Journey To Jupiter

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A Chris Godfrey of U.N.E.X.A. Adventure

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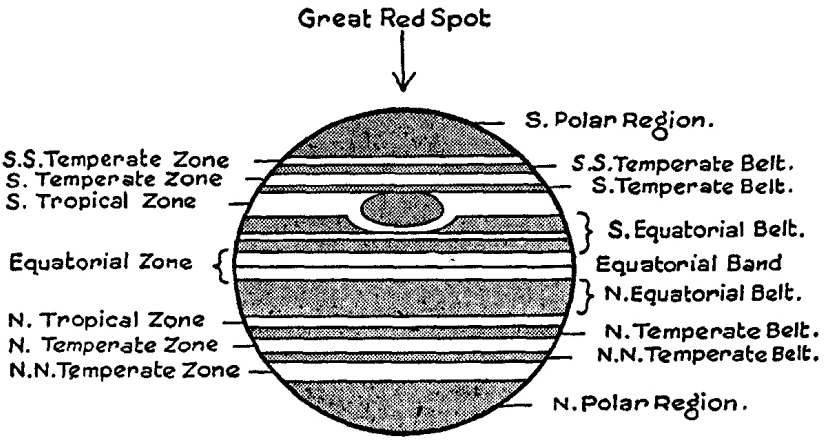
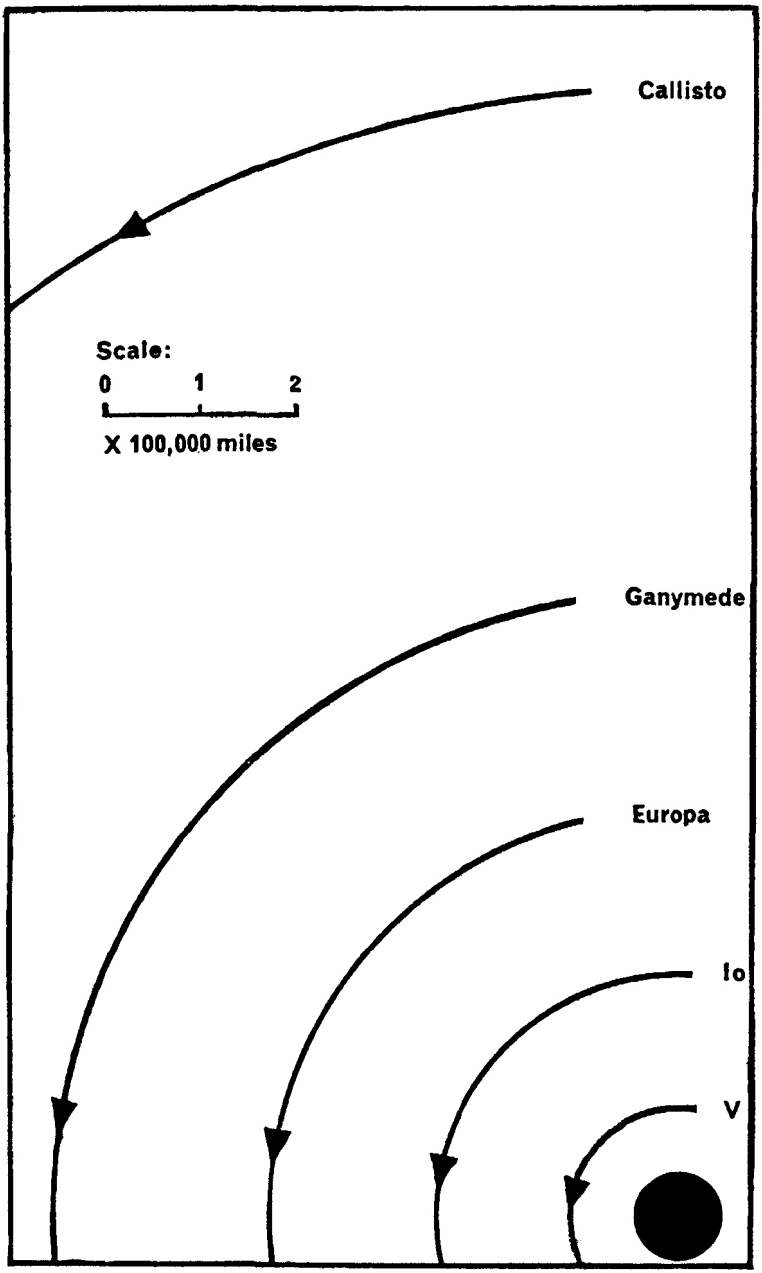
By the Same Author

Destination Mars
Expedition Venus
First on The Moon
Mission to Mercury
Outpost on the Moon
Terror by Satellite
Journey to Jupiter

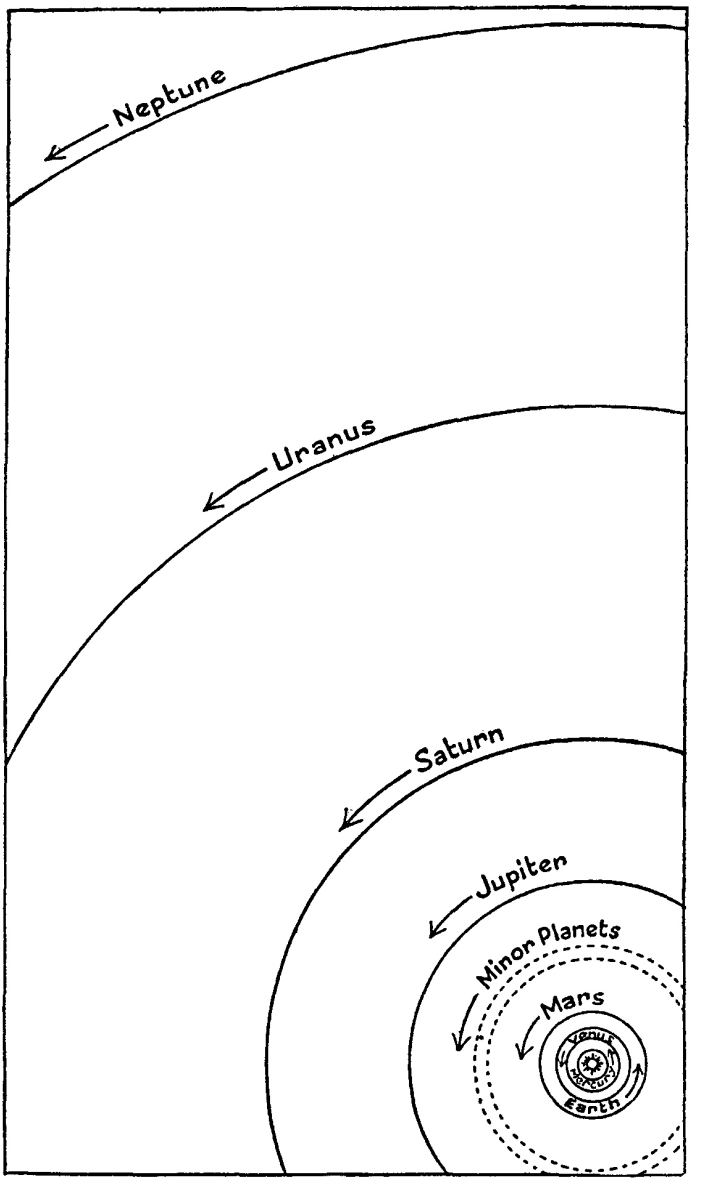
THREE DIAGRAMS SHOWING JUPITER, ITS MOONS, AND ITS POSITION IN THE SOLAR SYSTEM



1. Jupiter



2. The Inner Moons of Jupiter



3. Plan of the Solar System, drawn to scale (1 inch = 500 million miles)

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“Jupiter—here we come!”

The cheerful announcement was" made by Tony Hale, the spaceship’s mechanic. With his three companions he was strapped down on his contour couch as the last seconds before blast-off ticked away. Any moment now the giant rocket motors would roar into life. Then the huge ship would quiver for a few vital seconds before rising slowly and ponderously from the launching pad. Each moment it would gain speed as it raised itself ever higher on its deafening tail of fire. In a little over a minute it would be well up into the cloudless blue sky, its path marked with a dark trail of smoke. Before the watchers’ eyes it would get smaller and smaller until at last it disappeared.

Four human beings would, for the first time, be on a journey to the vast mysterious planet.

Along with Tony was Chris Godfrey, the young physicist who was leader of the expedition, together with Morrison Kant, the crew-cut American with broad shoulders and a perpetual grin, and Serge Smyslov, the dark, reserved Russian. All four had made many space trips together. Not only were they a well-knit, efficient team, but they were also the closest possible friends. Each had given up counting the number of times his life had been saved by his companions. Each knew that he would gladly give his own life to save that of his friends.

UNEXA, the United Nations Exploration Agency, had commissioned the undertaking. Long months of planning had preceded it and now all was set at Cape Kennedy for the great moment.

“Zero!”

The disembodied voice making the count—down called out the fateful word and, involuntarily, all four members of the crew held their breath. This was the moment when disaster could occur if the rocket motor failed to ignite properly. Then the expedition would be over before it ever left the ground. But everything went well, and as the quartet felt their ship begin to move they heaved a sigh of relief.

For the next few minutes they would all be held down by the terrific thrust of the motor. Until the giant booster had burnt out they would have difficulty in moving and speaking. Then, as this first stage of the rocket fell away from the rest, they would have a few moments' freedom until the second stage ignited. For a further four and a half minutes the ship and crew would be subject to more acceleration. Nine minutes after leaving the ground the rocket would have achieved escape velocity.

Chris Godfrey turned his head with an effort. He wished to assure himself that all was right with his crew. In turn each one raised a hand to signify that, apart from the discomfort of the acceleration, all was well. Forcing the muscles of his mouth and tongue to work, Chris reported to Control that everything was okay.

At last, after exactly the right interval, all pressure died away and the crew could move and talk freely once more.

"Everyone fit?" enquired Chris as they all began to free themselves of the straps. There was an enthusiastic chorus of affirmation as they worked over the safety belts.

"Right. You all know what to do," the leader called as he threw off the last strap. Then the most fantastic thing happened. Instead of sliding off his couch and standing on the cabin floor, Chris hung suspended, and without visible support, a few inches above his couch. He was in the condition of weightlessness—or free fall as it was called by astronauts. Though they had experienced it scores of times before, and for considerable periods, the crew never failed to show their high spirits at the onset of this strange effect. A puff of air from the lips was sufficient to send a crewman

sailing gracefully away until the cabin wall stopped him. Moving his arms or legs was enough to send him twisting and turning in a most hilarious manner.

"Shoes on," Chris called, and with the others he put on the special footwear with magnetic soles. This enabled them all to walk much as they did on Earth, except that they could also walk on the walls and ceiling like flies.

There followed a busy time for the crew. Each had his own jobs to do, the most important of which was to send a mass of. information back to Earth. Soon the giant computer at the Cape would digest this, together with much more from ground tracking stations over a wide area. Then it would give the result of the information fed to it—whether the ship with the official name of "Jupiter I" was on course or whether corrections were to be made. A great deal depended on the accurate work of the crew during this early stage in their flight.

For the next half-hour, while Tony was doing a routine inspection for possible damage during blast-oil, Chris, Morrey and Serge recorded the position of stars and made other observations which they radioed back to Earth. It would be a great relief when they were safely on course. Then they could switch on the ion motor which alone made their expedition possible.

All the preliminary readings had now been completed. Tony had found no damage to the pumps, valves or fuel supply. They could take things easy while the computer did its work. They could even have a little refreshment, for it was many hours since they had eaten and they were all hungry.

"Roast beef, pork chops, or the leg of a turkey?" asked Tony, who was in charge of rations.

This was a standing joke among the astronauts, for during their long voyage food would consist mainly of tablets. True, they were flavored like the delicacies Tony had mentioned, but this was only to give a little variety to their diet. Not until they returned to Earth once more would they indulge in the

luxury of meat and vegetables. And of course they could not drink from a cup or glass. Under the present weightless conditions free fluids would break up into innumerable tiny droplets which would fill the cabin like so many floating diamonds. All drinks had to be taken from a plastic container and squeezed into the mouth.

Their space meal over, the crew spent the time discussing their expedition while they awaited the result from the computer. Although they had been well briefed, Chris felt that they couldn't be too familiar with the program ahead.

"Tell us what you know about Jupiter," he said to Tony.

"Back to school again," Tony sighed. In a high-pitched voice, imitating a child reciting a lesson in class, he reeled off some facts about the giant planet.

"Jupiter is the largest planet in the solar system," he piped. "It is twice as large as all the other planets put together. Jupiter is thirteen hundred times as large as the Earth and it is more than five times as far from the Sun."

Chris and the others smiled their approval as Tony paused for breath.

"Top marks so far," Morrey called. "Carry on."

"Jupiter takes nearly twelve years to travel round the Sun," Tony continued flutingly, "but it spins round on its axis faster than any other planet. Its atmosphere is ammonia and methane, and it has a large red spot."

"There," he concluded in his normal voice, "that's all I know. One of you have a go."

"Whose turn?" Chris asked.

"I'll have a try," Morrey grinned. "Jupiter, the king of planets, has twelve attendant moons. They vary in size from a few miles in diameter to something larger than our Moon. The names of the four largest are Io, Europa, Ganymede and Callisto. Io is the nearest of these to Jupiter. Now over to you, Serge."

"Our objective, being so large, has a much stronger

gravitational pull than the Earth," said Serge. "Gravity at its surface is more than two and a half times what it is on Earth. Therefore a rocket would have to travel five times as fast to escape from Jupiter as we've had to do to get away from Earth."

A voice from the loudspeaker interrupted any further recital of facts about the king of planets. It was Control telling the crew that their flight path was extremely accurate and needed only a slight correction. Details of the necessary procedure were given, A short burst from one of the small lateral rockets would be sufficient, but it was important that Jupiter I's course should not be deflected too much. A rocket burst that was too long would push them past their correct trajectory into a faulty path again.

Chris remembered how, in his early rocket days, he'd had to make just such a correction. Lack of experience had caused him to see-saw backwards and forwards across the correct path before finally settling on it. He didn't want such a mistake to mar the present maneuver. True, there was now a built-in time switch for use with lateral rockets, but there was still a margin of error and ultimately it depended on the leader to set the ship on its correct flight path.

Glancing at the note he'd made of his instructions, Chris made his way to the panel of switches controlling the small side rockets. Selecting one which would ignite a lateral in the correct position, he set the timer and pressed the switch. A second and a half elapsed before there was any response, and it was the delay in this action, which varied each time, for which the astronaut had to allow. Quick as a flash Chris altered the timer to give the rocket its full burst. A slight quiver was felt in the cabin as their course was corrected.

"Think we've done it?" Tony asked.

"'We'll know soon," answered Chris. "Control will let us know if I've overshot the mark."

There was nothing to do but wait—wait while the men at the Cape plotted their new course.

"A.O.K.," the welcome news came over the radio soon afterwards, and the quartet in the space ship's cabin cheered with relief. Of course there would have to be other corrections later on, but not until Jupiter I was drawing close to its objective.

"Now for the ion.motors," called Chris, and the crew set about starting up" this new method of propulsion, which alone made long interplanetary journeys possible.

Unlike the rocket motor, which obtained its terrific thrust by burning high energy fuel and oxidant for a relatively short time, the ion motor provided only a gentle push from its stream of ionized particles. However, the effectiveness of the ion motor lay in the fact that it could be run almost indefinitely, and its small but persistent thrust could build up fantastic velocities.

"Motor on," Morrey called out a few moments later as the crew completed the drill for starting it up. But there was really no need for him to tell the others, for they could all feel the low gravity which the motor induced.

"It's like walking on the Moon," Tony declared as he removed his magnetic shoes. His stride across the cabin had lifted him a foot from the floor, just as it had done on Earth's satellite.

"You don't know how near you are to the truth," Chris Godfrey said with a smile. "This new motor, more powerful than any other, gives a thrust of one sixth 'g', almost the same as the pull one feels on the lunar surface. Be careful you don't bump your head."

The warning was by no means unnecessary. Under the light artificial gravity provided by the ion motor's low thrust, it was all too easy to misjudge any movement, and for the crew members to find themselves colliding with each other or parts of the cabin. Soon they would get used to the strange conditions, but for a time would have to take care that their muscles, conditioned by earthly gravity, didn't play tricks. They would have to avoid sharp movements, or the results

could be quite painful.

Their course settled, the ion motor running smoothly, Chris and his companions could now settle down to the routine of the Voyage. Apart from attention to their instruments and regular reports to Control, their main task now was to keep themselves fit and, most difficult of all, to avoid boredom. Each one of them secretly dreaded what might happen if boredom set in and nerves became irritated. Elaborate plans had been made to prevent it, but then no one had ever made a journey like this before.

Fortunately all four astronauts had previous experience of being confined in a space ship's cabin. On journeys to Venus and Mars they had been shut up together in a small space for many days. But they had never before undertaken a voyage such as this one—to the Sun's mightiest planet.

"Just how long will this trip take us?" asked Tony, voicing the most important question.

Chris had expected the query. The answer depended upon the velocity to be reached by their ship. In all their briefings at Cape Kennedy, and elsewhere, no one had ever mentioned this important aspect of their journey. Not even Chris's friend, Sir George Benson, had referred to it when he came to see them shortly before launching. Each of the crew had wondered why, but they had all tried to conceal their concern about this strange lack of information. Once when Chris had asked Sir George, the scientist had avoided giving a direct answer.

"Oh, we'll let you know once you're on the way," he had answered vaguely.

This wasn't like any previous voyage they had made. Before, the flight program had always been worked out meticulously. They had known to within a few minutes just when they would arrive at their destination, and even had a close estimate of when they would return to Earth. This time they had no such knowledge.

Was there anything sinister about this? Was it that the

men who had sent them thought little of their chances of survival?

Even as this thought forced itself into their minds they rejected it. Knowing Sir George Benson and the other responsible scientists as they did, the crew were sure that unless there had been a very good chance of a safe return, the expedition would never have been launched. This same quartet had sometimes chafed under what they had regarded as the unnecessary caution of Sir George Benson and his colleagues. Why, then, was the chief scientist being so cagey about something he must have known was puzzling them?

It was time they found out.

2

"Jupiter I calling Control. Over."

"Control calling. I hear you. Over."

"May I speak to Sir George Benson?"

"Sure. Nothing wrong, is there? I'll get Sir George right away."

Chris and the others waited silently for Sir George's voice to come through. Surely he would give them the information now. Their ship was well on its way; every second its speed was increasing by three miles per hour. Soon it would build up a fantastic velocity. When must the ion motor be shut down?

"Benson speaking. Everything all right, Jupiter I?"

He sounded almost as if he were in the cabin with them.

"Er—yes. Everything's fine. What about giving us the flight program?" Chris asked firmly.

"Very well. But first I'll explain why you didn't get it before launching. Briefly—it's because we're going to test your reactions to a very high velocity without any preconditioning. We want to see how you behave at a speed which is a measurable fraction of the speed of light. It was important for you to know nothing about this before, because we want to start this experiment with a clean slate."

"You mean it would have spoiled it if we'd known beforehand?" asked Chris.

"Not exactly spoiled it, but we preferred that you shouldn't know. You see, in order to reach solar systems beyond our own, Man will have to travel very much faster than he's done so far. Even at the speed of light it would take four and a

quarter years to reach our nearest neighbor," Benson told them. "We've got to start from rockbottom in our investigation of the problem so that we can plan how to train astronauts of the future to travel—literally—to the stars."

"Shall we ever be able to travel faster than light?" Tony enquired.

"I expect so—but not for a long time yet," Sip George answered cheerfully. "Meanwhile we've got a pretty full program trying to approach that speed. Some day someone will break through the 'light barrier', just as many years ago they crashed through the sound barrier."

"And this is the first experiment in the program?"

"That's Serge's voice, isn't it? Yes. The object of your journey is twofold—to find out all you can about Jupiter, and to test your own reactions to ultra-high-speed travel."

Morrey asked the next question:

"What velocity shall we reach on this trip, Sir George?"

"Perhaps you'd like to work that out for yourselves," the crew heard Benson reply, and they could imagine the twinkle in his eye.

"However, I'll give you a clue," he went on. "You'll be accelerating at the present rate for ten days."

Serge and Morrey did some rapid calculations; then they quickly compared notes before Morrey burst out with the result:

"Three million miles per hour!"

"That's near enough," Benson's voice, agreed. "That's the maximum you can reach on this voyage."

"How's that? Why can't we go even faster?" Tony wanted to know.

"It's very simple," Sir George told them. "Your flight path is about seven hundred. million miles. In ten days you will have reached the halfway point. Then you'll have to start decelerating or you'll.overshoot your objective. It will take

you just as long to reduce your speed as it has to build it up. So our flight should last twenty days each way," Chris concluded.

"Just about. That is if you don't have to cut off the motor before maximum speed. Of course if you find any ill effects—or if we do—you'll stop accelerating at once, but your journey will take longer."

"Three million miles an hour!" Tony echoed.

"Yes—but it's still less than one two-hundredth of the speed of light," Benson observed. "All the same, we expect some peculiar things to happen."

"Such as what?" asked Morrey.

"We don't really know. Even if we did, I'd prefer not to tell you, because it's important for you to discover and report them for yourselves."

"And that's all you're going to tell us?" the crew leader asked.

"That's all at the moment, Chris," Sir George replied, "but of course you'll be reporting to us every hour precisely on the hour. In addition you will be monitored constantly in case you have anything special to report. We'll be keeping a close watch on your performance through the usual telemetry channels."

"So that's that," exclaimed Tony as the loudspeaker went silent. "We're to be guinea pigs for ultra-high-speed travel!"

"Say, rather, that we are privileged to take part in the first experiment," Serge added. "After all, it had to be someone."

"But why us?" Tony persisted.

"Because we've such a long way to go," Chris explained patiently. "Would you like to be shut up in this cabin for four years? That's the time this trip would take at ordinary speed."

"Gosh, I couldn't stick you three for that long," Tony declared with a grin.

"Then the only alternative is U.H.S., which stands for—"

"Ultra High Speed!" the rest of the crew chanted in a chorus.

Gradually the routine in Jupiter I settled down. Promptly every hour a call was made to Control by one of the crew. After passing on the official report a few pleasantries were exchanged over the radio link. The crew received news bulletins and sports reports. Sir George Benson spoke to them at intervals.

"Feel any effect of your velocity yet?" he asked.

"No, sir,-" Tony answered, for it was his turn on the radio. "I can't say any of us have felt any different."

"I'm not surprised," Benson observed. "After all—you're only doing a quarter of a million so far."

However, there was one peculiarity that anyone not accustomed to space travel would have observed. There was a noticeable gap between the conversation in each direction. Jupiter I was now some two and a half million miles from Earth, and radio waves were taking fifteen seconds to travel between Earth and spaceship. When Chris or any of the others spoke, it was a good half-minute before the reply came back. It was rather uncanny to think that as the seconds ticked by their words were speeding towards Earth at the speed of light, but that they must wait this interval for the reply to come flashing back.

When Tony commented on this time-lag Serge told him that it would be much longer as they drew nearer to Jupiter. Messages to and from Earth would take over thirty-five minutes each way.

"So we'll have to wait more than an hour for a reply!" gasped Tony.

