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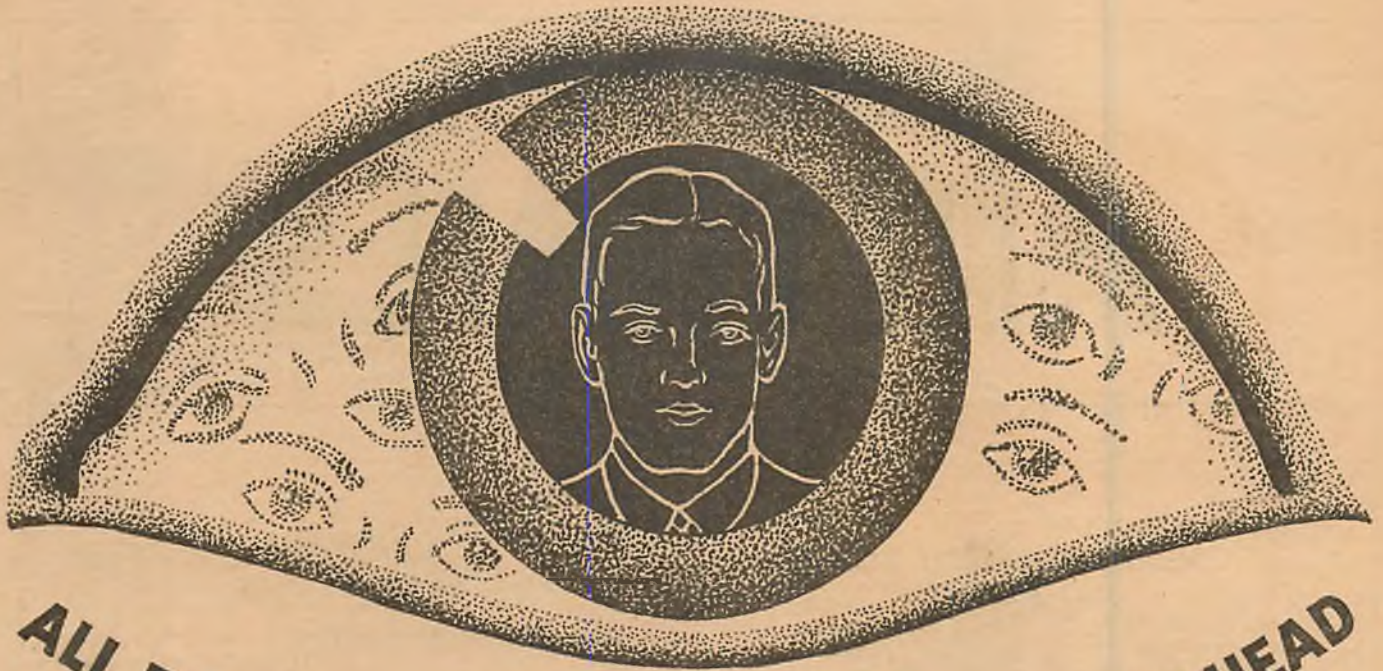
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Volume VI
Number 6

BILL BARNES AIR TRAILS

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SEPTEMBER
1936

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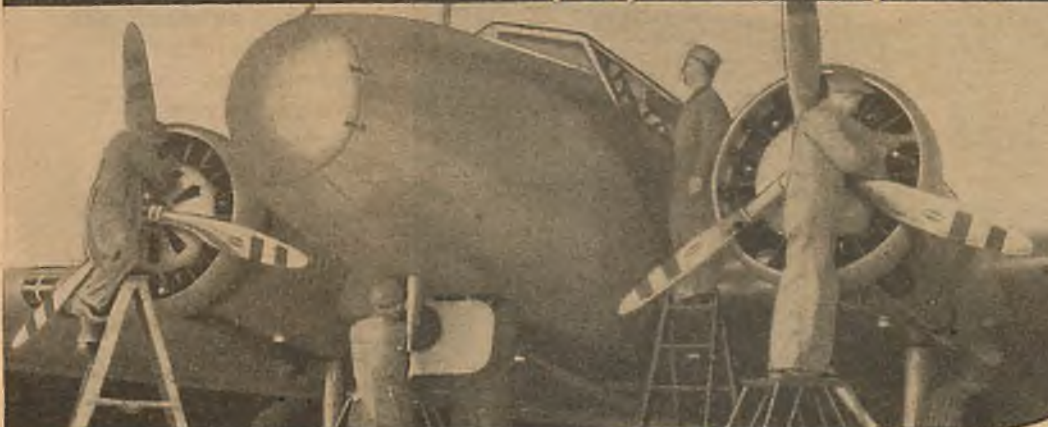
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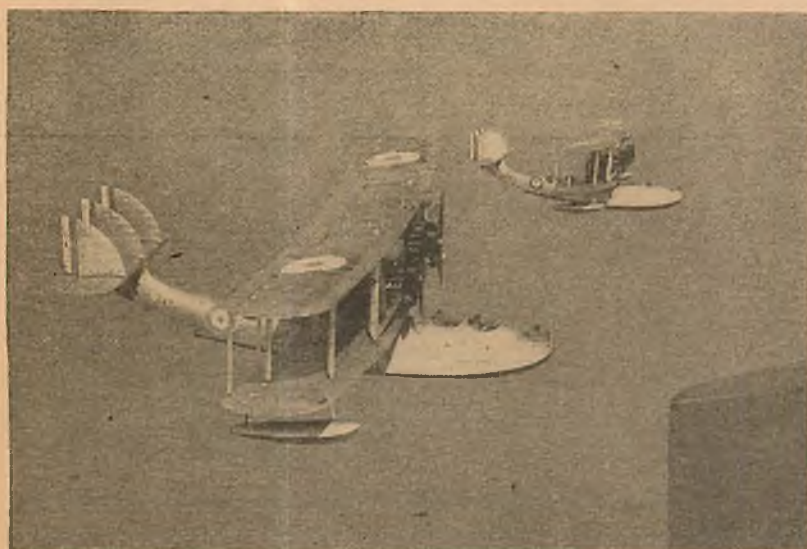
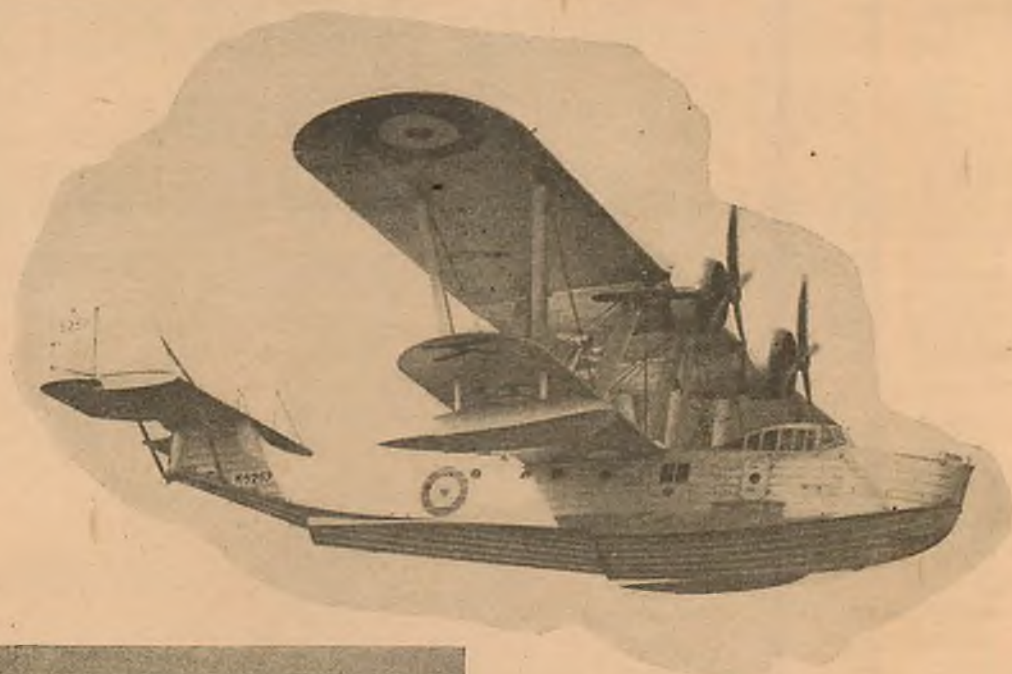
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ZOOMING in practice for French air show, Milo Burcham, American stunt ace, gives a good imitation of a rocket.

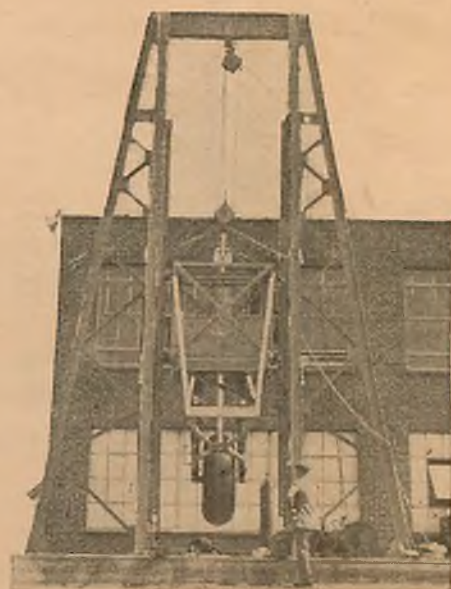
This Winged World

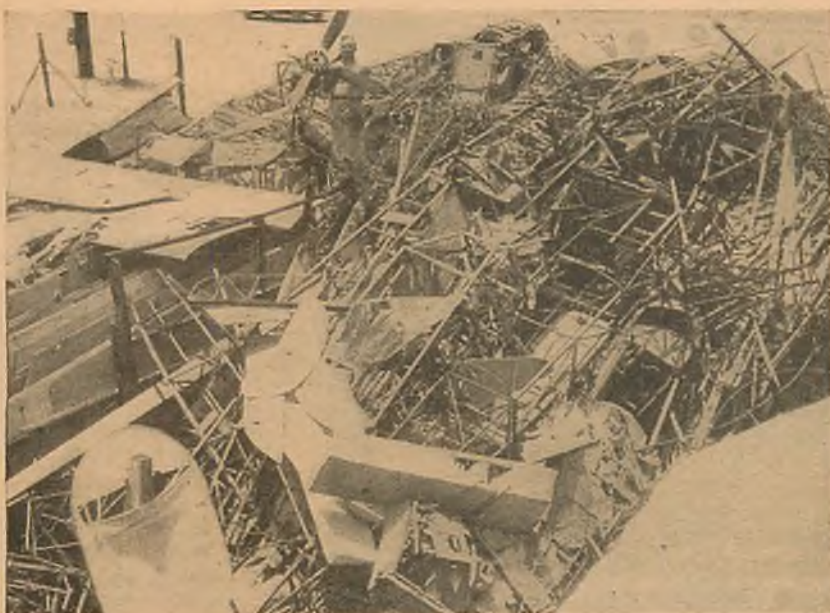
NEW addition to the Royal Air Force is this Saro London boat, powered with two Bristol Pegasus IIIs. Bomber's cockpit is at nose, with gun positions behind wing and at tail.



OLD mainstays of British force are these Supermarine Southamptons, first built in 1925, which seat crew in five tandem cockpits.

DROP test shows landing gear of 16-ton Boeing 299 bomber will withstand 80-ton strain.

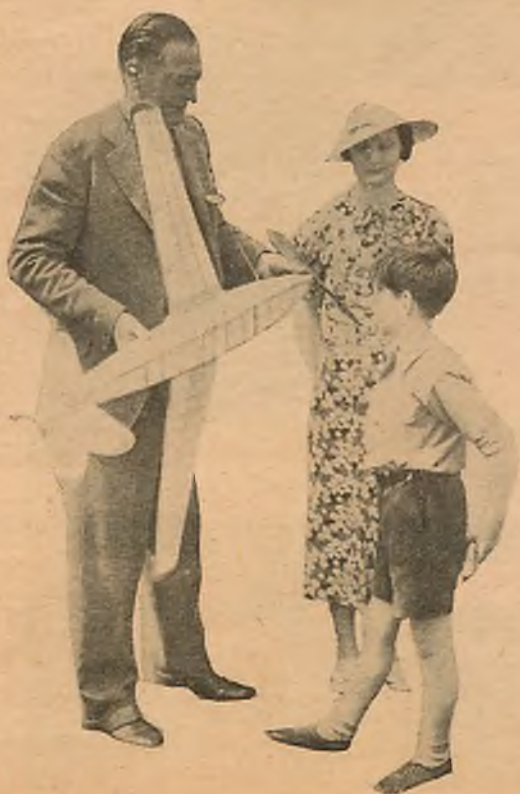




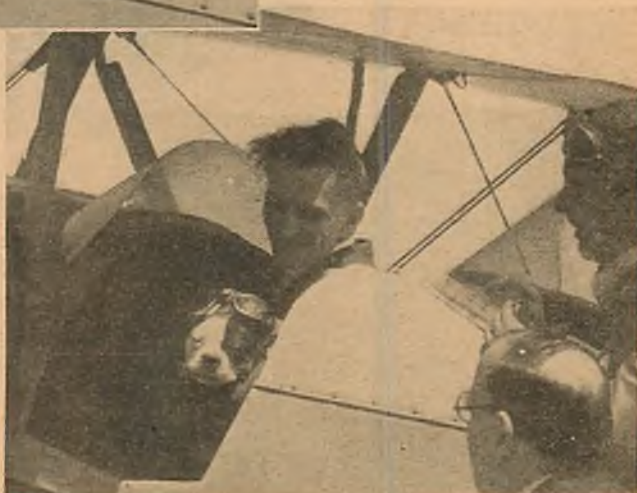
GRAVEYARD of many a famous plane, the Los Angeles wrecking yard of Arrigo Balboni, former war pilot, has received 2,100 ships since 1924. The proprietor, holding a shattered navy seaplane prop, hopes to add the Post-Rogers Lockheed to his mournful collection.

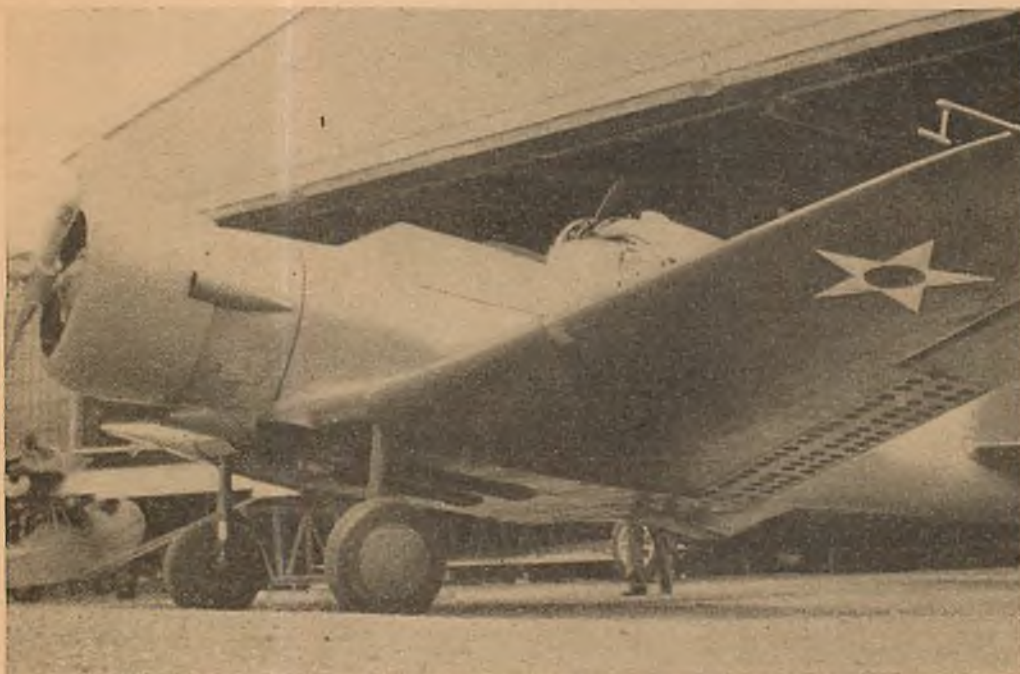


DEAF dog takes plane cure! Piloted by Andy Stinis and held by H. E. Anderson, he went up smiling (left) but came out of 5,000-foot dive looking pretty sick. Doctor reported, however, rapid change of air pressure had partly restored hearing.



C. R. FAIREY, maker of famous English planes, talks aeronautics with Peter Warwick during trials for Wakefield team, while Mrs. Fairey looks on. We don't know who's responsible, but somebody got that wing on wrong!



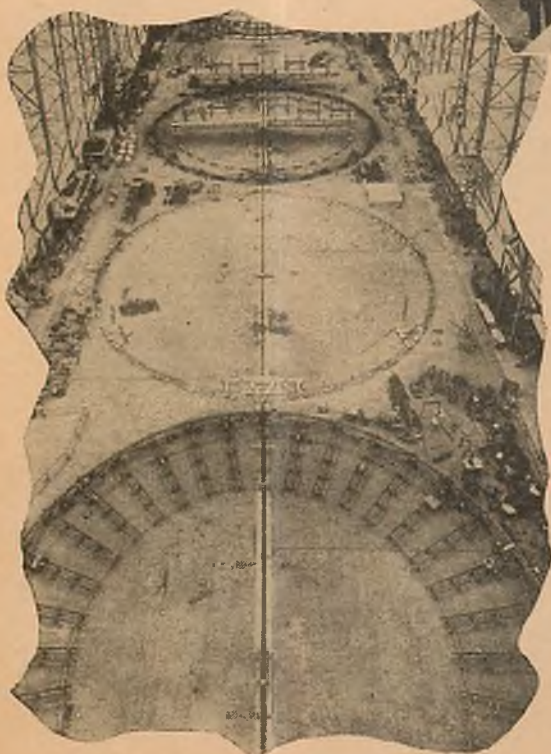


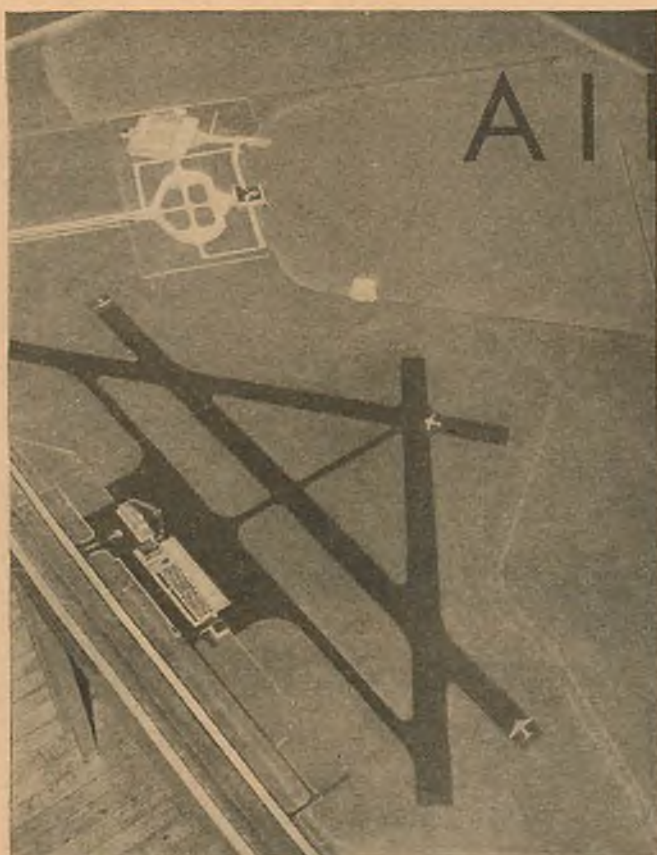
HOLES in flaps of experimental Northrop attack smooth air turbulence behind the wing when flaps are lowered and thereby lessen tail buffeting, without seriously reducing flaps' effectiveness. Although reported rejected by the army, this plane represents an interesting attempt to solve an aerodynamic problem.

ATLANTIC plans of Germany take shape in two forms. Right, plane on page 33 tries new catapult vessel "Ostmark." Derricks lean outward for wings to pass. Below, rings of LZ-130 dirigible being constructed along center line.



SPLIT wing built with permanent slot yields what has been shown by its inventor, W. E. Methvin of Tennessee, to be an absolutely spin-proof plane.





San Francisco municipal airport model shows future base for PAA's transpacific "Clipper" planes at top.

AIR Progress

A summary of aviation news

international speed aces. Britain's Royal Aero Club race from England to South Africa starting Sept. 15 for \$50,000 offered by I. W. Schlesinger, Cape industrialist, is limited to British Empire pilots and planes.

Performance

New international and U. S. non-stop amphibian distance records of 1,425 miles, covered from Puerto Rico to Langley Field, Va., in 11h 9m have been established by an air corps Douglas OA-5 piloted by Major Gen. Andrews and Major John F. Whiteley.

Mlle. Maryse Hilsz recaptured the women's altitude record from the Marquise Negrone of Italy, and incidentally broke the French men's record, with a climb to 46,947 feet—only 405 feet below the world airplane record held by Italy's Commander Donati.

Science

Meteorology furnishes the news this month, with Amelia Earhart leading in a demonstration of a new "fog powder" over Union Air Terminal in California. Dusted from the plane she flew by a device operated by its inventor, C. R. Pleasants, the chemical opened holes in 500-foot fog, clearly revealing the ground.

Two-week weather forecasts may be possible by 1940 by keeping records of the rise and fall in solar radiation, according to Dr. Abbott, Smithsonian Institution secretary. He wants ten mountain-peak observatories, and suggests that improved radio-robot sounding balloons might also help. Professor Piccard's latest balloon of this type, a 30-foot cellophane bag, landed after an 800-mile hop, its greatest height undetermined due to freezing of the radio battery.

Air Force

Several legislative bills are now in effect as an outcome of Congress' spring session which mean much to the army and navy. The army bills authorize a maximum strength of 2,320 planes, allot almost 60 million dollars to the air corps, provide for 565 new planes within the next year, and permit up to 1,350 air reserve officers to be recalled to active duty. The navy's bills provide 333 new planes within a year to bring its fighting force to 1,259 and authorize a new air station at Alameda, Calif.

Other bases contemplated for the future include two huge army and navy Alaska bases, and six large army bases within the United States.

Recent army contracts: 77 pursuits and parts for 8 more from Seversky, \$1,636,250. See page 33.

Navy contracts, totalling about 5 million dollars: 54 Northrop dive bombers, 54 Vought dive bombers, 83 Curtiss scout bombers.

Transatlantic

A new base for Atlantic hops has been started in Newfoundland for the British Air Ministry. It will have hard-surface runways, hangars, machine shops, and a hotel for the passengers which Britain visions for her new Short flying boats.

To blaze a trail via the substratosphere, Clarence Chamberlin acquired a Lockheed Altair and planned a 4-to-6-hour hop at 35,000 feet with 400-mile speed from Newfoundland to Ireland.

The dirigible *Hindenburg* continued to shuttle back and forth, numbering a 6-months-old baby among the passengers on its third trip here, and setting a new east-west record from Frankfurt, fourth trip, of 51h 17m.

Boldest of sea-hop plans were those of Dr. K. Zimmer of Germany and Demytere of Belgium, who hope to drift from Africa to South America in free spherical balloons.

Meets

Glider pilots staged their annual contest at Elmira, N. Y., with such success that an international meet with \$10,000 in prizes is planned at the same site next year for June 26 to July 10. Among outstanding performances this year were Emerson Mehlhose's unofficial U. S. altitude mark of 6,516 ft., duration record for two-seat gliders of 8h 48m set by Albert Slatter and Jay Buxton in the latter's Transporter, and Richard C. du Pont's record round-trip flight of 37 miles from starting point to announced goal and return.

Two important long-distance races have been announced. The French Aero Club's 13,629-mile dash starting Oct. 25 from Paris to Saigon, French Indo-China, and return will offer about \$79,000 in prizes to



*Hideous
treachery fed
embers of hate
that smoldered still
within ancient, evil ruins—
treachery that threatened to
blast Bill Barnes from the sky!*

by George L. Eaton



The Blood-Red Road to Petra

A HALF DOZEN little puffs of dust, that were running ostriches, fled before the slow-moving caravan. Heat rose from the hot desert sands like blasts from a fiery furnace. The only sounds were the rustle of the camels' feet and the dull, dead shifting of the sand as it crept slowly westward before the hot, dry wind.

As the sun plunged toward the sea of sand the breathless wind became a half gale. It whipped sand eddies into the cracked lips and chapped faces of the two men who led that long, thin line of pack camels. The Bedouins astride the baggage and riding camels drew their head cloths tighter across their noses, pulled the brow folds forward like visors, leaving only a slit from which their granular, burning eyes peered.

Their cartridge belts held their brightly colored cloaks tight at the waist to keep out the swirling sands. They wore their long rifles slung across their shoulders, and from their belts protruded the hilts of their ever-present daggers.

There was only the shifting of the sands, the padding of the camels' feet, the creaking saddles, the tinkle of bells to disturb the peace and quiet of dusk. No living thing moved across the desert wastes to disturb the solitude of that lone caravan.

Yet, something that was almost tangible, something like a tangible wave of terror crept the length of that long, thin line of camels, as the blood-red sun disappeared and the desert night plummeted down upon the caravan. The camels, seeming to sense that fear, nervously tossed their heads from left to right and bawled their uneasiness.

The two men in the lead glanced furtively at one another and licked their shriveled lips with tongues that were dry and swollen. They shifted in their saddles and glanced back at the rest of the caravan as the desert night swallowed them up. The long, thin line became a sinuous snake, the head or tail of which could not be seen from the center because of the dungeon blackness.

In an hour the wind died and the sky became calm and black and full of stars. Ahead they could see sand hills coated with tamarisk in the glow of the moon.

Beyond that first rim of sand hills the camels' feet padded on a floor of mud that was baked hard and was as flat as a lake. It extended to the first low hills of limestone that became great peaks against the sky in the distance.

"We shall find water within the Bab es Siq," one of the leaders said to his companion, in Arabic. His words came in the dull, rasping voice of a man who is parched. His companion acknowledged the words with a guttural grunt.

He was thinking of that long, desperate trek across the burning sands of the Great Nefud that lay behind them. He was thinking that now after the finger of Eternity had flicked them a half hundred times they should be safe. He was thinking of the riches they would divide once when they had marketed their cargo, if they got it safely home. His cracked lips twisted into a snarl at that word. *If*. Nothing, he told himself, could stop them now. He touched his hand to the bag of pearls

A Great Bill Barnes Novel of Air Adventure

that had come from the Persian Gulf. Sweet visions of his future life formed in his mind. His snarl became a smile.

In two hours they came to Es Siq, a cleft in the red sandstone hills. A Bedouin carried a blazing torch to lead the line of baggage and pack camels. Stupendous walls, in some places only twenty feet apart, and towering so high that in daytime the caravan would have looked like a line of ants from

the top, hemmed them in on both sides.

Even the camels ceased their grumblings and became quiet, afraid to flaunt their smallness in this gigantic work of Nature. Now and again, a single star twinkled in the dungeon of blackness overhead. The sweet odor of oleander was heavy in the air. It floated down the gorge of the Wadi Musa like the scent of ancient caravans bearing perfumes, frankincense, and myrrh.

They crawled along the bed of the Wadi Musa with weary, aching bodies. The half-conscious riders brought their camels' heads up with a jerk as they stumbled. The only thing that kept the riders in their saddles was the thought that soon they would feel cool, delicious water trickling down their throats. Then they could sleep the sleep of the weary. A few more days would bring an end to their long journey. There would be pay and a bonus, and the soft laughter of women, and that nameless fear would be behind them.

Because they were half asleep, they were unprepared when that first blast of gun fire crashed down the gorge and reverberated against the high sandstone walls.

Es Siq became a place of flaming guns, screaming animals and mad fanatics. Those two in the lead went off their camels with the first fusillade, their heads, literally, ripped from their bodies by a storm of machine-gun bullets.

The Bedouin riders, astride the camels, screamed for mercy as they were shot out of their saddles by the cloaked and turbaned madmen who poured out of the crannies and fissures that lined Es Siq.

The man who led them was tall and slender, with deep-set eyes that burned like twin fires. A black beard covered half his colorless face. His long, white silk robe streamed out behind him as he shouted orders. His brown head cloth, bound with a scarlet-and-gold cord, stood out as torches blazed in the gorge. His face became as mad as the faces of his men as he slashed the clothing off the two leaders of the caravan with his dagger, and searched it for treasure.

The thing that took place in Es Siq that night was horrible to behold. As each man fell from his camel an Arab dagger was slashed across his throat until his blood gushed out and his life departed. Their rifles and daggers and all their belongings were stripped from them.

A solid line of men stood at each end of the caravan, a line of grim, bearded men dressed in the robes of the nomad Bedouin. They were so placed to see that not one man of that caravan escaped to tell the tale.

When the pack and baggage camels were hobbled and quieted, Serj el Said, the leader of the bandits, shouted a command. Two lean, bronzed Europeans, wearing sun helmets, slacks, and automatics strapped around their waists, leaped to his side.

"Kill that dog who is trying to cut the ropes of the first pack!" he directed them.

One of them brought his automatic up. It barked three times. The Bedouin's body jerked as the bullets tore into him. His scream rose above the babble of his mates, then died as he plunged to the ground. The other Bedouins watched his body twitch convulsively. It was their custom that with victory came the right to plunder. They had become a pack of screaming, clawing zealots. Their hands sped toward the daggers in their belts.

Serj el Said watched them with an expression of contempt on his colorless face. Then he lashed them with words in Arabic.

"Are you men or dogs?" he asked them. "Do you snarl and claw and spit in your filthy greed while there is work yet to be done? We must lash those carrion to their camels and take them to the gorge of the Wadi es Siyagh. They must not be found here. Only Douglas, the infidel, will be found here by the British."

The Bedouins, grumbling, began tying the dead camel riders to the backs of their camels. Serj el Said spoke to his two European lieutenants in precise English.

"Bring Douglas," he said, sneering. "He will be what you call a red herring drawn across the trail of your countrymen."

They disappeared into one of the fissures that lined the mighty gorge. When they came into view again they were half leading and half dragging a man between them.

The man's face and head were bruised and discolored. His clothes were in tatters. Any one could see that each step cost him agony beyond description. But his eyes

were bright and unafraid. He carried his head high as he tried to laugh at the men on either side of him. There was an air of youth and courage and clean perfection about him.

"If I must die," he said, "I'm glad I learned what dirty rats framed me. No lower form of life ever existed."

"Shut up!" one of the men snarled. He was a huge bulk of a man with a thatch of sandy hair, and a scar that ran from temple to chin. His voice was a deep roar that became louder and louder as he spoke. His hamlike hands pressed cruelly into the shoulder of Douglas.

"MacTavish and Sneed," Douglas sneered. "A disgrace to their king and country. Two of the foulest traitors that ever wore the uniform."

Sneed's piglike eyes narrowed to mere slits as he banged the back of his hand across Douglas' mouth.

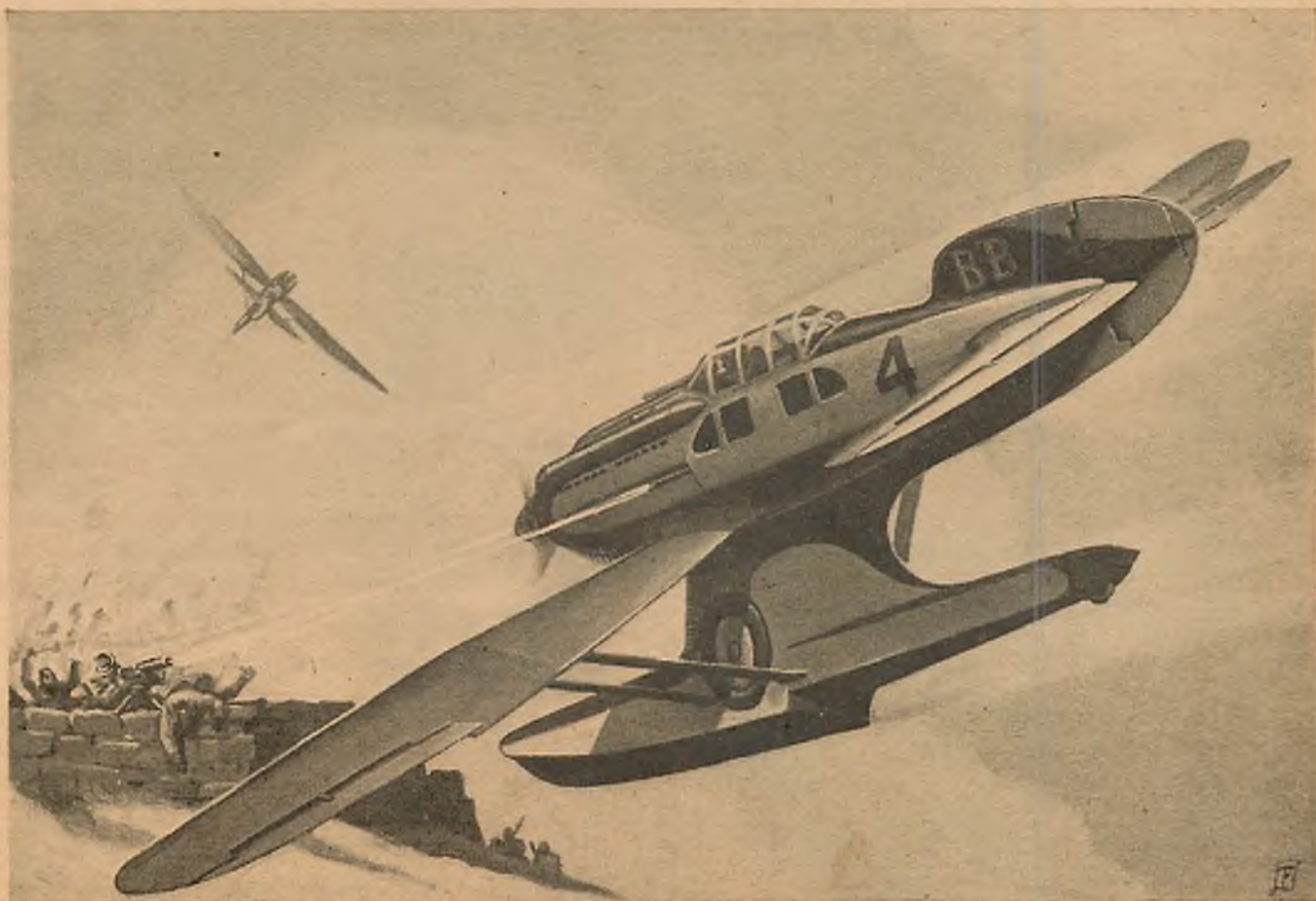
"Shut up, you swine!" he grated. "How would you like to have me turn you over to those mad Bedouins over there? They'd teach you how to be still by cutting out your tongue and staking you down in the desert sand."

They flung the white-faced Douglas against a wall of the gorge as Serj el Said came over beside them. His dark eyes gleamed malevolently as he gazed at Douglas.

"You'll be one less Englishman for me to cope with," he said. He turned to MacTavish and Sneed. "Well," he asked them, "why don't you kill him?"

A smile flitted across Douglas' face as he saw the momentary hesitation of the two Englishmen. He knew it would do him no good to plead for mercy. Nor would he have pleaded if he knew it would save his life. He was cast from a different mold than those other two.

It gave him no little satisfaction to see that they hesi-



Almost in the mouth of the machine guns, Shorty tore their crew to ribbons.

tated to murder a man who had been their fellow officer. He watched them with a smile on his lips and in his eyes. He was determined to die as he had lived, with his head up, afraid to look no man in the eye.

As MacTavish and Sneed drew their guns from their holsters, he spoke:

"A fitting job for two brave and noble officers," he said, almost lightly. "You should receive a citation from your greasy leader. You're not fit to associate with vermin. You——"

His body jerked and spun half around as MacTavish fired two bullets into his heart.

"That'll stop his mealy mouth!" MacTavish roared.

It did.

MacTavish rolled him over with his boot. Blood welled out of the two wounds and spread in a pool around him. His face was serene, as strong and determined in death as it had been in life.

WING COMMANDER Norton Kestrel, M. C., D. F. C., raised his eyes from the book he was trying to read and shook his head angrily. He was aware that

he had read the same paragraph at least a dozen times and did not know yet what he had read. He threw the book down and glanced around his comfortable quarters on the Royal Air Force field at Ma'an in Trans-Jordan.

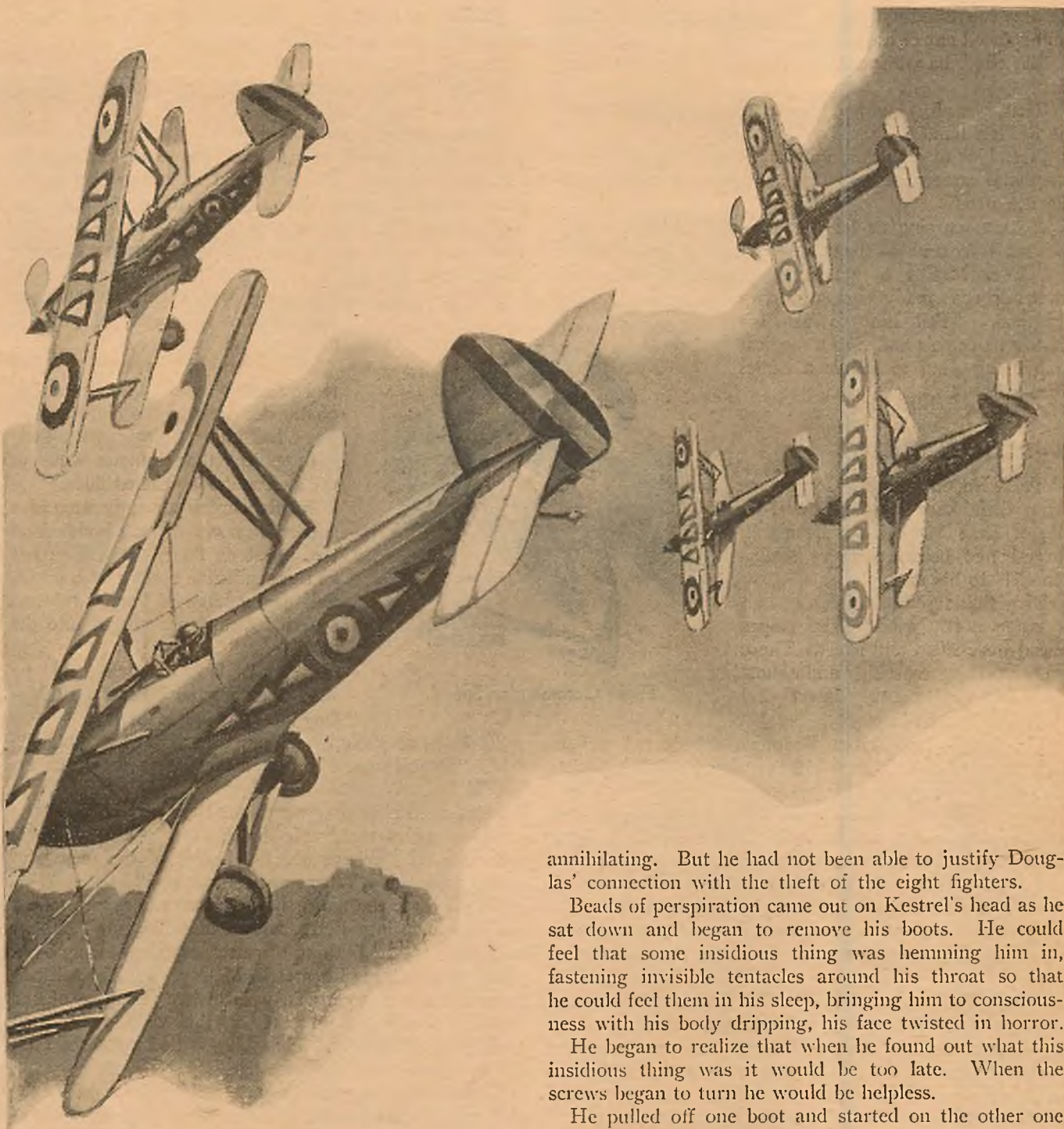
His mind flitted back to the disturbing reports he had received from British intelligence units in his area. Those reports might have something to do with the eight single-seater fighters that had been stolen from under his nose. And for the sabotage that had occurred.

He got to his feet and began to pace back and forth across the room, his rugged chin outthrust, his teeth clenched. He ran a hand through his fast-graying hair and across his lined cheek.

He had turned all of Trans-Jordan upside down trying to locate those eight ships. They had all disappeared at one time while he had been in Alexandria, Egypt, re-



He could feel bullets drumming into the Silver Lancer—could feel the big ship tremble under the impact.



ceiving secret instructions. One night the eight ships had been in their hangars. The next morning they had been gone. Other ships had been damaged. British and native intelligence men had worked on the case—without results.

What, he asked himself, was the connection between the theft of British air force planes and the restlessness of the natives? Who had been able to make those planes vanish like a magician slipping things up his sleeve?

The only result of his investigations had been the cashiering of young James Douglas, a flight officer under his command.

Kestrel's heart ached as he remembered the expression of anguish on Douglas' face when his wings had been ripped from his tunic. He would not have believed Douglas guilty of theft if the evidence had not been

annihilating. But he had not been able to justify Douglas' connection with the theft of the eight fighters.

Beads of perspiration came out on Kestrel's head as he sat down and began to remove his boots. He could feel that some insidious thing was hemming him in, fastening invisible tentacles around his throat so that he could feel them in his sleep, bringing him to consciousness with his body dripping, his face twisted in horror.

He began to realize that when he found out what this insidious thing was it would be too late. When the screws began to turn he would be helpless.

He pulled off one boot and started on the other one when he heard staggering footsteps scuffling in the hallway. He started toward the door, then stopped. It would be one of his men, drunk, he thought. He didn't want any more trouble to think about. He sat down again as something thumped against his door and he heard a scraping sound as it slipped to the floor.

The thing that lay there, when he opened the door, wore the usual mantle and head cloth of the native. But the clothes of this man were saturated with blood. The man's face was twisted in agony.

Kestrel shouted for help and dropped to his knees. When he opened the man's mantle he found that his chest was horribly shot away. He tried to stanch the flow of blood as the man opened his eyes. The man's lips moved slowly, but no sound came from them. He was trying desperately to speak before he died. Kestrel lifted his head and held his ear close to the man's lips. The man spoke to him in Arabic; his swarthy face

became convulsed with pain. Blood gurgled in his throat and spurted out of his mouth.

"Es Siq," he whispered, in Arabic. "Caravan—murder!"

That was all. His body went limp in Kestrel's arms as life left him.

"Get him to a doctor, quick!" Kestrel barked to the men who came running. "He is one of our native intelligence men."

He was cursing as he got his adjutant on the telephone. Why couldn't the man have lived to tell his story?

"Order McCoy to get a fully equipped and armed camel corps ready for departure immediately," he snapped. "Tell him to use his fastest he-camels and take a medical unit along—and to saddle a camel for me."

II—THE ANCIENT CITY

THE Imperial Camel Corps rose from their knees and bellowed as Major Duff McCoy, astride a tall, large-boned beast, roared, "Walk-march!" to his men.

They thundered out of Ma'an into a bitter north wind. The slopes ahead were silent and black. There was something searching and almost dangerous in that steady desert wind that blew in their faces.

The tough, lean desert Bedouins astride the camels rode them as though they had been born on their backs. The camels were trained to walk Arab fashion, with that bent-kneed gait that made their stride a little longer and a little quicker than the normal. They were finely bred beasts, but had-tempered and half wild. With noses high and wind-stirred hair they jiggled along at an uneasy dance that took them over the night sands swiftly.

"Was the Arab who gave you the warning one of our men?" McCoy shouted at Kestrel above the wail of the wind.

"Yes," Kestrel answered. "He had been working among the natives, trying to find out something about the disappearance of those half dozen caravans that have vanished around Petra. He must have attached himself to this caravan to see what he could find out. He could only say four words before he died."

"He'll never tell what he found out," McCoy said.

It was dawn when the camel corps entered Es Siq, that cleft in the red limestone hills that was a trail of the ancient world. Centuries ago the Romans tapped the wealth of Petra by building two roads to it. When Rome fell, Petra was abandoned except for a few desert tribesmen who lived miserably in its tombs and caves.

A poet sang of ancient Petra a hundred years ago: "The rose-red city, half as old as time." Its first written history is to be found in the Bible when it was the home of the Horites, cave dwellers whose progenitor was Hori, the grandson of Seir.

For centuries Petra was the rich crossroads of the world. The Arabian peninsula was a network of caravan routes. The products of Africa, Arabia, and India were taken through Petra and re-routed to the valley of the Nile, Palestine, Phoenicia, and the Euphrates-Tigris valley.

On this morning the descendants of those same desert tribesmen, who occupied the tombs and caves of Es Siq a thousand years ago, gazed down on the Imperial Camel Corps as it made its way between the massive ramparts of red and purple and yellow.

Traces of the arch and gate, that once made Petra impregnable, faded away into mammoth clumps of oleander blossoms. The unbroken walls were like gigantic skyscrapers along two sides of a street. Caverns high up on the sides were like huge windows. Dark stains that were sometimes red and sometimes purple jetted down the sides.

The Imperial Camel Corps was silent, as had been that caravan the night before, as it gaped at the wonders of Es Siq.

McCoy and Kestrel were taut and tense as they watched for some sign of the slaughter of the night before. For a half mile nothing came to their gaze except the ominous walls of the cleft and the pebbled floor.

As they came abruptly around a corner they saw a thing huddled on the limestone floor. It was as red as the sandstone rocks above it. A half dozen huge and ugly vultures scurried away and winged into the air.

Kestrel's face was white and he was trembling as he spoke to McCoy a few moments later.

"It looks as though our court-martial was right," he said. "Douglas must have been a thief and a murderer, too, if he was mixed up in this thing. I've always thought until now that we might have been wrong."

"This settles that," McCoy replied. "But where is the caravan? Where are the bodies of the men who were murdered? Where are the camels?"

"We'll leave the majority of the men here and take a half dozen on into Petra, with a machine gun," Kestrel said grimly. "This thing of caravans disappearing completely is giving me the creeps, McCoy. I'll dispatch two messengers back to Ma'an with orders for three of our ships to search from the air in this vicinity. They'll probably find nothing. This thing is tied up to the theft of our planes and the sabotage."

Kestrel, McCoy, and six native riders kept on up the cleft until the temple, El Khazna, burst upon them unexpectedly. The sheer beauty and mystery of the place kept them silent. They watched the changing colors of the ancient temple as it became red under the sun.

Something within them stirred as they tried to grasp the significance of the centuries that had raced by since unknown men had cameoed out this temple to an unknown deity. What could the mute figures on its face tell of the past and the present, and of the ancient city of Petra that was lost to man for a thousand years?

They passed the theater that had been constructed in the days of the Romans, and the ruins of the temple, Qasr el Bint, that was once the castle of Pharaoh's daughter.

They were silent, as men will be when they are with their thoughts, as they entered the crumpled ruins of the ancient city. At first sight it looked as though they were within a blind pocket with two ranges of sandstone mountains on the right and the left, and ancient walls to the north and south.



Flight Commander Sneed.

But nature had cracked an entrance to the east through Es Siq and to the west by the Wadi es Siyagh.

They searched the amphitheater and tombs and temples of the city, studied the great high place of sacrifice on the Zibb Atuf through glasses. They stood at the base of the highest mountain in Petra, Umm el Biyara, and tried to find the ancient stairway that made the flat-topped fortress accessible to man.

They turned their glasses on the Holy of Holies, the top of Jebel Harun—the Moslem shrine of Aaron. They knew that within the mosque was the only Dushara still in use, except the black stone of the Kaaba in Mecca. They knew that the site is so sacred that no non-Moslem is allowed to enter or even approach its holy precincts, so they turned their glasses away.

"It seems incredible that we can find only tracks," Kestrel said. "They would have to stop and rest the camels unless they killed them and took the cargo on fresh camels. What did they do with the riders they killed?"

they attempted to defile the sacred image of Dushara."

"That's true," McCoy said. "I think our best bet is to comb the place from the air. You may have a report from the three planes you ordered out."

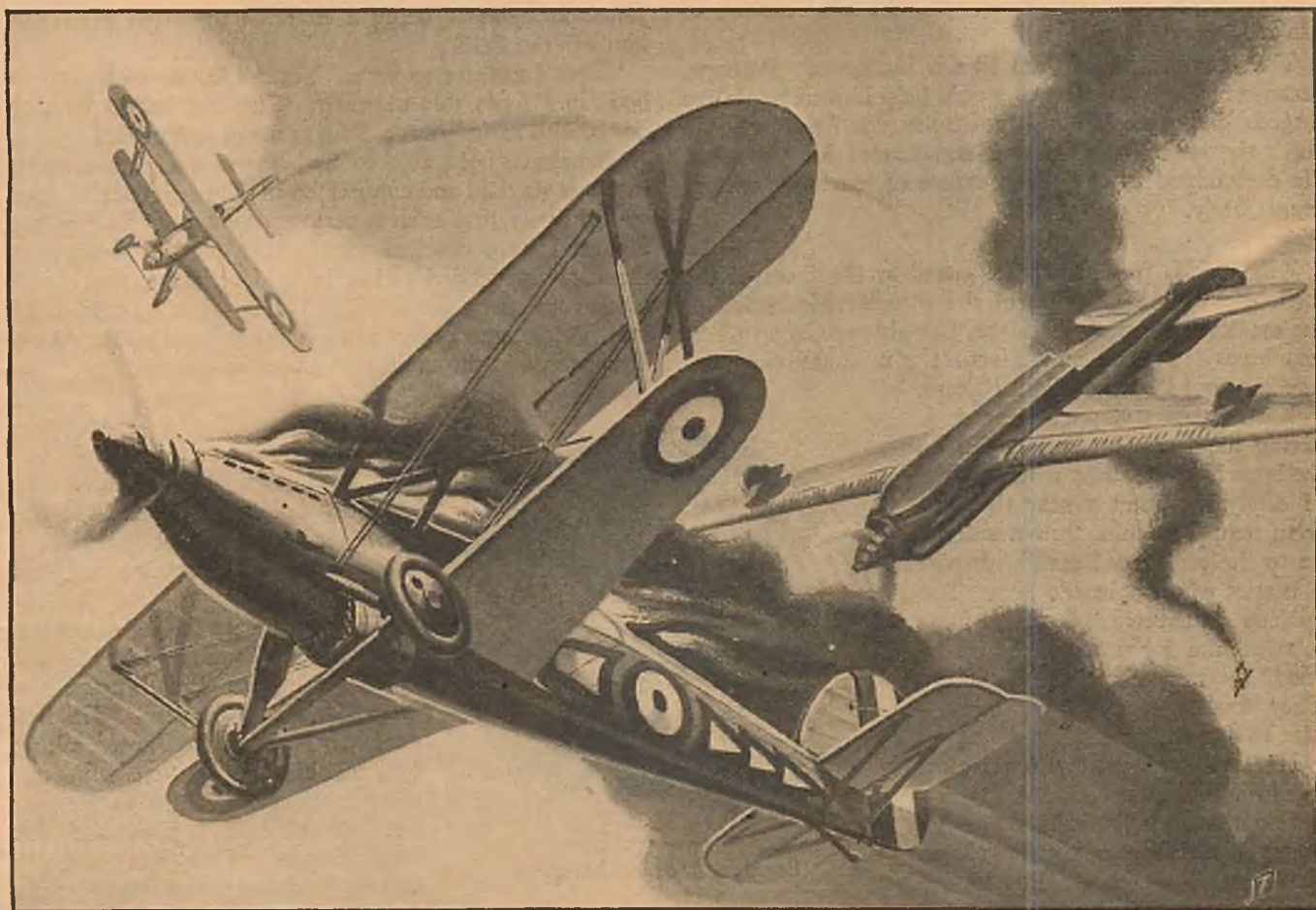
"We'll go back to Ma'an and leave a small garrison in Es Siq," Kestrel said. "We're going to have trouble, McCoy. Hell is going to pop around here. I want to get into the rooms of young Douglas in Ma'an and see what I can find. There may be a clue there."

COMMANDER KESTREL puckered his brow as he read the letter he had found in James Douglas' room. He had gone through Douglas' effects thoroughly, without finding a single thing that gave any clue to his death, until he found that letter.

DEAR BILL:

I don't know whether you will receive this before you leave China. I got your letter yesterday, and I can't tell you how appreciative I am.

But first let me wish you luck in China. I hope you get



Orange flame raced out and back into the face of the pilot.

"Probably threw them into the gorges of the Wadi Musa," McCoy said. "But they couldn't get out of here with camels unless they went out through Es Siq. The Wadi es Siyagh is impassable to caravans now."

"You think they're still in here?"

"I don't know," McCoy answered. "I don't know where they could be unless they are up there on Jebel Harun, the Moslem shrine. And they couldn't get camels up there."

"Nor would they dare," Kestrel said. "An army of a thousand hostile Bedouins would come out of the hills if

an order from the Nanking government for a couple of hundred planes. Good luck to you on that score!

As I told you in my last letter there are queer things going on here. The natives are restless and our Intelligence can't seem to get to the base of the thing. Eight of our fighters were stolen off the Royal Air Force field. Sabotage has been committed again and again. The whole thing remains a mystery. Then I was framed and stripped of my pips and wings and drummed off the field in disgrace.

You say in your letter that you will pick me up on your way back from China. You speak of flying from Nanking to Barnes Field, New York, as though you were going for an evening stroll!

Just one thing: I must clear my name before I leave here. I am going to do that, or die trying. I know you will under-

stand how I feel about this. Our wing commander—Kestrel—is beside himself. There is treachery and danger in the very air. You can almost see it. I know more about it than I can tell you in a letter. When you arrive here I will tell you what I know and, perhaps, you will help me unravel the thing.

I had always wanted to come to Arabia—"the land of mystery and romance." The mystery is still left, but not the romance.

