't worry," Jake soothed. "The Russkies have their own mess hall and they like to talk shop with B-17 pilots. C'mon, you're gonna meet Katya."

He wondered if he was imagining, but the crowded mess hall smelled to him straight off the pages of Dostoevsky. Cabbage, dank wool clothing, copious boot grease. Feeling as if he was in another world, he spooned up the formidable soup and devoured hunks of bread while Jake alternately ate and banked his hands through the air in testimony to the maneuvering capabilities of B-17s. Across the table, Russian pilots who either looked like plowboys or middle-aged pirates--the generation between had largely been wiped out by the Germans' demonic sieges from Leningrad to Sevastopol--listened monastically. Amid the bulky men, a woman who was not at all what Ben had expected--trim, keen, authoritative; she reminded him alarmingly of Cass--translated Jake's effusions and Russian spatters of questions.

"Yakov, they say, how big bomb pile?"

Always thought it was nearer 4000 - but you probably researched this

"Bomb load, right, two thousand pounds," Jake made an expansive gesture. "A ton--do you have those back home?"

"*Tonna,*" Katya reported, drawing the first smiles from the Russian airmen.

At first Ben had been relieved to see other American uniforms in the roomful of brown drab, a plump major and a couple of shavetail aides sitting with an ascetic looking Russian majordomo of some sort. The major proved to be the liaison officer, which meant he was there only under obligation, and in a matter of minutes had sent over the more diminutive of the aides to inquire why they were not in their own mess hall with everyone else. *Awful good question, shorty.* Jake pulled out all the stops, citing Ben as a big shot correspondent chronicling Lend-Lease and the peerless pilots of both nations. When the underling relayed that, the major gave them an edgy look, but he directly departed and so did the thin-featured political commisar or whatever he was. The entire room sat at attention until the

man was out the door. The moment he was gone, Katya relaxed and turned to Ben. "You are from *gazeta*?" Her voice was throaty and adventurous, and in spite of himself he could imagine how smoky it would sound in bedroom circumstances.

"Gazettes of all kinds, right, Ben?" Jake trumpeted. "He's as important in our country as your guys on *Pravda.*"

"Thanks all to hell for the comparison," Ben snapped. The Russian airmen were getting to their feet, taking their leave with stiff nods. As the mess hall began to empty out, a contingent dressed like Katya, male and female alike in thick-ply ground crew coveralls, drifted over curiously. She rattled out something and they sat down. *Wonderful, Ice. Now we're the main attractions at the zoo.* Of all there was to worry about in this, he figured he might as well start way up the list. Katya was watching him bright-eyed. "You have the same name as a very famous person," he speculated.

She burst out laughing. "No, no! Marshal Zhukov is not my family. He is great man, we are no ones."

Ben wanted that to be true. Zhukov was the titan of the Eastern Front, reputedly able to stand up even to Stalin's midnight military whims, and with geography on his side he had held out until he could start bleeding the German invaders to a slow death. The glut of war on Soviet soil seemed beyond sane comprehension. Three years now since Hitler made Napoleon's old mistake and turned thousands of miles of Russian snow into the blood of both sides; Ben had access in the correpondents' pool reports to the riveting dispatches of the Red Army front-line daredevil Vasily Grossman and discerned from Grossman's crafty coverage that survivors of the struggle had been through hell from both the enemy and their fanatic rulers. His eyes slipped to Katya's right hand and the sacrificed fingers. The million-dollar wound. A piece of body exchanged for a grant of existence. Before he could ask her what kind of aircraft she had flown--he had a

Their conferences often lasted all night, according to "Khrushchev Remembers" after which Stalin went to bed & everybody else "went to work"

In "Khrushchev Remembers" He(K) confirms this. He once said "No Comrade Stalin, we shall not be doing anything like that" and didn't even look up at Stalin—just ignored him, according to Khr.

spooky feeling it was a P-39, but that very well may have been Cass on his mind--Jake interjected. "They use this place as a canteen after it shuts down. Get ready to toast Mother Russia, Benjamin my boy."

Vodka made an immediate appearance. Glasses were splashed full and hoisted in accompaniment to a unison cry of "*Na zdrovya!*" Jake winked across at him. "That much Russian I know. 'Good health,' buddy." Wary from Cass's coma cola elixirs, Ben tested what sat so innocently clear in his glass. It tasted like spring water that had been tampered with by a moonshiner. While the Russians tossed theirs down he took a medium swig and clamped his fist around the glass to hide the fact that he hadn't emptied it. Nonetheless the bottle was making the rounds again and another toast was necessary, this one Jake's "To *bolshi semnadtsi!*" The Russians banged the table in homage to big bombers and gulped down. Here came the bottle again. *Holy damn, they inhale the stuff.*

Katya leaned toward him as if what she was about to say was vital. "Kheminveh. You have meet in the war?"

This is about as good as can be done in Russian on "Hemingway," honest.

The Ernie question. He'd had it dozens of times. *You'd think Hemingway invented the written word.* "I met him once, yes." He did not say it had been in the bar of the Savoy in London. He hiked his shoulders up and huffed out his chest to show the Hemingway mien. "Built like a bull. He was on assignment for *Collier's*--

"Coal? Kheminveh write about stove thing?"

"It's a magazine." Ben pantomimed flipping pages.

"With us *magazin* is on gun." Katya was impatient to reach her point. "Question. Kheminveh famous in Soviet Union, we all read. Hero in *The Sun Up Again*. Is he steer, not bull?"

Jake woke up to the topic. "Wait a minute. I read that. The guy lost the family jewels? Where'd it say so?"

"That's Hemingway for you," Ben sought to explain and realized the vodka wasn't helping. "He doesn't outright *say*--"

Jake shook his head in disbelief. "Weird. Did you ask him?"

"Of course I didn't ask him, the whole point of the goddamn book is--"

"Whoa. How can that be, the guy has lost his valuables and we're supposed to read it between the lines? I'd say that's news, it ought to be spelled out in black and white."

" Kheminveh is kid us, *da?*" Katya contributed. She shook her head censoriously. "We have saying: 'What is write in ink, axe can not cut off.'"

It hit him then, along with whatever shot of vodka the count was up to by now. He chortled and couldn't stop, laughing himself silly while others around the table tittered in anticipation. Finally he caught enough breath to say it. "That character's name is Jake! Get it, Ice? He's a *Jake* and his working part is missing in action and yours is present and accounted for and--" Jake guffawed and vowed to write Hemingway a complaining letter. Katya reddened and grinned foxily, translating in a rapid low purr to the other Russians. They caught on and roared.

Wiping his eyes--a bit of a sting there; he crazily wondered whether vodka could reach the eyelids--he focused as best he could on Katya. "Question for you." Her expression froze at a degree of politeness. "You flew. Tell me about that, please?"

"Nacht hexen." Katya rapped her breast sturdily, then fluttered a hand through the air while giving out an eerie high-pitched whistle. It was the kind of sound you could feel on your skin, and Ben tried not to twitch.

"It stumped me at first, too," Jake broke in. "But they've got great big mothwing biplanes called Polikarpovs that just about float through the air. Our darling here flew one of those. Two-seater, so what they'd do, she and a woman bombardier would go out in the middle of the night and get up a little altitude, just

behind the front lines, then cut the engine and glide over the German side," his outsize hands tracing that out in the air. "The bombardier had the explosives in her lap, she'd toss the bomb package out, blow up some Germans, and Katya would rev the engine back on and they'd haul ass out of there." Jake nearly bent double in fealty to the next episode. "Here's the best part. The Germans are down there scared shitless, all they can hear is the wind in the wingstruts as Katya and her chum come drifting over. They run around yelling 'Nacht hexen!' Night witches!"

"Was good, flying," Katya said quietly. She pantomimed steering a tow tractor. "Day witch now." Shrugging, she reached for the latest vodka bottle with the remnant of her hand.

Dazed, Ben sat out the rest of the evening that stretched toward morning. He felt he had to, he was Jake's alibi for consorting with allies who happened to be Red as their crimson flag. The conversation whenever toasts weren't being made crashed along in two languages and in between. At some point Jake volubly told the joke about the dude who was invited to a fancy barbecue and worried whether he would be able to tell cow pie from caviar and which fork to use with which. Katya's back-and-forth lingo had turned giggly, but Ben was numbly aware she could hold the tongue-tangling booze better than he could, they all could. In the haze of alcohol muddled images kept coming to him. Cass wingwalking amid the struts of a whopping biplane with a grinning Katya in the cockpit cutting the engine, on and off, on and off. *Sonofabitching war. Women didn't start it, why does it have to drag them in?* He tried to ward it off, but New Guinea replaced Alaska at terrible intervals, the grassy ambush with gashed bodies everywhere mingling with a teletype ticker absurdly chattering in the middle of the trail.

He pinched himself in hidden places to drive off those blears. Sick with longing for Cass--*shame to waste all this drinking without her*--he endeavored to concentrate on the troubling matter of Katya. Suppositions were not in shortage.

Suppose she had a husband somewhere? Suppose she had a Communist party commisar somewhere? Suppose she actually was the daughter of the great general Zhukov, performing whatever patriotic duty it was to hang out with clueless Yanks? No, wait, the clues simply were different, each to each. Jake's forebears had two thousand years of periodic murder directed at them. If anything, it had given Jake immunity from common fear. Jake didn't have to back up for any Mother Russia or anybody else. Determinedly he took stock of his massive friend across there amid the merry Russians, and that did it. The broad Slavic faces around the table all at once reminded him of Havel from football. And along with Havel, O'Fallon. Vic with greatly more cut off him than a pair of fingers. The others, out there in the treacherous time zones. He felt like sobbing. The team and its mortal dangers were a mere handful compared to the innumerable slaughtered in the vaster jaws of war, no question there. But they were his handful. God damn Jake and pulling *Pravda* out of the air. He was more than just a mouthpiece for a government propaganda organ, wasn't he? Had to be. Tepee Weepy only had him in its custody, it didn't own him. His mind lurched to the piece waiting to be written about Jake and this polar oasis where big bombers were handed off. *Good old ink, get it down with just enough between the lines, can't even cut it off with an axe, right, Ernie?* He wished he had a typewriter then and there, to capture all that was going to seem incredible in the sober light of day. Here the pair of them were, Jake and him, up near the top of the world, frozen though it was, thrust out of the lives they'd thought they would lead and in the company of a female warrior who proudly answered to the name of Night Witch.

Four time zones to the east, Bill Reinking rolled out of bed, careful as always not to disturb his wife. Cloyce was a notably late sleeper. Not many of those in a town like Gros Ventre, and he reflected on the distant passion that had

brought this particular woman from satin bedcovers to the quilts they had shared for nearly two dozen years. She was all for any manner of bedding at the time. *As was I.* This time of year first light detached itself from night in stubborn gray and he put on his glasses to track down his clothes and shoes. Padding across to the window that gave a glimpse of horizon through the giant trunks of the cottonwoods, he checked the sky as usual, not that the weather of the moment meant anything in Montana. The day ahead of him began cumbrously sorting itself out as he crept down the stairs--the county agent's session at the high school on food production for the war effort, all afternoon given over to typesetting the gleanings sent in by his rural correspondents, a Ladies' Aid pot-luck supper nominally nonpartisan where the Senator would just happen to whip through and speak his mind about the condition of the nation. By now he could forecast those indignant sentiments almost ahead of the words coming out of the Senator's formidable mouth, and the Senator no doubt could parrot off his dogged editorials before they were written. *We're as bad as an old married couple.* That stray thought stung. He tried to yawn it away, stoking up the kitchen stove in the semi-dark to hurry the coffee. It was a terrible habit for a newspaper editor, rising at dawn after late nights. Yet he had always done so and figured he always would. *The early bird gets the worm, but is that a balanced diet?* Fumbling for a pencil and pad on the sideboard, he wrote that down to use as a column-bottom filler.

While the coffee perked, he put on his mackinaw and hat to go out and scrape the frost off the car windshield. Another bit of headstart that did not gain a soul much in the long run, but it was something to do. Besides, the dawn air brought him a little of Ben now that he was stationed at East Base once more. That rainbow of planes to Alaska and then Russia: any amount of time Ben put in where virginal aircraft were flying instead of bullets was to be prized. *Praise be, Franklin D. I knew Lend-Lease was worth the abuse I took every week for being for it.* He

paused bent over the whitened windshield, taking in the silence that ushered the slow change of morning light. As a newspaperman he had to hew to the necessary enlistment of all men's sons in this war against the evils of Hitler and Tojo, but as a father he could privately covet any interval of amnesty for Ben. Scraping off another peel of frost, he paused again to listen. East Base started up even earlier than he himself did. It was an added habit now, delaying out here in the daybreak until he could hear the first distant sound of planes in transit.

His bunk was shaking and he wanted it to quit. Any motion made his head feel on fire, approximately to the roots of his hair. When he finally unclenched his eyelids, Jake was standing over him with one big mitt of a hand rocking the bunkframe. "Another day, another dollar, buddy. How you feeling?"

"Next thing to dead, if you really have to know."

"The more you sleep, the less you sin," Jake said cheerily as he opened the blinds and let in sunlight harshly magnified by snowdrifts. "You ought to be pure as a daisy."

Ben shielded against the brightness with an arm. Groggy as he was, it occurred to him to ask: "What time is our plane back?"

"It's gone." Jake busied himself at his ready-bag. "The other guys went with it, but I got us a better deal. We are now the captain and crew of our very own bush plane, Benjamin."

Ben woke up entirely. "Bush plane?"

"Sort of, yeah. You'll see. Weather people up here use it. Needs a little fixing up, so they're sending it south. It'll get us there, don't worry."

"When?" He wrenched up in bed, with something like congealed panic oozing past dizziness and hangover. "Have you gone even more crazy than usual?

I've got to get the piece on you done and in to Tepee Weepy on time or the bastards will never let me live it down."

"You're on assignment, ain't you? So assign yourself a nice leisurely flight and relax. You can write in the air as good as you can on the ground, I bet."

"Jake, square with me a minute, okay? Am I hallucinating or something? Won't it take goddamn near forever to make it to Great Falls in the kind of kite you're talking about?"

"That's the whole point," Jake explained with magnanimous patience. "Hours in the air, Ben--guys like me have to live by 'em. This'll put me up on anybody else in the East Base group by twenty or more hours of flying time. That much closer to the real war, my friend."

"Let me catch up here." Ben wobbled his head to try to clear it, which proved to be a painful mistake. "This field just lets you walk off with one of their planes to go home in?"

Jake rubbed his jaw. "It took a radio message to Grandpa Grady. He said he could spare me for a couple extra days. Said he could spare you indefinitely."

"I'm trying to decide whether to commend you or bust your nuts in my report, Eisman." The Fairbanks operations officer petulantly kicked the tire of the parked aircraft as if shopping the last jalopy on a used-car lot. "At least it gets this thing off our hands. But when you said your friend here has his wings you didn't bother to tell me he hasn't used them since, did you." His eyes bored into Ben. "I've never let a paper-airplane pilot be a co-pilot before."

"He's just along as sandbag, sir," Jake soothed, "strictly a glorified hitchhiker."

"That is precisely what he needs to be. Reinking, is that your name?" The ops officer appeared dubious about even that. "Unless Eisman goes deaf, dumb

and blind, or has some other kind of shit fit, you are not to touch those controls. Do you hear me?"

"Loud and clear, sir. I am to sit at the right hand of flying ace Eisman and be inert bodyweight for the next two or three days." Ben's answer drew heavy gazes from both men. "Does that about sum up my heroic role in the war effort?"

Jake piously stepped in. "Don't mind him, major, he rolled out of the sack on the wrong side this morning. I'll throw him out the cargo hatch if he tries to wrest the controls from me."

"With my blessing." The ops officer walked away as if the pair of them might be contagious. "Hand in your flight plan and vacate my airfield, lieutenants."

Skeptically Ben studied the aircraft again. "All right, Ice. What did you say this piece of junk is?"

"A Grumman Widgeon. Quite the rig, ain't it?" Jake was going through the motions of his inspection walk around the plane, although they both knew he was going to give it a clean report unless a wing dropped off and brained him.

Exhausted as the Widgeon OA-14 looked, Ben considered that a possibility. A spiderweb crack across half of the cockpit window--on the co-pilot's side, naturally--lent it a wall-eyed appearance. Perhaps fittingly for a weather plane, most of its paint from nose to tail had been swiped away by Alaska's vicious moods of climate. Dents in the struts of its wing pontoons indicated it had encountered more than occasional tree limbs while docking at inlet weather stations. Ben felt doubt in his gut. He had flown in amphibious aircraft before, but this one seemed designed to dither between sea and land. Beneath the cockpit and the first few passenger seats was a belly hull for it to float on, and spraddle-legged landing gear with narrow tires called bicycle wheels poked perilously out of that hull, barely holding the craft up off the concrete runway. Not since the most rudimentary biplane, back in earliest pilot training, had Ben seen aircraft wheels like these, and the rubber was

so aged and bald it looked to him as if it very well could have been the same weary set of tires.

He could not help eyeing the low belly of the semi-seaplane and the accumulated runway glop. "Will this thing clear?"

"Just," Jake said as if were a sure thing. Coming around the nose of the plane, he lobbed a bundled flying suit which Ben instinctively caught. "Ready to go for a ride?"

With Jake applying considerable body English to make up for two fewer engines and a couple of thousand fewer horsepower than he was used to, the Widgeon crawled into the air above Fairbanks. After the B-17, which was like traveling in a submarine in the air, to both men the floatplane felt like a flying raft, fickle every time it met a new air current. Slowly, slowly, it wafted over the tin rooftops of Fairbanks, its shadow lagging and shrinking behind it as if reluctant to leave the safety of the city limits. While Jake was busy coaxing the engines to smooth out, Ben peered out his side window at the glistening ice of the Tanana River and the curd of war materiel along its banks, instantly reaching for his pad. The supply dump, as it was aptly called, consisted of an infinite number of crates of aircraft parts, heaps of tires, long ranks of belly tanks, runway equipment of every sort; some of it tarped over and some of it not, the Lend-Lease mountains of supplies resembled an otherworldly tent encampment, strangely peopleless, strewn beside the frozen river for miles on end. Ben jotted as fast as his hand could go, adding the scene to others of untold weaponry stacked on Pacific atolls and Atlantic docks. He had read that the weight of impounded water in gigantic dams, Fort Peck and Dnieperstroi and their serpentine ilk, in theory added up to enough to affect the rotation of the earth. Looking down at the enormity of the random arsenal

piled up on one Alaskan riverbank, it could be readily imagined that the depots of war were pooling into a mass force certain to make the world wobble on its axis.

"Pilot to co-pilot," Jake intoned from two feet away. "Say farewell to Fairbanks, it's all bush from here on."

Ben glanced up and out over a sunlit wilderness seemingly unmarred by anything but the frail cracklines of the cockpit window. Sky, land, perimeter of the earth, all seemed to enlarge as the plane throbbed out into the circle of blue morning. To his astonishment, winter gradually gave way as they headed southeastward toward Yukon Territory. Fairbanks was caught in some isobar that had slipped from the North Pole, but snow had only seeped into the highest elevations along the upper Tanana. The river threaded ahead of them, marked as far as the eye could see by the gold of birches captured in its valley, amid spotty spruce and tundra everywhere else around. (I've always thought there are no trees at all on tundra)

Expansive as the outdoors around them, Jake grinned over at him. "Not bad, huh? Feel like Jack London yet?"

"Trapped this way in a tiny cabin with White Fang for days on end, yes, I do."

"My, you are cranky today. We'll purr into Northway in time for lunch, you'll see."

Time slowed, attuned to the stately beat of the engines. Half-hypnotized by the ceaseless tapestry of scenery, Ben sat back and let his mind drift. First of all to Cass, the situation with her always up in the air, an apt locution right then but one that made his lips draw tight. Off sideways to the piece he'd done on Dex, legerdemain he couldn't maintain forever for Tepee Weepy and was not at all sure he should. Back around to Jake, sitting here hoping to ride written words and padded flying time to the air over Germany. Afloat over a corner of the world the

war had not found, Ben uneasily traversed such thoughts as though they were air pockets, unbidden but there.

The plane was droning along at 4200 feet--he would forever remember that altimeter reading--when Jake announced:

"I feel a pimple coming on my butt and therefore deem myself incapacitated. Take over."

Ben made a derisive noise. "Thanks anyway, Ice, but it's been too long since--

"Bullshit, Ben. Once a pilot, always a pilot. Get busy and fly this heap."

"Knock it off, will you?" Unearned favors did not go down well with Ben, never had, never would. "That prissy ops officer had it right, I *am* a paper-airplane pilot any more, and nothing--hey, where're you going?"

"To take a leak in the jug, what does it look like?" Jake vacated the pilot's seat and turned sideways to edge past Ben, patting him on the head as he did so. "Better fly the plane, kiddo, somebody has to."