It would certainly be a strange experience, one that no human being had experienced before.

"Why only thirty-five minutes?" Tony asked some time later. "I thought our flight path was seven hundred million

miles?"

"So it is," agreed Serge, "but that's because We can't just travel in a straight line. Jupiter is moving on its orbit just as Earth is, and although the two planets will be about four hundred million miles apart when we get there, we have to travel nearly twice that distance. Radio waves, of course, go by the shortest route."

Jupiter I had now been on its journey for two days. The crew members took turns to rest and to be on duty: There was nothing much to do except to check instruments, report to Control and examine the hull regularly for damage from meteorites. To help keep themselves fit the crew had to perform specially designed exercises, for the prolonged period "under light gravity would otherwise have caused their muscles to become flabby.

"I shan't be sorry when were there," Tony remarked plaintively on the third day. Though Chris tried to keep all the crew as fully occupied as possible, they were finding the journey a little tedious.

"Come on. Snap out of it," Morrey chided his young friend. Like his leader the American knew that boredom might become dangerous on a long journey, Pity the poor crews who would have to make the trips to stars outside the solar system. Even if their ships reached the speed of light they would be years on the journey—unless the light barrier could be broken.

That reminded him. They must be traveling at the Best part of a million miles an hour. Had he noticed any strange effects? No, he couldn't say he had. Actually it was as if their ship were hanging motionless in the black void; Only the gentle pressure of the ion motor reminded him that they were moving at all. Yet he knew that every passing hour had increased their velocity by twelve thousand miles an hour.

"I can hardly pick out Earth at all," Serge called to the others. The Russian had been having a spell with the special telescope which could scan almost all of the sky. As Jupiter

was still so far away the crew had not yet spent much time in gazing at their objective. Instead they had been watching Earth recede and grow steadily smaller. Now it had shrunk almost to the size of the other stars and only a small disc showed through the telescope. Still, nostalgically, they looked at their home planet whenever they could.

"A hundred and one hours after blast off!" Chris announced to the others some time later. "Velocity one and a quarter million; distance traveled sixty-two million."

"Only one-tenth of the way," Tony groaned. "This is worse than being in prison."

"Tony!" Chris called out sharply. "You know perfectly well you mustn't talk like that. It's dangerous."

"Sorry, Chris," Tony answered contritely."I'll try not to do it again."

"Forty days in this cabin is no picnic for any of us," Morrey pointed out. "And, of course, it could be much longer. By the way, have any of you noticed any strange effects from our velocity yet?"

No one had, so it seemed that they would be able to go on accelerating till the halfway point. "Which is just as well," thought Chris, "because young Tony is going to be a handful if I'm not careful."

As each hour passed a report was radioed to the Cape. The crew performed their exercises and carried out their routine duties. But time still passed slowly. Day and night, of course, no longer existed, and the term "day" only signified a period of twenty-four hours. Eight days had gone by without event and they had covered two hundred and forty million miles since leaving Earth. Their velocity was now approaching two and a half million miles an hour. Not only Tony, but even Morrey was feeling the strain of this long confinement.

All the crew except Morrey were taking a rest period. They had just swallowed their uninteresting food and were lying gloomily on their contour couches. It was Morrey's turn to contact Control, and as the hands of their clock approached

the hour he switched on the set and prepared for the broadcast.

A puzzled look came over his face when the loudspeaker crackled but otherwise remained silent. Quickly he examined the set for a broken wire or a loose connection. However, with the specially built instruments developed for spaceships this was hardly to be expected. Radio was perhaps the most vital piece of apparatus aboard any ship, and it had been brought to a degree of reliability never dreamed of a few years before. So, of course, it wasn't the radio set that was faulty.

"I can't understand it," the puzzled American called to the others. "I'm not even getting the carrier wave."

This was the wave radiated by the station at the Cape. Even before speech was superimposed on it, the wave caused a slight hissing on the loudspeaker. Now the speaker was completely silent. In alarm the others left their couches and crowded around the set. It would be terrible if contact with Earth was lost. Not only would it be disastrous to the whole expedition, it would also be a great psychological blow to the crew.

"It was all right when I used it an hour ago," said Serge, "although I did notice two slight breaks in the transmission."

"I thought I got a break the time before that," Chris said.

By the merest accident Tony touched the tuning control. He must have altered the tuning somehow, for the loudspeaker came to life and the anxious voice of someone at Control was calling them. Chris took over the microphone.

"Sorry about this. Something must have altered our tuning and we.couldn't reach you," he explained.

The unknown voice from Earth said, "We had the same trouble with you. It's the Doppler effect caused by your velocity."

The report then followed its usual course, but Tony was puzzled.

“What’s the Doppler effect?” he asked later.

“You know how the whistle of a train drops a note or two after it’s passed you? That’s caused by the sound waves becoming longer and slower because the engine is moving away,” Chris explained. “The waves forming the whistle’s note are stretched out, just as they are squeezed in a bit as the train approaches.”

Morrey took up the explanation.

“If you’re standing alongside the tracks you hear a note a bit different from the one the engine driver hears. It’s a little higher if the train’s coming towards you and a little lower if it’s going away,” he said.

“Now it’s my turn,” Serge said. “The same effect would be noticed by the engine driver if you stood by the line blowing a whistle. He'd hear a slightly higher note than the real one as he came towards you, and a lower one as the train drew away.”

“As we’re moving away from Earth at two and a half million miles an hour, the radio waves are stretched and we’re out of tune with our set,” Chris concluded. "All clear?”

“Yes, that’s clear, I think,” Tony answered reflectively. “And that’s called the Doppler effect?”

“That’s correct,” Morrey agreed. “Of course there’s much more to it than that. It has helped to measure the speed of traveling stars.”

So the crew of Jupiter I, moving at the fantastic velocity of two and a half million miles an hour, had met the first strange result of their speed. Before very long they were to discover another, one that was rather frightening. Their speed would increase still more, but would they be able to endure it to the planned limit? Or would they be forced to shut off the ion motor and add more time to their already tedious journey?

The next few hours would give the answer.

3

Tony opened his eyes. How long he'd been asleep he didn't know. It had been his rest period and he had been tired and heavy-eyed when he sank on to his couch. Now after a good sleep he must report to Chris for duty. He rubbed his eyes, for they still ached a little.

Then he rubbed them again. There was still something wrong with them, something seriously wrong. He couldn't focus. Everything seemed blurred. It made him feel very queer. He shut his eyes again and kept them closed. When he opened them again things were no better.

"Chris!" he called in an anxious voice.

It was some time before the leader answered. Then his voice sounded a little strained.

"What is it, Tony?" he asked.

"My eyes! I feel queer," Tony gasped. "I can't focus."

Chris was silent for a time.

"You, too?" he whispered after a while.

"What—do you mean, Chris?"

"I've been feeling queer for the last hour, Tony, but I haven't said anything to Morrey and Serge. My eyes have been giving me trouble too. I wonder what's the matter with us? Just stay put, Tony, and I'll see how the others are.

Tony sank back on to his couch and shut his eyes. It was better with them closed. Had he eaten anything that had disagreed with him? He dismissed the thought at once, for their diet was carefully regulated. Odd that Chris felt that way too. They mustn't get sick. It just wasn't possible on a space trip.

Chris's thoughts were much the same as he went across to the other two members of the crew. He put out his hand to steady himself, for everything seemed blurred. As leader of the expedition he couldn't afford to be ill. What strange malady was it that had upset Tony and himself?

"Morrey! Serge! How are things?" Chris asked, striving to make his voice sound as normal as possible.

"Fine, fine," the American called back with forced heartiness, but the Russian didn't reply,

"Are you all right, Serge?" Chris asked.

"I—I don't know," replied Serge. "I feel rather peculiar. Just a little giddiness, I expect."

"Well, it's a good thing Morrey is a hundred per cent fit," Chris said with relief. "Tony and I don't feel too good either."

"Oh—I wouldn't say I feel a hundred per cent," admitted the American. "Just a little eye strain, I guess."

"You, too? Then that makes all four of us," Chris exclaimed. "Let's all try and give an accurate account of our symptoms. It may be important."

Now that the astronauts knew they weren't alone in feeling strange each described his symptoms to the others. Each admitted to his vision being blurred and to being unable to focus sufficiently to read the instruments. That this was important was obvious, for ability to get information from the numerous dials might mean the difference between success and disaster to the expedition.

Probing further, Chris found that the onset of symptoms had come earliest in Tony. The other three had noticed their blurred vision come on gradually. Giddiness arose from the effort to focus, but otherwise the crew felt fairly fit.

"If you keep your eyes closed, you'll feel all right," Tony volunteered.

"I'm afraid we can't do that," Chris pointed out, although he had already found the relief that came from shutting his vision off even briefly.

“Are you going to inform Control?” asked Serge.

“Let’s try to figure out what’s happened to us first,” Morrey suggested. “It will look mighty bad if all four of us report sick at the same time.”

“Yes, I'd hate to do that,” Chris agreed. “They’d recall us at once, of course.”

“Unless—” began Tony.

“Unless what?” the other asked.

“Why, unless it had something to do with U.H.S.," Tony answered thoughtfully.

Chris snapped his fingers.

“That’s it!”

“How come?” Morrey demanded.

“Let's relax on our couches,” Chris suggested. “There are no urgent readings to be taken just yet. In any case I doubt whether any of us could take them. So let’s rest our eyes while we have a talk.”

The others did as their leader had suggested. It was certainly a relief to sink on to their comfortable couches and to close their aching eyes.

“Now, what's this idea of yours, Chris?” Morrey asked.

“My theory is that the strain we feel is caused by our velocity. Human eyes were not designed to look at anything traveling at this speed. At a rough guess, looking at something just across the cabin, it will have moved almost half an inch by the time light from it has reached our eyes. That, I believe, is why everything looks blurred,” Chris announced.

The crew discussed their leader’s theory for some time. It seemed quite feasible. If so, it might mean that there was a limit to the velocity of manned space travel.

“If you’re right there’s probably a critical speed beyond which blurring starts,” Serge observed. “As we didn’t notice it at the same time, it may vary with different individuals.”

“In round figures this critical velocity would seem to be about two and three-quarter million miles an hour,” Morrey said.

“What will you tell Control?” asked Tony.

“We must report our symptoms and see if they arrive at the same theory,” Chris answered. “Then we’ll see if they alter our flight program.”

“How long till the next regular report?” Serge wanted to know.

Chris opened his eyes to look at the chronometer, but, with a gasp, quickly shut them again.

“Whew!” he gasped. “I don’t like that. I’ve just tried to have a look at the time but I couldn’t stand it. Perhaps we’d better call the Cape irrespective of time.”

Experimentally the others tried peeping around but; like Chris, found the results most uncomfortable.

“Looks like we’re the four blind mice,” Morrey commented with forced cheerfulness. “Think you can call up the Cape without looking?”

“Easy,” Chris answered. “Do it with my eyes shut! Oh, that's funny. I meant—of course I can do it.”

It would be strange if spaceships of the future, made to travel at speeds approaching that of light, were designed for operation without visual aid. Perhaps crews would work by touch instead of by sight, just as Chris was about to do now.

“If Chris is right and this blurring is caused by light slipping because of our speed, what would happen to anyone moving faster than light itself? Would they become invisible?” Tony asked as Chris felt his way round the cabin towards the transmitter.

“I should imagine so,” Serge said. “Astronomers say that there must be many galaxies in the universe that are moving away from us faster than the speed of light. That means that light from them can never reach us, so I suppose you’d say they were invisible.”

"How are you doing, Chris?" Morrey called.

"Nearly there," the leader answered. "I thought I knew every knob and dial in this cabin. I find I don't. Ah—here's the radio. I'm switching on now."

"You'll probably have to make another tuning adjustment," Morrey reminded.

"I hadn't forgotten."

He must have done it successfully, for a few seconds later they heard the carrier wave.

"Jupiter I calling Control," Chris's voice said. "I have to make a special report. All members of the crew find visual observations difficult and painful. We believe that this is caused by our speed giving rise to what we've christened 'light slip'. Everything looks blurred and we can no longer read our instruments. Some relief is obtained when we close our eyes and for the time being we are keeping them shut. I am sending this report blindly. We await your instructions. Over."

It was no use expecting an immediate reply. More than half an hour would elapse before the report reached Earth and Control's instructions came back. Meanwhile they could only remain on their couches and wait. Periodically one or other of them would open his eyes for a moment, but then the whole cabin would seem unreal, with no sharp outlines. After what seemed much longer than the expected period, the loudspeaker came to life.

"Control calling Jupiter I," a voice said. "We have your report. Stand by for instructions."

Then the radio went silent and the crew lay still, waiting. A few minutes later it spoke again. This time it brought the voice of Sir George Benson into the cabin.

"Benson speaking," he said. "I understand you're experiencing something you call 'light slip'. We knew that, theoretically, this might happen, but we'd no idea at what speed or what its effects would be. This is a discovery of

extreme importance to further development, so I'd like you to record your impressions in detail.

"Obviously your velocity must be reduced beyond the critical point, so that you can use your eyes again. Spaceships of the future will have to be designed for tactual as well as visual observation of instruments. As Jupiter I isn't so designed and we need your readings, you'll have to decelerate below the critical velocity. Do you think you can turn the~ship through one hundred and eighty degrees?"

All the crew knew that this was a most important operation. Turning Jupiter I through a half-circle would bring it tail first, so that the thrust of the ion motor would be against the line of flight and so would start to slow down the spaceship. In time their velocity would fall, the light slip would cease and they would be able to function normally. But it meant that their journey would be lengthened by a few days.

"Yes. I think I can do that," Chris answered, though he knew his voice would not reach Earth for some time. "I hope I don't fire the wrong lateral rocket."

"The switch is in the center of the top row. But I expect you remembered," Benson's voice continued. "A one and a half second burst should do it. Call again as soon as the maneuver is completed. Good luck."

"You heard that?" Chris called across to his companions, and they all assured him they had.

"Right. Here goes. This is like one of those parlor games we played as children—finding your way round a room blindfolded and bumping into all sorts of obstacles you ought to have remembered were there," Chris said.

The rest of the crew could hear him moving around the cabin.

"I think I have the right switches."

"Five rows of fives," Morrey said.

"Yes. I've just checked. Here goes."

Chris pressed the switch down for what he judged to be the required length of time. Normally he would have used an automatic timer, but it was impossible to set this with his eyes closed. As soon as he felt the ship quiver as it responded to the rocket thrust, his fingers sought and found a switch controlling a rocket on the opposite side. This he fired to kill the rotation caused by the first rocket. Otherwise the spaceship would have continued to tumble end over end. Had he succeeded or had he overshot the mark? With his eyes tightly closed it all had to be guesswork.

Cautiously Chris felt his way to the radio and reported that he'd done the job as well as he could. Control would be able to check their path, but if it was faulty it would mean they would have to go many million miles off course before another correction could be made. If this blind guess had not succeeded, then they'd have to wait until the ion motor had slowed them down enough for them to use their eyes. By that time who could say to what corner of the solar system they might have wandered?

With a sigh of relief Chris stretched himself on his couch. There was nothing he could do, nothing anyone could do, until the light slip stopped. It might be hours before any of them could see again.

"I'm thirsty," Tony said. "If I can get to the stores would any of you like a tube?"

He was referring to the plastic tubes of different-flavored liquids with which the astronauts, under conditions of low or zero gravity, regaled themselves. Yes, they would all like a drink if Tony could reach the stock. After blundering about for a few minutes he returned and placed a tube in the hands of each of his companions.

"I've no idea what you've got," he told them. "I did try to have a peep but it was hopeless."

"Orange," Morrey volunteered, as he sucked his tube.

"Banana," Chris said.

"Mine's orange, too," Serge told them.

“Ugh. Mine’s pineapple,” spluttered Tony. “Just the one I don’t like.”

At intervals one or other of them would try to open his eyes, but the slip was still there and there was nothing they could do but lie and wait.

Though Jupiter I had been turned completely around, everything felt the same. The slight pressure of the motor was just as before, but they knew that now it was pushing against their flight instead of gently urging it on.

Control came through several times, but it was still too early to tell whether their trajectory was a true one. Only when they were in a position to report visual observations of the star pattern outside would it be known whether or not a further correction was necessary.

Hour after hour passed, Still they were unable to look at the hazy outlines of their surroundings, though Serge declared he could notice a distinct improvement. They talked, they dozed, they ate and drank. Time was passing so slowly. Would the ship never decelerate sufficiently for them to see again? Suddenly their boredom was gone. The calm and quiet of the cabin was shattered, for the alarm buzzer had sounded.

An acrid smell of burning assailed their noses.

4

What on earth could it be? The alarm bell might mean one of several things, but that ghastly smell of burnt rubber narrowed it down. It must be that one of the electric cables was becoming overheated. But which one? Unable to use their eyes, the crew would have the utmost difficulty in locating the source of the trouble.

"Can we switch anything off?" gasped Chris. "We shall all be choking soon."

"I'll—do what I—can," Tony managed to say, "that is—if I can find the switches."

While the other three, choking and gasping for breath, felt cautiously along nearby cables, Tony stumbled around the cabin until at last he found what he was seeking. A few quick movements and he'd cut off all current from the solar batteries through the different circuits. Now, perhaps, the burning would stop. If only they could use their eyes to find the burnt cable!

Though further heating of the cable had probably stopped, the atmosphere inside the cabin was becoming unbearable. Each of them felt his senses swimming as his lungs fought to extract oxygen from the poisonous air they were gulping. One by one they must have slumped to the floor as oblivion descended.

How long he'd been unconscious Tony couldn't tell. He realized he was lying on the cabin floor, still with the nauseating smell of burnt rubber tormenting him. He opened his eyes, and then shut them again quickly as they began to smart in the smoke-laden atmosphere. It had been jet black inside the cabin except for one light patch. This must have been caused by sunlight streaming in through a

porthole, trying to fight its way through the thick clouds inside.

As he lay there fighting for every breath, Tony wondered how he could get rid of this choking smoke. If only he could open a valve and let it be drawn out by the vacuum surrounding them. But Jupiter I had no such valve. The only way he could let out the thick clouds was by partially opening the hatch—a risky business, for the inside of the cabin could be turned into a deadly vacuum in a very few seconds. Still—something had to be done. They couldn't survive in this atmosphere.

Groping his way forward Tony eventually located the oxygen valve. He opened it almost to its full extent, and the whistling noise told him that oxygen was rushing in from the storage tanks. Now he must find the hatch and open it just a fraction. Too much—and the end would come quickly. Ah—here it was! With his pulse beating more rapidly, Tony began unscrewing the large wing nuts that secured the door so tightly.

He need not have been scared. Even when the nuts had been slackened, the hatch remained tightly closed, clamped to the frame by the difference of the pressure inside and out. Tony knew that he would be unable to move the hatch unless the pressure inside was greatly reduced. So his plan for clearing away the rubber smoke had failed.

Wait a bit, though! To open the hatch the air in the cabin was pumped out into storage tanks and released again for further use when required. Before this could be done the astronauts must be wearing their space suits and helmets and Tony knew he could never fix them properly without being able to see. Still—if he let in fresh oxygen as fast as the poisonous atmosphere was pumped out, his unconscious friends would suffer no harm. It would be a tremendous waste of the precious gas, but he could think of no alternative.

Blindly Tony again fumbled his way across the cabin and almost fell over the inert form of one of his companions. His

groping fingers found the switch that would start the exhaust pump. He pressed it down—and nothing happened!

For a few seconds Tony was in despair. What could have gone wrong with the pump? Then he almost laughed with relief as he remembered that he'd cut off all circuits from the solar batteries. That was why the pump wouldn't work. He must switch on this one circuit. But suppose this was the one that had the burnt cable! Terrific damage might be done if another bad short occurred. Yet it was a risk he must take, for without the use of his eyes it would be almost impossible to find the fault. Again Tony rebuked himself for his unnecessary alarm. The electrical fault could hardly have been in the pump circuit, for it had been switched off at the crucial time. He found the correct circuit switch and soon he heard the comforting hum of the pump motor. Within a few minutes Tony's nose told him that his plan was working. The acrid smell of rubber was getting less and his breathing was much easier. If only he could see he was sure he'd find the smoke clouds almost gone. It wouldn't hurt to open his eyes for a fraction of a second, and it would reassure him that the air was indeed getting clearer. "Half fearfully Tony forced his eyes open and kept them open!

With a surge of joy he realized that he could see again. The light slip was gone! Jupiter I was travelling below the critical speed. How wonderful it was to get back the use of his eyes!

Yes, he'd been quite right. Apart from a slight haze showing against the shaft of sunlight coming from the porthole, the atmosphere inside the cabin seemed almost clear. Now he could turn off the valve and stop wasting the oxygen. Then he'd try to locate the wiring defect, for he was sure that soon Chris and the others would be sitting up again.

Concentrating on his task, Tony found the faulty wire within ten minutes. It was all right. He could restore the lighting, for this was not affected. Even as the light bulbs glowed in the cabin once more, Morrey sat up and rubbed his eyes. Almost as if they'd been waiting for this signal, Chris

and Serge regained consciousness too. Like Tony, they were greatly relieved that the light slip was gone.

"We'd better report," Chris said as soon as he could speak. "Control will know there's something wrong."

"Can I help you repair the cable?" Serge asked Tony. The mechanic was glad of the Russian's help, and while they were occupied on the job Morrey began a fresh set of observations and Chris sent a report to the Cape. None of them was feeling quite fit yet, for the thick smoke had played havoc with their air passages. They were glad to rest when their immediate tasks were finished.

"It all goes to show," Morrey was saying, "that even the most careful planning cannot foresee everything—certainly not light slip combined with a burnt-out cable. They'll have to think that one out before the next voyage."

"Or keep ships below the critical velocity," suggested Serge.

"I think they'll come up with something to meet the situation," was Chris's opinion. "We mustn't accept the critical velocity as our maximum speed. Otherwise we shall never reach beyond the solar system."

"Control calling Jupiter I," the loudspeaker interrupted. "We've just received your message. Thank goodness you're all right. Have you repaired the cable? Please let us have a full report."

"Feel well enough to do it?" Morrey asked Chris.

"I'd better have a try," the young scientist replied, as he slowly propelled himself over to the microphone and gave as clear an account as possible of the recent occurrence. He concluded with request for information about their trajectory and for further instructions.

"We'd better take it easy till the answer comes back," Morrey suggested. "Do you think you could fix us all up with a drink, Tony?"

The mechanic was improving steadily and seemed in

better shape than his companions. He had no difficulty in passing glucose tubes all around and they drank greedily.

"Suppose they ordered us back," Morrey said as they waited for the radio message. "What shall we do?"

"Go back, of course," Chris said at once. "We must obey orders—that is if we get them! What do you all want to do?"

"I vote we go on," Morrey answered promptly. "We are more than halfway there."

"That goes for me," Tony agreed. "I feel all right again now and I expect you fellows will soon be back to normal."

"It's hardly likely we'll have another short circuit," was Serge's opinion, "and we'll not be getting that light slip again.

"So you all want to continue. I do, too," Chris said. "We've come so far and there's been so much work put into this expedition that it would be tragic if it were terminated now. I'll let Control know how we feel."

It was Sir George Benson's voice that crossed the void to the four young men aboard Jupiter I. Chris had rather expected that it would be. Trust Uncle George to talk to them himself when things were critical.