I can't tell you how this thing is burning inside me, Bill.

There was a lump in Kestrel's throat as he came to the point where Douglas had stopped writing. He could picture young Douglas writing it, ready to pour out his soul to relieve his feelings. He wondered if a man could write a letter like that and still be guilty. He doubted it. Yet, stolen articles had been found in Douglas' rooms. He wondered for the first time if, as Douglas had claimed, he had been framed.

What, he asked himself, did Douglas know that he, Kestrel, didn't know? Was that the reason his dead body had been found in Es Siq?

He shook his head, angrily, as his thoughts jumped from Douglas to Bill Barnes. Barnes was coming to Ma'an!

The thought struck him like a bludgeon. Perhaps, because of Douglas, Barnes would help him untangle the threads that were binding him tighter and tighter. He stuck the letter in his pocket and started for his office. He determined to call a conference of his flight officers immediately.

KESTREL frowned as he gazed at the faces of the men before him. McCoy of the camels; McCardell of the medical; Kestrel's adjutant, Creighton; Group Commanders Braddock and Hector; six squadron commanders and a bevy of flight officers.

Kestrel's eyes stopped their wandering momentarily as they fell on the huge bulk of a man with a thatch of sandy hair and a scar that ran from temple to chin, then wandered on to the pink-faced man with pig-like eyes who sat beside him. The curious intentness of their faces startled him for a moment and he tried to remember their names. They flashed through his mind—MacTavish and Sneed.

He leaned forward and raised a hand for silence.

"Gentlemen," he said, "you no doubt have an idea as to why I have called this conference. But let me impress upon you that you have no inkling of the seriousness of the situation confronting us.

"I think it is best if I am frank with you. I was in receipt to-day of a communication from Sir Ronald, high commissioner of Trans-Jordan. He points out to me in no uncertain words that the Arabs in Palestine, Trans-Jordan, and Arabia are preparing to revolt.

"Some faction has aroused them. Trans-Jordan seems to be the center of their activities.

"Sir Ronald goes on to say that he knows we must constantly keep an eye on developments in the Mediterranean and the Red Sea and that we are in no position to withstand an Arab revolt with conditions as they are all over the world. We must nip the thing in the bud."

Kestrel stopped speaking, cleared his throat and ran his anxious eyes over the men before him.

"Anyway, that puts it up to us. I've known that something was brewing from the reports I have had from our intelligence men scattered over this area. Now I know why we had eight planes stolen from under our noses, and why others have been damaged. Also, I know why a half dozen caravans have mysteriously disappeared within the past few months. The goods those caravans carried can be traded for guns and bullets. The sacking of those caravans helps build up the illusion in the minds of the fanatical Bedouins that all the desert and anything that moves on it belongs to them."

Kestrel raised one hand and shook a finger at his men. His face was suffused with color and his eyes were spitting fire.

"Gentlemen," he went on, his voice rising, "whoever secured those eight planes from our field could not have done so without help from inside the field. Some place among us there are traitors. We must find them. I thought we had found the beginning when we convicted James Douglas of being a common thief and drummed him off the field.

"Now I am not so sure. You all know we found his body in Es Siq this morning. The two bullets we dug out of him came from a British army automatic!

"We have been able to find no trace of the caravan that was waylaid and confiscated in whole last night. But we do know that such a caravan went into Es Siq last night. I have checked with Jerusalem and found that the caravan carried riches beyond estimate, pearls and black coral from the Persian Gulf. That caravan went into Petra, but never came out—just as others have disappeared in the same mysterious manner.

"The same organization that looted our field looted those caravans, with help from some one inside our own lines. Douglas was killed with a British bullet. He was left there for a reason. Perhaps it was as a warning to us. That we will find out in due time.

"When we went through Douglas' effects to-day I found a letter he had been writing to Bill Barnes, the world-famous American. He had evidently written to Barnes telling him of his degradation with our forces. Barnes listened to his plea and offered him a place with his organization. That was probably due to the influence of Hassafurther, Barnes' chief of staff. He flew with

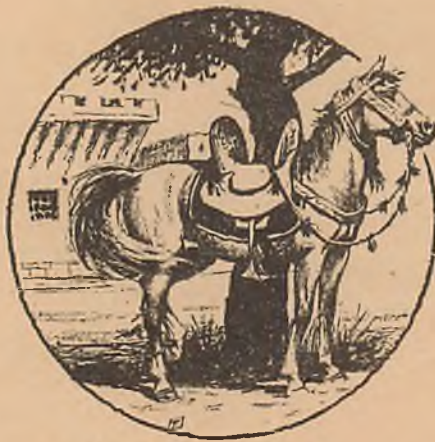
Douglas' older brother in a British squadron during the World War.

"Barnes is on his way here now. He is coming to pick up Douglas on his way home from a business transaction in China."

"Sir," Group Commander Hector said, "what has Barnes to do with us?"

"I'm coming to that," Kestrel said. "You know our situation here. You know that any overt act on our part will have the Arabs on us, slitting our throats. We must keep an eye on the situation at Alexandria and Port Said constantly.

"It is possible that we may interest (Turn to page 68)



Sandy's Arabian horse.

Parachute Development



(FROM COPY OF DA VINCI'S ORIGINAL SKETCH)

THE FIRST ACTUAL PARACHUTE DROP WAS MADE BY THE FRENCHMAN, GARNIERIN, AT PARIS, OCTOBER 22, 1797



LEONARDO DA VINCI INVENTED AND SKETCHED THE FIRST PARACHUTE IN ABOUT 1490

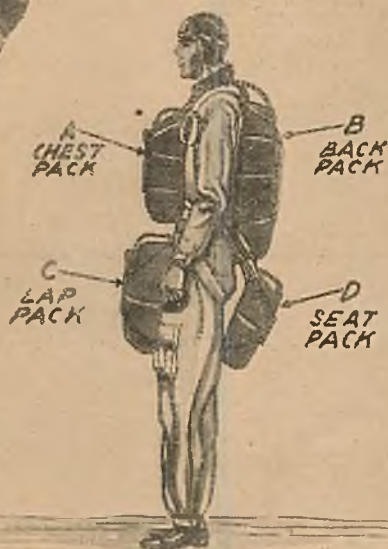


THE RUSSELL "LOBE" CHUTE PRODUCED IN '28 IS NONOSCILLATING

THE IRVIN CHUTE, USED BY PRACTICALLY ALL THE AIR FORCES OF THE WORLD



THE "GUARDIAN ANGEL" CHUTE, USED IN WORLD WAR, PACKED IN TUBE ON SIDE OF SHIP. PILOT HAD TO JUMP FROM SAME SIDE OR LINES FOULED



PARACHUTES MAY BE HAD TO BE WORN AT "A" AS SECOND CHUTE FOR TRAINING WITH CHUTE AT "B", OR AT "C" FOR EITHER GUNNER OR OBSERVER. THE USUAL TYPE FOR PILOT OR CIVILIAN FLYERS IS "D" WHERE IT ACTS AS A CUSHION

by Lieut.
W. M. Wood,
Air Corps
Reserve



The Dare-Devil Complex

THE airplane has been perfected to the point where danger from forced landings in well-maintained aircraft is almost non-existent. Modern airplanes do not flat-spin; in fact, they are inclined not to spin at all. They practically never come apart in the air when flown normally. They are stable at landing speeds, and even the fast planes of to-day, by using flaps and brakes, can land at speeds within the limits of safety. Considering these things, it may be said that technology has triumphed over the traditional dangers of flying.

At the same time, the airplane's unique and incomparable safety advantage remains as effective as ever. For aircraft are still, and always will be, the only vehicles which can do practically all of their traveling thousands of feet removed from any hard substance into which they might disastrously crash.

Why, then, should not the airplane be the safest of all fast means of travel? What keeps all this potential safety from being realized? What is behind the fatal accidents which are still much more numerous than they should be?

In the air transport field, where pilots, equipment and maintenance are of the best, a large proportion of accidents occur in bad weather, particularly at night. Modern methods of beating bad weather are marvelous, but by adding to the chain of personnel involved, they increase the chances for human error. For instance, the accident in Missouri which took five of the nine lives lost in the first half of 1935 was attributed to bad weather which proved disastrous because of four seemingly trivial errors on the part of personnel.

But why so many crashes in miscellaneous flying, where pilots can, and generally do, sit in

the hangar until the sun shines? Freed of the necessity of taking weather risks, why don't non-schedule fliers realize the tremendous potential safety of dependable craft operating far above the risk of crashing into something?

There is still, of course, the problem of the badly maintained airplane and the sloppy pilot in miscellaneous civilian flying. The plane can be licensed and the mechanic licensed and the pilot licensed, but if the mechanic is lazy and the pilot rusty and careless, the way is paved for one of those often-reported crashes:

"The engine faltered at about 200 feet, spectators said, and the plane fell in Mrs. Jones' back yard, despite valiant efforts of the pilot to right it. His skill did, however, keep it from hitting the house where the family was eating an early supper."



Your greatest enemy in the air is yourself. Flying safety doesn't come from the hand that moves the stick, but from the mental attitude that controls the hand. Read this wise, serious article — and then think it over.



The truth was that the pilot had been flying all afternoon with his engine acting a bit "falterish," and when it stopped he had pulled his nose up and tried to climb in a glide while he thought what to do. The plane had stalled and spun, hitting the ground completely out of control before it had time to tighten up or complete the first turn.

But there is a more serious and fundamental cause of miscellaneous and private flying accidents than bad maintenance and unskillful piloting. There is a danger that strikes most frequently at the kind of pilot who is perfectly competent in handling a ship.

Any one who looks at the figures can discover that about half of the fatal accidents in miscellaneous flying result from flights definitely determined as having been contrary to regulations.

For instance, in the first half of 1935, out of 124 fatalities, 56 occurred in 37 fatal accidents in which a violation was involved. Here was the score of various violations: illegal acrobatics, 8 accidents; illegal acrobatics and low flying, 4; illegal acrobatics and licensed pilot flying unlicensed aircraft, 2; illegal acrobatics, low flying and other violations, 2; low flying, 4; low flying and miscellaneous violations, 4; various other violations, 13.

Examining those figures, one might say: "Everybody knows that recklessness and rashness on the part of pilots causes accidents. What of it?"

Quite true. It is obvious. But less obvious is the fact that those figures are the key to the fundamental reason why flying, though inherently and potentially so safe, remains dangerous.

That reason is this: the airplane is more likely to be handled dangerously than any other vehicle, because of the peculiar psychological effect it has upon the man at the controls. The airplane is the master producer of what may be called the "dare-devil complex."

One factor in acquiring this dangerous mental condition has its origin, strange to say, in the airplane's one superlative safety advantage. Traveling several thousand feet above the nearest solid, visible substance is very safe indeed—but it is very dull. Not speed itself, but the sensation of speed

is the thing that gives us pleasant excitement. And at 3,000 feet or more, the earth creeps under your wings with exasperating slowness. You look at your air-speed indicator, but it does no good. You may *know* you are traveling at 180, but you *feel* like you're getting no place at all. And without a "quitty" engine to keep you anxious, you simply

get bored. You keep getting more bored all the time.

Soon you feel an impulse to register a protest. You want to pitch the plane around a bit, to throw it into a sudden steep bank and pull it out again, or to push the stick forward and feel yourself lift excitingly against your safety belt. You may indulge these innocent initial whims. Then, if you have a plane built for it and have a parachute under you, you may perform certain acrobatic maneuvers above 1,500 feet and still be within the limits laid down by regulation and good sense.

But these sensible acrobatics seldom satisfy you. Even if you are equipped for them and do them, the novelty of looping and rolling so high off the ground soon wears off and you begin to hanker after a little real action. Or rather, I should say, the adventurous element in you (and in me and everybody else) is very much stimulated by flying. I never saw any but very mature and experienced pilots who didn't play now and then—and even the oldsters who didn't, wanted to sometimes.

And that is how safety grows into danger. For if the airplane may be the safest and most boring of vehicles, it can also be the most exhilaratingly exciting—and the most dangerous. And the temptation to change boredom into excitement is very strong.

Pictured in the photos above are professional stunters. They know their danger, and they take their risks deliberately. We couldn't show any amateurs stunting "for fun," because there's usually nothing left when the photographer arrives except a scene like that on the opposite page, below.

You can hedge-hop. You may feel that you aren't traveling at all if you are up 3,000 feet or so, but when you go down to only 10 feet off the ground (as you are very likely to do sometimes) you get the full sensational benefit of your speed. Even at a little more than a hundred miles an hour, the ground whips by in a streaked blur. You have to look far ahead for trees and power lines and mountains and other things it might be uncomfortable to hit.

I knew a pilot once who enjoyed flying under telephone lines. Another liked to find two trees just the right distance from each other so he could fly between them and brush the branches with each wing. Another liked to do "contour" flying in hilly country. He hit a power line and literally burned up before he struck the ground.

Another diverting amusement is to dive straight at the ground and level off as close as possible and go skimming along the surface at almost twice your usual speed. This is quite exciting sometimes, especially if you start to pull out a little later than you should. A plane "pancakes" downward a bit at the bottom of a dive, and the quicker the pull-out, the farther it drops.

And of course, there is the whole list of forbidden acrobatics. The "dodoes" of my class, newly arrived at the Air Corps flying school, were unnerved a little by the newspaper accounts of two army pilots being killed. They had been looping a bomber, and fragments fluttered down over an area of several square miles. Some time later another pilot, during a fall of several thousand feet, finally fought his way out of the cockpit of a pursuit plane over which a collapsed wing had jammed. He had been trying the expressly forbidden outside loop.

Another flying acquaintance of mine enjoyed flying along the surface of a river, especially if it had trees on each side and the "canyon" thus formed was narrow and crooked enough to make the business interesting. He failed to see a telephone line. The poles were hidden among the trees.

And it's fun, too, to imagine you are an automobile with wings, and to go roaring down a curved highway, making all the bends with precision. It means a wild succession of almost vertical banks, gone into instantly and jerked out of with full control after a fraction of a second. This violent tossing about, combined with the fun you have jumping automobiles which startled and paralyzed drivers are trying to stop or get to the side of the road, plus the life-and-death matter of watching for telephone lines and so on, makes "playing auto" a very amusing and fairly exciting occupation for the erstwhile bored pilot. If he stays away from houses and sticks to his road, he won't even have to be worried much about being reported. For the motorists are too startled and really don't have time to get the plane's number.

ANOTHER factor in the dangerous psychological effect of flying on the pilot is this: in an airplane a man can be a fool and feel like a hero.

One might think that if excitement were all a man wanted, he could get it by driving a car at 60 as close as possible to the edge of a mountain road. He doesn't do it, because he would feel like a fool. He does do many other risky things in automobiles, however, which are foolish. Chiefly, of course, he drives fast. That is something that gives him the excitement of a sense of

personal power. And as his sense of power increases, his sense of risk, hence of foolhardiness, is held in check. He feels he is powerful enough to meet any situation.

Now the airplane, being the fastest and most marvelous of all vehicles, is unique in its capacity to give its operator a sense of personal power. The juvenile ego, in an airplane, can feel itself a veritable god. Diving down, shooting along the ground and then leaping straight up, with a magnificent surge into the heavens—it is an experience calculated to make one feel a bit supernatural and superior to the dangers that beset ordinary mortals. The airplane makes one feel physically more powerful than anything else, hence flying permits one to be extremely foolhardy without feeling like a fool. In other words, flying is liable to play the devil with your common sense.

WITH this false feeling of superiority to danger comes another phase, which might be called the "winged-god complex." Young pilots, especially, like the idea that they are being wondered at and admired. They like to display their power and glory before the gaping earthlings. It even gives them pleasure to know that some of the poor earth-bound creatures consider them fools. What they think subconsciously is: "It looks dangerous to them, but then they don't know how powerful and skillful I am."

Especially do young pilots enjoy "buzzing" the home folks. In an effort to astonish their relatives and friends (who knew them when they were mere humans), they will go to all lengths. Acrobatics are indulged in as close to the ground as possible—and sometimes closer.

With a powerful ship it is perfectly possible to skim along five feet above the ground and then to pull directly into a loop and come out flying level and right side up quite a distance over the starting point. A young army pilot I knew was doing that to astound the home folks. Something happened. Perhaps he was thinking more about how he looked from the ground than about how the ground looked from the ship. Anyway, he didn't pull out of his dive after the loop and buried the nose of his plane five or six feet in the earth of the airport. Disaster so frequently befalls newly fledged army pilots on their first cross-country visits to home that some post commanders prohibit these flights outright.

The Air Corps flying school class of which I was a member numbered about 225 at the beginning. Only one was killed during a year of student flying, much of which was solo work by students later washed out for lack of flying aptitude. Frequently more than one of a class are killed during the year of training, but almost invariably the next year is the more disastrous of the two. Of the 102 who graduated in my class, for instance, 8 were killed during the year that followed, mostly in "avoidable" crashes.

The secret of the low fatality during the student year is, of course, the rigid discipline of student flying maintained by the instructors, and the fact that the students are kept always conscious of their faults and immaturity. Therefore, they don't get too cocky, and they try their best to be as careful as possible.

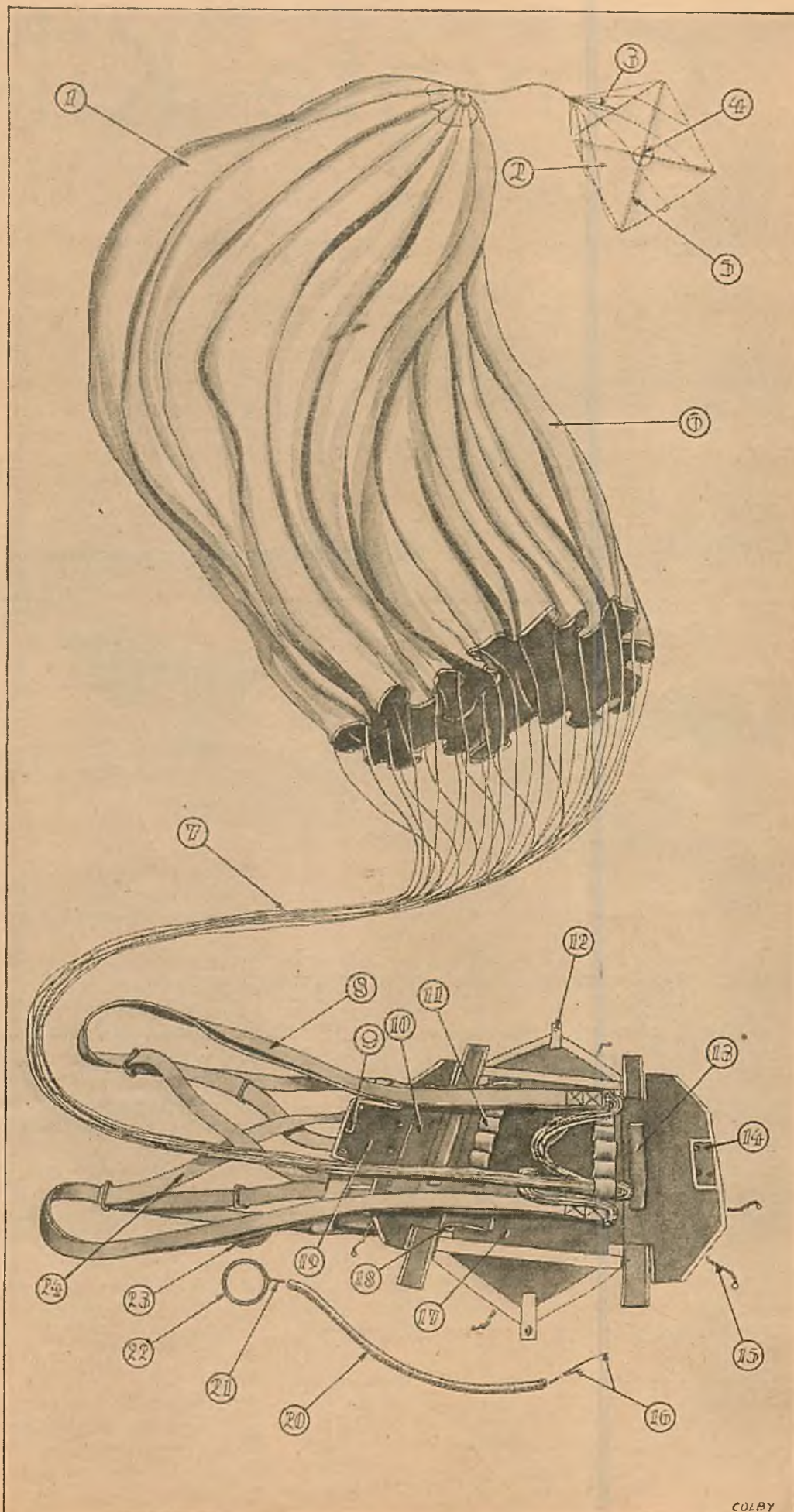
When graduation time comes at Kelly Field, the gray-haired senior officers tell the new A. P.'s that if they will make themselves observe air discipline, there is no reason why they shouldn't fly until their white beards tangle in the tail assembly. The (Turn to page 87)

THE FLIER'S DICTIONARY

The twelfth lesson in the technical terminology of the air. Save your files!

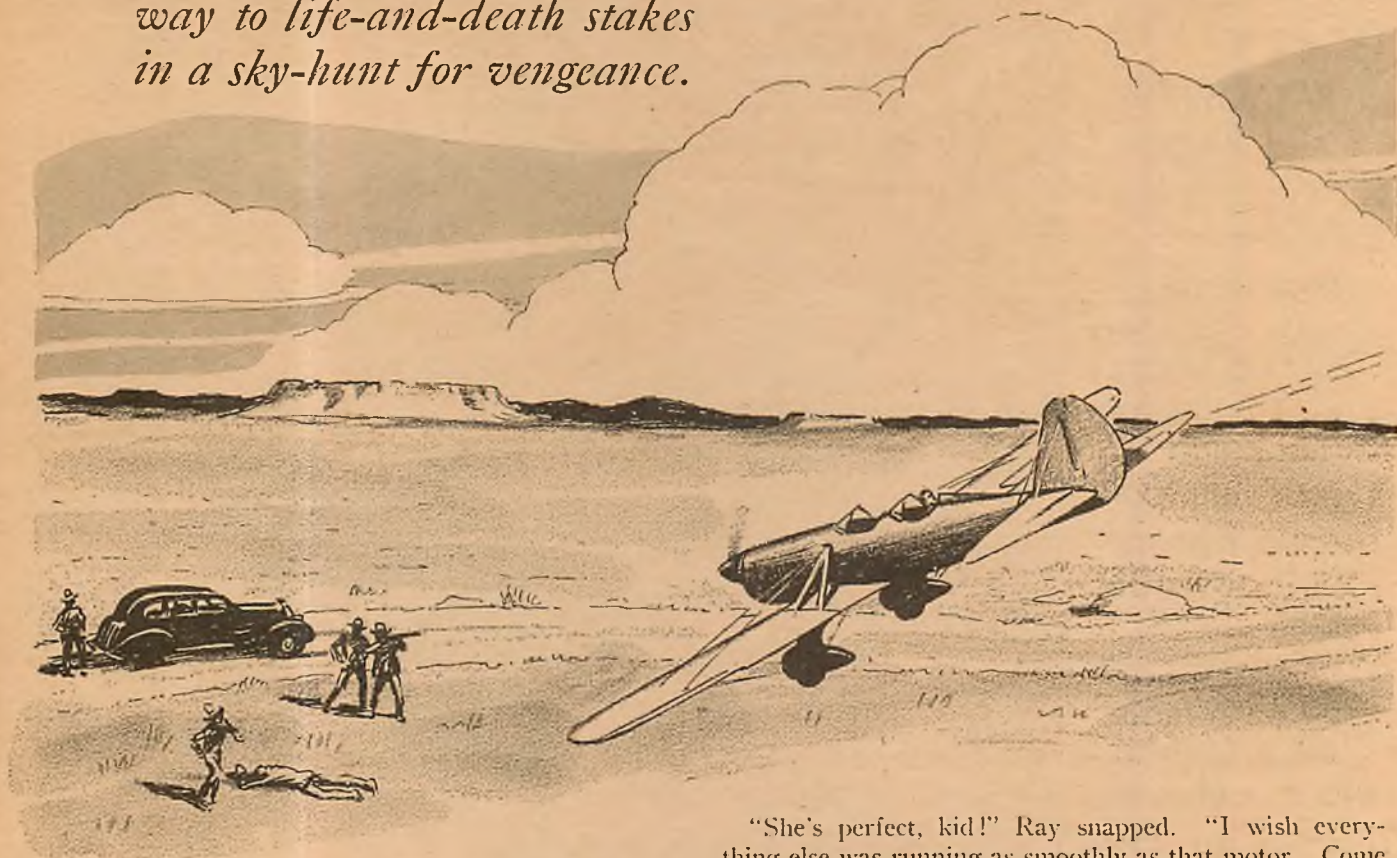
PARACHUTE And PACK

- 1 CANOPY
- 2 PILOT 'CHUTE
- 3 PILOT 'CHUTE SHROUD LINES
- 4 PILOT 'CHUTE STIFFENER SPRING
- 5 PILOT 'CHUTE RIB
- 6 CANOPY PANEL
- 7 'CHUTE SHROUD LINES
- 8 HARNESS LIFT WEBS
- 9 RIP CORD PROTECTOR FASTENERS
- 10 PILOT 'CHUTE FLAP
- 11 SHROUD LINE POCKETS
- 12 PACK END GROMMET
- 13 STIFFENER
- 14 LOCKING CONES
- 15 ELASTIC PACK OPENERS
- 16 RIP CORD LOCKING PINS
- 17 PACK CONTAINER
- 18 LIFT WEB GROMMETS
- 19 RIP CORD PROTECTOR FLAP
- 20 RIP CORD TUBING
- 21 RIP CORD
- 22 PULL RING
- 23 PULL-RING POCKET
- 24 'CHUTE HARNESS



Coyote Killer

Twenty-dollar bounties give way to life-and-death stakes in a sky-hunt for vengeance.



THE narrow red plane looked like a projectile and sounded angry as the devil as the inverted straight eight engine whipped the stubby propeller into a metallic blur. It trembled, rocked eagerly on its chocks, fighting its brakes in front of the weather-stained, corrugated iron hangar at Fort Hilton. Dust whipped behind it like a loose brown scarf.

Larry Balmer, youngest of the three Balmer brothers, wearing grease-smear coveralls, fists on hips, body stiffened, leaned forward to let the rhythmic blasts bark against his expert, critical ears. Ray Balmer, red hair beaten into a flaming bush, clamped his feet on the brakes in the cockpit, studied the instruments, held the throttle forward. He turned his head, looked at Larry, nodded grimly, eased back on the throttle until the motor idled. Then he cut the ignition switch, pulled himself from the glass-enclosed rear cockpit, jumped to the ground.

His hand rested on the cowling, partly concealing the legend:

MISTER JONAH

Fort Hilton Flying Service
Fort Hilton, Texas

"She's perfect, kid!" Ray snapped. "I wish everything else was running as smoothly as that motor. Come on into the hangar. I want to get the 'chute and talk to you."

"Going to test the crate?"

"In a minute."

Ray Balmer sent his long lean legs, encased in breeches and leather boots, pounding over the sun-baked field. He brushed the tangles out of his auburn hair with a large strong hand. His blue-gray eyes had a far-away look of preoccupation. His jaw, massive framework for a wide, thin-lipped mouth, was set by knotted muscle. Pioneer stock, which had formed the boundaries of west Texas and the border along the muddy Rio Grande, had given him a six-foot, two-inch frame, a certain wide-open, honest friendliness and the heart of a fighter.

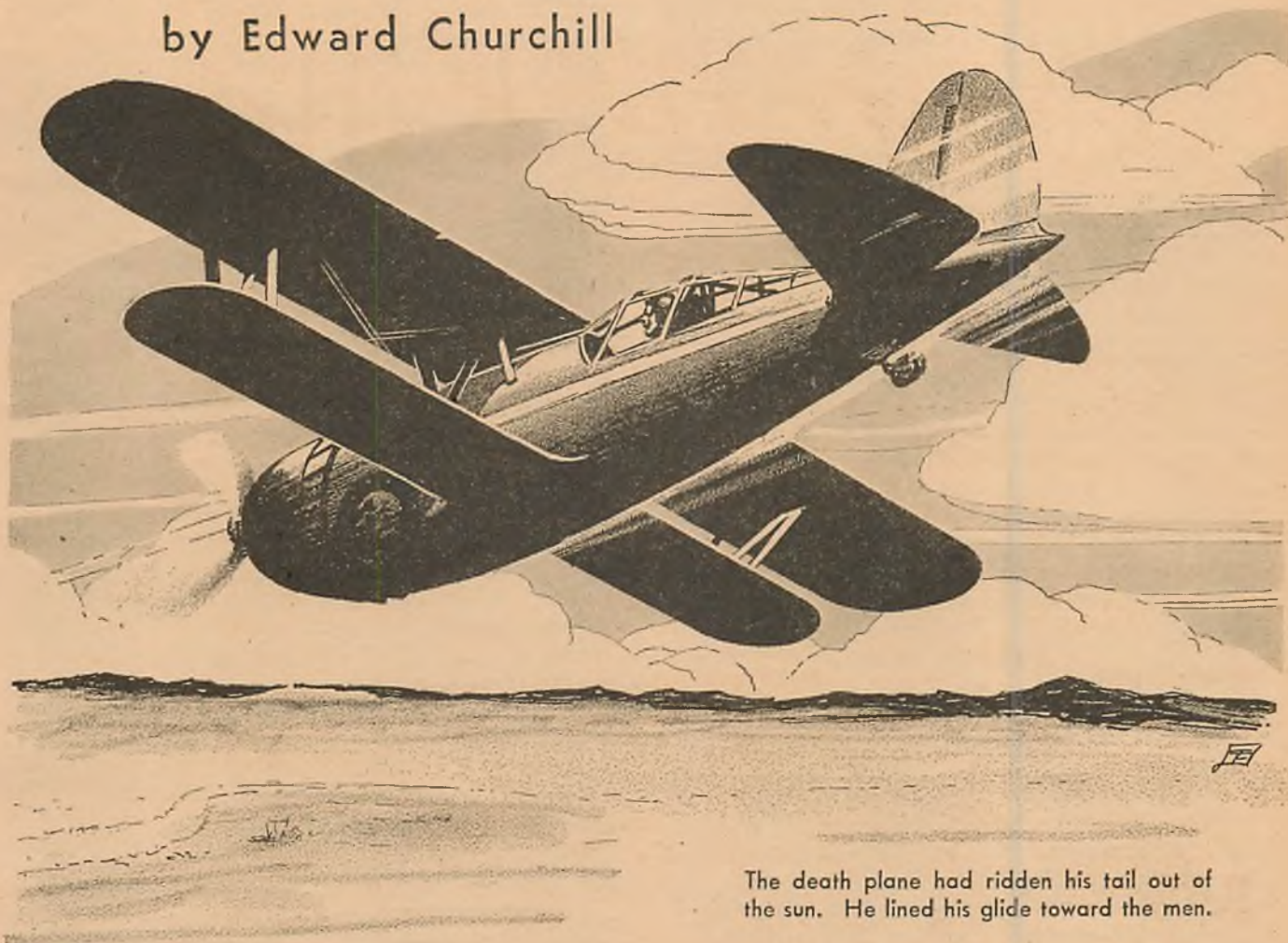
He stalked into the dusty, photograph-lined office, plopped into a swivel chair behind a battered desk, swung so that he could look through windows into the big shed. He motioned Larry to another chair.

"I'm testing her," he said, indicating the two-place racer with his thumb, "and then you've got to carry on alone."

"What?" The younger brother, five years Ray's junior and just turning twenty-one, leaned forward.

"My transportation to Washington, and orders, came this morning from the Federal Bureau of Investigation," Ray said. "I've got to leave at six ten to-night. I

by Edward Churchill



The death plane had ridden his tail out of the sun. He lined his glide toward the men.

take the training course and come out a G-man. Reading law turned out to be a good idea, after all."

"And that makes me——"

"The Fort Hilton Flying Service, punk. We knew a year ago, with the oil boom dying and the field settling down to steady production, that it wouldn't support three of us. That's why Kirk got into the Narcotics Division. Then the dust storm started. You know how students quit until the only money left was hunting coyotes for the twenty-buck bounty in the Curtiss Junior.

"Pumping lead into their tails financed *Mister Jonah* until that twister put her on her back and broke the spars. Now, here's the line-up.

"If *Mister Jonah* tests O. K., you close up shop here and see if you can knock off some dough with her in the national air races. In the meantime, there's a new wing for the Curtiss Junior up at the freight office. Snap the wing on and knock over some more coyotes. Kirk's dough has helped feed us.

"As soon as I get some, I'll shoot that to you. You haven't a thing to worry about."

Ray paused, looked into the hangar, surveyed the coyote ship and the two-place training monoplane, a reliable low-winged job. Then his gaze went to the red racer.

"*Mister Jonah's* a good airplane," he said, half to himself. "What gets me is who put the rap in against her with the department."

He rose, stretched his long body, went to the other

side of the office, picked up a pack 'chute, slowly and deliberately stepped into the harness and adjusted it.

He shot a quick look at Larry.

"There's something sour going on in San Blas County," he snapped. "We left the Curtiss on the field. A little wind came up. When we came back she was wrecked. Then somebody gets the Department of Commerce on our tails. Looks to me like somebody around here doesn't want us to fly. There's a motive. We've been using the ships to help Kirk try to smash that border drug gang. I've flown Kirk plenty—long after you were in bed—you didn't know——"

Ray saw that the heavy webbing was adjusted to suit him.

"Let's skip it and test this ship," he said, waddling across the field, the seat pack slapping his thighs. Larry, a puzzled, alarmed look on his face, followed.

Then the telephone rang.

Larry turned, ran back into the office while Ray stopped, looked after him.

Larry emerged from the office a minute later.

"It's Kirk calling from Rio City—wants to talk to you—says it's important."

"What's it all about, Bud?" he asked. "What's that? . . . Sure, I can get right over. I'm just testing *Jonah*. . . . Yep. If she's O. K. . . . The .45? . . . It's here in my desk. . . . Sure, I'll bring it. . . . Well, *Jonah* will catch anything on wings. I'll be with you in a couple of hours. . . . Right."

Ray replaced the receiver. Larry stood at the door when he turned.

"What's the matter with Kirk?" he asked. "If that bunch of Mexican hop runners is getting tough, I'll——"

Ray brushed by him.

"Keep your shirt on, kid. He wants me to fly *Jonah* over there. Says we may need him."

Ray reached the ship, jockeyed himself onto the step, swung a leg into the cockpit.

"Where do I come in? It's always been three of us against——"

"If you can figure how to get three in this crate, you can come along."

He stepped on the starter. The motor coughed a couple of times, barked, caught.

"Pull the chocks!" he barked. Lifelessly, Larry jerked the wooden blocks from the front of the wheels. Ray jazzed the motor a couple of times, released the brakes, got the tail up and streaked across the field. He eased the thin-winged racer into the air, climbed slowly, circling the dusty plain. At two thousand he felt satisfied with normal performance. The ship was light on the stick, easy to control. No wing or tail heaviness. He leveled off, opened the motor, made an easy banking circle. The air-speed indicator crept up to 240. He grabbed off a few hundred more feet, decided to try a dive.

To feel her out, he gave her about forty-five degrees. The motor revved up, the air-speed indicator leaped to 300.

Then he felt a gentle tug, followed by a flutter. Experience told him there was trouble on the right wing. He went white for an instant as he looked, just in time to see the aileron whip backward, torn from the wing. He felt a second tug, this time to the left. The second aileron jerked into space.

The dive steepened. The motor whined.

He jerked back on the stick. The ship screamed out of the dive, leveled off and then started to roll onto its back. Ray knew that this meant curtains if he and the ship didn't part company. Feeling sick at the thought of losing what amounted to his only real asset and the product of months of toil, he drove back the glass and metal panel above his head, pulled himself onto the top of the seat, hoisted his feet, after him, looked down at the field, which seemed to leap, twist and whirl first above and then below him, and jumped. He counted a long five as the apparent terrestrial gyrations continued, anchored the rip-cord handle in his heavy fist and jerked. The 'chute cracked behind him. The earth took its accustomed place beneath him. He looked up at the shimmering silk above him and sighed with relief.

He choked as he saw the red hornet plow downward, heard the thudding crash, watched it leap into the air as dust billowed around it. A moment later his feet jarred on the clay and he took the shock with his knees flexed. The 'chute dragged him off balance, then collapsed. He was stepping out of the harness, cursing, when Larry streaked up to him in his small coupé.

"I saw——" Larry began. "Both ailerons——"

"Get me over to that ship!" Ray ordered, leaping onto the running board.

A brief examination of the tortured mass of wood, wires, cloth and metal told him all he wanted to know. A quick look at the aileron hinge bolts was enough. He saw where each had snapped. A small bit of rough metal at the edge of each bolt, raw and fresh, told the

story of the break in the air. But the balance of the transverse sections was darker, shinier and smooth.

"Sawed the bolts three-quarters through!" he growled. "Now I *know* there's something wrong in San Blas County—and there's going to be trouble. Larry, let's go. I'm going to get out the trainer and hop over to Rio City right now. Kirk's waiting—and there's going to be a fight!"

He and Larry got into the car.

"There's more than Mexicans mixed up in this, Ray—that's the work of a man who knows something about mechanics."

Larry headed for the parachute. Ray got out, rolled it, tumbled it into the baggage compartment in the rear of the coupé. They were streaking across the field when both spotted a series of dust clouds coming down the highway.

"The mob from Fort Hilton," Ray mumbled. "Darn 'em! Must've seen the ship go in—or heard the crash."

Cars were already turning into the parking space behind the hangar when they arrived. More than a score of friends and acquaintances wanted to know what had happened, clamored for details. Others were racing their cars across the field to the wreck at the far end. Through the question-hurling group pushed a raw-boned man, the high heels of his cowman's boots kicking up little puffs of dust. His wide-brimmed hat was on the back of his head, revealing his heavy features, his sun-reddened face. A .45 swung at his hip beneath his flapping coat. A cartridge belt restrained his paunch.

"What's goin' on here?" he demanded of Ray's back.

The tall aviator swung around, glared at him.

"*Mister Jonah* just lived up to its name, sheriff."

"You better gimme th' details. I'm empowered by law t' make a report on all plane accidents in San Blas County."

"Shed her ailerons." Ray's terse explanations revealed his dislike for the heavier man. "Two thousand feet in a dive. What's left's in that pile over yonder. Help yourself."

Ray had reasons for his attitude. Six months before, after he'd taught the burly official to fly, the latter had shown his gratitude by trying to muscle in an out-of-town flying service. Ray wasn't telling him what really happened. He didn't trust him.

"I knew this would happen. I——" snorted the sheriff, then checked himself. Ray's quick brain had registered. He hadn't forgotten what the fellow had tried to do. Only an official, air-tight contract for exclusive use of the field had saved him from ruinous competition.

"You cracked to the Department of Commerce!" Ray finished, sudden color leaping to his face, causing it to crimson beneath its tan. He stepped forward. Larry grabbed his arm.

"Steady, Ray——"

"Blakeslee, that's just about your speed," he snapped. "If you didn't represent the law around here, and if I didn't have more important business on hand, I'd smack that blabbing mouth of yours."

"That stuff you fly is junk—all of it," Blakeslee charged. The motley crowd began to circle, stiffen, ready for action. Blakeslee's hand fell over the butt of his .45. His eyelids narrowed to slits. Ray's fists clenched.

The flier's blood boiled and he saw the sheriff through a red haze. Larry's hand and fingers (Turn to page 90)

GULLIBLE'S TRAVELS—Major Hunt



HAVING recovered my landing gear, as you read in last month's episode, I once more settled down to charting my route across the country in a bee line for Chicago by way of Florida and Maine. I was kept busy running back and forth from the chart room to the cockpit alternately plotting my course and flying the ship.

In fact, I was so busy doing this that I failed to notice a dark cloud dead ahead of me from the depth of which angry flashes of lightening darted to the earth below. It was only after I had tripped over a huge bag containing five hundred pounds of sand, for lightening the ship in an emergency, and being knocked unconscious, that I saw it. Being unconscious, I went up on the top wing for a bit of fresh air to revive myself.

By this time I had flown directly into the heart of the thunderstorm and terrific gusts of rain and large bunches of lightening were all about me. I decided to rise above the storm and escape the flashes that might strike the little monoplane any moment.

I leaped back into the cockpit and shoved the stick

for a zoom, but nothing happened. In fact, I was sinking lower all the time. The rain beating down upon me was forcing the ship lower, while the crackling lightening was getting closer with every flash.

Quick as a flash my marvelous brain saw a solution to the entire situation. I would not only rise above the storm, but protect my ship from the lightening at the same time.

I seized the huge bag of sand or "lightening" for the ship and rushed back to the top of the fuselage. Here I inverted the bag and poured the entire contents over the ship, completely covering it from nose to tail. At once, having taken the sand ballast out of the fuselage, the ship began to rise.

As every bit of the plane had been struck by some of the lightening sand, I knew I was safe from the bursts of electricity about me, for every one knows that "Lightening never strikes twice in the same place." I soon rose above the storm and continued safely upon my flight, once more saved by quick thinking and plenty of grit—which every one should have in an emergency.

Prizes for Mistakes!

1—Each month Bill Barnes-AIR TRAILS will print one picture and story to test your knowledge of aviation conditions and aerodynamics.

2—PRIZES will be awarded for the eleven entries listing the highest number of errors and contradictions in the picture and the story of Gullible's Travels. The First Prize will be \$5.00. There will be 5 prizes of \$2.00 each; and 5 of \$1.00 each. In the case of ties, duplicate prizes will be awarded.

3—List the errors you find in the picture. Then list the errors of fact contained in the story. Then check the story and picture for contradictions. A

contradiction and an error on the same item may be counted separately.

4—This puzzle will serve as a game. It will be fun, but at the same time it will test the knowledge you have gained by reading Bill Barnes-AIR TRAILS.

5—All entries must be neatly written (or typed) on one side of the paper only, listing only one error on each line. Number your errors in the left-hand margin 1, 2, 3, etc.

6—Address your answer to the:
September Contest Editor
Bill Barnes-AIR TRAILS
79 Seventh Avenue, New York, N. Y.

7—The Editors will be the Judges and their judgment will be final.

8—No entries will be returned.

9—All entries must be postmarked not later than midnight, September 15, 1936.

10—Prize checks will be mailed not later than October 15, 1936.

11—Every one is eligible to compete except employees of Street & Smith Publications, Inc., and their families.

Aeronautical



Engineers check their calculations with wind-tunnel tests.

What's the work of the aeronautical engineer? Where is he trained? What education is needed? These frequent questions are answered in this interesting article.

by Daniel Jordan

DESIGNING and building airplanes is like a delicate surgical operation. It requires the skill of trained specialists. Engineers who build bridges, skyscrapers, tunnels, or highways cannot build airplanes. Specialists are needed, and this has resulted in a demand for airplane engineers.

This profession is the baby of the engineering family. It is only 15 years old, but in such a short time the work that has been done gives it a position of importance among the engineering branches. Young men are turning to aeronautical engineering just as their fathers turned to mechanical and automotive engineering.

Aeronautical engineering is divided into two main divisions—the technical, or design, branch; and the transport, or operations, branch. The technical men build airplanes, engines, and all the other flying equipment, and the transport men operate the equipment. This does not include actual piloting, but rather the laying out of airways, operating airports, and taking care of the infinite number of ground details necessary to airline operation.

The technical engineer creates the airplane, thoroughly tests it in every respect and turns it over to the operations engineer who puts it into service. Most airplanes are designed and built to definite specification. When airlines are renewing equipment they state definitely what sort of air-liner they'd like and the designer is required to fill these specifications. Since an airplane must support itself in the bookkeeper's accounts as well as in the air, it must be built so some one will buy it.

There are three factors of greatest concern to the buyer—speed, safety, and economy of operation. If the finished plane qualifies in these respects, the buyer usually cares very little about the design details. The designer is allowed a free rein as long as the finished plane delivers a good performance.

Before an airplane is built, the designer must decide

if it is to be low-wing or high-wing, biplane or monoplane, have retractable or permanent landing gear, and what airfoil section should be used, how much tail area is necessary for stability, and make scores of other important decisions. He will probably draw up specifications for as many as 25 possible designs, each one slightly different, having a different wing shape, a slightly longer fuselage, or some other trifling difference.

Like candidates for a football team, the poor designs are eliminated and the most promising are retained. Then small models are built and tested in wind tunnels. From the wind tunnel the engineer can learn what sort of performance the finished airplane will deliver. When a design is finally decided upon, thorough and exhaustive tunnel tests will be carried out. Changes in design that add miles per hour to the top speed are sometimes the result of careful tunnel testing.

After tests are completed, actual construction will begin. Tens of thousands of blueprints must be made. Each part of the airplane must be drawn up and calculations performed to insure ample strength in the structure. During construction there must be close coöperation between the engineer and the shop. By working together they can produce a plane that shows good performance at low operative and construction costs.

After the plane is built, it is turned over to the test pilot for actual flight-testing. It's a high spot in a designer's life when his brain-child leaves the ground for its first flight. Imagine the thrill of seeing a plane of your own design fly successfully after watching it grow from a small three-view sketch.

However, the designing of large airplanes is such a complex job that it usually requires the work of a group of engineers rather than the effort of one man working alone. Thus the present trend is for an engineer to specialize in one particular phase of design such as land-

Engineering

ing gears, tail surfaces, or propellers. Companies undertaking the design of a new plane call in these experts rather than rely solely on their own general engineering staff.

One outstanding example of specialization in aeronautical engineering is the work that Stephen Zand of the Sperry Gyroscope Company has done in soundproofing of airplanes. He's developed it to such an art that he's certain to be called in whenever an airplane needs soundproofing. Recently he returned from Europe where he directed the soundproofing of planes on many foreign lines.

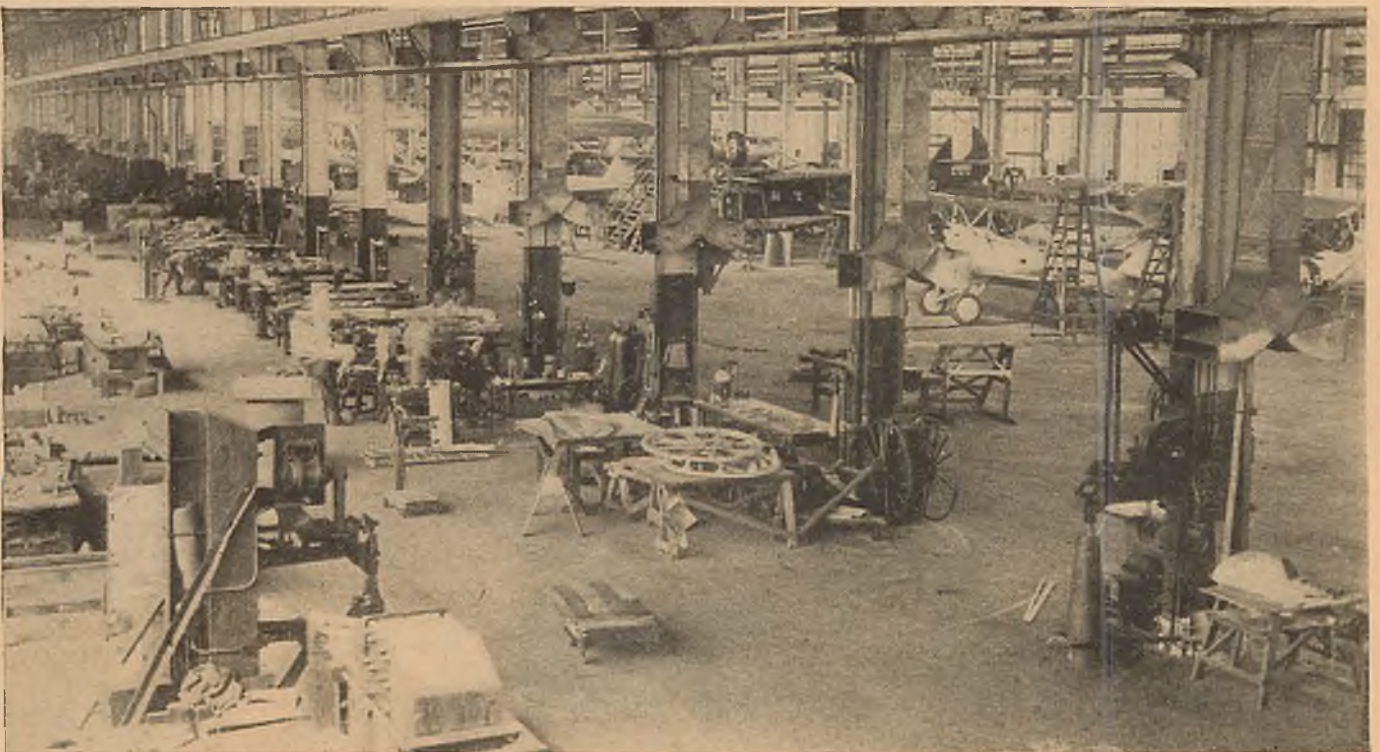
There are several fields of aviation that require highly specialized engineers. Aircraft engines, aviation fuel and oil developments, propellers, instruments, and aircraft radio are only a few of the fields. Experts in these branches of engineering are highly paid and there will be a constantly growing demand for their services. Sensitive altimeters that record accurately the distance above the ground must be developed. Likewise blind landings must be perfected before air lines can maintain 100 per cent schedules. These are two of the problems the engineer must solve as aviation progresses.

Engineers employed as plane designers, however, are faced with the prospect of unsteady employment. After a new airplane is designed and tested, it is turned over to the factory for production. The greater part of the engineering staff is no longer needed until another new airplane is designed. Thus the aeronautical engineer will find himself unemployed part of each year, unless he trains himself to fill some job other than designing. He

might take a job in the factory supervising actual production. Or if he's had business training, he can take a job in the office. If he's an experienced pilot, he could demonstrate airplanes to purchasers. The more training and experience he can get in branches other than designing, the easier it will be to stay on somebody's pay roll.

Four years at a first-rate engineering college which offers courses in aeronautics is necessary training for the engineer. The expenses for a year at college are about \$800. This can be reduced by part-time work and economical spending. There are approximately a dozen colleges in this country offering good aeronautics courses. The outstanding ones are New York University, Massachusetts Institute of Technology, University of Michigan, University of Minnesota, California Institute of Technology, and Georgia School of Technology. Bulletins describing courses and entrance requirements can be obtained from these colleges merely by asking for them.

There are other technical schools giving courses in aeronautical engineering that tie in actual shop work along with instruction, such as Curtiss-Wright Technical Institute, Boeing School of Aeronautics, Parks Air College, and several other schools which give excellent training in airplane construction and maintenance. A four-year course at a good engineering college, however, will probably take you farther. The apparently useless subjects which seem unrelated to aviation that the university courses include have the advantage of rounding out your education and making it more complete than a strictly technical training would be.



•Where the engineer's designs take shape—the aircraft factory. This one is the navy's own plant at Philadelphia.

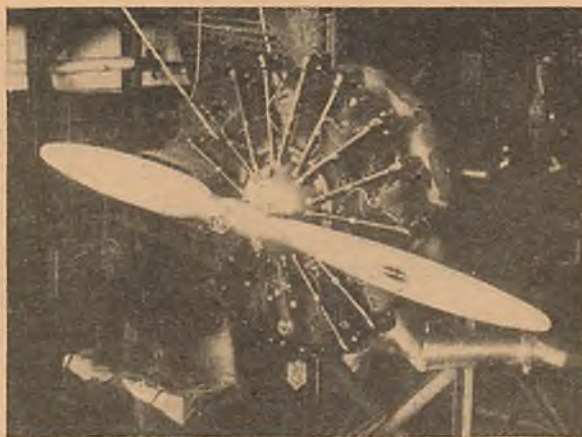
The entrance requirements to an engineering college are a high-school diploma and a good average grade in mathematics, physics, and chemistry. Other courses, such as mechanical drawing, shop work, or engine mechanics are not essential for entrance, but prove very helpful in college work.

It's usually disappointing for the high-school graduate who has decided to study aviation to learn that the aeronautical engineering course does not include any aviation subjects until the second half of the junior year. The first two years of the college course are spent in studying analytic geometry, advanced algebra, calculus, chemistry, mechanical drawing, and physics. In addition, aeronautics includes the same courses given to other engineers, such as electricity, strength of materials, and operation of machinery and engines.

In the senior year courses are entirely aeronautics. Airplane designing, aerodynamics, airplane engines, and the materials and methods of aircraft construction are studied. Finally, the student actually designs an airplane, carrying out the work in much the same manner as is done in the industry. These planes seldom develop past the drawing-board stage, but they do acquaint the student with the problems and technique of actual design.

The courses for the transport engineer are more varied. In addition to studying the theory and construction of airplanes, he takes up economics, accounting, aviation, and commercial law, and other subjects that will acquaint him with the business end of manufacturing and air-line operation.

In addition to the courses at a university, many en-



A mechanic's license is more important than a pilot's license to the would-be engineer.

gineering students attend flying schools during summer vacations. Here they learn engine maintenance and actual flying. This is a valuable supplement to the college work. However, flying experience is not required by the colleges. Contrary to most people's opinion, an aeronautical engineer is not a flying man and the engineering colleges do not teach flying. Ability to fly is helpful, but not necessary. What is often more important than a flying license is an engine mechanic's license. This is especially true for the transport

engineer, who usually begins work in the overhaul shops of the air line and in this way learns the organization of the company and acquaints himself with its methods of operation.