"You damn fool," Ben hurled over his shoulder, his hands clamping onto the controls. The Widgeon gave a sharp lurch, nosing upward, as Jake's weight moving toward the rear of the cabin radically altered its center of balance. His hands managing to tame that without any conscious help from the rest of him, Ben frantically scanned the infinite banks of dials, switches and gauges of an instrument panel that now seemed the size and complexity of a cathedral window. Flight school had never included this peculiar breed of aircraft in the first place. He could hear Jake back there humming loudly to himself while peeing, which did not help. Still inventorying the instrumentation, he kept coming up one short. Precisely now, of course, the Tanana River chose to turn cockeyed, twisting away in fresh directions, glinting like a silver snake. Alert in every corpuscle, Ben could see wire-like trees down there on its banks, he could see the carpet of yellow leaves on

the ground, he could see the bald tops of hills regularly passing under the wingtips. What he could not spot, somewhere right under his nose, was the most basic aeronautical instrument.

While he was trying to navigate without it, the Widgeon gravitated below four thousand feet and he hurriedly dropped the flaps for some lift. Just then Jake returned to the cockpit, gyrating into the pilot's seat as the plane bounded upward. "Ride 'em, cowboy. I will say, you fighter jockeys fly livelier than us old bomber drivers."

"Funny as a crutch, Ice," Ben gritted out, hands and eyes busy in several directions. "Here, do something with this airplane."

"Just when you're getting used to it? Wouldn't be fair." The big man sat back comfortably to spectate. "Don't worry, Uncle Jake is here to hold your hand."

"Then get busy and do it." Ben squirmed, feeling his face redden as he had to put the question the rawest rookie pilot would hate to ask. "I give up --did they forget to put the compass in this turd bird?"

Yawning, Jake squinted into the glare of the morning sun. "What, you don't know east when you see it?"

That again. Isn't there any other direction any more? "Goddamn it, Jake, I mean it. If I can't get a compass bearing I'll eventually have this thing headed off the map somewhere. Let's don't fool around in the middle of Alaska, all right?"

Jake was unfazed. He sat there loudly humming the chorus that went "*Some people say there is no Hell, but they're not pilots, so they can't tell*" until finally, when Ben had run out of swearwords, he rolled his eyes.

Ben's gaze ascended along with his, to the front ceiling of the cockpit where the compass hung like a bat.

"That maybe is one of the things they're gonna modify in this clunker," Jake speculated as Ben sheepishly adjusted course to the compass setting. "Now then, you ready to fly like a sane person?"

"Damn you, you know I am."

Bursting into laughter even though he still was struggling to tame the Widgeon's twenty-eyed dials and sluggish wings, suddenly Ben had never felt better. It ran through him like the thrill when he first soloed, the magic of being lightly attached to the sky. With Jake there beside him to coax and scold and to master any of the alchemy of the cockpit he erred on, the plane was his until they reached the barrier mountains and tricky downdrafts, perhaps half an hour yet. In that window of time, he hoped with all he was worth that Cass right then was flying too, the invisible musculature of the air supporting them both at once.

Eventually Jake took over and thriftily landed at the dirt runway at Northway at noon, and by late afternoon they were far into Yukon Territory. They overnighted in a cold Quonset hut at Whitehorse, then kept to the pattern the next day, Jake handling the plane in and out of dirtpacked Canadian refueling fields and then Ben's exultant turn at the controls whenever the terrain was not producing choppy air or something else insidiously murderous. His flying intervals became less as mountains grew, and he believed even Jake was relieved when at last they crossed the Rockies and ahead lay the hill country around Newbride, the final refueling stop before the big base at Edmonton.

"Circle a few times so they can get a good look at us," Jake unexpectedly turned the plane over to him when they were a few miles out from Newbride. "The radio's on the fritz, let me work on that." Slipping his own earphones on, Ben heard static and a voice that sounded a lot farther off than the airfield in the middle distance. Treed hills and straggles of the town penned in the field, but it appeared to be a more substantial runway than the dirt patches they had been putting down on

farther north. Ben was ready to be on the ground and regather. The air turned bumpy, and he concentrated on holding the altitude while Jake fiddled with the radio as if profanity was the sure cure. After many oaths, a particularly lurid outburst got through and he turned toward Ben and winked. "Sorry about that, tower. Requesting permission to land. Over." When the radio back-and-forth was done, Jake checked the altimeter and throttle settings and everything else Ben had conscientiously been trying to mind, but made no move to do more than that. "Want to brush up on your landing skills?"

Temptation nearly overwhelmed Ben. "Love to, but the air has more lumps in it than I like. You take it."

Jake sighed. "Okay, if you don't want any fun out of life. Looky there, nice gravel runway and everything, and you chicken out. I just don't know about you sometimes, Ben buddy." Taking the controls, he aligned with the runway, and as if showing how it was done, waddled the plane down to a perfect touch.

Abruptly the runway seemed to devour the Widgeon. With a sickening lurch the plane nosed over and skidded along on the belly hull at high speed, metal screeching hideously on the runway surface.

Ben shouted, "Put the wheels down!"

"The sonsabitches are!" Jake shouted back. "It's *fresh* gravel!"

The savage grating sound continued to fill the cockpit, both men tossed in their seats by the rough ride, as the plane plowed along. Eventually it ground to a halt.

There was a moment of sickening silence, then the strange wail of the Canadian version of a meatwagon reached them.

"I thought you were going to land it, not fly it into the ground, Ice. You all right?"

Jake rose out of the pilot's seat as if it had offended him. "Never mind me, how's the frigging airplane?"

They scrambled out as the ambulance crunched to a stop a little distance away and a Royal Canadian Air Force officer came leaping off its runningboard. The back doors flung open and a couple of teams of medics poured out, stretchers ready. They all halted at the sight of Ben and Jake standing nearly to their ankles in the runway gravel, gazing at the furrows made by the Widgeon's thin wheels in the loose surface and cursing violently together.

"Tch, tires of that sort," the Canadian officer said with a mild frown when things settled down. "We've had your P-39s and our own planes through here, no trouble. If it's a hard surface you're looking for, though, you're a bit preliminary." He gestured toward heavy equipment parked at the side of a hangar. "We'll have it tarmacked by this time next week, we figure."

Jake looked pale as he turned toward Ben. "I'll miss the next bomber run to Alaska. Grady will have my ass."

And your flying time will be just what it was. And Tepee Weepy will turn me inside out for missing a deadline. "Try it in the morning?" Ben came out with, not knowing what else to say, as a bulldozer coughed to life and clanked out to tow the Widgeon to the paved apron outside the hangars.

They were out on the flight line in the Canadian dawn. Like odd postulants, the two of them knelt under the Widgeon's scarred but intact hull and almost prayerfully began to let air out of the narrow tires on the landing struts. When the tires squished down to nearly flat, Jake proclaimed: "Let's see if that gives the bastards enough surface."

They strapped in, and Jake taxied out, revved the engines to an alarming roar and started down the runway. The entire airfield personnel clustered outside the hangars to watch, and the meatwagon had its motor running.

Shuddering and rattling, the Widgeon struggled mightily to free itself of the ground and there was a brief moment when Ben thought it had. But the more power Jake fed it for takeoff, the more the acceleration of force on the skinny wheels drove them down into the coarse gravel, even as deflated as they were.

As sharp as if it were on their own skin, both men felt the first scrape of the underside of the plane coming into contact with the runway. There was another interminable hideous screech of aircraft metal against rough surface until the Widgeon skidded to a stop, stranded there in the middle of the airfield like a fish on land.

Jake killed the engines.

"Damn," he said, barely above a whisper. The bulldozer lurched out and towed them back to the parking apron.

Before getting out to face the Canadian contingent, Jake sat in the cockpit chewing his lip. "I hate to start taking the plane apart. Grady will--"

"--have your ass, and rightly so. But maybe only half your ass," Ben told him with more hope than he felt, "if we can get what's left of this thing back to East Base more or less on time."

Looking over his shoulder, Jake took inventory of the interior of the plane and conceded. "Okay, okay. Let's see if our hosts would like some nice plane seats for their canteen."

Once the ground crew had unbolted the passenger seats and lugged them off merrily as scavengers given a shipwreck, Jake lined the lightened plane up with the waiting runway and gave it the gas. Glued to the side window as the twin engines

raged and the plane shuddered against the drag of the wheels in the gravel, Ben saw they were past their previous skid marks and thought they might make it this time. Then, agonizingly, they heard the telltale scrape again and in no time the friction of another skid slewed the Widgeon to another dead stop in the middle of the airfield.

"This is starting to get on my nerves," Jake spoke first in the quiet of the cut engines.

Ben indicated toward the bulldozer operator climbing back onto his big yellow machine. "Think how bored that catskinner is getting."

While they waited to be towed back to the hangar apron again, Jake softly tapped a big fist against the steering column. "Got one more trick up my sleeve. It takes some doing, old buddy. By you."

"As long as it doesn't take buckets of blood," Ben answered, "let's hear it."

He listened without saying anything more until Jake laid out the whole scheme. This time he indicated toward the forest at the end of the runway. "If it doesn't work, don't we end up with a plane in those trees?"

"The damn thing isn't any good to us the way it is," Jake provided in all reasonableness.

That much was unarguable, and the rest came down to the skills the two of them could muster in what they had been trained in. Ben took another look at the trees and swallowed hard, but got the words out: "Go for broke, Ice. You're the pilot, rumor has it."

Jake clapped him on the shoulder. "And you're the sandbag, so here's how I want you to do it."

Back at the hangar apron, they ran through the maneuver in the silent plane a number of times. The Canadian ops officer puffed out his ruddy cheeks when Jake told him what was intended, but the truth was, he wanted the high-and-dry

floatplane off his airfield as badly as they did. "Have a go," he bestowed ultimately and went off to alert his ambulance crew.

Ben climbed in behind Jake, keyed up and as ready as he could ever make himself be. No sooner had Jake put on his headphones than he motioned to the co-pilot's seat as if it was an easy chair.

"Sit down and relax. We need to wait half an hour, the sissy in the tower won't clear us for takeoff until they get here."

"Who?"

"The volunteer fire department from town. They're particular about their trees up here."

Ben settled in the seat, put up the collar of his flight jacket and tried to nap. The world of war marched through his head, ridiculous incongruities on parade. Years in uniform dwindled to this, two men trying to get an aging floatplane off a gravel runway some thousands of miles from the nearest combat. Survival perhaps dependent on a meatwagon and a fire engine in somebody else's country. The contradiction that an airplane amounted to anyway, a machine nominally too heavy to stay airborne due to the colossal engines needed to keep it airborne. Cass, all her P-39 flights with those hundreds of pounds of mechanism in back of her ears. A miracle every time. How long could miracles go on?

Jake was shaking him. "Here we go."

Ben snapped to. This time, he saw, the Canadian officer had positioned the medical rescue squad near the far end of the runway, with the firefighting equipment added.

"All right, Ben my boy." Jake sounded reconciled or ready, it was hard to tell which in the startup throb of the Widgeon engines. "Third time is the charm."

"It beats 'Three strikes and you're out,'" Ben had to grant. He squeezed Jake's shoulder as he edged up out of the co-pilot's seat. "See you in the wild blue yonder, Ice."

He went to the rear of the cabin and crouched. Up front, Jake fed the throttles even more and started down the runway at full force again, the squishy plane wheels doing their determined best to plow into the gravel. Imagination ran rampant in a situation like this, but with his weight back there shifting the center of balance toward the tail, it did feel to Ben as though the plane poised itself a trifle higher, at a more alert angle, up there at the nose.

Noise poured over him and the ride was so rough he had to brace himself with both hands on the floor; otherwise, he stayed in football stance, ready to go at Jake's signal. He could tell they were nearly to the point of the runway where the drag of the wheels drew the plane into the gravel on previous tries. The part of the mind that deals with such things considered whether the battered metal of the hull would hold up through another high-speed skid or whether it would split open and he and Jake would smear against gravel at seventy miles an hour.

"NOW!" Jake roared, his hands busy with the stick and the throttles, and Ben leaped catlike toward the cockpit, grabbing onto the crank that controlled the wing flaps. As fast as his hands could go he dropped the full flaps, and an instant later, hoping Jake's brainstorm had something to it, yanked the lever that pulled the landing gear up.

Its support gone from under it, held barely above the runway only by sudden upthrust of air from the flaps, for a terrible moment the Widgeon seemed to hover in defiance of gravity, like a leaf on a last breath of breeze. It then gave a slight lurch upward as if startled. *Don't stall!* was the single thought in both men's minds. Jake did something, although Ben wasn't sure what, and the plane stabilized. They were airborne, at least at the elevation of a few feet. Now the line

of trees was approaching fast. Delicately Jake fingered the controls and yelled, "Sandbag!"

Ben flung himself to the back of the cabin, half rolling into his crouched position again, trying to make himself heavy. As he did so, the nose of the plane lifted with the shift of balance, but he still could see green spears of treetops everywhere in the cockpit window. "Hang on!" he heard the shout from Jake.

Instead he gave a little jump from his crouched position, and when he came down the front of the plane teetertottered a bit higher, still staggering toward the treetops.

He did it again, the Widgeon's nose once more bobbing up ever so slightly. By now the wall of dark green branches was rushing at them so close and hard the effect was hypnotic. This was it, he knew, that daylight nightmare of Cass's engine hurtling forward to crush her but in this case two engines to rip loose and plow flesh, one each for Jake and him. His mortal organs getting busy with their last task, Ben braced himself into the back corner of the cabin for the crash, staring uncontrollably at the ridiculous agency of his oncoming death, the tops of evergreens as serene as Christmas trees.

Then sky.

It took some moments for this unexpected lease on existence to register on him. He huddled there not daring to move lest any twitch of a muscle disturb whatever equilibrium the Widgeon was struggling itself into. Its engines still at full throttle, he could feel the floor of the plane lurching drunkenly under him, but along with it was what could be construed as--*Jesus, is it? Is it?*--the sensation of lift.

Then the engine noise settled to a guttural effort and Jake was calling over his shoulder in a shaky voice: "Nothing to it. You can come out of hiding now."

Ben stumbled his way forward and dumped himself into the co-pilot's seat. Trees still were not very far below, but the Widgeon laboriously kept on rising above the branches' reach.

He saw Jake was wearing a grin big enough to eat pie sideways.

"Kind of puckers a guy up, down there in the seat of the pants, don't it? Better get busy writing all this up, scribe, so they'll give us medals for getting this tub off the ground."

"Right, Ice. A piece of gravel pinned on with a band-aid. How about if I just sit here and let my insides catch up with me?"

They flew giddily, men given wings, for the next little while. Canada's immense share of the earth spread around them in the clear autumn morning in timber thick as fur and pocket mirror lakes and rivers flowing north.

Fondling the controls, Jake was chortling and calculating aloud how long it would take to fuel up in Edmonton and then the flying time to reach East Base for suppertime beer at the Officers Club, when one of the engines went rough, smoothed out, sputtered a time or two, and quit.

"Now goddamn what?" Jake indignantly checked the instrument panel. "Take a look, it's the one on your side." It's "No. 1," he would say to a pilot but probably not to Ben

Before the words were out of Jake's mouth, Ben had craned around to give the stilled engine a looking-over. It only took an instant. The engine cowling was wet and aviation gasoline was whipping away behind it in a fine mist. "It's slobbering fuel like crazy," he reported hoarsely.

"Then I guess we don't try to restart the sonofabitch, do we." Jake rammed that throttle off. "We'll have limp on in to Edmon--"

The other engine quit.

--"aw, shit," Jake finished his sentence.

Only know if this old plane had a feathering device, probably did. If so, the first thing Jake would do was feather the propeller - cut way down on the drag

There probably would be no fuel on the cowling, it would be expelled through the exhaust & be almost invisible - though it's still a fire hazard - so feathering the propeller also conserves fuel & lowers fire hazard

more likely to happen,

× Losing an engine ~~could happen~~ giving that they were at full power - not NRP (Normal Rated Power) - use full power briefly - but of course use it if you have to, which they did

It could glide all the way to the ground - no matter how heavy

In the vacuum after that, the only sounds the wind in the struts and the creaks of a gliding plane that was too heavy to glide for very long, the pair of men stared the question at each other and made the same guess without having to say it. The Widgeon's repeated rough treatment on the gravel runway must have ruptured the fuel lines, and the gravity-defying takeoff over the treetops had encouraged leakage. By now Jake was striving to maintain altitude by madly pumping the flaps, the equivalent of using rowboat oars to try to move a barge, while Ben twisted in every direction in search of water they could set the plane down on. Off in the distance a lake gleamed, but too far for any sinking airplane to reach.

"pumping" the flaps up & down etc repeatedly - Don't see how this would accomplish anything

"I can't hold us in the air much longer," Jake said with strained calm.

you just glide down until you run out of airspace.

"How about we belly in on that clear patch down there?"

What choice did they have?

With gas all over us? Shielding the sun from his eyes with his hands, Ben scanned the stretch of forestless terrain coming under the plane, like a shaved-away spot on a mammoth pelt. He had to grit to give Jake the news that a windstorm had done the clearing. "It's full of downed trees, Ice. Tangled all to hell."

"That changes things. Raise Newbride, quick"--as Jake spoke, Ben already was on the radio chanting their position--"then grab the chutes. Toss me mine and the bivvie bag and you go. I'll pump the flaps as long as I can."

Having no choice, Ben clambered into jumping position, aware of the tail and the struts and other portions of the plane that he did not want hitting him when he went out the hatch. *Jump plenty far out when you jump, at least I remember that from flight school.* He gripped the ripcord ring so hard his fist hurt. Great gulps swept through him as he tried to blot out Dex's experience of puking in mid-air. Clinging in the hatchway, he stared past the toes of his flight boots, trying to judge. The Widgeon was losing altitude like mad, he could see individual stumps and logs down there; wasn't the ground too close for jumping? Probably yes

* Probably not "hard" (just locate it) if you deploy it accidentally you're probably dead

"Get out! Now!" Jake's bellow and the sickening shift of the plane as he abandoned the cockpit sent Ben out into the air. It's not felt much, you just look up and there it's deployed

Two things happened almost simultaneously, the teeth-rattling jerk as the parachute opened and the uprush of a monstrously large downed evergreen directly beneath him, its rootball splayed toward him like a natural mantrap. With everything he could muster, dangling and falling at the same time, he tugged at the parachute's lines in an effort to miss the log. At the very end of his mid-air dance of trying to twist aside, a limber root end raked up his body, swatting him under the side of the jaw and taking some face skin with it.

The next thing he knew he was on his side on the ground. The tree, as prone as he was, was close enough he could reach out and touch it. Still foolishly gripped tight in his hand was the ripcord ring.

Raw-faced and wincing from the sideswipe by the tree root, he lay there testing himself for anything broken. Except for his breath, nothing seemed to be. He was gasping his way toward normal intake of air when he heard, somewhere off across the mess of downed trees, the nasty sound of a crash. *Too big for Jake. Had to be the plane.* That started his thought process whirring. Before he even was onto his feet he was calling at the top of his voice:

"Jake! Jake?"

It took several shouts, but then a voice not all that far away answered. "Tone it down, Ben. I don't want my ears hurting too."

"Where are you?"

"How the hell do I know? Over here."

Using the rootball as a rough ladder, Ben managed to climb high enough to see across various logs to where a white drape of parachute indicated Jake's location.

"I'm on my way. Doctor yourself till I get there, can you?" The optimistically named bivouac bag, containing a medical kit and other emergency essentials, was with Jake.

"Who said I need doctoring?"

To Ben, that response did not sound particularly convincing. Wasting no time, he bundled up his own chute in his arms like dirty laundry and began picking his way through the maze of downed trees. Mostly the forest here had been tipped over by a big wind, roots and all, like a spill of wooden matches. A good many tree trunks, though, had been snapped off, leaving stray splintery snags tall as totem poles. Here and there stood survivor trees, incongruous loners with their kilts of evergreen branches above it all. The muskeg footing was laborious. Ben was sweating by the time he rounded the last big log and there was Jake, upright but grimacing as he stood there flexing the ankle in his unlaced left boot.

"How bad?" Ben asked.

"I feel beat to hell, about like you look."

Another spasm chased across the big man's face as he put weight on that foot. "Think maybe it's a sprain, not a break. Not gonna take the boot off to find out, the way the way the damn thing is swelling."

Jake's eyes met Ben's. "Tell you what really hurts--I dropped the bivvie bag coming out of the plane. Piss-poor time to fumble. Sorry about that, Ben."

"Don't worry," Ben spoke it with effort. "We've still got our chute packs. Can you walk?"

Jake hobbled around to test that out. "More or less. We're not going anywhere for awhile anyway, I guess." Both men turned and gawked south where a pillar of smoke marked the burning aircraft. After a bit, Jake said: "That was a sad-ass aircraft, you know that?"

"Never mind that, let's see what we're supposed to live on." Ben knelt to unzip the pack portion of his parachute for its emergency items, and Jake did the same. Each reached in and pulled out they first thing they found. They stared at the short machetes in their hands.

Next to come out was a tiny fishing kit, followed by rocklike pieces of chocolate called tropical bars.