"Hello, Jupiter I," the chief scientist said. "We are relieved to know you have survived the combined effects of the light slip and the overheated cable. However, in view of the serious respiratory effects which you have all suffered, we have decided to call you back. You will therefore carry out emergency procedure with your chemical motor and begin your journey back to Earth. When this operation has been completed, please report. We are sorry to end the expedition in this way, and we know that you will be disappointed too. But we cannot risk continuing it after the events that have just happened. Over."

"That does it!" Morrey groaned. "If only we were close to Earth and there wasn't such a long interval between messages we could argue it out."

"What are you going to do, Chris?" Serge asked.

“Request permission to carry on,” he answered promptly. “Tony, will you examine the cable and see if it’s all right? Serge, will you check the oxygen supply and see how much we used to restore the atmosphere? Morrey, can you calculate our position? When we’ve got all that information—if it’s as favorable as I think it is—we'll call up Uncle George and tell him were going on.”

Each of the crew members set about the tasks allocated by their leader. Although there was still some discomfort, it wasn’t too bad. Anyway, it was much better than having to crawl about with eyes closed. If the oxygen was all right there was no reason to turn back, for they would soon all be fit again. And even if they weren’t, Control would be none the wiser. “Good,” Chris said ten minutes later. “Everything seems fine. Wiring okay. Oxygen ample. Position nearly two thirds of the journey done. Right. Now here goes for Uncle George. And you chaps must back me up.”

Clearing his throat and speaking in his “official” tone, Chris said that the crew of Jupiter I unanimously requested permission to be allowed to continue their venture. He reported that the burnt cable had been replaced and was now functioning normally. Their oxygen supply was still quite adequate, and the greater part of their journey had been accomplished. Moreover, each of the crew was feeling much better and the effects of the temporary lack of oxygen and the choking smoke would undoubtedly disappear in a very short time.

“Look, Uncle George,” Chris went on, breaking into his normal voice, “we’re all right. Honestly we are. We’ve hurdled the worst part. We’ve never failed to complete a mission yet, and we’ll never be able to hold up our heads if we fall down on this one. Please let us carry on.”

Morrey, Serge and Tony added their pleas. They all assured Sir George that they were feeling fit again and it would be terrible if they were ordered to return. They were prepared—and definitely wished—to continue the expedition as if nothing had happened.

When their broadcast was over there was nothing for the crew to do but to wait. In other circumstances the stony silence of the loudspeaker would have indicated disapproval of their united request. Now it meant that their arguments and pleadings were taking considerable time to cross the vast distance between them and the person to whom they were addressed.

“It’s like waiting for a reply by mail,” Tony said impatiently.

There was nothing they could do about it. While they waited, they discussed their chances of being allowed to continue.

"After all, if we say were quite fit and are willing to go on, I think we should be allowed to do so,” Morrey protested.

“It isn’t as simple as that,” Chris pointed out. “As you know, a hundred per cent efficiency is expected from astronauts. Anything short of that might jeopardize the undertaking. We may feel all right, but can we be sure?”

"Chris, anyone would think you wanted to go back,” Tony said in surprise.

“Not at all. I’m only pointing out the difficulty of Uncle George’s decision. If he allowed us to proceed and anything went wrong that could be even remotely connected with what’s just happened, he’d be finished. Not only that, we all know him well enough to realize that if anything happened to us, he’d never forgive himself.”

“What an anticlimax if we have to go back now," Serge sighed. “I don't know that I’d ever want to make a space trip again.”

“How long will it be before we get the answer, Chris?” asked Tony.

Chris looked at the clock and did a rapid calculation.

“If Sir George can give the answer on the spot, we’ll know in about ten minutes. But he may want to consult someone, and then goodness knows how long we’ll be kept in

suspense," he replied.

Morrey was drumming his fingers nervously on the side of his couch. This wasn't a good sign, but then none of his colleagues would have criticized him, for they were all feeling the strain of Waiting.

"How long now?" Tony burst out.

"Five minutes," Chris answered shortly.

But it seemed like five hours. Then, within half a minute of the time Chris had estimated, the loudspeaker crackled. The reply was coming through!

5

"Control calling Jupiter I. Benson speaking," the well-known voice said. "So you are feeling better and wish to proceed? Of course you should really have a medical examination to see if the decompression and lack of oxygen has harmed you. As this is impossible I must take your word for it that you are reasonably fit again. I am sure you are all responsible young men and realize the consequences if your request is granted. Failure would be disastrous and may have political consequences in UNEXA. Well, I'll take a chance on my head rolling for it. You can go on!"

Shouts of relief and delight echoed through the cabin. Tony, with the help of the low gravity, celebrated by doing a few acrobatics. Morrey roared out a tuneless chant. Even Serge's usually solemn face was lit with a delighted grin. Chris, grateful beyond measure to Uncle George, watched his companions happily.

"Thanks a lot, Sir George," Morrey called to the microphone. "We are now more determined that ever to pull it off."

The voice from distant Earth sounded in the cabin once more.

"Having waited a suitable interval while, presumably, you've been letting off steam, I'd like your attention for a few moments if you can spare it," Benson said, and Chris could imagine the quiet smile that would be on the chief scientist's face as he spoke.

"Your flight path requires a further correction. Lateral number three, one point two five seconds. Please continue hourly reports as before. Continue decelerating. You should be able to get a bearing on your planet within the next few

hours. Over."

"Thank you. We'll make the correction now," Chris called back into the microphone. "Can you give us our new flight program?"

As the answer wouldn't come back for some time, the crew commenced their duties. Chris, now able to use the timer, corrected their direction, while Morrey discovered that their speed had fallen to just over two million miles an hour. With the telescope, now directed through the tail of the rocket, Serge scanned the skies for their objective. Tony clambered about on one of his perpetual tours of inspection.

"When you have a moment, come and have a look," called Serge without taking his eyes from the instrument.

First Chris and then the others peered through the eyepiece. They saw the majestic planet, now about the size of an orange, glowing like a huge jewel on a black velvet cushion. The famous dark bands were plainly visible and the mysterious red spot was prominent.

"I wonder what the spot and the bands really are?" Tony questioned, his eyes glued to the instrument.

"That's what we have to find out," Morrey answered, dragging the mechanic away so that he could have another look.

"I'll tell you all we know about them so far," promised Serge. "Just wait, till our next rest period."

The crew members were, still taking turns to look at the King of the Heavens when Control came through again. They didn't recognize the voice,

"Control calling Jupiter I. Here are your flight instructions. Cut off the ion motor at once for thirty-seven hours. Then you will re-start it and run it for one hundred and fifty hours. Your distance from Jupiter should then be six million miles and your velocity just over a hundred thousand miles an hour. Report your instrument readings each hour as usual."

"So we're on our way once more. We're back in business," Morrey declared with satisfaction.

Chris had been busily noting the latest instructions while Tony and Serge went to shut off the ion motor. As the steady thrust that they had become accustomed to for so long died away, everything in the cabin became weightless. Chris had just finished writing when he found himself floating a few inches above his couch. As for the log book, it went sailing gaily across the cabin until Morrey, with a puff of wind from his mouth, sent it shooting back. Unfortunately for the American, the act of blowing out a jet of air sent him careering into the cabin wall.

Serge and Tony floated back from their assignments. Everyone put on magnetic shoes to give them some measure of control. Routine was adjusted to the new conditions of zero gravity and reports were prepared and broadcast regularly. Control confirmed that the ship was on a true course. Now the crew could only wait.

"I'm going to try to sleep," Serge told Tony as the two settled on their couches for a rest period.

"No you don't! You promised to tell me more about Jupiter. Remember?" Tony protested.

"I remember," the Russian sighed. "Well, here goes. The most noticeable features of Jupiter are those you've already seen, the light and dark bands that stretch across it. I wonder if I can find a drawing showing this."

The Russian rummaged about in a small locker. One or two objects escaped from it like so many butterflies and had to be recaptured. Finally he pulled out a picture of the giant planet toward which they were speeding. Loosening the strap which secured him safely to his couch, Tony leaned over and looked at the picture with interest. *

"This drawing is as the planet is seen through the telescope—upside down, of course," Serge began. "So we call

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* See diagrams p-5

the top South and the bottom North. The dark strips are called belts and the light ones are called zones. Each one has a name according to its position."

"What are these?" Tony asked, indicating dark areas at the top and bottom of the drawing.

"This at the top is called the South Polar Region, and you can guess the name of the opposite one," Serge replied. "Actually we use many of the same terms as we do for Earth. For example, the different parts of the planet are called polar, temperate and tropical, and the one across the middle is called equatorial. Have you got that?"

"Yes, but there are a lot more streaks than that," Tony pointed out.

"I agree," his friend replied. "Let's just run through them. In the middle, as I've said, is the equatorial zone. Incidentally, there's a thin dark line running along the center and this is called the equatorial band. Next to the equatorial zone are the north and south equatorial belts—those dark strips there."

"What are you two doing?" interrupted Morrey, who had clumped his way toward the pair without their noticing.

"Just explaining to Tony the markings on Jupiter," Serge told him.

"But what are these light and dark bands?" Tony asked. "What are they made of?"

"Probably clouds," Morrey answered. "And they're not regular straight bands at all. They're made up of all sorts of Weird shapes which are constantly altering. As we get nearer you'll be able to see this."

"What are the names of the other bands, Serge?" Tony asked.

"South temperate belt and south south temperate belt, with equivalent ones to the north," the Russian told him. "The light bands in between carry the same names but are called zones."

“What’s this oval here?” Tony asked, putting a finger on the drawing.

“Ah, that’s the most interesting and perhaps the most mysterious thing on the planet,” Serge answered, settling down on his couch. “That’s the famous Red Spot. I’ll tell you about it next lesson.”

In spite of all Tony’s protests the Russian just smiled and closed his eyes.

“Just as we were coming to the most interesting part,” Tony grumbled, but he, too, had to settle down to rest.

“What do you make of it, Benny?”

It was Mr. Gillanders, a lifelong friend of Sir George Benson, who put the question to his chief. The big Australian scientist had just come from the control room that" was directing the flight of Jupiter I. He held a large square of graph paper on which two lines were drawn. The one crossing the graph in black was the planned velocity of the spaceship. The other in red was its actual velocity.

Sir George Benson put the paper down on his office desk and studied it closely. For a long time he remained silent. Then he turned to his companion.

“So this started twenty hours ago? Do you think it will correct itself?” he asked.

Mr. Gillanders shook his head doubtfully.

“It’s gone a bit too far, I think. Look, there have been a number of deviations before, but the red line has always rejoined the black within a couple of hours,” he answered.

True enough, Sir George could see several places where the red line had moved above or below the black one, showing that, for various reasons, Jupiter I’s speed had been slightly more or less than it should have been. But, as Mr. Gillanders had said, these divergencies were only temporary. Until the last one.

“I make the ship’s velocity to be eight thousand miles per hour too high,” the Australian explained.

Starting to move slightly above its black guide, the red line had slowly but surely increased its distance from it. Instead of returning to the guide line as it had always done before, the graph of the ship’s true speed had crept away from its correct value. Though still small compared with the ship’s total speed, the difference might become serious if allowed to go on unchecked. What was the cause of it?

“It’s too much to be an effect of solar wind,” Benson said, referring to the stream of particles constantly shooting out from the sun and exerting a small but measurable pressure on all space craft. “Maybe the ion motor isn’t operating at full power.”

“Telemetered data say that it is," Mr. Gillanders answered. “Of course it may be wrong, but I don’t think so. In any case we should know in a few minutes.”

“How’s that?” the chief scientist asked.

“They’re just finishing the graph for the first eight hours in free fall,” the Australian scientist replied. "Tompkins will be bringing it in shortly.”

The two men discussed this disturbing phenomenon while they were waiting for the latest information.

“I think you’re right about it not being the ion motor,” Sir George said. “Chris would surely have reported any signs of malfunctioning. As far as the crew are concerned they believe that everything is going normally.”

“Are you going to tell them?”

“Not yet,” Benson answered promptly. “No need to alarm them at this stage. We may be able to correct their velocity by rearranging the program. Ah—here’s Tompkins.”

Sir George and Mr. Gillanders studied the new graph closely.

“Look,” Mr. Gillanders said. “That proves it isn’t the ion motor.”

"You're right," Benson agreed, for he, too, saw that whereas the black and the red lines should have been exactly parallel during the free fall period, they were not so. Slightly, but quite perceptibly, the red line was drawing away from the black.

"This means that Jupiter I, instead of maintaining a steady speed under free fall, is slowly accelerating. What do you think is the reason?" Mr. Gillanders asked.

"I don't know," Benson admitted. "I should have thought that the ship was still too far away from the planet for it to have any appreciable gravitational effect. But I don't see what else it can be."

"Jupiter has a very strong pull," the Australian pointed out.

"Even so it shouldn't have had much effect at this distance," Sir George said. "I'll call the ship and tell Chris to start the ion motor again."

The chief scientist followed his colleague into the control room, where a team of men were busy monitoring all the data that was constantly being relayed from the spaceship. Mr. Gillanders strode over to one man and scanned the notes he was making.

"It's still going on," he told Sir George as he rejoined him "Right. Have the radio switched on," Benson ordered crisply.

"Come on, beautiful," Morrey's voice was saying.

Tony groaned and turned over. He'd hardly closed his eyes, it seemed, before that wretched American was waking him up.

"Go away," he mumbled.

Morrey didn't answer. Instead he just unfastened the strap that was holding the mechanic to his couch. With a gentle push he propelled the recumbent Tony across the cabin, and it was the collision with a stores cupboard that finally roused his victim.

Mouthing dire threats to his persecutor, Tony pushed himself away and made a grab for Morrey. The American was too quick for him and remained out of reach. Tony was just preparing for another onslaught when the carrier wave came over the loudspeaker. It wasn't the regular time for a call, so each of the crew paused, waiting to hear what was coming through on this special broadcast.

"Control calling Jupiter I. Benson speaking," the voice of Uncle George said. "There's been a slight change in your flight program. You're to restart the ion motor at once. That's all. Please acknowledge."

"Wonder what they're up to?" muttered Morrey as Chris went along to carry out the order. "They must have made an error in their calculations."

That wasn't Chris's opinion. He knew that Sir George and the other fellows in Control were too meticulous for a mistake like this to be made. Every calculation was double-checked. The possibility of error didn't exist. Why then, Chris wondered as he bent over the ion motor's controls, had this change of plan been made?

The fact that Sir George had given no explanation was a little strange. Usually he would have told them the reason for this alteration in procedure. Was anything wrong? Chris went over all the possibilities in his mind and he couldn't pick on anything. As far as he and the other members of the crew were able to tell, all systems were functioning perfectly, and apart from the burnt cable and the uncomfortable time caused by light slip, there had been nothing unusual in their journey.

Chris completed the operation, and the steady push of the motor could be felt. The rest of the crew were still speculating on the change of plan, but Chris didn't hazard any opinion. It was plain that Jupiter I was to be decelerated sooner than anticipated. Oh well, it would take them a little longer to reach Jupiter. He hoped that Control hadn't forgotten that some of their oxygen had been lost. Though there was still plenty of this vital gas, every delay reduced the

safety margin.

He must trust Uncle George. That was all he could do.

6

"That's better," Sir George Benson observed as he examined the latest graph that Mr. Gillanders had shown him.

Jupiter I's speed, thanks to the slowing down by her ion motor, was well below that originally planned. They would have to keep "the deceleration going during the period when the ship should have been coasting along in free fall. This would build up a considerable margin of safety. It wouldn't do to allow Jupiter I to approach the planet at too great a velocity. That would mean it would be difficult, if not impossible, to turn it into orbit. The result of such failure didn't bear thinking about.

"Keep me posted with the latest information," Benson said. "I'm going off duty for a few hours."

Mr. Gillanders nodded. He knew that, as always when a space venture was in progress, Sir George spared no one—least of all himself. Not only did he spend long hours in the main control room, he also insisted on being called from the camp bed in his office if there was anything unusual to report. Mr. Gillanders sincerely hoped that the mysterious excessive velocity of Jupiter I was not going to cause trouble. Sir George Benson would never forgive himself if disaster befell the crew after he had decided not to recall them.

After his friend had left, Mr. Gillanders moved quietly along the bank of instruments, each with its watchful attendant. The one that held the Australian's interest most was, of course, the apparatus registering the spaceship's velocity. As far as he could tell at that moment the red line was behaving itself. Maybe there would be no need after all to inform Chris and his crew of the strange behavior of their craft.

* * *

"Pity we're out of free fall," commented Morrey. "It's rather fun swimming about in the air."

"Have you any idea, Chris, how long our flight will be? We couldn't reach maximum speed, and we're decelerating more than we thought," Tony said.

"Originally our trip was to have taken about twenty days," the leader replied. "As you say, we couldn't reach the three million mark and now we've started up the ion motor again. I'd say that all this has added about four days to our journey's time."

"So we've about nine more days?" Serge asked.

"Ten, actually," Chris answered. "Oh, I know it's a bore, but we'll just have to put up with it. We all chose to carry on, you remember."

"We'll manage," Morrey grinned. "It will give us plenty of time to complete this young fellow's education."

"Oh, yes. What about the Red Spot?" Tony asked eagerly.

"Later," Chris insisted. "Meanwhile perhaps you'd be kind enough to check the oxygen stock."

"It's creeping up again, Benny."

The Australian scientist had placed the latest chart in front of his friend. It was obvious at the first glance that the extra deceleration gained by the early use of the ion motor was being whittled away. By now the motor would, in any case, have been switched on. This was the point of maximum difference between the black and fed lines. The chart showed that the red line had started to climb steadily towards its companion. At this rate in a couple of days the lines would cross. Then, as Jupiter I was slowing down less than expected, its speed would eventually be far ahead of what had been planned.

Sir George studied the graph intently. He was now

beginning to feel quite worried about the situation. To reduce the ship's velocity to anywhere near what it should be at this time would require a fairly long burst of the big chemical motor. This hadn't been foreseen, and in any case the reserves of fuel were not sufficient to meet this unexpected call.

Benson took an immediate decision.

"Call them back," he said brusquely to Mr. Gillanders.

While the Australian left to broadcast the necessary order to Chris and his crew, Sir George puzzled over the problem presented by those two colored lines. He was certain their calculations, were correct. He was equally convinced that the rocket was functioning exactly as it should. Surely the gravitational pull of the giant planet couldn't be greater than anticipated? The mass of Jupiter had been discovered by several different methods and its magnetic force was known exactly. What, then, was causing the spaceship to rush towards its objective faster than it should?

"I've sent the order," Mr. Gillanders informed his chief a few moments later. "They won't like it."

"Of course not. But we have no choice. Did you give any explanation?" Benson asked.

"No. I just said it was an urgent order to start up the chemical motor for five minutes. That should pull their velocity to about one and three quarter million miles an hour," Mr. Gillanders said. "I guess we'll have to depend on the ion motor doing the rest."

"We'll still have about eight minutes' fuel for the chemical motor left, but we'll need that on the way back," Sir George said. "And now I suppose I'd better explain to them what's happened."

"Come on. Exercises, everyone."

Chris gave the order to his friends. When the voyage first began each member of the crew faithfully performed the

specially designed exercises which would keep him fit during the long journey in the confined space of the cabin. After a while, however, the crew neglected the exercises, and now only the sharp command of their leader spurred them on to make the necessary exertion. For ten minutes Chris managed to keep the drill going. Then he could see it was useless forcing the crew any more.

“All right. Break away," he called.

His order was almost drowned by the voice on the loudspeaker. It was Billy Gillanders, who rarely came to the microphone.

“Control calling Jupiter I. This is an important message,” the voice said. “You are to cut off the ion drive and give the chemical motor a five-minute run. Over."

The crew were stunned. This could only mean one thing—that the expedition was over. Why? Only forty-eight hours before they had been given permission to continue. What had happened to cause the rest of the venture to be canceled? Had something gone wrong in Control? Even though all instruments were duplicated, had there been some catastrophe that prevented Control from functioning? Yet the radio had sounded all right.

None of the crew suggested that the cancellation be challenged. Before they had been unanimous in trying to persuade Sir George to let them proceed. Now there seemed a finality about Mr. Gillanders’s words that stifled all arguments. The very lack of explanation was chilling—just the bare order to start up the chemical motor. And—due to their great distance from Earth—there was no possibility of an immediate question and answer.

“I suppose we’d better do it,” Chris said gravely. As he’d told Uncle George before, this would be his first expedition to be cut short. There must be a good reason for it since his distinguished friend would know what a hard blow it was.

The rest of the crew remained in glum silence. Although Chris was the one who felt it the most, they were all bitterly

disappointed that this great adventure must come to an end. It was better not to say anything to Chris about it. It would only make him feel worse. All they could do was to settle reluctantly on their contour couches while Chris prepared to ignite the giant motor.

"Control calling Jupiter I. Benson speaking."

In spite of themselves the crew were startled to hear the chief scientist's voice. They all froze to attention, wondering what the loudspeaker would say.

"We very much regret having to terminate your expedition," Sir George began, "but it was inevitable. For some days—ever since you've been decelerating in fact—we have been worried about your velocity. It's too high, and we don't know what's causing it. Your ion motor, though functioning perfectly as far as we can tell, has not been retarding you sufficiently. Even when you were in free fall your speed, instead of being constant, increased slightly.

"The net result is that by the time you arrive in the vicinity of Jupiter you will be traveling too fast to go into orbit. You. are therefore instructed to use your chemical motor to kill as much velocity as possible at once. Your ion motor should eventually be able to pull you up and propel you back towards Earth. Will you carry out instructions at once, please. After the rocket has fired, switch back to the ion motor and report."

So that was that. Their expedition had come to an end because they were going too fast! But surely Control had all these things worked out before hand. They would all have preferred to take twice as long on the journey at a slower speed if they'd known of this possibility.

"About to start the chemical motor now," Chris said heavily into the microphone.

Climbing on to his own couch, and seeing that the others were on theirs, the leader reached to the small panel above his head, set the timer, cut out the ion motor and pressed the firing switch. In an instant they all felt the pressure, for—

unlike an Earth blast-off with a heavy load—the motor developed its full thrust immediately. Chris closed his eyes. He was desperately upset.

Instead of trying to talk to each other during the painful period of rocket thrust, the crew lay silent. Whenever they had been pinned to their couches before it had been at the beginning of an exciting adventure, or the start of a triumphal return home. This was neither. This was the abandonment of the enterprise to which they had looked forward so much. For the very first time they were being recalled before completing a mission.

There was no joy as the period of thrust came to an end, no light-hearted gymnastics in the temporary period of free fall. Chris switched on the ion motor, which, after the kick of the chemical engine, seemed very gentle indeed. As the others went sadly about their duties, Chris gave his report. In a fiat, toneless voice he confirmed that the chemical rocket had been fired, and that they were now back on the ion drive.

While he waited for his message to get to Control and for their further instructions to come back, Chris found himself without much to do. He wandered around the cabin watching the others at work. He knew they were all as disappointed as he. But there it was. Even if, by some miracle, Uncle George changed his mind once more and allowed them to proceed, there wasn't enough fuel in the tanks to do the original job.