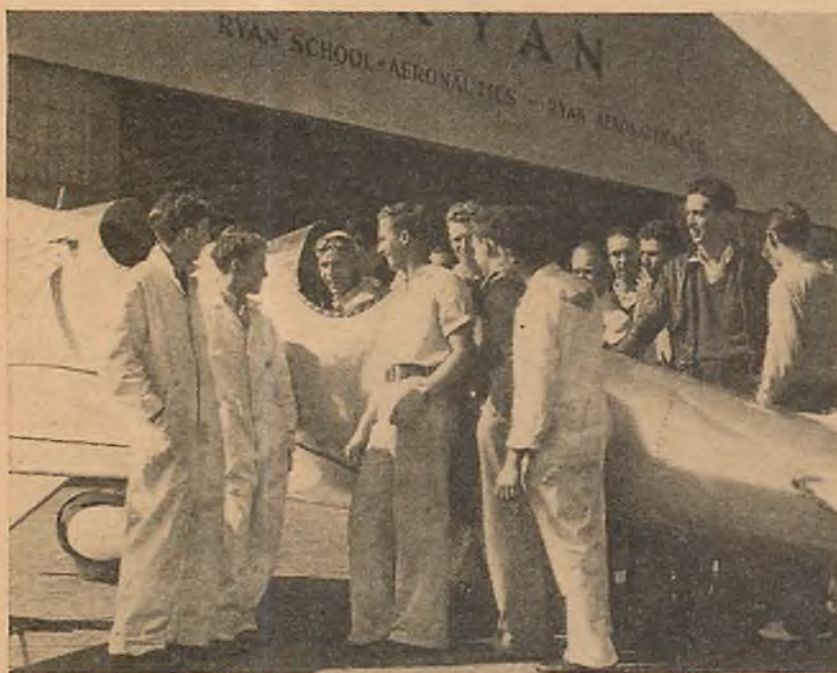
The problem usually confronting the high-school student is whether he is fitted for aeronautical engineering. Aptitude for mathematics is probably the greatest single requirement. If elementary algebra troubles you, and you don't enjoy working out difficult problems, it is more than likely you would fit better into some other branch of aviation.

Another qualification that's a necessary companion to mathematical ability is a real enthusiasm and desire to become an aeronautical engineer. (Enthusiasm that makes you look overhead at every passing airplane and talk about them every chance you get will carry you far.)

As soon as you've decided on aeronautics, begin your training. Read every available aviation textbook and magazine you can lay your hands on. Join the model club or glider club in high school. An example of the progress you can make is shown by the boys and girls of the Teaneck, New Jersey, high school who formed a flying club. Many of them have soloed in their two-place Aeronca. Any of these students who intend to continue their aviation studies will find themselves far ahead of the rank-and-file student.

Keeping abreast of the present-day developments in aviation will help give you a talking knowledge of aviation. (Many engineering students have a poor knowledge of airplanes.) They are not familiar with the different types and have little knowledge of the persons in the industry. Make sure you're well read and up to date on every aeronautical development.

Within the last year jobs have become more plentiful both in the technical and transport phases of aeronautical engineering. Many students have been placed directly from college into the airplane companies, which are busy filling orders for commercial and military ships. The whole industry is looking up and promises to be even better within a short time.



Peter Dana, holder of San Diego-Boston and Canada-Mexico lightplane records, greets fellow students of the Ryan flying and technical school.

What's Your Question?

By CLYDE PANGBORN

Wing Commander



As soon as possible after the questions are received, the Wing Commander of the Air Adventurers will answer on this page such questions as appear to be of general interest to our members.

Question: What is a Venturi tube? T. E., Milwaukee, Wis.

Answer: That short tube that you've seen, often fastened along the side of the plane's fuselage behind the engine, pinched near the middle and with flaring ends, is a Venturi tube. It's named after the Italian physicist who discovered its fluid principle more than a century ago. Air blows into it; squeezing through the narrow part, the air gains speed there, with a resulting proportionate decrease of sideward pressure. This lessened pressure produces a partial vacuum or suction in another long, smaller tube that runs from the cockpit instrument board and opens into the side of the narrow part.

The suction is used in several ways. Its usual uses are to help operate recording air-speed meters in conjunction with a Pitot tube (which produces pressure instead of suction), to activate air-distance meters, and to drive the gyroscopes for the turn and pitch indicators.

Question: How should I make an application to enter the Coast Guard Academy? What is a Coast Guard flier's salary? Does he get a pension? J. K., Atlanta, Ga.

Answer: For information on Coast Guard Academy applications, requirements, etc., write to Commander Pine, superintendent of U. S. Coast Guard Academy, New London, Conn. I suppose you know that they don't give aviation training there. After your four-year course, I believe you put in a request for flying duty and later take the navy flight course at Pensacola. I'm sorry that I haven't information at hand regarding salaries and pensions. You can probably get it from Coast Guard Headquarters, Treasury Dept., Washington, D. C.

I understand that there is right now, and will continue to be, plenty of opportunity for flying with the Coast Guard. You can't jump into it at once, of course, but the training you get and the service that you enter offer a fine career for a young man.

Question: Why is too much landing speed undesirable? R. O., Chicago Heights, Ill.

Answer: A fast landing covers a lot of ground. That's the chief reason why it's undesirable. The speed and resulting roll mean that you need a large field, and not all fields are large. Speed also exposes you to the hazards of any other vehicle, after you're on the ground.

Rough surface gets dangerous. You can't avoid obstacles or make turns as quickly.

Question: Which are the three or four best flying schools in the U. S.? What do you study in the ground school before you start flying lessons? What do you have to do to fly the mail after you get your license? E. A., Laconia, N. H.

Answer: I must decline an answer to the first question, because any choice that I might make among the many good flying schools would be unfair to the others. Write to the Bureau of Air Commerce, Washington, D. C., for their list of government-approved schools. You can't go wrong with any of those.

Ground subjects include theory of flight, airplane and engine construction, and air regulations. Thoroughness of such study and the addition of other subjects such as instruments, meteorology and aviation depend on what grade of license you're trying for.

To fly the mail after you've got the necessary transport license, you need one thing: a job. Your success in getting this will depend on available openings and on how good you are.

Question: Can the Macchi-Castoldi MC72 be useful for a round-the-world flight? Would it be possible for this plane to use a Diesel engine and go at the same speed? H. C. Z., Bayonne, N. J.

Answer: The Macchi-Castoldi world speed record plane would do well if it flew one or two hundred miles without having to land. A plane that would have to circle the earth in one-or-two-hundred-mile hops is not what I would call useful.

The Macchi's biggest drawback is its fuel consumption rate—to say nothing of the risky 130-mile landing speed. The 2,300-2,800 h.p. Fiat engine uses up gas about as fast as it can be poured from a can. Furthermore, the heat developed is so great that much of the plane's surface is covered with radiators for cooling the engine and the oil, and I doubt if the cooling system would stand prolonged use. The Macchi's records of 440 and 391 m.p.h., remember, were made over 1½ and 62 miles respectively—just short hops.

A Diesel engine probably could be substituted for the Fiat, if it could be kept down to the same weight, and could probably produce the same speed. It would have the advantage of using fuel more economically and thus extending the range.

HEADLINES

Publicity Irks Steve Harkins—Famous Pilot Worried Over Attention Given His Exploits

STEVE HARKINS threw the control wheel of the big twin-motored transport to the co-pilot and pressed the button on his radio transmitter.

"Trip Number Five—Trip Number Five," he chanted, "Calling Station WEZZ—WEZZ."

The voice of the "goat head" on the ground came back to him. "WEZZ—this is Station WEZZ. Calling Trip Number Five. Go ahead!"

"What is the surface wind? What is the surface wind?" Steve asked.

"WEZZ to Trip Number Five—surface wind ESE. Surface wind ESE ten-one zero. Go ahead! Go ahead! All clear! All clear!"

The hostess pressed a button in the tail of the ship and a small electric sign over a bulkhead read: "Passengers May Unloose Their Safety Belts."

She moved into the aisle and served the ten passengers with sandwiches wrapped in cellophane, hot bouillon, cake and fruit.

In a minute another sign appeared—"Smoking Now Permitted"—and she offered the passengers cigarettes.

Steve Harkins pushed his earphones back a trifle and spoke to co-pilot Johnson.

"Ride the beam, kid," he said. Johnson nodded his head and listened to the long interlocking A and N that told him he was on his true course.

Steve Harkins' bronzed face was a grim mask of disgust as he gazed ahead at the great bank of clouds forming. On top of everything else that had happened that day, he thought, we'll probably have no ceiling when we sit her down at Newark.

"How," he growled to himself, "did I know they didn't have any clothes on?"

He turned to Johnson after scrutinizing the clouds above and growled, "Get upstairs, redhead!"

A sea of mist closed in on the ship as she stuck her nose into the filmy clouds. The great wings stretched away into the fog with the wing tips hidden from sight. Steve pressed the button of his transmitter again and made contact with the "goat head" at WEZZ.

At four thousand feet the ship whipped out of the cold drab fog and stuck its nose into the glorious sunlight. Above, the sun glowed like a ball of fire in its bed of blue. Beneath, the clouds stretched interminably into spires and turrets that were white and pink and sometimes orchid.

An old lady in Seat Number Four on the port side stopped being sick and looked out the window. Steve grinned as he looked into the mirror that gave him a view of the passengers. He knew that if the old lady was like other old ladies he had flown, she was under the

impression that she had died and was entering the portals of heaven.

The "goat head" on WEZZ chanted his "Go ahead!" into Steve's ear. "Station WEZZ—WEZZ. Calling Trip Number Five. Calling Trip Number Five. All clear. All clear. Wind ESE—unlimited. Go ahead! Go ahead!"

"Goat head! Goat head!" Steve growled under his breath in answer.

He jabbed a forefinger toward the deck of the compartment and Johnson cut his throttles. The big ship plunged into the dripping dampness of the clouds again and the windowpanes became clouded with condensed moisture.

Far below, the long white terminal building burst into sight as they nosed through the clouds. On the roofs of the hangars were painted TRANSPORT, VISITING, PRIVATE, in large letters.

As a sign inside the cabin flashed, "Passengers Please Fasten Belts," Steve Harkins leaned toward "Red" Johnson and asked him the question he had asked himself only a few minutes before.

"How," he snarled, "did I know they didn't have any clothes on?"

Red Johnson looked at Steve out of the corners of his eyes and his mouth cracked open in a wide grin. He cut his gun and a whirring noise in the compartment reminded him to put down his landing wheels.

The big ship glided down into the wind until her wheels and tail skid floated above the ground as though they were on a traveling crane. They settled gently to skim lightly across the field.

"There wasn't any way you could tell they didn't have any clothes on," Red said above the roar of the motors as he taxied toward the ramp. "You better get ready to talk to the newspaper boys."

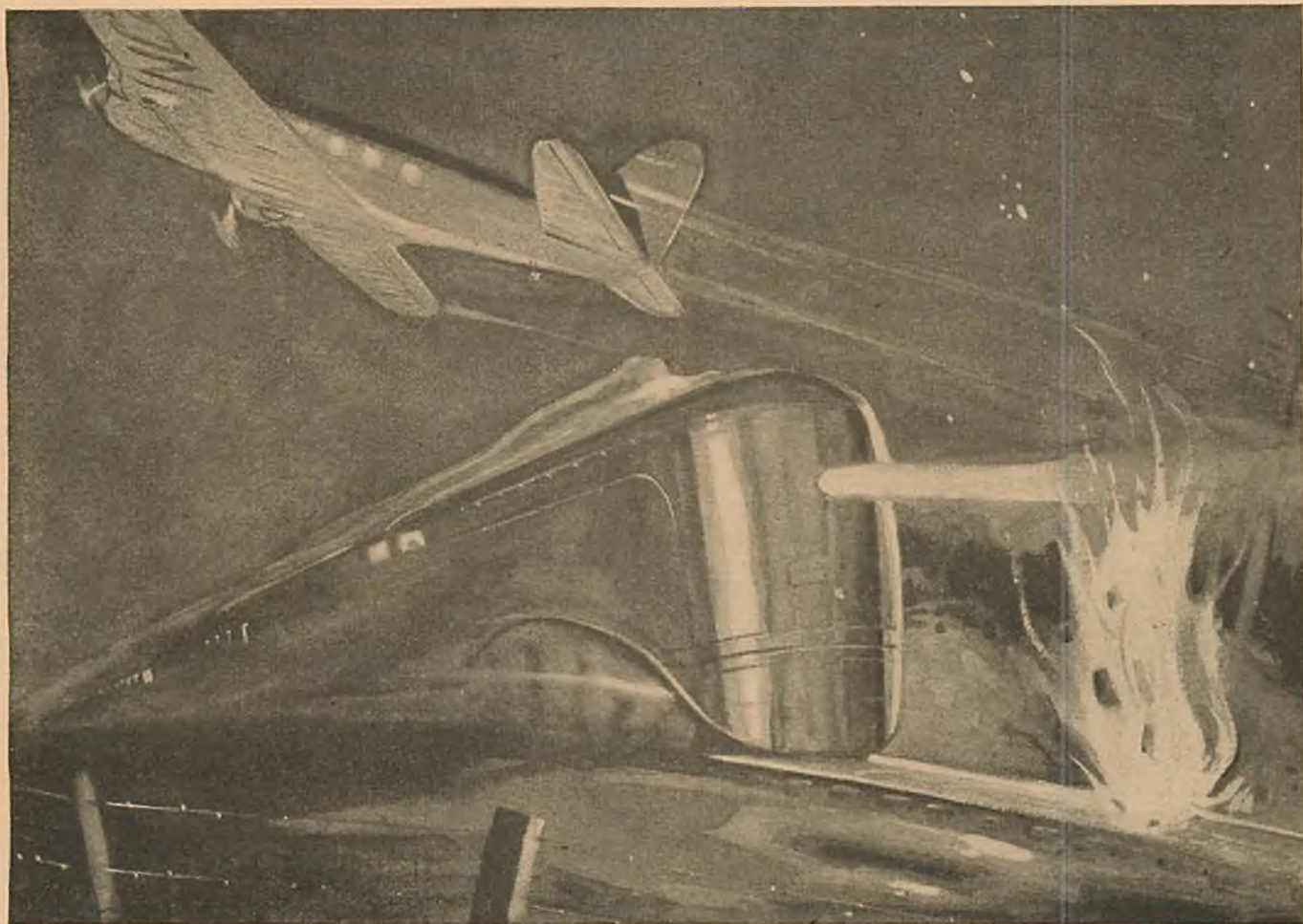
"Talk to 'em!" Steve shouted, his face red. "I'll reach down their throats and pull out their tonsils if they even speak to me!"

"You just have a knack of making the headlines," Red answered. "You're what they call good copy. You'd better make up your mind to make the best of it."

Countless thoughts rushed through Steve's mind. And they began with that day in May in 1929. The day he took his single-motored monoplane, *The Cranberry*, off Curtiss Field on Long Island and sat it down on Croydon Airport, a few

A short

Harold



The two flares landed directly on the tracks. Steve eased the nose of the big ship up.

miles south of London, England, some thirty hours later.

He was only twenty years old then, below voting age. The youngest pilot ever to fly the Atlantic in one hop. The attendant publicity had been too much for him. Reporters and photographers followed him everywhere. He couldn't escape them. And he began to loathe the sight of them.

He had refused all kinds of lucrative jobs. He refused to sign testimonials saying that Zebra cigarettes steadied his nerves and granulated sawdust was good for growing boys. He refused to take a position with a transport line as technical adviser.

He managed to drop out of sight for a year and do what he wanted to do most. He flew *The Cranberry* all over South and North America, landing in small out-of-the-way places where he wouldn't be recognized and asked to speak at Rotary dinners and be photographed.

Then an old pal, Bill Walters, gave him a chance as a co-pilot with the Amalgamated Air Lines. He started the job without any fanfare of publicity.

But not for long. The second month he was flying he managed to land a twin-motored passenger ship with only one motor. The other one came loose from its moorings while he was in flight. He managed to bank the big ship over and dump the loose motor into the Gulf of Mexico and land his passengers safely.

The papers picked it up.

Steve's name went on the front page again.

Another time he brought in his ship when one of his landing wheels had buckled. Not a passenger was scratched. Again the newspapermen were in his hair.

He threw up his job with Amalgamated and got one with Combined Airways. A month after he got the job he had to subdue an insane man with a revolver while he was flying his leg. He knocked the man out, quieted the passengers and landed his ship safely.

It was about this time that Steve first met Miss Martha Randall. He liked her freckles, he liked her smile. In fact, he liked everything about her. Within three weeks he told her so. She was more than a little glad to hear it. That made everything all right. But the newspapers—

Because Martha was the sole heir of Cyrus K. Randall, a conservative old New York banker, she was good copy for the newspapers. And Steve Harkins was excellent copy at any time. They immediately became plastered all over the rotogravures and the tabloids.

Steve wouldn't have minded so much having his picture taken with Martha. But Martha's family objected. They objected to any kind of publicity. They avoided it the way any sane person avoids the smallpox. Bad taste was the least objection they had to it.

At first they had thought that Steve Harkins was a very fine young man. But because of the publicity he had brought them they were beginning to doubt it. They had thought that Steve's spanning of the Atlantic in one hop was quite a feat. But it was too close to exhibitionism to have their full approval. Anything that included fanfare and trumpets they regarded with distaste.

story by

Montanye

When Martha announced her engagement to Steve and the newspapers rehashed all the things he had done in the air, they began to regard him with suspicion.

When Steve volunteered to make a dash above a dangerous stretch of Arctic waste to take supplies to some marooned explorers, it was too much for them. The newspapers and the radio reported his every move during those two tense days. The whole country held its breath until Steve came winging back out of the Arctic with his old confident grin on his face.

After Steve located the marooned explorers he led a flight of three planes in to rescue them. Again the world held its breath. When they came back without a mishap, Steve's name again adorned the front pages in large letters. And coupled with it now was the name of his fiancée, Martha Randall.

Mrs. Randall had a talk with Steve after that episode was over. She was a severe woman who held her head high and looked down her nose at him while she talked.

"It isn't that we object to the things you do, Stephen," she said. "They are all quite commendable. 'Thrilling' is the word Martha uses. But you see, for generations, our family have avoided anything that might be called sensational. We are a quiet, old, conservative family. When Mr. Randall and I were married we forbade the papers to publish a word about it."

"But Mrs. Randall," Steve said, hotly, "I can't help it if the papers pick this stuff up! I don't do it to get in the papers. I got so I hated the sight of a newspaper man after my hop to Croydon. But you can't get away from it in this day or age."

"You will have to get away from it, Stephen," Mrs.

Randall said, looking down her nose at a more acute angle, "or——"

"Or else," Steve muttered to himself. He wanted to tell Mrs. Randall that he was not thinking of marrying her, but her daughter. He wanted to tell her a lot of things, but he knew it would be just that much tougher for Martha if he did.

"I'll certainly try to keep out of the papers," he promised her. And he meant it.

That is why he was worried now.

"There they are," Red said, as he swung the big ship close to the landing ramp. Steve gazed out the window with wild eyes and groaned. At the end of the gayly colored canopy where the passengers and pilots would enter the terminal building were a dozen men with cameras. Steve knew, only too well, what that meant. They were waiting for him.

After the passengers had debarked Red Johnson grinned at him and said, "The papers picked it up all right. Better make up your mind to take it and like it."

"Get out of here, you grinning hyena," Steve said. "But say, wait a minute! Tell 'em I went up the other ramp. Maybe they'll fall for it. Then I'll stay here until they jackass the ship over into the hangar. O. K.?"

"O. K.," Red said. "I'll try it."

Steve watched anxiously while Red spoke to the newspapermen. Then heaved a sigh of relief as they faded away from the gateway.

Fifteen minutes later he was safely in the pilots' quarters looking at a newspaper Red Johnson had shoved into his hand. He didn't pay any attention to the kidding of the other pilots. He didn't even curse at them when they called him "Headline Harkins."

He opened up the newspaper and saw a picture of himself and then the headline. He gasped as he read:

HARKINS DISTURBS NUDE BATHERS

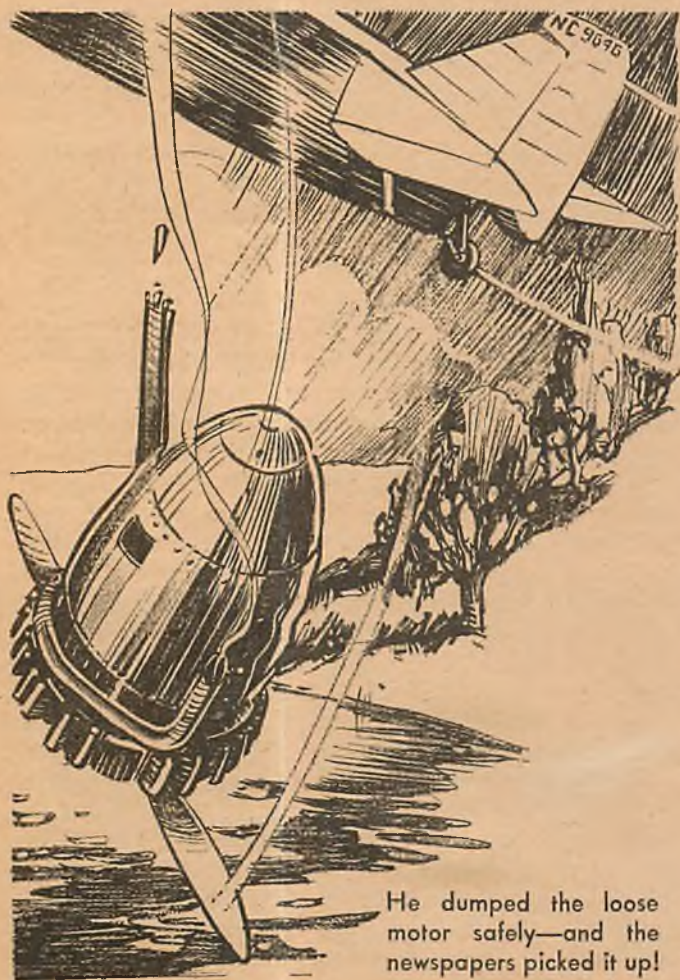
His eyes flew down the half column of print underneath. When he had finished he groaned and went into a telephone booth. He called a number and when he heard a voice on the wire he asked for Miss Randall. Perspiration ran down his face while he waited for her to come on the phone. He knew as soon as she spoke that she had seen the thing in the newspapers. He tried to be casual when he asked her if she had seen it. Her voice was cold when she told him she had seen it.

"It's terrible, Steve," she said. "Mother is having one of her spells about it. She tells me I've got to break our engagement. I'm pretending I will because I don't want her to get one of her heart attacks. You know the way she gets."

"I know," Steve said, grimly. "Now wait a minute. Let me explain how——"

"That won't do any good, Steve," Martha said. "You know mother doesn't pay any attention to explanations. I——"

"I want to explain to you!" Steve shouted. "I was trying to be a Boy Scout when it happened. Now listen! We were only a few miles east of Chicago, some suburb about fifty miles away. There is a private lake on one of the estates out there. I've flown over it fifty times and usually there has been some one bathing in it. Yesterday when we went over we were lower than usual. I saw a girl out in the middle of the lake in a canoe. I saw the canoe upset. Then, I saw (Turn to page 88)



AIR TRAILS GALLERY

A Picture Page of Modern Planes for the Collector



CESSNA C-34 ranks high on points of comfort and performance for private owners. Specifications and solid-model plans are given on page 65.



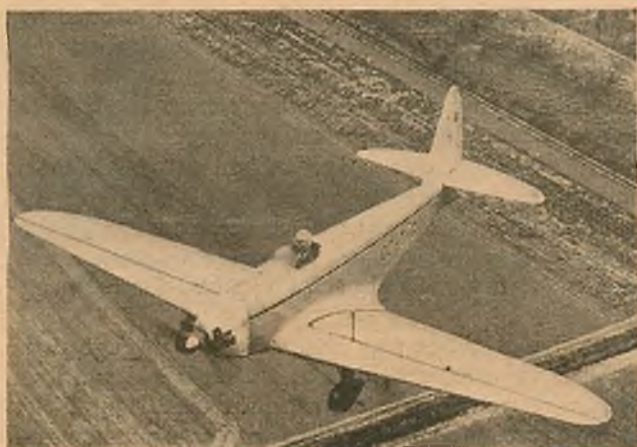
SEVERSKY newest model is this retractable-gear all-metal pursuit with twin-row P. & W. engine, controllable prop. The army has ordered 77.



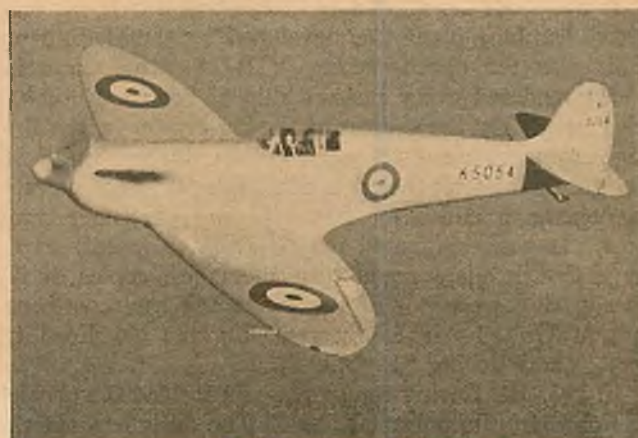
LOIRE 102 "Bretagne," France's bid for Atlantic mail, weighs 39,680 lbs., has four 720 h.p. Hispanos, 2,640-mile range, 192 top speed, 170 cruising.



DORNIER Do. 18 tandem-engined Atlantic boat "Aeolus" tested for catapulting from German vessel "Ostmark" on page 6, cruises 2,765 miles at 124.



TIPSY S, Belgian light plane of wood construction, weighs only 287 lbs. empty and cruises 70 m.p.h. on 1½ gals. of gas with 18 h.p. engine.

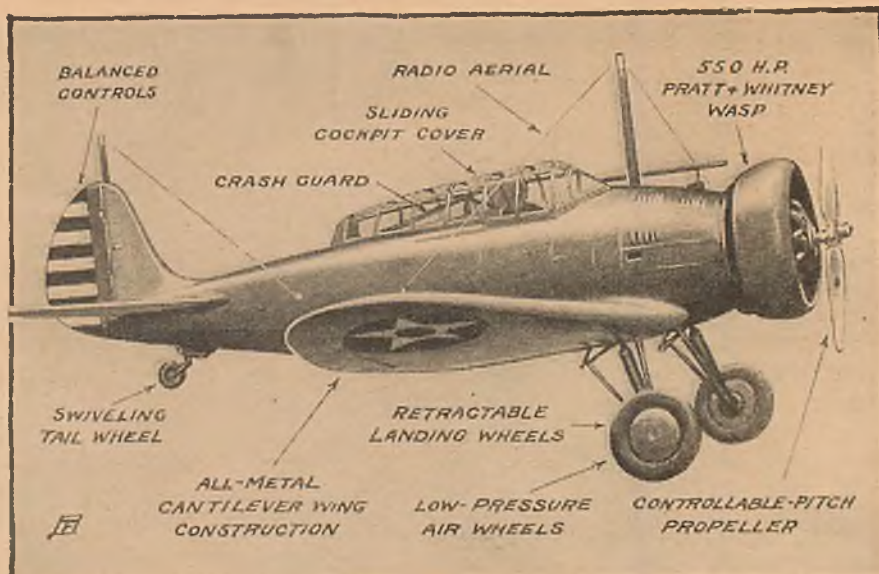


SUPERMARINE Spitfire I, latest British fighter, Rolls-Royce steam-cooled engine, is called "world's fastest military plane." Details are guarded.

The New Boeing Fighter

About the XP-29—the plane on the cover.

by Frank Tinsley



EVER since the close of the world war, the air corps of the United States Army has accepted the fact that a large percentage of Uncle Sam's fliers take to the air on wings built by Boeing.

This attitude is an eminently sensible one, for the military aircraft produced by the Seattle organization have long been rated by fighting pilots as among the fleetest and most efficient war planes in the world. Beginning back in 1920 with their first pursuit job, a 140 m. p. h. biplane, Boeing engineers have set a stiff pace for their competitors in the international race for better military aircraft.

Not content with excelling in the field of pursuit aviation, the Boeing company designed and built a series of fine passenger transport planes. Prominent among them was the old "Forty," as sturdy and dependable a ship as ever carried Uncle Sam's air mail. The "Eighty" was the largest of the fleet and a distinguished pioneer in the field of luxury air-liners. She was capable of carrying 18 passengers and a generous load of mail across the continent in tri-motored comfort at a speed of 138 m. p. h. The famous Monomail is already historic as the ship which inaugurated a revolution in American airplane design. She was the first of the current procession of all-metal, cantilever, low-wing monoplanes that have been copied all over the world.

It was from the Monomail design that a twin-motored, heavy bombing plane was developed for the U. S. army. This was the epoch-making Y1B-9A, whose amazing speed rendered every pursuit ship of her time obsolete. Encouraged by the success of the big egg-layer, the Boeing engineers went to work on an adaptation of the design. This took the form of a high-performance cabin monoplane intended for fast mail and passenger transport. It was designated the "247." As rapidly as the huge Seattle plant could turn them out, copies of this speedy ship were put in service on the transcontinental run of United Air Lines, replacing the old Ford trimotors and Boeing "Eighties."

In 1933 the Boeing company again tackled the problem of improving its pursuit planes. The designers felt that the biplane fighters of the "12" series had pretty nearly reached the limit of their development. The P-12E's top speed of 189 m. p. h. had been overshadowed by several foreign interceptor types, notably the British Hawker

Fury. The Boeing engineers decided on a radical forward step in pursuit design. They drafted plans for an all-metal monoplane fighter.

It was the now famous P-26A, a trim little single-seater which has become the pride of the U. S. army air corps. Her top speed of around 235 m. p. h. hopped old Uncle Sam back into the front ranks and her conformance with army strength requirements rated her as one of the huskiest single-seaters in the world. To her builder's credit it may be said that Boeing pioneered in the development for military use of the N. A. C. A. engine ring and streamlined wheel spats. The P-26A is a great little airplane and is justly considered to be the backbone of America's pursuit aviation to-day.

"That's all very well," I hear you say, "but how about to-morrow?" That, my air-minded readers, is a fair question, and here's a fair answer:

Realizing only too well that to-day's aerial backbone becomes to-morrow's weakest rib, the designing skill of the Boeing company has been turned loose on the job of improving its little brain child.

A few rough sketches on the leaves of a scratch-pad outlined some of the possible improvements in the design. Among them was the elimination of the external system of bracing wires by the use of a cantilever type of wing. Another was the elimination of the head resistance caused by the fixed under-carriage. This could be effected by the adoption of retractable landing gear. A glance at the two front-view drawings will quickly demonstrate what a decided lowering of parasitic drag must result from these two changes in the layout of the ship.

It took months of calculation, design, and wind-tunnel testing before the correct answers to the problems involved could be worked out. Then more months for the drafting of the final plans. At last construction was begun on the three sample ships required for the army tests.

These flying guinea pigs have been put through their paces, first by company pilots at Boeing Field and then by the army trouble-shooters assigned to Wright Field. They have passed the difficult tests with ease and now you will find them, garbed in the colors of a fighting squadron, diving across the cover of this issue of AIR TRAILS.

Very little may be divulged concerning the technical features of the XP-29. A careful study of the few pub-

lished photographs, however, reveals certain facts. It is established practice in practical aircraft design to incorporate in a new type many of the features of previous models that have proven their worth under the grueling test of service conditions. This is true to a large extent in the case of the new Boeing.

An examination of the side-view drawings plainly demonstrates that the XP-29 is really not much more than a very thoroughly "cleaned up" version of the present P-26A. The Boeing engineers have designed the new model around the same 550 h. p. Pratt & Whitney Wasp engine used in the former ship, and have retained the old fuselage pattern almost line for line. They have made slight changes in the shape of the entering edge of the vertical fin and have replaced the old streamlined tail-

wheel housing with an exposed, fully swivelling wheel in a castor-type mounting.

The draughty open cockpit which was such a characteristic feature

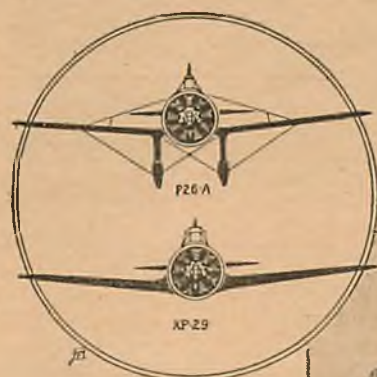
of the XP-29. She has been said to hit a high speed of over 300 m. p. h. This, however, seems to me to be an excessive claim when we consider that the P-26A with an identical motor, has an established top of not more than 235. While the increase in speed due to enclosing the cockpit plus elimination of bracing wires and landing gear is undoubtedly great, I question whether it would amount to 65 m. p. h.

Even at that, it seems pretty clear that the XP-29 will hit a fast enough pace to come close to the performance of the newly revealed low-wing interceptor-fighters of the British air force, and do it with much less horse power.

I'd give a lot to see one of the new big Twin Wasps stuck into the business end of the Boeing. This would bring it up to the probable power range of the Rolls-Royce Merlin with which these latest British planes are fitted. Then I, for one, would be willing to back the stubby little Yankee craft against John Bull's Hawker any day in the week—even if the Hawker has speedier-looking lines. After all, don't let's forget the old saying, "Handsome is as handsome does," for admitting, as I

freely do, that the Boeing is not quite as pretty a plane as the Hawker, the new XP-29 certainly looks like a "doer" to yours truly.

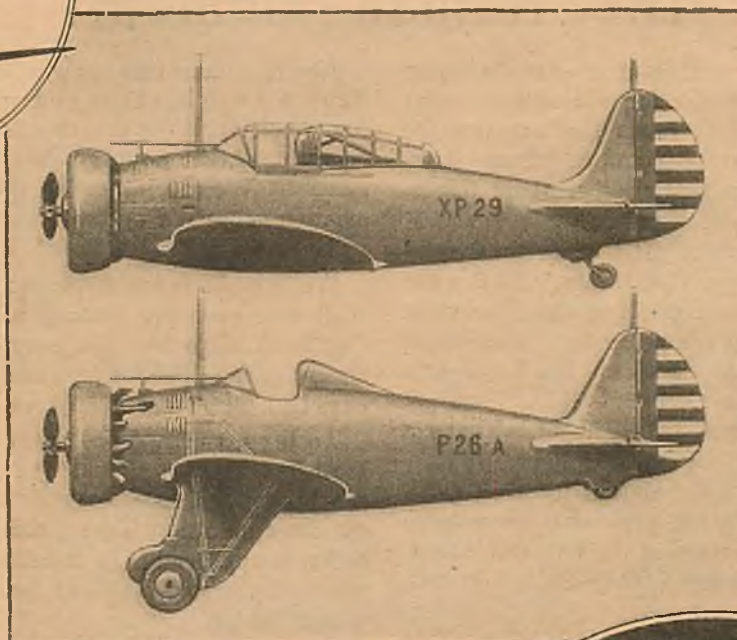
Boeing has once more put us in the military speed race. In the past, each new Boeing enabled American army and navy airmen to regain lost ground and forge ahead to a point where they could more than match the skill and fighting efficiency of any air corps on earth. Given proper power, the XP-29 will probably do that thing again.



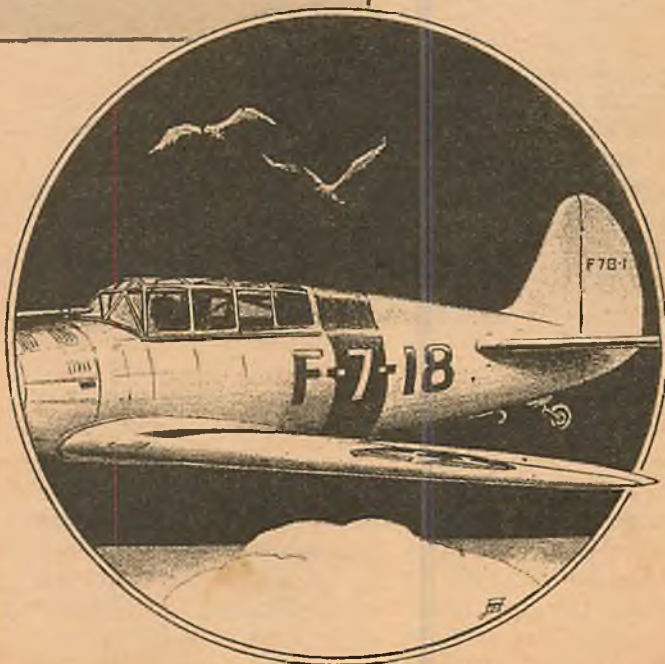
of the P-26A has been covered with an elaborate transparent enclosure of the sliding-hatch type. In the army model of the new bus (XP-29) this cover is cut off at a point midway between the cockpit and the fin, while the navy's version (F7B-1) is provided with a rear deck reaching to the rudder post. This is required on all navy fighter models in order to provide the necessary stowage space for the regulation emergency life-saving equipment. Directly behind the cockpits of both versions of the new ship we find the crash-guard head-rest of the P-26A present in skeleton form. The radio masts and equipment of both the old and the new types seem to be identical.

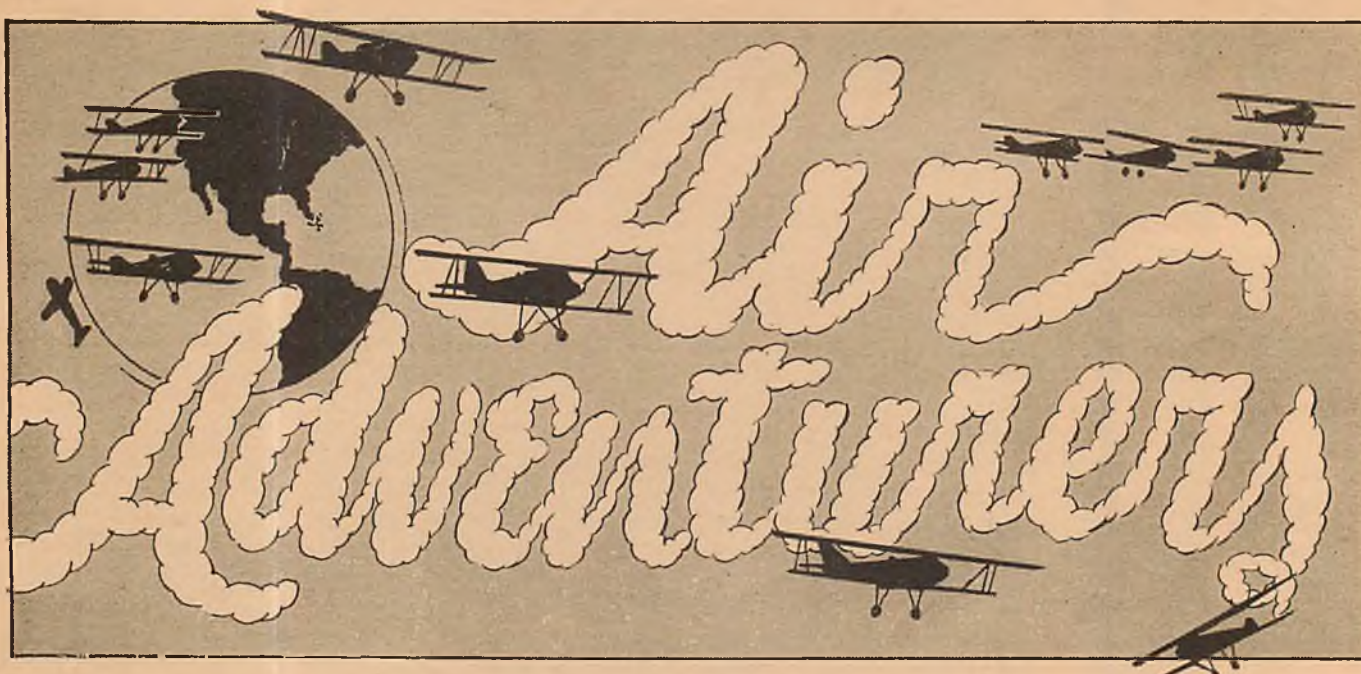
The main departure in the new Boeing design is the clean cantilever wing. This is placed a little lower on the fuselage than the externally braced wing of the preceding model. Due to the nature of its construction, it has a thicker section and a larger fillet. The general shape of the wing and the design and placement of the ailerons appears to be similar to those of the P-26A. In place of the familiar streamlined spats of that ship we find a simple and efficient retracting mechanism provided with long-stroke shock-absorber struts of Boeing design. The wheels are of the same type as those used on the older ship and are fitted with brakes and regulation low-pressure tires.

Nothing definite is divulged regarding the perform-



Differences and similarities between three related planes.





The Human Element

DOG days, these—the mid-summer sun booming down, the horizon shimmering through the heat waves, the air full of thermals that are fine for model-flying but not much for comfort. Lazy days, when it seems too much trouble to bother about things, and certainly not a time to be serious.

Let's be serious, nevertheless. It's never the wrong time to be serious about important things, and it's the right time to be serious about one important thing in particular, because that thing comes up for discussion in this issue of Bill Barnes-AIR TRAILS. It's here—let's face it, fellow Air Adventurers.

It's something that's seldom talked about. That's a good reason for bringing it out into the light.

No matter how great are the strides made in aeronautical science, no matter what perfection we achieve in mechanical devices, there remains the human element. Human beings are not machines. They make mistakes, they forget, their judgment wavers.

Lieutenant Wood discusses the human element in flying in a splendid article in this issue. As Air Adventurers, we should take more than ordinary interest in what he says. To us, above others, his message is important. For we are the pilots of to-morrow.

Like every other means of transportation, airplanes can be instruments of death. The distinctive characteristic of airplanes, however, is the grand feeling of freedom and power and exaltation which flying gives to the flier. That exhilaration can numb our judgment and lead us into a state of mind that scoffs at common sense. And that's when accidents occur. Government statistics show that private fliers crash mostly because of themselves rather than their machines. In other words, because of carelessness.

For this reason, the present campaign which the government is conducting for the development of "safe" planes is a good one. Although even the best "safe" planes can be crashed by a pilot who is careless or foolish enough, they will help to eliminate some of those casualties that will keep on as long as the human element in flying remains undisciplined.

Just how does this apply to us? In this way: we can throw the weight of our great organization into the fight for air safety. We can express our individual opinions against amateur stunting, low flying, "showing off" in general. We can insist that there's nothing wrong with aviation—that it's only a comparatively small group of stubbornly careless aviators who are wrong.

We can discipline ourselves for the future when we shall take over the controls along the world's airways. Our knowledge and our seven-point Creed—Self-Reliance, Courage, Initiative, Independence, Loyalty, Integrity, and Obedience—can serve to strengthen us.

To the new readers, I want to say that you can help most by marching shoulder to shoulder with us. If you can honestly pledge yourself to uphold our Creed, send me the application blank printed below. If your application is approved here at headquarters, you will receive your membership certificate and be entitled to wear our winged badge.

Forward, Air Adventurers!

Your Flight Commander,

Albert J. Carlsson

(MEMBERSHIP COUPON)

To the Flight Commander, Air Adventurers,
79-89 Seventh Avenue,
New York, N. Y.

I am interested in aviation and its future developments. To the best of my ability I pledge myself to support the principles and ideals of AIR ADVENTURERS and will do all in my power to further the advance of aviation.

Please enroll me as a member of AIR ADVENTURERS and send me my certificate and badge. I enclose ten cents to cover postage.

Name Age

Address

☐ Check here if interested in model building.

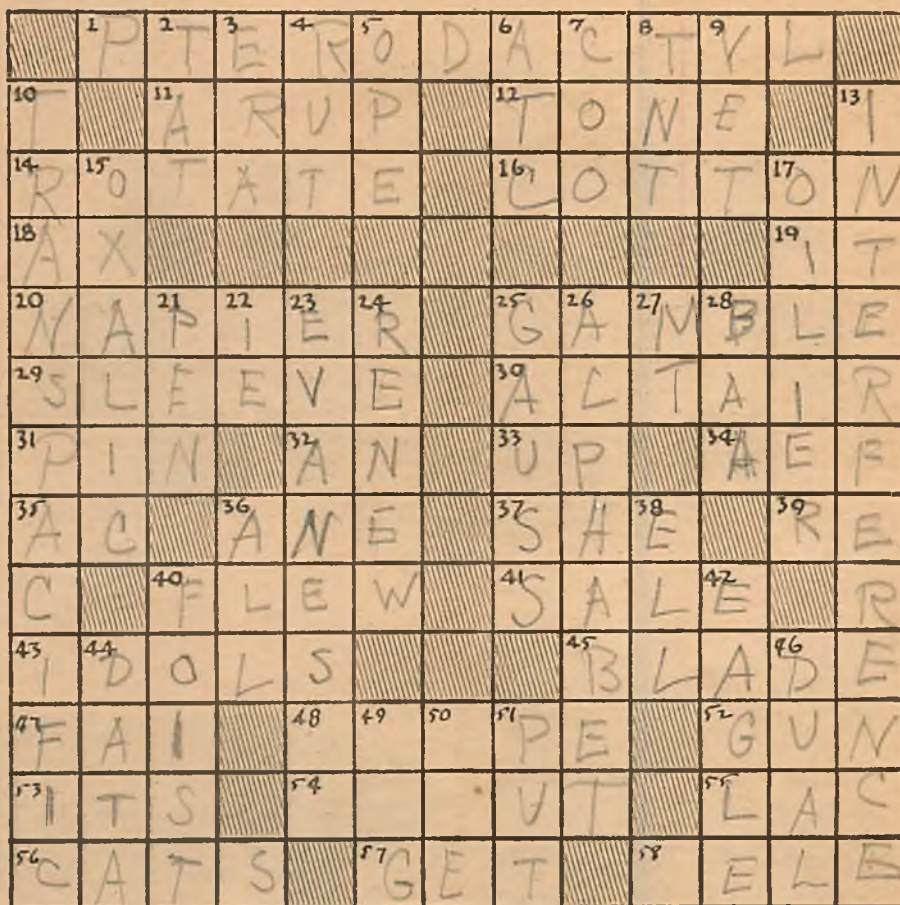
(This coupon may not be used after October 15, 1936.)

CROSS WINDS

*Can you answer
the aeronautical
definitions in
this puzzle?*

Across

- 1—Name of British tailless plane
11—Name of American tailless plane
12—Musical sound
14—What propellers do
16—Air slang for fog
18—Hewing tool
19—That thing
20—Make of British aero engines
25—To wager
29—Fabric tube on balloon for passage of gas
30—Type of Lockheed plane
31—Wire fastener
32—Article
33—Aloft
34—Initials of U. S. army in France
35—Short for kind of electric current
36—How a Scot might say "one"
37—Feminine pronoun
39—Concerning
40—Took flight
41—Commercial transaction
43—Religious images
45—Element of propeller
47—Initials of international aeronautic regulating group



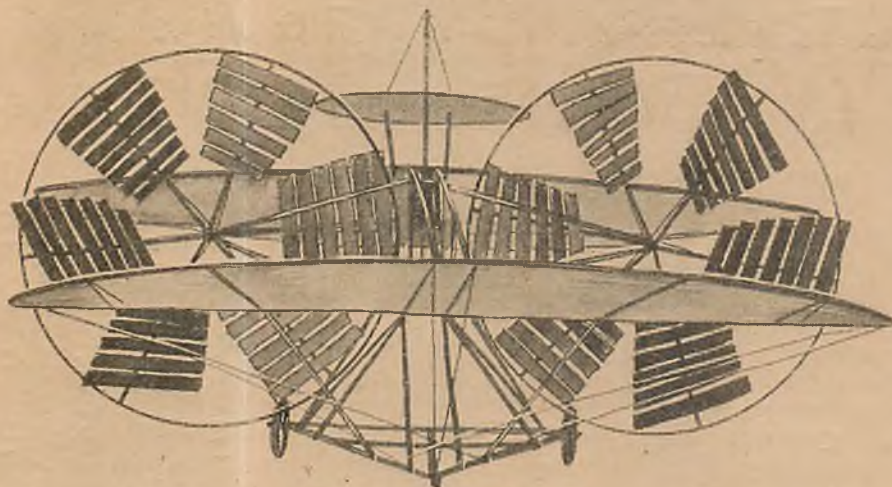
- 48—To end
52—Explosive weapon
53—Neuter possessive
54—Kind of heron
55—Resinous substance used in finishes
56—Feline animals
57—Acquire
58—Erase

Down

- 2—To make lace
3—Period of time
4—Groove
5—Poetic for open
6—Initials for what good planes get from the government
7—Pigeons' cry
8—Abbreviation for powerful explosive
9—Up to now

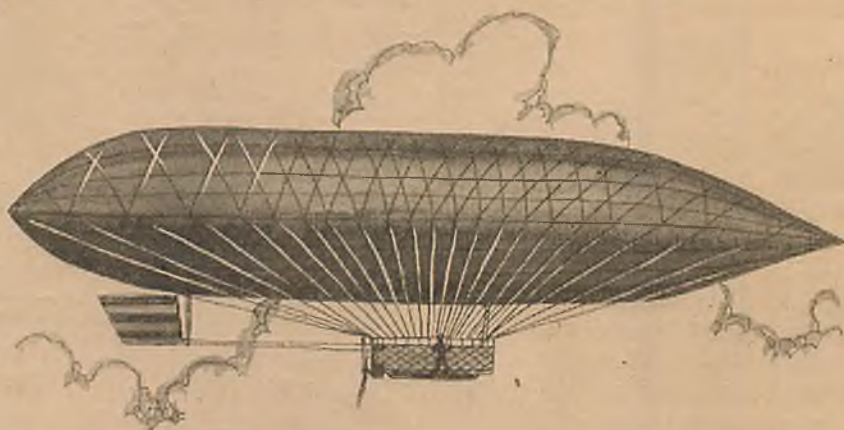
- 10—Route of "China Clipper"
13—Interruption of air flow, particularly between biplane wings
15—Poisonous acid
17—Greasier
21—Writing instrument
22—Abbreviation for "that is"
23—Vanish
24—Regenerate
25—Unit of electrical magnetism
26—Our letter system
27—Abbreviation for mountain
28—Sheep's utterance
36—Total
38—Measure of cloth
40—Interpolate
42—King of nature's fliers
44—Technical details
46—Type of controls for two
49—Source of life
50—Existing
51—Place in position

Pictorial History of Man in the Air



1875 THOMAS MOY
INVENTS AN "AERIAL
STEAMER" WHICH
ACTUALLY LIFTS ITS
WEIGHT WITH ITS
THREE HORSEPOWER
STEAM ENGINE !

1875 IN GERMANY,
PAUL HAENLEIN,
FLIES FIRST AIRSHIP
POWERED WITH AN
INTERNAL COMBUSTION
ENGINE RUN BY THE
COAL GAS FROM THE
BAG OF THE AIRSHIP



1876 W.J. LEWIS, OF NEW YORK,
PRESENTS A "FLYING CAR". IT
HAD FOUR HELICOPTER AIR-
SCREWS, TWIN PROPELLERS,
AND TWO WINGS AMIDSHIPS.



1875 SIVEL, TISSANDIER,
AND CROCE-SPINELLI
RISE 27,950 FEET. ONLY
TISSANDIER RETURNED ALIVE



The MODEL WORK- SHOP



Conducted by

Gordon S. Light

ARE you a "street-light flier"? Most builders are. The thrill of gliding a model, practicing take-offs and landings in the street under the light late at night holds some fatal attraction few of us can resist. Fatal, because the party seldom breaks up before the models do. But the thrill of seeing a model narrowly miss a telephone pole, barely flick the branches of a tree, or wobble along hard pavement in a safe landing is what makes street-light flying such good sport.

Recently I had a new thrill when a model enthusiast demonstrated the flat-gliding ability of his gas model. It dusted in for as sweet a landing as any street light was ever privileged to see. And all this took place at 1 o'clock in the morning. It must have been rather confusing to late home-comers to see an eight-foot plane landing on the city streets.

Rubber-powered models are the ones really at home under the street lights. The usual procedure is first to glide a model. Soon you become a little more daring; you put a few turns in the motor and try a power glide. The next step in the model's destruction is to try a take-off with the idea of catching it before it climbs too high. After each take-off you add a few more turns, and soon the model climbs so steeply that you can't catch it, and you stand helpless while it crashes into some obstacle. If you're lucky and the model lands unharmed, it is just a temporary delay before the model gets out of con-

trol again. This time you'll certainly not be so lucky, and you'll retire to the workshop to repair the damage.

Automobiles are the chief ogres. One night a small stick model made a longer flight than we expected. As it came in for a landing an automobile met it as it was several feet off the ground. We looked for the pieces as soon as the car passed, but couldn't find a trace. However, the driver stopped a block away and found the model underneath the car. It had been pinned to the radiator by the wind force and had fallen off when he stopped. The interesting point is that the model was undamaged and ready for more flying—and we flew it again.

Street-light flying does have its good points. The night air is usually calm, and you can make your minor adjustments without troublesome gusts and currents. Then, too, a few glides and rough landings will quickly bring out the weak spots in the model's construction; you can correct these and save yourself trouble when you really go to the flying field. The street-light airport is a sort of rough proving ground.

But these reasons are merely a half-hearted and semiscientific attempt to explain away the weaknesses that are part of the nature of practically every model builder. The desire to fly a model under all sorts of handicaps is something the best of us don't even try to resist. We're all just dyed-in-the-wool street-light fliers.

The Contest Calendar

MISSISSIPPI VALLEY Model Airplane Tournament, St. Louis, Mo., Aug. 21-22. Annual event, with attractive prizes, open to all in this section. Information, entry blanks from sponsor: Stix, Baer & Fuller Model Airplane Club, St. Louis, Mo.

LEBANON Third Annual Outdoor Meet, Lebanon, Pa., Aug. 29: rain date Sept. 7. Complete list of outdoor events, including gas-model contest. Trophies, airplane rides, medals, sweaters, other prizes totalling 35 awards. N.A.A. rules. Open to all modelers from Eastern States. Information: Contest Director, Exchange Club, Lebanon, Pa.

AMERICAN LEGION Fourth Annual National Model Airplane Contest, Indianapolis, Ind., Aug. 29-30. Full list of outdoor and indoor events. Rules, entry blanks: Director, Aeronautics Commission, 777 No. Meridian St., Indianapolis, Ind.