"Jungle issue," Jake said tonelessly. "Goddamn sonofabitching goddamn supply depot bastards--"

"Quit," Ben ordered. "Eat. We've got to keep our strength up." He tried the chocolate and nearly broke a tooth. "Petrified."

"Must be what the machetes are for," Jake muttered.

They sawed their way through the chocolate and sucked on it while they spread out the white parachute canopies as a marker for any search plane. Around them hung the ear-ringing silence of the Canadian forest. It was at the forefront of both their minds that in country this far north, it was always about five minutes to winter.

IVAN: They little doubt knew their APPX. Location at any time, so if there was anything like a communication system up there, they would have called "control" before jumping. And even in those days they would have been able to get an azimuth and combining that with the APPX position would give a decent "FIX".

"Man oh man, this is not so good," Jake eventually observed out loud. "Where are the Canucks with all their rescue regalia when we want them?"

Wondering that himself, Ben said, "Takes a while to fly here, you know that. We'd better get busy, just in case. Firewood. Come on, let's get to whacking with these daisy cutters."

They had amassed a woodpile of the driest branches they could find to cut and were digging in the muskeg trying to reach water--none too successfully--when they heard the sound of a plane.

A small spotter aircraft of some kind, it looked about the size of a moth as it puttered through the air, in over the forested edge of the windfall and ever so slowly toward them, an arm waving out the co-pilot's window in good cheer as it

made a pass over them. No airplane created could land in the jumble of trees, snags, and logs, so both Ben and Jake knew what to expect, the drop of a bag of survival gear. Around again came the plane and again the cheery wave, but no bag was dropped.

"I wish he'd hurry up," Ben muttered as the small plane buzzed off to circle in for another try. "Puddlejumpers like that don't carry all that much fuel." Jake simply fixed a solid glare at the visiting aircraft as if the emergency bag could slide down on that.

One more time, here the frail aircraft came, propeller whirling like a child's pinwheel, and a sizable soft object was lobbed toward them. It blossomed out in a little parachute all its own, then decided to ride the breeze, straight toward the topmost branches of one of the taller standing trees nearby which Ben and Jake had paid no particular attention to, until now.

The chute neatly snagged on the worst of the high branches, tangled itself, and dangled the bag sixty feet above the cursing pair of men.

They bayed obscenities at the rescue bag festooned in the treetop like a Christmas trimming, until better sense kicked in. Meanwhile, the light plane wagged its wings--in the circumstances, it seemed more like a regretful shrug--and flew off in the direction of Newbride.

It was Jake, sounding almost pensive, who remarked, "That guy wasn't waving for exercise, was he. He wanted us out away from this shit-eating tree."

Taking stock of the situation, they could tell it was impossible to climb an evergreen that tall and spindly; the upper branches would break off under the weight of a man and so might the whole crown of the tree. On the other hand, the base of the tree looked appallingly substantial when the only thing you had to chop it down with were machetes meant for jungle vines.

The first half hour's worth of excruciatingly careful chopping, so as not to break the blades, produced a notch about as big as a beaver could chew in minutes. Panting and arm-weary, they had just resigned themselves to another hour or so of chipping away, when the sound of a more powerful aircraft engine reached them.

They looked up. This one was arriving from what they figured was the direction of Edmonton and coming like a streak.

Ben identified the silhouette and wondered if he could be hallucinating.

"VIP treatment this time around, Benjamin." Jake shaded his eyes. "We rate a P-39. Hope the guy is bringing us long woolies and his aim is better than that last prick's."

There were thousands of Airacobras in the sky of war, hundreds of pilots gunning a twelve-piston engine to a full four hundred miles an hour at any given time. This one roaring in on them had no business being flown by her, Ben knew in the deepest reasoning part of himself; Cass could be on the Seattle run, or on the ground at East Base, or anywhere between. But reason did not stand a chance as he craved her into creation there in the sun-glint of the rapidly oncoming cockpit. As he watched, afraid to blink, the P-39 lowered its nose and dove toward them. Jake, waving both arms, froze into semaphore position as the plane skimmed into the clearing in the forest, low as a crop-duster and fast as an artillery shell. Facing into the madcap flyover, Ben no longer knew whether to pray it was Cass or not at those controls.

The P-39 tore past so close over them they could feel the propwash. Now he was sure it was no one but her. He felt queerly responsible: Cass only would have flown a circus stunt like that to see what condition the crash left him in.

"That," Jake declared in the corridor of dwindling roar as the fighter plane climbed sharply, "is one shit-hot pilot." Both men watched the Cobra's ascent as fliers do, as if counting contour lines of elevation.

At around fifteen hundred feet the plane pulled up and settled into circling over them.

"What the hell now?"

"Writing a message," Ben somehow was sure. "Come on, let's get way out in the middle of this mess, we don't want the drop bag to end up in another tree."

Clumsier than vertical bears, they plunged through the fallen-timber maze until they reached a marginally more open patch of muskeg. They planted themselves in anticipation there, and Jake took up waving again. "The goddamn guy doesn't have to check his spelling," he complained as the Cobra kept to its droning orbit over them for the next some minutes. "Just tell us how they're gonna get us out of here."

"He will." Ben had nearly admitted *She*. "Next pass, watch for the drop bag."

Both of them tensed, ready to chase down the weighted leatherene bag, like a long yellow stocking, wherever it landed.

What came sailing out of the P-39 was the size of a bulging mail sack, so accurately aimed it very nearly hit them.

Jumping back until they were certain it was through rolling, Ben and Jake needed a further instant to realize it was a duffel bag. Together they pounced and opened it. They pawed through like pirates at a treasure chest. C-rations. Wool socks and gloves and watch caps. A down mummy bag. Matches. Two canteens of water. Two thermoses of hot coffee. Four cans of beer. Nestled amid it all, the message drop bag, and inside, the scrawled note:

> *Flyboys:*
>
> *Happy to see you up and around. Proceed five miles, compass heading S/SW, to nearest lake. Bush plane will be waiting for you tomorrow--sorry I can't, but WASPS and Cobras don't swim.*

Only room for one sleeping bag in the duffel, you'll have to share. Don't snuggle any closer than I would.

Jake looked up from the note as the P-39 cut another perfect tight circle over them, as if they were the bullseye of a target the size of Canada. "Bitch, whoever she is," he said in admiration.

The only acknowledgment Ben could think of was to throw up his hands in the possible direction of Edmonton--*Go! Go!* Jake looked at him for a moment, then commenced rummaging through the duffel bag. "Here's a dilemma--coffee or beer?"

"Save the beer." Ben watched the fighter plane go. "It's going to be a long night."

The five miles took them all the next day. Jake peglegged the distance, his twisted ankle splinted with halved tree branches, while Ben humped along with the precious duffel and picked out their compass route. At noon, barely halfway and their energy depleting fast, they made the decision to cram down all the C-rations to give their bodies something to work with. Ultimately both men were staggering, but always in the direction pointed by the compass needle in Ben's hand, as they lunged out of the forest to a lakeshore just before dusk. Half a mile away at a mooring buoy, a floatplane revved its engine and began to cruise across the surface of the water. In terror that it was taking off, the two of them futilely tried to outshout the roar of the engine. Then the skimming floats beneath the plane cut an arc on the lakewater like skates curving on ice, and the aircraft slowed to a chug, aiming in to shore exactly at them.

It took some moments for this unexpected lease on existence to register on him. He huddled there not daring to move lest any twitch of a muscle disturb whatever equilibrium the Widgeon was struggling itself into. Its engines still at full throttle, he could feel the floor of the plane lurching drunkenly under him, but along with it was what could be construed as--*Jesus, is it? Is it?*--the sensation of lift.

Then the engine noise settled to a guttural effort and Jake was calling over his shoulder in a shaky voice: "Nothing to it. You can come out of hiding now."

Ben stumbled his way forward and dumped himself into the co-pilot's seat. Trees still were not very far below, but the Widgeon laboriously kept on rising above the branches' reach.

He saw Jake was wearing a grin big enough to eat pie sideways.

"Kind of puckers a guy up, down there in the seat of the pants, don't it? Better get busy writing all this up, scribe, so they'll give us medals for getting this tub off the ground."

"Right, Ice. A piece of gravel pinned on with a band-aid. How about if I just sit here and let my insides catch up with me?"

They flew giddily, men given wings, for the next little while. Canada's immense share of the earth spread around them in the clear autumn morning in timber thick as fur and pocket mirror lakes and rivers flowing north.

Fondling the controls, Jake was chortling and calculating aloud how long it would take to fuel up in Edmonton and then the flying time to reach East Base for suppertime beer at the Officers Club, when one of the engines went rough, smoothed out, sputtered a time or two, and quit.

"Now goddamn what?" Jake indignantly checked the instrument panel. "Take a look, it's the one on your side."

Before the words were out of Jake's mouth, Ben had craned around to give the stilled engine a looking-over. It only took an instant. The engine cowling was

wet and aviation gasoline was whipping away behind it in a fine mist. "It's slobbering fuel like crazy," he reported hoarsely.

"Then I guess we don't try to restart the sonofabitch, do we." Jake rammed that throttle off. "We'll have limp on in to Edmon--"

The other engine quit.

--"aw, shit," Jake finished his sentence.

In the vacuum after that, the only sounds the wind in the struts and the creaks of a gliding plane that was too heavy to glide for very long, the pair of men stared the question at each other and made the same guess without having to say it. The Widgeon's repeated rough treatment on the gravel runway must have ruptured the fuel lines, and the gravity-defying takeoff over the treetops had encouraged leakage. By now Jake was striving to maintain altitude by madly pumping the flaps, the equivalent of using rowboat oars to try to move a barge, while Ben twisted in every direction in search of water they could set the plane down on. Off in the distance a lake gleamed, but too far for any sinking airplane to reach.

"I can't hold us in the air much longer," Jake said with strained calm. "How about we belly in on that clear patch down there?"

With gas all over us? Shielding the sun from his eyes with his hands, Ben scanned the stretch of forestless terrain coming under the plane, like a shaved-away spot on a mammoth pelt. He had to grit to give Jake the news that a windstorm had done the clearing. "It's full of downed trees, Ice. Tangled all to hell."

"That changes things. Raise Newbride, quick"--as Jake spoke, Ben already was on the radio chanting their position--"then grab the chutes. Toss me mine and the bivvie bag and you go. I'll milk the flaps as long as I can."

Having no choice, Ben clambered into jumping position, aware of the tail and the struts and other portions of the plane that he did not want hitting him when he went out the hatch. *Jump plenty far out when you jump, at least I remember that*

from flight school. He gripped the ripcord ring so hard his fist hurt. Great gulps swept through him as he attempted to blot out Dex's experience of puking in mid-air. Clinging in the hatchway, he stared past the toes of his flight boots, trying to judge. The Widgeon was losing altitude like mad, he could see individual stumps and logs down there; wasn't the ground too close for jumping?

"Get out! Now!" Jake's bellow and the sickening shift of the plane as he abandoned the cockpit sent Ben out into the air.

Two things happened almost simultaneously, the teeth-rattling jerk as the parachute opened and the uprush of a monstrously large downed evergreen directly beneath him, its rootball splayed toward him like a natural mantrap. With everything he could muster, dangling and falling at the same time, he tugged at the parachute's lines in an effort to miss the log. At the very end of his mid-air dance of trying to twist aside, a limber root end raked up his body, swatting him under the side of the jaw and taking some face skin with it.

The next thing he knew he was on his side on the ground. The tree, as prone as he was, was close enough he could reach out and touch it. Still foolishly gripped tight in his hand was the ripcord ring.

Raw-faced and wincing from the sideswipe by the tree root, he lay there testing himself for anything broken. Except for his breath, nothing seemed to be. He was gasping his way toward normal intake of air when he heard, somewhere off across the mess of downed trees, the nasty sound of a crash. *Too big for Jake. Had to be the plane.* That started his thought process whirring. Before he even was onto his feet he was calling at the top of his voice:

"Jake! Jake?"

It took several shouts, but then a voice not all that far away answered. "Tone it down, Ben. I don't want my ears hurting too."

"Where are you?"

"How the hell do I know? Over here."

Using the rootball as a rough ladder, Ben managed to climb high enough to see across various logs to where a white drape of parachute indicated Jake's location.

"I'm on my way. Doctor yourself till I get there, can you?" The optimistically named bivouac bag, containing a medical kit and other emergency essentials, was with Jake.

"Who said I need doctoring?"

To Ben, that response did not sound particularly convincing. Wasting no time, he bundled up his own chute in his arms like dirty laundry and began picking his way through the maze of downed trees. Mostly the forest here had been tipped over by a big wind, roots and all, like a spill of wooden matches. A good many tree trunks, though, had been snapped off, leaving stray splintery snags tall as totem poles. Here and there stood survivor trees, incongruous loners with their kilts of evergreen branches above it all. The muskeg footing was laborious. Ben was sweating by the time he rounded the last big log and there was Jake, upright but ~~grimacing~~ wincing as he stood there flexing the ankle in his unlaced left boot.

"How bad?" Ben asked.

"I feel beat to hell, about like you look."

Another spasm chased across the big man's face as he put weight on that foot. "Think maybe it's a sprain, not a break. Not gonna take the boot off to find out, the way the way the damn thing is swelling."

Jake's eyes met Ben's. "Tell you what really hurts--I dropped the bivvie bag coming out of the plane. Piss-poor time to fumble. Sorry about that, Ben."

"Don't worry," Ben spoke it with effort. "We've still got our chute packs. Can you walk?"

"You damn fool," Ben hurled over his shoulder, his hands clamping onto the controls. The Widgeon gave a sharp lurch, nosing upward, as Jake's weight moving toward the rear of the cabin radically altered its center of balance. His hands managing to tame that without any conscious help from the rest of him, Ben frantically scanned the infinite banks of dials, switches and gauges of an instrument panel that now seemed the size and complexity of a cathedral window. Flight school had never included this peculiar breed of aircraft in the first place. He could hear Jake back there humming loudly to himself while peeing, which did not help. Still inventorying the instrumentation, he kept coming up one short. Precisely now, of course, the Tanana River chose to turn cockeyed, twisting away in fresh directions, glinting like a silver snake. Alert in every corpuscle, Ben could see wire-like trees down there on its banks, he could see the carpet of yellow leaves on the ground, he could see the bald tops of hills regularly passing under the wingtips. What he could not spot, somewhere right under his nose, was the most basic aeronautical instrument.

While he was trying to navigate without it, the Widgeon gravitated below four thousand feet and he hurriedly dropped the flaps for some lift. Just then Jake returned to the cockpit, gyrating into the pilot's seat as the plane bounded upward. "Ride 'em, cowboy. I will say, you fighter jockeys fly livelier than us old bomber drivers."

"Funny as a crutch, Ice," Ben gritted out, hands and eyes busy in several directions. "Here, do something with this airplane."

"Just when you're getting used to it? Wouldn't be fair." The big man sat back comfortably to spectate. "Don't worry, Uncle Jake is here to hold your hand."

"You're going to get it, don't worry," Jake soothed. "The Russkies have their own mess hall and they like to talk shop with B-17 pilots. C'mon, you're gonna meet Katya."

He wondered if he was imagining, but the crowded mess hall smelled to him straight off the pages of Dostoevsky. Cabbage, dank wool clothing, copious boot grease. Feeling as if he was in another world, he spooned up the formidable soup and devoured hunks of bread while Jake alternately ate and banked his hands through the air in testimony to the maneuvering capabilities of B-17s. Across the table, Russian pilots who either looked like plowboys or middle-aged pirates--the generation between had largely been wiped out by the Germans' demonic sieges from Leningrad to Sevastopol--listened monastically. Amid the bulky men, a woman who was not at all what Ben had expected--trim, keen, authoritative; she reminded him alarmingly of Cass--translated Jake's effusions and Russian spatters of questions.

"Yakov, they say, how big bomb pile?"

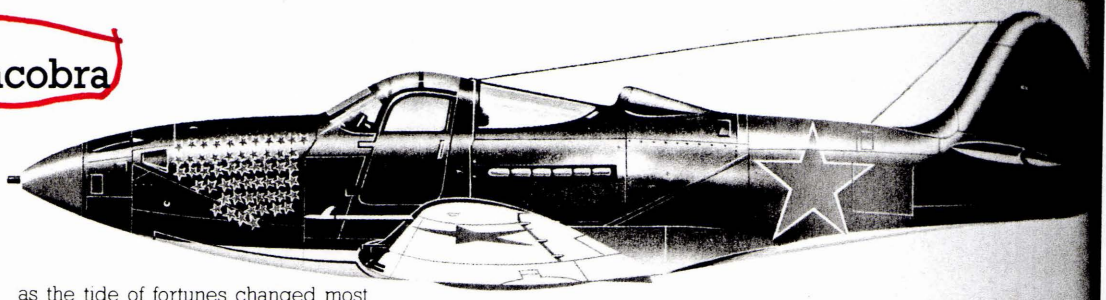
"Bomb load, right, ~~two thousand pounds~~ eight tons," Jake made an expansive gesture. "~~A ton--~~do you have those back home?"

"*Tonna,*" Katya reported, drawing the first smiles from the Russian airmen.

At first Ben had been relieved to see other American uniforms in the roomful of brown drab, a plump major and a couple of shavetail aides sitting with an ascetic looking Russian majordomo of some sort. The major proved to be the liaison officer, which meant he was there only under obligation, and in a matter of minutes had sent over the more diminutive of the aides to inquire why they were not in their own mess hall with everyone else. *Awful good question, shorty.* Jake pulled out all the stops, citing Ben as a big shot correspondent chronicling Lend-

USA

Bell P-39 Airacobra



The Bell P-39L Airacobra was a failure as an air combat fighter (apart from notable exceptions such as the aircraft shown here, of the Russian, Major Pokryshkin) and was used mainly in the ground attack role.

The radical **Bell P-39 Airacobra**, with midships engine and tricycle landing gear, enjoyed a disappointing career as a fighter with the American and British air forces as a result mainly of the abandonment of the turbosupercharger which had promised to bestow excellent performance at high altitude; this equipment was in any case banned from export to the UK, with the result that the Airacobra did not match up to RAF requirements for an interceptor. The upshot of this was a gradual change to the ground-attack role in American service, and disposal of very large numbers to the Soviet Union from 1942 onwards, 4,773 of the 9,558 built being supplied to that nation, mainly through Iran, but also over the Trans-Siberian railway. More than 200 Bell Airacobras were also shipped to the USSR in the North Cape convoys.

P-39s entered service with the V-VS early in 1943, the principal variant being the **P-39N** which featured a hub-firing 37-mm cannon, two nose-mounted 12.7-mm (0.5-in) and four wing-mounted 7.62-mm (0.3-in) machine-guns; a single 227-kg (500-lb) bomb could be carried under the fuselage.

In Soviet service the P-39 was used initially as a pure fighter, but gradually as the tide of fortunes changed most Soviet *polks* (fighter regiments) undertook a dual role in response to the demands of the massive ground battles that raged on the Eastern Front. Often the P-39s would be called on to carry out specific bombing tasks, after which they would revert to fighters to provide cover while subsequent bombing attacks went in. The majority of P-39 *polks* were deployed on the central and southern fronts, and numerous Soviet pilots achieved considerable success in the aircraft; Captain Grigori Rechkalov scored 44 of his 58 air victories in a P-39 with the 9th Guards Fighter Division, and Aleksandr Pokryshkin, who commanded a P-39 *eskadril* in the 216th Guards Fighter Division's 16th Polk and later became the Soviet Union's second highest scoring pilot, shot down 48 of his 59 victims while flying P-39s, many of these falling in the course of dual-role fighter/bombing missions. For all the P-39's obvious success on the Eastern Front, wastage through accidents was by all accounts very high, relatively inexperienced pilots finding the aircraft tricky to handle and, with the big Allison engine located behind the cockpit, forced landings and other landing mishaps were frequently fatal. A much smaller number of the later but related **Bell P-63 Kingcobra** was also supplied to the Soviet Union, this aircraft being equipped to carry three 227-kg (500-lb) bombs.