Returning to his couch, Chris waited for the irritating interval to pass. Uncle George was quite right, of course, to recall them if they were going too fast. As the chief scientist had said, too great Velocity would prevent them from orbiting Jupiter and fulfilling their mission. Quite apart from the dire consequences to the crew, there was little point in continuing a venture that was doomed to failure. Maybe lessons would be learned from their experience and perhaps another mission would be mounted with better results. Who knows—maybe they would all have a chance to have a second try.

“Your message received,” a voice from Earth said. “Will you continue reporting hourly. Also will you commence regular visual observations of the planet. Please photograph at ninety-minute intervals.”

What an anticlimax! Instead of circling the majestic and mysterious planet, the crew of Jupiter I were to taper off their unfortunate expedition with a series of dull, routine observations. It was ironical that their impetus would carry them much nearer to their former objective before the ion motor pulled them up and started them on the way back.

Tony no longer wanted to learn about the great baffling sphere that loomed ever larger in their telescope. Sometimes, as a break from sheer boredom, he would take a cursory glance through the instrument. But the ever-changing belts of light and shade, the attendant family of moons, the mysterious Red Spot, none of these aroused his interest now that he knew they were beyond reach. Even though the great planet now looked the size of a basketball Tony barely spared it more than a few moments.

“Don’t you want to hear about the Spot?” Serge asked him, but Tony merely shrugged and asked what was the use. Morrey took the photographs regularly and Chris broadcast his report to Control. It would be a good thing when all their velocity had been killed and they were on the way home. Now that they had to return—the sooner, the better.

A day passed. Then part of another. The strain of the crew was increasing with every hour.

“Why can’t we use all the fuel and burn the chemical motor?” Tony burst out. “Anything’s better than this—this long-drawn-out agony.”

“You know perfectly well why we can’t,” Chris snapped back. “We’ll need the fuel for the Earth landing.”

“If we ever make it,” Morrey muttered.

Serge remained grimly silent. Never as voluble as his other friends, the Russian seemed to have withdrawn completely within himself. Though he performed his duties

efficiently, they were done automatically, as if he were some complicated robot.

Sir George Benson, Mr. Gillanders and the other scientists in Control could sense the changed atmosphere in the cabin of Jupiter I. There was no longer any light-hearted chatter accompanying the reports. Instead, the regular messages were dull, lifeless and brief. Sometimes they were even a few minutes late, as if the crew didn't care any more. Benson was worried because he knew what might happen if one of the crew reached the breaking point. He and the others at the Cape did all they could to encourage and enliven the four astronauts.

Mr. Gillanders was a worried man too. For he was the one who had to follow the track of the spaceship. He, more than anyone else, was aware of the exact position, direction and velocity of the rocket. And he wasn't happy about it. The firing of the chemical motor should have reduced the speed enough for its weaker companion to have halted the rocket some six million miles away from the planet. At the speed it was still moving it looked as if Jupiter I would go much nearer—uncomfortably close in fact.

The big Australian waited impatiently for the next series of readings to be taken from the tracking instruments and from the various radio telescopes that were following the spaceship. He could see Sir George Benson speaking over the radio, trying no doubt to encourage his friends out in space. He must report to Sir George fairly soon. How would he let him know that Jupiter I was not slowing down as predicted? Would the chief scientist authorize a last desperate burst from the chemical motor?

Ahl The next lot of readings were ready. Mr. Gillanders collected them from the men who were receiving and took them aside for a quick appraisal. Then the sweat oozed from his big, tanned face. He checked and re-checked his calculations. There was no doubt about it. He could no longer delay the report to his chief. Sir George had caught sight of Mr. Gillanders's face and had a premonition that

something was very wrong. He hurried towards his friend.

"What is it, Billy?" he asked, dreading the answer.

Mr. Gillanders could hardly speak.

"Jupiter I will hit the planet," he managed to say.

7

It was no use. Chris had done all he could to keep up the flagging spirits of his companions. He himself had to struggle harder than ever against despondency. Sometimes despair, sometimes irritation, flooded over him. For a moment he decided that once he got back to Earth he'd never make another space trip again. But this hasty resolve soon melted away, for he knew that come what may, he could never forsake the path that leads to the stars.

"Tell you what I'm going to do, fellows," Chris said in an effort to capture the interest of the other three. "I'm going to grill Uncle George until I find out just what's gone wrong. If I can force him to admit that it's through no fault of ours, I'm going to drag from him a promise that we can crew the ship making the next attempt."

"Think he'll commit himself?" Morrey asked.

"He'll jolly well have to," Chris declared stoutly. "If we're not to blame for this recall, how can he refuse us the opportunity of having another go?"

"Will there be 'another go'?" asked Serge.

"Of course. You don't think that this failure will conclude Man's attempts to explore the Universe, do you? I should think they would mount another expedition as soon as they've solved what's gone wrong with this."

"Control calling Jupiter I. Your velocity is one point one million miles an hour. Your distance traveled is five hundred and sixty-seven million miles," the loudspeaker announced.

"Hey! That doesn't leave us very far to go, does it?" Tony burst out.

"Only a mere hundred million miles or so," Morrey

answered with a touch of sarcasm.

"How near do you think we'll get, Chris?" Tony asked.

Strangely enough Chris was rather evasive in his answer.

"It's hard to say," he fenced. "It depends on several factors."

Serge and Morrey looked at their leader quickly. It wasn't like, him to be so imprecise. Was he uneasy over something?

"Come on, what about giving Uncle George the works?" Morrey said, and Chris went to the microphone as he had promised.

"Jupiter I calling Sir George Benson," he said. "The crew would like to know if the mission has been terminated because of any action of ours. If not, can you tell us why? As you can guess, we all feel pretty bad about it, and it would help if we knew the cause."

"Go on, ask him if we can man the next flight," Tony whispered.

"I'd also like to request that, if the failure isn't due to any action of the crew, we be promised the next ship to attempt this mission," Chris said earnestly.

There, that was it. Chris had kept his promise to his colleagues and asked for the cause of the recall and had staked a claim for the next expedition. However, deep down, he was worried. He was concerned about their ship's performance. He had a feeling that all was not well. The thought even crossed his mind that Control might be holding something back.

"Are you going to tell them?" Billy Gillanders asked his chief.

Sir George, his face drawn and pale with anxiety, beat a restless tattoo on the desk with his fingers. If he told Chris and the other three that there was no hope of their returning to Earth he could imagine the effect. In spite of their past training and their proved courage they would find it hard to face death by crashing into the planet they were supposed to

explore from a distance. No, out of consideration for his four friends, he would keep the terrible truth from them as long as possible.

"No," he answered with a sigh. "If there were anything to be done, any hope at all, I'd tell them, for I'm sure they'd face the danger courageously. But I just can't bring myself to tell them they're doomed. At least let us spare them a few hours' agony."

"Why not let them run the chemical motor again?" Billy Gillanders asked.

"For two reasons," Sir George sighed. "One—they don't carry enough fuel to stop them and to land the ship when they get back. Two—it would give the show away at once. Oh, I've no doubt Chris and perhaps Morrey and Serge will realize what's happening soon. But at least Tony won't know just yet unless they choose to tell him."

"It's—it's heartbreaking," the Australian groaned. "Nothing we can do while those poor fellows go speeding on to their doom."

Sir George didn't trust himself to answer. Scientists are sometimes thought to be cold and without emotion. Yet they are ordinary men and women with loves and hates and fears, just like anyone else. Sir George was torn with grief at the impending loss of his four friends.

"Can any of you guess how long since blastoffP" Chris asked his companions. They were lying listlessly on their contour couches. Conversation was scrappy and ill-tempered, even though the leader had done his best to cheer everyone up. Soon, he thought, he might even be called upon to keep the peace, for everyone was showing signs of ill temper.

"Who cares?" Morrey snorted.

"All I'm worried about is how long it will be till we get home," Tony said sulkily.

Serge didn't even trouble to answer.

"Well, for your information, we left Earth exactly fifteen days ago," Chris said doggedly.

"How much longer till we pull up?" Morrey asked, rolling over to face the others.

"Five days, I'd say," Chris answered.

"That means twenty days on the outward journey and at least twenty days back," Serge observed, talking to no one in particular. "And all wasted."

"That's not true," Chris declared sharply, and he could feel his anger rising. "We've made many novel observations and we've discovered light slip. At least future expeditions will have the benefit of this."

They relapsed into strained silence and Chris gave up the attempt to engage them in conversation. To tell the truth, he was feeling very edgy himself. He reached for the pad on which he'd noted the progress of their ship and—to give himself something to do—he began a more careful calculation of their flight path and position.

However, something just wouldn't come right. Maybe his brain wasn't working as efficiently as it should. The uneasiness which he'd felt some time before came flooding back over Chris as he studied the figures on his pad. Either he'd made a silly miscalculation, or there was something seriously wrong with their flight program. Giving his whole mind to the task, he rechecked his figures—and found them correct!

That could only mean that Jupiter I was not in the position it should have been; but hadn't the burst from the chemical motor put that right?

This was serious. Chris's figures showed that the spaceship, instead of decelerating at a steady twelve thousand miles an hour, was slowing down more gradually as time went on. First the figure fell to eleven and a half thousand. Now it was less than eleven thousand miles an

hour. As a result Jupiter I was much nearer the planet than it should have been. Even more disquieting was the possibility that the deceleration would continue to decrease more and more. It could mean that there would come a point where, in spite of the efforts of the ion motor, the ship would decelerate no more.

Chris shuddered as he considered this prospect. He knew well enough that unless their direction was reversed before too long, they would be drawn into Jupiter by the giant planet's powerful gravity. Even if they could deflect their ship and avoid a head-on collision, the tremendous pull of this vast body would eventually drag them back to their doom. He felt a prickly perspiration break out over his body as he thought of this possibility.

Should he tell the others? No. There was just a chance he might be wrong and then they would have been upset without cause. What about Control? Maybe Control knew and was keeping it from him for the same reason that he had decided not to inform Morrey, Serge and Tony. Yet he'd like to know whether his fears were well-founded or not. He'd rather know the truth than continue in this horrible doubt. Even if Control confirmed their fate, he'd prefer to be told.

How could he let the Cape know his fears without giving himself away to the others? The cabin was far too small for privacy, and if he attempted to send a secret message to Earth, the suspicions of his companions would be aroused at once. It seemed that he'd have to listen to the routine communications from Control without discovering whether they, too, knew that the ship was in danger.

In a way Chris was glad of the lack of interest that his companions were showing in the reports exchanged over the radio. They made their own observations—under his constant pressure—with boredom. They listened to messages from Earth in a desultory fashion. Had it been otherwise Chris was sure that the normally keen brains of Morrey and Serge would have told them what was wrong. Then Tony, too, would have been infected by their concern. As it was,

they were all just utterly fed up with having to return to Earth without completing their mission.

Sir George Benson refused to go off duty. In spite of the pleadings of his senior assistants and friends, the Director insisted on remaining in Control, constantly studying the reports of Jupiter I's progress. As he and Mr. Gillanders looked silently over the latest set of figures, Sir George knew that the ship's deviation from the planned program must be getting obvious. His main concern now was just when and how to tell the crew.

"Isn't there even a remote chance that we could deflect the ship into a path that would cause the planet to pull it into orbit? Then perhaps the chemical motor could break the orbit again as the ship turns in this direction," Mr. Gillanders asked earnestly.

"No, Billy," Benson answered with a sigh. "I've checked the figures and it can't be done. The planet, for some unknown reason, is attracting the ship more than it should. Even if we can avoid a direct hit, Jupiter I would simply shoot off into space and be lost."

"What a choice!" the Australian said unhappily. "To run smack into Jupiter, or get lost in infinite space. I think I'd rather end it quickly."

"The crew will have to make their own choice," Benson answered, his voice scarcely above a whisper, "but how I'm going to tell them, I don't know."

"My guess is that Chris, at least, won't be surprised. He knows the ship is moving faster than it should. It Won't take him long to foresee from the latest observations what's going to happen," Mr. Gillanders said.

"I agree," Sir George said shortly, "so I think I can only wait another twenty-four hours before telling them. What will their position be then, Billy?"

The Australian scientist glanced down at his notepad.

“Seventeen days from blast-off, velocity six hundred thousand, distance from Jupiter seventy-six million,” he replied.

“How long have they got?” Benson asked, his mouth feeling dry.

“Another ten days,” Mr. Gillanders told his chief. “By then their velocity will have fallen to a hundred and thirty thousand miles an hour and their distance from the planet will be two and a half million miles. From then on their velocity will increase, and they will impact next day.”

“I wish I could put off telling them a little longer,” Sir George groaned, “but I’m sure it would be useless. Tell you what to do. Let them know that tomorrow I’ll have a very important message for them and I’ll give it to the crew myself. Maybe Chris will guess what’s coming. Perhaps he’ll prepare the others for the shock.”

“Any idea, yet, what you’ll say?” Billy asked. “And have you decided to let UNEXA know?”

“The answer to both questions is ‘no’,” Benson replied, running his fingers through his silver hair. “But I’ll tell Chris and the others first before I make an official report.”

It was Mr. Gillanders whose voice came over the radio next. Chris had stayed with the big Australian and his family many years before when he had made his first rocket flight from Woomera. Always his regard for Billy had been second only to that for Sir George himself, so he was always pleased to hear his old friend's voice. Now, even though it had taken almost half an hour on the journey, Chris could sense something different about the broadcast.

Billy Gillanders’s voice, though a little distorted by distance, was too familiar not to be recognized. At least it should have been, but there was certainly something very different this time. He seemed tense and made no attempt at a joke. All he said was that in twenty-four hours Sir George himself would give them an important message.

This unusual piece of information aroused the interest of

the other three and they speculated for a time about the possibility of a further change in plans. As for Chris, he had a sinking feeling that he knew what was coming. Sir George was going to break the news of their fate to them. It couldn't be anything else. The belief gave him a queer feeling in his stomach.

What should he do now? Where did his duty lie? Ought he to prepare his friends for the coming shock? Or should he leave it to Sir George to tell them?

Chris wondered what their reaction would be. They had faced death before and had had hairbreadth escapes. Now there seemed no possibility of escape from whatever doom lay ahead. If there had been even the remotest chance he could have kept hope alive in his crew. That wasn't possible, so now the important thing was to see that they passed their last few days of life with dignity, not allowing their courage to break or their fortitude to weaken. So he would prepare them for their fate as best he could. He would warn them of what Sir George's message would be!

8

“How long have we been together?” Morrey repeated his leader’s question. “Eleven years? Twelve?”

“Must be even longer since we first met,” Serge said with an embarrassed smile. Both he and Chris remembered clearly that their encounter was on the barren surface of the Moon when they had met in deadly rivalry. Common sense had soon told them that this was no spirit in which to face the perils of space. They had cooperated and soon the warm friendship had grown up between them that was typical of the new spirit of partnership between East and West.

Tony joined in the discussion, reminding them of his first journey with this famous crew. He’d been a boy suffering from a strange malady which the natural radiation of space had cured. Since then he'd been their almost inseparable companion and had developed into one of the most skilled mechanics in astronautics.

“We’ve had some close shaves,” Chris said, and this was sufficient to remind them of the numerous times they had faced death together. Each of them had saved the lives of the others on many occasions and this was partly responsible for the close bond that had developed, making them an inseparable unit. The discussion lasted a long time, until Chris felt he could make the next move.

“Yes, we’ve faced disaster together many times,” he said deliberately, “and we’ve always kept our courage. I’m sure we shall again.”

There was an instant's silence as the others sensed, something behind their leader’s words. “Shall,” Chris had said, not “may.”

Without waiting for his friends to say anything, Chris

plunged on.

“We’ve always known the risks we were taking,” he said quietly, “and we’ve always had the chance to back out. I think we’ve always known that, some time, we wouldn’t get back. Well—this is it.”

The faces of his three friends grew pale as the meaning of Chris's words sank in. Tony looked for a moment as if he might faint, but he pulled himself together courageously.

“What’s happened, Chris?” he asked hoarsely.

Morrey and Serge maintained a tight-lipped silence.

“I'm fairly certain we’re going much too fast,” the astronaut replied. He was grateful, but not surprised, that his friends hadn’t gone to pieces from the shock of his revelation. Perhaps it was because they had escaped from apparently hopeless situations so often before that they believed subconsciously that again they would survive. Whatever the cause, he was relieved that no one’s courage had failed.

“Better tell us all you know, Chris.” Although still pale, Morrey’s voice was not emotional.

Their leader spoke as calmly as he could. He knew that his own behavior would set the pattern fore the others.

“I began to suspect something was wrong some time ago. When we had to give the chemical motor that unscheduled run I wondered what could be the reason. My calculations show that the ion motor isn’t slowing us sufficiently. We’re going much faster than we should, and we’re closer to Jupiter than we ought to be.”

“What’s gone wrong?” asked Serge. “Has the ion motor let us down?”

“I don’t know,” Chris admitted. “Maybe Uncle George will be able to tell us tomorrow. At least—that’s what I expect his special message will be about.”

“Can’t we run the chemical motor again?” Tony demanded.

“We could, but even if we used up every ounce of fuel we carry, I doubt whether it would decelerate us sufficiently. Then, of course, we’d have nothing left for the landing if we did get back.”

There was a long silence in the cabin as each of the crew tried desperately to accept his fate and remain calm. Such was the faith of everyone in Chris that no one questioned what he said. They knew he would never have told them at all if he’d been in any doubt about his facts. He was much too good a mathematician to have made a mistake. Chris was too good a scientist and far too experienced to have misinterpreted the instruments. And he was much too good a friend to alarm them without cause. They must accept what Chris had said as the true facts. Jupiter I would never carry them back to Earth!

It was Morrey who broke the silence.

“Well—I guess that’s that,” he drawled in an elaborate effort to display complete calm. “It had to come some time.”

“We’ve had—what do you say?—a good run," Serge said simply, “and we are together.”

Tony didn’t trust himself to speak. He could only force a wan smile and nod silently.

“The only thing to do is to carry on with our jobs,” Chris declared. “Perhaps Control will be able to discover what’s gone wrong so that the next expedition can succeed.”

What would the end be like? If they crashed into the giant planet it would be swift and merciful. If they shot past and wandered off into space it might be slow and agonizing. There would be a gradual exhaustion of both oxygen and food. One by one they would die. Who would be first and who would be last?

“Come on. Let’s not allow ourselves to get morbid,” Chris said firmly. He knew how dangerous it would be for any of them to dwell on the fate that lay ahead. They must work right to the end. They must make as much use as possible of the life that was left to them.

In contrast to the serious and heavy atmosphere of a few moments before, when the crew had first learned of their inevitable fate, the air in the cabin became brittle and light. It was as if each of the quartet was determined to shut out of his mind for as long as possible the awful thoughts that had come crowding in. There was unnatural laughter at the least thing. Meticulous and elaborate care was taken over each of the routine jobs they did. They chatted together inanely on every possible subject except the one they were trying desperately to avoid.

Hours passed and they seemed scared to let up. In spite of fatigue they worked on feverishly, afraid to rest in case their thoughts became morbid. Chris forced himself to take stock of his companions, for he knew this couldn't go on. At last he ordered them all back to their couches for rest and refreshment.

"Look, fellows," Chris burst out as his friends began their nervous chatter again, "let's be realistic and talk about the thing that's most on our minds. We can't keep avoiding the subject. The sooner we get to talking calmly and rationally about it the better. Agreed?"

One after another the rest of the crew agreed that they must accept their fate and try to discuss it dispassionately. If they could get used to talking about it freely some of the terror would be dissipated.

"Sir George will be surprised when we tell him we know," Morrey said with almost natural cheerfulness. "I'll bet he's sweating it out not knowing how to tell us."

"That's so," agreed Serge. "I think it would be kinder if we sent a message to him saying that we know what's going to happen."

"Good idea," declared Chris. "I know how terribly upset he and all our friends must be. If we can let them know were facing things calmly it will be a great relief. It's the least we can do."

"Shall I warm up the set? Will you speak to him?" asked

Tony, eager to be doing something.

"Yes. I'll have a word with the old boy," Chris answered, his eyes softening with affection for the dear friend he would never see again.

Tony rose to prepare for the broadcast. Somehow this thoughtful, kind decision had lightened their spirits. It was as if a gentleness and affection for all mankind had descended on them now that they would shortly be saying good-bye. Yes, they must remain cheerful and brave to the last. And they must do everything possible to help those who would follow.

"Okay, Chris," Tony called, and Chris went over to the microphone.

"Jupiter I calling Control," he began. "This is a special message to Sir George Benson from all the crew. Please don't worry. We believe we know the reason you're going to send us a special message. We already know that we can never"—here Chris's voice went a little husky—"return to Earth. But we'd like to hear what's gone wrong. Don't be concerned about us. We've talked it over and we've all decided to accept things calmly. As Serge has reminded us, we've had a good run. So please, Uncle George, don't worry too much."

As he finished his broadcast Chris turned to the others who nodded their agreement.

"That should ease his mind a little," Serge said. "Pity it will take an hour to reach him."

"What are the chances of our crashing into Jupiter?" asked Morrey, returning to the subject that they must all discuss.

"Unless we get different information from Control, my guess is that we shall hit in just over two days," Chris answered calmly.

"That will be better than wandering off into space," Serge declared, "and it will give us a chance of finding out something about the atmosphere and surface."

Chris agreed. “No doubt we shall arrange with Control to send out signals right up to the moment of impact,” he said. “That should settle doubts about the nature and depth of the clouds.”

“And it should tell something about the surface,” observed Morrey. Then he wished he hadn’t said it, for his words were followed by a tense little silence; all the crew knew that he was referring to the way their ship would smash into the planet.

“Er—yes, well, now I think we should observe Jupiter and its moons as much as possible,” Chris said quickly. “We’ll use up all the film and also record our visual impressions.”

“What’s the use of taking photographs?” asked Tony. “It seems a waste of time.”

“All the same, we’ll do it,” Chris answered severely. He wasn’t going to let any of his companions slacken up, for that would be the first step towards a complete breakdown.

While they were waiting for their message to reach Earth and for Sir George Benson’s reply to come back, the quartet carried on their duties while trying not to think too much about the future. Serge operated the camera and took numerous photographs of the planet. Tony looked through the telescope, fearfully, and yet with fascination, at the giant world where they would soon meet their end.

Jupiter filled the telescope’s whole field. Tony gazed at the brilliant globe. The light and dark bands which are the planet’s most notable feature were very prominent. He recalled the names that the different zones had been given. The broad light strip running across the center of the planet was, he remembered, the Equatorial band. It was not, he could see, an unbroken strip. There was a faint line approximately along the center dividing it in two. Now he could also see that the edges of the different light and dark belts were not straight and continuous. These were irregular and ill-defined.

In the midst of the South Tropical Zone Tony could see

the dusky oval of the famous Red Spot, that object on the planet which had fascinated and puzzled generations of astronomers. It wasn't red at all, but a light brownish color. He must ask one of the others how it got its name.

Perhaps the object that most excited Tony's curiosity was a dark patch, perfectly round, which he hadn't seen before. He called out to Serge and asked what it might be. The Russian came to the telescope and gazed through it for a few seconds.

"That, my friend, is the shadow of one of the satellites," he said.

"You haven't told me much about them," Tony said, his eye still glued to the instrument. "What are they like?"

Chris overheard. Here was an opportunity of distracting their thoughts from the subject to which they must inevitably return. Bravely though his companions would face the end, there was no reason why they should dwell on it when there was something else to think about.