JUNIOR AVIATORS OF AMERICA National Junior Air Races, Buffalo, N. Y., (changed from Cleveland, O.) Aug. 30-Sept. 2. Sanctioned by N.A.A. Open to winners of Junior Aviator wing-city elimination contests sponsored by Scripps-Howard newspapers.


CANADIAN NATIONAL CONTEST, Toronto, Ont., Aug. 31-Sept. 2. Outdoor, indoor and gasoline events. United States modelers eligible. Information: Contest Director, Canadian National Exhibition, 705 Lumsden Building, Toronto, Ontario, Canada.

JUNIOR AVIATION LEAGUE of Boston, outdoor summer contest, Sept. 5. Open to J.A.L. members in Boston and vicinity. Information: Junior Aviation League headquarters, Jordan Marsh Co., Boston, Mass.


The Model Workshop asks the aid of readers and clubs in developing for their benefit a complete, detailed report of all model contests and exhibitions, large or small, everywhere. Listings should be received by The Contest Calendar, AIR TRAILS, 79 7th Ave., New York City, at least two months in advance; news of winners and results as soon as possible.

The Biggest


*More entrants, more models,
Detroit event that saw
depart and new*



Wakefield
victor—Al-
bert A. Judge
of England.



Chester Lanzo,
winner of open-
age fuselage.



It's Ray
Wriston of
Tulsa, let-
ting one
go.

THE WAKEFIELD TROPHY—the grand old mug of model building—is back in England. The team of six British builders sent over to Detroit had what it took to relieve America of the cup.


Winning it this year gives the British five victories out of nine contests. It means that next year American builders will invade England in a determined effort to even the count.

Just seven seconds' difference in a three-flight average decided the outcome. The British model of Albert A. Judge piled up a 4-minute 9-second average flight compared to 4 minutes 2 seconds by the entry of Ray Wriston of Tulsa, Okla.


America fared even worse in the Moffett International Contest. This four-year-old trophy goes to far-away New Zealand after a three-year-stay in this country. The winner, Vernon Gray, shipped his model by express to the contest, where it was flown by Bertram Pond, an old-time modeler from Peru, Ind. Pond turned in the amazing time of 44 minutes 14 seconds. No other entrant came near this time, and that means the Moffett will take a long jaunt to the other side of the world for a year's stay.

No one was sorry to see Vernon Gray win the trophy. He's been sending models to these contests for several years, and his victory is a pleasant climax. His ships have always flown well, even after their 10,000-mile trip, which is a tribute to his cleverness and ability.

Despite the loss of two international trophies, no one will deny that the 1936 contest was a wonderful event. There were more entrants and more models than at any previous contest. The event was truly an international



Stout Trophy
victor Ervin
Leschner.



A Canadian flier
tries for the Moffett.

National Meet

*long flights marked the 1936
two international trophies
champions arise.*

one. There were entrants from practically all parts of the United States, including Florida, California, Oklahoma, Texas, Nebraska, New York, and North Carolina. Michigan, Ohio, Indiana, Illinois, and other States near Detroit all sent big delegations. Canada was well represented by twenty-six builders from Toronto, Ontario, British Columbia and several other provinces. England sent a team of six. Andre Vinere, national champion of France, was present with his own models and those of five other French builders. Then, to really round out the international aspect, there were models shipped from New Zealand and Australia.

On Monday, June 29, models and model builders began to converge on Detroit. Bus lines, railroads, airlines, and automobiles all brought their share.

The large Book-Cadillac Hotel was soon turned into a model hangar. Each room became a miniature workshop with propeller carving, wing covering, and last-minute adjustments being carried on. By Monday noon so many model builders had registered for the contest that the late-comers were forced to take rooms at the Y. M. C. A.

Detroit was a fine host to the modelers. Headed by the *Detroit Times*, which sponsored the contest, all the industries and civic organizations did their bit to make the contest a success. General Motors, Ford Motor Company, Stinson Airplane Company, Berry Brothers, and A. C. Spark Plug Company are only a few of the organizations that provided a continuous round of sight-seeing and amusement. Trips around Detroit, visits to the General Motors Exhibit and the Ford Motor Company and Ford's Greenfield Village, free movies, swimming, river boat rides, visits to amusement parks, and

Bert Pond, who
flew for Vernon
Gray.



Frank Tlush, Texaco
gas model winner.

Bruce Luckett,
winner of the
Mulvihill.



Judges checking
John Ginnetti's
Wakefield entry.



General view of the
busy contest scene.



trips to Selfridge Field are samples of what the builders were doing when they weren't occupied with their models.

The contest lasted three days, from Tuesday to Thursday, June 30, July 1 and 2. The first day's flying included the Mulvihill stick model contest, the Stout cabin fuselage, and the elimination contests to pick the teams which would represent America in the finals of the Wakefield and the Moffett International.

Monday night there was a heavy rainstorm. It rained steadily all night and did not clear until Tuesday noon. Plans for the outdoor flying, however, went ahead. Before the afternoon was many hours old, the air currents were good enough to take a model away for a 48-minute flight. This was the best time recorded for the day, although there were many other really long flights. The light breeze blowing across Wayne County Airport made ideal flying conditions. The airport was smooth and grass-covered, and the surrounding country was free from trees and other obstructions, with numerous roads making ideal model-chasing terrain.

The officials and timers at the contest were flying officers from the U. S. army air corps division at Selfridge Field. They kept after the models with remark-

able enthusiasm, considering the hot sun. Every contestant was grateful to them for their work. The thrill of watching the models fly, however, offset the tedious task imposed on them.

The boys from Tulsa soon proved who was going to take the Mulvihill Trophy this year. With their fast-climbing tractors, they soon had turned in flights of 41m 41s, 23m, and 10m. Bruce Luckett, Jr., Alvie Dague, Jr., and Jesse L. Vint, all from Tulsa, won the first three places in the order named. The type of model they flew was a small stick tractor equipped with a landing gear. The model had the steepest climb of any on the field. During the 40 seconds of propeller duration, the model climbed until it was nearly a speck in the sky. And then the good glide of the model stretched this duration into a long flight.

The boys from Tulsa proved themselves true champions, winning high places in every contest. Their club consists of only thirty-odd members, yet the trophies and models they took home with them would do credit to an organization many times that size. They were as enthusiastic and as pleasant a group of modelers as we ever met, and it was fun to have them win.

Winners and Ranking Contestants at the National Meet

OUTDOORS

WAKEFIELD International Trophy, fuselage models (Average of three flights.)

1—Albert A. Judge	England	4m 09s
2—Ray Wriston	Tulsa, Okla.	4m 02s
3—Robert Copland	England	3m 23s
4—Richard Everett	Elm Grove, W. Va.	2m 59s
5—J. B. Allman	England	2m 43s
6—Gordon S. Light	Lebanon, Pa.	2m 40s
7—Dennis Fairlie	England	2m 05s
8—Andre Vincere	France	1m 49s
9—G. Dubois	France	1m 47s
10—John Ginnetti	Atlantic City, N. J.	1m 36s

MOFFETT International Trophy, fuselage models

1—Vernon Gray	Auckland, New Zealand	44m 14s
(Flown by Bertram Pond of Peru, Ind.)		
2—Robert Jeffrey	Findlay, O.	10m 58s
3—A. Worley	England	9m 45s
(Flown by Robert Copland.)		
4—Bruce Luckett, Jr.	Tulsa, Okla.	8m 40s
5—W. Worden	England	7m 40s
(Flown by Albert Judge.)		

STOUT Trophy, fuselage models

1—Ervin Leschner	Philadelphia, Pa.	36m 01s
2—Robert Copland	England	20m 07s

OPEN-CLASS (over 21) Fuselage Contest

1—Chester Lanzo	Cleveland, O.	48m 45s
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MULVIHILL Trophy, stick models

1—Bruce Luckett, Jr.	Tulsa, Okla.	41m 41s
2—Alvie Dague, Jr.	Tulsa, Okla.	23m 03s
3—Jesse L. Vint	Tulsa, Okla.	10m 00s

BALFOUR Trophy, stick models (open class)

1—Sheldon Bell	Toledo, O.	6m 30s
2—Richard Korda	Cleveland, O.	5m 32s

TEXACO Trophy, gas models

1—Francis J. Tlush	Lyndhurst, N. J.	45m 34s
2—Hewitt Phillips	Belmont, Mass.	30m 12s
3—Joseph H. Buehrle	Little Rock, Ark.	27m 50s
4—Michael Graneiri	Newark, N. J.	26m 40s

OPEN-CLASS Gas Model Contest

1—Mike Kostich	Akron, O.	36m 52s
2—Melvin Yates	Joliet, Ill.	27m 32s
3—Dick Bodle	Akron, O.	26m 27s
4—Raymond E. Podolsky	St. Louis, Mo.	24m 59s
5—Vernon Boehle	Indianapolis, Ind.	24m 39s

INDOORS

STOUT Trophy, stick models

1—John Haw	Philadelphia, Pa.	18m 10s
2—Bruno Marchi	Medford, Mass.	18m 01s
3—Wilbur Tyler	Boston, Mass.	17m 52.5s
4—John Ginnetti	Atlantic City, N. J.	17m 52s
5—Roderick Doyle	Alameda, Calif.	17m 20s

SPRINGFIELD Trophy, stick models (open class)

1—Carl Goldberg	Chicago, Ill.	19m 26s
2—Ray Wriston	Tulsa, Okla.	17m 56s
3—Joseph P. Matulis	Chicago, Ill.	17m 55s
4—Ira J. Fralick	Syracuse, N. Y.	16m 45s
5—Gordon Johnstone	Detroit, Mich.	16m 23s

BLOOMINGDALE Trophy, fuselage models

1—Alvie Dague, Jr.	Tulsa, Okla.	16m 17s
2—John Haw	Philadelphia, Pa.	14m 54s
3—Albert W. Courtial, Jr.	St. Louis, Mo.	14m 31.8s
4—John Ginnetti	Atlantic City, N. J.	14m 00s
5—William C. Gough	Chicago, Ill.	12m 55.8s

OPEN-CLASS Fuselage Contest

1—Joseph P. Matulis	Chicago, Ill.	11m 21.5s
2—Jesse Bieberman	Philadelphia, Pa.	10m 25s
3—Ted Becksted	Chicago, Ill.	9m 37.5s
4—Ira J. Fralick	Syracuse, N. Y.	8m 05s

NON-FLYING SCALE

MODEL AIRPLANE NEWS Trophy

1—Louis Casale	Syracuse, N. Y.	98 per cent
2—Bronik Soroka	Cleveland, O.	97.9 " "
3—Harry Walker	Cleveland, O.	96 " "
4—Carroll Krupp	Akron, O.	95.8 " "
5—Fred Mayfield	Akron, O.	95.4 " "

In the contest for the Stout Fuselage Trophy, Ervin Leschner of Philadelphia, Pa., turned in a winning time of 36m 1s. Robert Copland, of England, worried the American boys when his model was clocked at 20m 7s. However, his plane was lost, making additional flights impossible.

One incident proved how model flying has advanced in the last few years. We saw a builder bringing his model back after a flight. He was downcast, and from all appearances it seemed his model must have flown poorly. He tossed his plane to the ground and disgustedly told his companion that the confounded ship flew only 7 minutes! Seven minutes is still a good flight at any contest, yet his standard was so high he couldn't think of anything less than 30 or 40 minutes. Later in the day he did turn in a flight of this length, to place among the winners.

In the two other events run off on Tuesday—the elimination contests for the Moffett and the Wakefield International contests—teams of six U. S. entrants had to be selected to represent this country in the final events. Last year's winners automatically became members, so in reality only five boys were picked for each team. Of the five picked for the Wakefield, Ray Wriston of Tulsa turned in the best record with a three-flight average of 14m 54s. Ray's plane flew away after being timed at that figure, leaving him without a model to fly in the next day's finals. Needless to say, he didn't get any sleep Tuesday night, but he did have a new model ready for the event on Wednesday.

In the Moffett elimination, Donald Krause, of Erie, Pa., turned in the best flight of 16m 32s. The excellent flights of the United States ships during these eliminations seemed to indicate that both the Wakefield and the Moffett trophies would remain in this country for another year. But during the events of the next two days there were disappointments in store.

The second day of flying, July 1, was for the finals in the Wakefield event and the gasoline-powered contest for the Texaco Trophy. The weather was practically perfect. The Wakefield event was slow in getting started, due to confusion about interpretation of the English rules. After several Americans had made minor changes in their models to conform to the English viewpoint, there was further delay in measuring the wing area. Failure of the English judges to calculate the wing area properly caused more than one American entrant to think perhaps his model was not eligible. Finally these errors were discovered, and, after checking and re-checking the American entries, they were found to be well within the requirements.

When the American team seriously started their flights, they found that A. A. Judge of the British team had turned in a flight of about 8 minutes. American hopes sank pretty low until Ray Wriston revived them with a flight of 9 minutes, when the model disappeared. The model continued to fly for 20 minutes and was later recovered for another flight. American hopes soared even higher when we learned that Judge's model had been damaged when he was winding up for his second flight. Meanwhile, Wriston, who was leading the American team, had taken his three official flights. Two of his flights were poor, pulling his average down to 4m 2s. Judge had his model repaired by this time and was ready to fly. He needed a flight of about 1m 30s to beat Wriston. He won the Wakefield with a flight of not

Side Lights

A 300-pound lady spectator dashing madly out of the path of Ben Shereshaw's wild-flying gas model.

* * *

The Florida and California entrants forgetting models to argue about the climate and the size of grapefruit grown by their home states.

* * *

Francis Thush's gas model landing in the only tree in the middle of a large cemetery, after a flight that won the gas-model event.

* * *

A mother-and-son combination of model builders from St. Louis. Both good modelers and entered in several events.

* * *

A gas model that completed two full loops high in the sky and then resumed its flight in normal nonchalant fashion.

* * *

Two girl entrants—Barbara Maschin of Westfield, Mass., and Mary Roll of Detroit, Mich.—both old-timers. Good enough to give all of the boys a genuine worry.

* * *

Gas-model motors running in the hotel at 3 a. m. the morning before the contest. They annoyed the manager, who was interested in maintaining quiet for the other people who were trying to sleep.

* * *

Frank Ehling's gas model, which took off with bad adjustment. It climbed and then turned and dived viciously at Frank, its wing giving him a hard whack across the middle of his back.

* * *

Andre Vinere, the French entrant, whose well-built models and pleasant spirit attracted every one.

* * *

During the presentation of trophies, when Carl Goldberg was receiving the Springfield Trophy for the third time, some one called, "Why not let him keep it?" That's good advice, since Carl has been at the top in indoor flying for the last six years and allowing him to keep the trophy would save the needless trouble of the annual presentation.

* * *

A team of six should be sent to England to win back the Wakefield Trophy next year. Sending the builders is a quicker and surer method than shipping the models and having them flown by proxy.

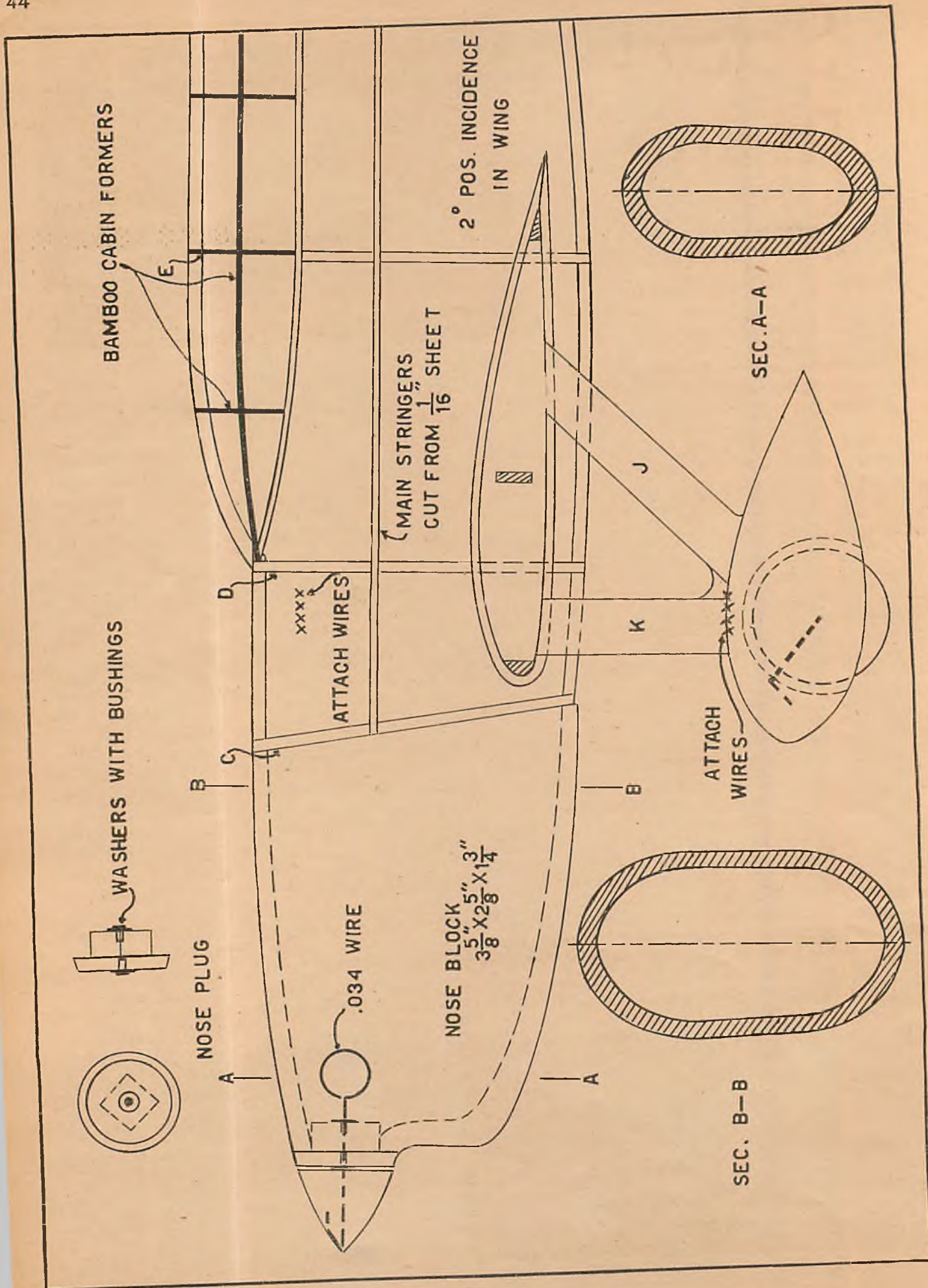
quite 2 minutes, beating Wriston's average by 7 seconds.

While the Wakefield contest was being decided at one end of the airport, the gas-model contest was under way at the other end. At all times throughout the day there was at least one gas model in the sky. At many times there were so many that it seemed a miniature pursuit squadron had come down from Selfridge Field.

The old days when it was considered a triumph to get the motor running and the model into air without a crash are gone forever. Most of this year's crop of gas models performed nicely, and the motors were reliable. When the models made rough landings it was usually a matter of only a few minutes before they were in the air again.

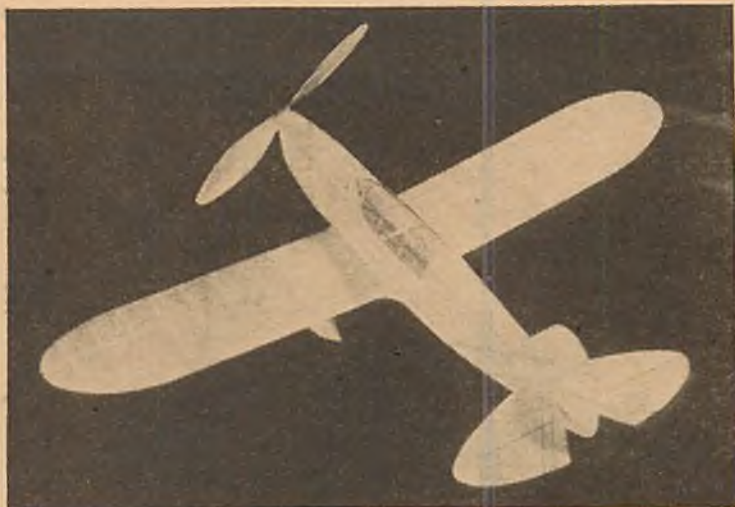
William Atwood from California was present with a whole fleet. One interesting little ship of his had a small single wheel mounted inside the front of the fuselage. He ran alongside to balance the wing on the take-off. It showed a remarkably steady glide because of the clean design.

Hewitt Phillips of Boston, Mass., had an interesting gas model. Single-motored, it was built along the same general lines as the Lockheed Electra, with twin fins mounted near the ends of the elevator. In addition it was equipped with a retractable landing gear which snapped up into the wing the instant the model left the ground. After a flight of 30m 12s, which was good enough to win second place, the model (Turn to page 94)



Sport Plane

by Louis Garami
and Henry Struck



THE new Brown B-3 custom-built sport plane is a remarkable performer. Its top speed of 205 m.p.h. and its landing speed of 40 m.p.h. make it one of the outstanding two-seaters of the present day. Its qualities probably come from the valuable experience gained by the Lawrence Brown Aircraft Company in the construction of the famous Brown light racing planes, among which are the well-known *Miss Los Angeles* and the *Miles & Atwood Special*. The new Menasco C-6S-4 250 h.p. Super-Buccaneer 6-cylinder supercharged engine pulls the B-3 through the air at 190 m.p.h. cruising speed, due to the plane's light construction and aerodynamically clean lines.

The full-size B-3 has a welded steel tubing fuselage, covered with fabric, and fabric-covered wing of solid wood spars and wooden ribs. Its span is 32 feet and length over-all 26 feet. Weight empty is 1,850 pounds and gross weight 2,650. Cruising range is 600 miles.

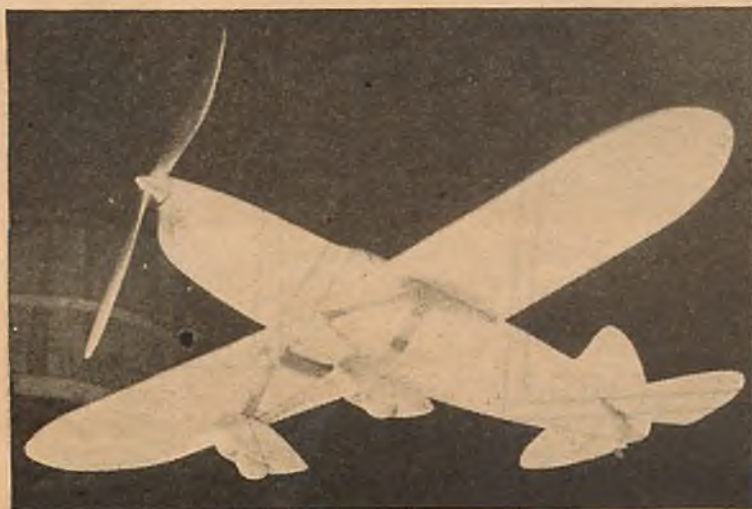
Our model is a remarkable flier and a good replica of the original.

FUSELAGE

Construction is simplified by employing four main stringers. Trace these from the top- and side-view plans and cut them from 1/16" hard balsa. Cut the formers

*A fast-flying model of
a speedy new two-seater.*

BROWN B-3



Looking down at a bottom view to get an upward slant!

from 1/8" soft sheet. Lay the stringers on the plans and mark the position of the formers on them. Cement bulkheads D, F, H in place. As soon as these are dry, the other bulkheads are placed in position. Bend the rear hook of .034 piano wire and cement it securely into former H.

The auxiliary stringers of hard 1/16" square balsa are glued in place to complete the contour of the fuselage. Bend the cabin formers from 1/32" square bamboo by holding it over the gas range for a few seconds. Glue them to the cabin stringers at the proper points.

Glue two soft blocks of balsa 7/8x5/8x35/8" lightly together and carve them to the outside shape of the nose block, shown in cross section and side outline on the front and side views, after which they may be split apart and hollowed out to the approximate thickness shown by the dotted lines on the plans. Cut a hole 3/8" square in the joined nose block and make a plug to fit. Washers with bushings inserted are used at front and rear of the nose plug to serve as bearings.

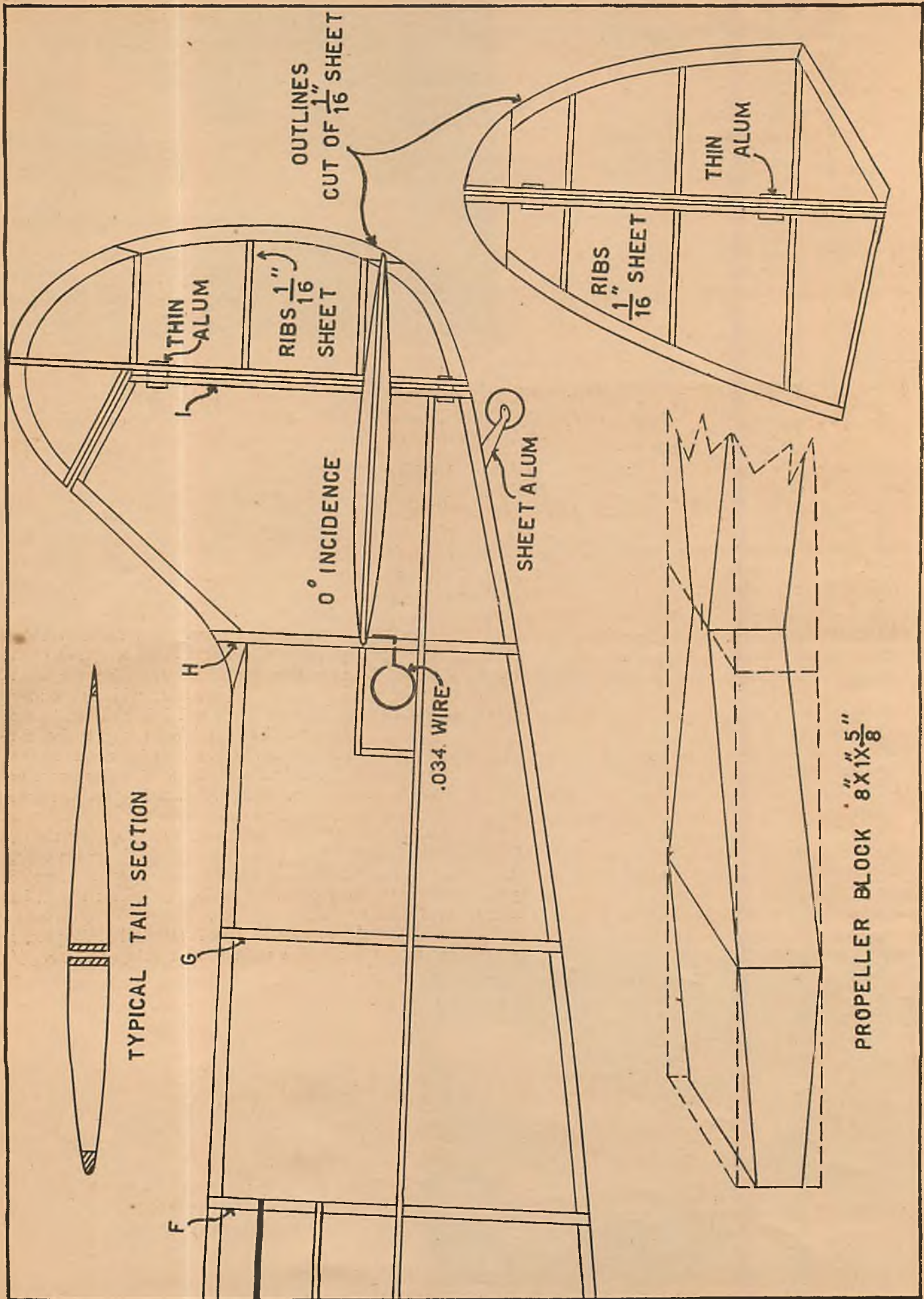
Cover the body with narrow strips of Japanese tissue, spray with water, and dope when dry. Cover the cabin with light celluloid. Because of the complex curve of the forward section of the cabin, four pieces should be used there to make a neat job.

The tail-wheel fork is attached at the proper point to the main bottom stringer and a 3/8" balsa wheel mounted in it.

TAIL GROUP

Make the tail surfaces as light as possible by using soft balsa throughout. Main spars are 1/16x1/4". Ribs are of the same material and are streamlined to the shape of the typical tail section. The outlines are cut of 1/16" sheet balsa and cemented in place. Hinge the surfaces together with soft sheet aluminum and cover with tissue.

Attach the stabilizer at zero degrees incidence to the stringer immediately above the main stringer. Spray and dope *lightly* to prevent the warping of the surfaces that might occur with a heavier application. Pin the parts to a flat surface while they are drying.



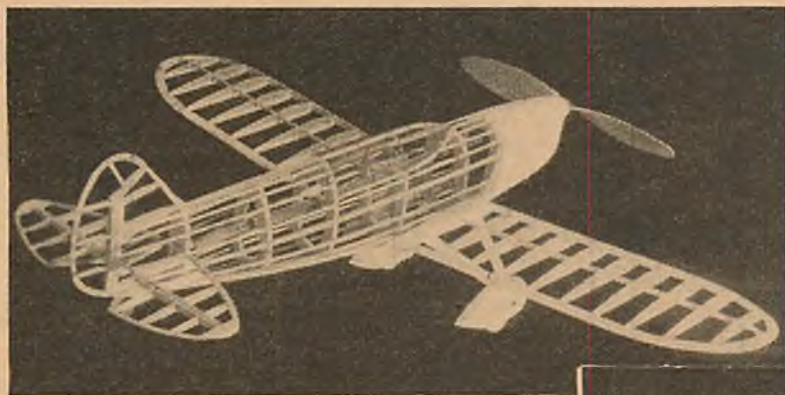
WING AND LANDING GEAR

The wing construction is light and strong. This is accomplished by using a deep spar. Cut all the ribs of 1/16" sheet, using the templates given. The spar is made of 1/8x5/16" medium balsa, tapering from the last No. 1 rib to 1/16" at the tip.

Shape the leading and trailing edges of medium balsa. Place the spar and edges upon the plan and mark the position of the ribs. Slide the ribs on the spar and attach the edges. Add the tip outline, cut from 1/16" sheet to complete the wing.

Ailerons and flaps are not necessary for a flying model. However, their location is shown on the plan for those who wish to add them for exhibition purposes. To cover the wing tip perfectly, use separate sections of tissue. The rest of the wing is covered in one piece.

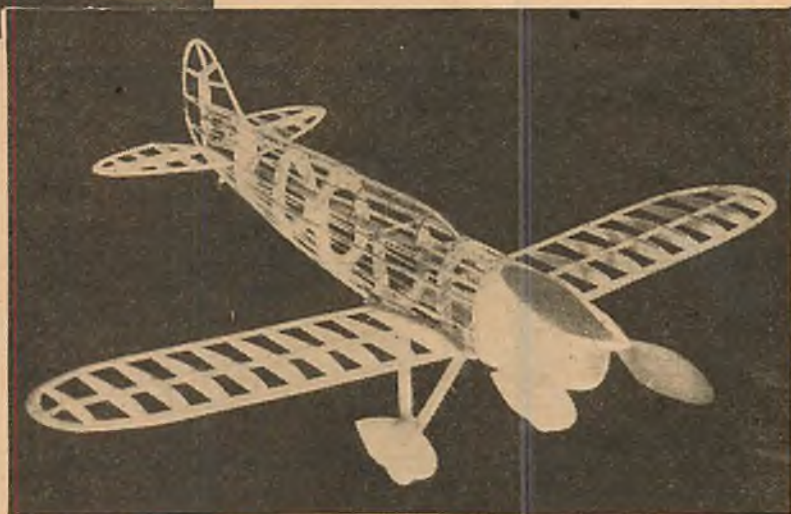
Shape the wing fillet from a soft balsa block 4 3/4 x 3/4 x 5/8". Cement the completed fillet to the wing.



These skeleton views are a guide to good workmanship.

Variations in the fuselage lines or fillet may necessitate individual fitting. Each wing tip is raised 3/4" to give proper dihedral.

The streamlined landing struts are made of 1/8x7/16" hard balsa. To make the pants, first cut out the center piece to accommodate the wheel. The wire shock absorber is glued in place before the sides are added. Carve and sandpaper to proper shape. Join the struts to form a V shape. The completed struts are attached to the fillet at the points indicated on the plans. Fasten the pants to the apex of the struts with plenty of cement.



PROPELLER AND MOTOR

Medium balsa 5/8x1x8" is used for the propeller block. Carve carefully and try to reproduce the shape of a standard metal prop. The photographs will serve as a guide. The spinner is 3/4" in diameter and made of hard balsa, with the rear cut out to fit the propeller.

The prop shaft is bent of .034 wire, passed through the nose plug, then the prop, and the end bent over and embedded in the spinner. Don't forget, however, to include two washers between the prop and plug. Six strands of 1/8" brown rubber provide ample power for this model.

FLYING

The model is a fast flier. For this reason a field of tall grass should be chosen when the first test is made. Because of the heavy nose and light tail surfaces, the center of gravity is in an excellent position and only minor adjustments may have to be made to get the model flying nicely. Use the movable tail surfaces for this purpose.

Glide the ship gently into the wind, making adjustments with the elevators until a flat glide is secured. Now put 50 turns in the motor and try a short test hop. Gradually increase the number of turns till the maximum of 250 is approached. With lubricated rubber and a winder, 500 turns may be safely stored and the flight duration consequently greatly increased.

Next Month—

The NEW Wakefield Winner!

Direct from the national meet at Detroit come complete plans and instructions for building the *leading model of the year*, presented by

GORDON S. LIGHT

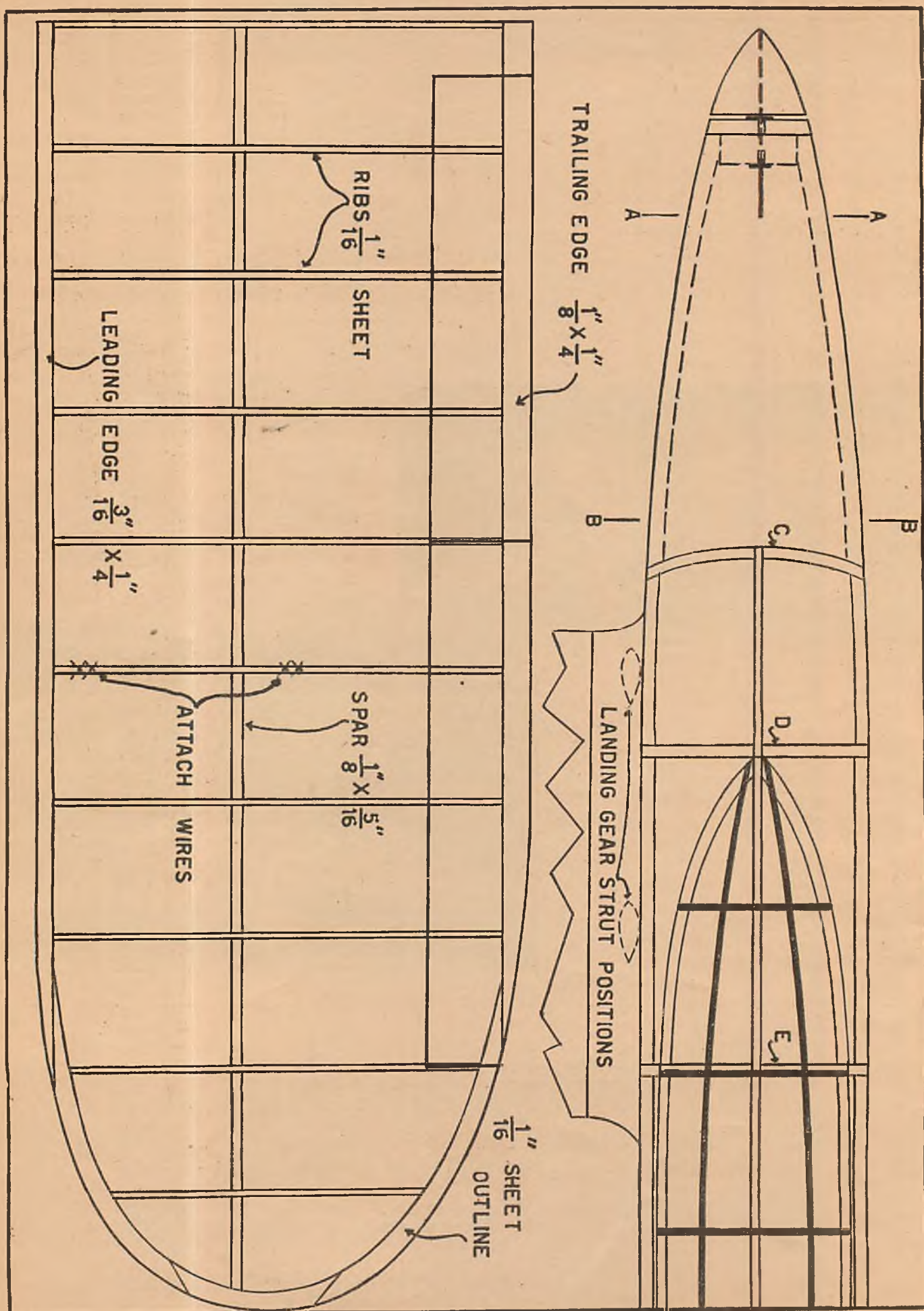
1935 winner

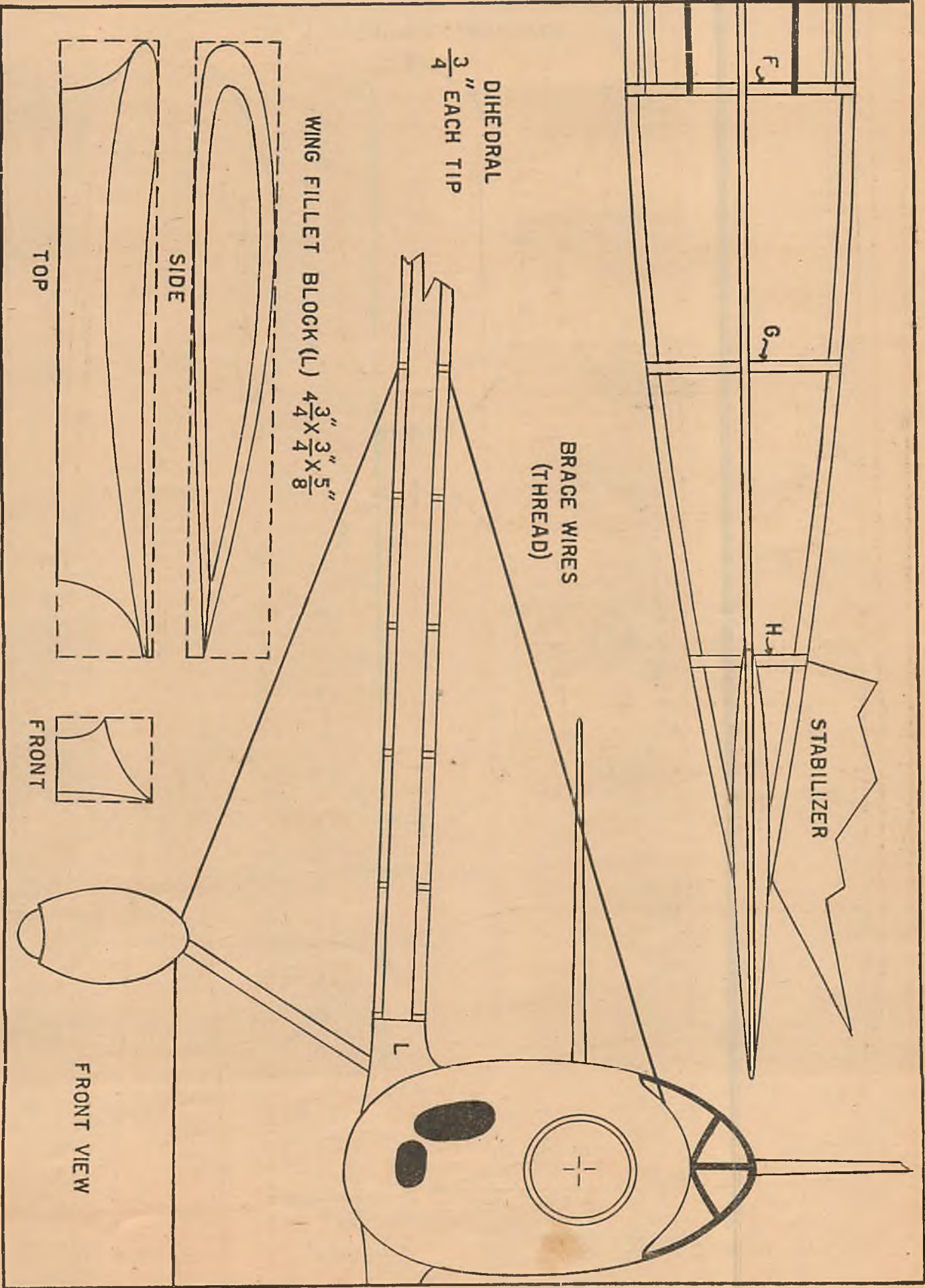
in
collaboration
with

A. A. JUDGE

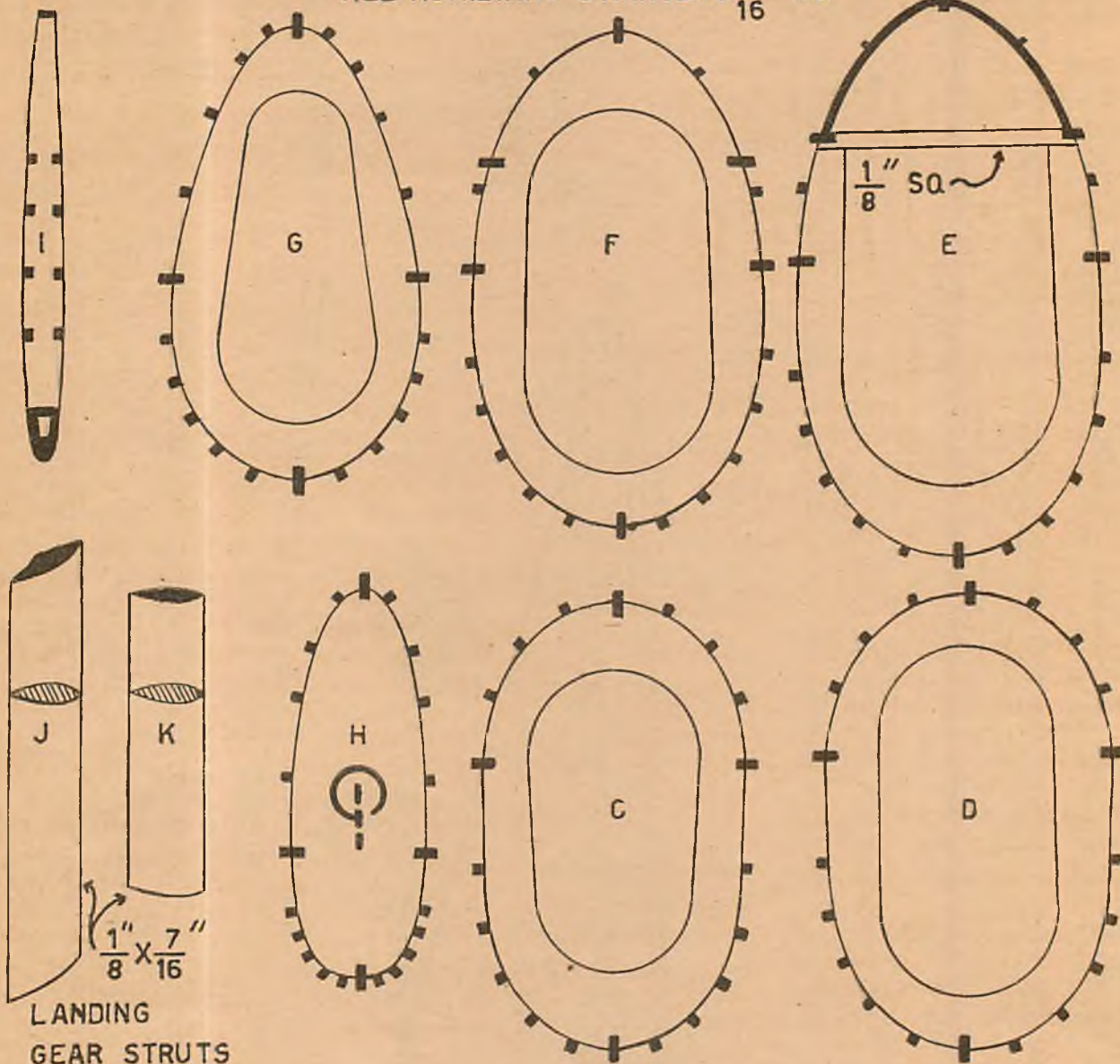
1936 winner

An exclusive Model Workshop feature in the October issue, on sale September 9th.





ALL AUXILIARY STRINGERS $\frac{1}{16}$ " SQ



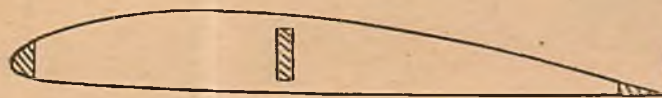
ALL FORMERS $\frac{1}{8}$ " SHEET



RIB 1, 16

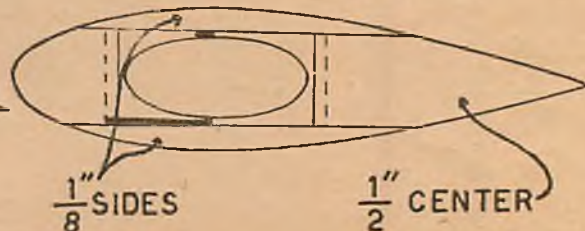
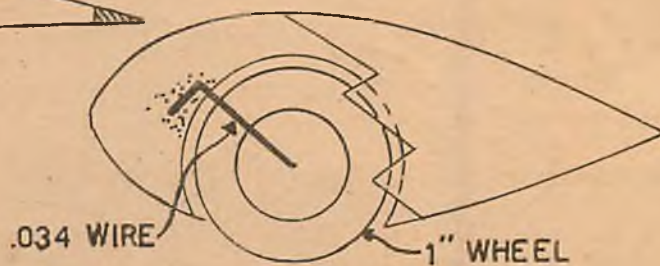


RIB 3, 2



RIB 2, 2

ALL RIBS $\frac{1}{16}$ " SHEET



The Discussion CORNER

The model art progresses through exchange of ideas. The Discussion Corner is a monthly sounding board for your opinions. This month readers discuss airfoil sections. For October we're publishing answers on demountable vs. fixed motors. Topics that will follow are listed below. Think about them, then write your opinion in 150 words or less and send it to The Discussion Corner. One dollar is paid for each answer printed.

I FIND that I have a hard time making a choice between three different airfoil sections. These three sections are the ever popular Clark Y, the C-72, and the U. S. A. 27. For an exact choice I think the C-72 airfoil would be my choice. The C-72 has three advantages; it can accommodate a large spar, it is a high lift airfoil, and it improves the glide.

Do bottom-cambered airfoils add to the model's flight? I'll say they do. Both the C-72 and the U. S. A. 27 airfoil have under-camber and are noted for high lift and gliding qualities. I have noted the difference in my models' flights when using the Clark Y and the C-72 airfoils. The Clark Y is a high-lift section itself, but for duration models I take the under-cambered airfoil every time.—HARRY FOSBURY, Portland, Ore.

For all-around flying I think the Clark Y airfoil is the best for models. I never cared for bottom-cambered airfoils because I never noticed any increase in lift or flying qualities. Also a bottom-cambered wing is more difficult to cover than a flat one.

I never had much success with airfoil sections whose maximum camber fell below 10 per cent of the chord. In other words, the thin sections with considerable under-camber and upturned trailing edges never produced the results of the airfoils with 11 to 14 per cent camber.—JOHN F. BYRNES, Chicago, Ill.

For low-speed rubber-powered models it doesn't seem to make much difference in my models what shape airfoil is used as long as it has no sharp bends and curves. The variation between the usual airfoils seems so slight that I do not believe it would change the flying characteristics of a rubber-powered model, the top speed of which probably does not exceed 10 miles an hour. For gas models with faster speeds the airfoil is more important. I find the C-72 section is a good one for a gas model.—WILLIAM FEINMAN, New York City.

On commercial models, I find that an airfoil such as a U. S. A. 27 and a flat or Clark Y stabilizer bring good results. Wings on commercial models should be of high aspect ratio; therefore on some models those air-

foils of under-camber design are recommended. For pushers, under-camber designs are good for elevators, such as R. A. F. 32 and Eiffel 400, and for the main wing a Clark Y is the best combination with an M section tailplane.

A bottom-cambered airfoil does add to duration by giving much lift at the start, taking the plane high so as to get more out of the glide. But it has its faults. It has a very steep glide. The only way this glide can be made flat is to use, on commercial models, a thin modified Clark Y on the stabilizer, and on pushers to use a Clark Y on the main wing and an M section on the tailplane.—JACOB KOSOFSKY, Philadelphia, P. M. A. A. junior pusher record-holder.

This Month's Topic

What airfoil section do you find most successful for models? Do bottom-cambered airfoils add to the model's flight?

I don't like airfoils with negative bottom camber such as the M-6 airfoil. I have tried this airfoil repeatedly thinking its stable characteristics would be good for the model. In every case I found that while stability was improved a little, the lift of the wing fell off so

as to make the model practically unflyable. I tested it at all flying angles. When replaced with a wing of the same area having an airfoil similar to the Clark Y, the model proved quite an efficient flier with the same power. I have found also that a high-lift airfoil flown at low angles of incidence is better than a low-lift airfoil flown at higher angles.—MILTON CROSS, Glendale, Calif.

COMING UP are these topics:

For November—*What step in building a flying model gives you the most trouble? What is your chief difficulty in getting a good flight? Have you any suggestions for overcoming these obstacles?* Answers must reach us by September 1st.

For December—*What weight rules would you like to see adopted for contests? Should the best flight or average of three flights be taken? Would you like to see an organized discussion on modeling as one of the contest activities instead of confining the program to competitive flying?* Answers must reach us by October 1st.

Keep your answers within 150 words. Every modeler's opinion is welcome. One dollar will be paid for each answer printed.

Lazy Taperwing

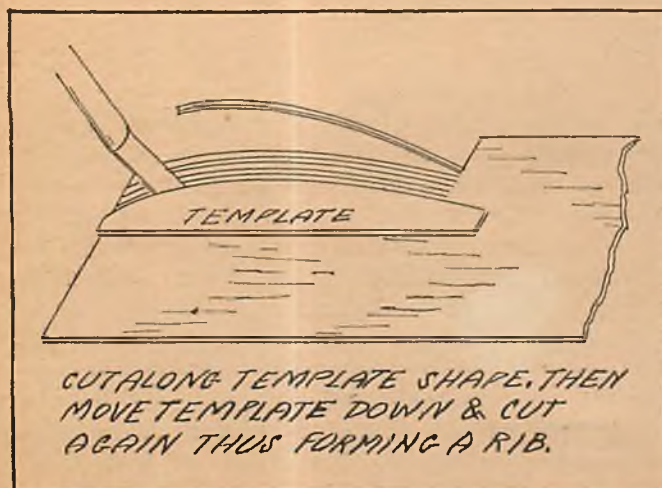
Here's a low-flying indoor stick model with plenty of lasting quality that's handy for beginner and expert alike.

THIS "lazy taperwing," capable of turning out flights of 15 minutes or more in the hands of the more experienced builders, is also simple enough for the beginner to construct and fly.

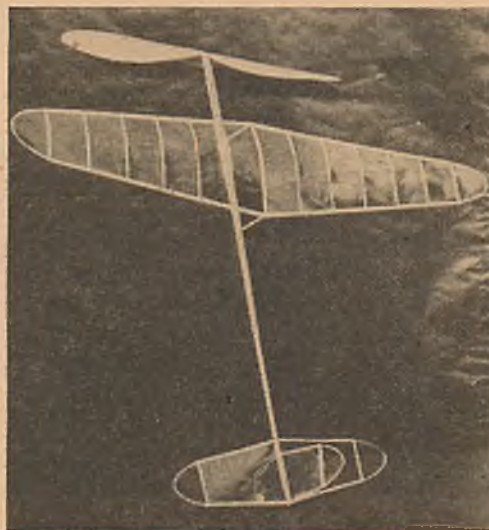
Inherently a low flier, this model seldom reaches a height greater than 40 feet on a 10-minute flight. This is one thing you builders who are handicapped with low ceilings will appreciate. Another point is the fact that this ship requires very little adjustment to put it into flying shape. The original ship flew almost 8 minutes on its second flight. As is characteristic of indoor models, the cost of materials is small; about 40 cents will cover every detail and leave enough material unused to build two or three more wings.

WING CONSTRUCTION

The first thing to be done is to draw the wing on cardboard or paper in full size. The spars are sliced $\frac{3}{32}$ " wide from a sheet of $\frac{1}{16}$ " balsa of 4.5 to 5 pounds per cubic foot stock. A template of the ribs can be made from cardboard or sheet aluminum. Cut fourteen ribs $\frac{1}{32}$ " deep from $\frac{1}{32}$ " sheet balsa. The diagram shows clearly how they are cut. Pin the spars to the drawing and cement the two center ribs in place. The other ribs are fitted into place by cutting off equal lengths from the leading and trailing edges of the oversized ribs until they will fit between the spars.



by Lawrence N. Smithline



CLASS B TRACTOR

Then cement them into position. Make a cardboard template of the tip shape, bend two pieces of $\frac{1}{32}$ " square balsa around it, let it dry and attach the tips with cement. The wire clips are bent as shown in the diagram and cemented to the balsa stilts. These stilts are cemented in place after the wing has been covered and assembled. The wing is finished now except for covering.