Specification

Bell P-39N Airacobra
Type: single-seat fighter-bomber
Powerplant: one 1,200-hp (895-kW) Allison V-1710-85 liquid-cooled V-12 piston engine
Performance: maximum speed 642 km/h (399 mph) at 3355 m (11,000 ft); climb to 4570 m (15,000 ft) in 5 minutes 20 seconds; service ceiling 11735 m (38,500 ft); range 1205 km (749 miles)
Weights: empty 2562 kg (5,645 lb); maximum take-off 3720 kg (8,200 lb)
Dimensions: span 10.36 m (34 ft 0 in); length 9.19 m (30 ft 2 in); height 3.78 m (12 ft 5 in); wing area 19.79 m² (213 sq ft)
Armament: one hub-firing 37-mm cannon, two nose-mounted 12.7-mm (0.5-in) and four wing-mounted 7.62-mm (0.3-in) machine-guns, plus a single 227-kg (500-lb) bomb carried under the fuselage

USA

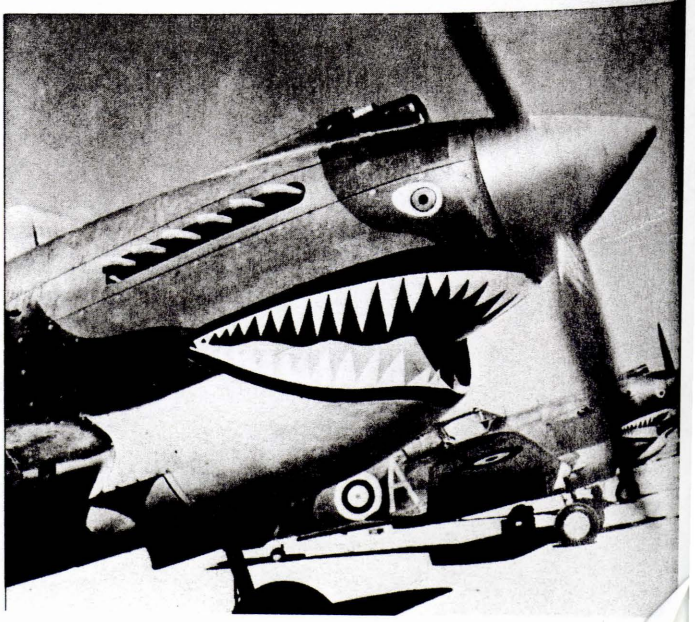
Curtiss P-40

The Kittyhawk Mk IV was the RAF equivalent of the P-40N Warhawk, and is shown here in the markings of No. 112 Sqn in 1944.

Although firmly rooted among the first generation of monoplane fighters of the late 1930s, the famous **Curtiss P-40** family underwent progressive modernization, and as each version became outmoded by later fighters, it came to be employed as a passable fighter-bomber. Adopted as the USAAC's standard fighter and subject of heavy British purchasing in 1940, the early **P-40B, P-40C** and **Tomahawk** entered service in 1941, the first RAF squadron to receive the latter being No. 112 in the Middle East. The Tomahawk's performance as an interceptor was disappointing, being generally inferior to the Hurricane Mk II, and it was therefore employed mainly for ground attack, although the armament of six rifle-calibre machine-guns was far from adequate. Tomahawks (and the equivalent P-40B/Cs) were shipped to the USSR and Turkey, and were flown by American pilots in the Pacific and South East Asia. The **P-40D** represented something of a transformation, with the Allison engine installed in a shortened nose, fuselage guns removed and the radiator moved forward. Known as the **Warhawk** in American service (as were all P-40s) and **Kittyhawk** in RAF service, this and subsequent similar versions were built in very large numbers up to 1944, from mid-1942 being equipped as fighter-bombers in the USAAF, RAF and other Allied air forces to carry up to three 227-kg (500-lb) bombs under fuselage and wings; later versions could carry a 454-kg (1,000-lb) bomb under the fuselage. They were particularly active in the close-support role in North Africa after the victory at Alamein and the 'Torch' landings, and in the campaigns in Sicily, Italy and the Balkans. The Packard-built Merlin was used until the end of the war. Despite its widespread use as a fighter-bomber the P-40 was not generally appreciated as a result of its control sluggishness and lateral trim changes as speed built up in a diving attack; the latter behaviour, which gave rise to excessive yawing at the moment of bomb release, made accurate bombing extremely difficult, and P-40s were more usually employed for attacks on larger rather than smaller targets.

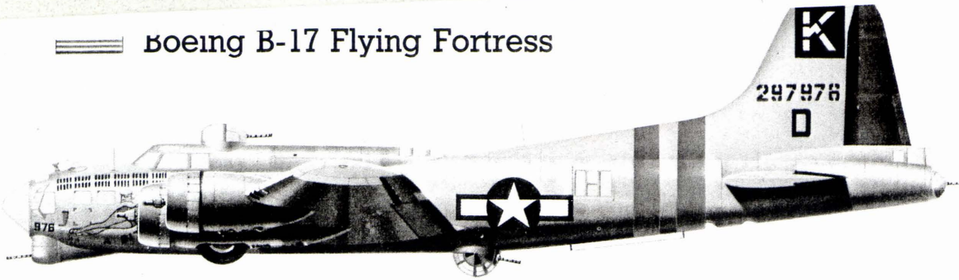
Specification

Curtiss P-40N Warhawk
Type: single-seat fighter-bomber
Powerplant: one 1,360-hp (1015-kW) Allison V-1710-81 liquid-cooled V-12 piston engine
Performance: maximum speed 609 km/h (378 mph) at 3200 m (10,500 ft); climb to 4570 m (15,000 ft) in 6 minutes 49 seconds; service ceiling 11580 m (38,000 ft); range on internal fuel 547 km (340 miles)
Weights: empty 2722 kg (6,000 lb); maximum take-off 5171 kg (11,400 lb)
Dimensions: span 11.38 m (37 ft 4 in); length 10.16 m (33 ft 4 in); height 3.76 m (12 ft 4 in); wing area 21.92 m² (236 sq ft)
Armament: six wing-mounted 12.7-mm (0.5-in) machine-guns, plus one 454-kg (1,000-lb) bomb under the fuselage and two 227-kg (500-lb) bombs under the wings



Bearing the famous shark's teeth markings of No. 112 Sqn, these Tomahawks are ready for take-off at

B-17 Flying Fortress in Action

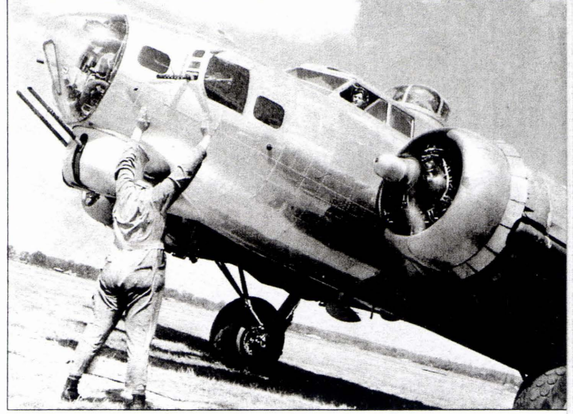


This Boeing B-17G, A Bit o'Lace of the 711th BS, 447th BG was based at Rattlesden. Spectacular nose art became a speciality of the US Army Air Force, and art featuring the female form was invariably well executed. This contrasted with a virtual ban on nose art by RAF Bomber Command.

Pursuing an operational theory that high flying, heavily armed bombers were the surest means of striking strategic targets in daylight, the US Army Air Corps issued a requirement in 1934 for which the **Boeing Model 299 Flying Fortress** was designed and first flown on 28 July 1935. Twelve **Y1B-17** (later **B-17**) service test aircraft entered service in 1937 and were followed by small numbers of **B-17B** and **B-17C** bombers in 1940-1, and by the **B-17D** in 1941. The **B-17E** introduced the enlarged vertical tail surfaces and tail gun position characteristic of all subsequent B-17s, as well as power-operated twin-gun turrets aft of the cockpit and below the centre fuselage. 512 B-17Es were produced, this version being the first US Army Air Force heavy bomber to see combat in Europe with the 8th Air Force. A total of 3,400 **B-17F** bombers, with enlarged one-piece nose transparency, was produced during 1942-3, and these were followed by the principal variant, the **B-17G**, which, in reply to calls for improved nose armament to counter the Luftwaffe's head-on attacks, introduced the two-gun 'chin' turret; production totalled 8,680 B-17G aircraft by Boeing, Douglas and Lockheed-Vega. The Fortress was deployed principally in Europe during the war, with much smaller numbers operating in the Far East. The type carried out many epic raids, large formations of bombers, each bristling with heavy machine-guns and providing mutual protection against enemy fighters, pounding across the daylight skies over Hitler's Reich. In due course heavy losses forced the Americans to introduce escort fighters – the P-38, P-47 and P-51. One temporary expedient involved the use of a small number of B-17s modified as **YB-40** 'escort' aircraft, some aircraft carrying up to 30 machine-guns. Fortresses (B-17Cs, Fs and Gs) served in small numbers with RAF Bomber and Coastal Commands.

Specification
Boeing B-17G Flying Fortress
Type: 10-crew daylight medium/heavy bomber
Powerplant: four 895-kW (1,200-hp) Wright Cyclone R-1820-97 radial piston engines
Performance: maximum speed 462 km/h (287 mph) at 7620 m (25,000 ft); climb to 6096 m (20,000 ft) in 37 minutes; service ceiling 10850 m (35,600 ft); range with 2722-kg (6,000-lb) bombload 3220 km (2,000 miles)
Weights: empty 16391 kg (36,135 lb); maximum take-off 32660 kg (72,000 lb)
Dimensions: span 31.62 m (103 ft 9 in); length 22.78 m (74 ft 9 in); height 5.82 m (19 ft 1 in); wing area 131.92 m² (1,420.0 sq ft)
Armament: twin 12.7-mm (0.5-in) guns in turrets under nose, aft of cockpit, under centre fuselage and in tail, and single-gun mountings in sides of nose, in radio operator's hatch and in waist (beam) positions, plus a maximum bombload of 7983 kg (17,600 lb)

An unusually clean B-17G is marshalled to a halt on delivery to a unit in England. Such pristine condition would not be long-lived; nose art and battle damage would soon make the aircraft look more businesslike.



One of the most famous bombers of all time, the Boeing B-17 was so impressive when the prototype appeared in July 1935 that it was dubbed 'Flying Fortress'. The name stuck and became a registered trademark. The US Army Air Corps had merely asked for a 'multi-engine' bomber, to carry a 2,000-lb (907-kg) bombload. Rival companies built twin-engine machines, but Boeing went for four engines to get more speed and altitude. Eventually the first B-17 was delivered on 1 March 1937, with a crew of 7 distributed around the tube-like fuselage, five of them each manning a defensive machine-gun. Amidships was a short but deep bomb bay housing up to 2177 kg (4,800 lb) of bombs, with a catwalk down the centre.

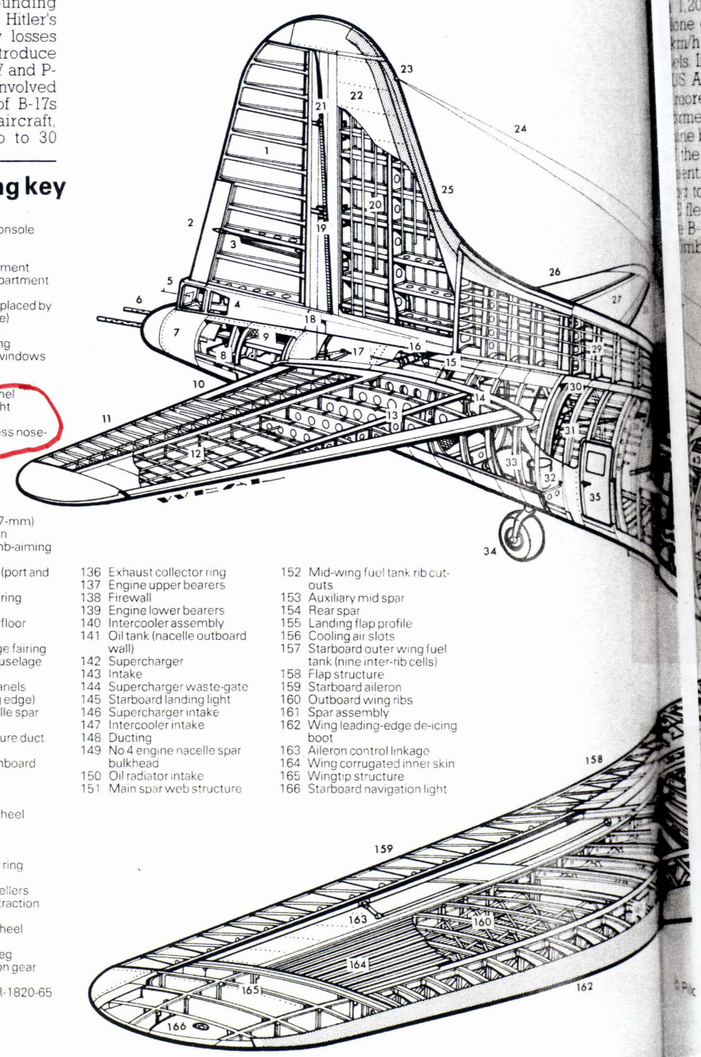
By 1940 the production model was the B-17C, with 1,200-hp (895-kW) turbosupercharged engines giving a maximum speed of 512 km/h (320 mph), much faster than later models. In 1941 the RAF was given 20 because the US Army wanted to see how this model, with more guns, self-sealing tanks and armour, performed in combat. The result was a disastrous one being destroyed in a few weeks, but as the trouble was bad luck and bad management. Enough was learned, however, for work to redesign the B-17 and the resulting B-17E flew on 5 September 1941.

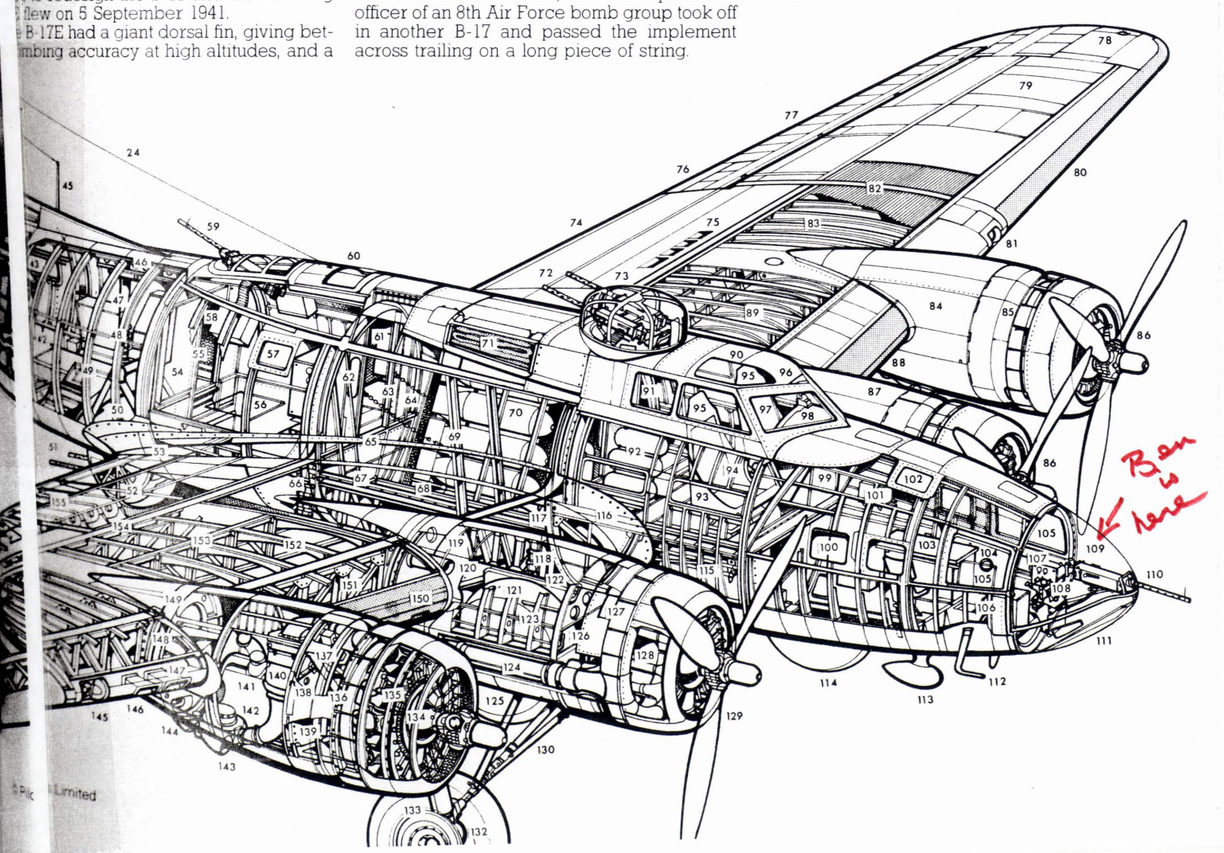
The B-17E had a giant dorsal fin, giving better bombing accuracy at high altitudes, and a larger tailplane. There were many internal changes, but the main difference was in radically better defensive firepower, with 10 12.7-mm (0.5-in) Brownings and two or three of 7.62-mm (0.3-in) calibre. The small guns were manually aimed from the nose, while the big weapons were in a two-gun power-driven dorsal turret, a twin manual installation in the roof of the radio compartment, two manual waist positions, a manual tail turret (filling what was previously a blind spot) and under the fuselage a powered ball turret whose occupant had to be small. In the event of a belly landing the ball turret had to be vacated, and if the door jammed the whole turret had to be severed from the aircraft by a special spanner carried on board, the occupant then escaping as it fell. On at least one occasion it was found the special tool was not on board, and the operations officer of an 8th Air Force bomb group took off in another B-17 and passed the implement across trailing on a long piece of string.

In April 1942 the B-17F introduced many improvements including a frameless Plexiglas nose which in later versions had two 12.7-mm (0.5-in) guns in left and right cheek mountings. Hundreds of B-17Fs formed the backbone of the growing might of the 8th Air Force, which from August 1942 operated over Germany and other European countries. After much action the Luftwaffe decided head-on attacks were especially effective and to counter these the main change in the B-17G was to add a chin turret with two more guns, making a total of 13, all of 12.7-mm (0.5-in) calibre (only one gun was fitted in the roof of the radio compartment, making the odd number, and later this was often omitted). The B-17G was the final mainstream variant, and 8,680 were built, the last 7,000 or so being unpainted instead of olive-drab.

Boeing B-17F Flying Fortress cutaway drawing key

1 Rudder construction
2 Rudder tab
3 Rudder tab actuation
4 Tail gunner's station
5 Gunsight
6 Twin 0.5-in (12.7-mm machine guns)
7 Tail cone
8 Tail gunner's seat
9 Ammunition troughs
10 Elevator trim tab
11 Starboard elevator
12 Tailplane structure
13 Tailplane front spar
14 Tailplane/fuselage attachment
15 Control cables
16 Elevator control mechanism
17 Rudder control linkage
18 Rudder post
19 Rudder centre hinge
20 Fin structure
21 Rudder upper hinge
22 Fin skinning
23 Aerial attachment
24 Aerials
25 Fin leading-edge de-icing boot
26 Port elevator
27 Port tailplane
28 Tailplane leading-edge de-icing boot
29 Dorsal fin structure
30 Fuselage frame
31 Tailwheel actuation
32 Toilet
33 Tailwheel (retracted) fairing
34 Fully-swivelling retractable tailwheel
35 Crew entry door
36 Control cables
37 Starboard waist hatch
38 Starboard waist 0.5-in (12.7-mm) machine gun
39 Gun support frame
40 Ammunition box
41 Ventral aerial
42 Waist gunners' positions
43 Port waist 0.5-in (12.7-mm) machine gun
44 Ceiling control cable runs
45 Dorsal aerial mast
46 Ball turret stanchion support
47 Ball turret stanchion
48 Ball turret actuation mechanism
49 Support frame
50 Ball turret roof
51 Twin 0.5-in (12.7-mm) machine guns
52 Ventral ball turret
53 Wingroot fillet
54 Bulkhead
55 Radio operator's compartment
56 Camera access hatch
57 Radio compartment windows (port and starboard)
58 Ammunition boxes
59 Single 0.5-in (12.7-mm) dorsal machine gun
60 Radio compartment roof glazing
61 Radio compartment/bomb-bay bulkhead
62 Fire extinguisher
63 Radio operator's station (port side)
64 Handrail links
65 Bulkhead step
66 Wing rear spar/fuselage attachment
67 Wingroot profile
68 Bomb-bay central catwalk
69 Vertical bomb stowage racks (starboard installation shown)
70 Horizontal bomb stowage (port side shown)
71 Dinghy stowage
72 Twin 0.5-in (12.7-mm) machine guns
73 Dorsal turret
74 Port wing flaps
75 Cooling air slots
76 Aileron tab (port only)
77 Port aileron
78 Port navigation light
79 Wing skinning
80 Wing leading-edge de-icing boot
81 Port landing light
82 Wing corrugated inner skin
83 Port out wing fuel tank (nine inter-rib cells)
84 No 1 engine nacelle
85 Cooling gills
86 Three-blade propellers
87 No 2 engine nacelle
88 Wing leading-edge de-icing boot
89 Port mid-wing (self-sealing) fuel tanks
90 Flight deck upper glazing
91 Flight deck/bomb-bay bulkhead
92 Oxygen cylinders
93 Co-pilot's seat
94 Co-pilot's control column
95 Headrest armour
96 Compass installation
97 Pilot's seat
98 Windscreen
99 Central control console pedestal
100 Side windows
101 Navigation equipment
102 Navigator's compartment upper window (subsequently replaced by ceiling astrodome)
103 Navigator's table
104 Side gun mounting
105 Enlarged cheek windows (flush)
106 Ammunition box
107 Bombardier's panel
108 Norden bombsight installation
109 Plexiglas frameless nose-cone
110 Single 0.5-in (12.7-mm) nose machine gun
111 Optically-flat bomb-aiming panel
112 Pitot head fairing (port and starboard)
113 D/F loop bullet fairing
114 Port mainwheel
115 Flight deck underfloor control linkage
116 Wingroot/fuselage fairing
117 Wing front spar/fuselage attachment
118 Battery access panels (wingroot leading edge)
119 No 3 engine nacelle spar bulkhead
120 Intercooler pressure duct
121 Mainwheel well
122 Oil tank (nacelle inboard wall)
123 Nacelle structure
124 Exhaust
125 Retracted mainwheel (semi-recessed)
126 Firewall
127 Cooling gills
128 Exhaust collector ring assembly
129 Three-blade propellers
130 Undercarriage retraction struts
131 Starboard mainwheel
132 Axle
133 Mainwheel oleo leg
134 Propeller reduction gear casing
135 1,200 hp Wright R-1820-65 radial engine
136 Exhaust collector ring
137 Engine upper bearers
138 Firewall
139 Engine lower bearers
140 Intercooler assembly
141 Oil tank (nacelle outboard wall)
142 Supercharger
143 Intake
144 Supercharger waste-gate
145 Starboard landing light
146 Supercharger intake
147 Intercooler intake
148 Ducting
149 No 4 engine nacelle spar bulkhead
150 Oil radiator intake
151 Main spar web structure
152 Mid-wing fuel tank rib cut-outs
153 Auxiliary mid spar
154 Rear spar
155 Landing flap profile
156 Cooling air slots
157 Starboard outer wing fuel tank (nine inter-rib cells)
158 Flap structure
159 Starboard aileron
160 Outboard wing ribs
161 Spar assembly
162 Wing leading-edge de-icing boot
163 Aileron control linkage
164 Wing corrugated inner skin
165 Wingtip structure
166 Starboard navigation light





USSR

Polikarpov U-2

Occupying a unique position in Soviet aviation history, the **Polikarpov U-2** primary trainer biplane had an inauspicious start. The **U-2TPK** prototype, which appeared in early 1927, had been built to achieve economy in repair and maintenance, the wings comprising four identical thick-section interchangeable rectangular panels with square tips. Similarly, a common control surface was used for ailerons, elevators and rudder. The result was a biplane with very poor flight characteristics. It had thus to be redesigned, aprearing as a neat, manoeuvrable biplane having staggered single-bay wing with rounded tips, conventional cross-axle landing gear, and tandem open cockpits for instructor and pupil. Powered by a 75-kW (100-hp) radial engine, the new prototype made its first flight on 7 January 1928. An immediate success, it was placed in quantity production, deliveries starting in 1928, and by the time of the German invasion of the Soviet Union in mid-1941 over 13,000 had been completed.