"Yes, let's continue Tony's education," he called to the others, and, willingly, they returned to their respective couches.

"Perhaps I'd better begin," Serge said, trying to show everyone how carefree he was. "Jupiter, as you know, has twelve moons. Because of the strong pull of Jupiter's gravity, they all have to race around the planet at a pretty fast pace to keep in their orbits. Not much is known about any of them, but the big four must all be fairly similar to our moon—no atmosphere, rocky and terribly cold."

"I believe the four large ones were discovered by Galileo when he made the first telescope," Morrey said.

"Io, Europa, Ganymede, and Callisto," Tony recalled proudly.

"Well done," smiled Serge. "They also have numbers, usually written in Roman style, I to IV."

"Have the others got names?" enquired Tony.

“They are usually referred to by numerals only,” Serge told him. “They go, of course, up to number XII.”

“And that was the shadow of one of them that I saw through the telescope?” Tony asked.

“Yes. Probably the shadow of Io, the one nearest in size to the Moon. You can usually see one or more of the satellites or their shadows crossing the disc of Jupiter. We’ll see if we can identify them,” Chris said.

“Hold on a bit,” Morrey called out. “I think that’s the carrier wave from Control. We should be getting a message back from Sir George at any time now. Better call off lessons for a spell.”

They fell silent, wondering what Benson would say. Perhaps, deep in the minds of, some of them, there was still a lingering hope that he would tell them they were wrong and would dispel their fears.

No wonder, then, that they listened tensely as the loudspeaker announced. “Control calling Jupiter I. Sir George Benson is going to speak to you.”

9

"Chris. Morrey. Serge. Tony. I have had your message," the voice of Uncle George said. Even at that distance they could detect the emotion which he was trying to suppress.

"Let me say at once how much I appreciate it," Benson went on, "and I only wish I could say that you are wrong. Unhappily, I have to tell you that you are not. For some reason, unknown to us as yet, your ship cannot decelerate sufficiently for you to return. I have known this for some days, but have put off telling you so that I could spare you as long as possible. As you've guessed, I was going to force myself to break the news to you in a few hours' time. Well—you've relieved me of that task."

The crew were listening intently. It was hard to realize that they would never again see the man to whose voice they were listening. Sir George Benson was admired by all of them. But for Chris the feeling was much deeper. For many years—since Chris was a schoolboy—there had been a warm affection between them. It had seemed the most natural thing in the world for the famous scientist to be "Uncle George" to the young astronaut.

"Your courage and the calmness with which you've accepted the situation is no surprise to any of us. We are preparing a special program of observations. This will help to keep you occupied and may give us a clue as to what's gone wrong. Call us as often as you like. We are all with you in spirit."

The message was over, the radio silent. How very much alone they felt. Though none of them would admit it, the ending of Sir George Benson's broadcast left them with a sense of isolation. It took all their courage to keep their heads high and there was more than a suspicion of a quiver

around Tony's mouth.

"Good old Uncle George," Chris breathed. The sooner they received a definite program of observations the better. Work —continuous work—Was the only thing that could stop them from thinking.

"Are you going to reply?" Morrey asked.

"Can we say good-bye to all our friends?" enquired Tony.

"Plenty of time for that later," Chris answered harshly. "No, Morrey, I think We'll leave the line open for that program he promised us. The sooner we get going on that the better."

"How long have we got left?" Tony asked with a slight quiver in his voice.

"Let's not worry about that, old feller," Morrey countered. "What's it matter, anyway?"

"Oh—er—I was only wondering if you'll be able to tell me all about Jupiter," Tony answered, avoiding the truth.

"Let's have another look at him," Morrey suggested, swinging off his couch. He went over to the telescope and took a long look. Then he let out a whistle.

"He looks terrific," he called. "Come and see."

In turn they gazed through the instrument at the vast disc of the giant planet. As they watched, the belts and zones, the most prominent of the Jovian features, were in constant movement. All colors, from dark red to greens and blues, could be seen. Light and dark patches moved quickly across their field of vision, carried along by the tremendous speed of the planet's rotation.

As they watched they saw, too, that mysterious object, called the Red Spot, creep into view from around the planet's limb. Cradled in the hollow it made in one of Jupiter's encircling bands, the Red Spot looked like a reddish-brown-colored egg of stupendous proportions. Like other features of the Jovian scene it was full of movement, with dark veins and patches constantly changing position. The whole great

oval seemed to be rotating like a gigantic whirlpool. It gave the impression of unimaginable forces at work, churning eternally at the poisonous atmosphere.

"Wonderful!" breathed Chris.

"Stupendous!" declared Morrey.

"Fascinating!" avowed Serge.

"Frightening!" said Tony.

Their observations of the planet were cut short by a string of messages from the loudspeaker. A long and detailed program had been quickly prepared that would occupy them for days. They made no comment, although each knew that they could never live to complete all the observations called for. With maybe less than forty hours left, they could only carry on until the final catastrophe silenced them for ever. Pity—because it would have been grand to put up a good show for their last job. If only they could have prolonged things by just twenty-four hours. By then they could have found out a great deal more about the king of planets.

Chris watched his companions going about their tasks. As he observed their brave efforts to appear natural and unconcerned, he realized how much each of them meant to him. He had been their leader on many space voyages and his great consolation was that the disaster which faced them was no fault of his. If it had been caused by an error on his part, then the last few hours would have been difficult to bear. No—he hadn't caused it, and he couldn't find a way out. At least he knew he was incapable of thinking of a solution if all the best brains on Earth, including Uncle George, had failed.

One of the tasks which Control had set the crew was to observe closely the transits of the various satellites and to follow the movement of their shadows on the reflecting surface of the planet's atmosphere. By this means it was hoped to learn a little more about the nature and density of the whirling clouds of gas that gave Jupiter its varied colors. Chris himself undertook to observe and log the paths of the

moons and their shadows, leaving the others free to do other work.

There were only four satellites to which Chris needed to give his attention. Seven of the remainder were very small and already the spaceship was within their orbits. The twelfth satellite was also a tiny one, but it was closest of all to the planet and raced around it at the incredible speed of eighty thousand miles an hour. At this tremendous velocity it circled the giant planet in just under twelve hours!

It was fascinating to watch the family of satellites chasing each other around their primary. To anyone standing on the planet—if someone ever should—it would appear even more wonderful. Then the observer would see not one but twelve moons, the outermost one going in the opposite direction. It would be like some vast aerial ballet with the dancers perpetually Weaving backwards and forwards against the inky backcloth of space.

For a few moments Chris closed his eyes and tried to imagine the scene he would never see. Apart, perhaps, from the rings of Saturn, it would be the most wonderful sight in the solar system. Then the thought struck him. Perhaps if their ship could be turned into orbit it might become the thirteenth satellite! Rather whimsically Chris began to calculate the velocity and direction that Jupiter I would have to achieve to gain that proud distinction.

The speed at which any satellite must move in order to maintain a stable orbit is, Chris knew, dependent on its distance from the planet. In close orbits the speed, like that of Satellite V, has to be very great to counteract the tremendous gravity of its giant primary. Satellites in more distant orbits can afford to move more slowly, and the four in which Chris was particularly interested clearly illustrated this principle.

Io, the innermost of the four, speeds along at forty-seven thousand miles an hour on an orbit some two hundred and sixty-two thousand miles from Jupiter. Next comes Europa, which is four hundred and seventeen thousand miles from

the planet and only has to travel at thirty-four thousand miles an hour. The velocities of the next two, Ganymede and Callisto, are twenty-five thousand and nineteen thousand miles per hour respectively.

"I wonder what our velocity will be when we approach the planet?" Chris mused. Their speed was now less than a hundred thousand miles an hour. It was still falling slowly under the thrust of the ion motor, but soon the tremendous pull of Jupiter would cause it to accelerate again. Then the ship would move faster and faster until it crashed into the Vast magnet that was attracting it.

Was it worth while asking Control for help in trying to get into orbit? Chris had no doubt that the huge computer at the Cape could decide whether such a complicated maneuver was possible. But even if it were, would it be desirable to prolong the agony of the crew by placing them in a perpetual orbit from which there was no escape? For himself Chris would rather choose a quick end. However, the others must be in this too. Before he contacted Control, or even mentioned it to his companions, he would do some rough calculations himself.

On the pretext of preparing a final report, Chris took his notepad to his couch and began his task. From time to time he asked for instrument readings from the other three, who looked at him curiously as he worked on. It was good to see their leader so calm, they thought, for it helped to steady their own nerves.

Chris looked at the calculations on his pad thoughtfully. If they were correct it should be possible to put the ship into almost the same orbit as the satellite Io—two hundred and sixty-two thousand miles from Jupiter and with a velocity of forty-seven thousand miles an hour. Perhaps they might even get a close look at Io as they sped along with it on its endless journey.

Should he put the question to his friends? Perhaps it Was hardly fair. It wasn't as if doing so would give them a chance of survival. Now if getting close to Io or even landing—

A great quiver shook him. A thought, so startling as to be unbelievable, had struck him. His heart raced as he tried desperately hard to be sensible and push the thought out of his mind. What was the use of entertaining such a mad idea? Far better to forget it and not disturb the reasonably calm mental state of his companions. Yet, try as he might, Chris couldn't thrust the idea from him. He wanted to badly, for in even letting his mind dwell on it he recognized a chink in his own mental armor. Wishful thinking at this stage could be highly dangerous.

Thank goodness Morrey, Serge and Tony couldn't read his mind. They would have thought he'd really gone crazy if they'd guessed that the idea of landing on Io had forced its way into his head. And they would have been really convinced of his madness if only they'd known he'd had the wild idea that the landing might be the means of their salvation.

Chris looked around the cabin at the calm, unhurried work of the others. No, it really wouldn't be fair to torture them with even the slightest hope. Once it had been upset they might never regain the placid resignation that they had all achieved. It wasn't as if Chris himself believed that there was the slightest chance of escaping the fate all four had accepted as inevitable. Still—it had been an idea.

For want of something better to do while the others were still busy, Chris went over his calculations again. He must be wrong somewhere, of course, and it would be interesting to find just where he'd made an error. Slowly and carefully he checked his figures, watching out all the time for the mistake that had led to such a fantastic conclusion.

He couldn't find it. Grimly suppressing the tumult of feelings that welled up inside him, Chris forced himself to remain calm and to go over the whole thing again. But he still couldn't discover where his error was. According to the scribblings on his notepad it should be just about possible to land their ship on the satellite Io, to rest on the moon-like surface, and then at a suitable point in Io's orbit, to blast-off

again in the direction of Earth!

One of the thoughts that emerged from the conflict that was raging in Chris's mind was regret that he'd ever started this thing at all. If only he hadn't begun this unfortunate mental exercise he'd still be as calm as the others. Now his soul would know no peace, for how could he tell what he should do?

Though the figures on his pad gave rise to a faint hope, Chris refused to believe them. How could they be correct when Control, with all the facilities, brains and experience at its disposal, had failed to find this supposed chance? Even if the odds had been a million to one against success, Uncle George would have urged them to take the chance.

"What's the matter, Chris?"

Serge had come up to his leader's couch and wondered at the agonized expression on his friends face. The Russian looked at his leader with deep concern. Usually Chris was the steadiest of them all and they each took their cue from him. But here he was showing all the signs of mental distress. What had come over him?

Chris looked at his friend keenly. He was faced with a vital decision. Should he tell the Russian about this crazy idea of his, or should he keep it secret? True, Serge was phlegmatic to a degree, but could the Russian retain his composure under the impact of what he would tell him? If he gave way then the others would break down too. Meanwhile, what should he say to Serge?

"Well, Chris?"

The two looked into each other's eyes. Yes, he'd tell him. He could depend on Serge. It would be relief to unburden himself of the notion that had bored its way into his mind. Serge could help dispel it or confirm that it was just possible. Speaking quietly, so that Morrey and Tony could not hear, Chris told his friend the cause of his mental conflict.

To Chris's infinite relief the Russian listened calmly. At the end he gave no sign of the impact his leader's words may

have had. Silently he took the notepad and checked the calculations meticulously while Chris went over to Tony and Morrey and spoke to them about their work. He did this to dispel any curiosity they might have had as to why he and Serge were conferring together so quietly. A quick glance in the direction of the Russian told Chris that Serge had finished his task.

With a word of encouragement to Morrey and Tony, Chris broke away and made his way to where Serge was waiting with the notepad in his hand.

"Well, what do you make of it?" he asked.

10

“It might work,” Serge replied briefly.

“You can find no flaw in my calculations, no mistake in my deductions?”

“No.”

“What would you do, Serge? Would you take a chance?”

“I would. Of course I can guess what your problem is—whether such a slim chance is, worth getting worked up about,” Serge answered. “Of course it’s up to you to decide."

“Yes, I know,” Chris answered. "Is it best to avoid raising hopes over such a remote possibility—or would it be unfair to miss even this slight chance? Go back to the others, Serge, and I'll think it over.”

The Russian returned unobtrusively to his duties while Chris wrestled with perhaps the most difficult decision of his life. As he.always did, this young scientist, this modern astronaut, did an old-fashioned thing. He prayed for guidance. And the answer came.

With a quick intake of breath Chris turned and called for the attention of his companions. Wonderingly Tony and Morrey asked themselves what their leader wanted. Serge, of course, knew the answer.

Carefully Chris explained the work he’d just been doing and how, as a result, it had seemed to him that there was a million to one chance that they might get back to Earth after all. If they took the chance and it failed, they would probably be condemned to wander off into space or to become another member of Jupiter’s family of moons. On the present course their fate was quick and certain. If they made this attempt to save themselves they would probably be rewarded with a

slow and distressing end. What did they want to do?

Several times Chris—mainly for Tony's benefit—repeated the details of his wild scheme. Each time he emphasized the great odds against its success and the price they would have to pay for failure. Morrey, invited to look at the calculations, expressed complete faith in Chris and Serge and refused the invitation. Tony said he'd do whatever Chris wanted, so once again the decision was left with the leader.

"Then we'll have a go!" Chris declared, and immediately felt an immense sense of relief now that the die was cast.

"I'll get on to Control at once," he went on briskly. "Because of the time lag there's not a moment to lose."

While the set was warming up the Russian and the American, heads close together, bent over Chris's notepad. Serge was explaining details of the plan to Morrey, who nodded silently as each point was made clear. Meanwhile Tony had clambered up among the fuel tanks to find out exactly how much chemical fuel they had left.

"Control, are you there? Jupiter I calling," Chris said into the microphone. "This is an urgent message. We believe we can turn our ship into approximately the same orbit as the satellite Io. If so we shall attempt a landing. Then, if this is successful we shall try to position the ship for a launching towards Earth when Io is in a suitable position. We request you to check our calculations and hope you'll agree to the attempt."

Then followed a string of figures that Chris read from the notepad Serge had passed to him. Ten minutes later he concluded his broadcast.

"We know the odds are great against being able to carry out this plan," he said, "but we've all agreed that we'd like to make the attempt and we request your help."

Now more than ever before they felt the disadvantage of being so far away from Earth. It would be more than an hour and a half before a reply could come back. By that time they would be perilously near the point at which they must

commence the maneuver—if it was to be done at all. Without the help and blessing of Control, they knew that the plan would be impossible; only the giant computer at the Cape was capable of making the refined calculations necessary for such a delicate operation.

The time crawled by slowly. A dozen times Chris went over his plan with the others. Repeatedly Tony examined valves, pumps, gauges and fuel tanks. Serge and Morrey gazed through the telescope until their eyes ached, but now they paid particular attention to Io. If they were to land on this barren moon, they must do so the next time it circled the planet. What would it be like, they wondered, as they watched it disappear around the limb of Jupiter? When it reappeared around the other limb they would have to start chasing it if Chris's plan was to work.

"Control calling Jupiter I," the voice of Sir George Benson suddenly boomed in the cabin. "How are you getting on with those observations? Report your condition to us."

The crew realized that this was not the reply to Chris's broadcast; the two had crossed each other somewhere in space. However, their message should have reached Control by now, and perhaps Sir George's answer was even then speeding back. There was not much point in replying to him. Everything would be altered if they were to have a shot at the landing.

Again what seemed an age passed by, and then Control came through again. This time, they knew, it would be the reply to their message.

"Benson calling Jupiter I," the loudspeaker announced. "Your message received and understood. We're checking your figures. If we find your suggestion is possible, the decision will be left to you. We will give you all the help we can. We'll also try to give you a fair estimate of the odds against success to help you decide. Stand by."

So Uncle George would help! Chris felt comforted that the famous scientist, who was also his great friend, would give

the plan his blessing. The astronaut had little doubt that his figures, checked and double-checked by Serge and Morrey, were reasonably accurate. Of course they couldn't compete with the facilities at the Cape, but no doubt Uncle George would want to assure himself that there was at least an element of hope in the difficult program that would have to be worked out.

There was a growing air of excitement in the cabin of the spaceship. Although the three older members of the crew tried to suppress any optimistic feelings, they found it too difficult in the face of Tony's chirpy attitude. In spite of their warnings, Tony felt elated. He couldn't help hoping that once again, in the face of overwhelming odds, they would all survive. On many previous occasions they had seemed doomed, but each time something miraculous had saved them. And so why not again?

"Control calling Jupiter I."

Uncle George hadn't lost much time. These must be their first instructions coming through. So Control believed in the possibility, remote though it might be, of Chris's plan! That was a heartening start.

"We have not yet had time to work out final details of your proposed maneuver," an unknown voice said, "but here are some preliminary instructions to be carried out at once."

They were to run the chemical motor for a few seconds, after having turned the ship through one hundred and seventy degrees by means of the small lateral rockets. This would thrust Jupiter I forward in a new direction which must be observed carefully. Several times this would have to be repeated, and the utmost care was needed to conserve their precious chemical fuel. The ion motor would continue its laborious task of decelerating the ship.

"Ready?" Chris called, and the others assured him that all was set for their effort to begin. Not that we're likely to achieve anything—Chris thought to himself—but what can we lose?

The tiny side rocket was ignited by the pressure of a switch, and a carefully controlled burst set the spaceship turning. Another burst from one on the other side stopped Jupiter I's motion when the desired angle had been reached. Watching instruments in the cabin's console, Serge announced that they were now in the attitude suggested by Control. Without hesitation Chris cut off the ion motor and started up the powerful chemical booster.

In their complete absorption in what they were doing the crew had forgotten to return to their contour couches. As a result the cabin floor came up and gave them all a painful blow as the rocket motor kicked the spaceship along its new course. Fortunately the automatic timer was working, and after a few seconds the motor was shut down. The crew were able to pick themselves up ruefully from the floor to which they'd been clamped by the powerful thrust.

Observation through the telescope showed that the ship was no longer heading towards the center of the planet. Instead it seemed to be traveling towards the limb. Careful checking proved that their new position was reasonably close to that worked out by Control. Now would follow a series of operations turning the spaceship first one way and then the other. All the time they would be drawing nearer to the giant planet while Io, the little moon that was their only hope of salvation, sped on its way round the back of its master.

The voice of the loudspeaker interrupted them.

"Control calling Jupiter I. Here are some amended instructions."

Again the string of directions came across space from the men at the Cape. Chris noted them down carefully and checked them when Control repeated them for a second time. Finally the voice of Sir George Benson came through.

"That's the best we can do for you," he said. "Because of the time-lag and also because of radio interference from Jupiter itself, we can't give you final directions. For the last bit you'll be on your own. If you succeed in making a landing

I suggest that you remain on Io for several orbits. When you're ready to blast-off, do so eighty minutes before the satellite emerges from the planet's shadow. That should set you on a fairly good-course back, and we can correct it later. You won't have much time for sending any messages from now on, so I'll just conclude by saying our prayers are with you all."

As the radio fell silent all the crew members felt a tightening around their hearts. Would this be the last human voice they would hear? Was Sir George the last person who would speak to them? If only they could have kept in continuous conversation with their friends on Earth it would have helped to combat the waves of black despair that engulfed them from time to time. Just such a feeling welled up now that the final contact with Earth was broken.

But this wouldn't do, Chris decided. They still had a chance, slender though it might be. While that existed they must let nothing interfere with the task of turning their ship into orbit.

"Thanks for your help," he called back to Earth. "We're now going to concentrate on moving the ship. We'll call you back as soon as we're on our way home. Give our regards to everyone. Over."

Chris didn't trust himself to say anything else. Instead he directed his companions to their posts, where they would remain for the critical hours ahead.

Several times the complicated maneuver of changing the ship's path was successfully completed. Surely they must now be fairly close to the desired orbit.

It was Morrey who was on duty at the telescope when Io came hurtling around from the back of the giant planet. By now the satellite seemed to have grown much larger, and its landscape appeared to be very similar to that of the Moon. The American called out that their objective was in view, and then helped Chris and Serge to make a further correction to their flight path.

“Two more bursts from the chemical motor and I believe we’ll be on the right track,” Chris called to his companions.

The velocity of Jupiter I was now some sixty-seven thousand miles an hour compared with the forty-seven thousand of the satellite. Their speed would have to be much closer to that of Io if they were not to be smashed on its rocky surface. Still the ion motor worked steadily, and slowly their speed was falling. But would it fall sufficiently to avoid disaster on the barren little world they were chasing?

“Keep the radar on Io,” Chris called to Tony. “Keep singing out the distance."

“Right!” the answer came back at once. “I make it ninety-seven thousand.”

They would never do it. How could they reduce the velocity differential of twenty thousand miles an hour in this relatively short distance? Because of the tremendous pull of the giant planet their ion motor was able to decelerate the ship by scarcely three thousand miles an hour. It would take some seven hours to pull their speed down to that of Io. And by that time they would have crashed into the satellite or shot past it!

Saying nothing to the others, Chris pondered the problem desperately. He could use the chemical motor again, but he must conserve fuel for the lift-off back home. It would be tragic if the chemical motor enabled them to land safely on the satellite and then was unable to carry them away. Quickly he slipped away to see for himself how much fuel was left in the tanks. When he returned to the cabin his face was drawn and his lips were compressed. His decision had been taken!

11

"Eighty thousand miles," Tony called, his eyes glued to the instruments.

About an hour had passed by since Chris had decided on his desperate gamble. Every minute they were drawing nearer to Io, for Jupiter I was almost on the same path. One further adjustment should put them into exactly the same orbit, and then it would be a matter of overtaking the satellite on its endless journey around the planet.

"What's our speed?" Chris asked Morrey.

"Seventeen thousand," the American answered instantly. Chris knew that this figure was not their absolute velocity, but the velocity relative to the satellite. He'd given instructions for this reading to be watched, for it was the critical one. Only if they could reduce this velocity to almost nil would their landing on Io be safe.

The final correction was made. Chris was satisfied that the ship was as nearly as he could get it in the same orbit as the satellite. Io loomed larger and larger in the telescope as Jupiter I streaked towards it. Physical features became plainer every minute as the miles between them were eaten up.

"Sixty-eight thousand miles," Tony announced.

"Fourteen thousand an hour," Morrey called out.