TAIL

The elevator and rudder are made in the same fashion as the wing. Draw them full size and pin the $\frac{1}{32}$ " spars on the plan. Put in the ribs, make a template of the tips and finish as has been explained above.

MOTOR STICK AND BOOM

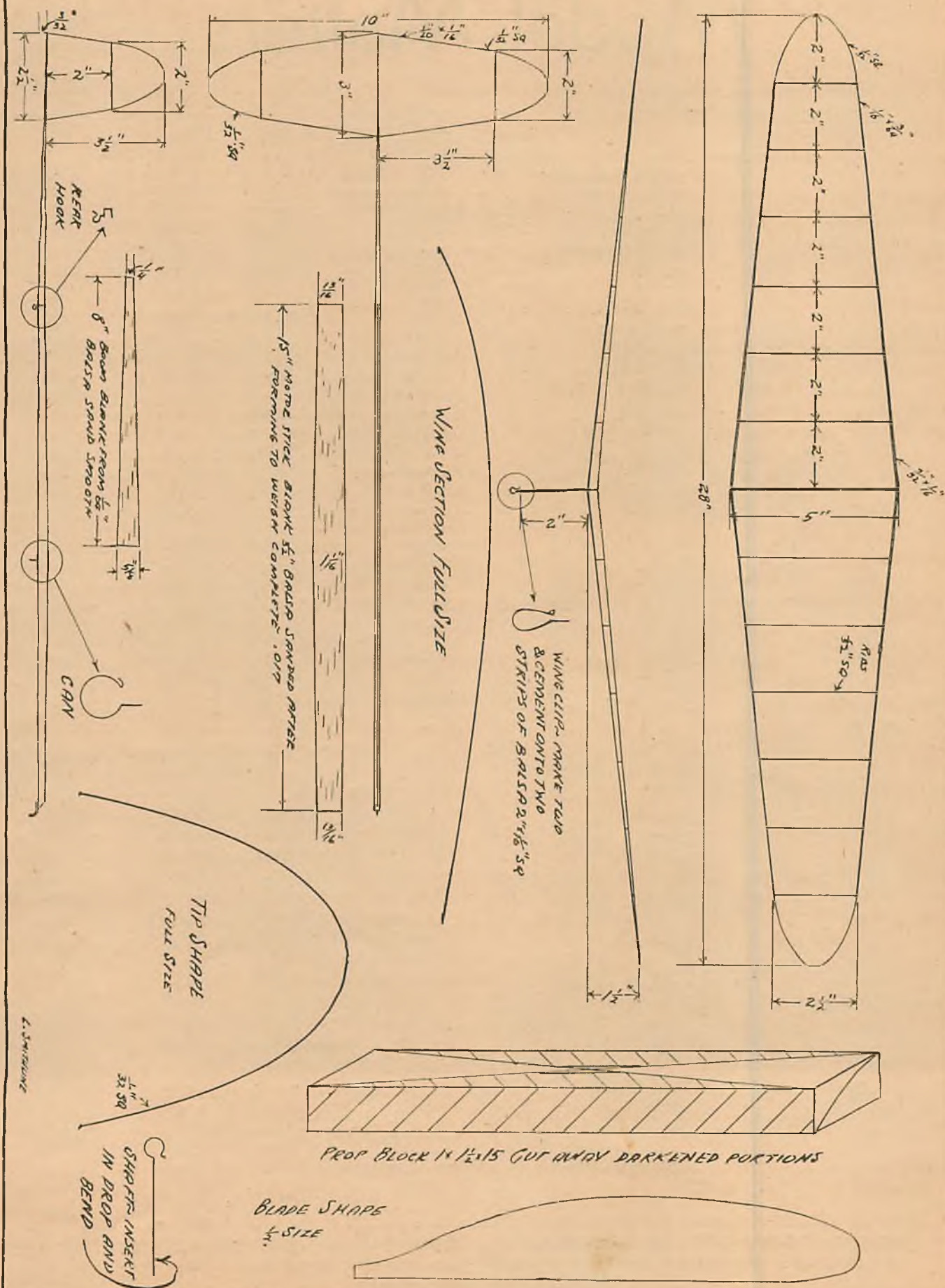
As it is essential that an indoor model be as light as possible, the motor stick and boom are always made hollow. Some experienced builders make microfilm-covered props in order to cut down weight. Ambitious builders sometimes go to extremes by making hollow spars for their wings.

The former for the hollow fuselage is made of hard wood 15 inches long, $\frac{1}{8}$ " thick, and $\frac{3}{8}$ " wide at the center, tapered to $\frac{1}{4}$ " at the ends. This stick should be kept, as it is a standard size. A motor stick blank of $\frac{1}{32}$ " sheet balsa $1\frac{1}{16}$ " wide at the center, tapered to $\frac{13}{16}$ " at the ends, is soaked in hot water, bent around the former (seam on top) and wrapped with $\frac{1}{2}$ " bandage. When the blank has dried out, remove the bandage and sandpaper the balsa smooth. Then remove the balsa fuselage from the former and cement the seam. Cut the front end of the tube at an angle and cement caps of $\frac{1}{32}$ " balsa over the front and rear. When the caps have dried, cement the thrust bearing, rear hook and can in place. This finishes the motor stick.

The boom blank of $\frac{1}{64}$ " sheet balsa is bent around a former $\frac{3}{16} \times \frac{3}{32}$ " tapered to $\frac{1}{16}$ " square by 8 inches long in exactly the same way as the motor stick. The blank necessary for this boom is $\frac{5}{8} \times \frac{1}{4} \times 8$ " of $\frac{1}{64}$ " sheet balsa.

PROPELLER

On an indoor model the most important thing is the propeller. An indoor model depends (Turn to page 94)



*Flight records
and contestants in
competitions.*

Model Matters

*Club notes and
news of model or-
ganizations.*

In the contest tabulations below, results are to be read as minutes (to the left of the colon), seconds, and fractions.

NEW ENGLAND CHAMPIONSHIP

The seventh annual New England Championship Model Airplane Contest, held at Boston, June 6 and 7, produced the following times, new Boston records being marked by an asterisk (*):

Indoors		Outdoors	
Stick R. O. G.		Gliders	
1-Torrey L. Capo	12:02*	1-Robert Shea	3:15*
2-Hewitt Phillips	10:20	2-Bruno Marchi	:50
3-Leslie Woodman	9:53.4	3-Frank Barrett, Jr.	:45*
H. L. Stick		H. L. Stick	
1-Hewitt Phillips	14:38.4*	1-Maurice Sulkin	3:13
2-Wilbur Tyler	14:24.5	2-Richard Stuart	3:00
3-Bruno Marchi	12:57.4	3-Roy Carlson	2:45
Fuselage R. O. G.		Fuselage R. O. G.	
1-Daniel J. Cline	9:08*	1-Levi Walba	3:55
2-Stephen J. Sardella	8:36.5	2-Frank Barrett, Jr.	2:32
3-Richard K. Stuart	8:09	3-Arthur Sampson	2:30
Gliders			
1-Bruno Marchi	:42.2*		

EASTERN STATES GAS MEET

Results of the International Gas Model Airplane Association's contest at Hadley Field, New Brunswick, N. J., on May 9:

1-Maxwell Bassett, Philadelphia, Pa.	24:18
2-Walter Dickerson, Newark, N. J.	9:18
3-William Dombert, Ridgewood, N. Y.	6:53
4-Fred Knoll, Woodmere, N. Y.	6:45
5-Carl Thompson, Jr., Wilmington, Del.	6:00
6-Stephen Kowalik, Wilmington, Del.	5:55
7-Robert Long, Reading, Pa.	5:45
8-Julius Gottlieb, Jersey City, N. J.	5:31

EASTERN STATES INDOOR MEET

Results of the Eastern States indoor contest, held in the navy's huge airship dock at Lakehurst, N. J., on April 25, show some interesting times:

H. L. Stick	
1-Bruno Marchi, Medford, Mass.	20:06
2-Mayhew Webster, Philadelphia, Pa.	19:25.6
3-William Wert, Philadelphia, Pa.	19:03.2
Fuselage R. O. G.	
1-Ervin Leschner, Philadelphia, Pa.	11:42.4
2-Herbert Greenberg, Newark, N. J.	11:21.6
3-Walter Lees, Philadelphia, Pa.	10:03
Baby R. O. G.	
1-Merrill Malley, Atlantic City, N. J.	10:41.8
2-Mayhew Webster, Philadelphia, Pa.	9:43.2
3-William Lutz, Philadelphia, Pa.	9:39.4

ST. LOUIS ELIMINATIONS

The contest held by the Stix, Baer & Fuller Model Airplane Club at St. Louis on June 12 and 13, with indoor events at the Arena and outdoor events at Curtiss Steinberg Airport, resulted in the selection of Marvin Schmidt, 1934 Moffett winner, and Albert W. Courtial, Jr., as club representatives at the national meet. Best times were as follows:

Open		Indoor Stick	
Outdoor Cabin		Junior	
1-Carl Fries	1:58	1-Bill Azbell	14:12
2-Robert Baum	1:30	2-Carl Fries	11:35
3-C. C. Magrath	1:08	3-Jake Friedman	2:47
Outdoor Stick		All-types Contest	
1-Jake Friedman	4:10	1-Robert Gibbs	6:12
2-C. C. Magrath	1:37	2-Lennox Murphy	1:38
3-Bill Azbell	:58	3-Pat Owens	1:11

Twin Pusher		Indoor Stick	
1-Harry Purviance	2:51	1-A. W. Courtial, Jr.	16:29
2-Robert Guilfooy	2:27	2-Bill Gray	10:53
3-Hugh Schneidewind	2:25	3-Louis Reidinger	8:42
Senior		Indoor Cabin	
Outdoor Stick		1-A. W. Courtial, Jr.	11:30
1-Marvin Schmidt	11:58	2-Louis Sutter	7:10
2-Louis Sutter	7:11	3-Donald Dodd	2:40
3-Robert Guilfooy	6:29		
Outdoor Cabin			
1-Marvin Schmidt	12:42		

CANADIAN NEWS

A new provincial model group, to be known as the Maritime Model Aircraft League, has been organized by J. Arthur Covey of St. John, N. B. The league hopes to assist in promotion of contests in cities and towns in the Maritimes, and to organize an annual Maritime Provinces contest. Included in the new league are clubs from Perth, St. John, St. Stephen, and Chance Harbour, N. B., and Summerside, P. E. I.

Canadian model builders learn with regret of the loss of two of their outstanding members. Albert Levy of Toronto, first-place winner at the 1933 national meet at New York and present world-record holder in the indoor flying scale class, has moved to Chicago. Harry Burrows, also of Toronto, the Dominion's best indoor modeler during 1934 and 1935, has sailed for England, where he will join the Royal Air Force.

The Toronto branch of the Model Aircraft League of Ontario held a contest for Wakefield-type ships at the airport of the Toronto Flying Club on Saturday, June 6th. The meet was under the direction of G. J. McKinnon, the league secretary. Results were: first, Frank Leat, 2:05.2; second, Jeff Noble, 1:22; third, Jim Haffey, 1:00.

OFFICIAL CANADIAN RECORDS

Indoors

Baby R. O. G.	
Junior: Clarence Dunn, Hamilton, Ont.	4:19
Senior: Ernest Houslander, Hamilton, Ont.	8:34
Open: Melvin Bardsley, St. Catherine, Ont.	6:47

H. L. Stick (30-150 sq. in.)	
Junior: Don McIntyre, Guelph, Ont.	5:43
Senior: Alex Smillie, Galt, Ont.	9:53
Open: John T. Dilly, Galt, Ont.	7:03

Fuselage R. O. G. (30-150 sq. in.)	
Junior: George Reed, Toronto, Ont.	3:56
Senior: Fred Hollingsworth, Vancouver, B. C.	6:53
Open: John T. Dilly, Galt, Ont.	6:23

Flying Semi-scale (R. O. G.)	
Junior: Jack Barton, Weston, Ont.	1:46
Senior: Harold Frier, Toronto, Ont.	2:19
Open: Albert Levy, Toronto, Ont.	4:14

H. L. Glider (30-150 sq. in.)	
Junior: Bill Holden, Galt, Ont.	:14
Senior: Ernest Barrie, Galt, Ont.	:32

Outdoors

H. L. Stick (100-200 sq. in.)	
Junior: Joe Purvis, Toronto, Ont.	3:47
Senior: Victor H. Davey, Winnipeg, Man.	5:41

Fuselage R. O. G. (200 sq. in.)	
Junior: Tom Smith, Winnipeg, Man.	:58
Senior: Victor H. Davey, Winnipeg, Man.	1:54
Open: Fred J. Rogerson, Hamilton, Ont.	:43

The Model Workshop has been compelled, through lack of space, to postpone Alan D. Booton's article on balloon tires for gas models, announced for this issue. Watch for it next month!



by
William
Winter

All-metal construction, speed and maneuverability are combined for the lowly cadet in the army's latest basic trainer, presented herewith in solid-model form.

Tops in Trainers

THE new Seversky advanced or "basic" trainer for the army air corps is a low-wing monoplane of all metal construction. It is said to be the first trainer purchased by the government entirely designed as a basic trainer rather modified from some previous design.

The high speed of this ship, now designated by the army BT-8, is 176 m.p.h. and the landing speed, because of a newly developed flap arrangement, is less than 60 m.p.h. It is worthy of note that in addition to being the fastest trainer the army has ever bought, this latest Seversky is the equal of most of the tactical service ships in climb and maneuverability.

The purpose of the basic trainer is to prepare by practice those students who have advanced from the primary training stage for the actual handling of fast pursuit, attack and bombing planes.

Because of its equipment and flying characteristics, the BT-8 enables the intermediate student to get the "feel" of the average high-performance tactical plane. The instruments and radio provided for training purposes are the equals of those found on the latest air liners. These instruments are complete enough to allow not only the usual flight training, but also blind flying and blind landings.

An important feature of the Seversky trainer is the interchangeability of the float-type landing gear to convert the ship into an amphibian. The pontoons are so constructed that emergency landings are possible on snow, ice, mud, or heavy sand. For this reason the BT-8 is adaptable to service anywhere from Florida to Alaska. The army's contract calls for the construction of thirty of these ships.

FUSELAGE

The fuselage block is first trimmed down to its outside required dimensions. The profile is then drawn on the side of the block. With a sharp knife, cut away the excess wood. On the top of the block draw the

thrust line and the side lines of the body. As before, cut away the excess balsa. That portion to be enclosed by the cellophane hood must be slightly cut out to provide a flat surface at this spot.

Having completed this preliminary operation, trace or cut out the templates and paste them on stiff paper. The block is now rounded, using the templates frequently to check the shape. The filleted portions will be treated later, so don't become alarmed at this point.

The cowl is cut from a block pared down to the diameter size. Note that the cowl tapers toward the front. After you have shaped it, hollow out the face to provide for a dummy engine. Sand the completed cowl first with medium paper and then with progressive grades of finer papers. The double cowl effect is obtained by cutting a shallow ridge around the fuselage

block the proper distance from the nose.

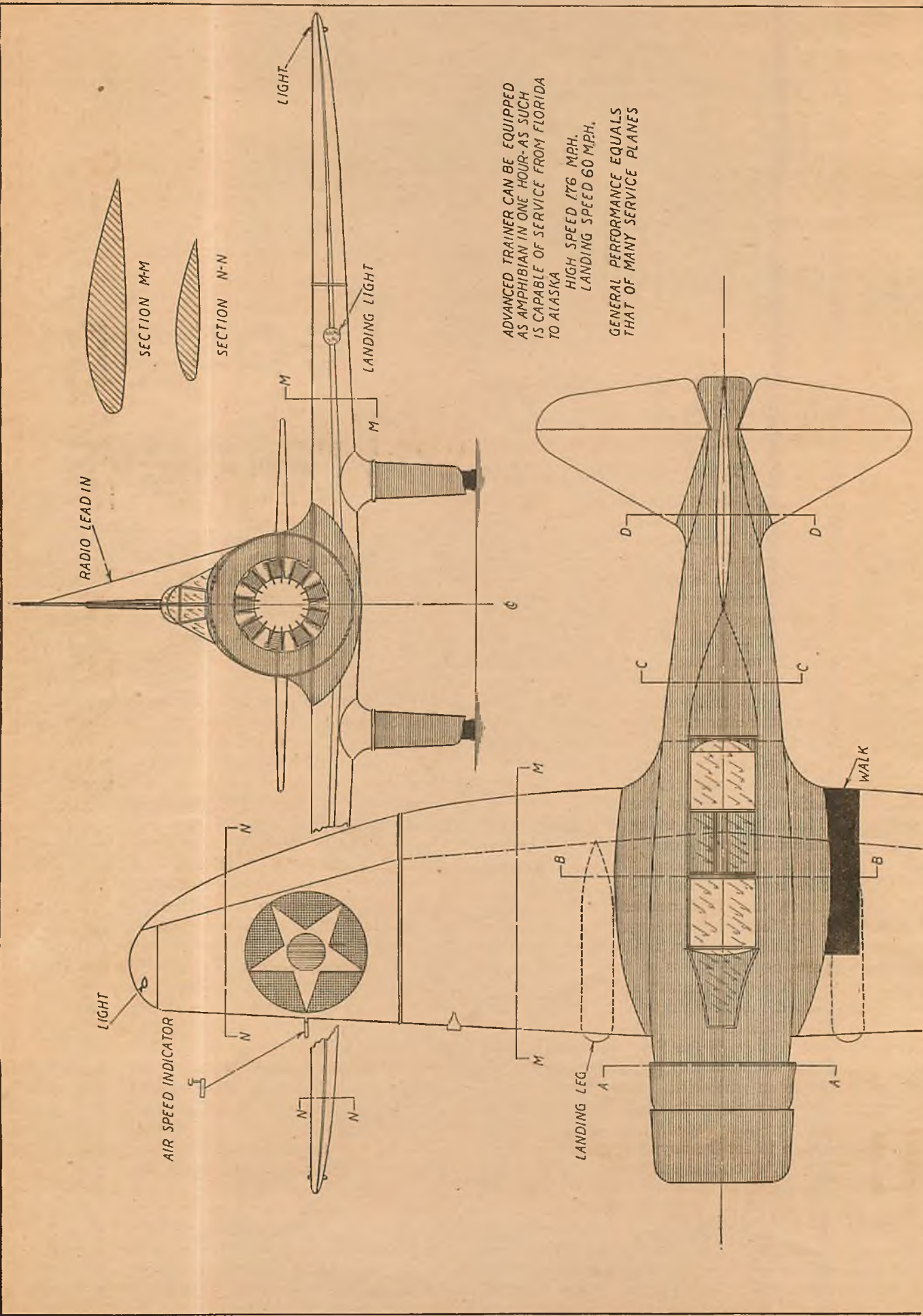
Sand the finished block to a satin finish and cement the cowl in place. Before advancing further it is necessary to provide means for attaching the wings at a later stage. If you are careful, the butt ends of the wings may be cut concave to match the fuselage curve. The original model had a notch cut in the bottom of the fuselage block to fit the wing. In either case, the fillets are to be molded in with wood filler or some similar substance. Therefore the wing joints need not be well fitted, as they will be concealed. If it is decided to fit the wings in the last mentioned manner, cut the wing cavity in the bottom of the block. Glue the tail wheel in place on a light wire axle.

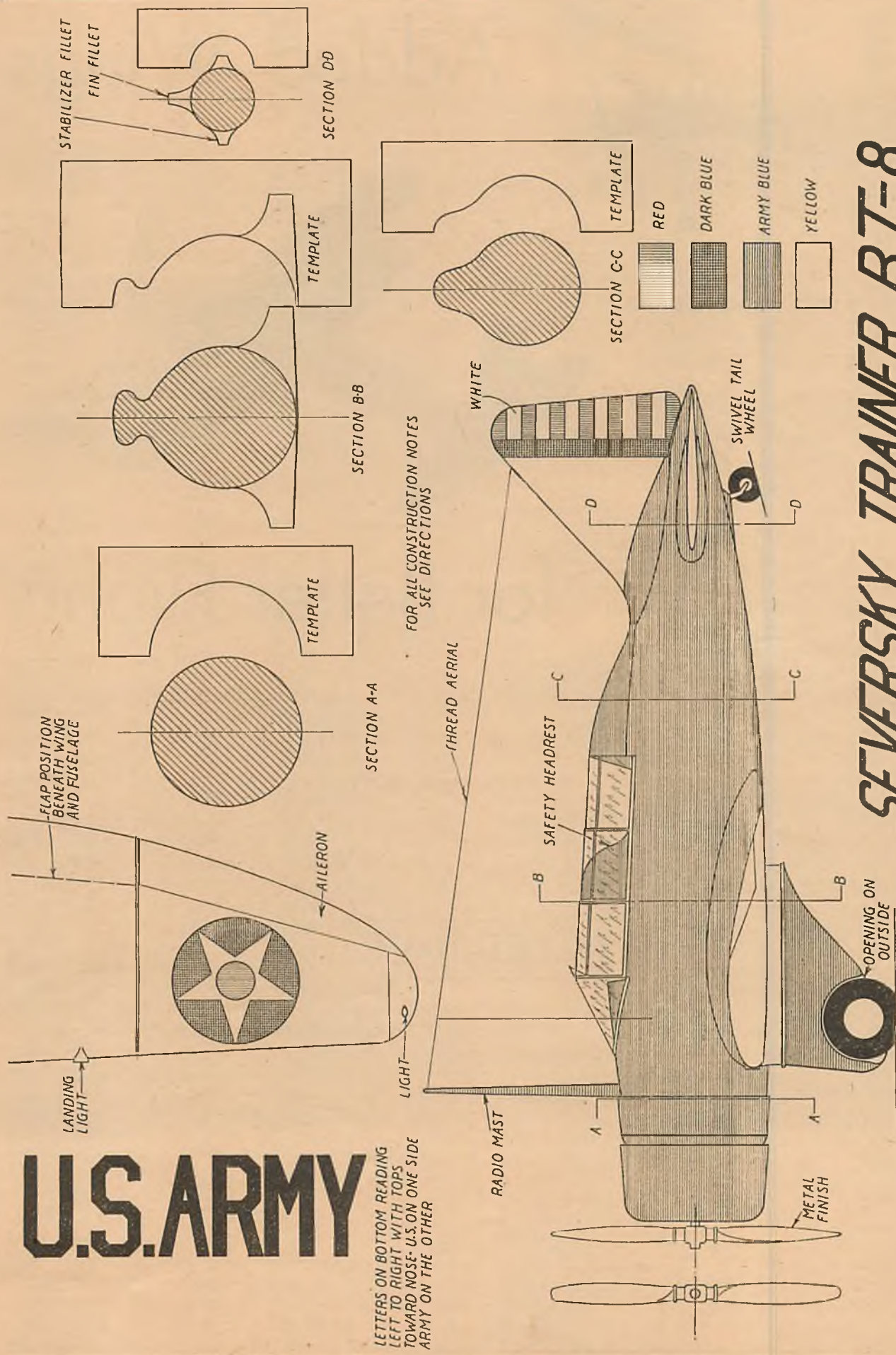
TAIL

Cut the tail surface units to their outline shapes from soft $\frac{1}{8}$ " sheet balsa. Each piece tapers toward the tip, as seen on the front view. With a razor trim both stabilizer pieces and rudder to a

(Turn to page 96)

SEVERSKY BT-8





U.S. ARMY

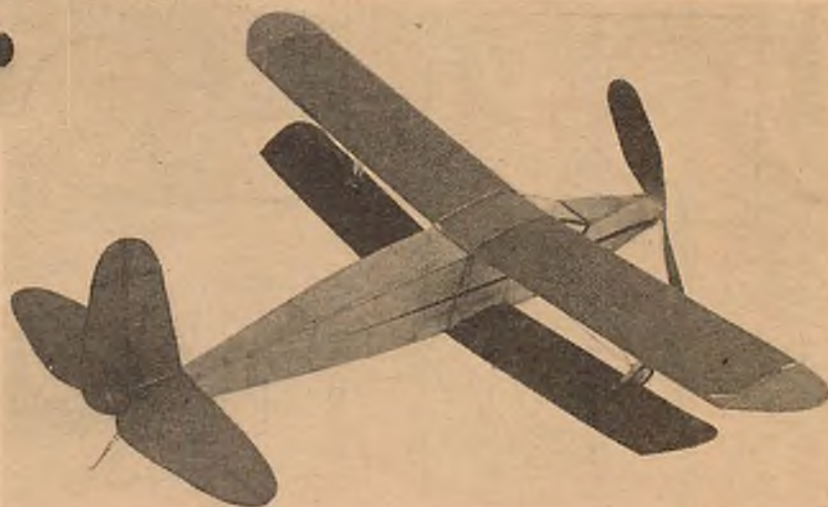
LETTERS ON BOTTOM READING
LEFT TO RIGHT WITH TOPS
TOWARD NOSE- U.S. ON ONE SIDE
ARMY ON THE OTHER

SEVERSKY TRAINER BT-8

SCALE $\frac{1}{4}'' = 1'$



Longitudinal and lateral stability seem inherent in this unusual biplane design, as well as commendable endurance. In other words, grab yourself a load of new flying thrills!



for Better Flights

FLYING-MODEL biplanes have become rare. In the last ten years I cannot recall more than one or two successful biplanes. Modelers have neglected them in the quest for longer flights. But the old biplane still packs a good performance and the fine flights turned in by the Old-Timer make me feel a trifle guilty for neglecting biplane design. The stability and smoothness of the flight in gusty air, together with a flat glide and slow sinking speed, deliver a performance that is a credit to biplane design. Since no special effort was made to develop a duration model, the 65-second average flight was particularly pleasing.

The Old-Timer has several interesting features. The upper wing is movable, that is, it can be moved backward and forward along the top of the fuselage. The bottom wing, in this respect, is fixed. However, the incidence can be changed through a wide range of angles. The model was not sensitive to adjustments and extremely simple to get flying. There was no stalling tendency. When the elevator was badly adjusted the model climbed to a nice height and then seemed to "hang" there. That is, the nose was pointed up and the model seemed motionless, apparently neither gaining nor losing altitude. There was none of the pitching and diving that is so common in monoplanes when they are slightly out of adjustment.

The total wing area of the Old-Timer biplane is 265 square inches. Since the total weight is 3.68 ounces, the wing loading is .7 ounce per 50 square inches. This is slightly below contest regulations, which would require a weight of 5.3 ounces. But from all indications, the chords of the upper and the lower wing could be reduced without cutting down on the lift, yet improving the efficiency. Then, too, the size of the propeller on a contest version of this model could be stepped up from 13 inches to 16 inches, thus requiring a heavier rubber motor. This in turn would boost the weight and the contest requirement could be met without any trouble.

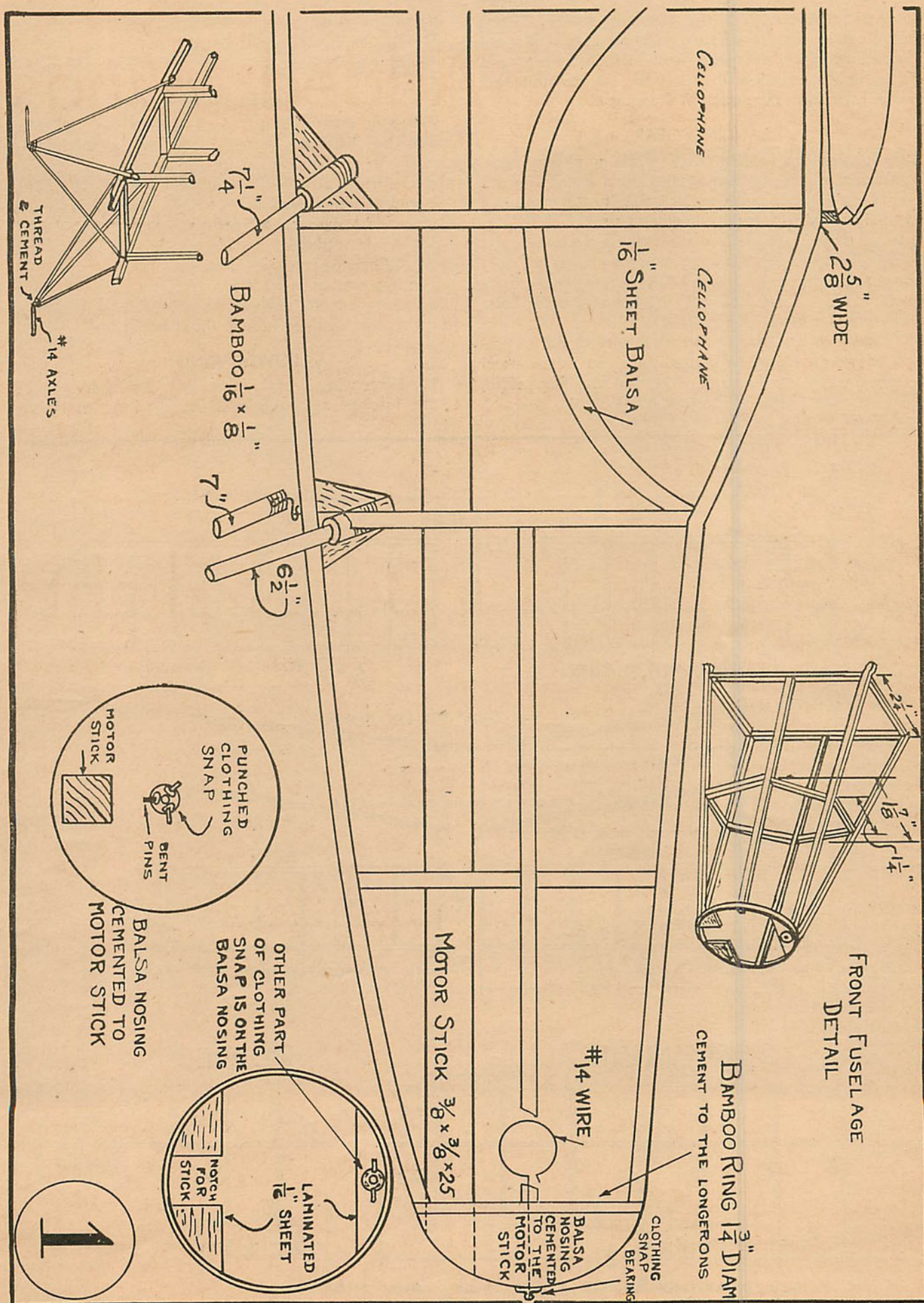
The OLD-TIMER

One feature in a biplane which contributes immensely to its stability is decalage. That is the name for the difference in angular setting of the upper and the lower wing. Since the upper wing is set at a higher angle than the lower, it is positive decalage. Decalage prevents stalling and diving—two maneuvers which are as disconcerting to modelers as to real plane designers.

The upper wing of the model is made rigid throughout, just as if it was to be used on a monoplane. It is attached to the fuselage with rubber bands. The bottom wing is made in two halves and is attached with wire prongs that fit into the fuselage. It is held in position by two small balsa struts that join it to the top wing. These struts are attached so the upper wing may be moved without disturbing the lower wing, outside of a slight change in dihedral which is not sufficient to change any of the flying characteristics of the model. The resulting wing structure is strong, yet flexible, and requires a minimum of fittings and tinkering to assemble. The only additional work necessary to build this biplane instead of a monoplane is the easy task of building the lower wing and attaching it to the upper one. Let's start construction, and the fuselage is the logical place to begin.

FUSELAGE

The full-size side view of the fuselage, built of $\frac{1}{8}$ " square balsa, is given in drawings #1, 2, and 3. I have given the width of the fuselage at the positions of the cross braces in the drawing, rather than include a full-size top-view drawing. Joining the two fuselage side panels is simple if you first put in place the cross braces at the wing, making the fuselage $2\frac{5}{8}$ " wide here. Then



add the cross brace at the rear, making the width 1". After these have set, add the remaining braces. These should round out the fuselage so it assumes a pleasant streamlined curve. The cross-section shape is rectangular throughout except at the nose, and the variation here will be clear from the sketch in drawing #1.

LANDING GEAR

Each half of the landing gear is made up of three bamboo struts. Two of these fit into balsa sockets on one side of the fuselage and the third runs to the other side and is fastened with a wire hook-and-eye.

Balsa sockets are easily made. Select a piece of soft balsa. Push the bamboo strut (split to $1/16 \times 1/8$ " size) into the end of the balsa piece. Force the strut into the wood for 3". Now cut away the outside of the balsa piece until the walls of the balsa socket are $1/8$ ". Give the wood a coat of cement and wrap with thread to prevent breaking. Cut the 3" length into four sections and cement them to the fuselage. To make this joint rigid, reinforce with pieces of sheet balsa.

The actual lengths of struts are indicated. The wheels will be at the correct position if you duplicate these lengths.

Wire axles are cemented and threaded to each half of the landing gear and a pair of $1/4$ " wheels slipped on.

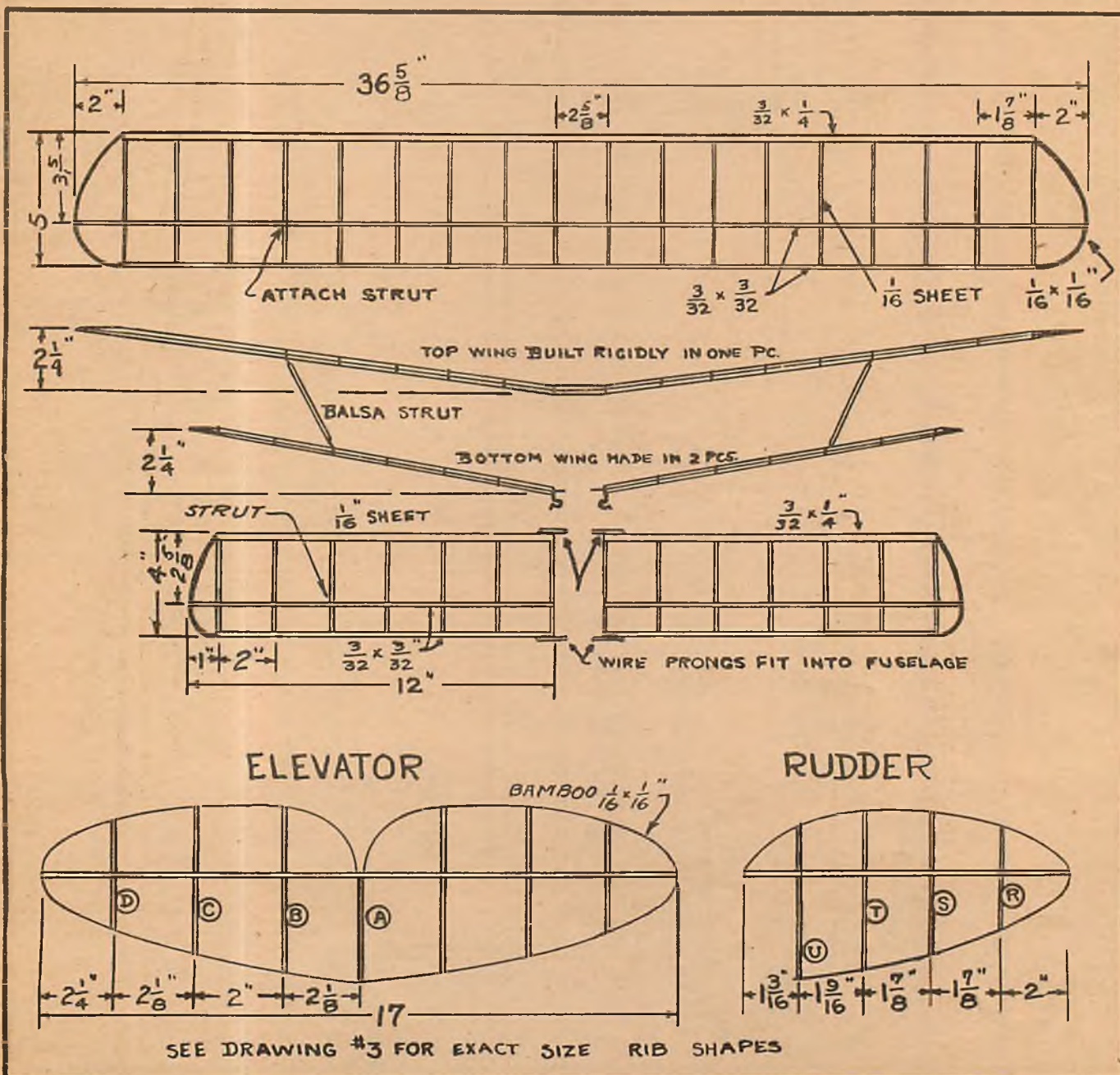
UPPER WING

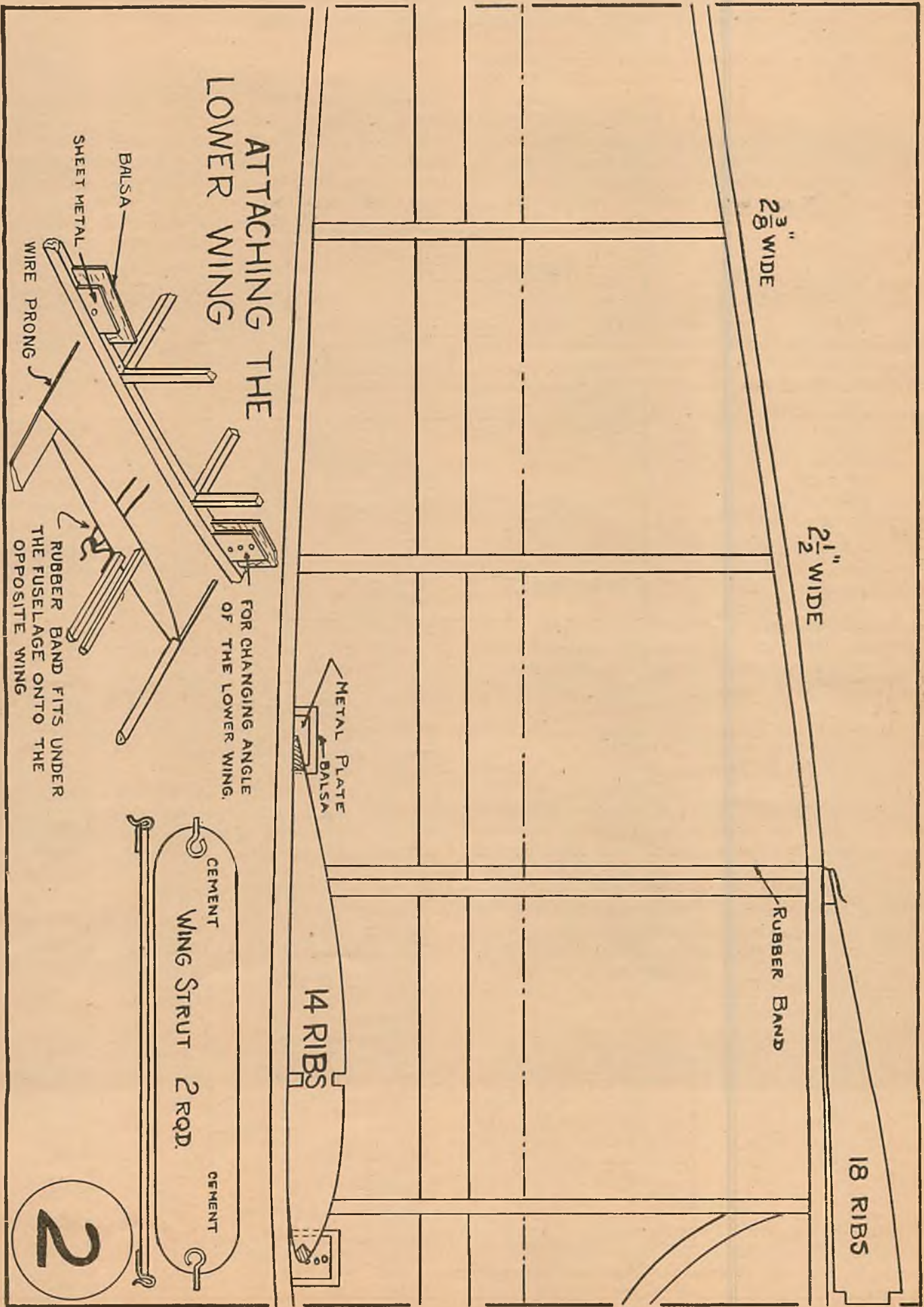
Two-spar construction is used in the wing. That is, $3/32 \times 3/32$ " spars are inserted in the top and the bottom of each rib at the position indicated in the rib pattern which is drawn on top of the fuselage. Notice, too, that the wing leading edge is $3/32 \times 3/32$ " and is inserted edgewise into the front of each rib. The trailing edge, $3/32 \times 1/4$ ", is triangular and is butt-jointed to the rear ends. Wing tips are $1/16$ " bamboo.

The upper wing is made in one piece. In adding the dihedral angle the center section, $25/8$ " wide, is left flat to fit on top the fuselage. Each tip is raised $2 1/4$ ".

LOWER WING

The lower wing is made in two halves. Each is joined to the fuselage and additional bracing is given by the





balsa strut which attaches it to the upper wing. Construction procedure and size of material follow exactly that of the upper wing.

Small $1\frac{1}{2}$ " lengths of #10 piano wire are cemented to the leading and trailing edges at the end of each half. These wires are for attaching the wings as shown in drawing #2. The metal plates can be made of almost any sort of metal ranging from tin cans to sheet dural. The holes should be punched small enough so they fit the wire prongs. The three holes in the front plate should be close together so the wing incidence can be changed a slight amount at a time.

MOTOR STICK

Select a medium hard piece of balsa $\frac{3}{8} \times \frac{3}{8} \times 25$ ". The shape of the balsa nosing which is cemented to the front of the stick is shown in drawing #1. In case you weren't able to bend a perfectly circular ring of bamboo for the front of your fuselage, be sure you cut the balsa nosing to fit the particular shape of your bamboo nosing rather than the one given in the drawing. The balsa nosing should fit snugly against the bamboo.

The method of attaching the stick inside the fuselage should be clear from studying drawings #1 and #3. When removing the motor stick, separate the clothing snap with the tip of a knife. Don't depend on cement alone to hold the snaps, but reinforce them with bent pins.

ELEVATOR AND RUDDER

Despite the fact that the rudder and elevator are drawn in greatly reduced size, you'll have no trouble assembling them since all ribs, of $1/16$ " sheet, are given full size in drawing #3. The spars in both rudder and elevator are $3/32 \times 3/32$ ". The outline is bent from bamboo $1/16 \times 1/16$ ". The elevator is left flat throughout the length. The rudder is cemented to the rear of the fuselage. Allow sufficient space between rib U and the fuselage top to slip in the elevator.

The only fitting necessary for attaching the elevator is shown in drawing #3. This wire hook fits over the fuselage and the elevator is held in place by rubber bands passing underneath.

PROPELLER

A 13" propeller has been selected for this model because it revolves fairly fast and provides a snappy flight. However, if you happen to have a spare propeller, use it even though it might be an inch or so larger or smaller. Four stages of propeller carving are shown in the drawing.

COVERING

In using tissue don't forget you can get the maximum strength by running the grain lengthwise. Be careful to iron out all wrinkles before attaching with banana oil; spray the covered model with water, and all wrinkles will disappear. Give the tissue one or two

coats of dope, depending on the thickness of the doping mixture. Don't neglect to cover the cabin windows with cellophane.

ASSEMBLING

Mount the upper wing by rubber bands which pass around the fuselage. Slide the wire prongs on the lower wing into the metal sockets. Keep the two halves in position by linking with a rubber band, as shown. Attach the two balsa struts to eyelets in the upper and lower wings. Notice that these removable struts, by reason of their round ends and wire fittings that are bent short or long, will permit adjustment in the upper wing—either moving it backward or forward, or changing the angle of incidence.

Likewise the elevator angle can be changed by raising or lowering the rear edge with different-sized balsa blocks.

FLYING

The setting of the wings as shown in the drawing proved to be the most efficient. Your model may require a slightly different adjustment. Stalling and diving can be controlled by moving the top wing backward or forward. However, be careful about adding positive incidence to the lower

wing. Keep this setting as near zero as possible. A slight negative angle was beneficial. Likewise a zero setting in the elevator was helpful. That is, the bottom of the elevator should parallel the line of flight.

The original Old-Timer flew in left circles under power. As the power diminished the turn became less until the model was turning in right circles during the glide. The climb was steep, yet the model never seriously threatened a stall. Sinking speed and forward speed on the glide were remarkably slow. In fact, the Old-Timer's performance just about sold me on biplane designs.

SPECIFICATIONS

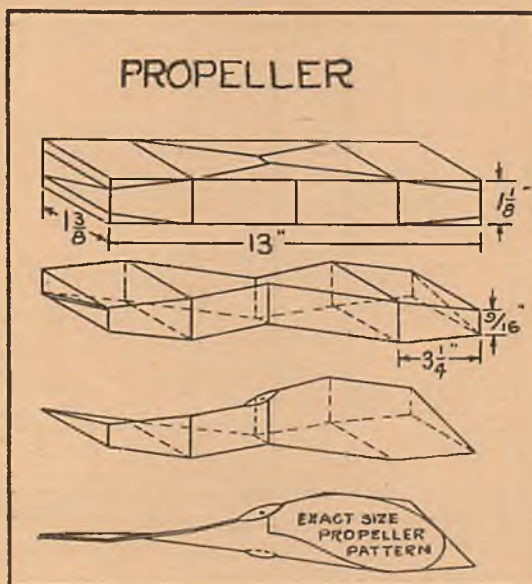
Area upper wing	165 sq. in.
Dihedral upper wing	$2\frac{1}{4}$ " each tip
Area lower wing	100 sq. in.
Dihedral lower wing	$2\frac{1}{4}$ " each tip
Rudder area	20 sq. in.
Elevator area	43 sq. in.
Elevator incidence	zero degrees
Incidence upper wing	$3/16$ " at leading edge
Incidence lower wing	zero
Center of gravity location: 3" back from L. E. of upper wing, $\frac{1}{4}$ " below rubber motor.	

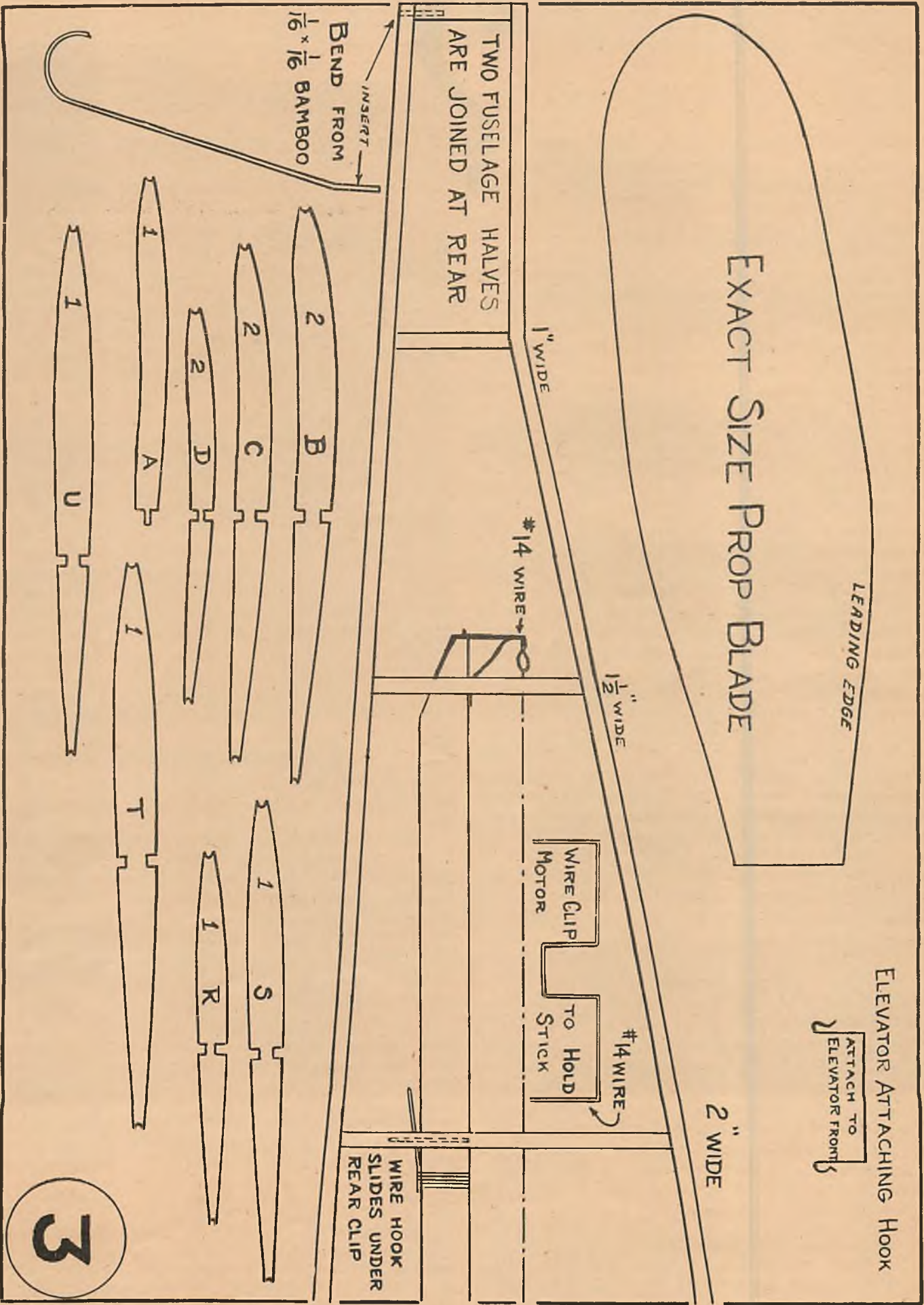
WEIGHTS

Propeller and motor stick	.57 ounces
Landing gear	.49 "
Fuselage and rudder	.86. "
Elevator	.17 "
Lower wing	.39 "
Upper wing	.44 "
Rubber (14 strand of $\frac{1}{8}$ " flat)	.76 "

Total weight R. T. F. 3.68 ounces

—G. S. L.





Have you a question on model building or flying that bothers you? Bring us your problem and



we'll answer it in the interest of readers everywhere. Replies by mail require return postage.

TRIANGULAR FUSELAGE

Question: Is a triangular-shaped fuselage cross section good designing practice for a model airplane? If it is used, should the flat side be on top or bottom? J. J., Brandon, Manitoba, Canada.

Answer: A fuselage with triangular cross section has the disadvantage of not closely resembling a large airplane. Though not absolutely essential, appearance adds an extra thrill to the flight if the model has the same lines as a big airplane. Another unpleasant angle is that the small cross-sectional area of a triangle requires that the width and depth of the fuselage at the maximum point be considerably greater than a square, rectangular, or oval cross section would be.

A point in favor is the ease of construction. Two longerons can be pinned in shape on the workbench to form one side of the fuselage and the third longeron added while this section is still pinned flat.

If a triangular fuselage is used, a pleasing set-up would be to have the flat side on the bottom. Fastening the wing to the fuselage, however, would be difficult with such an arrangement. This could be overcome by making the fuselage rectangular in cross section at the position where the wing is fastened and then taper the front and the rear into triangular shapes.

As far as aerodynamic efficiency is concerned, the fuselage shape probably does not seriously affect the flight of a model airplane, whose speed is usually about 8 miles per hour. A beautifully streamlined, oval-shaped fuselage is attractive and offers less drag, but it is doubtful if the increase in flight is measurable. It is even more doubtful if the added trouble in building an oval cross section is worthwhile. Triangular, rectangular, and square fuselages are easier to build and perform practically as well.

BUILT-UP MOTOR STICKS

Question: Would you describe in detail the construction of a built-up motor stick? T. N., Visalia, Calif.

Answer: The reason a built-up stick is used in preference to a solid one is the additional strength it offers to the twist and pull of the rubber motor. That is, for sticks of equal weight, the built-up stick will be stronger.

The easiest way to make a built-up stick is to cement a strip of balsa to the top of a piece of channeled balsa. Channeled balsa is usually referred to as a U-beam. Any company selling a variety of sizes of balsa wood is certain to have U-beams.

If you have a bench saw you can make your own U-beams by cutting away the inside of an ordinary motor stick. Merely raise the table of your saw outfit until the depth of cut is slightly less than the depth of the balsa piece. Then run the piece over the top of

the saw, cutting the walls of the U-beam down to $3/32$ ". The cap strip for the U-beam is the same thickness, and should be wide enough to completely cover the top. It is attached with liberal portions of cement, since the cement itself contributes to the stick's strength.

A second and more difficult way of making a square built-up stick is to use four pieces of flat balsa and cement them together in the same fashion as you would make a wooden box.

A built-up stick is usually given one or more coats of banana oil to protect it against rubber lubricant. The ends of the stick can be plugged with balsa blocks to provide a firm fastening for the rear hook and the front nosing. Square sticks can be strengthened by adding balsa bulkheads every few inches. These will prevent the walls from collapsing.

Motor sticks can be built in still other ways. One way is to moisten sheet balsa and form it around a circular object such as a $1/8$ "-diameter dowel. The dowel is later removed, and the resulting stick is extremely light and strong. Another variation of this idea is to make the stick of sufficient size so the rubber motor can be run through the center. This makes a particularly clean job in single tractors or twin pushers.