Though its principle role was primary training, the U-2 was soon modified as a light passenger transport, air ambulance and agricultural aircraft. Production continued on a massive scale during World War II, and the U-2 took on an even wider range of duties, including liaison, light attack, night nuisance raider and propaganda aircraft complete with microphone and loudspeaker.

After Polikarpov's death, on 30 July 1944, the U-2 was redesignated **Po-2** in his honour, and post-war it continued in production in the USSR for several years. Trainer and ambulance variants were built on a large scale in Poland from 1948 to 1953. Po-2s served with many Soviet allies and a small number still remain in flying condition in the USSR and several other countries. The total built is credibly reported to be in excess of 40,000.

Specification

Polikarpov U-2VS

Type: trainer and multi-purpose aircraft

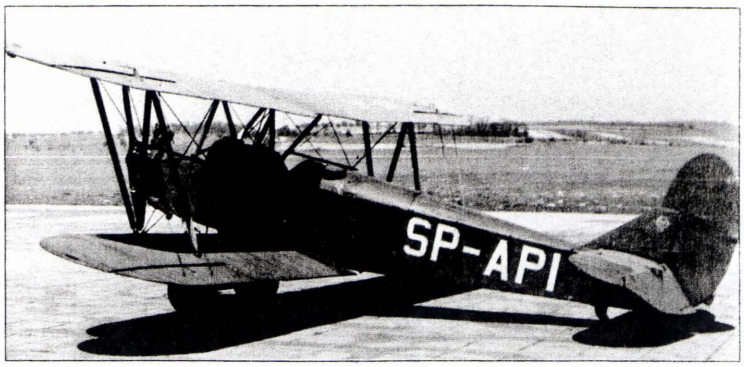
Powerplant: one 75-kW (100-hp) M-11 radial piston engine

Performance: maximum speed 156 km/h (97 mph); service ceiling 4000 m (13,125 ft); range 400 km (249 miles)

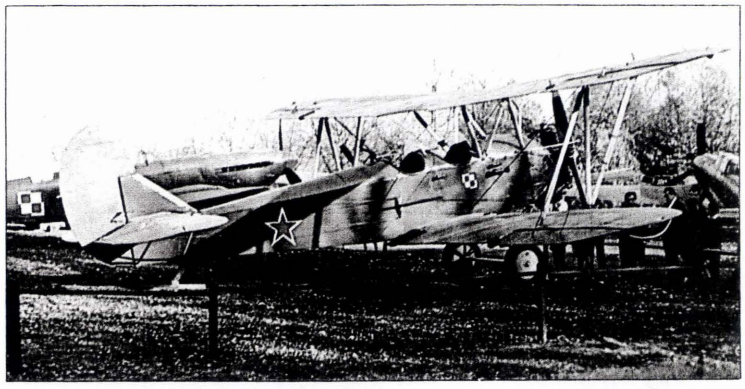
Weights: empty equipped 635 kg (1,400 lb); maximum take-off 890 kg (1,962 lb)

Dimensions: span 11.40 m (37 ft 4.8 in); length 8.17 m (26 ft 9.78 in); height 3.10 m (10 ft 2 in); wing area 33.15 m^2 (356.84 sq ft)

Armament: none



Built on a large scale in Poland as the CSS-13, the Polikarpov U-2 (known as the Po-2 after the designer's death in 1944) was used in a wide array of both civil and military roles, and has probably been built in greater numbers and in more variants than any other aircraft in history.



A Soviet built U-2 supplied to the Polish forces at the end of World War II, preserved at a Polish museum. Over 100 regiments, each of 42 aircraft, operated the 'Kuburuznile' ('Corn Cutter') at the height of the war.

ITALY

Meridionali Ro.37bis

Meridionali, then named Officine Ferroviarie Meridionali, first became involved in the Italian aircraft industry in 1923, beginning manufacturing activities two years later by licence-construction of Fokker designs. Subsequently, after two years under the name Romeo, the title Industrie Meccaniche e Aeronautiche Meridionali (IMAM) was adopted in 1936.

In 1934 the company had started design and production of a two-seat fighter/reconnaissance biplane under the designation **Romeo Ro.37**. This was an unequal-span single-bay biplane of mixed wood and metal construction. Its design included fixed tailwheel landing gear, all three wheels being provided with speed fairings; a braced tail unit incorporating a variable-incidence tailplane; and accommodation for two in tandem enclosed cockpits. Power was provided by a 522-kW (700-hp) Fiat A.30RA Vee engine. An improved **Ro.37bis** was developed subsequently, and this introduced an optional radial powerplant comprising either the Piaggio P.IX or P.X supercharged engine. Both models proved popular for their day, with production of the Ro.37 and Ro.37bis exceeding 160 and 475 respectively, and export orders were received from Afghanistan, Hungary and from countries in Central and South America.

Ro.37 and Ro.37bis aircraft were involved in the Spanish Civil War from October 1936 and were used extensively by the Regia Aeronautica during Mussolini's invasion of Abyssinia between October 1935 and May 1936 that country until 1941. Some 275 Ro.37bis aircraft were in service with the Regia Aeronautica when Italy became involved in World War II, and these saw first-line service in the East and North African campaigns and in the Balkans. After withdrawal from first-line service they found a variety of uses, but all had been retired before Italy's armistice with the Allies on 8 September 1943.

Specification

Meridionali Ro.37bis

Type: two-seat fighter/reconnaissance aircraft

Powerplant: one 418-kW (560-hp) Piaggio P.IX RC.40 radial piston engine

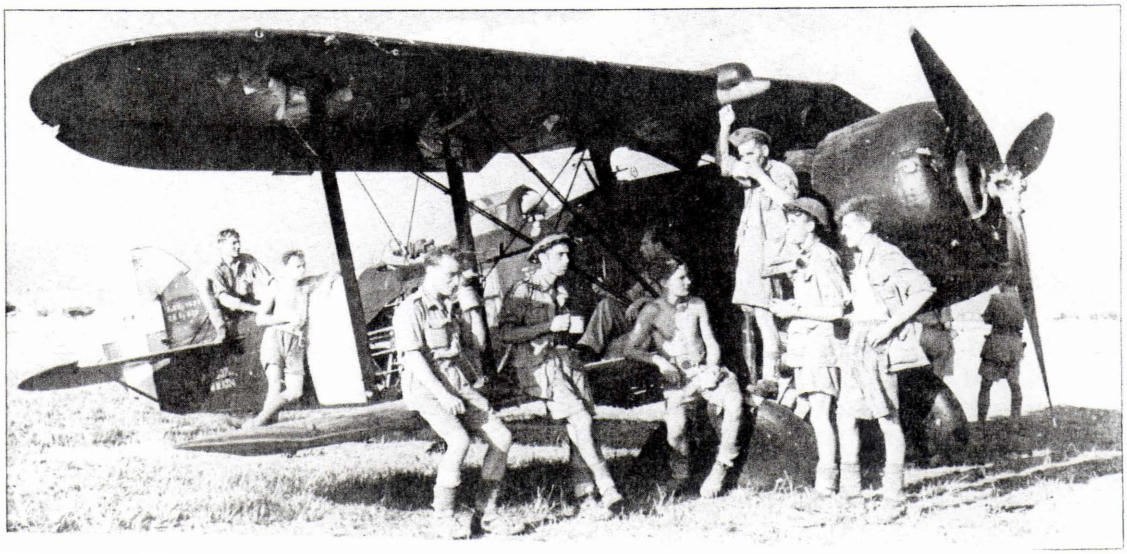
Performance: maximum speed 330 km/h (205 mph) at 5000 m (16,405 ft); cruising speed 250 km/h (155 mph); service ceiling 7200 m (23,620 ft); maximum range 1120 km (696 miles)

Weights: empty 1585 kg (3,494 lb); maximum take-off 2420 kg (5,335 lb)

Dimensions: span 11.08 m (36 ft 4.2 in); length 8.56 m (28 ft 1 in); height 3.15 m (10 ft 4 in); wing area 31.35 m^2 (337.46 sq ft)

Armament: two fixed forward-firing 7.7-mm (0.303-in) machine-guns and one gun of same calibre on trainable mount in rear cockpit, plus up to 180 kg (397 lb) of bombs on underfuselage racks

The Meridionali Ro.37 saw its heyday during the Spanish Civil War. A few soldiered on into World War II, this example being captured during the battle for Monte Corvino near Salerno in 1943.



Grumman Widgeon

From Wikipedia, the free encyclopedia

The **Grumman G-44 Widgeon** is a small, six-person, twin-engine amphibious aircraft. It was designated **J4F** by the U.S. Navy and Coast Guard and **OA-14** by the United States Army Air Corps and United States Army Air Forces.

G-44 Widgeon

A Grumman Widgeon on Frazier Lake on the southwest end of Kodiak Island, Alaska

Type	Amphibious transport
Manufacturer	Grumman
Maiden flight	1940
Primary users	United States Navy United States Army Air Force United States Coast Guard Royal Navy
Number built	345
Developed from	Grumman Goose

Contents

Design and development

The Widgeon was originally designed for the civil market. It is a smaller version of the Grumman's earlier G-21 Goose, and was produced from 1941 to 1955. The aircraft was used during World War II as a small patrol and utility machine by the US Navy, US Coast Guard and by the Royal Navy.

The first prototype flew in 1940, and the first production aircraft went to the US Navy as an anti-submarine aircraft. In total, 266 were built, including 176 for the military. During World War II, they served with the US Navy, Coast Guard, Civil Air Patrol and Army Air Force, as well as with the British Royal Navy, who called it the "Gosling".

Operational history

On August 1, 1942, a J4F-1 flown by US Coast Guard Patrol Squadron 212 based out of Houma, Louisiana and flown by Chief Aviation Pilot Henry White spotted and attacked a German U-boat off the coast of Louisiana. White reported the submarine sunk, and he was subsequently credited with sinking *U-166* and awarded the Distinguished Flying Cross; however, the wreck of *U-166* was found in June 2001 by an oil exploration team working for BP Amoco and Shell Oil Company, and the sinking of *U-166* is now generally credited to *PC-556*.[1] White's aircraft is now thought to have made an unsuccessful attack against *U-171*, a Type IXC U-boat identical to *U-166* that reported an air attack coincident with White's attack. *U-171* was undamaged by White's attack, but was sunk four months later in the Bay of Biscay.[2]

After the war, the type was redesigned to make it more suitable for civilian operations. A new hull improved its

water handling, and six seats were added. A total of 50 of the new **G-44A** were built. Another 40 were produced in France as the **SCAN-30**; however, most of these ended up in the United States.

McKinnon Enterprises converted some Widgeons to "Super Widgeons". The conversion features replacing the engines with Lycoming GO-480 flat six piston engines, and various other modifications, such as:

- Modern avionics
- 3-blade propellers
- Larger windows
- Improved soundproofing
- Emergency exits
- Increased Maximum Takeoff Weight
- Retractable wing-tip floats (optional)

Operators

Military operators

- Brazil
- Israel
- Portugal
- Thailand
- United Kingdom
- United States
  - USAAC
  - USAAF
  - US Coast Guard
  - US Navy
- Uruguay

Survivors

There is an ex-Coast Guard Widgeon on display at the Pensacola Naval Air Museum in Pensacola, Florida.

Specifications (G-44A)

Data from {name of first source}

General characteristics

- **Crew:** one, pilot
- **Capacity:** 5 passengers
- **Length:** 31 ft 1 in (9.47 m)
- **Wingspan:** 40 ft 0 in (12.19 m)
- **Height:** 11 ft 5 in (3.48 m)
- **Wing area:** 245 ft² (22.8 m²)
- **Empty weight:** 3,240 lb (1,470 kg)
- **Loaded weight:** 4,500 lb (2,041 kg)

- **Max takeoff weight:** 5,500 lb (2,500 kg)
- **Powerplant:** 2× Ranger Engine L-440C-5 inverted inline 6-cylinder engines, 200 hp (150 kW) each

Performance

- **Maximum speed:** 139 knots (160 mph, 257 km/h)
- **Range:** 800 nm (920 miles, 1,481 km)
- **Rate of climb:** 1,000 ft/min (305 m/min)

See also

Related development

- Grumman Goose

Comparable aircraft

- Sikorsky S-38
- Sikorsky S-39
- Piaggio P-136
- Supermarine Walrus

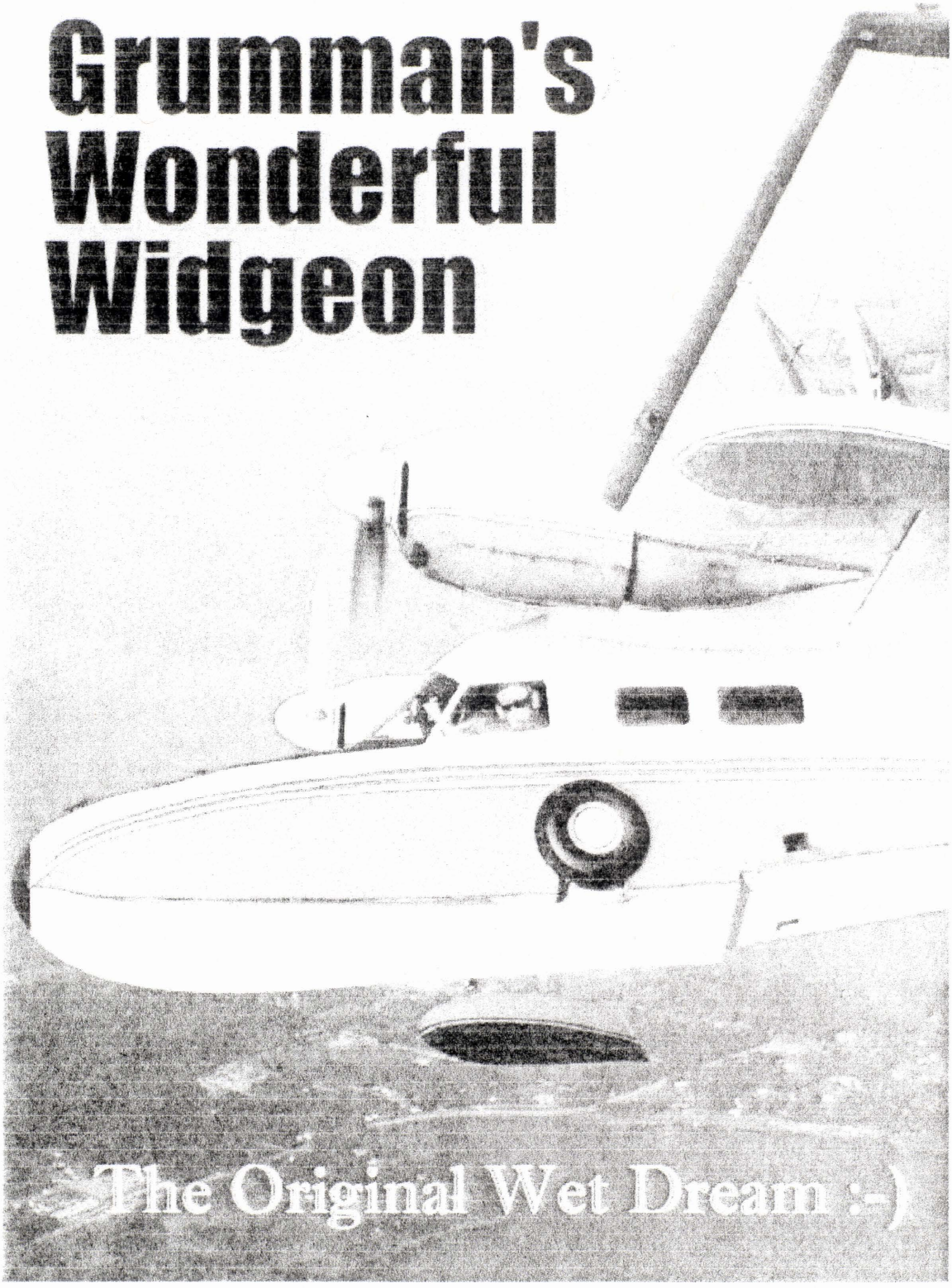
Related lists

- List of seaplanes and flying boats

Retrieved from "http://en.wikipedia.org/wiki/Grumman_Widgeon"

Categories: Seaplanes and flying boats | United States civil utility aircraft 1940-1949 | United States Coast Guard Aviation | Grumman aircraft

Grumman's Wonderful Widgeon



by Budd Davisson, , July, 1990

Avionics

From Wikipedia, the free encyclopedia

Avionics is a portmanteau which literally means aviation electronics. In essence it comprises all electronic systems designed for use on an aircraft. At a basic level this comprises communications, navigation and the display and management of multiple systems. It also comprises the literally hundreds of systems that are fitted to aircraft to meet individual roles. These can be as simple as a search light for a police helicopter or as complicated as the tactical system for an Airborne Early Warning platform. Avionics also refers to the electronics on artificial satellites and spacecraft.

The study of avionics and its impact on aerospace technology has grown at an amazing rate. Initially the ancillary part of an aircraft, avionics has, for many aircraft, become the sole reason for its existence. Increasingly, military aircraft become the means of placing powerful and sensitive sensors into a tactical environment.

Contents

History

The term avionics did not gain any credence or general use until the early 1970s. Up to this point instruments, radios, radar, fuel systems, engine controls and radio navigation aids had all formed individual and often mechanical systems.

In the 1970s avionics was born. This was mostly driven by military need rather than civil airliner development (the cold war). A large number of aircraft had become flying sensors platforms, and making large amounts of electronic equipment work together had become the new challenge. Today, avionics as used in military aircraft

almost always forms the biggest part of any development budget. Aircraft like the F-15E and the now retired F-14 have roughly 80 percent of their budget spent on avionics. Most modern helicopters now have budget splits of 60/40 in favour of avionics. (F-22?)

The civilian market has also seen a massive growth in cost of avionics. Flight control systems (fly-by-wire) and new navigation needs brought on by tighter airspaces, have pushed up development costs accordingly. The major change has been the recent boom in consumer flying. As more people begin to use planes as their primary method of transportation, more elaborate methods of controlling aircraft safely in these high restrictive airspaces have been invented. Whilst the nature of civil aircraft means that avionics is almost always confined to the cockpit, the budgets and development made in the civil market has for the first time started to influence the military.