Chris studied the figures carefully, but they only confirmed his belief that their ship would smash into the satellite at too great a speed for the crew to survive. Perhaps their end would, after all, be very little different from the one that had seemed inevitable before this idea of his. Now they would crash into one of Jupiter's satellites instead of colliding with the giant planet itself! Unless—

Though all the attention of the crew was concentrated on their ship and on Io, they were very conscious of the vast world that loomed so near. Occasionally one of them would turn the telescope for a brief glimpse of the planet. All they could observe was a sea of poisonous gases which writhed and twisted under the tremendous spin of Jupiter. By comparison Io, though bleak and rocky, seemed familiar and friendly. Maybe it was the satellite's similarity to our own Moon, which they all knew so well, that robbed it of its terrors. A landing on Io, if they could make it, would be much the same as their first lunar landing.

"We're fifty—seven thousand miles away," Tony replied in answer to Chris's question.

"And our velocity has dropped to twelve thousand," Morrey added.

"Shall we do it, Chris?" Serge asked.

The leader gave a start. But he might have known that the more experienced of his companions would soon see the significance of these two sets of figures. Serge, and no doubt Morrey, realized as well as he did that they were not going to slow down sufficiently. Tony probably hadn't understood yet, so Chris, with a significant glance towards the junior member of the crew, replied that he'd like to see more figures before deciding if anything further was required.

Suddenly Tony, who was taking a spell at the telescope, let out a yell.

"It's gone!" he gasped.

"What's gone?" the others asked in a chorus.

"Io—it's disappeared," Tony blurted out.

For a second there was a stunned silence in the cabin. Then Morrey burst into a howl of laughter.

"Don't worry, Tony," he laughed, "nothing's happened to our pet satellite. It's only gone into the planet's shadow."

Tony was reassured when it was explained to him that Jupiter's moons are constantly disappearing and reappearing

as they enter and leave the vast shadow cast by the planet. However, Chris was not so happy. He'd overlooked the fact, in concentrating on getting into the right orbit, that Io would be in the shadow when they were due to approach and possibly land. Though darkness didn't make the undertaking impossible, it certainly increased the hazards.

Forty-six thousand miles to go and still traveling at just over ten thousand miles an hour! That was the situation when Chris called for the next" report. He could see that both Serge and Morrey were aware of the meaning of these figures, but Tony went about "his tasks cheerfully. He was happy to be doing something, even if the others did put their chance of survival as one in a million. Now that they were in the same orbit as the satellite, surely the odds had shortened considerably.

Though the satellite was no longer visible, its signal was becoming stronger on the radar screen. As the rocket's ion motor struggled valiantly to slow down the ship, Jupiter I was racing towards the little fleeting world. Thirty-six thousand. Twenty-seven thousand. Eighteen thousand miles away.

By now the velocity was down to four and a half thousand miles an hour more than that of Io—nothing very much if the chemical motor could have been used. But Chris knew that all he could spare of the giant motor's thrust was an eight-second burst, and this he was reserving until the last moments before touch-down.

Any minute now the spaceship would be following its quarry into the planet's shadow. The sun, constant companion since they left Earth, would vanish, leaving them to plough through space without the benefit of its friendly light. Chris supposed it would be interesting to see Jupiter from the dark side, but he'd have infinitely preferred to encounter Io in the solar glare. The illuminated disc of the giant planet had almost disappeared. Now it had gone altogether and the ship was speeding through an inky void.

"I believe I can see Io," called Serge, who was doing a spell

at the telescope. When Chris had a look he could see the satellite, much nearer now, glowing with a faint luminosity. When he looked at Jupiter itself Chris could see that the back of the planet was not entirely dark. The whirling gases of its atmosphere had a ghastly light of their own. Automatically he began to make what observations he could. He hadn't much hope that they would ever be of use.

By the time Jupiter I had approached to within one thousand miles of Io, the ship's speed had fallen to thirteen hundred and fifty miles an hour. In less than sixty minutes the fate of the crew would be settled. At the five hundred mile point the rocket's velocity was still over a thousand miles an hour. Chris knew that he couldn't delay his last desperate gamble much longer.

Inside the cabin the temperature seemed stifling, though thermometers proved that it hadn't really risen. Each of the crew was strained and tense as the critical moment drew nearer. Even Tony, who hadn't realized the risk they were running, had ceased his perpetual chatter and was as tautly strung as the rest.

"Two hundred and fifty miles."

"Nine hundred and fifty an hour."

The crash was obvious and inevitable—unless Chris's eight-second burst of the chemical motor did its job.

"Get on to your couches," the leader ordered as he switched over control of the rocket to the small instrument panel above his own couch.

Silently the crew settled into their couches and tightened the straps. In a very few minutes it would be over, one way or the other. There could be no attempt at choosing a landing spot on Io. They were approaching much too rapidly to pick out a level patch on its rocky surface. If they struck one of the sharp, tooth-like peaks, their ship would be torn to shreds. If they landed on one of the precipitate mountain sides they would fall headlong and be crushed in some deep ravine.'Only if Jupiter I had the good fortune to land on a

comparatively level patch would they survive.

"Helmets on!" ordered Chris. Even if they made a relatively safe landing there was a strong possibility that the rocket casing would be fractured and their precious oxygen would escape. Maybe the wearing of the space helmets would save their lives—but for how long?

A quick look around at his companions assured Chris that all was ready. Another glance at the duplicate instruments on his panel showed that they were now a hundred miles from the satellite and their velocity was still eight hundred miles an hour. Gritting his teeth Chris pressed the firing button and waited for the chemical motor to start.

The few seconds' delay seemed endless, but at last the familiar kick told them that the motor had sprung to life.

One, two, three—thirteen, fourteen, fifteen seconds he gave it—far longer than the safe maximum of eight. Yet Chris knew what he was doing. They should be able to land now with only a reasonable bump. As for take—off when the time came—well, he had certain plans for that.

Might as well stay on their couches. Jupiter I would reach Io any time now. Even if they had time to move about the cabin there was nothing they could do to control the final descent of their ship. It would be better to remain on the contour couches and wait for the crash. If the chemical motor had done its work, if they landed on a fairly level spot, if the rocket casing stood the strain, all would be well. And if none of these pieces of good fortune happened, their lives would be over very soon.

The strain of waiting for the landing was almost unbearable. Several times Chris tried to speak to his friends over their helmet radios, but he couldn't think of what to say. At times like this words seemed inadequate, so rather than say the wrong thing he kept quiet. The others must have been thinking the same, for none of them spoke. All Chris could hear was the rapid breathing of his companions.

Crash! It had happened! The whole universe seemed to

have turned upside down. Just before the lights went out they could see a few loose articles flying about the cabin, hitting first one wall and then the other. They could feel the ship turning over and over. Pieces of smashed instruments struck their helmets. Something quite large hit Morrey and knocked him senseless. Then it was over. The ship was still. They were on Io!

How long he lay Chris could never remember. When he regained consciousness he found he was hanging from his couch suspended by the straps. Around him was total darkness. He couldn't see what had happened to the others

or what position the ship was in. Fearfully he spoke into his helmet radio.

"Morrey! Tony! Serge!"

But there was no reply. Were they alive or dead? Was he, himself, alive? Yes, that was the one thing he could be sure about. Now to release himself from the straps that held him suspended.

It wasn't easy. From the weight of his body Chris knew that the gravity of Io was, indeed, roughly the same as that of the Moon. After a bit of a struggle—for the straps had somehow become twisted—he freed himself and dropped away from the couch. Instead of the cabin floor it was a sloping wall that he landed on. So Jupiter I must be in a real pickle.

Chris's first concern was for his friends. He must find out if they were injured or even dead. In the pitch blackness it was a little difficult to orientate himself in the cabin, so he'd better try to get the emergency light to work.

Even as he took this resolve, Chris saw that there was a patch that was slightly less black. This could only be one of the ship's portholes. Io must be leaving the planet's shadow and it would be getting lighter outside. Ah! There was the emergency light, specially made to meet such a situation. Robust almost to the extent of being indestructible, the lamp had its own built-in battery that would last for many hours.

Chris pressed the button and the cabin was flooded with light.

Quickly he turned to his companions. He could see them hanging grotesquely by their straps from the couches. They were motionless, and for a moment panic filled him. Making his way through the debris in the cabin, Chris soon assured himself that Serge, Morrey and Tony were alive but unconscious. One after another he eased them from their bonds and made them as comfortable as he could. Next he looked around the cabin more carefully than he'd done before. Ah, there was the pressure gauge and it seemed undamaged. He made his way towards it anxiously. It registered zero!

So the rocket casing had been damaged and the oxygen had escaped. That meant that they must live in their space suits until the casing was repaired—or until the oxygen supply was exhausted. A groan coming over his helmet radio interrupted Chris's thoughts. One of the others was coming around. He examined each in turn. It was Serge who was showing signs of life, and within a few minutes the Russian stirred and tried to sit up.

"Take it easy," Chris called over the radio, and Serge flopped back again.

There was little Chris could do for his companions except to see that they had plenty of oxygen flowing into their masks. While he was waiting for them to recover he would examine the cabin to try to find the fracture. If it was a small one Tony might be able to repair it. If it was too large this would be the end of their story. He turned to look, with the help of the emergency light, around the walls.

Chris had no need to look very far. Io had been racing on into the light of the sun, and it was this light that was beginning to stream in through a jagged hole. Though he hadn't the practical knowledge of his young friend, Chris had very grave doubts whether Tony would be able to repair it.

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“Are you feeling better?” Chris asked.

One by one the other members of the crew had recovered consciousness. As all the oxygen had been drawn out of the cabin through the gaping hole, they had to retain their helmets and converse over the radio. Each of them assured their leader that he was quite fit, although Chris doubted the absolute accuracy of this in view of the buffeting they’d had.

“What about it, Tony? Can it be repaired?”

Chris’s question was the critical one, and they all waited tensely for the mechanics answer. Tony had made his way over the litter in the cabin and examined the "hole intently.

“I'll have to have a look outside,” he said presently.

As the rocket had two walls, the inner one forming the cabin and the outer one being the rocket casing itself, Tony had in fact two holes to patch up. The rock, or whatever it was that had done the damage, had torn its way through both sheets of metal. Repairing the inner wall would only make the cabin airtight and they would be able to survive in it without their space suits, but the protection of the outer skin would be needed to ward off damage from the constant rain of micro-meteorites and cosmic dust.

So far the crew had made no attempt to leave the ship. Now it was essential for them to venture outside to see if the damage could be repaired. It was also vital to find out how and where Jupiter I had landed. They must be prepared to leave the relative security of the cabin and be the first humans to set foot on the strange world outside.

“Right. See that you’ve all got fresh oxygen bottles. Io here we come,” Chris called.

Fortunately the cabin door, although at an angle for which it had never been designed, was accessible. Because of the vacuum inside the ship there was no need to operate the air lock procedure. Chris seized the inner door handle and released it. He swung open the door into the air lock, and then stepped in. Watched closely by the others,;he took hold of the outer fastening and twisted. With a strong pull he wrenched open the door, and there were four gasps over the radio as the quartet peered outside.

Io was like the Moon and yet different. There was the same barren wilderness, the same harsh light and black shadows. Like the Moon it had no air or water. Gravity was almost the same, being one sixth of that on Earth. But Io was much colder than the Moon. Even in the full glare of the sun its temperature never rose above freezing point, while in the shadow of the primary it was very near absolute zero.

Another striking difference between Earth's satellite and that of Jupiter was the complete absence of craters. On the Moon, there are innumerable circular depressions of all sizes varying from a few feet to scores of miles. Io had none, but from what Chris could see through the cabin door its surface was covered with a multitude of jagged pinnacles of all sizes. They reminded him of pictures he'd seen of the cruel teeth of a shark. Unswept by any wind or worn down by rainfall, the pinnacles seemed razor-sharp. No wonder one had cut right through the outer and inner casings of their rocket. It would hardly be surprising if they found that the outer casing, at least, had other holes punched into it by the many frightful fangs that sprouted everywhere.

Another danger the crew would face from the teeth of Io was that their space suits would be slashed to ribbons unless they exercised extreme care. Any one of the pinnacles could pierce the suits, let out the pressure and end the life of the wearer within seconds. Yet they had to brave this to examine the outside of their ship.

It seemed, from what Chris and the others could see from the open hatch, that Jupiter I was wedged at an angle

between two of Io's giant teeth. All around were scores of other pinnacles glinting in the light and each casting a dark shadow. It seemed as if they were waiting to work vengeance on the intruders from space.

Chris studied the situation closely. The rocket was leaning at an angle of about forty-five degrees, the cabin door was just over ten feet from the ground. Though the gravity was the same there would be no light—hearted leaping about on Io as there had been on the Moon. Instead of jumping down lightly as they would have done under lunar conditions, the crew would have to leave the cabin with extreme care. Tony disappeared into the ship and returned a few minutes later, with a light folding ladder.

As leader of the expedition it was Chris's privilege and responsibility to be first to set foot on this alien world. With his three companions holding the top of the ladder firmly, he climbed slowly down. Twisting his body Chris avoided a nasty-looking rock and stepped on to a few square feet of flat ground.

Watched by the others, the leader took a look around. The ground beneath him seemed firm. Here there was no layer of dust like that he had found on the Moon. He couldn't see far in any direction because of the forest of large and small pinnacles that surrounded him. Edging his way carefully past several of them Chris was able to move a few yards and to get a better view of the ship.

As he had feared, the outer casing of the rocket was battered and torn in several places. From where he stood the hole that went right through into the cabin seemed a large one. If there were other places where the inner casing had been damaged Chris couldn't see them without a much closer examination. It would be a tricky business clambering over the rocket to inspect it. Experimentally Chris touched one of the smallest of the pinnacles. It was hard rock of some strange kind that he'd never seen before. As he looked at these wicked-looking projections he noticed a peculiar thing. Each pinnacle had a sharp edge running up one side and

down the opposite one. Moreover, these sharp edges all ran in the same direction on every pinnacle he could see.

As he looked around Chris described all he saw to his companions over the radio. They were still crowded impatiently in the cabin hatch.

“Can’t we come down yet?” the voice of Tony called out.

“Yes, but be mighty careful. Watch for that sharp one near the ladder. One of you had better stay aboard in case of emergency,” Chris answered. “Any volunteers?”

There was a pause before Serge’s voice answered with a sigh, “All right. I’ll stay in the cabin.”

“Good man,” Chris called back. “I’ll see you get a spell very soon—though it’s not very pretty out here, I can promise you.”

He turned to watch first Tony and then Morrey climb down the ladder which Serge was still holding at the top. To make room for the other two Chris had to step back and in doing so he stumbled. Quick as a flash he put out his hand to stop himself from falling against one of the razor edges. Automatically he'd avoided the sharp part of the pinnacle and pushed against the comparatively smooth side. To his utter amazement the top of the pinnacle snapped off like a carrot and fell gently to the ground.

“That’s funny,” exclaimed Morrey, who had seen the incident. “These teeth don’t look very brittle to me. And how did they come to tear a hole in the ship?”

“Search me!” Chris muttered. “Tony, will you nip back into the ship and fetch a hammer. I'd like to give one or two of these fellows a gentle tap.”

In a few minutes Tony returned with the small geological hammer used for chipping away rock samples. He handed it to his leader and Chris struck one of the teeth a firm blow on its sharp edge. Nothing happened except that the hammer bounced off with quite a visible mark on its head.

“No wonder our ship’s been cut up,” Morrey murmured.

“They’re like diamonds.”

“And yet this other fellow snapped off easily enough,” Chris pointed out. “They all look the same."

He struck one or two more of the pinnacles on their sharp edges but was unable to make any impression except on the hammer.

“Here, let me have a go,” Tony’s voice requested, and Chris handed the implement to his young friend.

"How’s that?” asked Tony triumphantly, and Chris and Morrey could see that he’d broken off quite a fair-sized piece of-rock.

“How did you do that?” demanded Chris.

“Easy,” Tony laughed. “Like this.”

He struck one of the pinnacles a sharp blow, not on its razor-like edge but on its side. It snapped easily. When he struck a second one the same thing happened.

“That’s queer,” Morrey said. "Hit them on the edges and they’re as hard as steel, but tap them on the sides and they're as brittle as eggshells.”

“It must have something to do with their molecular structure,” the voice of Serge suggested, for the Russian was watching with interest from the hatch.

“In that case we should be able to clear some of them away,” Morrey suggested, and Chris agreed.

“Let’s first clear a space that we can move around in,” the leader said.

Tony still had the hammer and he set about the nearest pinnacles. Even when he struck them close to the ground they broke off easily, and soon a number of them were lying about.

“We’d better get rid of these rocks,” Chris observed, “otherwise we’ll be ripping our suits against them.”

While Tony continued his work of execution, Chris and Morrey carefully seized a couple of broken pinnacles and

flung them away. Because of the satellites low gravity they were able to throw the jagged pieces of rock quite a distance. One of them collided with a distant pinnacle and this, too, snapped off. After ten minutes' work several square yards of surface had been cleared. The space was fairly flat, too, with only the stubs of the pinnacles raised an inch or two from the ground.

"Ease off a bit," Chris ordered over the radio. "We must plan this thing carefully. We haven't unlimited supplies of oxygen, you know."

"Can't I come down yet?" the plaintive voice of Serge asked.

"Just be sure that the ladder is secure. Then you can join us to plan our next move," Chris called back.

"Jumping crickets! Look at that!" Morrey burst out as Serge made his way down the ladder. The others turned to see what had astonished the American. A huge crescent, stretching almost halfway across the sky, had arisen above the jungle of sharks teeth that surrounded the little party.

"That's Jupiter," breathed Chris. "What a size!"

Io was moving around toward that face of the planet that was illuminated by the sun. Its vast bulk was becoming more apparent as the satellite sped on. The wealth of color was staggering, with the belts and zones writhing about like an endless procession of colored snakes. For a long time the quartet gazed speechlessly at the awesome sight.

"Come on, fellows," Chris said at last. "We've work to do."

The others tore their gaze from the giant planet and considered their immediate problems. Jupiter I, they could see, was firmly wedged between the sharp edges of two large adjacent pinnacles. The outer casing was scratched and torn where the rocket had plunged through this forest of teeth. It was the tip of a smaller pinnacle, wickedly projecting between the two larger ones that were holding it, that had cut right through into the spaceship's cabin.

Because the wearing of space suits made a heavy demand on their stores of oxygen, it was essential that repairs to the cabin should be given priority. Once this was airtight the crew would be able to relax without their helmets, and the apparatus for restoring the oxygen to the atmosphere could work again. The longer they had to use fresh oxygen from the cylinders on their backs, the more their reserves diminished. They must, therefore, speed up the work outside the rocket as much as possible.

"If you can clear some of these horrible things from the side I can get up and look at the hole," Tony announced. "Meanwhile I think we'd better let the ship stay wedged until I've done the repairs."

"You're the boss in this," Chris said, and it made Tony feel good to know that his practical skill and experience were appreciated by his brilliant friends. At one time he had felt hopelessly inferior as he listened to the others discussing things far above his understanding. But gradually he had come to realize that a first-class mechanic was as vital on a spaceship as any other member of the crew. He was never tired of urging young friends back home to take pride in the skill of their hands if they were not cut out for an academic career.

When the others had cleared away the offending pinnacles, Tony placed the ladder against the side of the ship and climbed up to do his inspection.

"Whew! That's a nasty one," the others heard him exclaim. "Still—I think I can do it. I'll get a plate and the welding equipment from the stores if one of you will give me a hand."

The others were only too anxious to help him. They knew that only he had the skill to do the repairs and they were quite willing to act as laborers for him. While Tony took a sheet of special alloy from his stores, Morrey collected the arc welder and carried it outside. One end of the cable was plugged into the batteries to bring power to the welder. It was just long enough to reach all parts of the rocket. Then Tony went inside once more to bring out the electrodes with

which he would make the weld.

Watched by his colleagues, Tony climbed to the hole once more. With a pair of metal cutters he deftly shaped the sheet of alloy until it covered the damaged casing. He placed it over the hole and reached for the electrode holder which Morrey passed up to him. Then he clipped in the electrode, and while he held the sheet in position with one gloved hand, he touched the casing with the electrode. As he expected, there was a blinding flash and he began to weld.

“Don't look at this,” Tony called to the other three. “It will affect your eyes.”

They could see that he had a dark-colored shade over the vizor of his helmet, so they turned away.

“Let’s clear away a few more of these,” suggested Morrey, while Tony worked steadily on, the other three continued their work of execution among the pinnacles. Gradually they were clearing an area all around the rocket except for the two pinnacles supporting it.

“How are you doing, Tony?” Chris enquired over the radio.

Before the mechanic could reply there was another blinding flash—not from the welding but from the snakelike cable. It had been severed as if with a knife by the cutting edge of one of the rocket’s two supporting pinnacles.

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Tony examined the severed cable with concern. He had no doubt that he could repair it, but valuable time would be lost. What was just as important, the cable would be shortened by about a couple of feet in order to make the joint. Just one or two more such shortenings and the cable wouldn't be long enough to reach all parts of the rocket.

With gloved hands it wasn't too easy to repair the cable, but at last Tony had done it.

"Will you fellows hold it away from the knives of these devils?" he asked, and Chris, Serge and Morrey had the humble task of holding the cable away from the pinnacles while Tony finished the welding.

"Now for the hole inside," Tony said as he climbed down the ladder. Soon he was busy patching up the inner casing, and from start to finish the job took him just over an hour.

"I can't see any more holes in the inner casing," said Serge, who had been making a careful inspection. "Shall we try a pressure test?"

"Yes. The sooner we can take these helmets off, the better," Chris agreed.

All the crew climbed back into the cabin, and after Morrey had closed the hatch, Tony opened the valve to let in some of their limited supply of fresh oxygen. All eyes were turned to the gauge which recorded accurately the pressure inside the cabin. Would it remain steady, or would it fall again, showing that there was still a leakage? For five minutes the needle remained in the same position.

"That's it!" exclaimed Chris. "Tony you've done a great

job. It will be such a relief to get these helmets off."

Almost before the leader had finished speaking the other three had whipped off their helmets and were breathing the air in the cabin gratefully.

"I think some refreshment is called for," Chris said as soon as his own helmet was removed.

The crew members were rested and refreshed. Now they were able to hold a Council of War.

"I think the most important job is to free the ship and to get it into position for blast-off," Chris began. "Then we can complete the repairs to the outer casing."

"Are we going to do any exploring?" Morrey asked.

"No, we can't spare the oxygen. In any case half our instruments are smashed and we couldn't do much," answered Chris. "We'll just concentrate on leaving Io as soon as possible."

"I'm with you on that!" Tony concurred with feeling.

"How about chemical fuel? Didn't you run the motor longer than you expected?" asked Serge.

"Yes," Chris agreed, "so we must lighten the ship as much as possible. Every ounce of surplus equipment must be jettisoned if we're to get off the ground."

"How about oxygen? Shall we manage?" Morrey enquired.

"We'll manage," the leader answered, "but we mustn't waste a cubic centimeter."

The others didn't know, of course, that they hadn't enough oxygen—at least not enough for four people to get back to Earth. Coldly and deliberately Chris had calculated how long their reserves would last, and coldly and deliberately he had decided on his course of action. What that was he couldn't tell any of them. All he knew was that it was better for three people to reach Earth alive than four people to die on the way.

First they must concentrate all their efforts in getting Jupiter I back on an even keel. It would be a delicate operation, but now that they had some clear ground around the rocket they might be able to use the jacks that formed part of their equipment. When the ship set off from Earth there had been no intention of making a landing, so they hadn't brought the large jacks that would have done the job easily. The two small ones they had were designed only for internal use, such as propping up fuel tanks while repairs were being made.