GETTING GOOD FLIGHTS

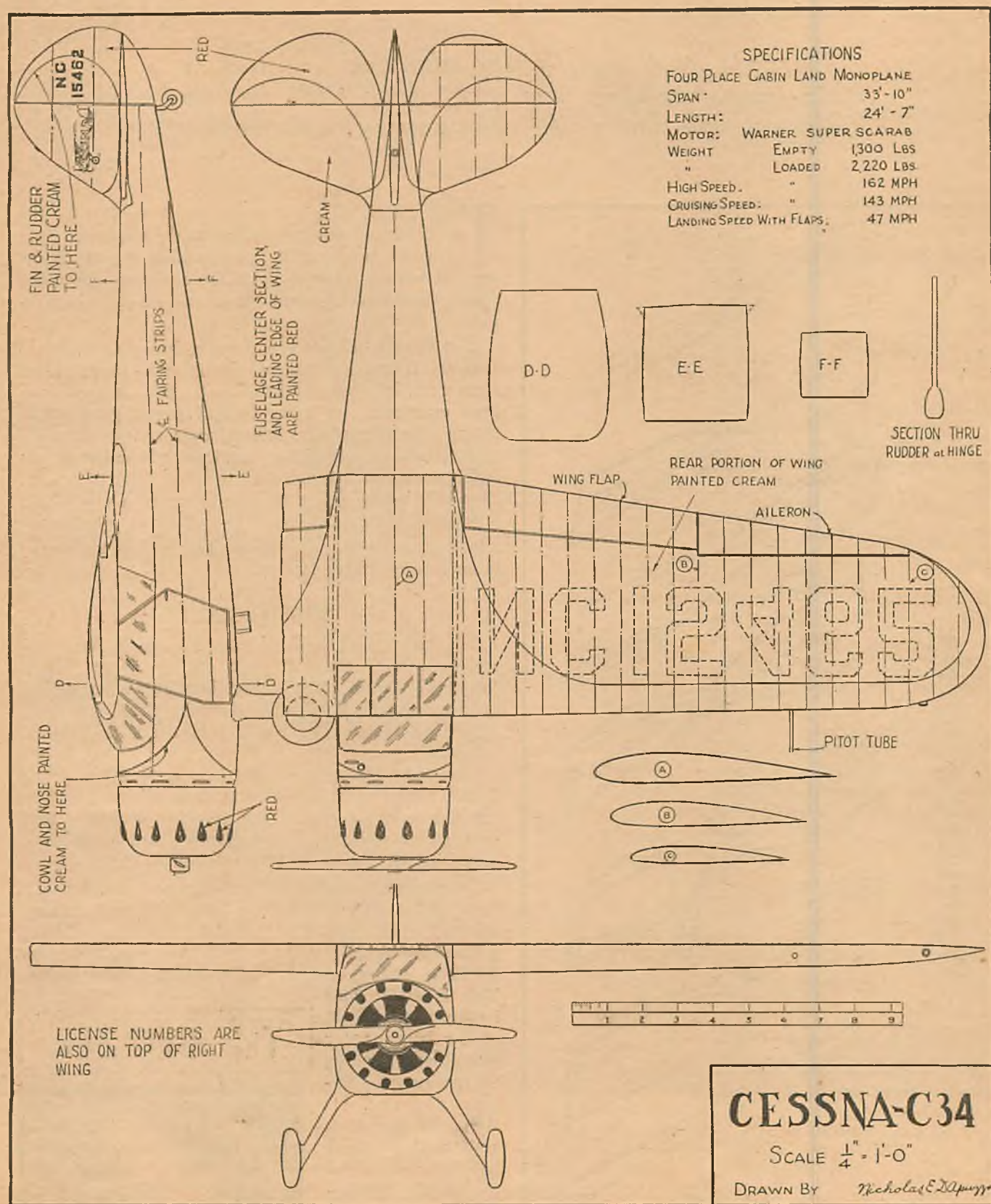
Question: Would you please tell me the secret of getting good flights out of models? J. M., Mystic, Conn.

Answer: First build a model of sound design. Follow the plans and instructions carefully. Take advantage of the years of experience of the writer by closely following his plan of attack. Build your models rugged. If you're a beginner, this is especially important, since the model must absorb considerable punishment before the embryo flier finally gets it adjusted. If your model is heavier than the specifications of the plans, merely add a few strands of rubber.

Take the finished model to the flying field and fly it. Work with it until you get it flying. Warp the wing, twist the rudder, change the elevator setting, or make any other adjustments, but stay with the model until it flies. It's not uncommon for experts to spend three or four hours at a stretch working with a model. Don't let rough landings discourage you. Few models come out of crashes with damages that can't be repaired in a half hour or less.

If a lengthy session of flying convinces you the model is hopeless, check the wing and tail settings carefully, and make sure they jibe with the original plans. Remember that if you add enough rubber the model must go somewhere. And this isn't a bad thing to do to models that fail to respond to ordinary adjustments.

The Most Efficient Plane



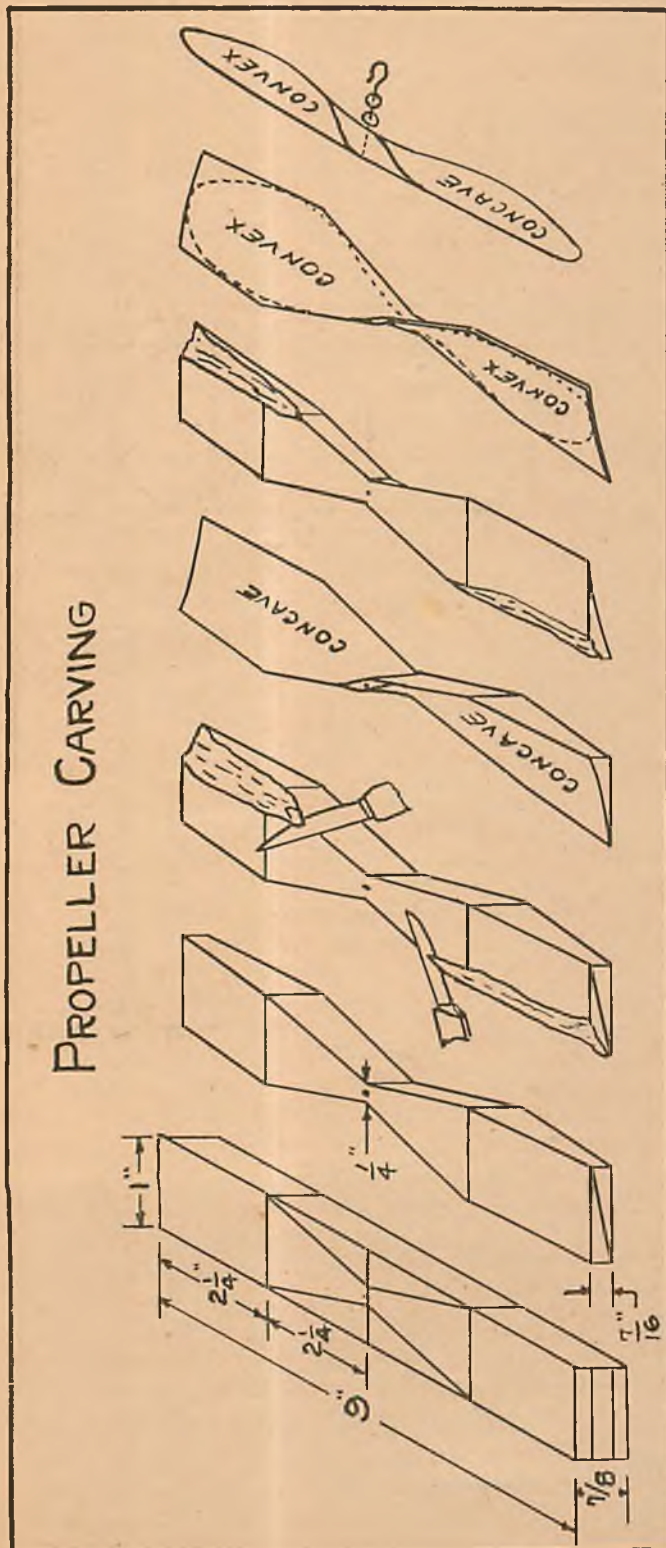
Winner among five popular planes in two ATC or governmental Approved Type Certificate contests that weighed speed, landing, take-off, economy, course time and equipment, the 145



h. p. C-34 is called "the world's most efficient airplane." It makes a fine ship for private flier and model builder. At left is the Cessna emblem, and there's a photograph on page 33.

From the Ground Up

There's a lot of model-flying education concealed in this simple rise-off-ground stick tractor. It's just the thing for the novice who wants a sure-fire performer.



THE BUZZER gives you more flying fun for the least amount of work of any model airplane. Construction is so simple you can build it some morning and have it ready to fly in the afternoon. And the flights should average between 45 and 60 seconds without any trouble.

The Buzzer belongs to a famous family of models—the stick tractors, or pullers. Its relatives range in size from a few inches up to 4 or 5 feet. Stick tractors have been equipped with every sort of power plant—clock springs, compressed air, rubber bands, and gasoline motors. Modifications of the stick tractor have been taken indoors and refined to such an extent that at present they rule indoor flying without threat of a competitor.

For the beginner the use of a motor stick instead of a built-up fuselage is reassuring. The single-surface wing is another attractive feature.

CONSTRUCTION

The motor stick is a convenient place to start construction. Sand the saw marks out of a piece of balsa $\frac{1}{4} \times \frac{3}{8} \times 19\frac{1}{2}$ " and mark off the location of the landing gear and rear hook as indicated on the plan. The hook, shaped as shown, is inserted into the stick 2" from the end.

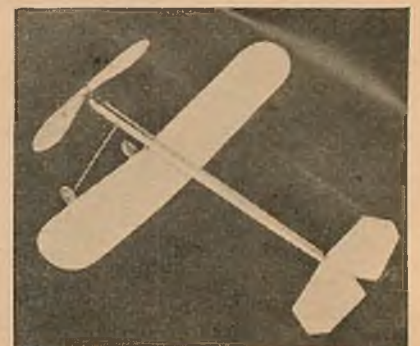
The bearing which supports the propeller is made from a flat strip of dural metal, or a flattened brad in which a hole the size of the propeller shaft has been punched or drilled. Thrust bearings are available at model shops; they're usually two for 5 cents.

This bearing is cemented and thread-wrapped to the front of the stick so that the hole is about $\frac{3}{8}$ " above the top.

The landing gear is made from one piece of bamboo 13" long. First bend it in the center to a V shape. This is easily done by heating an old screw driver or chisel and bending the moistened bamboo around it. About $\frac{1}{2}$ " from each end, bend the bamboo into an axle for the wheel. This end is then rounded with a knife and the wheel slipped on it. The wheel is held in place by a few drops

(Turn to page 95)

The BUZZER



THE BLOOD-RED ROAD TO PETRA

(Continued from page 16)

Barnes in our plight because of his interest in young Douglas. He does not know Douglas is dead. From what I have heard of him he is a man of action—and one who gets results. He may be able to track down the source of the theft of our planes and the murder and disappearance of those half dozen caravans. We must be ready to coöperate with him in every way possible.

"And, gentlemen, we must track down the traitors that are within our midst. Check all of your men. Keep an eye on them. No one is above suspicion. I do not wish to have this wing of the Royal Air Force a disgrace to the finest air corps in the world!"

"When," Group Commander Hector asked, "will Barnes arrive here?"

"To-night, sometime," Kestrel replied. "I have been in touch with the airport at Bagdad, after checking back on his route as far as Calcutta. He will follow the regular air route over the Hamad Desert."

"He is alone?" Hector asked.

"He is flying his Silver Lancer," Kestrel said. "Hassfurth, Gleason, and Sanders are with him, flying the famous Snorters."

III—PREPARATIONS

GROUP COMMANDER HECTOR threw off his belt and tunic and sat down in an easy-chair in his quarters. He was a big man with iron-gray hair and a round, inscrutable face. He sat, now, as immobile as a stone Buddha, staring straight ahead of him.

He called, "Come in," as a low knock sounded on his door. He didn't speak to MacTavish and Sneed as they came in the door. Instead, he stared at them as he had been staring straight ahead a few minutes before. Even the huge MacTavish fidgeted under his gaze.

Finally, Hector spoke. "You carried out my orders?" he asked.

"Yes, sir," Sneed answered. "Our men are on the way. But there is one thing I wanted to mention to you, sir. The men are frightened."

"Frightened!" Hector roared. "They'll be more than frightened if they don't carry out your orders."

"They're nervous about Kestrel," MacTavish said gruffly. "They know what the British government can do to a man."

"You're a fine pair," Hector sneered. He pointed a long finger at them. "Drum into their heads that they don't have to be nervous about the British unless they go yellow and talk. Get it through their heads they're in this thing now. There isn't any turning back. I'd drive it into their heads if it wasn't

dangerous for me to be seen talking to them.

"Make 'em understand that they have everything to gain. None of us is in this for glory. With Serj el Said on the throne of Arabia and Trans-Jordan, the British won't be able to touch us. And he'll be there. The British haven't time to stop and fight an Arab revolt with half the world ready to go to war. We're the ones on the inside. We'll get the cream. Make your men understand that."

"Are you sure you can trust Serj el Said?" MacTavish asked. "When I—when Douglas was shot last night Serj el Said said, 'You'll be one less Englishman for me to cope with.'"

"So you're getting nervous, too, eh?" Hector sneered. Again he pointed his finger. "Listen! I have Serj el Said tied to me the same way I have you tied. I could put both of you in a military prison for the rest of your lives. I could do the same with him. You, in turn, have the same hold on your men if you carried out my instructions as I told you to carry them out."

"Don't forget that I have you just where I want you. And don't think I won't turn on the pressure if I think it necessary."

"What about yourself?" MacTavish asked. "Do you think you can get out clean if some one talks?"

Hector came out of his chair like a thing on springs. His face was purple as he roared at MacTavish.

"Say 'Sir' when you speak to me, you swine!" he shouted.

"Sh-h!" Sneed said, stepping between the two men. "We'll get no place shouting at one another. I think it's time we got under way. Our men have already gone. We'll report to Serj el Said at Petra."

His right elbow prodded MacTavish in the side as he finished speaking. MacTavish tried to twist his ugly face into a smile, and half succeeded.

"Sneed is right, *sir*," he said. "You can depend on my loyalty, *sir*. All three of us are tense. You know things are going to crack wide open quite soon. It's getting inside me."

"I understand, MacTavish," Hector grunted. "But keep in mind that there must always be one leader, and to remain leader he must crush opposition without mercy."

"I'm depending on you two to keep your men lined up. When we're ready to strike, things will have to work with the precision of a machine. There can't be any slips. I'm tying up the loose ends now so that there won't be any slips. A lot depends on your success to-night. You mustn't fail. You'll have

the advantage of a surprise attack and superior numbers.

"Carry on with your assignment!"

MacTavish and Sneed saluted smartly and took their leave. Hector threw his big hulk into the same easy-chair and again stared straight ahead of him, as immobile as a stone Buddha.

AS the two dark forms of MacTavish and Sneed slunk out of the officers' quarters on the Royal Air Force field, Wing Commander Norton Kestrel sat in his own quarters, staring at his adjutant as though he could not believe what the man had just told him.

His sunken eyes and lined cheeks gave mute evidence of the fact that he had not had sleep for over thirty-six hours. His twitching face was pale beneath its coat of tan.

"You're sure of this, Creighton?" Kestrel whispered.

"Positive," Creighton answered. "Two of our Beersheba spies just made a report to me. They are thoroughly reliable. The Bedouins are gathering in tribes."

"But what Moslem would dare to mutilate the Dushara?" Kestrel asked, his voice stunned. "If the natives believe we did it, the lives of non-Moslems will not be worth a farthing. If we start using an air patrol above the mosque on Jebel Harun it will only add to the natives' conviction that we have tried to enter the Holy of Holies."

"I'll get word through to Anman, Jerusalem, and Mecca," the adjutant said. "The natives will strike when their leader tells them he is ready."

"We will have to evacuate all women and children and double all guards," Kestrel said, pulling at his haggard face. "I'll issue general orders, immediately. Then I must have some sleep. Barnes will be here sometime before morning. I wish to see him the minute he arrives."

IV—OUT OF THE NIGHT

THE PROPS of the three Snorters and the silver bullet that was the Lancer were ticking over slowly as Bill Barnes came out of the administration building of the airport at Bagdad. The goggled, white-helmeted heads of "Shorty" Hassfurth, Bill's chief of staff, "Red" Gleason, and young "Sandy" Sanders, the youngest of Bill's little squadron of aces, jutted above the rim of their yellow-and-black-and-red amphibians.

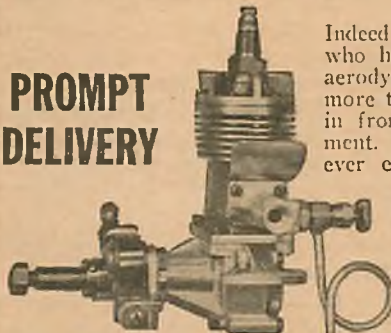
They were waiting, impatiently, for Bill to signal the dispatch tower. Luggage, ammunition, emergency equipment in the tails, and fuel had been carefully checked.

Shorty Hassfurth, that blue-eyed,

G. H. Q. GAS ENGINES

AN ENGINEERING TRIUMPH.... *never before at so low a price!*

**PROMPT
DELIVERY**



Everything is in the kit including plug, coil, condenser, tank, ignition wire, cylinder, piston, connecting rod, timer, crankshaft, all screws, nuts, bolts, etc. Every part is fully machined and finished. No oil, gas, batteries or propeller included. Postpaid for only....

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motors ever constructed. Has broken records for amazing performance... and just imagine—flies model planes up to 10 ft. wingspread. Also used for boats and stationary use. Easy to start and simple as ABC to assemble—average assembly time is only 45 minutes. So easy only a screw driver is needed.

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G.H.Q. SPORTSTER KIT

The G.H.Q. Sportster kit specially designed for G.H.Q. Gasoline motor but may be used for any other motor of like weight and power. Built according to scientific aerodynamic principles—Has made hundreds of successful flights without crackup—Marvelous glider.... And what a climber! 4-hour flights are common! A



complete kit of all parts including plan, all wood, wire wheels, metal and other parts. Postpaid for only \$5.00.

READY-TO-RUN G.H.Q. "GAS" MOTOR

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10c to \$1.00**

**G. H. Q. MODEL AIRPLANE CO.,
564 Southern Boulevard, Dept. T, New York, N. Y.**

broad-faced veteran of a thousand battles in the air, wanted to be on his way to the Royal Air Force field at Ma'an. He wanted to see and talk to James Douglas, the brother of an old War-time pal. He had seen young James a half dozen times in England since his brother had been killed. And once, young Douglas had spent a couple of weeks with him on Barnes Field, Long Island.

A strong bond of friendship had been forged between Douglas, Bill Barnes, and Shorty Hassfurth during those two weeks. They had been horrified, then angry when they learned that Douglas had been cashiered from the Royal Air Force. Now they wanted to get to him to prove that their friendship was something more than empty words.

Bill Barnes' bronzed face became grim and a little tense as he studied the scudding black clouds racing across the sky. A vision of that night two years before when he and young Sandy had been caught by a sand storm over the Syrian Desert flashed through his mind. Then he shook his head angrily and raised his hand above his head. The dispatch tower acknowledged.

The twin Diesels in Red Gleason's Snorter roared. A signal flashed and the big amphibian rolled forward. It streaked down the runway into the wind. The tail came up. The earth faded

away beneath it and the spinning landing wheels described an arc as the bracing members folded and swung up into their wells. Red took the thundering ship upward in tight spirals to level off at five thousand feet. The wind screamed along the streamlined fuselage as Shorty Hassfurth and young Sandy kicked their ships into the wind and joined him.

Bill Barnes' eyes sparkled as they ran over the instrument layout of the Silver Lancer. He felt a surge of pride as he told himself for the thousandth time that he was sitting in the greatest fighting ship in the world.

He touched the elevating and transverse screws of his telescopic machine gun and 37 mm. cannon sight, tested the radio control group and ran an eye over the Stark 1-2-3 flight instrument layout. He pivoted the infra-red-ray telescope—which permitted him to sight along a beam of "black light" through fog clouds or darkness—on its two-hinged supports, to test it.

His whole body was singing as he stuck his booted feet into the rudder stirrups and opened the throttle. He cocked his head to one side as he released his brakes, and listened to the throb of his engines.

He was smiling to himself. He eased the stick back and took the great ship

into the air. The world, he decided at that moment, was a pretty swell place to live in. His trip to China and his business with the Nanking government had been successful. Things were on the up and up. To-morrow they would pick up young Douglas at Ma'an and a few days later they would be back on Barnes Field on Long Island.

The yellow wheel-gear light and the green floating-gear light flashed as the amphibian gear folded completely into the fuselage and wings.

Bill threw his radio key and spoke to his men.

"Be sure your running lights are O. K.," he said. "Watch out for the air currents over the desert. They're tricky. We'll cruise at two hundred and fifty. Shorty, you take the point of a V with Red on the right and Sandy on the left. I'll be a couple of hundred feet above and behind you. Keep plenty of distance; you'll need it. Signing off."

"Say, Bill!" young Sandy broke in, breathlessly. "Do you suppose I could pick up a good Arabian horse when we get to Ma'an?"

"How're you going to get him home, kid?" Bill asked, grinning.

"He's going to let Douglas take his ship and swim the horse across the Atlantic," Shorty Hassfurth offered.

"Naw," Red Gleason interrupted.

"He's going to get a jumper and jump him across the Atlantic. Or, maybe, get that magic carpet some one used to fly around on."

"All right, smart guys," Sandy said, heatedly. "No one asked you what you thought."

"We just like to be helpful," Shorty said. "You know, do our daily good deed. Why don't you buy a camel instead. It—"

"Nuts!" Sandy said and threw his radio key.

The air was causing their compass needles to jiggle in crazy fashion as they passed above that flat, arid stretch of northern Arabia. From each dial on their instrument panels came a pale, phosphorescent glow. Their gyro- and earth-inductor compasses, and turn-and-bank-indicators were going mad as the hot, upward drafts of air bounced them around.

As the fury of the wind increased they had to clench their teeth and use every bit of concentration at their command to keep on their course.

The sturdy ships dropped into pocket after pocket, slapping them against their safety straps. Every moment was a fight; every twist and lurch and drop had to be compensated for.

Their ships would nose upward, suddenly, like an ocean liner riding a heavy sea, only to slide down again on the other side.

Then a sand storm came roaring at them like a giant monster. Bill checked his bearings while he tried to keep control of the Lancer, threw his radio key and gave his position to his men. The world became a yellow-and-black hell, with sand seeping through the locked overhead hatches of the four planes.

"We'd better get some altitude," Bill gasped into his microphone. "We may be able to get above this. Get up to fifteen thousand and hold the same course."

"You ought to be down on the ground on your favorite Arab steed, kid," Shorty panted into his microphone.

"Don't worry about me, you Pennsylvania kraut," Sandy gasped. "We'll be lucky if you don't crack up your Snorter." He flipped his radio key and began to feel his way even more cautiously. He was using every sense, relying more on his inherent touch and skill than on his instruments. He was crouching forward over the stick. His shoulders ached from being banged against the cowling and the rubber crash pad in front of him.

Suddenly, it seemed that a giant hand came out of the air from above to slap him toward the earth. He nursed the ship to an even keel, his eyes anxiously scanning his instrument board. He drew the stick back and talked to the Snorter. Terrific blasts of air and sand were beating against the windshield. His hands

were clammy with perspiration. His whole body was wet. He threw his radio switch as a ruby light gleamed on his radio panel.

"Check in, all of you." Bill's voice came over the air.

They gave Bill their positions and all said they could not see one another's navigation lights.

"Hold 'em as you are," Bill said. "Try to keep on your course. We ought to be out of this soon. Signing off."

He pulled the Lancer out of a flat spin and tried to peer earthward—abysmal darkness, the swirl of sand around his running lights on his wing tips. He pulled the parachute lever and watched the flare take a dizzy course earthward. The whole world was a thing of swirling sand.

Far out in front of Sandy and Red, Shorty Hassfurth jerked the stick of his Snorter back into his stomach to bring it out of a dive. It was being buffeted about like a leaf in a gale. His body ached from being thrown against the cowling. His stomach ached from being slapped against his safety strap. His heart was pounding from exertion. Sand had crept through his hatch to settle in his eyes, his mouth, even down his neck. He shook his fist at the weather and cursed it as only he could curse at such a time. He nursed the ship back into level flight, only to have it picked up and slammed down another four hundred feet. The storm raged



A renegade Super-Fury.

and roared without a let-up. He wondered how long his Snorter could take such a buffeting. Then it occurred to him that he didn't care much. He was getting so tired that nothing mattered.

Off to the right, Red Gleason was fighting with a laughing tenacity that was characteristic of him. He whipped his ship out of pocket after pocket while he tried to accompany the scream of his motors with his own voice.

The motor, he told himself, was singing bass and the screaming wind that brought that high-pitched whine to his props was singing tenor. He was carry-

ing the baritone, although he couldn't carry a tune. He gave an excellent imitation of two drunken men singing in a bathroom as he studied his compass and checked his course again. His head was ringing like a blacksmith's anvil from the beating he had been taking. He threw his radio key and a roar like the bellow of a bull greeted him.

"No radio, no peace, no ceiling, no nothin'," he said to himself, through clenched teeth, and settled back to the business of taking his Snorter through that storm.

Suddenly, the sand and wind no longer beat at the windowpanes of nonshatterable glass. Bill flipped his radio key and shouted, "Red, Shorty, Sandy!"

The three of them gave the all-clear signal. Bill's breath hissed between his teeth as he exhaled. His eyes swept from his map and chart to the instrument board as he asked them for their positions. He checked them against his own and gave them their course. Ten minutes later they were back in their original positions.

"All right," Bill said to them. "Take it easy. Hold your course. I'm going to break out the infra-red-ray telescope to take us in the rest of the way."

He brought the telescope out of its recess in the instrument panel and threw the switch. He looked into the eyepiece, which was not unlike the old-fashioned parlor stereoscope. Ahead the pitch-black night became as day as the beam of infra-red rays projected themselves artificially into the darkness and the electron telescope enabled him to pick them up.

As he started to adjust the lens, a sharp, staccato noise came out of the night. It brought him straight up in his bucket seat, his eyes wide.

He had heard that noise too many times before not to know what it was. And he knew by the sound of that staccato chatter that the machine guns he heard were not the Brownings set in the engine housing of his Snorters.

He could feel bullets drumming into the wing and tail surfaces of the Silver Lancer; he could feel the big ship tremble under the impact. He pulled the control column of the Lancer back into his stomach as he heard screaming props and thundering motors dive beneath him. As the nose of the Lancer streaked upward, he threw his radio switch and began to chant the call letters of his men. Red Gleason's voice came back to him first. And he could feel the blood in his body turn to ice as he heard Red's voice.

"Bill!" Red gasped. "Bill! They got me. I still have control, but they got me bad through the shoulder. I'm trying to climb."

Bill's hand was a ball of muscle and steel around the control column of the Lancer as he tried to pick thoughts out of his whirling mind.

"Can you make it? You aren't going to faint?" he asked quickly.

"I'll be all right if I can get above 'em," Red said, his voice steadier. "I'm getting hold of myself now. One bullet almost tore my shoulder off. The pain is easing now."

"Turn on your oxygen tank and get up to twenty-five thousand," Bill said. "They're coming back!"

"Bill!" Shorty's voice cut in. "They made a sieve of my Snorter. They are flying without lights. I thought I heard their engines, but I wasn't sure. I was sure when bullets began drumming into me."

"Get up with Red!" Bill barked. "Stay beside him. Keep contact by radio. Leave your navigation lights on. Where's Sandy?"

"I'm riding all right, Bill," Sandy broke in, his boyish voice high-pitched and strained. "They came out of nowhere, Bill. I think there are about six or eight of them. I can hear them climbing. They're trying to get above us."

"You get up with Red, too," Bill said. "I'll try to find them with my telescope. Then I'll join you."

"Look out for a crash, Bill," Shorty said.

"I'll watch it," Bill growled. His whole body was burning with anger now. It had been the most murderously unfair attack that had ever been made on him. His body and mind were seething with rage. He neutralized the controls of the Lancer and cut his engines. He could hear the drone of six or eight engines below him to the north. He kicked his rudder and stuck the nose of the Lancer down. He peered into the eyepiece of the infra-red telescope, as he thought he had the nose of the Lancer on the ships returning to their murderous attack.

As the telescope picked up the eight planes racing upward, Bill gasped and continued to peer with unbelieving eyes. The ships were fast, rugged one-seaters with flat, short wings, lean fuselage, stripped-down undercarriage and mighty power plants. But those things were not what made him gasp. He gasped because he could see the squadron insignia of the Royal Air Force painted on the sides of the fast little ships!

As fire and orange flame jetted from the machine-gun troughs along the engine housing of the eight ships, Bill jerked the control column of the Lancer back into his stomach and stuck the nose upward to escape that hail of lead. He could feel the Lancer tremble from stem to stern as bullets drove into the tail assembly. Then he was away from them. He leveled the Lancer off and began to spiral upward.

His mind was a maelstrom of thought. Why had a portion of a squadron of British planes attacked him? He wasn't

sure, but he believed that the insignia he had seen was the insignia of a squadron stationed at Ma'an.

Then all of that left his mind as he thought of Red Gleason. He flipped his switch and made contact with Red on the radio.

"How are you coming, fella?" he asked him anxiously.

"I'll do, Bill" Red said weakly. "But I'm losing a lot of blood. I'll have to sit down soon."

"Do you think you can make it to Ma'an?" Bill asked. "It's a half hour. It will be dawn by then. We'll stay at twenty-five thousand until just before we're ready to land. It will be safer than landing on the desert, with those ships over us. Do you think you can make it?"

"I'll make it all right," Red said.

"Three hundred miles an hour," Bill ordered. "Keep your radio open and shout if you think you're going to be in trouble, Red."

"O. K.," Red said.

"Bill!" Sandy said excitedly. "I can see those planes streaking off to the west with their running lights on. They tried to get up to us, but began to wallow at about twenty-two thousand feet. Who are they, Bill?"

"They were British army planes," Bill said grimly. "And the pilots wore British uniforms. I can't figure it out."

"Shall I follow them, Bill?" Shorty asked quickly.

For a moment Bill hesitated. Then he spoke with his usual decisiveness. "No," he said. "Let 'em go. They might gang you. And we've got to stick with Red in case he has to land."

V—EXPLANATIONS

DAWN was creeping out of the east when the Silver Lancer and the three Snorters circled the field at Ma'an twice while they studied the wind sock and the layout of the field.

Five minutes later Bill led the way in. He had set his brakes, killed his engines, and was over the side before the man in the uniform of the Royal Air Force reached his side.

"Oh, Barnes! Mr. Barnes!" the man called as Bill ran toward Red Gleason's Snorter. Bill knew that Red must have fainted, because his twin props were still whirling after he set his brakes and the ship came to a halt. He turned his head and waved a beckoning hand at the man in the light-blue uniform.

Bill's face was white, and the muscles in his cheeks stood out like whipcord as he dived into the front cockpit of Red's Snorter.

Red was curled up over his stick, and his left shoulder was a sodden mass of red. Bill's breath whistled through his nostrils as he slipped the catch on Red's safety strap and lifted him bodily out

of the cockpit and tenderly slipped his feet to Shorty Hassfurth.

The eyes of the man in the sky-blue uniform widened with horror as he saw the blood-saturated body of Red Gleason. But he didn't forget why he had been sent out to greet Bill Barnes.

He saluted and began, "Wing Commander Kestrel sends his compliments to Mr. Barnes and his men, and re—"

"Stow that!" Shorty Hassfurth snapped at him. "We need an ambulance. Hop!"

Kestrel's adjutant stared at Shorty for a fraction of a second. "Right!" he exploded as he swung on his heel and sprinted toward a group of buildings.

Bill Barnes had cut away Red's white overalls and was packing gauze against his horribly mutilated shoulder. Shorty was doing what he could to help, while Sandy looked on with that touch of sadness and horror in his eyes that bespoke his youth.

"Do you think it's very bad, Bill?" he asked.

"Plenty bad," Bill growled. "The bird who did that is going to pay for it. Red's lost a lot of blood, and I don't see how the bone can avoid being shattered."

He glanced up as an ambulance came clanging across the field with two or three men hanging on the back—then back at Red. His hard eyes became misty as he gazed at the calm stillness of Red's white face.

"Guts!" he said, half to himself. "He has what it takes." He knew what pain that last forty-five minutes must have cost Red. He knew how he must have struggled to fight off unconsciousness until he had his ship down safely.

"That," Shorty Hassfurth said, his voice husky, "is something he learned in France when they used to give us orders to bring our ships back. They didn't care if we got shot through the head. That was all right with them. But they needed the ships."

Bill and Shorty lifted the inert form of Red into the ambulance, hung on the back step while it clanged its way across the field to the hospital.

Ten minutes later they saw Red wheeled into the operating room, his face as white as the sheet that covered him.

BILL BARNES' face was a thundercloud as he faced Wing Commander Kestrel across his desk. Both he and Shorty had shaken the commander's hand.

"How did this thing happen, Barnes?" Kestrel asked. "Is he badly hurt?"

"We left Sandy with him," Bill said. "He is still under the ether. We don't know how bad it is. But some one is going to pay for it."

"Could he have shot himself accidentally while he was in the air?" Kestrel



Sandy cut the first man down with his automatic just as the Arab raised a rifle.

asked. "They told me it was a bullet wound."

"It is a bullet wound," Bill said grimly. "It's a wound from a machine-gun bullet fired from a Royal Air Force plane by a man in British uniform!"

"I say!" Kestrel exclaimed. He started to rise from his chair, then sank back again while the color drained from his face.

"A bullet fired from a British plane by a man in British uniform," he said stupidly.

"What about it?" Bill barked. "We were about two hundred miles from Ma'an when eight one-seater biplanes dived on us with all their machine guns yammering. Luckily Gleason was the only one who was hit. The rest of us managed to get out of their line of fire. Hassfurth and Sandy joined Gleason at twenty-five thousand feet. I stayed down to learn who had attacked us."

"Eight one-seater biplanes," Kestrel repeated. He talked like a man under the influence of a strong drug. "How could you tell who they were at night?"

"My Lancer is equipped with an infra-red-ray telescope," Bill said. "I could see them as plainly as I could in the daytime. I saw their uniforms. They were not wearing overalls. And I saw the British cockade and the squadron

insignia. I checked the insignia with a plane on the field a few minutes ago. They are the same."

"Yes," Kestrel said, like a man who is tired beyond endurance. "they are the same. About two hundred miles northwest of here?"

"That's right!" Shorty barked.

Kestrel looked at him for a moment as though he didn't see him. Then a faint smile flickered on his twisted lips.

"I'm sorry this has happened, Barnes," he said. "I am more sorry than I can say. Things are happening so fast I can't keep up with them mentally. I must explain to you. I'll try not to bore you. You must be patient. I hope this won't make a difference. I've been hoping since I learned you were coming you would help me, Barnes."

"How did you know I was coming?" Bill asked.

Kestrel's eyes left Bill's and traveled upward to a point on the wall across from him, then shifted back to Bill's face, then to Shorty's. He shook his head sadly as he spoke.

"I learned it from a letter Douglas was writing to you, Barnes. We found it in his rooms in town. He—he—"

"What about Douglas?" Shorty snapped again. "Where is he? We know about his court-martial. Where is he?"

"He's dead," Kestrel said. "He was murdered night before last!"

"Murdered!" Shorty said slowly. His own face was white now, and he was thinking about the parents of young James Douglas. He was thinking about the tragic death of James' older brother during the War. Thoughts rushed through his mind. He tried to speak and found that he couldn't.

Kestrel's eyes softened as he saw the tragedy written on Shorty's hard face. He put up a hand and spoke softly.

"Let me tell you about things," he said. "I'll lay all the cards on the table. You'll understand if you let me tell you the whole story. It can't be told in halves. You wouldn't understand if I told you that way."

Bill and Shorty sat spellbound while Kestrel unfolded the whole weird story. At times Kestrel stopped as they glanced at one another incredulously.

He told them of the unrest of the natives and the attempt to mutilate the sacred Dushara. He told them of the theft of eight British planes and the cashing of young Douglas. He told them all he knew up to the time he had gone to bed the night before.

"Those planes that attacked you," he said, "were the ones that were stolen. It is as I thought. Some one is work-

ing from the inside. They knew you were coming. They sent out those ships to stop you. But who sent them? And from where did they come? Those two things, gentlemen, are the things that confront us. If we can find out those things we will learn who murdered your friend.

"I admit now I was a fool to listen to the charges against him. He was not guilty, and he was determined to prove it to us. The things he learned cost him his life. What were they?"

"If I had not been such a fool he would be alive to tell us. One of your own men has been dangerously wounded through no fault of his own. It seems that you are drawn into this thing without being able to help it. The long arm of the man behind it reached all the way to China to enmesh you in a fiendish plot that may cost thousands of lives. I need your aid. I beg you to work with me. By working together we can each satisfy our own interests."

"We're in, all right," Bill said. "And we're going to stay. Have no fear about that. We want to know who murdered Douglas. And if Gleason doesn't pull through——"

He stopped, unable to go on.

"What about Douglas?" Shorty asked. "Will he be sent home?"

"I have cabled his parents," Kestrel said. "I will do what his parents wish."

"I'll take care of that," Shorty said abruptly. "They are friends of mine, too."

VI—PETRA'S STRONGHOLD

BILL and Sandy paced nervously up and down the anteroom of the hospital. Shorty Hassfurther, whose anxiety was even greater than theirs about his best friend and War-time pal, sat reading a newspaper and mentally cursing his nerves.

An interne had told them that they would not be permitted to see Red that day. He was so heavily doped, he said, he would not be able to recognize any one.

But they were waiting to get a report from the doctors who had worked on his shoulder in the operating room. They knew it was very possible that his left arm might be amputated.

Major McCardell, in command of the medical unit, made a report to them. He was an elderly man with a long and naturally dour face. Bill's heart fell to his boots when he made his appearance and Bill got a glance at his face.

"I'm glad to be able to tell you," he said, "that it isn't as bad as it looked at first. He will not lose his arm and we will be able to build up the bone very satisfactorily. It will always be a little stiff, but he will not be a cripple. He is doing very well considering the shock and frightful loss of blood. We

will have to keep him extremely quiet for a few days. It is possible we may need a blood transfusion or two."

"That's where I come in," Shorty said gruffly. "My blood has been tested for him. They used my blood for him once before."

"That's a relief," McCardell said. "We may need you, Hassfurther."

"Wing Commander Kestrel has given us quarters on the field," Bill said. "Will you send an orderly to us as soon as we can see Gleason?"

"I will," McCardell nodded. "And I'll keep you informed about any developments. Don't worry about him; that won't do any good."

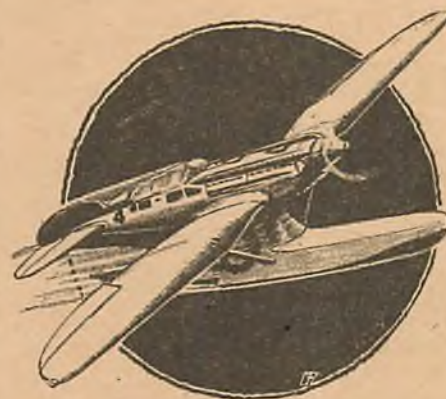
"O. K." Bill smiled. "We know you're doing your best."

Bill reported to Wing Commander Kestrel before he took the Silver Lancer into the air a half hour later.

"I'm going to look the land over," he said to Kestrel. "I may see something that will give me an idea."

"Some one has got to get an idea pretty quick, Barnes," Kestrel said. "If we can find the place they are hiding those eight planes and where they took the cargo from those seven caravans, we'll be a long way toward a solution. Even my own men are getting jumpy now. They know that somewhere there are traitors. We are like a house divided. Every one is suspicious of every one else." He wiped his face with a handkerchief, and Bill saw that his face was white and tense, and strained to the breaking point. "You'll want to go through Douglas' things with Hassfurther?"

"When I come back," Bill answered shortly. "Hassfurther will remain here



One of Bill's Snorters.

on the field. Sanders is going with me."

Bill whipped the Silver Lancer into the air in a manner that had the grease monkeys and mechanics on the field wide-eyed. As he spiraled upward, they stood in little groups hardly able to believe what they saw.

At five thousand feet Bill leveled off and looked over the side as Sandy's voice came over the intercockpit phone.

"Say, Bill," Sandy said, "I wonder where a fellow would go to buy a horse?"

Bill didn't answer him. He was searching the boulder-strewn desert below with his eyes. Here and there he could see the tents of the nomad Bedouins with their camels grazing near by.

"How much do you think a good Arabian horse would cost?" Sandy persisted.

"How the deuce do I know?" Bill growled. "Why don't you get yourself a harem instead?"

"Not for me," Sandy said emphatically. "I'd rather have a horse any day than a lot of women!"

"All right, all right," Bill said. "Now shut up. I didn't come up here to talk about horses. Keep your eyes on your altimeter. I'm going to cut north over the Dead Sea."

They raced the length of the Dead Sea into the Jordan Valley before Bill banked the silver ship around and came back over the precipitous cliffs on the eastern shore. Black basalt from volcanic eruptions blended with the bright red of the sandstone cliffs. Where wind and rain had chiseled away portions of the cliffs, great columns stood erect with black crowns on their heads, which faded into red, until, at the base, the bright-blue waters of the Dead Sea lapped at their feet.

The narrow chasm, through which the Wadi el Mojib flowed into the Dead Sea, flashed below their wings, and here and there they saw bright-red patches where the fertile land had been newly plowed. Scattered along the wadies were camps of Bedouin goat-hair tents.

Gliding down to a thousand feet as they entered another valley, they could see the terraced gardens and orchards below El Kerak.

Then they were back over the vast expanse of desert plateau that was the northernmost extremity of the Syrian Desert. The tan-and-yellow desert was bare of trees or color, except where a wadi cut its surface. To the east the desert rolled away interminably, and to the west a low range of hills towered into the air.

Bill stuck the nose of the Lancer up, and just cleared the tops of the scrub-oak thicket on the westerly range with his altimeter at five thousand feet.

They both gasped in amazement as they sped between the dazzlingly colorful twin ranges where Petra nestled. To the west stretched the deep expanse of the Araba, blue-tinted, remote and forbidding. The yellow, tan and ivory sandstone changed to vivid red as they flew between the two ranges of fascinating shapes and color.

"That is Petra, kid," Bill said, pointing. "Kestrel gave me a map. The large building in ruins used to be the castle of Pharaoh's daughter, and the hill above it is El Habis, the Acropolis Hill.

"Over there on the left is El Khubdhah and El Der. The river below us is the

Wadi es Siyagh. It's the only outlet from Petra, except Es Siq, where Douglas was murdered two nights ago. But it's impassable to caravans."

"How did that caravan get out of Petra?" Sandy asked.

"It didn't," Bill said grimly. "It's in here some place. That highest peak is Jebel Harun. The building on the top with the white dome is the tomb of Aaron, and the place where the Dushara is kept. Some one tried to get in there the other night and mutilate the Dushara. The natives, according to Kestrel, are half mad because of it.

"That great flat mountain over there is Umm el Biyara, Petra's most ancient stronghold. It tells in the Bible how David wanted to storm the Edomite stronghold in his day. There used to be a single path cut in the side of it so that men could get to the top. But erosion has worn it away."

"We could almost land on there, couldn't we, Bill?" Sandy asked.

"Almost is right," Bill said. He flew lower and inspected the great, flat surface. "It might be done, but I don't want to do it. It was impregnable in its day, and still is, except from the air. The little mountain beside it is El Habis. That's an unfinished tomb. The rock-cut *couloir* was the only way to the top of Umm el Biyara. After the men had taken their women and children and elders to the top they could close off the path with a gate. They had cisterns on the top—you can still see them—to catch and hold water."

"Gosh, Bill," Sandy said. "You know a lot, don't you?"

Bill swung around in his seat and looked at Sandy suspiciously. But Sandy was serious.

"You aren't trying to kid me, are you?" Bill asked.

"No! Gosh, no, Bill. I'm really interested."

The air had become bumpy now above the crags and caverns of Petra. Bill yanked the stick back and zoomed the big ship upward.

"The best way to get into that place is on a horse, Bill," Sandy said.

"That's the way we'll come next time," Bill answered. "I'm going to circle this place now. Those caravans and those eight ships have to be some place. Button up your lips. I'm going to open the Lancer up wide and cover as much territory as I can."

VII—STRANDED

THE RED limestone hills surrounding Petra gave way to the great barren wastes of the desert as Bill opened the throttles of the Lancer and circled westward. Here and there among the boulder-strewn stretches of desert west of Ma'an they could see Arab encampments with horses grazing where there seemed to be no vegetation.

As the ruins of an old Arab citadel flashed beneath their wings, Bill stuck the nose of the Lancer down and circled back. No living thing moved within the crumbling walls. Outside, heat danced from the sun-scorched steppe as the sun crept higher into the heavens.

Twice they saw large bands of roving Bedouins astride sturdy Arab horses. Flying low, they saw the fierce nomads of the desert unsling their rifles and felt the drum of their bullets as they pounded through the metal skin of the Lancer. As they nosed upward the tribesmen shook lances and yataghans at them until they were mere specks on the desert.

"Take her for a few minutes, kid," Bill said to Sandy. "There is something screwy about our fuel tanks. I told 'em to check 'em when we landed this morning. We may have picked up a couple of punctures last night."

Sandy held the Lancer at three hundred miles an hour while Bill checked the fuel lines and tanks. He checked and rechecked his instruments to find their position.

"We're almost two hundred miles from Ma'an, Bill," Sandy said. "And she isn't pulling the way she ought to. I just adjusted the props and it didn't do any good."

"Stick the nose on Ma'an, kid," Bill said. His eyes were worried as he scanned the instrument panel. "Give her some more juice."

Sandy opened the throttles another notch, and the air-speed indicator crept up to four hundred miles an hour. Then he leaned over and inspected the extension handles of the two .50-caliber machine guns at his right and left and fingered the trigger cables. The circular dials of the automatic counters showed capacity filling.

For fifteen minutes Sandy held the nose of the Lancer pointed at the horizon, and Ma'an. Perspiration dripped down his face as the sun became hotter and hotter. He half closed his eyes to protect them from the intense glare.

Suddenly his eyes flew open and he sat up in his bucket seat with a start. The far-away roar of airplane motors came faintly to his ears. He thumbed the sun, but could see nothing. He looked back and up on both sides, and still could see nothing. He saw that Bill was bent over so that any sound would be drowned by the roar of the twin Diesels in the Lancer. He bent his head and cocked it to the right, then to the left.

It sounded as though the planes were coming toward him from his starboard side. He scanned the air above and below the starboard wing. The sound was certainly growing louder and coming closer. He decided he had better speak to Bill. He hesitated another minute while he listened.

And while he listened it happened!

Two formations of three fast, rugged, one-seaters were diving out of a wisp of fleecy clouds a thousand feet overhead, their mighty power plants roaring at high-pitched crescendo as they dived.

Sandy gasped in horror and shouted Bill's name three times in the inter-cockpit phone. White streamers of lace floated through the air as machine guns began to yammer their song of death.

As Sandy jammed the control column forward into a vertical dive, Bill grabbed at the controls and yanked the throttle wide.

"Break out that swivel gun!" he roared as the Lancer plummeted toward the desert at terrific speed. "Don't miss when I come back up in a loop!"

Sandy broke it out and pushed back the sliding hatch. He ran the gun across the track while he nearly choked with excitement. His freckled face was dripping with perspiration. He held the palms of his hands against his head for a moment to lessen the pressure as the Lancer continued to plunge earthward.

The two V formations continued their dive, following the Silver Lancer toward the desert. Bill's mouth was a firm, hard line across his face as he glanced back and up. He held the stick forward until the Lancer was almost at terminal velocity. Then he swung the nose up with the touch of a master. Machine-gun bullets drummed into the tail assembly as the Lancer came up and over on its back.

Bill centered the controls and rolled right side up as the six light-blue ships dived under him. He could see the cockade of the Royal Air Force and the same squadron insignia he had seen on the ships that had attacked them the night before.

Opening the throttle of the Lancer wide, he stuck the nose up in an abrupt climbing turn until he almost stalled. He kicked his rudders and rolled to the right. He was back on his original course with the nose of the Lancer pointed toward Ma'an.

He cut his throttles while he studied the six blue ships. The men piloting them wore helmets, goggles and overalls, and he saw, as they came out of their dives in a precise formation, that they could fly.

A thousand thoughts raced through Bill's mind as he watched them spiral upward and return to the attack. He knew he was justified in returning their fire. Yet he hesitated. He knew he could open the throttles of the Lancer and run away from them. He could land safely at Ma'an, but he would still know nothing about their base.

He could climb to a ceiling they could not reach and follow them to their base, but he was worried about his fuel supply. If his tanks had been punctured the night before and he was forced to

land, he and Sandy would be at their mercy.

Then one of the blue ships was on his tail again. He heard the *tat-tat-tat* of its machine guns, followed by the fire of another. He could feel the bullets lashing through the Lancer's tail assembly and creep forward. He pulled the stick back and sent the Lancer skyward in a desperate zoom.

"All right, kid," Bill shouted into the telephone. "Let's dish it out!"

He heard Sandy's swivel gun chatter as the six rugged biplanes closed in on them from every side. He gunned the Lancer and pulled away. The light-blue ships tried desperately to stay on his tail.

"Now, kid!" he roared. "We'll take it to 'em!"

He whipped upward in a chandelle and dived head-on at the six rugged one-seaters. He dived with his two .50-caliber guns yammering. But his speed was too great for accurate fire. The blue ships dived and zoomed and skidded to get out of his mad path.

A blue ship came under his sights for that fraction of a second that is enough. His finger fastened down hard on his gun trips. He raked the blue ship with a withering fire. The pilot's head jerked upward, then slumped forward on his chest as it became a mask of blood. The plane slipped off to the right and began a fluttering descent to the desert, until the nose fell and the tail began to spin.

Bill gunned his engine again and came over in a normal loop on the tail of another ship. His line of tracer smoke curled above the head of the pilot. His bullets crashed into the fuselage and crept forward into the engine block. Little wisps of smoke rose along the engine housing. Then orange flame raced out and back into the face of the pilot.

As Bill zoomed upward he heard Sandy's swivel gun chattering again. He glanced back over his shoulder, and saw that Sandy's eyes were gleaming like balls of fire in a face that was streaked with black.

Then the air seemed to be filled with flashing, slashing blue planes. They darted about the Lancer like wasps about an enemy who has disturbed their nest. They were everywhere, charging in from all angles, trying to get the Lancer in the vortex of their fire.

Bill whipped the Lancer through the air with the speed and precision of an automaton. He knew that the Lancer was taking a terrific pounding, and he knew that one bullet in the reserve tank on which he was running might be fatal. But he was determined to fight it out now. He was determined to fight until he had the knowledge he wanted. And that meant he must drive off those four planes so that he could land beside the pilot who had bailed out of his burning plane.

As another blue plane came under his sights his finger clamped down on the trip of his 37 mm. cannon. A half dozen roaring barks sounded above the din of throbbing motors and yammering machine guns.

What had been a sturdy biplane became a great cloud of black smoke, stabbed with streaks of saffron and crimson. Ribbons of bright orange shot out of it as it broke in all directions. The three ships behind it zoomed upward to get out of the path of the flying debris. Wings and fuselage hurtled through the air as the shells of the 37 mm. gun struck the engine block and detonated. The engine dropped from the black cloud and raced toward the desert. A gust of wind struck the black cloud of smoke and tore it apart. All that was left of the biplane and its pilot were bits of cloth and metal falling earthward.

"That ought to teach 'em something!" Sandy gasped.

But Bill was too busy avoiding the six streams of death that were aimed at him to answer. He grimly counted three in his mind as he came up in an outside loop and dived. Again his fingers fastened down on his machine-gun trips. The pilot of the ship that was under his sights tried to stand up and walk off into space. Or so it seemed. But he would never try to walk again. His body had been made into a sieve, from which his life's blood poured out into the cockpit as the ship plunged toward the silent, endless desert.

It was then that the other two biplanes decided that discretion was the better part of valor. They stuck the noses of their ships down and opened their throttles wide as they saw the fourth of their comrades go to his death. Their faces were white and frightened as they glanced back and up over their shoulders.

Bill wiped the perspiration out of his eyes as he watched them go. For an instant he had an almost overwhelming desire to follow them and tear their ships to pieces with his bullets. They had tried to gang him, thinking their superior numbers would give them an advantage he could not overcome.

The blood pumped through his body like liquid fire as he watched them go. They were the murderers of young Douglas. And they had tried to murder him. He debated whether or not it was his duty to go after them. Then he decided against it. If he could pick up the man he had seen bail out of his burning ship he would take him back to Kestrel, and Kestrel would make him talk.

He took his eyes off the fast-disappearing ships and scanned his instrument panel. The blood in his body, which had been boiling with rage a moment before, seemed to freeze.

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His fuel gauge showed zero as his engines began to spit and sputter! He idled them out and tried to hold his altitude while he studied the barren wastes of sand below them.

"Gosh, Bill," Sandy's voice came to his ears. "We'll never get out of here."

"Shut up!" Bill answered as he threw his radio key and began to chant Shorty's call letters into the microphone.

But Shorty's voice did not answer. No sound came back to Bill but the faint crackle of static. He twirled the volume, wave-length control, and the master tuning control to get the radio station of the Royal Air Force field at Ma'an.

As an answering voice came back he spoke his name once. Then all was silence. He stared at his radio controls and twirled them while he continued to chant the field's call letters into the microphone. But no voice answered except Sandy's.

"It's dead, Bill," he said as Bill threw his telephone switch.

"Get out some glasses," Bill said to him. "See if you can locate Ma'an. I can't see it because of the mountains to the east. Perhaps you can find it with the glasses. I'm trying to stretch out our altitude, but we're almost out of it."

"I can see where it is, approximately," Sandy said in a moment. "But it's a long way from here. What do you suppose is wrong with the radio?"

"Something shot away," Bill said curtly. The cold hand of fear clutched at his heart as he gazed at the interminable sea of sandy hillocks that stretched on and on, forever.

He knew that unless one of Kestrel's men sighted them in that vast expanse of sand it would be their last resting place. A man might fight his way through to water and civilization, but his chances would be small.