Main categories

Avionics, like electronics, is a massive subject that does not easily lend itself to simple categorisation. The headings below try to allocate areas of interest, from which you can delve deeper into the subject areas.

Aircraft avionics

The cockpit of any aircraft is the most obvious location for avionics. It is also the most contentious and difficult. Systems that allow the aircraft to fly safely or have direct control over the aircraft are all directly controlled by the pilot. These safety critical systems and the items that support them are all referred to as aircraft avionics. Honeywell is the market leader in flight avionics.

Communications

Probably the first piece of avionics to exist, the ability to communicate from the aircraft to the ground has been crucial to aircraft design since its inception. The boom in telecommunications has meant aircraft (civilian and military) fly with a vast array of communication devices. A small number of these provide the critical air to ground communications systems for safe passage. On board communications are provided by public address systems and aircraft intercoms.

The VHF aviation communication system works on the Airband of 118.000 MHz to 136.975 MHz. Each channel is spaced from the adjacent by 8.33 kHz. Amplitude Modulation (AM) is used. The conversation is performed by simplex mode.

See also: Aircraft Communication Addressing and Reporting System

Navigation

This article concerns navigation in the sense of determination of position and direction on or above the surface of the Earth.

Soon after communications the envelope within which an aircraft could be operated was limited by the conditions. Navigation sensors have been developed from the early days to assist pilots in safe flight. As with communications, there is a vast array of radio navigation and relative aircraft based navigation devices that can be fitted to an aircraft. One of the most important ways in which aircraft navigation is done today is with the aid of the GPS system.

Police and EMS aircraft (mostly helicopters) are now a significant market. Military aircraft are often now built with a role available to assist in civil disobedience. Police helicopters are almost always fitted with video/FLIR systems to allow them to track suspects or items they or their command are interested in. They can also be fitted with searchlights and loudspeakers for the very same reason police cars are.

EMS helicopters obviously need medical equipment, which is rarely classified as avionics. However, many EMS and Police helicopters will be required to fly in unpleasant conditions, this may require more aircraft sensors, some of which were until recently considered purely for military aircraft.

See also

- ACARS
- Flight recorder
- Distress radiobeacon
- Integrated Modular Avionics
- Avionics software
- ARINC

References

External links

- Space Shuttle Avionics (http://klabs.org/DEI/Processor/shuttle/sp-504/sp-504.htm)
- Aviation Today Avionics magazine (http://www.aviationtoday.com/av/)
- RAES Avionics homepage (http://www.raes.org.uk/cmspage.asp?cmsitemid=SG_Av_Sys_Home)
- On-Board Electronics related papers (http://paginas.terra.com.br/educacao/ee/) (Portuguese)
- [ISBN 9788536501574 - Book: Eletrônica Embarcada Automotiva] (Portuguese)

Retrieved from "http://en.wikipedia.org/wiki/Avionics"

Categories: Articles lacking sources from January 2007 | All articles lacking sources | Avionics | Embedded systems | Electronics | Wireless communications | Aircraft instruments | Spacecraft components

Displays

The advent of avionics as a separate entity was quickly followed by integration of these functions. The drive to manufacture more reliable and better quality means of displaying flight critical information to pilots started very early on. True glass cockpits have only started to come into being since the G-IV in 1985. The introduction of LCD or CRT displays was often backed up by conventional instruments.

Today the reliability of LCDs means that even these flight critical back ups are 'glass'. But this is only the superficial element. Display systems carry out checks of key sensor data that allows the aircraft to fly safely in very aggressive environments. Display software is often written in the same way as that for flight control software, as essentially the pilot will follow it. The display systems can take multiple different methods of determining attitude, heading and altitude that the aircraft use, and provide them in a safe and easy to use manner to aircrew.

Aircraft flight control systems

Aeroplanes and helicopters have had different means of automatically controlling flight for many years. They reduce pilot workload at useful times (like on landing, or in the hover), and they make these actions safer by 'removing' pilot error. The first simple auto-pilots were used to control heading and altitude and had limited authority on things like thrust and flight control surfaces. In helicopters, auto stabilisation was used in a similar way. The old systems were all electromechanical in nature until very recently.

The software driven systems fitted to almost all new major aircraft today have made a significant leap forward. The advent of fly by wire and electro actuated flight surfaces (rather than the traditional hydraulic) has massively increased safety. As with displays and instruments, critical devices which were electro-mechanical had a finite life which was very restrictive. Electronic systems are not limited by the mechanical constraints. With safety critical systems, the software is written in very strict conditions, where the ideal scenario is that it will never fail.

Collision-avoidance systems

To supplement air traffic control, most large transport aircraft and many smaller ones use a TCAS (Traffic Alert and Collision Avoidance System), which can detect the location of other, nearby aircraft, and provide instructions for avoiding a midair collision. Smaller aircraft may use simpler traffic alerting systems such as TPAS, which are passive (they do not actively interrogate the transponders of other aircraft) and do not provide advisories for conflict resolution.

To help avoid collision with terrain, (CFIT) aircraft use systems such as ground-proximity warning systems (GPWS), radar altimeter being the key element in GPWS. One of the major weaknesses of (GPWS) is the lack of "look-ahead" information as it only provides altitude above terrain "look-down". In order to overcome such weakness, Modern Aircraft use the Terrain Awareness Warning System (TAWS).

Weather systems

Weather systems such as weather radar (typically Arinc 708 on commercial aircraft) and lightning detectors are especially important for aircraft flying at night or in Instrument meteorological conditions, where it is not possible for pilots to see the weather ahead. Heavy precipitation (as sensed by radar) or severe turbulence (as sensed by lightning activity) are both indications of strong convective activity and severe turbulence, and weather systems

allow pilots to deviate around these areas.

Recently, there have been three important changes in cockpit weather systems. First, the systems (especially lightning detectors like the Stormscope or Strikefinder) have become inexpensive enough that they are practical for light aircraft. Second, in addition to the traditional radar and lightning detection, observations and extended radar pictures (such as NEXRAD) are now available through satellite data connections, allowing pilots to see weather conditions far beyond the range of their own in-flight systems. Finally, modern displays allow weather information to be integrated with moving maps, terrain, traffic, etc. onto a single screen, greatly simplifying navigation.

Aircraft management Systems

As integration became the buzzword of the day in avionics, and as PCs came onto the market, there was a natural progression towards centralized control of the multiple complex systems fitted to aircraft. Combined with displays and flight control systems, these three core systems allow all the aircraft systems (not just avionics) to have their data compiled and manipulated to make it easier to maintain, easier to fly and safer.

Engine monitoring and management was an early progression into aircraft management for ground maintenance. Now the ultimate extension of this is total management of all the components on the aircraft, giving them longer lives (and reducing cost). Health and Usage Monitoring Systems (HUMS) are integrated with aircraft management computers to allow maintainers early warnings of parts that will need replacement.

The aircraft management computer or flight management systems are used by aircrew in place of reams of maps and complex equations. Combined with the digital flight bag they can manage every aspect of the aircraft chock to chock.

Although avionic manufacturers provide flight management systems, aircraft management and HUMS tend to be specific to the airframe as the design of the software is dependent on the aircraft it is fitted to.

Mission or tactical avionics

The major developments in avionics have tended to happen 'in the back' before the cockpit. Military aircraft have been designed either to deliver a weapon or to be the eyes and ears of other weapon systems. The vast array of sensors available to the military (as for the front) is then used for whatever tactical means required. As with aircraft management, the bigger sensor platforms (like the E-3D, JSTARS, ASTOR, Nimrod MRA4, Merlin HM Mk 1) have mission management computers.

As the sophistication of military sensors increases and they become more ubiquitous, the pseudo-military market has started to dip into the product. Police and EMS aircraft can now carry some very sophisticated tactical sensors.

Military communications

While aircraft communications provide the backbone for safe flight, the tactical systems are designed to withstand the rigours of the battle field. UHF, VHF Tactical (30-88 MHz) and SatCom systems combined with ECCM methods, and cryptography secure the communications. Data links like Link 11, 16, 22 and BOWMAN, JTRS and even TETRA provide the means of transmitting data (such as images, targeting information etc.).

Radar

Airborne radar was one of the first tactical sensors. As with its ground based counterpart it has grown in sophistication. The obvious massive benefit of altitude providing massive range has meant a significant focus of developing airborne radar technologies. The general ranges of radar of Airborne Early Warning (AEW), Anti-Submarine Warfare (ASW), and even Weather radar (Arinc 708) and ground tracking/proximity radar.

The military has used radar in fast jets to help pilots fly at low levels in several operations. While the civil market has had weather radar for a while, there are strict rules about using it to navigate the aircraft.

Sonar

Soon after radar came sonar. Dipping sonar fitted to a range of military helicopters allows the helicopter to protect shipping assets from submarines or surface threats. Maritime support aircraft can drop active and passive sonar devices (Sonobuoys) and these are also used to determine the location of hostile submarines.

Electro-Optics

Electro-optic system covers a wide range of systems, including Forward Looking Infrared (FLIR), and Passive Infrared Devices (PIDS). These are all used to provide imagery to crews. This imagery is used for everything from Search and Rescue through to acquiring better resolution on a target.

ESM/DAS

Electronic support measures and defensive aids are used extensively to gather information about threats or possible threats. Ultimately they can be used to launch devices (in some cases automatically) to counter direct threats against the aircraft. They are also used to determine the state of a threat or even identify it.

Aircraft Networks

The avionics systems in military, commercial and advanced models of civilian aircraft are interconnected using an avionics databus. These network protocols are similar in functionality as an in-home network connecting computers together, however, the communication and electrical protocols can be very different. Here is a short list of some of the more common avionics databus protocols with their primary application:

- Aircraft Data Network (ADN): Ethernet derivative for Commercial Aircraft
- Avionics Full-Duplex Switched Ethernet (AFDX): Specific implementation of ARINC 664 (ADN) for Commercial Aircraft
- ARINC 429: Commercial Aircraft
- ARINC 664: See ADN above
- ARINC 629: Commercial Aircraft (Boeing 777)
- ARINC 708: Weather Radar for Commercial Aircraft
- ARINC 717: Flight Data Recorder for Commercial Aircraft
- IEEE 1394b: Military Aircraft
- MIL-STD-1553: Military Aircraft
- MIL-STD-1760: Military Aircraft

Police and Air Ambulance

History > Overview

Air Force History Overview

Early Years

On Aug. 1, 1907, the U.S. Army Signal Corps established a small Aeronautical Division to take "charge of all matters pertaining to military ballooning, air machines and all kindred subjects."

From the close of the Civil War until 1907, the Signal Corps had acquired eight balloons, though two more were procured in 1907. A year later the Signal Corps purchased a small dirigible, used at Fort Omaha, Neb., for the instruction of servicemen. But not until May 26, 1909, did Lts Frank P. Lahm and Benjamin D. Foulois make their first ascent and qualify as the airship's first Army pilots.

The Signal Corps began testing its first airplane at Fort Myer, Va., on Aug. 20, 1908, and on Sept. 9, Lt. Thomas E. Selfridge, flying with Orville Wright, was killed when the plane crashed. He was the first military aviation casualty. After more testing with an improved Wright Flyer, the Army formally accepted this airplane, identified as "Airplane No. 1," on Aug. 2, 1909.

Four years after the Signal Corps took charge of air matters, Congress appropriated funds for Army aeronautics: $125,000 for fiscal 1912. By the close of October 1912, the Signal Corps had acquired 11 aircraft, but possessed only nine. "Airplane No. 1" had been given to the Smithsonian Institution, and one other had been demolished in an accident.

In early 1913, the Army ordered its aviators who were training in Augusta, Ga., and Palm Beach, Fla., to Texas to take part in 2d Division maneuvers. In Galveston on March 3, the Chief Signal Officer designated the assembled men and equipment the "1st Provisional Aero Squadron," with Capt Charles DeF. Chandler as squadron commander.

The 1st Provisional Aero Squadron began flying activities a few days later. On Dec. 4, general orders redesignated the unit as the 1st Aero Squadron, effective Dec. 8, 1913. This first military unit of the U.S. Army devoted exclusively to aviation, today designated the 1st Reconnaissance Squadron, has remained continuously active since its creation. Assigned a role in the Punitive Expedition of the Mexican border in 1916, this squadron became the first air combat unit of the U.S. Army.

Meanwhile, Congress created in the Signal Corps an Aviation Section to replace the Aeronautical Division. Signed by the President, this bill became law on July 18, 1914. It directed the Aviation Section to operate and supervise "all military [U.S. Army] aircraft, including balloons and aeroplanes, all appliances pertaining to said craft, and signaling apparatus of any kind when installed on said craft."

- The section would also train "officers and enlisted men in matters pertaining to military aviation," and thus embraced all facets of the Army's air organization and operation.
- The old Aeronautical Division continued to exist, but operated as the Washington office of the new section.

When World War I broke out in Europe in August 1914, the 1st Aero Squadron represented the entire tactical air strength of the U.S. Army. It counted 12 officers, 54 enlisted men and six aircraft. In December 1915 the Aviation Section consisted of 44 officers, 224 enlisted men and 23 airplanes--still a tiny force when compared to the fledgling air forces of the European powers.

But the war in Europe focused more attention on aviation.

By this time the Aviation Section consisted of the Aeronautical Division, the Signal Corps Aviation School at San Diego, the 1st Aero Squadron (then on duty with the expeditionary force in Mexico), and the 1st Company, 2d Aero Squadron, on duty in the Philippines. In October 1916, Aviation Section plans called for two dozen squadrons--seven for the Regular Army, 12 for the National Guard divisions, and five for coastal defense -- plus balloon units for the field and coast artillery. In December 1916 the seven Regular Army squadrons either had been or were being organized. All 24 squadrons had been formed by early 1917, but the 1st Aero Squadron remained the only one fully organized and equipped. Plans for still greater expansion of the Aviation Section were incomplete when the United States entered World War I on April 6, 1917.

Disclain

This section is dedicated the men and women whc made the U.S.Air Force what it is today. The people, events and equipment of the past are integral to understanding the future. The various subsections provide an overview of the Air Force heritage, important peopl airpower, images, milestones and art. For more in depth coverage c Air Force history go to ou links page and visit som of these specialized sites

World War I
On May 20, 1918, President Woodrow Wilson issued an executive order transferring aviation from the Signal Corps to two agencies under the Secretary of War: the Bureau of Aircraft Production, headed by Mr. John D. Ryan, and the Division of Military Aeronautics, directed by Maj. Gen. William L. Kenly.

On May 24 the War Department officially recognized these two Army agencies as the Air Service of the U.S. Army. Three months later, on Aug. 27, the President appointed Mr. Ryan Director of the Air Service and Second Assistant Secretary of War.

Despite a combat record of only nine months (February to November 1918), the Air Service made a respectable showing during World War I. The 740 American aircraft assigned to squadrons at the front on Nov.11, 1918, Armistice Day, represented little more than 10 percent of the total aircraft strength of Allied nations. But the Air Service had conducted 150 separate bombing attacks. Penetrating as far as 160 miles behind German lines, its aircraft had dropped about 138 tons of bombs. In all, the Air Service downed 756 enemy aircraft and 76 enemy balloons, while losing 289 airplanes and 48 balloons.

The dispersal of aero squadrons among various Army organizations during the war made it difficult to coordinate aerial activities, which led to the creation of higher echelon organizations. At the front, squadrons with similar functions were formed into groups, the first organized in April 1918 as I Corps Observation Group. The following month the 1st Pursuit Group was formed, and in July 1918 the American Expeditionary Forces organized its first aircraft unit higher than a group--the 1st Pursuit Wing--made up of the 2d and 3d Pursuit Groups and, later, the 1st Day Bombardment Group. In November 1918 the AEF possessed 14 groups (seven observation, five pursuit and two bombardment).

Following the armistice, demobilization of the Air Service was rapid and thorough.

At war's end the Air Service possessed 185 aero squadrons; 44 aero construction; 114 aero supply, 11 aero replacement, and 150 spruce production squadrons; 86 balloon companies; six balloon group headquarters; 15 construction companies; 55 photographic sections; and a few miscellaneous units.

By Nov. 22, 1919, all had been demobilized except one aero construction, one aero replacement, and 22 aero squadrons, 32 balloon companies, 15 photographic sections, and a few miscellaneous units. Between Nov.11, 1918 and June 30, 1920, officer strength plummeted from 19,189 to 1,168, and enlisted strength dropped from 178,149 to 8,428.

Following World War I, the strength of the Air Service matched what Congress considered satisfactory for peacetime.

Between Wars
The Army Reorganization Act of 1920 made the Air Service a combatant arm of the Army and gave the Chief of the Air Service the rank of major general and his assistant chief the rank of brigadier general. Tactical air units in the United States were placed under the nine U.S.Army corps area commanders where they continued to be employed primarily in support of the ground forces. The Chief of the Air Service retained command of various training schools, depots and other activities exempted from Army corps control.

During most of the 1920s, the total offensive strength of the Air Service in the United States consisted of one pursuit, one attack and one bombardment group. Overseas, the Canal Zone and the Philippines each had assigned one pursuit and one bombardment squadron with two squadrons of each type stationed in the Hawaiian Islands. The Air Service focused initially on observation and pursuit aviation, with major aeronautical development efforts concentrated in the Engineering Division at McCook Field, Dayton, Ohio.

The formal training establishment took shape during the 1920s. The Air Service concentrated flying training in Texas. Technical schools for officers and enlisted men were at Chanute Field, Ill. The Air Service (later, Air Corps) Tactical School trained officers to command higher units and taught the employment of military aviation. First located at Langley Field, Va., this school moved to Maxwell Field, Ala. in 1931.

The Air Corps Act of 1926 changed the name of the Air Service to Air Corps, but left unaltered its status as a combatant arm of the U.S. Army.

The act also established the Office of Assistant Secretary of War for Air. The Air Corps had at this time 919 officers and 8,725 enlisted men, and its "modern aeronautical equipment" consisted of 60 pursuit planes and 169 observation planes; total serviceable aircraft of all types numbered less than 1,000.

In August 1926 the Army established the Air Corps Training Center in San Antonio, Texas. A few weeks later, on Oct. 15, the logistical organization was placed on firmer footing with the establishment of the Materiel Division, Air Corps, at Dayton, Ohio. A year later this division moved to nearby Wright Field, thereafter the primary base for air logistics.

In Texas, Randolph Field, the "West Point of the Air," was dedicated on June 20, 1930, and became the headquarters of

the Air Corps Training Center and the site of the primary flying school in 1931. By June 30, 1932, the Air Corps had grown to 1,305 officers and 13,400 enlisted men, including cadets, and possessed 1,709 aircraft. The Corps also possessed at this time two airship and two balloon squadrons.

On March 1, 1935, the General Headquarters Air Force, which had existed in gestation since Oct.1, 1933, became operational and assumed command and control over Air Corps tactical units. Tactical units, less some observation squadrons scattered throughout the nine Army corps areas, transferred to this initial air force.

The three GHQAF wings were located at Langley Field, Va.; Barksdale Field, La.; and March Field, Calif. The Office of the Chief of the Air Corps and GHQAF existed on the same command echelon, each reporting separately to the Army Chief of Staff. The GHQAF Commander directed tactical training and operations, while the Chief of the Air Corps maintained control over procurement, supply, training schools and doctrine development. On March 1, 1939, the Chief of the Air Corps assumed control over the GHQAF, centralizing command of the entire air arm.

President Franklin D. Roosevelt acknowledged the growing importance of airpower, recognized that the United States might be drawn into a European war. Assured of a favorable reception in the White House, the Air Corps prepared plans in October 1938 for a force of some 7,000 aircraft.

Soon afterwards, President Roosevelt asked the War Department to prepare a program for an Air Corps composed of 10,000 airplanes, of which 7,500 would be combat aircraft.

In a special message to Congress on January 12, 1939, the President formally requested this program. Congress responded on April 3, authorizing $300 million for an Air Corps "not to exceed 6,000 serviceable airplanes."

World War II

Beginning in September 1939, the German army and the German air force rapidly conquered Poland, Norway, Holland, Belgium, France and within one year had driven the British off the continent. Leaders of the Air Corps now found themselves in the novel position of receiving practically anything they requested. Plans soon called for 54 combat groups. This program was hardly underway before revised plans called for 84 combat groups equipped with 7,800 aircraft and manned by 400,000 troops by June 30, 1942. All told, U.S. Army air forces strength in World War II would swell from 26,500 men and 2,200 aircraft in 1939 to 2,253,000 men and women and 63,715 aircraft in 1945.

With this enormous expansion underway, the War Department began in 1939 to establish new bases and air organizations in rapid succession overseas and in the continental United States. At the same time air leaders worked to create an independent institutional structure for air within the U.S. Army.

Both necessity and desire thus caused a blitz of organizational changes from 1940 through 1942. On November 19, 1940, the General Headquarters Air Force was removed from the jurisdiction of the Chief of the Air Corps and given separate status under the commander of the Army Field Forces. Seven months later, these air combat forces returned to the command of air leaders as Gen. George C. Marshall, U.S.Army Chief of Staff, established the Army Air Forces on June 20, 1941, to control both the Air Corps and the Air Force Combat Command.