"We must be careful not to snap either of the two supporting pinnacles," Chris declared, "otherwise the ship will fall flat and we'll never get her up. Let's see where we can place the jacks to get some purchase."

Tony and Serge carried the jacks outside while Chris and Morrey made a careful study of the ship's situation. Under terrestrial conditions the job would have been utterly impossible, for Jupiter I would have weighed nine tons. On Io this was reduced to the equivalent of approximately thirty * hundredweights, which was still a formidable task without the right equipment.

"We'd better get some ropes to steady it," suggested Tony.

"Good idea," Chris agreed. "We'll use the nylon safety lines."

These were strong thin ropes that regulations compelled every astronaut to use when working outside the ship during flight. Not infrequently it was necessary for one or more members of a spaceship's crew to leave the safety of their cabin and to venture into the void outside. There they would make observations or do repairs with one end of the rope attached to their belts to prevent their floating away. The ropes were light and very strong and would be ideal for the job in hand.

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" A hundredweight is equal to 100 pounds.

“I’ll get them,” Tony volunteered, but before he could return to the cabin the quartet had a shock. Suddenly, within a few seconds, daylight faded and it became pitch dark. The satellite, traveling at such a high speed, had moved into the planet’s shadow once more. For some hours it would be night and it would be impossible to work in the dark.

“Back into the cabin, everyone,” Chris called sharply.

This hold-up was most unfortunate. They would have to spend a number of precious hours lying idly in their cabin. Because of the angle of the ship they couldn’t use the couches, so they would have to make themselves as comfortable as they could despite the rocket’s crazy angle. It was routine procedure, when oxygen was running short, for every member of the crew to lie prone when not engaged on some essential duty. It helped to restrict the consumption of this vital gas.

“Where are you all?” Tony’s voice sounded in their helmets. "I can’t see a thing.”

True enough, none of them could see the others or even the ship. “Stay where you are,” Chris ordered sharply. If they moved about they would soon lose their sense of direction, besides being in grave danger of blundering into the sharp edge of a pinnacle. Their voices were, of course, no help, for on the helmet radios they sounded the same wherever the speaker stood. The sudden blackness was uncanny and a little frightening. It was as if some huge cover had been placed over the small world.

“Don’t move your feet, anyone,” Chris said. “Just feel about with outstretched arms to see if we can touch each other.”

After a few waves of his arms Chris felt something. He grabbed it and found it to be a hand.

“Who’s this?” he called.

“Someone’s caught my flipper,” Morrey’s Voice said.

“Good. You others found each other yet?” Chris asked.

“No. Still waving about,” Serge answered.

“Keep on. I’m going to move about a bit. Morrey, hang on to my hand. I’m going to walk around in a circle with you as the center. So don’t move. Just follow me around,” Chris said.

"Okay, do your stuff,” the American called back.

“It’s like Blind Man’s Bluff,” Tony’s voice piped up a little shakily.

Chris, left arm outstretched and with his right hand firmly grasped by Morrey, walked slowly around, feeling for the other two or the rocket. He felt nothing.

“Are you sure you haven’t moved?” he called sharply. “I could have sworn you were closer than that.”

“I haven’t moved,” Tony insisted.

“Nor I,” the voice of Serge added.

“Then there’s nothing for it but for Morrey and me to sweep the area,” Chris said unhappily. “Stay where you are. We don’t want to be chasing each other.”

With one hand grasped firmly by his companion and the other outstretched, Chris and Morrey began to move forward slowly. They had no idea which way they were going, whether it was toward or away from the rocket or their friends. Great care had to be taken, for they knew that the forest of menacing teeth surrounded them in every direction in that impenetrable blackness.

A small light flashed inside Chris’s helmet. It was a warning that his oxygen cylinder was running low and that he must replace it within ten minutes. This was another hazard that the crew had to face. If they were lost and couldn't find the ship, how could they get the fresh supplies of oxygen that would keep them alive?

But the falling reserves in Chris’s oxygen flask had compensations.

“I’ve just seen a light,” the excited voice of Tony called. He

had caught the very faint glimmer that the warning light had made inside Chris's helmet. Only in this intense blackness and if one happened to be looking in the right direction could it be seen.

"It's my oxygen light," Chris informed them all. "Can you both make your way to me?"

In a very short time he and Morrey felt the groping hands of Tony and Serge.

"Well, at least we're all together," the American said with forced cheerfulness. "Now where's the ship?"

"I've got about seven minutes left," Chris told the others. They knew that this meant they must find the ship, get inside and seal the hatch so that their leader could breathe. Failure to do so would mean that in ten minutes at the outside Chris would be dead.

"Let's get moving then," Morrey said crisply.

Though they knew that Jupiter I couldn't be more than a few yards away the minutes were ticking by and none of them had touched it. It was an eerie feeling to know that they might be moving away from their ship and blundering among the threatening forest of rock.

"Someone must have stolen it," Tony said in an attempt to conquer his growing alarm.

"I've got something," Serge called out and the rest of the crew froze instantly. Gently the Russian ran his gloved hand over the object he'd touched while the others waited expectantly. How long had Chris got left now? Six minutes? Five?

"It's—it's a pinnacle," the disappointed voice of the Russian told them. The irregular surface was certainly not that of their sleek ship, damaged though it might be. He hoped he hadn't slit his glove on the cutting edge. That would very soon make two casualties.

"We must face about and go in the opposite direction," Morrey said. Chris was doing no more talking to conserve his

oxygen. Slowly, inch by inch, the quartet moved forward with hands joined. After every step they would raise their arms and grope forward into the impenetrable dark. Chris was now feeling the effects of his failing oxygen supply. Try as he might he couldn't avoid the deep labored breathing that revealed his condition.

"We must move a little faster," Morrey said desperately. Even as he spoke Chris stumbled and had to be helped by Tony and Serge. It was as Chris was beginning to feel his senses reel that they found the ship. Morrey felt the hull and gave a shout of relief. Within less than a minute the crew had helped Chris aboard. While Morrey was sealing the hatch Tony was pumping oxygen into the cabin and Serge was removing his helmet. With the aid of the emergency light they could see their leader painfully gasping for breath. Gradually his breathing became more normal and the crew began to relax.

"Keep still, Chris," Morrey urged. "We'll soon make you more comfortable. I expect we'll have to spend some hours penned up in here."

There was still a lot of debris littering the cabin. Broken instruments, stores of various kinds, tools and equipment were jumbled together. The rocket's landing hadn't been a happy one.

"Let's have something to keep us going," suggested Tony.

He unearthed some bars of chocolate and a few meat tablets. Then he sorted out some glucose tubes and handed these around.

One of the greatest pleasures in returning to Earth, Tony always maintained, was that it meant an end of "space food." Always the first thing the four friends did after each landing was to get the sort of hearty meal enjoyed by earthbound mortals. After weeks, perhaps months, of uninteresting but adequate concentrated food, steak and french fried potatoes had a very strong appeal.

"We must get the time of sunrise accurately," Chris told

his crew as they chewed their meat cubes. “Remember you—er—we have to blast-off twenty minutes before Io leaves the shadow.”

He hoped his friends hadn’t noticed his slip of the tongue. To cover it he talked on rapidly, deliberately including himself in all their plans.

“While were tied up in here we can decide how much equipment we can abandon. Remember we’ve got to be ruthless and get rid of every ounce possible,” he declared. “We can start pulling the cabin to pieces now.”

“If you say that’s essential why not decide what is absolutely vital for the return journey and jettison the rest?” suggested Serge.

“Good idea,” Chris agreed. “Let’s begin.”

It was surprising how much equipment they found they could do without. As they discussed each item Tony clambered about dismantling the various items to be discarded.

“That’s about it,” Morrey said at last, when they seemed to have exhausted all the possibilities.

“Oh no, it isn’t,” Chris answered firmly. “This isn’t anywhere near enough. I said ‘every ounce’ and I meant it. What’s the use of keeping things if the rocket can’t take off?”

Again they went through their stores and equipment, with Chris being ruthless almost to the point of brutality. Only he knew how critical the lift-off weight was going to be. In spite of the protests of Morrey and Serge he decided to abandon even their contour couches.

“We shan’t be pulling against the same gravity here,” he pointed out, “so we’ll have to put up with lying on the floor.”

“The cabin will be as bare as Mother Hubbard’s cupboard,” Tony sighed, but he worked on steadily.

“Now let’s have a look at the food stores,” Chris said finally. Amid a storm of protests all around he selected various items to be thrown away.

"We'll be on starvation rations," Morrey protested angrily.

Four people, yes, Chris thought, but three people would manage. How could Morrey know that he wouldn't go short after all?

14

"Do you think there's any hope?"

The question was put by Mr. Gillanders, the big Australian scientist, to his friend and chief, Sir George Benson. Both men had been great friends of Chris and all his crew for some years. It would be terrible if they never returned. Both men, particularly Benson, would feel the loss keenly. Sir George would not only lose his particular friend Chris Godfrey and the others, he would also know that he was responsible for sending the young men on this dangerous voyage. It had been he who had planned the use and testing of the ion motor—the operation of which had built up such a fantastic velocity that the ship couldn't get back. At least, it shouldn't by all the laws of probability. But then—

"I don't know, Billy," Sir George answered slowly. "To be honest, I haven't much hope, but then you know this incredible team as well as I do. I hesitate to say that anything is impossible for them. So maybe I still have a faint glimmer of hope left."

"You're still listening for them?"

"Of course. Every large radio telescope in the world is taking its turn in keeping a constant watch for even the slightest sound from them. So far we haven't heard a thing since they began to try to get the ship into orbit," Sir George told his friend.

"And we know what the chances were of their succeeding," sighed Mr. Gillanders. "Almost—but not quite nil."

"Don't give up hope yet, Billy," Benson said. "If Jupiter I did land on Io it may be several days yet before they can blast-off. We're going to keep listening for a month if necessary.

"All right. I'll try not to despair," the Australian replied with a wan smile, "but I feel so helpless. If only there was something we could do to help them!"

Sir George Benson was silent for a moment. Then he looked at his friend intently.

"You know, Billy, I think we may be able to do something. It's an idea I've been turning over in my mind for the last few hours."

Mr. Gillanders looked startled.

"Gosh! Benny," he exclaimed, "if you've had a brain storm, out with it! Anything will be better than just doing nothing."

It seemed as if Mr. Gillanders's question had made Sir George take a difficult decision. His face became determined and his eyes shone brightly. "I'm going to ask UNEXA to let me divert the Martian expedition," he declared.

"What, the one that set out ten days ago?"

"That's the one, and I'm determined to persuade them to let me do it!"

The expedition to which Sir George had referred was the third to the solar system's fourth planet. Some time ago the first Martian landing had been made by these same four young men whose lives were now in peril in the region of Jupiter. Chris and his crew, after shattering adventures, had returned to report the discovery of ancient buildings left by a long-vanished race. The buildings had..been buried for countless centuries by the drifting sands on the dying planet.

A second and larger expedition had been sent a little later, and this had been responsible for further discoveries about the ancient civilization that had once peopled the Red Planet. Now a third ship was on its way, carrying a crew whose task it would be to try to find out about the remarkable technical achievements of the defunct Martians. It was this expedition that Sir George Benson planned to divert to the assistance of Jupiter I.

But would the United Nations Exploration Agency agree

to calling off this project, in which so much money had been invested and which held such exciting prospects? Would it sanction its Director's plan to send the Mars III careering through space on a vague attempt to help the Jupiter crew? Would the lives of four young men be as important as the vast amount of information the expedition would bring back from the ancient planet?

"If only we knew they were still alive and could use the help, UNEXA might agree," Mr. Gillanders said doubtfully. "I don't think it will, otherwise."

Sir George knew there was a lot of sense in what the Australian said. So much had been anticipated from the Martian expedition, so much knowledge could be gleaned from the remains of the planet's incredibly advanced civilization that he knew the scales would be heavily weighted. Still—he could only try. And if he failed he could always offer his resignation.

"I'm off to New York," Benson said briefly, and within the hour he was aboard a plane speeding north.

It was the next day before the delegates making up the United Nations "Exploration Agency could be gathered together. Meanwhile Sir George had spent a harrowing time waiting for some news of Chris and his friends. Not a sound had come from Jupiter I, and with every hour that passed Benson had to fight harder to keep his hopes alive. When at last the meeting began his face was showing signs of strain.

While the delegates—mainly scientists with a sprinkling of politicians—listened politely, the Director gave them an up-to-date account of what had happened. Many already knew of the spaceship's trouble. Sir George was careful to emphasize that the crew found themselves in such a precarious position simply because they had carried out the program arranged. The mysterious force which had drawn them to the giant planet was totally unexpected and the Agency must accept responsibility for the crew's predicament.

"I ask the delegates to agree to the diversion of the Martian expedition if I believe it can be of assistance to the unfortunate crew of Jupiter I," Sir George concluded.

There was an outburst of protest as soon as he resumed his seat. Did he seriously propose that all the time and money behind Mars III should be wasted? How could the crew of the Mars rocket help the Jupiter spaceship? And even if it could, would it be justified? As an eminent scientist himself, Sir George must know of the stupendous possibilities if only a small fraction of Martian science could be revealed. Was this to be sacrificed for the remote chance that the Jupiter crew could be helped? Even if it meant that four lives could be saved, what was this compared with the untold benefits that could arise if the secrets of Mars could be revealed?

With an effort Sir George allowed delegate after delegate to have his say. At last there seemed a lull in the spate of arguments against granting his request. The Director rose to his feet again.

"Gentlemen," he began, "you shock me. Since when has human life become of such little worth? Did not this vast Organization of the United Nations come into existence to prevent war, save life and alleviate suffering? Since when have we counted the cost of a rescue operation? Do accountants prepare a balance sheet before a lifeboat puts to sea? Are we concerned with money when an air—sea search is looking for a plane down in the ocean? If miners are trapped do we count the cost of lost production? In a mountain rescue do we add up the wages of the rescue team?

"Gentlemen, you know the answer is the same to all these questions. I am only asking for the same consideration for the four brave young men who are now in such dire peril."

"Does the Director seriously think that the present case has any parallel?" asked a bearded scientist from one of the Arab countries. "If we call off the expedition to Mars we are throwing away the opportunity to learn the lessons of thousands of years. Who can tell what thousands, perhaps

millions, of lives could be saved if we could only glimpse the medical knowledge of the doctors of Mars? Can We sacrifice all this, and much more, because there may be a slight chance to rescue the crew of Jupiter I?"

Sir*George Benson could feel himself trembling, so great was his anger and disgust. Yet he knew he must present his case calmly, or it would most certainly be lost.

"Another Martian expedition can be despatched in less than six months' time," he informed the delegates. "We shall not lose the knowledge that is concealed beneath the Martian sands. It has been there for half a million years. It will wait for just half a year longer. Diversion of Mars III will mean a small delay, which is negligible, and the cost of another expedition. Is it the latter that's worrying you, gentlemen?"

"Benson, you know better than anyone how much has been put into this Martian expedition," a delegate from Germany said. "You know that it is the most important thing the Agency has attempted. How can you ask that the whole project be scrapped in favor of the remote possibility of saving the Jupiter I crew?"

"It has always been the policy of this Agency to help its astronauts as much as is humanly possible," Sir George answered doggedly. "The knowledge that this is so is a great boost to men on these hazardous voyages. If we abandon these four young men to their fate we shall lose the confidence of every astronaut in our service. None of them expects the Agency to do the impossible, but they do expect that we will not let them down."

"But just think of the difficulties. Jupiter I is farther away from the Earth than any ship has ever been. Mars III is not equipped for a rescue operation," Professor Boronoff, the Russian, pointed out.

"Mars III has the fuel and stores sufficient for it to reach the orbit of Jupiter," Benson persisted, "and both crews are trained in transfer technique. If the ships can get within a few miles of each other crewmen can move from one ship to

another as necessary."

"I do not think you are justified in wasting so much effort on such a problematical venture," Professor Boronoff retorted. "I move that the Director's request be refused."

"Wait a minute, gentlemen," Sir George said desperately. "I've kept my strongest argument till last. Of course if I thought the rescue attempt was useless, I wouldn't risk the Mars III crew, but what I want to say is this. Have you forgotten the grey mould from Venus? Don't you remember that all life on Earth was threatened? Can't you recall who saved you, and me, and everyone else? It was these same four young men whom you propose to write off. Is that how you mean to repay them? Had it not been for their courage and skill there would have been no Martian expedition, no United Nations, and none of you. Do I try to rescue these four—or don't I?"

There was an uncomfortable silence as the Director, arms folded, sat down. Several delegates whispered together. Others cleared their throats audibly. Some scribbled on the writing pads before them. None met the stern gaze of Sir George as he looked around challengingly.

"Well, gentlemen?" he barked.

The Russian rose to his feet.

"We take your point, Director," he said. "If this Agency agrees to give you a free hand, will you undertake not to divert Mars III unless you are certain it can do some good?"

"I can't promise that, Professor," Benson answered, "for how can I be certain what difficulties will be encountered out in space? What I can do is to give my promise that I will not risk the lives of the Mars crew if Godfrey and his companions do not need help or are beyond help."

"That's reasonable," an American said. "I propose that we give the Director free hand."

A vote was taken and every delegate—some slowly raised his right hand in assent.

"Thank you, gentlemen," Sir George said quietly as he rose to leave. "You have restored my faith in my fellow men."

"Did you manage it?" Mr. Gillanders asked eagerly as his chief stepped out of the plane.

"Yes, but more of that later. Any news?" Sir George asked, his voice sharp with anxiety.

"Afraid not," the Australian admitted reluctantly. "We still haven't picked up a sound. What are their chances, Benny?"

"It depends on so many things," Benson sighed. "Whether they managed to get into orbit, whether they landed, whether the ship was damaged—and so on. I just can't tell, Billy, and there's no way of finding out except just to keep on listening."

"What are you going to do now?"

"I'd like a word with Rosenberg. Can you let him know?" Benson asked.

"At once," Gillanders answered, and as the Director made his way to his own office, the Australian went to look for Dr. Rosenberg, a Deputy Director who was in charge of the Mars expedition.

Back in his own familiar surroundings in the fabulous rocket base of Cape Kennedy, Sir George sank into the uncomfortable chair he'd never bothered to change. A battery of phones were the only things on his desk, although the office walls were completely covered with graphs and charts. Knowing it was hopeless, Benson nevertheless picked up one of the phones and flicked a switch.

"Anything?" he asked tersely.

He put the receiver back after the negative reply and spent the next few minutes leaning back in his chair, deep in thought. A knock on the door recalled him to his surroundings.

"Come in," he said, and Dr. Carl Rosenberg, one of

America's foremost rocket scientists, entered his chief's office. The two men exchanged cordial greetings.

As a general rule Benson gave his deputy a fairly free hand. Though his was the overall responsibility, Benson had allowed Rosenberg to plan and execute the journey to Mars. He had always found it worked out better to let his assistants carry out their assignments with a minimum of interference from him.

"Sit down, Carl," the Director said, indicating one of the spare chairs. "How's Mars III going?"

Rosenberg launched into an enthusiastic account of the near-perfect flight of his rocket and of the satisfactory reports from the crew. He went on to confirm that everything was going according to plan, and that he anticipated making the landing as scheduled in another six days' time.

The Director waited for him to finish and nodded his approval. Then he spoke.

"Carl," he said, "I have a shock for you. I may divert Mars III and send it on a rescue mission after Jupiter I."

15

Morrey was on duty when the first streaks of light began to appear. Within a short time Io had moved completely out of the planet's shadow and the crew, who had been resting in turn, were able to resume the task of getting their ship into a take-off position.

"Did you get the time?" Chris asked.

"Yes. I noted the exact moment the sun peeped around Jupiter," Morrey replied. "Here it is."

"Good. That means that the ship must blast-off" in forty-one and a half hours from now," Chris answered. "Shall we go outside and carry on?"

It was essential that no time should be lost in freeing the ship from the clutches of the two pinnacles. If they failed to get ready for the launching in the time allowed it would mean that another night must pass before Io would be in a suitable position. And that would mean that more oxygen would be used. It would also mean more demands on the batteries, and these were already very low. At such a distance from the sun the solar cells could produce only fifty per cent of the normal current, while no electricity at all was generated during darkness.

Chris watched his companions fixing their helmets and oxygen packs. A curious tightness gripped his heart. If he carried out his plan this would be the last time he'd see his friends except through their facepieces.

"Ropes ready?" Morrey's voice was asking over the radio as Chris joined the others outside the ship. Tony produced the coils of strong nylon cord which they were to fix to the ship. As he was the lightest of the four, it was Tony's job to

clamber over the rocket and tie the ropes to the steel rings set at intervals in the outer casing. It was a tricky job, for they had no means of knowing just how firmly Jupiter I was wedged. It was essential to avoid dislodging the rocket prematurely, so Tony had to move with extreme caution. But at last the job was done.

"Whew!" breathed Morrey as Tony made his way to the ground. "I thought there for a moment that it had slipped."

"Yes, I felt it move," Tony agreed, "but it's all right now."

The jacks were placed in position, and while Chris, Morrey and Serge hung on to the nylon ropes, Tony began to work the jacks, moving the rocket a fraction of an inch at a time. A bad moment came when one of the jacks slipped and the rocket was in danger of crashing to the ground. Only the utmost exertion of the three on the ropes held the ship steady while Tony replaced the jack.

Long before Jupiter I was back on an even keel the crew were aching with fatigue. Rest was impossible, for there was always the danger that the ship would slip back. With muscles straining to the utmost Chris, Morrey and Serge hung grimly on to the ropes while Tony continued his delicate work with the jacks.

"It should right itself any minute now," Morrey's voice gasped over the radio. The others were too weary to talk. Inside the helmets their faces were streaming with perspiration. They couldn't carry on much longer and they were using vast quantities of oxygen.

"Careful now," Tony's voice warned, and the crew members literally held their breaths as the last vital movement was made. Then, suddenly, Jupiter I moved. For a few agonizing seconds it stood poised—and then settled firmly on its base. The crew were too exhausted to cheer as they sank wearily to the ground.

"Come on," Chris urged, "there's a lot to do before darkness comes again."

Tony spent some hours welding more patches on the outer

casing. Morrey wondered why it was necessary, but Chris insisted that it would be just their luck for a meteorite to strike in a spot where the inner casing was exposed. While Tony was working outside, Chris, Serge and Morrey had the heartbreaking task of carrying away all the equipment they were going to discard. Most of it they stacked at the edge of the clearing they had made around the ship. They wouldn't risk carrying it into the forest of pinnacles beyond. Only when all their work was done would Chris agree to a rest period.

Gratefully they climbed back into the cabin—now at its correct angle—sealed the hatch, released the oxygen and removed their helmets.

"Thank goodness for that," Morrey breathed as they rested on the cabin floor. "I thought it was all over when she nearly slipped."

"But she didn't," Tony pointed out proudly, "and now Jupiter I is all set ready to take us back to good old Earth. That'll be great, won't it, Chris?"

"Er—yes," the leader said with a momentary hesitation. How could they know what his thoughts were at that moment?

"Refreshments all around, I think," Serge said, pulling himself up and going towards the meager remains of their stores.

"Not for me, thanks," Chris said, and added hastily as the others looked at him in surprise, "I just don't feel like it at the moment."