He threw a switch and watched his instrument panel until his wheel-landing-gear light and float-landing-gear light burned. Then he flattened the Lancer out until his wheels were just kissing the sand. They struck the irregular surface at eighty miles an hour, with flaps set well down. The engines gave their last sputtering gasp as Bill threw on his wheel brakes and cut his switches.

Suddenly he sat bolt upright in his bucket seat and probed the air above him. Then he tore out his radio headset and shouted at Sandy.

"Get your gun ready, kid!" he said. "Those two planes are coming back. They must have seen us banking down and came back to find out what was the matter." He went over the side of the Lancer with a bound, saying, "I'll get the submachine gun and the rifle out of the emergency locker. Be ready; they'll come shooting."

They came shooting! They came roaring down like two attack ships with all

four of their machine guns yammering and their engines wailing in protest.

But they had not counted on the flexible gun in the rear cockpit of the Lancer. They had expected to find their two victims helpless.

Nor could they shoot with the accuracy young Sandy displayed. After that first terrific onslaught they zoomed upward as Sandy's .30-caliber gun sent burst after burst into them.

"Gosh, Bill," Sandy said after that first attack, "if we could only use the cannon!"

"Take this Thompson gun," Bill said grimly. "I'll handle your gun. They'll be back in a minute."

But they didn't come back. Bill watched the two circling ships, waiting for one of them to rock his ship slightly and extend an arm upward, meaning to attack.

Instead, the leader of the two ships rocked his plane violently and "peeled off" toward the south, indicating that he was going out of action. The other one followed close on his tail. They had had enough of the accurate shooting of Bill Barnes and Sandy.

"They'll probably come back with reinforcements," Bill said. He ran his tongue across his dry lips and was startled as he caught himself doing it. He knew that the terrible hands of desert thirst were flicking him. He knew that unless one of Kestrel's men located them they would never be able to get out of there alive.

But he kept those thoughts to himself as he looked at Sandy. He knew that it would be useless to tap the radiators for water because of the chemical mixed with it. It would make them both deathly sick. He thought about two French airmen who had been forced down in the Sahara. They had kept themselves alive by scooping the dew off their wings in the morning and putting it in a container.

That and a thousand other things, flashed through Bill's mind in those first terrible minutes. Then he got hold of himself and grinned at Sandy.

"We'll have to get under the ship, kid," he said, as though this was something that happened to them every day. "We can take advantage of the shade. We won't get so thirsty. Kestrel and Shorty will have men out looking for us in no time."

"I'd like to get hold of that grease monkey who said our fuel was O. K.," Sandy said.

"Perhaps," Bill said slowly, "he told us that with a purpose."

VIII—TRUE HORSEMANSHIP

THE NEXT FEW HOURS were burned into their brains indelibly by the desert sun. When it seemed that they could stand no more, the sun turned on

its most scorching rays. At midday they lay panting below the float of the Lancer, moving every few minutes to stay within its shade. Their lips were beginning to crack and their tongues swell into things that felt like huge, dry sponges.

Bill tried to tinker with the radio. But each time he thought he had mended the defect and threw the switch, no crackle of static came to his ears.

"Gosh, Bill," Sandy said at two o'clock, "do you suppose they'll look for us? I—I—"

"Sure, they will," Bill said hastily. He gazed at Sandy's burning eyes and cracked lips and turned his head away to hide the thing that came into his own eyes. "They're probably scouring the countryside now. They may not pick us up until morning. But they'll find us. It gets cool out here at night. We'll be able to get water then by scraping moisture off the wings. Keep your chin up, kid. We've been in tighter spots than this one."

"Oh, I'm all right," Sandy said, trying to laugh. But it wasn't much of a laugh. It was more like the hack of a consumptive. "We—we'll be laughing about how thirsty we were in a few hours."

"That's right, kid," Bill said. But he knew it wasn't right as he anxiously scanned the sky. He knew it would be a long time before they laughed about that day—if they ever laughed again.

In the late afternoon Bill broke out some chocolate from the emergency equipment in the tail locker of the Lancer. And he jotted down in his memory to the effect that if they ever did get out, in the future the emergency equipment would include a certain amount of water.

The sun was poised, ready to plunge into the sea of sand to the west when Sandy let out that first startled exclamation and began to shout at Bill, and point.

Bill followed the direction in which he was pointing, and his eyes narrowed after their first moment of astonishment. Between two hillocks of sand they could see a half dozen mounted men. They wore the bright-colored mantle and head cloths of the desert nomad, and Bill could see that they were armed to the teeth with lances, rifles, shotguns and yataghans. Then they were gone from view.

"Wait a minute, kid," he said. "Stop yelling! They may not be so friendly. Remember, they took shots at us before."

"I'd do anything for some water, Bill," Sandy said desperately.

"If they're unfriendly you don't want to fall into their hands," Bill answered sharply. "Kestrel said the natives were ready to revolt. It may be a tribe on their way to join others in the revolt.



Bill brought the Lancer around and stuck the nose down toward the little knot of men.

Bedouins are notorious for their methods of torture. Get into the rear cockpit of the Lancer. I'll get in the front. If they come toward us in a friendly fashion, stay in the cockpit and have your gun ready. If they come shooting, let 'em have it."

As twilight settled upon them, the desert became a place of exquisite color for that brief period between daylight and dark. Then the day's fierce heat began to radiate away through the clear, dry air, and the chill of night crept upon them. In an hour's time the moon was high overhead, making the night nearly as light as day.

Suddenly Bill sat up in the front cockpit and threw the switch on the infra-red-ray telescope. He had seen what he thought were moving forms on the crest of the hillock ahead. He took one look through the telescope, then spoke to Sandy.

"They're coming, kid!" he said. "There are forty or fifty of them all around us. I can cover the front with my machine guns. You'll have to take care of the rest. They'll charge on horseback. Use your—"

That was as far as he got when that horde of wild tribesmen came charging over the hillocks of sand from every side, their robes flapping out behind them, their guns spouting fire and death, their horses driven half crazy by their high-pitched screams.

Bill's finger came down on the gun trips of the two .50-caliber guns in the nose of the Lancer as that first mad wave reached the crest of the hillock. His guns cut a path through the charging tribesmen before they began their charge. As they tore down the side of hillock, out of range, he snatched the Thompson gun from the deck and swung it in an arc.

Behind him, Sandy ran the .30-caliber gun over its track with the swift precision of a trained gunner. Horses and men fell in screaming heaps as his bullets tore into them.

The desert night became a place of horror as the deadly fire of the two machine guns cut down the charging zealots. Yet, on they came, shooting from the saddle, screaming their chant of hate and war.

When they were within twenty yards of the Lancer the thin line wavered. Horses and men piled up in struggling, howling masses. The unwounded men behind them could not advance. For an instant they hung there, returning the machine-gun fire with poorly placed shots from their rifles.

Then they broke and went streaming back over the hillocks, with half their number dead or dying.

"Take it easy, kid," Bill said. "They'll be back. You'd better get some more ammunition in your gun while you can."

The horrible screams of the wounded

horses and men nearly drowned out his words. An occasional shot pinged into the Lancer from behind the hillocks.

"Gosh, Bill," Sandy said. "I wish they'd go away now. Look at that horse over there. It's a beauty. I could get it if I dared get out."

"You stay where you are, you half-wit," Bill growled. "You don't need a horse; you need a nurse."

Bill's hands were trembling and his whole body ached from loss of sleep and nervous excitement as he checked over the ammunition he had left for the sub-machine gun. He found that he had just enough to stand off another charge such as the last one.

"How about your ammunition, kid?" he asked Sandy.

"Not an awful lot left, Bill. One belt."

Bill shook his head angrily, then peered through the infra-red telescope again. The Arabs had stopped firing now, and he could see no movement beyond the hillock. He debated with himself for five minutes about the course he ought to pursue.

"Listen, kid," he said finally. "can you ride that horse?"

"Ride him!" Sandy answered. "Look at him, Bill. He's still standing there like a statue over the body of his master. You know I can ride him. I learned how to ride horses right after I learned to walk. I—"

"All right," Bill said sharply. "I'm going to give you a chance to ride him. Kestrel or Shorty will never find us here before that gang of bandits out there finds a way to slit our throats. It can't be more than twenty miles to Ma'an. If you can get into the saddle and get through that first line of Arabs you ought to make Ma'an within a couple of hours. An hour after you leave I'll turn on the landing lights of the Lancer to help you find me from the air. Don't let Kestrel send a lot of planes out here to crack up when they try to land.

"Just tell Shorty the situation and come with him. He'll get in some way. You can bring enough fuel with you to get the Lancer out of here. Take an automatic and the rifle with you, and be ready to shoot when you ride over that rim of sand. Then ride!"

"What about you, Bill?"

"I'll be all right, if you get through safely. I have enough ammunition to hold them off for a couple of hours."

"Suppose they charge in the way they did before—from all sides?"

"I'll handle that," Bill said. He knew he didn't have a chance if they started working their way toward him under the cover of darkness. If they charged, mounted, he could stand them off for a time. But if they crept in on him, they could get close enough to use their deadly yataghans.

He believed Sandy could get through if he once got astride the superb white

horse that was only fifty feet away. Those fifty feet would tell the story. The kid would either get through safely or be killed in the saddle—which was better than being tortured.

Bill closed his lips tightly and peered through the telescope again. "All right, kid," he said. "Good luck! Shoot your way through if you have to. Don't let them take you alive."

He found Sandy's hand with his own in the dark.

"I hate to leave you here, Bill," Sandy said anxiously.

"Don't worry about me, kid," Bill laughed. "None of those desert lice have my name on their bullets."

"I'll be seein' you, Bill."

"Right, kid. Go like the devil when you get aboard."

He saw Sandy drop over the side of the Lancer, saw his dim form, bent half double, flash across that fifty feet of sand. He expected to hear a fusillade of rifle shots and see him pitch forward on his face at any moment. Those few seconds brought cold perspiration out on Bill's body and left him weak and trembling. He saw the white horse go up on its hind legs with its front ones pawing the air. He saw Sandy bent over its neck. For an instant they were silhouetted against the sky, a perfect target for enemy bullets.

Then the horse and Sandy became a part of the desert night. He saw them again for an instant as Sandy topped the first hillock, saw them plunge out of sight on the other side.

Shouts and rifle shots floated back to his ears. Then a bedlam of clamor, Arab oaths, and he heard an automatic spit many times—and knew that Sandy was still in his saddle.

As the shots and cries died in the distance, Bill knew that Sandy had got away without being hit.

He leaped for the telescope and then clamped his fingers down on the trigger cables of his two .50-caliber guns as twenty or thirty men came charging over the crest of sand ahead, on foot. His bullets cut two paths through their ranks before they plunged down the side and were out of range. He dived into the rear cockpit of the Lancer and swung the .30-caliber gun to bear on the screaming tribesmen as they came on and on.

His blood ran cold as turbaned heads appeared above the rim of the Lancer. The two automatics in his hands were hot as he fired them point-blank into the desperate, mad faces. Something seared his arm as a dagger slashed through his overall.

WHEN young Sandy went over the side of the Lancer he was not worried about Arab bullets. He was worried about one thing only. That was: whether he could get into the saddle

Again he paid no attention to the challenge of the guards as he pounded on the door of Kestrel's rooms. When the door flew open to expose the haggard face of the wing commander, Sandy half staggered, half fell into the room.

SKYWAY MODEL AIRCRAFT SUPPLY CO.

He whipped the Snorter into the air

with a characteristic touch and stuck the nose almost due west. He picked up the landing lights of Bill's Lancer and Shorty's Stormer within a few minutes.

His heart was pounding so hard that he could hardly breathe as he dropped a flare and set his Snorter down within

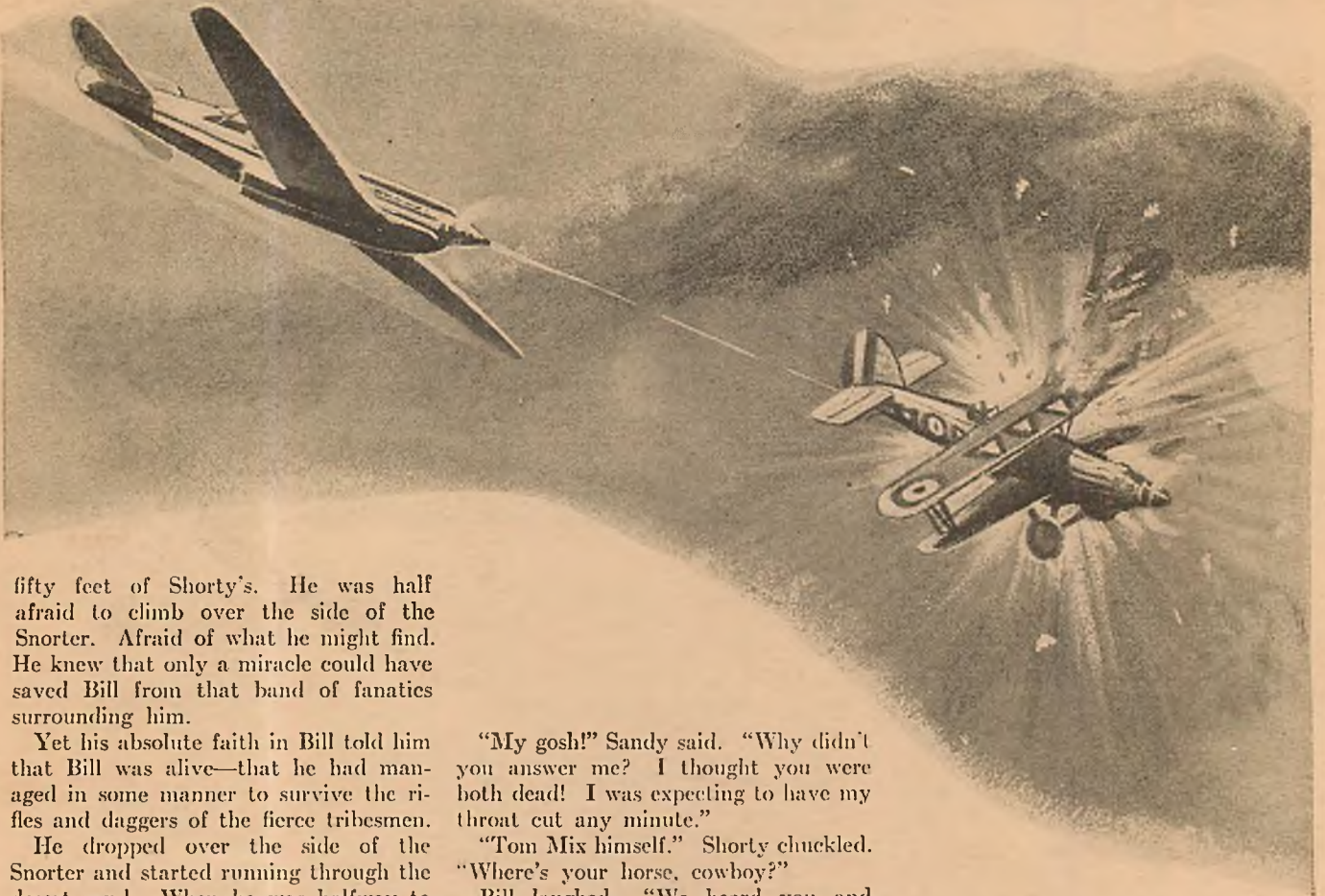
Lancer with pounding feet and heart. He swung up on a step of the Lancer and pulled himself up.

Shorty was bending over Bill, applying antiseptics to a half dozen minor wounds. Sandy's face blazed with anger as Shorty and Bill gazed up at him with the bland expressions of men who are used to such things.

brought him back here. We might have made him talk. I'm sorry I had to shoot down four of your stolen ships, Kestrel. But that leaves your enemy with only four. He can't get very far with them."

"You're wrong, Barnes," Kestrel said wearily. "Ten more of our ships were stolen from under our noses to-day. It must have been part of that group that attacked you."

Bill stared at Kestrel incredulously.



fifty feet of Shorty's. He was half afraid to climb over the side of the Snorter. Afraid of what he might find. He knew that only a miracle could have saved Bill from that band of fanatics surrounding him.

Yet his absolute faith in Bill told him that Bill was alive—that he had managed in some manner to survive the rifles and daggers of the fierce tribesmen.

He dropped over the side of the Snorter and started running through the desert sand. When he was halfway to the Lancer he came across the bodies of a dozen dead Bedouins. They were piled on the rim of a hillock where Bill's bullets had found them as they came over the top. When he could restrain himself no longer he shouted Shorty's name. Then again, and again.

His blood seemed to freeze in his body as no answering call came back to him—only the faint sighing of the desert winds and the swish of the sand beneath his feet.

He drew his automatic from an over-all pocket and slowed his pace. Had they got Shorty, too? Were they waiting for him? Cold chills crept up his spine and seemed to fasten around his heart.

Then the sound of faint voices came to his ears. He stopped and stood motionless. The voices came again, higher, clearer.

He recognized the voice of Bill Barnes.

He shouted again. And this time Bill's voice came back to him. Sandy covered that remaining space to the

"My gosh!" Sandy said. "Why didn't you answer me? I thought you were both dead! I was expecting to have my throat cut any minute."

"Tom Mix himself," Shorty chuckled. "Where's your horse, cowboy?"

Bill laughed. "We heard you and thought that you'd get over here all right," he said. "We didn't hear you shout."

"You're all right, Bill?"

"Just a few dagger scratches," Bill said. "They tried to get me again, and almost succeeded. I cracked a few heads and threw a tear bomb at them. It took the fight out of 'em. They went streaming back across the desert—what was left of 'em—to the place they came from."

IX—A BIG PROBLEM

BILL BARNES could hardly hold his eyes open as he sat in Kestrel's quarters a half hour later.

"Gleason's all right, you say?" he asked.

"Quite," Kestrel answered. "McCardell says he has a splendid constitution. He'll be as good as new in no time."

"It's too bad I ran out of fuel," Bill said bitterly. "I could have picked up the man who bailed out of his ship and

"Ten more!" Bill gasped. "How could they do it? Who flew them?"

"Let me explain," Kestrel said, mopping his face with a shaking hand. "I understand now why Douglas was framed and then murdered. And why the attack was made on you. Douglas was one of the three flight commanders in the squadron whose planes have disappeared. The other two were named MacTavish and Sneed. They are the two scoundrels who have been working for the enemy inside our lines. They disappeared along with the captain I appointed in Douglas' place to-day."

Bill Barnes got to his feet and paced across the room. When he whirled, he addressed Shorty Hassfurth. "Do you get the set-up?" he asked.

Shorty stared at him for a moment, then slowly shook his head. "It's coming to me," he said.

"MacTavish and Sneed tried to get Douglas to work with them," Kestrel went on. "He wouldn't listen to them.

So they framed him as a common thief so he would be cashiered and out of the way, and another man put in his place who would work with them. They slipped in a bunch of renegade fliers; there are plenty of them out here in the East. They did it right under our very noses. They dressed them in British uniforms and waited for the right time to strike. Our enlisted mechanics took their orders from MacTavish and

"Don't you have some idea who is behind all this?" Bill asked. "Hasn't some native sheik or former ruler made trouble for you?"

"Plenty of them," Kestrel said. "The French have had the same trouble in Syria. The Arabs have been dreaming of one great Arab State for hundreds of years. An Arab State ruled by Arabs, without a mandate."

"But where," Bill asked with as much patience as he could muster, "are their headquarters? Where can they hide those planes right under your nose?"

"And just who disgraced and then murdered Douglas?" Shorty snapped.

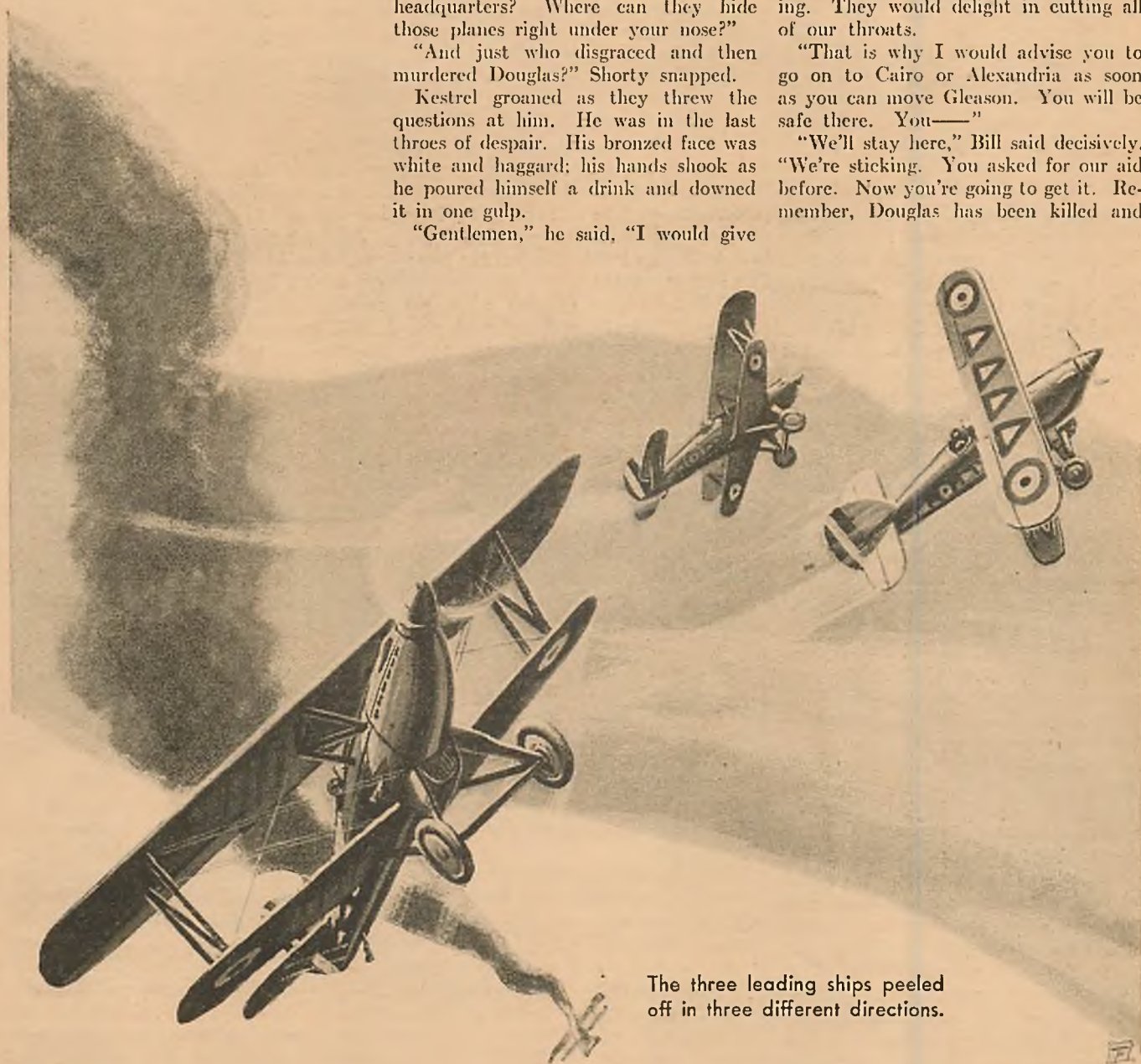
Kestrel groaned as they threw the questions at him. He was in the last throes of despair. His bronzed face was white and haggard; his hands shook as he poured himself a drink and downed it in one gulp.

"Gentlemen," he said, "I would give

units. They are ready to strike in unison when they receive the word. When they do, the slaughter will be frightful. "The desert tribesmen are mad fanatics when they go into action. They lose all control of themselves. Their only desire is to murder, torture, and plunder. They have always believed that the desert belongs to them. That is why they prey on caravans and pilgrimages to Mecca. They believe they are justified in murdering and plundering. They would delight in cutting all of our throats.

"That is why I would advise you to go on to Cairo or Alexandria as soon as you can move Gleason. You will be safe there. You——"

"We'll stay here," Bill said decisively. "We're sticking. You asked for our aid before. Now you're going to get it. Remember, Douglas has been killed and



The three leading ships peeled off in three different directions.

Sneed. They didn't know there was anything amiss until it was too late.

"Douglas must have found out something. That's why he stayed around here. They learned that he was getting on the right track. And——"

"They murdered him!" Shorty said bitterly.

"That's it!" Bill snapped. "But what about the squadron commander? Have you checked on him?"

"I'm doing that now," Kestrel said wearily.

my life to be able to answer those questions. And I've got to find the answer soon or Trans-Jordan is going to flow deep with human blood.

"Whoever is the leader of this rebellion is working with sagacity and craft. Usually different tribes of Arabs will not band together—not even against a common enemy. They prefer to go their own way, fighting their own battles. But now they are being cleverly welded together, if I can believe the reports that are coming to me from our intelligence

one of my men dangerously wounded. That's reason enough for me to see the thing through.

"But now," Bill went on, "I've got to have some sleep. I can't go on until I've had a few hours' rest. You'll let me know if anything develops with Gleason?"

"I'll let you know," Kestrel said.

Shorty followed Bill from the room.

SHORTY HASSFURTHER strode across the landing field at Ma'an shortly

after breakfast the next morning. His face was like a thundercloud.

Bill had told young Sandy to stand by where he could find him—and Sandy had disappeared. Shorty had an idea where he could find him, and why. He swung along a string of buildings at the edge of the field. These were the stables.

In a small corral between two of the buildings he came upon Sandy. He stopped abruptly as he heard a string of words coming from Sandy's lips, and his scowl changed to a grin. He saw that Sandy was talking to the horse he had ridden into Ma'an the night before, and he saw that he was deadly serious about it. He was making emphatic gestures as he recited poetry to the horse. Shorty stifled his laughter and listened.

—“Away! the fevered dream is o'er,
I could not live a day, and know
that we should meet no more!
Who said that I would give thee up?
Who said that thou wast sold?
'Tis false—'tis false, my Arab steed!
I fling them back their gold!
Thus, thus, I leap upon thy back,
and scour the distant plains!
Away! Who overtakes us now shall
claim thee for his pains!”

With the last words Sandy fastened his hand in the horse's mane and started to swing himself to its back. But Sandy's movements were too quick. They frightened the horse and he went shooting to one side and came down with his legs stiff. At the same instant Sandy went shooting in the other direction and came down on the back of his neck.

Shorty could restrain his laughter no longer. He threw back his head and howled with glee.

“You gave him too much juice when you tried to get off the ground, kid,” he shouted. “You want to be careful or you'll rip out your undercarriage.”

Sandy rolled over on his stomach and looked at the horse, then at Shorty. His face was red and his eyes were spitting fire.

“You hit him with something,” he said to Shorty.

“I didn't hit him with anything,” Shorty denied. “He just doesn't recognize you. You aren't wearing one of those head cloths and mantle.” Shorty's face was grave now. “You've got to dress like an Arab if you expect to ride Arabian horses,” he went on. “They're funny that way. I read an article about it once. They won't let any one ride them if he doesn't wear a head cloth.”

Sandy studied Shorty's face suspiciously as he climbed to his feet. “You sure about that, Shorty?” he asked.

“Absolutely, kid,” Shorty said solemnly. “You want to get one of those gay headdresses and a silk cloak with a leather girdle around it, and a dagger

in the belt. Then your horse will eat out of your hand.”

“I wonder,” Sandy said, “where a fellow could buy them?”

“Oh, almost any place,” Shorty answered. “But right now Bill wants you. We're going over to Douglas' rooms to take a look around, and he wants you along.”

“O. K., Shorty. I'll be right over. I can get the cloak and head cloth when we get back.”

“Yeah. But don't forget it,” Shorty said earnestly. “You can't expect to ride one these horses without 'em.”

Sandy looked at Shorty out of the corners of his eyes again. He was almost sure that Shorty wasn't kidding him. But he wasn't positive. He had had too many such experiences with Shorty in the past to be certain.

“Say, Shorty,” he said suddenly, “how do you suppose I can get this horse back to Barnes Field? It's just the horse I've always wanted.”

“We'll take care of that when we come to it,” Shorty answered, trying to suppress a grin. “Don't worry, we'll find a way.”

X—JEZZAR

BILL, Shorty, Sandy and Wing Commander Kestrel spent an hour going over the things in Douglas' room, trying to find some clue to the secret that had been in Douglas' possession.

While they were there, messengers came constantly with dispatches and reports for Kestrel. With each one his expression became more glum and desperate. Finally he blew up.

“I can't see that this is getting us any place. While we poke around here the natives are getting ready to fall on our necks,” he said.

“Sandy and I will look around here a bit longer,” Bill said. “Shorty, you go back with Kestrel and see how Red is coming along.”

Kestrel hesitated, but in a moment he took his leave, followed by Shorty.

When they were gone, Bill turned to Sandy. “Douglas' servant has been hanging around trying to tell me something with his eyes. He was afraid of Kestrel. He's outside the door, I think. Call him in.”

Sandy went out the door and came back in a few minutes with a man who was both frightened and inarticulate. Bill spoke to him both kindly and sternly. The man shook his head and began to jabber in Arabic.

“Take it easy,” Bill said. “Can you speak any English?”

“Few words,” the servant answered.

“You want to tell us something?” Bill asked slowly, enunciating each word carefully.

“Me,” the man said, “servant.” He crossed the room and pointed to a picture of Douglas. “Name, Jezzar.”

“Jezzar,” Bill said, smiling. He studied the man's face and tried to gain his confidence by his expression. “You tell me?”

“I know,” Jezzar said, and burst into Arabic, his nervous, slender hands fluttering before his face, his eyes shifting about the room.

Bill held up a hand. “Take it easy,” he said. “Tell me in English.”

“To-night,” Jezzar said. “I take you. Petra. Es Siq, when——” He made motions with his hands.

“He means when the moon is up!” Sandy said brightly.

“At dark?” Bill asked.

“Dark. Es Siq,” Jezzar said. “Ride horse?”

“Tell him,” Sandy said, “we can ride any horse in Arabia.”

“Shut up!” Bill said to him. “Douglas—Petra?”

Jezzar nodded his head. “I show you,” he said. Then he touched his finger to his lips and glided toward the door.

Bill Barnes stood without speaking for a period of several minutes. He was thinking about the slaughter that had occurred in Es Siq a few nights before. He was wondering if the man was to be trusted. At least, they would have to gamble to find out. He counted on the fact that there had been genuine distress and sorrow in the man's eyes when he had pointed to the picture of his dead master.

“All right, kid,” Bill said to Sandy. “That's your job—get me a horse to ride. We'll meet him in Es Siq at dusk.”

“What,” Sandy asked, “do you suppose he is going to show us?”

“Your guess is as good as mine,” Bill answered.

THE DARK, narrow gorge of the Wadi Musa was as silent as a tomb when Bill and Sandy rode into it at dusk that night. The only light that came to them on the dangerous path was a streak of silver moonlight far overhead.

“This,” Bill said, “would be a swell place for an ambush.”

“It's spooky, Bill,” Sandy answered. “It is filled with the ghosts of dead men.”

They both felt their hearts crawl up into their mouths as a white figure on a white horse loomed up in the darkness ahead. Bill's automatic leaped into his hand as he called out softly, “Who is there?”

“Jezzar,” came back to them as softly. “Follow.”

He swung his horse around and led them deeper and deeper into the black chasm.

“Have gun ready,” he said once, dropping back beside them.

The soft sighing of the night wind, heavy with the scent of oleanders, the

creaking of their saddles and the scrunch of their horses' feet on the pebbles of the trail, were the only sounds to break the heavy silence.

As they came out of the mouth of Es Siq, a clearing spread out before them and their first glimpse of El Khazna, in the moonlight, was as unreal as the figment of a dream.

The nine figures carved into the front of the upper story of the temple to an unknown god took on fantastic shapes in the shadows—shapes that seemed menacing and fearful in the absolute silence of the night.

Sandy's breath whistled in his throat as he realized that the slithering shadows that crept along the face were not shadows. They were lizards, iguanas and snakes.

Jezzar, riding on ahead of them, called upon Allah to uphold his horse as it stumbled, then broke into a soft song. To the south a mountain rose out of the valley floor to the great high place of sacrifice.

The dim outline of the Roman amphitheater took shape as they passed out of the Outer Siq, and beyond the ruins of the Palace of the Maiden, grotesque in the moonlight.

To the west rose the dim shape of Jebel ed Der, the Mountain of the Monastery. To the north the top of Jebel Harun, where lights flickered around the tomb of Aaron, the Moslem shrine holding the sacred Dushara.

As Jezzar dropped back beside them once more, he touched his lips with his fingers and ran them across his throat; they knew only too well what he was trying to convey to them. He pointed to the mosque where lights burned, and waved his hand from left to right to signify that there were thousands of men on the mountains around Petra.

Farther on they entered the gorge of Es Siyagh and crept along the base of El Habis, the unfinished tombs of the ancient Edomites. Dark splotches on its sides were sepulchers, and on the top, gleaming dark in the moonlight, were the ruins of a castle.

Beyond El Habis loomed Umm el Biyara, dark and silent and menacing. As Jezzar brought his horse to a halt and pointed a finger toward the ancient stronghold, Sandy's horse came up on its haunches, then plunged toward the great wall of stone that was the base of Umm el Biyara.

"Whoa, you fool!" Sandy shouted as he tried to swing his mount around. But for the moment the horse had the bit between his teeth and showed no inclination to turn around. Then, as the bit cut into its tender mouth it came up on its haunches again and whirled.

As its front feet touched the ground, Sandy described an arc over its head. He struck the ground feet first, and managed to hang on to the reins.

That somersault over the horse's head was all that kept Sandy from being annihilated by that first blast of rifle fire from along the base of Umm el Biyara. The bullets tore over his head and came to a stop in the body of Jezzar, just behind him. One strangling cry came from the lips of Douglas' old servant. Then he rocked backward and rolled off his horse like a bag of meal being dropped from a wagon.

Sharp stabs of orange flame appeared from a dozen places along the base of the ancient stronghold as Bill came charging in on his horse and grabbed at Sandy's reins.

"Mount, kid!" he shouted. "They got Jezzar. He was dead before he hit the ground."

"Hold him, Bill," Sandy panted. He circled to the left of the plunging horse and got one foot in a stirrup. As Bill let go of the reins and emptied his automatic toward the stabs of orange flame, Sandy managed to swing into the saddle.

"Come on!" Bill shouted. "We've got to get out of here the best way we can. I memorized the map Kestrel gave me. We'll follow through the ruins of Petra along the ancient wall to the Outer Siq. I can see white forms coming out of the darkness over there. They'll get us in a few minutes. Are you all right?"

"I'm all right, Bill," Sandy puffed, "if I can make this fool horse behave. He wants to go toward that gunfire."

Bill swung his horse over beside Sandy and grabbed at his reins.

"I thought you could ride any horse in Arabia," Bill grunted as he rode through the ruins, leading Sandy's horse.

"He went nuts, Bill," Sandy said. "I can manage him now. I'll follow right behind you. We'll make better time."

"We'll have to," Bill growled. "If they can signal ahead they'll cut us off in Es Siq and we won't have a chance. We've got to keep ahead of them."

The sharply turning trail that wound between the sandstone walls of Es Siq was the thing that kept them from being slaughtered by the hard-riding Arabs behind them. Their escape became a running fight that lasted throughout that long mile from the ruins of the city to Bab es Siq.

There they reloaded their automatics, took a prone position behind the crumbling gates and fired at random as they heard their pursuers drawing close. In another thirty seconds they were again in their saddles and racing across the desert sand toward the airport at Ma'an.

"Did you have any idea where Jezzar was taking us?" Sandy asked as they swung out of their saddles before the officers' quarters on the airport.

"None," Bill said shortly. "He was about to tell us something when they opened up with their rifle fire. The natives probably have guards all through the city to protect the Dushara. They

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As Bill spiraled upward, the whole world seemed to explode.

shoot first and ask questions afterward."

"You know, Bill," Sandy said cryptically. "I have a hunch. I——"

"Get yourself some sleep," Bill said gruffly. "That's what you need most. I'll have to make a report to Kestrel."

"But listen, Bill!" Sandy said. "I think——"

"Good night," Bill said, and started toward his quarters.

XI—SANDY'S HUNCH

IT WAS shortly after dawn the next morning when Sandy stole over to the stables and asked a native groom to saddle his horse.

A few minutes later he was in the saddle and leaning over the neck of his mount, whispering in its ears the way he had seen Western riders do in the movies.

"We'll show 'em, old pal," Sandy said in the horse's ear. "We'll teach 'em to pay some attention to our hunches."

The white horse turned its head and eyed Sandy with anything but a friendly look, and Sandy remembered what Shorty had told him. He had forgotten to wear a head cloth and mantle. And he could see that his horse didn't like it.

"I'll remember before we come out again," Sandy told him as they made their way over that boulder-strewn waste of sand between Ma'an and Bab es Siq.

The sun was playing a symphony on the red walls of Es Siq as Sandy guided the dainty-stepping steed through the winding pass. As Es Siq ended abruptly into a cross gorge that was the Outer Siq, the face of El Khazna gleamed like white marble ahead.

As they stole past the old Roman theater, Sandy checked the ammunition in his automatics and in his extra clips. His heart was pounding now, and he could feel his face burning with excitement.

Taking a westerly course along what was once the main avenue, he passed the remains of a triple triumphal arch from the Roman period. Along the sides of the city were the ruins of hundreds of temples cut into the sides of the stupendous cliffs; its courts, libation basins, and altars where the ancients worshiped all carved from rocks of ocher and all shades of red.

Sandy gazed with silent awe at the crumbling tombs, temples and palaces built on the towering limestone hills above the city. Then his breath quickened as he sighted the ruins of the Crusader castle atop El Habis, and behind it the great flat rock that was Umm el Biyara.

He guided his horse to the place where he believed Jezzar had been murdered the night before. But there was no sign of his body or his horse.

It was there that Sandy let the reins fall loosely on the Arab horse's neck.

The horse raised its head and peered toward the great mountain of stone, then whinnied softly and moved toward it without guidance.

"That's the old pal," Sandy whispered. But he didn't touch the reins. He let the horse have its head and almost held his breath as the horse advanced.

Picking its way carefully and surely, the horse cut around a rough ledge of overhanging rock, went down the side of a ravine and up the other side. At the top it entered what looked like a stone doorway, barely high enough to admit the horse and Sandy on its back.

In a moment the horse came out on a narrow pathway, wide enough to pass along, clinging to the inside. As they came out into the air again Sandy's red face suddenly became white. He saw that they were already fifty or sixty feet above the jagged rocks at the base of the stone mountain. There was not room for the horse to turn around on the rock-cut *colloir*. If its feet slipped they would both be plunged to their death on the rocks below.

If they went on, Sandy believed, the horse would take him to the secret stronghold of the men who had attacked them in the air and on the ground two days before.

For an instant Sandy hesitated. He checked his horse until he came to a halt. Then he clenched his teeth, took one of his automatics out of its holster and said aloud, "All right, baby. Let's go!"

BILL BARNES tried to blink the sleep out of his eyes as he slapped his bare feet down on the floor of his room. He stared at Shorty Hassfurth and saw that he was dressed for flying.

"Say that again," he said to Shorty.

"One of the grooms at the stables told me Sandy had his Arabian steed, as he calls him, saddled at dawn. He left here alone, headed for Petra."

"The nit-wit!" Bill growled as he reached for his clothes. "He tried to tell me last night when he got back about a hunch. I wouldn't listen. He's going to play it alone."

"What is he going to do?" Shorty asked.

"I wish I knew," Bill snapped. "Listen, Shorty. Get the Lancer and your Stormer warmed up. We'll have to go out and look for him if he hasn't had his throat cut already."

"There's hell popping this morning," Shorty said. "I just talked to Kestrel. Rioting in several cities in Trans-Jordan and Palestine. It's only a question of time, he says."

"Yeah," Bill growled, "and that fool kid has to go out and stick his head right into the noose. I think I know what he had in mind. We'll fly over Petra first. Come on, let's go!"

"I'll have the Lancer ready when

you're dressed," Shorty said as he jumped for the door.

"Check the ammunition counters!" Bill shouted after him.

Twenty minutes later they were above the jagged, dazzlingly colorful twin ranges between which the city of Petra lies. They sped down the length of Es Siq at an altitude of only a few hundred feet. Above the Wadi es Siyagh they darted through wisps of clouds until they were near the peak of Jebel Harun. They circled the white dome of the tomb of Aaron and felt rifle bullets drumming into their wings.

As they swung back over the valley of Petra, Bill flipped his radio switch. "Get down a couple of hundred feet," he said to Shorty. "We'll see him now if we're ever going to see him."

He kicked the rudders of the Lancer and stuck the nose down as the flat top of Umm el Biyara took shape to his right. He flew only a hundred feet above it while he studied every detail.

Suddenly his hand tightened on the control column and his face became a shade whiter. Below him he saw a lone figure riding on a white horse. He knew it was Sandy. He shouted into his microphone to Shorty and pointed as a swarm of brown-faced men dressed in the gaudy mantle of the desert Bedouin appeared from nowhere above Sandy.

For one horrible moment Bill saw Sandy's horse rear up and swing its front feet toward the edge of the narrow little path it had been climbing. Then one of the mantle-clad Arabs had it by the bridle. He saw Sandy try to bring his automatic into play while he tried to gain control of the horse. Then he saw the barrel of a rifle crack down on Sandy's head and saw him topple from the saddle.

Bill brought the Lancer around and stuck the nose down toward that little knot of men as they carried the unconscious Sandy toward the mouth of a cave. But he didn't dare clamp down on his gun trips. He cursed between clenched teeth as he zoomed upward and saw the Arabs disappear. He tried to find the path Sandy's horse had been climbing, but it had disappeared. Without some moving object on which the eye could focus the path could not be seen.

Bill knew now that he had been right about Sandy's hunch. Sandy had taken his horse back to the spot where it had balked the night before, when it had tried to go toward the base of Umm el Biyara. The horse had led Sandy to the secret entrance to the top of Umm el Biyara.

But where, Bill asked himself, were the people who were inhabiting the ancient stronghold? How could they hide themselves so completely from sight?

He became aware of Shorty's excited voice in his ear. He said, "I didn't get

what you said, Shorty. I'm trying to figure how we can get in there to get Sandy out."

"That is where those stolen ships are being concealed," Shorty said. "They must have a hangar under the surface with a camouflaged top that makes it look like the regular terrain. It's the only place for them to be. They could land those little fighters on the top."

"You're right, fella!" Bill yelled. "Douglas must have learned about it or suspected it, and they killed him to keep their secret until they are ready to strike."

"Kestrel says they're ready now, Bill," Shorty said quickly.

But Bill wasn't listening to him. He was talking to the radio man on the field at Ma'an.

"I've given the word to Kestrel," Bill said in a moment. "He'll send bombers to help us bomb them out. But we've got to get Sandy out of there before they begin to blow it apart. I'm going to sit the Lancer down on top of the place if I can make it. I think I can. What do you say, fella? Are you coming in after me? It's not an order. Use your own judgment."

"I'll be on your tail, Bill," Shorty answered. "Perhaps you'd better drop a couple of bombs yourself to soften 'em up."

"Let's go!" Bill roared.

He kicked the Lancer around and stuck the nose down as he unfolded his retractable landing gear. He set his flaps well down and cut his engines, but he was still doing a hundred miles an hour as he skimmed the surface of the great flat rock with his landing wheels. At the far end, when it seemed that nothing in the world could keep him from plunging over the side, he kicked his rudders and swung the big ship around.

Shorty fish-tailed in a few feet behind him and brought the slower-landing Snorter to an abrupt halt.

"Sit tight for a moment until we see what happens," Bill said into his microphone.

They didn't have long to wait. The whole top of the stone plateau suddenly swarmed with men. They popped up along one edge and came storming up like a regiment of Sikhs going over the top, their robes streaming out behind them, their faces contorted with hate.

"Swing your ship around and let 'em have it!" Bill shouted into the microphone. At the same time he fastened his fingers down on his own 50-caliber guns. His two fixed guns stuttered out their song of death, to be joined a moment later by the louder roar of his cannon.

But his guns were set too high. His bullets ripped harmlessly over the heads of the charging mob of madmen.

"Bill!" Shorty's voice called in his ear

phones. "They're bringing up one-inch rapid-firers and machine guns. They'll tear us to pieces!"

"O. K., guy," Bill said, and now his voice was calm and steady. "Give your ship the gun. Take a run the length of the top and then give her all she's got when you strike the edge. It's our only chance. We'll have to bomb them out."

How Bill and Shorty ever got through that frightful hail of lead no one will ever know. The charging tribesmen broke before the scream of their propellers and the roar of their engines as Bill and Shorty headed their ships into their midst. But when they broke they dropped to their knees and emptied their rifles into the fleeing ships. From the edge of the plateau came the death rattle of a dozen machine guns and the louder bark of one-inch rifles.

The speed of their ships was the only thing that kept Bill and Shorty from being annihilated before they reached the edge of the plateau. They could feel bullets drumming into the skin of their ships and could feel them trembling like mortally stricken animals under the impact.

But they made the edge, with a prayer on their lips that when they went over the edge their motors would be functioning.

For one awful second the two ships sagged, then the noses settled, the tails lifted, and they began to climb.

"Are you O. K., fella?" Bill asked Shorty.

"O. K., Bill," Shorty answered, "but my ship is a sieve."

"Get some altitude," Bill instructed.

"What about Sandy?" Shorty asked.

"We'll get him," Bill said grimly. "If they hurt that kid I'll—" He stopped. His bronzed face was white and strained as he gazed over the side of the Lancer. As his eyes fastened on the top of Umm el Biyara he gasped.

A dozen of those fast single-seaters belonging to the Royal Air Force were standing in a line on the far end of Umm el Biyara. Their props were turning over, and they were facing into the wind. Men were climbing over the sides into the cockpits.

"They're coming after us, Shorty," Bill said, and there was a ring of real anticipation in his voice.

"Good!" Shorty said. He leaned over the side of the Snorter as the first of the little ships whipped into the air, followed by another and another.

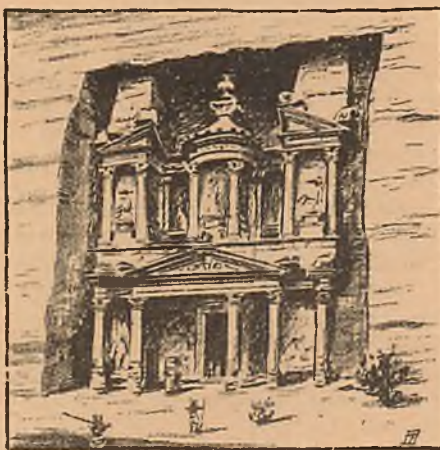
"Stay up where you are," Bill instructed. "Kestrel will send some bombers. He can break up this uprising before it gets really started."

Bill whirled the master tuning control on his radio panel and chanted the call letters of the Ma'an airport into his microphone again. Suddenly he was aware that Shorty was flying in close to him,

trying to signal with his arms and plane because his radio wave length had been tuned out. Bill twirled the wave-length control and barked Shorty's name.

"Look down below, Bill!" Shorty gasped. "They have Sandy spread-eagled out on the top of Umm el Biyara. They must have tuned in our wave length and heard you say you were going to send for bombers. That's their answer."

Bill's heart climbed up into his mouth as he grabbed at a pair of glasses and turned them on the figure stretched out



El Khazna, the rock-hewn temple.

on the ground five thousand feet below. He turned the glasses directly on Sandy's tortured face. Then he took them away as his stomach turned over from horror.

In that one glimpse he had seen that Sandy's face and head were battered and bloody. His arms and legs were spread out and pegged to the ground. His face was a twisted blotch of agony.

Cold perspiration popped out on Bill's face and his hand gripped the control column so tightly it seemed he might rip it from its socket.

"All right, Shorty," he said, trying to keep his voice steady. "Those twelve single-seaters are above us now. They're in four V formations of three planes each. They're swinging back to attack. Remember what they did to Douglas?"

"I'll remember!" Shorty snarled. "We've got to get to Sandy, Bill!"

"We'll get him!" Bill said, so quietly Shorty could hardly hear the words.

XII—ATTACK

AS the twelve British ships completed their turn they broke the four V formations and formed two stepped-up columns of six planes in a line, each a little above and behind the one in front.

Bill saw the leader rock his wings and knew the instant they were going to dive. He spoke into his microphone softly.

"The column on the left is yours," he said to Shorty. "When they're five hundred feet away, dive under 'em and

then chandelle back to get on their tails. Give 'em hell, fella!"

"Give 'em hell!" Shorty echoed. "One for Douglas, one for Red, and one for Sandy!"

Bill eased the control column back and sent the Lancer up into an abrupt climbing turn until it almost stalled; then he whipped the nose level and down again. For an instant he pushed his throttles all the way open. A gale whined and snarled over the cantilever wings and streamlined body of the Lancer as the silver plane plunged toward the stepped-up column of single-seaters below it.

Bill's fingers clamped down on his gun trips when he was only two hundred feet above and behind that straight column. His bullets tore into the last ship as it came under his telescopic sight. They drew a pencil line down the center of the fuselage until they reached the open cockpit. There they drove into the head of the man whose hand was wrapped around the controls.

He died before he knew what manner of thing had hit him. His ship skidded off to the left and stuck its nose downward. It dived into the earth with its wings folded back, like a gannet diving for a fish.

The next man in line threw one desperate look back over his shoulder and sideslipped his ship out of the way of Bill's deadly fire.

Bill caught the third one from the rear with his .37-mm cannon as he started a barrel roll. A great cloud of black smoke and orange flame took the place of the one-seater as the shells detonated on the engine block. Débris flew in a hundred different directions. There was no indication that a man had been at the controls as the smoke cleared away. He had become a part of the scattered débris.

The three leading ships in the column peeled off in three different directions. Bill saw one of the biplanes whirling toward the earth like a falling leaf as Shorty riddled it with bullets. Then he zoomed the Lancer up underneath one of the three ships that had broken formation.

For a split fraction of a second the lean fuselage came under his sights. His fingers clamped down on the triggers in the stick. His powerful .50-caliber bullets ripped the bottom out of the rugged little fighter. The pilot shot up in his seat as the bullets drove through his body. His arms sprawled over the cowl as the doomed ship fell into a spin.

"They asked for it!" Bill said to himself viciously. There was no mercy in his heart now. He knew these men had murder in their hearts. They had tried to live by violence, and they must die by violence.

He saw that the five remaining planes

of the column Shorty had singled out were forming a Lufberry circle around him. They were trying to tighten it up to get Shorty within the vortex of their concentrated fire. He smiled grimly as he saw Shorty whip his Snorter directly into the guns of one of them. But Shorty's bullets were writing death across the face of the enemy pilot before he could clamp down on his triggers. The plane fluttered out of the fight toward the earth below.

Bill kicked the Lancer around and picked off another of the four ships circling Shorty. He saw Shorty's hand come over his head with his thumbs sticking up.

Within a space of three minutes' time they had shot six of the one-seaters out of the air. The other six were forming in two V formations of three each now. The leader was giving orders with tail wags and hand signals. They were spiraling up, seeming reluctant to return to the attack.

For an instant Bill studied the leader while he flipped his radio key. Then his gaze whipped toward the direction of Ma'an as the drone of twin-motored bombers came to his ears.

His face froze as he saw a route column of six giant bombers speeding toward him. Above the bombers was a squadron of eighteen British planes, identical to the ships he and Shorty had been fighting.

"Shorty!" he screamed into his microphone. "I'm going to land on Umm el Biyara again. You'll have to clear the way for me. Those bombers will go to work on the place. They don't know Sandy is spread-eagled out on the top. Attack those machine guns and ground guns while I land and get him!"

"You'll never get down, Bill!" Shorty shouted. "You can't use your guns. They'll tear you apart!"

"You'll have to hold them off," Bill said. "Rake the south side with your

guns. Get down to fifty feet. It's our only chance. Here I go! Get on my tail!"

Bill sat the Lancer down on the top of Umm el Biyara again in the face of that deadly concentrated fire. But it did not last for long.

Flying almost in the mouth of the machine guns on the ground, Shorty tore their crews to ribbons. Dead men piled up at the mouths of the entrances to the underground caverns. He stilled every gun while Bill brought his ship around and rolled across the plateau toward Sandy.

Then he was over the side in two jumps, tearing at the pegs that held the helpless Sandy.

"You all right, kid?" he asked, his breath coming in quick gasps.

"Just a little dented around the edges, Bill," Sandy managed to grin. "They—they—" His eyes closed as his head lolled back, and Bill knew that he had fainted.

Bill struggled desperately as he saw the big bombers nosing down to drop their horrible eggs. Then he had Sandy over his shoulder. He struggled up the side of the Lancer and dropped Sandy in the rear cockpit.

Half the world exploded beyond the far rim of Umm el Biyara as he gave the engines of the Lancer the gun. He raced the powerful ship across the plateau and dived it off the edge. For one horrible moment he could not bring the nose up. Down and down they plunged. Then his controls caught and he eased the stick back.

As he spiraled upward the whole world seemed to explode. The top of Umm el Biyara became a shambles as the six bombers, in route column, laid their eggs.

Bill leveled off at five thousand feet with Shorty beside him. Far off to the west he saw the eighteen British planes

in pursuit of the six enemy ships. He locked his controls and spoke to Shorty.

"Sandy's out cold," he said.

"Is he badly hurt, Bill?" Shorty asked, his words clipped and anxious.

"He'll do," Bill said. "I'm going to sit down on the airport at Ma'an. Our job is finished."

THAT same evening, Wing Commander Kestrel, Bill Barnes, Shorty and Sandy sat in Kestrel's quarters. Away to the east the desert wind was moaning again. Now and again a camel bellowed a protest at the desert night.

"You've helped break the back of the revolt at the very beginning," Kestrel said. "Serj el Said, the Arab leader, is dead. Four of our men paid the cost for treason, Hector by his own hand. The bribe offered them must have been high. It is hard to admit—but true—that a few scattered men in any country may become traitors. Most of the civilian fliers working for Serj el Said are dead. If we could only bring poor Douglas back I would be satisfied."

They sat silent for a moment, listening to the soft sighing of the wind.