Early in 1941, the War Department instituted a series of actions to create a hierarchy for noncombat activities. It set up a command eventually designated Flying Training Command to direct new programs for training ground crews and technicians. The next year, the new command assumed responsibility for pilot and aircrew training. In mid-1942 the War Department established the Air Corps Ferrying Command to fly aircraft overseas for delivery to the British and other Allies. As the functions of the Ferrying Command expanded, it was redesignated as the Air Transport Command.

To control supply and maintenance, the War Department established the Air Corps Maintenance Command under the Air Corps Materiel Division. The Materiel Division then concentrated on procurement and research development.

The War Department reorganization on March 9, 1942, created three autonomous U.S. Army Commands: Army Ground Forces, Services of Supply (later, in 1943, Army Service Forces), and Army Air Forces. This administrative reorganization did not affect the status of the Air Corps as a combatant arm of the US Army.

All of these actions affecting the air forces and commands that comprised the AAF emphasized the surge towards an independent service and the expansion of combat forces that took place during World War II.

Before 1939 the Army's air arm was a fledgling organization; by the end of the war the Army Air Forces had become a major military organization comprised of many air forces, commands, divisions, wings, groups, and squadrons, plus an assortment of other organizations.

Rapid demobilization of forces immediately after World War II, although sharply reducing the size of the Army Air Forces, left untouched the nucleus of the postwar United States Air Force (USAF). A War Department letter of March 21, 1946, created two new commands and redesignated an existing one: Continental Air Forces was redesignated Strategic Air

airrum.com/pIREPS/PrepWidgeon.html [By Red Parmelee] Portland, OR

I arrived in Great Falls from Long Beach, California at the time they opened Civic Center, early 1942. I was bunked on the ice skating rink next to the piano that was used as a make shift desk for pay call -- and to play cards on. I'm sure most of you will remember that.

We flew up on Western Air Lines -- some of the people with me were Jack Frost (First Sergeant), Harry Wood (Radio Operator), and, I believe, little Charley Correy, as well as the mad Russian, Serocko. I was assigned to the flight line. Charley Correy was Line Chief and I was Assistant Line Chief, working days.

I had my first flight out of Gore Field in June 1942 when the Operations Officer, Orrey Shirter, stopped me on the Flight Line one day and asked me if I'd ever flown in an OA-14. I told him 'no' but I'd flown in an OA-10 which is a Gruman Goose. He asked me if I'd go to Seattle with a civilian pilot named Sasseen and pick up that plane, to take it to Anchorage, Alaska. I told him I'd love to! Sasseen and I flew over to Seattle on June 30 and went to the civilian side of the field and there sat a Gruman Widgeon OA-14 in Air Corps colors. Neither one of us had ever seen one before. It was twin engined with four cylinder Manasco inverted engines on it. We did a walk around, read the Dash-1 and took off and flew around the field, making one landing.

We flew to -- I'm going to give you the codes because that's the way it's listed in my Form 5. July 1: SA-SM-SM-GTYC-XD (Sas)P. July 6: XD-FTStJohn-YD-XX-Northway. July 7: Northway-FX-Elmend. This trip took a total flying time of 22 hours and 50 minutes, from June 30 to July 7. We flew eleven hours in one shot with four landings, which was, oddly enough, an all night flight with daylight all the way. Some of the experiences along the way included landing at Edmondton and having the

right strut on the landing gear go flat, dumping all of it's fluid. We got hanger space and I took the strut off and tore it down -- it had the old leather-type chevron seals in it, totally disintegrated by that time. Of course, they had no similar seals in their hydraulic shop. When I was in the hanger I saw a Furry Battler there and checked the tail strut, figuring it looked the same size as our damaged strut. The Battler had been damaged. I got the head of the hydraulic shop to let us tear the tail wheel strut apart -- we tore it down and the seals fit perfectly, except they were neoprene. We rebuilt the strut, installed it, serviced it and it worked all the way to Elmendorf.

At Watson Lake the number 1 engine ran rough, backfiring. I tore the magneto off and checked the points, only to find them burnt and pitted. I borrowed a fingernail file from one of the civilian workers and dressed the points, installed them back in, gapped them -- the engine ran perfectly from then on. On the way to Northway we located and circled Jack London's cabin. Sasseen had often air-dropped books, food, newspapers and whiskey to him at the cabin. London d. 1916 ?

When we got to Northway there was a Stinson Tri-motor sitting on the parking ramp. Sasseen used to own it, flying it all over Alaska and the Yukon as a bush pilot. It was the only Stinson Tri-motor I had ever seen.

At Northway they were rebuilding the runway and when we landed the bicycle-type wheels and tires dug into the soft surface and we nosed over and slid on the big float. No damage resulted from that. A big D7 cat came over and pulled us to the hard surface parking area. We slept on the flor in the Radio Shack that night and ate with the civilian construction workers. We got in the plane the next morning, taxied out

to the end of the runway, started down the runway and dug in the main wheels -- sliding along once again on the nose of the float. The D7 cat came out again and pulled us back onto the hard-surface parking area. We let the air out of the tires, taxied out again, and started down the runway and it nosed over again. The cat came out again, and towed us back. Sasseen and I just sat there and looked at each other for a while. He finally had me sit in the tail section as far back as I could go -- he started down the runway and, when he gave me a hand signal, I ran forward, pulled the landing gear up, and dropped the full flaps. The plane jumped up into the air and staggered out through the trees, finally getting up enough speed to head for Fairbanks.

We put air back in the tires at Fairbanks and headed to Anchorage and delivered the airplane to the Operations office there. I was back there about a month later in a C-47. When we were in OPs I didn't see the OA-14 out there so I asked where it was. They said it was in the bottom of the bay. The Operations Officer and Engineering Officer had checked themselves out in the airplane and flew it several times and then decided to make a water landing. They landed alright but they took about three tries and the length of the bay to try to get it off. On the fourth try they yanked the plane up -- it went straight up and straight down into the water, taking both crew members with it.

Sasseen was later made a service pilot -- the last time I saw him he was a Captain, one of the most proficient pilots that I ever flew with.

BELL P-39 THAT NEVER MADE IT NORTH

The P-39 I had orders to fly to Fairbanks was rather unusual in that it was not Russian (with the Red Star), but had U.S. Army Air Force markings and was an instrumented Cold Weather Test aircraft. I remember thinking to myself, how neat to fly one of our own after about 16 "Russian 39´s" North.

We left Great Falls on October 5, 1943, a flight of 4, as I remember it. In the P-39´s, we usually flew in flights, we had no inter plane communications, only 5 channel VHF, no navigational aids, and were rather dependent on the weather being reasonable.

We all were fairly "independent thinkers" as only early 20´s in age can be. The weather was beautiful! We arrived in Edmonton in early afternoon and as I can remember, I squawked a somewhat rough engine. This was not unusual with the Allison V-1710. We were receiving a propeller treatment at that time, of slobbering on a coating of a substance not unlike roofing tar for icing protection. This always, made a relative acceptable shaky Allison engine, near unbearable.

It was a warm Fall day, on October 6th, and I only had a light summer flight suit, A-2 jacket and my prized Dehner Mosquito boots as clothing beyond my normal uniform. Again, the weather was beautiful.

We departed Edmonton, enroute to Fort Nelson and with our "bathtub" belly tanks, possibly Watson Lake. This was not to be for me. Somewhere, near two thirds of the way to Grand Prairie, all Hell broke loose in my engine. It seemed to bog down, shake like hell then sort of smooth out. Luckily, Lt. J.P. Ewald noticed that I was dropping back from the flight. About this time, boiling engine coolant started entering the cockpit. I rolled down a window to get some breathable air (the 39 had doors not unlike an automobile), this only made the situation worse, probably because of the differential pressure. I saw Lt. Ewald pull up close on my wing, he was waving like crazy and motioning me to get out. I had no intention of leaving the aircraft because that really contained our only satisfactory survival gear. From what I could see the terrain would allow an emergency gear-up landing. (wrong again). At about 600 feet above the ground, (Ewald´s estimate) fire now entered the cockpit. I used the Emergency Door pin releases, but had to kick the door from the aircraft. Out I went, only to get one helluva blow in my back when I contacted the horizontal stabilizer.

I do not remember pulling the ripcord but it was still in my hand when I landed, which was almost immediate. I lost my boots in the opening shock of the parachute. The airplane, in my estimate, was less than 100 feet from my landing point, deep in the ground and burning like hell. All around me were tremendous

windfall logs, which certainly would have finished me off, if I would have been able to stay with the aircraft. I was unable to get around since my legs would not answer any of my wishes, but I did manage to get a bit of a distance from the fire, which was then bursting with explosions, which I assume were oxygen tanks, etc.

Lt. Ewald "buzzed" me several times but according to his later statements, he could not see me because of smoke and I could not but feebly wave to him. Lt. Ewald went on to (I guess) Grand Prairie, to report an airplane down.

My situation was not too much of a problem in my mind, frosts at night had taken care of the mosquitos which are a real disaster in Canada in the summer. It was known where I went down and other than the fact I did not have the use of my lower limbs, I seemed to be in good shape. (wrong again)

I was much more severely burned, while in the aircraft, than I realized. Hands pretty bad and flight suit, especially the legs, shot. I was thirsty, but no water available because I seemed to be on a terribly thick "muskeg" type area. I tried to dig for water, but never could reach any. I was able to zip open my "so called" emergency kit in the back cushion of my seat pack parachute. Inside, was the "Jungle issue" emergency kit. One very large machete, 2 tropical chocolate bars (which is what the machete is for), a small fishing kit, signal mirror (most valuable to anyone down, even today) and various other things I do not remember as being of much use. The parachute canopy, shroud lines and pack covering, all of a sudden became the most valuable equipment I had. It was getting dark.

It started getting cold as the sun went down, not cold but Damn cold, probably because I had some shock reaction and I was all of a sudden feeling really alone. I started to crawl around for some wood, very difficult but able to get about a bundle that would fit in a bushel basket. Luckily, I had some matches in a Marbles waterproof match case, I personaly carried.

Night, and if I were to live forever, I will never forget that night. All of a sudden my doubts of rescue were large, I was terribly thirsty, and then came the noises of Canada at night. Wood ran out somewhere in the middle of the night, probably fortunate, because I probably would have set the parachute canopy ablaze to keep warm.

Morning, GOD was I glad to see it! About 2 hours after sunup a North American AT-6 showed up. He circled the area for a bit, then came in low and pitched out a note as close as he could, but an interminable distance from me. I do not know how I found the note, but I still have it. It stated, "We know where you are. Be calm. If you are hurt, stand up and wave your arms." Needless to say, I was unable to let him know that I was a bit tore up. He left very soon thereafter because an AT-6 doesn't carry much fuel.

At least I´m not alone anymore!

The AT-6 returned, pitched out a duffle bag which hit very, repeat, very near me. It was perfectly configured to my situation. Down mummy-bag, 2 canteens of water, 2 cans of beer, matches, some rations, warm socks and gloves. I´m sure there were other things, but these I remember. Also, a note which stated, (not verbatim) "You are near a lake called Horseshoe (Gerault Lake). We will fly back and forth from the crash site to the lake. Stay under us and you will make it fine. About 6 miles".

Comes the crawl. I do not remember any pain throughout any of the ordeal, but I´m sure there must of been some. All I remember is those Godforsaken windfall logs, every=which=way, most I crawled under. It got dark again, how far I had gone, I did not know. The AT-6 left only after dark. I´m not sure they knew the distance I had made towards the lake, nor had I.

Morning. AT-6 with me at first light. I slept good with sleeping bag. Start again with the logs and my impairment. Sometime late afternoon, I heard a police whistle, seemed far away, but good to hear. I shouted but no response that indicated they heard me. Sometime later, I shouted again. This time they shouted back. I dumped the sleeping bag and all else I had been dragging along and tried to make better time. It was getting close to sunset again and I didn´t want to spend another night, so I guess I started to panic a bit and started to plead with them not to leave me. I finally arrived at the lake shore some distance from the Beech Staggerwing on floats and 2 of the best looking bush pilots in the world. One of their first interests, was the gear I left behind. One of them went after it and I guess they found it. Up to this time, no one realized I was hurt and I sure there could have been a bit of bitching about how long it took for me to reach the lake.

They gave me a hot cup of coffee out of a thermos (best I ever drank, and I´ve never been able to duplicate it). Then I took a good look at the lake, or I should say a pond. "No problem, they said". I was not in a position to argue and wanted no part of the country anymore, so they laid me in the back seat, and off we went.

After some time in traction at Edmonton, I was transferred to Great Falls AFB, Gore Field were I recovered in good shape.

Following this incident, I flew P-39, A-20, B-26 aircraft "North", but with a much better survival kit, my own. But, that´s another story.

After thoughts: Johnny Ewald (now deceased) later became Chief Pilot, Flying Tigers Airline. The seat-pack parachute I used was manufactured under contract to the Air Force by Fashion Frocks Inc., a dress maker in New York. The bush pilots who picked me up, we corresponded intermittently, but I went on to Corsica, Italy, then the CBI, and lost track.

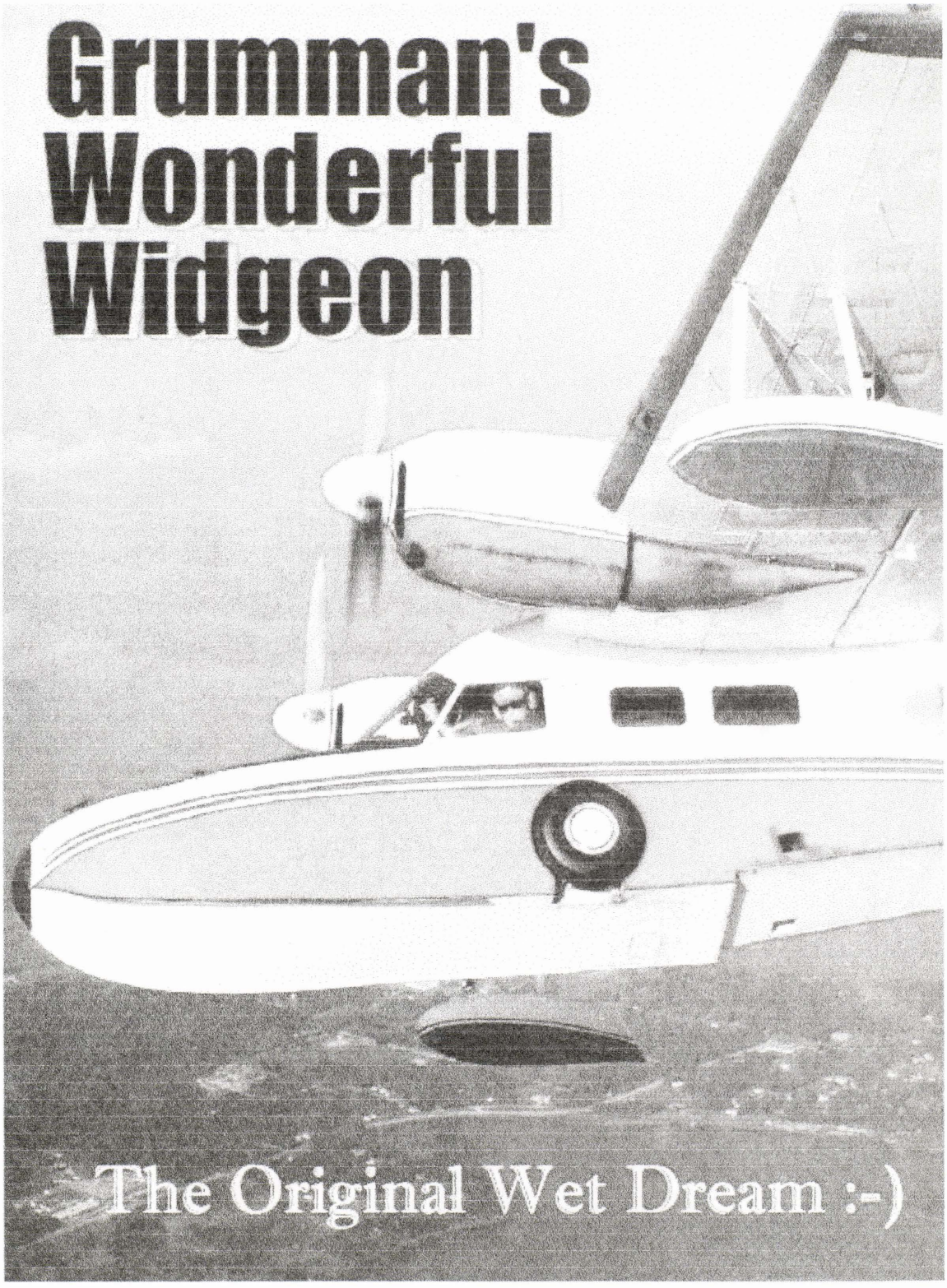
ABOUT THE AUTHOR

Bob LeSuer now lives in Ennis, Montana. He is an active flight instructor since 1942. Bob served in the Army Air Force during WWII in the ETO and the CBI. He flew P-51´s with the 186 Fighter Sqdn., Montana Air National Guard, Gore Field, Great Falls, Montana, later 196 Ftr Sqdn., San Bernadino, Ca. flying Lockheed F-80´s. Went to Korea in the "Police Action", flying Republic F-84´s.

Bob also was an Experimental Engineering Test Pilot with Douglas Aircraft Co., Flight Test Pilot, Federal Aviation Administration. He is a Fellow, Society of Experimental Test Pilots, an International Organization.

Bob is the only Federal Aviation Administration, Designated Engineering Representative in the state of Montana. Montana is his love and he does not take vacations from it.

Grumman's Wonderful Widgeon



by Budd Davisson, , July, 1990

finally dropped the idea of phoning. I always remember with amusement that this was one of the few times that Harry Hopkins was not called upon for help.

The various areas of Russia that were being built or rebuilt were apparent from the kind of supplies going forward on Lend-Lease. Many of the supplies were incredibly long-range in quantity and quality. Here are some of the more important centers:

Soviet City	*Nature of U.S. Lend-Lease Material*
Chelyabinsk	Tractor and farm machinery
Chirchik	Powder and explosive factories
Kamensk Uralski	Aluminum manufacture
Nizhni Tagil	Railway car shops
Novosibirsk	Plane factory and parts
Magnitogorsk	Steel mill equipment
Omsk	Tank center
Sverdlovsk	Armament plants

The Russians were great admirers of Henry Ford. Often the interpreter would repeat to me such statements of theirs as, "These shipments will help to Fordize our country," or "We are behind the rest of the world and have to hurry to catch up."

It had become clear, however, that we were not going to stay at Newark much longer. The growing scope of our activities, the expansion of Lend-Lease, the need for more speedy delivery of aircraft to Russia—all these factors were forcing a decision in the direction of air delivery to supplant ship delivery. It had long been obvious that the best route was from Alaska across to Siberia.

From the first the Russians were reluctant to open the Alaskan-Siberian route. Even before Pearl Harbor, on the occasion of the first Harriman-Beaverbrook mission to Moscow in September, 1941, Averell Harriman had suggested to Stalin that American aircraft could be delivered to the Soviet Union from Alaska through Siberia by American crews. Stalin demurred and said it was "too dangerous a route." It would have brought us, of course, behind the Iron Curtain.

During the Molotov visit to the White House, Secretary of State Cordell Hull handed Harry Hopkins a memorandum with nine items of agenda for the Russians, the first of which was: "The Establishment of an Airplane Ferrying Service from the United States to the Soviet Union Through Alaska

and Siberia." When the President brought this up, Molotov observed that it was under advisement, but "he did not as yet know what decision had been reached."

Major General John R. Deane has an ironic comment on Russian procrastination in this regard:

> Before I left for Russia, General Arnold, who could pound the desk and get things done in the United States, had called me to his office, pounded the desk, and told me what he wanted done in the way of improving air transportation between the United States and Russia. He informed me that I was to obtain Russian approval for American operation of air transport planes to Moscow on any of the following routes in order of priority: one, the Alaskan-Siberian route; two, via the United Kingdom and Stockholm; or three, from Teheran to Moscow. I saluted, said Yes, sir, *and tried for two years to carry out his instructions.*[2]

Where the U.S. was not able to force Russia's hand, Nazi submarines succeeded. Subs out of Norway were attacking our Lend-Lease convoys on the Murmansk route, apparently not regarded as "too dangerous a route" for American crews. A disastrous limit was finally reached when out of one convoy of 34 ships, 21 were lost. The Douglas A-20 Havocs, which were going to the bottom of the ocean, were more important to Stalin than human lives. So first we started flying medium bombers from South America to Africa, but by the time they got across Africa to Tiflis, due to sandstorms the motors had to be taken down and they were not much use to the Russians. Nor were we able to get enough of them on ships around Africa to fill Russian requirements for the big offensive building up for the battle of Stalingrad.

Finally, Russia sent its OK on the Alaskan-Siberian route. Americans would fly the planes to Fairbanks, Alaska: Americans would set up all the airport facilities in Alaska *; Soviet pilots would take over on our soil; Soviet pilots only, would fly into Russia.

The chief staging-point in the U.S. was to be Gore Field in Great Falls, Montana. A few years before the war General Royce, who had been experimenting in cold-weather flying with a group of training planes called "Snow Birds," had found that Great Falls, with its airport 3,665 feet above sea

* Later it came out that we actually built bases for the Russians in Siberia. Colonel Maxwell E. Erdofy, the famous airport builder, and crews from the Alcan Highway project were ordered to Russia and kept in isolation and under Soviet guard as they built Siberian airports. I find no record anywhere of this work having been charged to Lend-Lease.

level, on the top of a mesa tableland 300 feet above the city itself, had a remarkable record of more than 300 clear flying days per year, despite its very cold dry climate in the winter.

If you look at a projection of the globe centered on the North Pole, you will see that Great Falls is almost on a direct line with Moscow. This was to be the new and secret Pipeline. The Army called it ALSIB.

SOURCES
CHAPTER TWO
The "Bomb Powder" Folders

1. *The Strange Alliance*, John R. Deane, (Viking, 1947), pp. 90-91.
2. *Ibid.*, p. 78.

CHAPTER THREE

We Move to Montana

It was the coldest weather in 25 years when the route was mapped out. First of all, Major General Follette Bradley flew experimentally by way of the old gold-field airstrips of Canada. With the Russians he scratched out a route from Great Falls through Fairbanks, Alaska and across Siberia to Kuibyshev and Moscow. It is the coldest airway in the world across the Yukon to Alaska and through the "Pole of Cold" in Siberia, but it worked.

Colonel (then Captain) Gardner, our trouble-shooter at Newark, was one of the first to go ahead to Montana. Then Lieutenant Thomas J. Cockrell arrived at Great Falls in charge of an advance cadre to make arrangements for the housing and quartering of troops of the 7th Ferrying Group of the Air Transport Command, which was moving from Seattle.

Gore Field was at that time known as the Municipal Airport of Great Falls. Although it had been selected as the home of the 7th, actual construction of barracks and other accommodations had not been started. The Great Falls Civic Center was therefore selected as a temporary home, with headquarters, barracks, mess-hall and other facilities combined under the roof of the huge municipal structure. The Ice Arena was also used as a combination barracks and mess-hall and temporary headquarters were established in the office of Mayor Ed Shields and the offices of other city officials.

For nearly four months, the Civic Center remained the home of the 7th Ferrying Group, while contractors rushed construction of the barracks, hangars and other buildings which were to make up the post on Gore Field. The group completed its move up to Gore Hill early in November, 1942. The 7th Group continued to supervise all stations and operations along the Northwest Route until November 17, 1942, when the Alaskan Wing of the Air Transport Command was established to take over the operations of the route to the north through Canada to Fairbanks, where hundreds of Russian pilots were waiting to take over.

Major Alexander Cohn arrived from Spokane to establish the 34th Sub-Depot for the Air Service Command. It was this depot that supervised the mountains of air freight that originated from all over the United States and poured into the funnel of this end of the Pipeline.

Colonel Gardner arranged for my transfer from Newark to Great Falls. My orders designated me as "United Nations Representative." Few people realize that although the United Nations Organization was not set up in San Francisco until September, 1945, the name "United Nations" was being used in the Lend-Lease organization as early as 1942, as in my original orders to Newark.

For the record, I want to quote my orders to Great Falls, with one phrase italicized. One reason for this is that in 1949 the New York *Times* printed the following statement of a "spokesman" for the United Nations: "Jordan never worked for the United Nations." I thereupon took the original copy of my orders in person to the *Times*, explained that this was an Army designation as early as 1942, and asked them in fairness to run a correction (which they did not do), since I never claimed to have "worked for the United Nations" and their story left the impression that I was lying. Here are my orders, with the original Army abbreviations:

Army Air Forces
Headquarters, 34th Sub Depot
Air Service Command
Office of the Commanding Officer

Capt GEORGE R. JORDAN, 0468248, AC, having reported for duty this sta per Par 1, SO No. 50, AAF, ASC, Hq New York Air Serv Port Area Comd, Newark Airport, N.J., dated 2 January 43, *is hereby asgd United Nations Representative*, 34th Sub Depot, Great Falls,

George Racey Jordan

voyage, Mrs. Kotikov told us, across Siberia by camel caravan! She assured us that a rocking boat was infinitely preferable to a swaying camel. Since she spoke some English, and quickly learned to use a typewriter, she became Kotikov's secretary, office manager, and general assistant.

My flight from Great Falls to Fairbanks—about 1,926 miles—took six days! I kept a day-by-day record of the nightmarish trip, much of it penciled in the air. Also, it was my habit to write once a week to my mother, and some of my letters have helped me to piece out the record quite fully. The first three days of the trip, the easiest leg, brought us to Watson Lake. Here are some diary entries:

> *Tuesday, Feb. 2*—Landed at Edmonton, first stop. Weather foggy, but up above the clouds we saw the Rockies and a gorgeous sunset against the mountains. Many Canadian fliers and planes.
>
> *Wednesday, Feb. 3*—Covered very mountainous country at 10,000 feet. Lots of clouds and storm patches. Arrived Grand Prairie O.K. Then Fort St. John. Very rugged looking ahead. Arrived Fort Nelson 3:45 P.M. Too overcast to go on. Went to Hudson Bay trading post. Saw a trapper with frozen whiskers who had come 70 miles through the bush by dogsled.

On Thursday we arrived at Watson Lake, getting down just in time to avoid the very bad snowstorm which had started. During the afternoon and night of the next day thirteen men perished, and Februrary 5, 1943 became known as "Black Friday" on the American arm of the Pipeline. Everyone aboard the C-49 transport piloted by Colonel Mensinger was lost.

I had met Colonel Mensinger that Friday morning at Watson Lake. We were all blizzard-bound—about 30 pilots—with the weather closed on the north by a frost-bank 10,000 feet high. The outdoor temperature was 35 to 50 degrees below zero. The runway was a strip of solid ice, between furrows of snow. That day the sun rose at 10:15 A.M. and set around four o'clock in the afternoon. At midday our pilot, Captain Arthur C. Rush, and I struggled across the field to the weather station. We were protected by three suits of winter underwear, furlined flying jackets, special gloves, chamois face masks and three pairs of heavy socks inside our boots. At the weather shack we found an officer who introduced himself as Colonel Mensinger. Of slight figure and medium stature, he was well on the way to fifty years. He was intelligent and courteous, but he grew indignant as messages began crackling off earphones inside the depot.

"Just listen!" he exclaimed. "All we need to know about weather is coming through from naval stations in the Aleutians and submarines far out at sea. But we can't understand a word of it. Men are dying because it isn't protocol for the Navy to share its code with the Army." He said he had jotted down a notebook full of memoranda on weather intelligence, "our worst bottleneck." When he got to Edmonton, he would prepare a "broadside of a report."

Just then it was announced on the loudspeaker that Colonel Mensinger, who was flying south, could go, if he wanted to take a chance; but that Captain Rush and I, who were northbound, had to stay. The Colonel said he would face the risk. For the sake of American lives, he felt that his report could not wait. As we shook hands, he complimented me on the work being done at Great Falls.

Rush and I were tramping off to lunch when we heard his motors start. The plane dashed along the runway in a spume of ice chips kicked up by metal grippers in the tires. Thus Colonel Mensinger, with his ten companions and his notes on weather service reform, vanished into oblivion. His body was not found until five years later.

This was my diary entry for the next day:

> *Saturday, Feb. 6*—Temperature 35 below. Slept last night in sleeping bag. Huskie dog under my bed had nightmare, howled and upset bed. In evening saw old movie, "King of Alcatraz." Played poker with the boys; won a little. Two of our best pursuit pilots sprained ankles, first time on skis; no more skiing allowed. Magnificent Northern Lights. After sunset beautiful glow in black night from sun below horizon—very strange. Three wolves ran across lake, must be very hungry to come that close. Colonel Mensinger's plane and another plane reported lost . . . Others went up, looked for fires or signals. Nothing seen.

On Monday our enforced stay at Watson Lake ended, but we were in for a much greater ordeal. We began the six-hour flight from Watson Lake to Fairbanks by crossing an area that became known as "the Million Dollar Valley," because planes worth more than that sum were lost there. It was the 220-mile run from Watson Lake to Whitehorse, the next airfield to the north. We went up to 14,000 feet to break out of the frost-bank. It had been 54 below zero when

we left the ground. At nearly three miles up we estimate the temperature at 70.

Then our heater froze! We knew we were in for it. This is what I later wrote home from Fairbanks to my mother:

> That trip from Watson Lake was a horror. I never knew a person could be so cold. I nearly lost a couple of toes, and my heels are still sore. My nostrils cracked when I breathed and the corners of my mouth hurt like a toothache. I shut my eyes because the eyeballs pained so. My shaving brush froze and the hairs dropped off—just like my eyelashes. I ate forty lumps of sugar and lots of candy bars. Your socks were a big help. The pilot couldn't see out of the window because of his breath freezing on the pane. So we flew by instruments until the end, when we used lighter fluid to wash a hole to land by. . . .

When our plane put down at Fairbanks, the first person aboard was a Russian girl of middle height, a mechanic, with a flat Slavic face and with the shoulders and torso of a wrestler. She took one look at me and screamed.

I was told later that my mouth resembled icy slush. My nose and cheekbones were covered with frost and my eyes were staring like glass. I couldn't stand erect, because my knees were bent as if crippled with rheumatism. So were my elbows. I was almost insensible. After all, I was forty-five years old, and couldn't take it like pilots in their twenties.

Without inhibitions, the generous girl seized my head with her brawny arms and hugged it to her warm bosom. She held it there until I could feel "pins and needles," which showed that the tissues were warming back to life. Then she helped me into her "Bug"—a midget car with tractors for snow-work—and sped across the field to the Russian operations office.

I was stripped down to shorts and plunged into a tub of cold water, which to my body seemed hot. Cups of cold water were poured over my head and shoulders by Russian men and girls. One of them brought vodka in a paper cup and grinned at me: "Russian medicine!"

As I sipped it gratefully, my mind began to work again. Through the window I saw our plane, which had been towed across the field. An air hose, blowing out the heater pipe, hurled chunks of ice against the building. Then there was a roar of engines, and the C-47, which Captain Rush had landed only a few minutes earlier, was off for Siberia with a Soviet crew.

Suddenly the Russians, including a Colonel or so, dropped everything and stood at attention. Over my shoulder, for the first time, I saw the slight, elegant figure of a man about forty years old and weighing 125 pounds. His hair was black, and his dark, ascetic face could have been that of a holy recluse.

When he addressed me, the voice was soft and gentle. He spoke in cultivated English. "I'm sorry you had such a hard trip," he murmured. I gave him a wet hand. He ordered the Russians to heat cloths on the steam radiator and put them against my neck. At his direction, they rubbed me down with rough towels until I thought the skin would come off. Finally he said that if I felt well enough he would like me to be his guest at dinner. I accepted, and he departed.

I asked who he was. The answer was one of the names most dreaded by Russians in America—that of the Lend-Lease spy chief for the Soviet Purchasing Commission, Alexei A. Anisimov.

At Fairbanks you do everything underground, and don't come up except to fly. Shops, restaurants, quarters—they all made a marvelous underground city. The underground part of the airport was in the shape of a circular tunnel five miles long and nine feet in diameter, connected by stairways with heated offices and hangars above. At this time the new Alcan highway was not yet through, and was not expected until the spring. Everything had to be brought into Fairbanks by plane or boat. The airport was known as Ladd Field.

There were seldom fewer than 150 Soviet pilots at Ladd Field, and sometimes there were as many as 600. They were older and hardier than our boys, and nearly all were combat veterans. The deadly Siberian lane was considered a great honor by these pilots, and it was held out to them as a reward for courage and for wounds in action.

While I was there, one of these pilots landed an Airacobra on the apron instead of the runway, and drove it weaving among other craft parked along the plaza. The operations officer, Captain Frederick J. Kane, took him to task. The flier answered rudely: "I got eight Nazi planes. How many you got?"

As I entered the Officers' Mess, in response to Mr. Anisimov's invitation, I noticed that the Americans kept apart, on the other side of the dining-hall, where women were not allowed. The Russians, on the other hand, were sitting with their wives, and with girl translators. I looked for my host, but could not spot him. Suddenly the Russians stopped eating,

thrust their hands under the tables, and sat at attention. Mr. Anisimov had entered.

He greeted me cordially. As we sat down at his table, the silence in the room persisted. It was not until he picked up his knife and fork that the Russians shifted from "attention" to "at ease." He acted as if this procedure were the most natural thing in the world, and undoubtedly it was, for him.

At that dinner I sealed my subsequent fate in the Army, the final outcome of which was not to occur until fifteen months later. Data that Mr. Anisimov gave me, verified by my personal inspection, formed the basis of the Alaskan report which I made on my return to Great Falls. This report touched off a drastic reorganization in the Northwest area. It also brought upon me the wrath of Colonel Dale V. Gaffney, commander of Ladd Field and chief of the Cold Weather Testing Unit at Fairbanks, who was Anisimov's *bête noire*.

In the big shake-up which my report subsequently sparked, the Russian movement was transferred to the AAF's Alaskan Wing. But the following October Gaffney was promoted to Brigadier General and became my commanding officer. Thus was fulfilled the prophecy of a friend who called me from Wright Field as soon as he read my Alaskan report. "It's nice to have met you," he said. "I'll see you in civilian life sometime. Don't you know you've cut your own throat?"

My official jugular had 15 months to go as I sat at the dinner table with Mr. Anisimov and he outlined his complaints. Colonel Gaffney, he charged, was taking all the good mechanics for his weather operations when it was obvious that the very best ones should be servicing Russian planes for the 6,000-mile hop across Asia. The Alaska Defense Force was snatching Russian supplies for its own needs in Alaska and the Aleutians. Equipment for both Alaska and Russia, mixed in utter confusion, lay stretched for miles in heaps buried under snow, along the bank of the Tanana River.

As the last point was difficult to credit, I borrowed a heated truck the next day, and made morning and afternoon trips along the riverside. It was 50 below zero, so cold that I could work only twenty minutes at a time before returning to the truck to warm up; the task would have been impossible without Colonel Kotikov's boots. On the morning tour I was accompanied by my Lend-Lease opposite number at Ladd Field, Captain Robert P. Mortimer.

Captain Mortimer originated a suggestion that delighted the Russians. It came in a letter addressed to me in Great Falls some days later: "Do you think you could put any cargo, say four or five hundred pounds, in each of the A-20s

and B-25s that are coming up here?" Thereafter we loaded 350 pounds of freight on every B-25 and 320 pounds on every A-20. Since they could make the run to Moscow in two-thirds of the time needed by transport craft, Colonel Kotikov used the bombers for triple-A priority shipments.

Captain Mortimer told me that a building previously used for storing Russian goods had been taken from him by the Alaska Defense Force, and that all materials reaching Fairbanks had been combined in one giant pool. There was no inventory, and he was having trouble locating supplies scheduled for Russia. A quotation from my Alaskan report speaks for itself:

> We drove about five miles through woods along a tortuous road. I found the supply pool not in buildings and segregated in bins, but strung along the river bank in many different piles. Some were under tarpaulins and all were under much snow. We got out several times, probed the snow away with sticks and looked at the boxes.
>
> We saw many generators, complete Mobile Depot units, complete instrument shops in crates, unwrapped tires of different sizes and thousands of boxes of aircraft parts buried so deep in snow that it was difficult to know whether we were scraping the true bottom . . .
>
> By actual count I saw nearly a hundred boxed Pratt-Whitney and other type motors covered with snow along this river front. . . . In one case we found a mimeograph machine, for which Captain Mortimer said he had been trying several months to get an order through. . . . There seemed to be hundreds and hundreds of boxes of Air Corps spare parts, tools, dies, belly tanks, tires, pioneer equipment and wheel assemblies . . .
>
> A sergeant (my driver) told me that in the spring this river always overflows its banks for a quarter of a mile on either side. It is a most dangerous situation because many supplies will surely sink out of sight in the moist tundra, if they are not actually inundated by the freshet when the ice breaks.

Including my list of recommendations, the report was eight pages long. As a tribute to Colonel Mensinger, I urged that naval weather codes be made available to Air Forces radio operators. I included three Russian requests, in behalf of speed, which were granted: de-icer boots were removed from all planes; camera installations were stripped from Airacobras; and tow-target equipment was omitted from B-25

bombers. The Russians explained that they had plenty of real Nazi targets to practice on.

Among other things, it was recommended that each air station should have a first echelon repair shop, and spare supplies of tires, tubes, generators and radio sets; that Russian materials be isolated in a building of their own at Fairbanks; and that facilities and personnel at Gore Field be enlarged to cope with the mounting operations.

On Wednesday, February 10th, our return-trip plane arrived from the Russian front. It was a C-47, thoroughly pounded and badly in need of repairs. It had no heater. Captain Rush looked it over and said, "I hope it hangs together long enough to get us home." We started the engines and finally took off. I had exchanged farewells with Mr. Anisimov that morning.

We flew to 14,000 feet and soon everything on the plane was frozen. An orange in my pocket became as hard as a rock. We had on board ten pilots and crewmen who had delivered Soviet planes at Ladd Field and were returning to Great Falls for another consignment.

It got colder and colder. Some time later, looking out from the sleeping bag into which I had crawled with all clothes on, I was amazed to see the crew chief, Sergeant O'Hare, holding the blaze of a blow-torch against his foot. He said he could feel nothing. I told him he would burn off his toes and be crippled for life. He said he knew it, but anything was better than freezing to death. I put out the torch and rubbed his feet with a crash towel. When circulation was restored, he did the same for me.

We managed to get to Fort Nelson, where a safe landing was made and where we had a good dinner of caribou steak. We were all ready to take off again when a snowstorm arose, so we decided to stay over in the comfortable log cabins. In the morning it was 33 below zero and it was with the greatest difficulty that we coaxed the motors to start, warming them up from 6 A.M. to 9 A.M.

When we were 150 miles from Edmonton, the fuel pressure of the right engine began an ominous drop! We got ready to heave everything overboard except U.S. mail and Russian dispatches and diplomatic pouches from Moscow. I tore out the radio operator's table, wrenched off the toilet seat, disposed of every loose object in sight. Poor Captain Heide, who had been two years in Nome and was on his first return trip to the U.S., watched as I dragged his steamer trunk to the door.

The gauge dropped from 20 to 6. I adjusted my parachute

and opened the door. At 3 we would fling everything overboard and bail out, leaving Captain Rush to try a belly landing with one engine. Then the pressure began rising. When it got to 10 we breathed a big sigh, shook hands and sat down again. By this time Edmonton was in sight. Were we glad to get down!

After lunch we set out on the last lap to Great Falls. Just as we took off, I saw gasoline pouring over my window. The tank cap on the left wing had been put back loose, and was swept off by the slipstream. The whole side of the plane was being drenched. I ran and told the pilot, who said: "Boys, all we can do is pray that we don't have any sparks from that left engine."

We tightened parachutes and flattened noses against the windows looking for sparks, as Captain Rush wheeled around to land. Seconds seemed like hours. I looked down on Edmonton and wondered in what part of the town I would land if I had to jump.

The pilot skillfully banked the motor to keep sparks away from the gasoline spray, and throttled the left engine the moment our wheels touched the ground. We radioed the control tower, and a jeep dashed up with a new cap. We not only screwed it on, we wired it down. By then we were looking at another sunset, and flew homeward by the light of the stars.

It was around midnight of Friday, February 12th, when we got back to Great Falls. All my life I had heard of the "Frozen North." Now I knew what a terror it is.

One the morning of February 17th I laid my Alaskan report before Colonel Meredith, a rugged veteran who had been trained at West Point. He read it through with minute care, word by word. Then he demanded incredulously: "You want me to endorse this?" I answered yes; the report was what I was sent to Fairbanks to get.

"I thought you wanted to be a Major," he said. "Evidently you've given up all hope of promotion." But instead of handing the papers back, he called a stenographer to take a memo for Lieutenant Colonel P. I. Doty, chief of the United Nations Branch, Patterson Field, Fairfield, Ohio.

At that moment I admired more than ever the type of officer developed by the U.S. Military Academy. Colonel Meredith was a close friend of Gaffney, but this is what he dictated: "The attached report of Captain Jordan has been read and carefully noted. It is strongly recommended that constructive action based on findings in the attached report . . . be inaugurated immediately."

At the next rating of officers, which took place every

Russian proverbs: (crimped at corners in "Russian sayings" file)

One time isn't the same as another time.

Whoever loves someone, grabs him by the hair.

What's been written by pen, can't be cut off by an axe.

Let's see, said the blind man, how the cripple will dance.

We'll see, said the blind man, and the deaf man said, we'll listen.

We're to each other like a fish is to water.

The heart is not a stone.

He'd be a good one to send for death. (said about someone unbelievably slow)

The more you sleep, the less you sin.