"If there is anything, any way I can show my gratitude to you, Barnes, anything I can do for you, I—"

"Listen," Sandy broke in, trying to grin through his bandages. "There is something you can do for me!"

"Name it, Sandy," Kestrel said.

"Get me an Arabian horse and ship it to Barnes Field," Sandy said eagerly. "You killed mine when you bombed Umm el Biyara."

"That's an order," Kestrel said, "that will be carried out."

"What in the world," Bill asked, "will you do with a horse?"

"Do with him?" Sandy said. "What do you think I'll do with him? I'm going to use him to realize one of the ambitions of my life. I'm going to win the Kentucky Derby!"

THE DARE-DEVIL COMPLEX

(Continued from page 20)

youngsters get wings and also warnings against the first year of freedom. The danger period, they are urged to remember, is between 200 and 500 hours. Yet those graduates, or at least a large percentage of them, invariably go right out and begin hedge-hopping and looping off the ground, and thrilling the home folks, and doing all the other things that are such a lot of fun. Young civilian pilots do the same thing, as witness the fatal accident figures on illegal acrobatics and low flying.

The lucky among the young pilots are sobered a bit every time an acquaintance kills himself. In the army, especially, where one knows hundreds of pilots, the

young pilot has the queer experience of hearing that Ed and Jack and Joe have killed themselves doing things that he himself has been getting by with. Gradually he adds to the list of pranks he will no longer pull, and thus he and other lucky ones eventually become wiser and older pilots, and usually live on and on.

What has happened, of course, is that these maturing pilots have become sufficiently impressed with the necessity of discipline to discipline themselves. They have learned, in what might be called a "school of hard shocks," that the hedge-hopping pilot is never as safe as he feels.

The only substitute for this costly seasoning of pilots is iron discipline imposed from above. The high safety of flying-school operations is an example of the effect of iron discipline. The remarkable record of the First Provisional Air Division maneuvers in 1931, when 600 planes flew three million or more miles, and most of it in close formation, without a serious accident, is another example. I happened to have been one of the pilots on that occasion, and I can testify that the air discipline was rigid. The safety records of the air lines, every one knows, are due largely to rigid air discipline, systematically maintained.

But in ordinary individual and pri-

vate flying, of which there will be more and more, the problem is squarely up to the pilot.

He must learn that his moods and judgment from moment to moment are not always reliable. For instance, in instrument flying the pilot is taught that he must exercise his intellect and follow the instruments, even though this violates the dictates of his "feel." He is taught that his "feel" is distorted and rendered false by unusual physical forces operating on the balance mechanism in the inner ear.

A pilot should also be taught that in an airplane his "feel," or sensitiveness, to risk is being distorted and rendered false by unusual and subtle psychological forces operating on the discretionary mechanism of the mind. When a young pilot gets bored at 2,000 feet and feels it would be such a little thing to roll or loop, even though he has no parachute—when he begins to feel so superior to danger that he just *knows* he

could get by with a little exciting "contour flying"—he should be forewarned with a knowledge that those feelings are like those false and fatal promptings he makes himself violate under the blind-flying hood. A young pilot in an airplane is always hearing the sweet voices of the Sirens luring him deceptively to destruction.

Flying instructors should repeatedly pound warnings into their students' heads. Young pilots (no matter what their age in years) should be kept constantly aware of how the dare-devil complex will inevitably come. It is a part of the normal human reaction to the experience of flying.

With the return of prosperity and the arrival of the mass-production airplane, there are going to be a lot more inexperienced pilots than experienced ones, at least for a while. And the time will most certainly come when thousands of high-school boys (and girls, too) will learn to fly as a matter of

course. If a lot of them are not to be killed, they must be impressed with this simple fact: airplanes may get safer, but the foolproof airplane will never be built. Technical genius may make engines so dependable and planes so stable that rusty and amateurish pilots will no longer flop in with dead motors from 200 feet or crack up while landing. But pilots will always be able to fly them into power lines, or jerk the wings off on trees.

As long as airplanes leave the ground and human nature remains what it is, the major battle against flying danger will increasingly be fought in the human mind. Pilots must watch for danger in themselves. Rigid self-discipline and constant alertness against the dare-devil complex is the price of future air safety. Veterans know from sad experience that this is true. The flying student of the present and future must be effectively taught its truth, or suffer the consequences.

HEADLINES

(Continued from page 32)

the girl struggling to get back to the canoe. She went under once. So I flew over to a float along the shore and almost skimmed the water. When I got near the float all the girls on it ran. I waved out the window at them and pointed toward the canoe. But they were all hiding. When I zoomed up they came out but they didn't do anything about the girl who was drowning. I went down again and tried to signal to them. They all ran and hid again. I skimmed above the girl out in the center and saw that she had managed to get hold of the canoe. So I went on my way.

"After we got into Chicago some one phoned and wanted to thank me for what I had done. They explained that none of the girls on the float had any clothes on. That's why they hid. I—"

"But that isn't the way the newspapers had it," Martha cut in. "They didn't say anything about the drowning girl. They said you spent the afternoon circling above a bunch of nude bathing beauties."

"They lie!" Steve shouted. "They got hold of it some way and tried to make a funny story of it."

"Well," Martha said, "you don't have to speak to me that way because you're angry at the newspapermen."

"I'm not angry at you!" Steve shouted angrily. "I was trying to save the girl's life. I—"

"You're still shouting at me," Martha said. "When you have cooled off call me again."

Steve stared at the mouthpiece for a moment after he heard the receiver

click. When he hung up the receiver his face was white and he was saying things under his breath that he certainly wouldn't have wanted Martha to hear.

When he telephoned Martha an hour later a maid told him she was not in. The same thing happened a half dozen times during his two-day lay-over in New York.

At the end of those two days he resolved that he would never again try to help any one.

"They can drown, they can freeze, they can burn to death for all of me," he snarled to himself. "If you help 'em what does it get you? Trouble!"

He knew that it wasn't Martha's fault he couldn't get her on the telephone. He knew she was probably being guarded so closely she couldn't even write him a letter.

Then a half hour before he started for Newark and his leg to Chicago he had a note from her.

DEAR STEVE:

I'm heart-broken about not being able to see you or even talk to you on the telephone. But you know how mother acts. I can't make her listen to reason. She and father are going away in a couple of days. When you come back from your next trip they will be gone. Then I can see you. You mustn't blame mother and father too much. They're just so old-fashioned they can't help it.

MARTHA.

Steve felt a little better after he read that note. He resolved that when he

got back he would not only see Martha, but would marry her while he had a chance.

The trip to Chicago was like all the trips to Chicago. During most of it Steve sat back in his seat and glowered at the instrument panel while Red Johnson did the work. That was the advantage of being the pilot.

"All dames are alike!" Steve said suddenly. The remark so startled Red Johnson, who had the controls, that he jammed the wheel to starboard. The sudden change in course brought a quick squeal of frightened protest from the old lady in Seat Four.

"Keep on your course, freshman!" Steve snarled.

Red laughed. Then he made little clucking noises with his tongue.

"What's the matter, did her old man kick you downstairs?" he asked. Steve gave him a withering glance.

"Why don't you get yourself another girl?" Red laughed.

"It's not her fault," Steve said. "It's her father and mother. They're so old-fashioned they think only bank robbers get their names in the papers."

"Or chorus girls," Red said, grinning. "Listen, I knew a fellow once who had the same thing you have—girl trouble. Her parents thought this friend of mine was a no-good."

"Well?" Steve snapped.

"He fixed it so they didn't bother him any more."

"Yeah, what did he do?"

"He shot the parents. Both of 'em," Red said, still grinning.

"Funny guy, eh?" Steve sneered.

"Not funny, just practical," Red laughed. "Here comes the 'goat head' in." He cut his gun, lowered his landing wheels, circled once and glided down into the wind.

AFTER a day's lay-over, Steve and Red started on their return trip to Newark. An hour out of Chicago, Red pushed back his earphones and said, "They say we're going to get some soupy weather."

"We've had it before," Steve answered. "Mebbe we better get upstairs."

In another fifteen minutes fog came rolling in toward them, fog that cut them off completely from the rest of the world. Steve checked his instruments and took his bearings with an eye constantly on his bank-and-turn indicator and his inclinometer.

"What do they say about our ceiling?" he asked Red.

"About five at Newark," Red answered.

The fog licked at the coated window glass as great drops of rain began to splatter against them. Steve cursed and told Red his opinion of such weather. He had the wheel now, and he was feeling his way cautiously, depending as much on inborn instinct and perception as on his instruments. An air pocket slapped them down seven hundred feet with a bang that made the whole ship vibrate.

The stewardess stuck her head in the door and said, "The old lady in Number Four wants to know if you can't be more careful."

"Tell her, sure," Steve said. "Tell her it's all just in fun."

The hostess grinned and disappeared.

Another downward current of air cost them another five hundred feet. Steve worked quietly and calmly to regain balance, his eyes glued to the instrument board.

Hail began to beat on the windows and rattle off the metal sides of the ship. Then the fog and the rain increased.

"I'm going to stick her nose down and see if we can't get out of this," Steve said.

As darkness settled around them they cut through a rift in the cloud bank at five thousand feet. The lights of a village flashed beneath their wings and Steve checked the town on his map.

Far ahead came a brilliant flash that cut high into the black heavens. Then repeated. Every ten seconds the two-million-candlepower beacon blinked into the darkness. After the regular flash came the rapid dot-dash signal that gave the number of the beacon.

Steve stuck the nose of the big ship on the beacon ahead and settled back in his seat. They had left the rain and fog behind them now.

In an hour the city of Toledo spread

out below them, sparkling like a million jewels set in a coronation crown.

"We're right on the button," Steve said to Red as he threw the wheel to him. He leaned close against the window and gazed downward into the blackness beyond Toledo. Far off to the east, ten miles away, he could see the chain-like lights of the Blue Diamond Express hurtling through the night on its run from Cleveland to Toledo.

"The Blue Diamond is right on the button, also," he said, half to himself. Every night on his eastern hop Steve checked his own time and position against the time and position of the crack New York Central train.

Suddenly, as Steve's eyes swept the darkness below him, his breath hissed through his teeth. He flattened his face against the glass as the thing that had caught his eye disappeared beneath the belly of the plane. Then he was shouting orders at Red Johnson.

"Quick," he said, "give me the controls! Get the goat head at Cleveland and tell him the trestle bridge across the Sandusky is afire. Tell him the Blue Diamond is heading for it at sixty an hour. The Blue Diamond may have a wireless telephone. They've got less than ten minutes to work. Hurry!"

Red Johnson didn't ask any questions. An expression of mild surprise flashed on his face as Steve first grabbed at the controls. After that he was all attention. He pushed the button on his transmitter and began to chant as Steve stuck the nose of the big ship downward.

"Trip Number Five. Trip Number Five Calling Station WEAZ—WEAZ," he called.

"WEAZ. This is Station WEAZ. Calling Trip Number Five. Go ahead!"

"Get this fast," Red chanted, his voice steady. He relayed the information Steve had just given him. The goat head at Cleveland took the information as quietly as Red had given it to him. In two minutes he was back on the air telling Red that the Blue Diamond carried no telephone.

"You get it?" Red asked Steve.

Steve nodded his head. He was down only a thousand feet above the burning trestle now. They could see the flames shooting high into the heavens as a stiff breeze fanned them. The passengers in the big ship had their faces glued against the windows.

"Can you see the Blue Diamond?" Steve asked Red. Red leaned forward and peered into the night ahead.

"Five miles away and coming like a bat out of hell!" he said as calmly as he could.

Steve nodded again and banked the big ship around. He pressed a button that brought the stewardess running.

"Tell the passengers there is a train headed for that bridge," Steve said. "Tell 'em we've got to stop it. The en-

gineer is out of sight of the trestle until he is almost on top of it. He won't have time to set his brakes and stop after he sees it. We're going down low to stop him. Tell them not to be nervous, but to fasten their safety belts."

The stewardess nodded and closed the door to the bridge behind her. Steve saw horror and fright written on the faces of the passengers as she told her little story.

He was taking the plane down so that it was only a hundred feet above the crackling flames now. He could see that the bridge was almost burned away in places. He knew that thundering engine would go through the bridge as though it was match wood. He stuck the nose of his ship on a straight line with the railroad tracks away from the bridge. Red Johnson's knuckles were white, he was holding his radio transmitter so tightly. He was talking to the goat head at Cleveland, keeping him informed of Steve's movements.

A thousand feet away from the trestle Steve nodded to Red and said, "Hold her just here and hold her steady!"

His hand reached for the parachute-flare release. He worked it once, twice. The two flares took a dizzy course earthward, swerved away from the tracks in a gust of wind, then were carried back to land directly in the center of the tracks. The whole earth became one horrible white sphere.

Steve eased the nose of the big ship up. A mile away he could see the lights of the racing train. He held his breath for a matter of thirty seconds while he watched the snorting iron monster racing to its doom.

Then the blurred lights of the train became more distinct and Steve knew that the engineer had been blinded by the two flares and was setting his brakes. His breath hissed through his lips as he exhaled and looked at Red Johnson's tense face. Red grinned and shook his head.

"That does it," he said. "That was neat going, fellah."

"Yeah," Steve said bitterly. "And to-morrow morning the newspapers will have it and all you yaps will be callin' me Headline Harkins again. I don't know what the hell is the matter with me. Why can't I mind my own business?"

"Just a Boy Scout at heart," Red said. "We better turn on the juice. We're goin' to be late gettin' into Cleveland."

FIVE HOURS LATER Steve climbed wearily out of the pilot's seat of the big transport. His face was drawn and lined, and his eyes were red spots in his white face. He dragged himself up the ramp and growled at a couple of newspapermen who were waiting there to get his story.

"Talk to Red," he said to them. "I don't know nothin' about it. I wasn't there. I was out for a walk."

He went into the pilot's quarters and listened to the usual kidding. He wondered if it was too late to take a chance on getting Martha on the telephone. After she saw the papers in the morning it would be too late. She wouldn't ever speak to him again. Then he was electrified by a shout from the inner office.

"Hey, Harkins," a voice shouted. "A twist wants to talk to you on the telephone."

When Steve lifted the receiver off the hook his hand was shaking. He scowled and cursed under his breath. Then he heard Martha's voice in his ear.

"Yeah," Steve said after she spoke. "You sound as though you'd been running up a hill."

"Steve!" Martha half screamed. "I think it's the most wonderful thing you ever did. So do mother and father."

"What are you talking about?" Steve asked suspiciously. "Have you seen the papers?"

"Yes," Martha said. "I sent out for all of them."

"What does your mother think about —" Steve began.

"She thinks it's wonderful, Steve. I just talked to both of them on the telephone," Martha said breathlessly. "They both said we could forget all the objections they had to our engagement. Isn't that grand, Steve? Isn't —"

"Listen!" Steve shouted. "Have your father and mother seen the papers?"

"Seen the papers?" Martha said, and she was half crying now. "I don't know whether they've seen the papers or not. Anyway, it won't make any difference. Oh! I forgot to tell you, Steve. They were on that train!"

COYOTE KILLER

(Continued from page 24)

bit into the flesh of his arm. He heard him whisper:

"Nix, Ray. He'll plug you—or send you to the clink. Kirk needs you. Then you've got the six-ten to catch for Washington."

The redhead, ready to scrap at any time he knew he was right, made a masterly and successful effort to control the rage which almost overpowered him. He turned on his heel, stalked to the hangar, leaving the gun-slinging officer hanging onto his revolver butt and looking a little bit silly.

Ray reached the two-place training monoplane, savagely pushed on the trailing edge. Larry manipulated the dolly beneath the tail skid. The ship rolled forward. Other willing hands helped. Outside the hangar, Larry crawled into the cockpit. Ray spun the prop. The motor coughed. While it was warming, Ray told Larry:

"I'm late going after Kirk. Shoot a wire to the Department at Washington, will you? Tell 'em I'm stuck."

Larry crawled from the cockpit.

"What reason'll I give?"

Ray hoisted himself into the little ship.

"Tell 'em anything—tell 'em there's some coyotes down here that I've got to wipe up before I come east."

He gunned the motor, throttled back, gunned it again, released the brakes and bee-lined down the field.

RAY BALMER, with fifteen miles to go to Rio, with his nose away from the afternoon sun, gained a minute and lost altitude down to five hundred feet in a long, shallow dive. He leveled off, peered over the side of the ship, and found his eyes riveted on five milling men. The men were on a white, sandy patch about fifty yards from the Rio City-Fort Hilton Highway. Their car was parked at the side of the road.

There was mystery and suspense in the fast action he saw. First one of the men, evidently in serious trouble with

the others, ran a few feet. His pursuers caught up with him. He turned, fists flailing. One of the attackers sprawled, skidded in the white, sandy clay. Then a second went backward, heels kicking. But they leaped to their feet, closed in, four against one. Ray's sympathies went out to the under dog who was putting up such a battle against overwhelming odds. Involuntarily, he throttled his motor, made a wide, mushing circle with the slow trainer.

"If I could get down and help—" he muttered. He felt the handle of the .45 automatic which he had jammed into a pocket of his breeches.

The mesquite and greasewood clumps were thin here. He banked, just as he saw one of the cowardly attackers whip out something that glistened in the afternoon sun.

"Good Lord!" he gasped. "He's going to kill—"

He saw a thin line of smoke, saw the fighting fool who didn't quit when the cards were stacked, rock and sway. He forgot about Rio City, about Kirk, about his mission as he again saw red, as his rage mounted over the cowardly shooting. He banked sharply, started to come in for a landing, groped for the pistol.

As he cut his throttle, he heard the vicious whine of the wires of a high-powered plane, the sting of a motor five times as powerful as his, and stared fascinated at his wing as little black holes showed in the fabric to the right and left of him. He straightened out, shot his wings vertical with a flip of the ailerons and gave the trainer full gun, knowing that he was hopelessly out-classed. He tensed himself, felt the little plane strain in a stiff bank, felt and sensed the impact of more lead as he looked back and above him, and realized how he had gotten into such a spot.

The bigger plane, a bullet-nosed Alvon biplane which cruised at better than three miles a minute, wheels up, a top-

mounted synchronizer machine gun spurting death at him, was hard on his tail. He knew that he was trapped. He cursed the fact that he had had to crack open the only 'chute he possessed to save himself from *Mister Jonah* a few hours before, but he knew at the same time that curses were futile.

Lead cut around him, crashed into the fuselage behind him, raked the wing. More lead spanged into the motor. It coughed, spluttered and died.

The lethal plane had ridden his tail down out of the sun.

He was cold, calm, as bullets spewed behind him. He knew that somehow the murderous pilot was connected with the four men below. He would not kill them. And Ray had to get down now if he was to survive the withering fire which chilled his backbone. He had to line himself in that last glide so that the metal hail, missing him, would cut into the men on the ground and force the killer to stop shooting.

B-r-r-i-p-p—b-r-r-i-p-p—b-r-r-i-p-p.

The pilot behind him was signalling with short blasts of his motor to the men below. They broke suddenly and ran for their car, plunging through greasewood, mesquite and cactus which hid the scene of their revolting crimes from the highway.

Ray, desperate, knowing that he could not rip through the heavy, spiked growth and crash them, nor could he wreck their car, pulled into another sharp bank as lead bit into his tail surfaces, saw a boulder-lined gulley, aimed for it, pulled back his stick and braced himself for the crash.

The undercarriage crunched against the boulders. The little ship nosed up. Ray grabbed at the cowl as he felt his safety belt snap, held himself from being dashed into the rocks. The shock broke his hold, but he had slowed himself so that when he did hit, arms covering face, he was only bruised, shaken.

He was hovering on the fringes of

consciousness as he heard the relentless yammer of the machine gun, the snarling motor, the whining wires of the other ship. Lead slapped the rocks, ricocheted, sang, screamed, droned. He somersaulted to a spot where he was shielded by his own motor and protecting boulders. He whipped out his automatic, drew careful aim, and returned the fire.

He watched in the direction of the road for the four men to appear, but there was no sign of them.

Again and again the big biplane dived at him from angle after angle. He sought new shelter each time. Finally, after making a fresh shift, he was in a position to see the man who had been shot by the cowardly quartette, a bundle of clothing seventy-five yards away in the open. As he looked the victim moved.

The pilot must have detected this, for he sent his ship screaming down at the helpless victim, the machine gun anchored on the top wing blasting viciously through the silvery arc of the propeller. Ray clenched his fists, cursed impotently, as he saw plumes of sand leap around the helpless man. The pit of his stomach writhed at the sight of the kill lust which ruled the pilot.

This business finished, the pilot climbed, banked, dived at Ray again. The catapulting plane had not reached him, however, when the lead stopped kicking up its little geysers. Ray knew the reason. The murderer had emptied his hopper. He blazed at the ship, even though he knew that he had about as much chance of hitting the pilot of the rocketing craft as he had of hitting a soaring eagle with a rock.

The plane pulled out of the dive. Ray noticed that it bore neither letters nor numerals of identification, and that it was painted a dark gray. It leveled off, went into a long climb. Ray lay still until it was just a speck in the distance, swearing.

"The yellow coyote!" he stormed. "Didn't even have guts enough to land and shoot it out like a man!"

Then, blanketing his movements from the road by using the stark gray underbrush, he worked his way to where the car had stood, pistol ready. The car had disappeared.

He doubled back to the spot where the lone, game battler had been dropped. He sighted the twisted body, advanced on it, a horrible realization coming at first slowly, then with full force as he saw the clothing, the shape and size of the body. He ran forward, his breath coming in dry, choking sobs, dropped to his knees as he blurted:

"Kirk! Kirk! For God's sake, speak to me! It's Ray!"

He bent over the shattered chest of his older brother, heard the faint, failing beat of his heart. He cradled his brother's head in his arms. Kirk's eyes

opened. There was the faint glint of recognition. A smile smoothed his pain-tortured features.

"Ray—" The word was barely audible. "I—knew you'd come—"

"Who shot you—what happened?"

"Found out dope—being run by ship—last two—nights. Plane—crosses Rio before moon is up—between here and—Rio City. Gang found out—I knew—trapped me—"

"Who's the pilot?"

"Don't know—he'll fly again—to-night and—"

A shudder ran through Kirk Balmer's body and telegraphed the fatal message to Ray. The younger brother spoke softly, hoping that the other would hear his words.

"I'll get the man who did this, Kirk, old fellow. I'll get him if it takes the rest of my life. I wired the boss in Washington I had to stay and kill coyotes—and that's just what I'm going to do."

Far in the distance, over the silent reaches of the plain, he heard the roar of an automobile motor. He knew he had to work fast.

Ray pulled himself to his feet, ran to the ship, grabbed sections of torn linen, ripped them from the smashed wing. He returned to the body, laid them over it, secured them with rocks. That would keep beasts of prey and the inevitable black crows from desecrating it until he could send Joe Moss, the Fort Hilton undertaker, for the remains.

Then he dashed through the underbrush to the road, reached it as the car he had heard pounded down the sand-clay road two hundred yards away. He ran into the highway waving his arms. The car shot around him. There might not be another for hours. He whipped out his pistol, fired over it. The car skidded, lurched to a halt. Ray ran to it. The white-faced driver stuck out his head.

"Wha-what's the matter?"

Ray ran to the car, pistol drawn.

"Sorry to frighten you like this. I won't harm you," he snapped. "I had to stop you—might not be another car for half an hour, and minutes count. There's been trouble. You're driving me to Fort Hilton as fast as this crate'll roll."

IT WAS DARK when the car bumped alongside the unlighted hangar at Fort Hilton airport. Ray thanked the driver, piled out. He felt a sudden chill, although the night was warm, as he looked at the stained structure, standing eerie and ghostlike in the moonless night. As the car sped away, his mind filled with foreboding, he rounded a corner of the building.

"Where's Larry?" he muttered. Larry usually was there to meet him. Had something happened to the boy? Was

there another horrible message waiting him inside the hangar, he wondered? He slipped his pistol into his right hand. With his left hand he fished out his keys, inserted one into the lock of the small door within the larger door at the front of the building. Then he kicked open the door.

A roar greeted him. He rocked backward as the searing shock of a bullet tearing into his left shoulder threw him off balance. But his quick eyes caught the direction of the orange-red flash of flame and his own gun barked hollowly a split second later. He heard a moan, the thud of a body. Unmindful of his wound, he raced to the light switch, clicked it. Big overhead lamps drove the shadows back.

A lifeless body lay on the dirt floor.

Ray went to it, kicked it over. He saw the man was a Mexican. A bullet had drilled through his heart. Blood soaked his shirt, formed a sticky, dark puddle. He glanced around him, started. The wing was on the little two-place pusher monoplane—the coyote killer!

He barged into the office, grabbed the telephone, called his home.

He heaved a mighty sigh of relief as he heard Larry's voice.

"Brace yourself, kid," he said steadily. "Don't let mom get wise. Kirk's dead. Fifteen miles out of Rio City. A Mex just ambushed me in the hangar. Got me in the shoulder. He's dead. Stall mom. Get in your car. Pick up Doc Bender. Say nothing to anybody. Get the doc out here as fast as you can drive."

By the time Larry, white-faced and shaken, and Doctor Bender, puzzled and uncertain, had arrived, Ray had called the undertaker and given him full instructions as to how to find his brother's body. He also had temporarily stopped the flow of blood which had soaked his shirt.

"Had some trouble finding Doc," Larry said. "He was shooting pool down at Stockton's, and a bunch was there. They think something's up."

Ray turned to Doctor Bender.

"Fix this hole in my shoulder, Doc," he ordered. "It didn't bust anything. It's clean, I think."

While the physician worked, Ray told both men what had happened.

"How come the coyote killer's got the wing on?" he asked Larry.

"I got worried and called Trent over at Rio City. Knew you'd see him if you'd got into town all right. He said Kirk had disappeared about noon, and that you hadn't showed. I got hold of Charlie and Carroll Tate, went up to the station and brought the wing down on the trailer."

"Anybody see you?"

"Don't think so. Leastwise, nobody paid any attention. I came down the side streets with it. The Tates helped

me mount it. I figured I might fly over to Rio myself if you didn't show pretty soon."

"Good thing you didn't go through town. I've got a hunch that if any member of this gang—here or in Rio City—knew we had a ship that would fly, they'd have burned the hangar."

Ray winced as Doctor Bender tightened the bandages.

"Not too snug, Doc," he said. "I'm going to have to use that arm."

"What can you do?" asked Larry. "All we've got is the coyote killer. She's only got forty-five horses in her nose, can't cruise at more than seventy and only carries two hours' gas. You've got to buck an Alvion, cruising at better than one-eighty, equipped with a machine gun. You might as well attack the army with a putty knife. It's sure death."

Ray's lips formed into a thin, grim grin as he motioned toward the tiny two-place pusher.

"You're forgetting a lot of things, kid," Ray replied. "First is that I've been gunning a lot of tricky coyotes in the last two years. I've gotten more than a hundred. There's a twelve-gauge automatic mounted on the sliding swivel in the front cockpit. I can carry twenty gallons of extra gas in the rear cockpit and refuel in the air. Remember how I got 'Old Crusty,' the killer the ranchers were after for six years? I loaded up with beebie shot, flew over the district where he had been hanging out and dodging the boys who had been trying to get him. I cruised overhead until he came out of his hole—and I got him. Those beebies have a lot of force. And they spray."

"And so——"

"The man who killed my brother is in Old Crusty's shoes right now. I know he's coming over the border with a load before moon up. I know approximately where he'll cross. And those babies usually fly at around ten thousand. I'll be higher."

Ray bit off his words and the three men stared at the door of the hangar as it creaked open. A Colt .45 appeared first. It was followed by Sheriff Blakeslee. He stalked into the office. He looked at Ray.

"Gun shot, eh?" he rasped. He looked out into the hangar, saw the dead Mexican. The body stared at the ceiling through sightless eyes.

"You killed him." Blakeslee's look accused Ray. The latter nodded.

"Self-defense," he added. "He ambushed me."

Blakeslee's eyes glinted.

"That's what you say." He stalked forward, passed Larry, looked down at the wounded flier.

"Balmer, you're under arrest—suspicion of homicide."

Something in Ray's throat tightened.

Pin-pricks went over his body. He controlled a desire to spring at the bulky man who stood over him. Then Larry went into action. Ray didn't see what his younger brother hit the sheriff with. But he dropped like a log. Ray leaped to his feet. The bandage was finished now.

"Nice work, Larry!" he whipped. "There's going to be hell to pay for knocking him cold, but in the meantime, I've got to get moving."

Ray looked at both men. Then at the fallen Blakeslee.

"He must be mixed up in this gang some way. I've felt it ever since he half admitted that he'd tipped the Department of Commerce about *Mister Jonah*, hoping to ground it. This move implicates him more. How'd he know we were here?"

"Somebody down at Stockton's pool hall must've tipped him," suggested Doc Bender. "There was a mob in there when Larry found me."

"Maybe so. But I still think he's on the inside. Somebody's been trying to keep us out of the air—wreck our planes. Somebody who knows Kirk and I were using them trying to grab the gang. And Blakeslee nearly had one grounded. Then somebody fixed it to crash, just when we needed it most. Larry, do you think he saw that the coyote killer had a new wing on it?"

"Hardly. I saw him come in. The wall and the door hid it from him."

"Fine! Then, even if he is on the in, he won't have anything to tip the mob about. They'll think I've nothing to fly. They'll go right ahead with the shipment. Here, Doc—Larry! Grab hold. We'll heave him into Doc's car. Doc can drive him home and treat him."

The men carried the unconscious official to the car. Then they returned.

"Help me with the plane," Ray ordered.

Larry, Doc and Ray checked the shotgun, stocked beebie ammunition, filled the gasoline tank, loaded twenty more gallons and a parachute flare in the rear cockpit. Then they turned out the bright hangar lights, opened the big doors and rolled the small monoplane into the open. Larry spun the propeller. The little three-cylinder Szekeley barked, caught. It didn't make much noise with the special muffler Ray had installed to prevent alarming the coyotes.

After a couple of minutes he waved good-bye to Doc and Larry.

"I'll be back before dawn," he promised.

He shoved the throttle forward.

Stars glinted like sun-backed holes in a black blanket as Ray, having twice refueled from his extra gasoline supply, cruised at twelve thousand feet, glared out over the sky and land, ever seeking the dope-running biplane. The moon would soon be up. At the rim of the

plain the sky was getting milky. Back and forth Ray went, above the sleeping 'dobe-built Rio City, east to a point above the point where his brother had been wantonly slain, back again to Rio City, his ship whispering along like the cape of an avenging ghost.

Twice, three times, four times, Ray thought he saw patches of stars blink out in procession, which indicated the passage of his quarry. Each time his eyes tricked him.

Then, far in the distance—how far he couldn't guess—he saw the wink of a flashlight pointed on a southward angle. Pointed toward the sky and the border! Ray's blood pounded against his temples as he watched. The light blinked three times—then once—then three times. It was out for a while. Then the signal came again from the far reaches of the mesquite-dotted plain.

He slapped his stick and rudder over, headed in that direction, hoping that his tiny craft could be neither heard nor seen by those on the ground. He knew that he was taking a hundred-to-one chance—even though he had been cocksure in talking to his brother—for the shotgun was effective only up to five hundred feet against coyotes and he could expect only three or four shots at the fleet ship he sought. After that—he shuddered. After that, a machine gun on the nose of a ship traveling three miles a minute would be ripping into the fuselage of the slow coyote killer. After that, there were those human jackals on the ground, signalling with the flashlight, ready to complete any part of the task left undone by the pilot.

Now, if the pilot had caught the signal as he had, he was streaking forward toward it like a homing pigeon. Smugglers came in fast and straight—wanted to get the run over with.

Below and behind him he saw the eerie purple-blue flame of exhaust stacks. His eyes calibrated his speed, the speed of the plunging smuggler, his angle of dive. He shoved the stick forward, took a big gulp of the air which drove into his face, stiffened his body and shot downward like a hell-diver after a fish at the ship which, he guessed, was a thousand feet below him.

Then the quarry was underneath his sights, a black patch against the gray-black plain. It seemed to hurtle up at him.

He squeezed the trigger of the gun. Wind whipped at his face, slapped his shirt. Wires sang, struts sighed, and the motor and propeller screamed like an angry angel. The ship rocked and bumped. The gun blasted. The biplane shot out from under him. He followed with his sight, allowing for the drive of the wind. Second shot. Third. Fourth. Fifth. The breech locked open. The gun was empty. His heart sank, he felt weak all over, and his wound hurt

him as he saw the biplane plunge onward through the night at the signals. He reached into his pocket, pulled out one shell after another, reloaded.

He was sunk! He knew now that, unless something miraculous happened, unless he had hit the plane, death's wings were brushing him.

His speed, the wild momentum of his dive, carried him downward, ever downward, and straight ahead toward the signal light.

If he was going to die, those on the ground were going to pay dearly. Those dirty coyotes who had shot down his brother!

Then, following the exhaust glow of the other plane with his gaze, he saw it scream downward, bank, come after him. Its gun blazed at him. As he swung his reloaded gun up, the ship banked again, streaked for the signal light. He aimed at the light, too.

Ray was over it a second later. Coolly he got the parachute flare, fired it over the side. A moment later the plain blazed into light. Men cowered, darted zigzag like the desert rats they were, scurried for shelter, but not fast enough. As Ray broke down into the light he saw ocherous spats of flame, and knew that they were firing at him.

He was going to sell out dearly—and he could handle the coyote killer. He'd pegged many an animal as it zigzagged along a fence line.

As he dived he counted the points from which the firing was coming.

Four! The four men who had attacked his brother!

His face twisted with cold fury. He leveled off twenty feet above the ground. His beebee-spraying gun barked once. He saw the first man fall. He banked, cut back, picked another patch of spurt-ing flame, blasted. The second man dropped almost as the heel of the shotgun kicked into Ray's shoulder. If he could only wipe out the four before the biplane got on his tail! He waited for that as he picked a third man, saw him stagger a few steps and fall flatly.

His fourth shot roared into the night.

The last rat rocked backward away from his machine gun. The flare went out.

Ray zoomed, throttled his motor back, listened. His heart leaped with joy. He heard the pound of a missing, coughing, spluttering motor off to his right. He banked. The moon was lifting its golden rim over the frayed edges of the low hills of the east. For a second he caught the reflected glint on the top of a streaking plane below him. Then he heard a crash and the rip of metal cowlings.

He dived down over the ship.

He could see nothing but the black wings. No sign of life. He banked once more, slipped low, picked what looked like a clear space in the mesquite, cut his gun, mushed in. The plane pan-



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caked, leveled off, settled again, rolled to a stop.

Pistol in hand, he leaped from the cockpit.

He ran to the side of the wrecked ship, saw that it was not badly torn up. It smelled of gasoline. The liquid had soaked the ground. He knew what had happened then. He hadn't gotten the pilot, but the beebees had riddled the gas tanks. He found footprints in the soft sand. Clutching his pistol, he followed them under the increasing light of the full moon.

He had not far to go. Ahead he saw a figure limned against the light sky. "Halt!" he bellowed.

The figure turned. Fire flashed, a revolver cracked. Ray snapped a shot. He saw the man ahead reel, go down. He advanced cautiously, worked his way over to one side, took advantage of the shelter of mesquite. The fellow was waiting for him. Moonlight glinted on his weapon.

A second shot shattered the stillness. Ray pulled the trigger of his automatic. It had jammed. Wild with rage he hurled it at his enemy, sprang through the air after it, landed on top of the man. The struggle was short. Moonlight fell on the man's face.

"Good Lord!" Ray exclaimed. "Blakeslee!"

Ray bound his prisoner, loaded him into the rear cockpit, where the extra gasoline had been, and taxied up in front of the hangar at Fort Hilton just before dawn, as he had promised. Doc Bender and Larry ran to the ship. Ray, weak and shaking, pulled himself out of the cockpit and in a few minutes had told his story. A telephone call started deputies organizing a posse to go to the scene of carnage. Blakeslee was locked up in his own jail.

Then Larry gave Ray a telegram.

"Came just before you took off," he said.

Ray ripped it open, saw that it was from the director of the Federal Bureau of Investigation, scanned it tiredly.

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He handed it to Larry, who glanced over it grimly.

"Some day! Two airplanes washed out, a bullet in your shoulder, Kirk dead—and now this. What're you going to do?"

"Get some sleep." Ray sagged down on a cot in the hangar he had often used.

WHEN he opened his eyes he saw noon sunlight and felt some one shaking him gently. It was Larry.

"The posse found two men still alive,"

the younger brother said. "They confessed. You wiped out the entire mob. Blakeslee's held for murdering Kirk. He had the plane in an underground hangar on his ranch. He could leave here after you did anytime and beat you to where you were going hands down, because of its speed."

Ray closed his eyes for a moment. He heard Larry say:

"This came."

It was another telegram. It was again

signed by the director of the F. B. I. He read:

HAVE JUST SEEN NEWSPAPERS STOP WHY DIDNT YOU SPECIFY TYPE COYOTES QUESTION IN VIEW CIRCUMSTANCES HAVE REPLACED YOU ON LIST STOP REPORT AS SOON AS YOU HAVE RECOVERED FROM WOUNDS

The redhead smiled.

THE BIGGEST NATIONAL MEET

(Continued from page 43)

unfortunately landed in a tree and was hopelessly wrecked.

The Texaco Trophy was won by Francis Tluth of Lyndhurst, N. J. His older brother, Charles, built the engine which powered this ship. These brothers have produced many successful gas models during the last two and a half years, and turning in good flights was just in the day's work for them. Unfortunately, the wing on this model was broken when they recovered the model from a tree after the winning flight of 45m 34s.

Most of the gas models showed remarkable gliding ability. After the motors had carried them into the air a few hundred feet, they would soar on for miles, so accurately were they adjusted. One outstanding attempt to cash in on the soaring ability of gas models was the gas job entered by Vernon Boehle of Indianapolis, Ind. This ship's wing-span was 15 feet. It was powered with a Cyclone engine. Unfortunately it was slightly underpowered, and did not get the altitude sufficient to turn in a record flight. Boehle's best time was close to 25 minutes.

Although there was a prize for the best radio-controlled gas model, none appeared to claim it. After the contest the A. C. Spark Plug Company announced an award of \$200 for a radio-controlled ship, so it is a certainty that there will be at least one such model at next year's meet.

On July 2, the third and final day of the contest, the indoor entrants went to the Olympia Auditorium to compete for the two national indoor trophies, while outdoors the Moffett finals were held at the airport. Every one was surprised when Bert Pond, flying a New Zealand entry of Vernon Gray, turned in 44m 14s. The British and U. S. entrants did their best to win for their countries, but the air currents decreed that there was to be only one long flight, and we had to be content with second place and the British with third.

When the Moffett contest had been run off, the last few hours of indoor flying were in full swing. The ceiling of the Olympia was only 90 feet high, and in addition there were several clusters of hanging lights. Many good indoor models met their doom against the lights and steel rafters. By 5 o'clock it was evident that John Haw's stick-model flight of 18m 10s, set up earlier in the day, was going to win. And by 6 o'clock, when the flying ended, John was the winner of the Stout indoor stick-model trophy and a 1,000-mile trip on Central Airlines. Alvie Dague of Tulsa won the indoor event for cabin fuselage models with 16m 17s. With this victory goes one-year possession of the Bloomingdale Trophy and permanent possession of the Detroit Times Trophy.

A fitting climax to three wonderful

days of flying was the banquet on Thursday evening given by the A. C. Spark Plug Company. William B. Stout, designer of the Ford tri-motor transport and at present manufacturing automobiles, was the toastmaster. Stout is a model builder from way back, and the donor of the two national trophies which bear his name. It seemed like old times to have him at the contest. H. S. Walesby, aviation editor of the Detroit Times and contest director for the meet, announced that the meet would be held in Detroit again in 1937 if official sanction could be secured. He said the Times would offer prizes amounting to \$1,000. Indoor flying would be held in the airship dock at Akron, and the contestants would make the trip to Akron by special train and boat. Outdoor flying would be held in Detroit at the same Wayne County Airport, which all contestants agreed is an ideal place.

From the standpoint of the contestants who didn't win high places, the event still packed a thrill that winning last place couldn't entirely erase. Last year's champions practically all failed to repeat. John Stokes, Torrey Capo, Vernon Boehle, Leo Weiss, Kenneth Ernst and myself all tried hard against stiff competition. Fate just didn't seem to be kind to us, so we joined the others in hailing the new champions for 1936.

—G. S. L.

LAZY TAPERWING

(Continued from page 52)

entirely on the propeller to keep it up. There are no thermal air currents of which the model can take advantage.

The prop is carved in exactly the same way as an outdoor prop, except that a great deal more care must be used. When carving the block, the blades are carved to about 3/32" thick, and sandpaper varying from #2 to #10-0 is used progressively on the blades until the proper thinness is obtained. The blade thickness at the hub

should be only 1/16" and at the tip 1/64". The blade cross section should be an airfoil shape and the depth of the camber about 3/32". A template of the blade shape should be made and the prop cut to conform with this shape. Bend the shaft, insert it in the prop, and cement it.

Keep in mind that the prop must be perfectly balanced. A smoothly turning prop adds greatly to the flying qualities of the model.

COVERING AND ASSEMBLY

Cover the model with microfilm. (How to make microfilm and cover with it was explained in last month's issue.) After the two halves of the wing have been covered they must be cemented together at the proper dihedral. When the wing is dry, support it level by the tips, put a dot of cement on the end of each clip-stick and touch them to the wing spars at the dihedral point. In this way you will be sure that the clips

will dry perpendicularly. Drop a globule of cement on the leading and trailing edges of the tail at the center rib and put it on the small end of the boom. Then cement the rudder on the center rib and perpendicular to it. Clip the wing to the motor stick, in line up the tail and rudder with the wing, and cement the boom to the motor stick. Do not forget to raise the tail. When the boom is dry, slip two washers on the prop shaft and put the prop in place.

FLYING

When the model is ready to be flown, make an 18" loop of 5/64" brown rubber and put it in place. Move the wing until its center point is directly over the place where the model balances.

On the first flight the rubber should be wound about 300 turns so that any adjustments can be made. Stalling or diving can be remedied by moving the wing forward or backward. The model should turn in a circle 40 or 50 feet in diameter. If it doesn't, warp the rudder to increase the turn. When you try your flights in a building which is very low, you can increase the rubber length in order to keep the model down.

If this happens to be one of your first ships, you may find it advantageous to use 3/32" flat rubber instead of the

5/64". A lubricated length can take 2,400 turns—enough for 19 minutes, if you are going after records.

WEIGHTS

Wing	.020 ounces
Motor stick	.017 "
Boom	.002 "
Prop	.017 "
Tail & rudder	.002 "

Total .058 ounces

SPECIFICATIONS

Wing area	95 sq. ins.
Tail area	24 sq. ins.
Wing incidence	zero degrees
Elevator incidence	—1½ degrees
Prop pitch	29 ins.
Wash-in in left wing	
Rudder warped to left for turn	

MATERIALS

(All balsa should be between 4½ to 5 lb. stock.)

1 sheet 1/64"	
1 " 1/32"	
1 " 1/16"	
1x1½x15" prop block	
Microfilm solution	
Thrust bearing (dural) and washers	
1 foot wire .016" diam.	
Brown rubber	

FROM THE GROUND UP

(Continued from page 66)

of cement on the end of the axle. This one-piece bamboo landing gear does away with the annoying job of putting wire axles on the ends of the landing-gear struts.

The bamboo is cemented and threaded to the motor stick at a point 2½" from the front. A bamboo or wire tail skid, bent to the shape in the drawing, is inserted in the rear of the motor stick.

TAIL

You can easily sketch a full-size tail plan from the dimensions given in the drawing. Cover your plan with wax paper and then pin 1/16x1/8" balsa to the outline. Carefully cement together the ends of the pieces—not forgetting the main spar which runs the length of the elevator. The rudder is made over half of the same pattern as the elevator. Put the tail aside to dry; we'll return to it later for covering and assembling.

WING

The wing spars are 1/16x3/16x22" and are joined by seven bamboo ribs which have been split to approximately 1/32x1/16". After the ribs have been cemented in place on the spars, bend the bamboo wing tips. From my collection of tin cans of varying diameters I was able to pick an old baked-bean can

which was exactly 3½" in diameter. After a few minutes of heating over a gas burner, it was hot enough to bend the bamboo tips. The total operation, outside the actual heating of the can, takes about 10 seconds, and the wing tips are perfect half-circles. And since both of the tips are bent at the same time, the wing is certain to have a nice uniform shape.

Raise each tip of the wing 2" above the center. Break the spars at the center, raise the ends of the wing, and then coat the break with cement. Support the wing in such a position that it will retain its shape throughout the drying operation.

The wing is attached to the motor stick with two wire clips. These clips should fit snugly, yet shouldn't groove the stick. The rear clip should be 1/8" higher than the front clip. Bending them to this size will automatically set the wing at the correct angle. The clips are cemented to the wing spars.

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28x4.50-20	2.40 30.85	33x4 2.95	34x4½ 3.45 1.15
30x4.40-21	2.40 30.85	33x4 2.95	34x4½ 3.45 1.15
28x4.75-19	2.45 30.85	33x4 2.95	34x4½ 3.45 1.15
28x4.75-20	2.50 30.85	33x4 2.95	34x4½ 3.45 1.15
28x5.00-19	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
30x5.00-20	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-18	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-19	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-20	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-21	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-22	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-23	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-24	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-25	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-26	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-27	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-28	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-29	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-30	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-31	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-32	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-33	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-34	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-35	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-36	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-37	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-38	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-39	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-40	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-41	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-42	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-43	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-44	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-45	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-46	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-47	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-48	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-49	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-50	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-51	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-52	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-53	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-54	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-55	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-56	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-57	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-58	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-59	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-60	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-61	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-62	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-63	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-64	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-65	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-66	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-67	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-68	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-69	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-70	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-71	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-72	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-73	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-74	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-75	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-76	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-77	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-78	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-79	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-80	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-81	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-82	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-83	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-84	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-85	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-86	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-87	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-88	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-89	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-90	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-91	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-92	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-93	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-94	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-95	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-96	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-97	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-98	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-99	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15
32x5.00-100	2.55 30.85	33x4 2.95	34x4½ 3.45 1.15

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The size of the block is $\frac{7}{8} \times 1 \times 9$ ". First of all, mark the exact center of the block on both sides. Push a needle half-way through from one side and then remove it and start the hole from the other side. Guide the needle so the holes will meet in the center of the block.

Next lay off the block with pencil and ruler. In this operation, as you did in punching the center hole, make duplicate markings on both faces of the block. Cut out the blank and then carve the blades of the propeller as indicated in the sketch. Once you've visualized what a finished propeller looks like, you'll have an easier job carving one, so inspect other builders' propellers whenever possible. And if you're building models by yourself, digest the drawings and the photos and you'll soon get the idea.

A piano-wire shaft is inserted through the center of the finished propeller. By resting the shaft lightly on your finger tips you can find the heavier blade and sand it off until the prop balances. Next bend the front end of the shaft and cement it to the prop hub. When bending piano wire fittings, don't rely entirely on your pliers to obtain a smooth, rounded shape. Wrap the wire around a circular object such as a dope brush, lead pencil, or nail, and then finish the fitting with the pliers.

Six strands of $1/30 \times \frac{1}{8}$ " rubber power this model sufficiently for a lively flight. Notice that the rubber is attached to

the rear hook by an "S" hook, which permits you to transfer the motor from the stick to the winder.

COVERING

A white model is always attractive, but any color is appropriate for the Buzzer. Cover the elevator and wing on the top side, the rudder on either side. Don't dope the tissue with either water or prepared dope, as it will stretch this wing out of shape. A light sprinkling of steam will shrink up all wrinkles.

The rudder is cemented to the top center of the elevator. The elevator in turn is cemented to the top rear of the motor stick.

FLYING

Clip the wings to the fuselage and we're ready for some fun. By balancing the motor stick on a knife edge, you can readily locate the model's balancing point, which should be about $1\frac{1}{8}$ " back from the front edge of the wing.

It won't take much twist of the rudder to turn the Buzzer. An even more effective way of turning the model is warping the wing. It probably will be necessary to warp up the front edge of the left wing, to take care of the torque of the propeller, which tends to depress this side.

You can have an interesting and instructive afternoon with the Buzzer by trying out various adjustments. Warp up the rear of the elevator and the model will show a decided climbing ten-

dency. Warping down the elevator will give it just as pronounced a diving inclination. Or you can have the same results by moving the wing forward or backward. The six strands of unlubricated rubber will take 900 turns as a maximum, but for ordinary flying 600 turns will do the work nicely.

WEIGHTS

Wing	.11 ounces
Elevator and rudder	.07 "
Propeller	.08 "
Motor (6 strands)	.22 "
Motor stick and landing gear	.47 "
Total weight R.T.F.	.95 ounces

MATERIAL REQUIRED

(Balsa unless otherwise stated)

- 2 pcs. $1/16 \times 3/16 \times 22$ " for wing spars
- 2 pcs. $1/16 \times 1/8 \times 24$ " for tail
- 1 pc. $1/4 \times 3/8 \times 19\frac{1}{2}$ " for motor stick
- 1 pr. of $1\frac{1}{2}$ " diameter wheels
- 1 strip of bamboo for wing ribs, tips, landing gear
- 10 ft. of $1/8 \times 1/30$ " black rubber
- 2 ft. of #10 piano wire for shaft, hooks, clips
- 1 dural thrust bearing (wire or flattened-nail bearing will do)
- 1 propeller block $7/8 \times 1 \times 9$ "
- several copper or brass washers to reduce propeller friction.
- $1/2$ ounce of cement and banana oil
- 1 small sheet of tissue

—G. S. L.

TOPS IN TRAINERS

(Continued from page 55)

streamlined section. Sand the completed surfaces carefully and cement each piece neatly in position. Using wood filler or other moldable substances, form the fillets as shown on the top and side views.

WINGS

The wings are cut to their required outline from a soft sheet of $3/8$ " balsa and tapered toward the tip. Shape them in accordance with the sections given on the plans and sand smooth. Using thickened cement, fasten the completed wings in place and mold the fillets.

LANDING GEAR AND DETAILS

Cut each landing-gear leg to shape from $9/32$ " sheet or heavy $1/4$ " stock. They are streamlined and cut out on the outside only to accommodate the wheels. When completed, sand them carefully, cement in position and mold the flared top fillet.

Cut the wheels from sheet balsa if the required size is not available.

The prop is built of scraps in accordance with the detail on the plan. Mount

it on a pin so that it will be free to revolve.

The enclosure for the crew is built up of light wire frames and cellophane covering.

CROSS WINDS

B	A	M	B	O	O	C	A	M	B	E	R
N	O	O	N	N	T	E	A	L	E		
I	O	X	S	E	A	N	R	E			
T	A	R	H	A	T	C	H	R	A	N	
S	N	I	P	E	D	T	O	W	A	R	D
S	N	O	W	M	G	A	G	E			
L	O	G	S	T	A	P	C	E	N	T	
I	N	T	O	R	P	E	D	O	A	A	
T	G	F	I	L	T	H	V	B			
O	U	R	T	E	E	S	I	T			
A	V	I	A	T	E	R	O	T	O	R	S
S	A	L	V	O	I	F	O	L	I	O	
L	E	E	A	T	E	P	A	P			

Answers for August

PAINTING

Give the entire surface a coat of clear varnish to fill the pores. Dope will do, if necessary. Sand where possible before painting.

As designated on the plan, the fuselage, fillets and landing-gear legs are army blue. The rest of the ship, with the exception of the markings, is yellow. The marking colors are given by the key on the plan. Trim with black.

Cement the radio mast in place using #60 thread for an aerial.

MATERIALS

- 1 $5\frac{5}{8} \times 1\frac{1}{8} \times 1\frac{3}{8}$ " balsa block
- 1 $9 \times 3\frac{3}{8} \times 2$ " " "
- 1 $1 \times 3/32 \times 9/16$ " " "
- 1 $1/8 \times 2 \times 6$ " balsa sheet
- 1 $1\frac{1}{2} \times 4 \times 1\frac{1}{4}$ " " "
- 1 pr. $5/8$ " wheels
- 1 $1\frac{1}{4}$ " tail wheel
- $1/4$ oz. cement
- wood filler
- paint
- cellophane
- light wire

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- ★ 18 to 1 GLIDE

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Value of Kit	7.50	You Save
Brown Jr. Motor	21.50	4.00
Total Value	29.00	
Brown Jr. Motor Alone 21.50 p. p.		

Combination Price Including		
BABY CYCLONE MOTOR		
Value of Kit	7.50	You Save
Baby Cyclone Motor	15.75	3.25
Total Value	23.25	
Baby Cyclone Motor Alone 15.75 p. p.		

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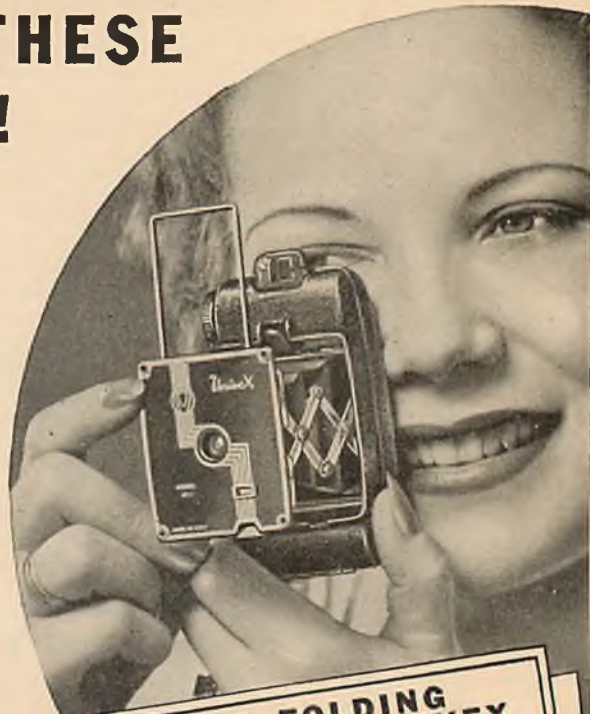
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