Not much point in consuming valuable food, Chris thought. The others will want every ounce.

"Are we all set?" asked Morrey.

"Well, the outer casing looks like a patchwork quilt, but I think it should manage," Tony laughed.

"The ship's in the right position. There's nothing more to do outside, is there, Chris?" Serge enquired.

“No, I don't think so. Maybe I’ll have a quick look around just before we blast-off, but for now I think all we can do is wait.”

“We couldn’t do much outside even if we wanted to,” Morrey informed them. “It’s dark already.”

As the crew had been talking, darkness had fallen with its usual speed. Io was passing into the shadow of the giant planet, carrying them, they hoped, out of the sunlight for the last time. In a few brief hours they would leave this dead little world and be on their way home, bathed all the way in the light of the glorious sun.

“The firing switch must be pressed at exactly eleven forty,” Chris said, and they were all so excited at the prospect of returning that they saw nothing strange in their leader’s telling them to do something he always did himself.

“Better all get some sleep,” Chris suggested. “Sorry about the couches, but it wouldn’t be much consolation to have them if the ship wouldn’t lift, would it?”

“We’ll manage,” grinned Tony. “You going to get down as well?”

“In a minute. There are one or two things I must do first,” Chris answered, trying to speak lightly.

While the other three were making themselves as comfortable as possible on the cabin floor, Chris wandered around the few remaining instruments to confirm that everything was ready for the blast-off. Yes, it seemed that the only thing left was to press the firing switch. Pray God there was sufficient fuel left in the tanks to give the ship its escape velocity! If not, Jupiter I would fall back on to the satellite and all further hope of escape would be gone.

Now the problem was how to get out of the rocket without arousing the suspicion of his friends. They would have to be awake, of course, because they would have to wear helmets while he opened the cabin door. A few minutes before launch time he would make some excuse to inspect the ship from outside. Even if they discovered he was not coming back

there wouldn't be time to do anything before the ship was due to take off.

Chris looked at his three sleeping companions affectionately. Many times it had seemed that they must be parted. Now there could be no doubt. It was final and inevitable. If only he could be sure that his friends would reach Earth safely his own fate would be of less consequence. Had any of them known how precarious were their chances of survival Chris was certain each would have tried to do what he was doing now. Chris smiled slightly to himself as he thought of how he had kept this knowledge from them. Perhaps they would forgive him once they were safely home.

Time passed slowly. Chris was tired, but he would not let himself sleep for fear he would sleep too long. And, after all, what did it matter how tired he was?

Ought he to write a note to his three friends? No, that would be too melodramatic, and Chris hated anything that savored of heavy drama. He could say "goodbye" to them over his radio after he had left the ship. And to his friends on Earth?

Chris shook himself. No use getting morbid. What he was about to do was of his own free will and would be done gladly. But he would be thankful when it was all over. His one wish was that his plan would go smoothly without any trouble from the others. It wouldn't be long now. In a few minutes he must rouse them to put on their helmets since the cabin would be emptied of oxygen in order for him to go outside.

One by one he gently shook his friends back into wakefulness.

"Time to be off yet?" yawned Morrey.

"In about twenty minutes," Chris answered evenly. "Will you put your helmets on now. I want to have a last look around outside to see if everything is all right."

"I'll come with you," Serge volunteered as they obeyed their leader's request and began putting on their helmets.

"No, you stay here, Serge," Chris said a trifle more sharply than he had intended. It wouldn't do for the Russian to accompany him. That would spoil things altogether.

"Just as you say," Serge answered, a little mystified by his leader's tone.

"Ready?" Chris asked over his radio, and the other three all answered, "Yes."

"Start the pump then, Tony."

"Don't be long, Chris," Morrey called out as the hatch was opened. "You mustn't miss the bus."

Chris couldn't trust himself to answer.

"Hey! Oughtn't you to be coming back now, Chris?" Morrey called out ten minutes later. Though their leader was outside they could speak to him through their helmets as if he were waiting with them in the cabin. "Is everything all right? We blast-off in ten minutes, you know."

Meanwhile Chris had clambered down the ladder and with the help of an electric torch had taken a look around the ship. Jupiter I stood poised ready for its long journey back to Earth. There were no obstructions, and there seemed no reason why it shouldn't be a perfect lift-off. Then he hesitated. It would be so easy to return to the ship and take his chance with the others. But he mustn't weaken. Such action would only reduce to zero the already slim chance his companions had. He braced himself and strode out towards the forest of stone.

At most points around the edge of the clearing the crew had made, the pinnacles were too close together for him to squeeze through even if he could avoid their razor edges. Not that he cared whether or not his space suit was cut. That would be a quick end, but it would also mean that he would be discovered by his friends and no doubt they would carry him back to the ship. Better for him to get hopelessly lost in that maze of dragons' teeth.

He had almost circled the clearing when he found one place where he could squeeze through comfortably. Deliberately he stepped through the gap, and then saw another opening ahead. This he followed and by good luck found several more. By now he had lost sight of the rocket. Should he not tell his friends now to seal the hatch and prepare to take off without him? Perhaps he'd better penetrate a little farther into the jungle in case they might have some crazy notion of trying to force him back.

Chris went several more yards deeper into the maze, and as he was squeezing past a particularly fearsome brace of pinnacles he heard Morrey's voice. So they were starting to get alarmed, were they? He'd better break it to them now that he was not returning to the ship, and that they must leave him behind.

"Chris, are you all right?"

Morrey's voice was a little anxious now. Time must be running short. It would be unfair to keep his friends in suspense any longer. Unless they prepared now to blast, they would overrun the launch time.

"Serge, Tony, Morrey," Chris said, trying desperately to clear the choking feeling he felt in his throat, "The ship's position is fine. It should lift off smoothly. But"—and here he nearly broke down—"I'm not coming back with you!"

He heard the startled gasps of his friends quite plainly over the radio, and before they could recover sufficiently to speak, he hurried on with his message.

"I'm not coming back, because with my weight and with my consumption of oxygen and food, you'll never make it. I'm sorry I couldn't tell you this before, but I knew what you'd do if I did. So—I'm giving you all my last orders. Seal the hatch and prepare to blast."

16

To say that the three crew members left in the cabin were staggered would be the greatest understatement of all time. Had they heard him correctly? Had Chris really said he wasn't coming back to the ship and that they must return to Earth without him? This wasn't a bad joke, was it?

"Chris!" burst out Serge, who recovered first. "You can't mean that. Come back to the ship at once."

"Sorry, Serge," Chris's voice came back. "My mind is made up. You must all three be very sensible about this. Jupiter I hasn't enough fuel or oxygen to carry four of us back to Earth. But it can take three. Don't waste any more time, but get on with your preparations to blast-off."

"Don't be crazy, Chris," spluttered Morrey. "I'm coming outside to bring you back even if I have to carry you over my shoulder."

"It's no use, Morrey," their leader's voice answered patiently. "You won't find me. I'm out among the pinnacles and you could never track me down."

"Chris!" Tony cried out in distress. "You can't do this to us. You know well enough we won't leave without you."

"You have no choice," Chris answered. "Whatever you do, I'm not coming back to the ship. As your leader I order you to prepare to blast."

"Nothing doing," Morrey replied doggedly. "Either you come with us or we all stay."

"I—I appreciate how you feel," Chris's voice came back with a tremor, "but you must obey my order. Besides—it's your duty to return to Earth with all the information and experience we've gained from this expedition."

“Listen to me, Chris,” Serge said patiently. “If it’s as you say and one of us must remain behind, you’re the last person who should desert the ship. You have a duty, too, you know. You’re the one above all others who should go back to Earth and report.”

As he was speaking he felt his arm grasped by Morrey. The American gave a sign indicating that he and Tony were going after Chris. Serge signaled his comprehension and agreement. It was unthinkable that they should let their leader make this sacrifice for them.

“No. This is my decision,” the voice of Chris came back. “I’ve no doubt that if any of you had known the facts that I did, you would have tried to do the same thing.”

Morrey and Tony had scrambled down the ladder into the clearing. Not a glimmer of light could be seen to indicate where Chris might be. Their own torches would have to be used very carefully to avoid warning him that they were searching for him. Thanks to their radios they could speak to both Chris and Serge as if they were still in the cabin. At all costs they mustn’t let Chris know they were after him.

“Come back into the cabin, Chris,” Morrey said artfully. “Let’s talk this thing over.”

“It’s no use, Morrey,” Chris’s voice answered. “You stay where you are and be sure you blast-off on time.”

Carefully keeping the torch beam on the ground, Tony and Morrey tried to make out where Chris could have gone. From the faintly reflected light they could make out the impenetrable circle of pinnacles. It was impossible for him to have squeezed in between them. As they talked they slowly circled the clearing, looking for a likely gap.

“Chris,” Tony said, to keep up the illusion that they were all three together in the cabin, “what shall we say to Sir George? He’ll blame us for letting you do this.”

“Nonsense. He’ll understand. Just you get back, that’s all,” Chris answered.

Morrey stopped. He'd spotted the place where Chris must have gone through. Holding Tony's arm, he stepped through. By straining his eyes he could just make out the further gap and they squeezed through carefully. There couldn't be many more such spaces between the thick cluster of sharp rocks, so Chris couldn't be far ahead. How could they carry on without letting him see the light of the torch? Then Morrey had an idea.

"All right, Chris," he said. "You win. We're closing the hatch now and we shall be switching on in five minutes."

He hoped that Tony, and Serge back in the cabin, would understand his plot. They did.

"Good-bye, Chris—and thanks," said Serge.

"Good-bye, chaps, and good luck," Chris answered with a catch in his voice. "And thanks for being sensible."

"Good—bye, Chris," Tony called, trying to sound resigned.

"Hatch closed now," Serge announced. "We're all in position for blasting."

Would Morrey's plot succeed? Now that he believed Jupiter I was about to take off, would Chris reveal himself? Morrey switched off his torch, and he and Tony waited breathlessly, straining to peer into the darkness for a sign of their friend.

Chris breathed a sigh of relief when he heard that his three friends were obeying his last orders. It was hard to resist their pleas to remain together. If he hadn't been sure that his action was giving them a chance to live, he would have preferred to be with them to the end. As it was he was glad they were letting him make his sacrifice without any painful scenes.

He thought that he could edge forward a little to watch the rocket lift off, though he dared not venture into the clearing. Shining the torch in front of him to pick out the way he'd come, Chris worked his way forward towards the clearing where the ship stood poised. He'd stop just a few pinnacles

away so that he could get a glimpse of the rocket as it sped into the sky. It shouldn't be many seconds now. Without doubt his friends would be watching the cabin clock waiting for the critical moment to arrive. The torch shone ahead and he moved forward.

Then Morrey and Tony attacked. Morrey seized Chris around the chest, and a sharp struggle followed, with the combatants oblivious of the menacing teeth. Suddenly Chris collapsed, for Tony had cut off his oxygen supply and rendered him unconscious. Quickly and carefully they carried him the last few paces into the clearing, where Serge was waiting to assist them up the ladder. Ten minutes later, as dawn was breaking over Io, Jupiter I shuddered and strained as its motor fought to lift it from the rocky surface.

Inside the cabin four still figures lay on the bare floor. Chris was still unconscious, though his helmet had been removed and he was breathing the free oxygen in the cabin. It wouldn't be long before he came around. Morrey, Serge and Tony waited anxiously. Would Jupiter I make it—or would it fall back, its fuel exhausted, on to the cruel teeth of the barren satellite?

Then the crew let out a sigh of relief as they felt their ship slowly pick up speed. Every second that passed increased their chances of escape. Every few miles added to their velocity improved the prospects of a return to Earth. But just as they thought they were out of danger, the pressure of the cabin floor ceased. The motor had cut out. All the fuel had gone!

"Quick. The ion motor!" gasped Morrey.

Serge and Tony hurled themselves across to the controls to start up the weak atomic thrust. A few seconds lost might mean disaster. Desperately they worked the switches, and the ion motor came to life. All three watched the altimeter dial with bated breath as, with tantalizing slowness, the needle crept on.

"We've done it!" Morrey breathed at last. "We're on our

way."

"What's happened?"

Chris had opened his eyes and gazed around the cabin blankly. Morrey turned from watching the dial.

"Don't worry, Chris. We're taking you back to Earth with us.

For a moment Chris's eyes remained blank and uncomprehending. Then he tried to sit up, but was gently, but firmly, pushed back by Tony.

"You prize fools!" he spluttered. "You've ruined everything! Why did you do it?"

It was Serge who answered for all of them.

"Get this into your head, Chris," he said quietly. "We weren't going back without you. Oh—I know you're going to say that now we have you on board none of us will return. That's a chance we are all prepared to take. If we don't make it, then we'd rather all four of us be together at the end."

"But your duty!" Chris stormed. "It was your plain duty to try to get back with all the data we have. Now everything will be lost and the expedition wasted."

"You know that isn't true, Chris," Morrey joined in cheerfully. "Already we've sent Sir George loads of 'gen'. And there's no reason why we shouldn't send piles more once we can re-establish radio contact—even if we can't take it all the way ourselves."

"Chris, have you thought how we'd feel if we'd gone without you?" Tony asked. "We'd all have felt like murderers, deliberately leaving you behind to die on Io. It's better this way, Chris. It's all or none."

"Well, you've done it now," Chris said wearily. "I don't know how long we shall last, so we'd better try the radio."

"Sorry we had to treat you a bit roughly," apologized Morrey. "If we hadn't made you pass out by cutting your oxygen, we wouldn't have been able to get you aboard. We

couldn't knock you out because of your helmet. Hope you don't feel too bad now."

"No," Chris answered, "Just a slight singing in my ears. I was a fool to walk into your trap."

"No good grousing now," Morrey pointed out, "you can't do anything about that. We're on our way and traveling at seventy thousand miles an hour."

"Seventy thousand?" queried Chris. "Oh, of course. That includes the forty-seven thousand velocity of Io. It should get us back to Earth in just over a year—if we can live without breathing for that long."

There was an awkward silence in the cabin. Sooner or later they would have to think about the end.

"Let's try the radio," Morrey suggested, anxious to divert their thoughts. "We may be able to get through now."

"Warm up the set, Tony," Chris said. "Let's hope they can pick us up at the Cape against the background radiation from Jupiter. Oh, did any of you notice the exact time of our blast-off? It should have been twenty minutes before dawn, remember?"

The others had to confess that they hadn't noted the precise time.

"We—er—had other things to do," Tony explained, thinking of how they had had to handle their leader. "I believe we fired the motor just as the sun was rising."

"That will give us the time to within a couple of minutes. Still—you realize, don't you, that were well off course. Control told us to take off when Io was in the right position to set us on the correct trajectory. Being twenty minutes or so late we shall be about three degrees off course. Not that it really matters now," Chris said coolly.

Morrey and Serge glanced at each other. So Chris was still resentful that they had prevented his sacrifice. The sooner he got over it, the better. It would be awful if they had to spend their remaining days with Chris so angry.

“Chris,” Morrey said, going over to his leader, “answer me this question. If I’d planned to make you leave me behind what would you have done?”

The two looked at each other squarely. Gradually Chris’s eyes softened. There was only one way he could answer his friends question, and they all knew it.

“Sorry, fellows,” he said uncomfortably, “I’ve been a bit sore over things, but let’s forget it now, shall we? Besides,” he concluded with a forced smile, “anger makes one consume more oxygen.”

It was a great relief to all four that they were united once more. Never, during all the long years of friendship, had there been any serious disagreement among them. To have had a rift between Chris and the rest would have been tragic at this time. Their reaction showed the tension they had felt. The four shook each others hands and began laughing and talking at once.

“What about that radio message?” Chris asked at last. “Is the set ready?”

On being assured that it was, Chris began to think of what he should say. First he must tell the Cape that, though they had managed to take off from Io in the approximate direction of Earth, they would be about three degrees off course because of the delay in blasting. This information should allow the giant radio telescopes to follow their path more easily.

Then he’d have to report that there was no possibility of their return to Earth because of the exhaustion of chemical fuel and the limited supply of oxygen. Therefore, he would tell Sir George, they proposed to broadcast every scrap of information they had collected for the benefit of any expedition that might follow. They would start this as soon as their signal had been acknowledged from Earth, so that the task would be completed before their supplies ran out.

After he’d scribbled a few notes on his pad, Chris took the microphone and began speaking into it slowly and distinctly.

Would they hear his words back on Earth? It would take two hours to get a reply. All he could do was to repeat the message at intervals, hoping that, as they gradually moved away from the giant planet, the radio telescopes of Earth would be able to distinguish the ship's signal.

For five minutes Chris spoke. Then he handed the microphone back to Tony.

"We can only wait and hope," he said. "Meanwhile we'll repeat the broadcast every half-hour until we get a reply."

It was a very difficult time waiting for their call to reach Earth and for any answer to come speeding back. For two hours they must be as patient as possible, doing what jobs they could about the cabin. Because all but the most essential instruments had been removed in the desperate effort to lighten the ship, there were few observations they could make. Even parts of the telescope had been discarded, so they were unable to use it.

"Perhaps we'd better take an inventory of our supplies," Chris said as they waited with what patience they could.

"Then we can start rationing ourselves. Not that anything we can do can make them last long enough, but we may be able to keep going until we've given Control all the information we can."

Each of the crew was grateful for having a definite job to do. Breaking off only to repeat the broadcast, they checked every item of food, drink and oxygen that the ship carried. Chris examined the list and did some rough calculations.

"We have enough gas to last us twenty-one days," he announced. "The food will give out before then, but We can stretch that a bit. So it looks as if we can carry on for another three weeks."

"And how long will it take the ship to get back?" asked Serge quietly.

Another period of rapid calculation followed.

17

"Allowing for the continued thrust of the ion motor, and assuming we could bring the ship back on course, it will take sixty-four days to reach Earth," Chris answered.

A long silence followed.

Janet Lindsay had been at Jodrell Bank, the radio astronomy station, for six months. Officially she was working on a thesis for her Ph.D., but every spare moment was spent in the control room of the giant instrument that could be seen outside. Because a number of the regular staff were on holiday, Janet had succeeded in being drafted for duty on the radio telescope. Being the very junior *junior*, and being "temporary staff" as well, she'd been given the dull and uninteresting job of routine watch.

Tonight the huge dish was turned towards the planet Jupiter, for it was Jodrell Bank's turn to keep the forlorn search going for the missing astronauts. During the day the telescope had been engaged on the exciting search for a new and powerful source of radiation that seemed to be coming from the direction of the Andromeda nebula. Now Janet was left to listen for anything unusual that might come from the region of the giant planet.

As the hours passed she found her thoughts wandering. How she would have loved to touch the controls that would send the huge saucer of steel probing across the sky. What fascinating mysteries still remained to be solved among the myriads of universes that littered the heavens! However, her instructions were explicit. All she had to do was to listen and record anything unusual while the telescope automatically followed its objective across the night sky.

To stretch her legs Janet wandered about the control

room, looking at the masses of instruments peeping from gray painted metal panels. She knew the use of only a fraction of them, but every day she was learning more. She had to concentrate on two only. They were called oscillographs and recorded the radio noise from Jupiter. One was like a television tube on which a point of light danced up and down. The other was steadily turning out a roll of paper on which a pen had scribbled some zig-zag lines. An expert could tell if there was anything unusual coming in by watching the dancing light and by studying the lines on the paper roll. But even experts admitted that there was no instrument as sensitive as the human ear for detecting changes of sound.

Janet returned to a table and slipped on a set of headphones. She could hear the crackle of noise that was the voice of Jupiter. It was the same as she had heard for hour after hour. What was the giant planet trying to say? she wondered. Would Man ever be able to understand those strange noises she was listening to now? She leaned back in the comfortable chair. How easy it would have been to go to sleep.

On the table were three telephones, but Janet was concerned with only one of them. This was the direct line to the home of Sir William Evans, Professor of Radio Astronomy at Manchester University and Director of the radio observatory. Her instructions were to call Sir Bill, as he was secretly called by everyone, if she should hear anything unusual. Of course it had been hinted darkly that a false alarm wouldn't be received very kindly. Not even an enthusiast like the Professor enjoys being fetched out of a warm bed for nothing. Janet's feelings were mixed. She'd love to hear a change in the radio noise, but she'd be scared to disturb Sir Bill.

She took out the knitting from her hold-all. She couldn't feel much interest in it just then, but it was something to do, and, with needles clicking, she stretched her legs forward and concentrated on the pattern. In the headphones the voice of Jupiter rumbled on, and Janet paid little attention to

it.

Then she heard it—at least she thought she had. A slightly different sound was coming to her and it distracted her from her knitting so that she dropped a stitch. What was it? It was faint and it was almost drowned" by the noise of the planet's normal radiation. Before she could collect her thoughts the sound had gone. She felt her heart racing. Instinct told her she was on to something. Could these unusual noises be the sound of a human voice?

She was about to remove the headphones so that she could walk across and inspect the slowly moving roll of paper for any unusual trace when she heard it again. Yes, she was almost sure it was a voice. Could it be the missing astronauts? This time Janet had no thought of taking off the headphones. She might miss just that sound that would settle her doubts.

What would she do if she believed she'd heard the sound all the world had been listening for? Phone Sir Bill, of course. But she'd have to be very sure before she disturbed the great man's slumbers. She knew he'd been working long hours and wouldn't take kindly to the intrusion of the telephone merely on the ground of feminine intuition. Oh, why wouldn't it come again? The tension she felt was increasing as she concentrated all her will power in an effort to hear if that faint sound had indeed been a human voice.

As the seconds ticked by and Janet heard only the Jovian rumblings, doubt began to enter her mind. Had she fallen asleep momentarily and dreamt she'd heard what she wanted to hear? The paper roll would show, but she dare not abandon her concentrated listening even for a moment. Had she imagined a different sound? Had her ears been playing tricks with her? The knitting had fallen to the floor unheeded. The girl prayed for the sound to come again.

There it was! If her heart had been racing before it was beating away in double quick time now. It was undoubtedly a human voice she'd heard, distorted and almost submerged by the planet's broadcasts, but still recognizable. She tore off

the headphones and raced across to the oscillograph. Even to her inexperienced eye there was a change in the shape of the wavering line. So she hadn't imagined things. She must call Sir Bill.

Janet's hand was trembling as she reached for the telephone and she hesitated for a moment before lifting the instrument. With a grimace of determination she picked it up and she knew that at that instant the bedside phone at Sir Bill's house, two miles away, would begin to buzz. She waited breathlessly to hear his voice.

"What is it?" a voice grunted. Sir Bill was a heavy sleeper.

"Oh—er—sir, I've got something. I'm sure it was a voice," the girl burst out, "and the trace shows something too."

"Did you record it?" Evans asked.

"No. I'm afraid I never thought of it," Janet answered, aghast.

"Jumping tomcats, girl, isn't that the first thing you were told to do?"

"I'm—I'm sorry, sir," Janet gasped, "I'll switch the recorder on now. Will you be coming along, sir?"

"Yes, I'll come. But if this is a false alarm, you're in for it, young woman," Sir Bill snapped as he clamped down the receiver.

Janet could hardly return her own receiver to its stand, she was shaking so much. Her knees felt weak as she went across to the tape recorder and set it running. Suppose nothing else came through. The professor would have only her word for the unusual sounds she'd heard. True, the oscillograph record would confirm something out of the ordinary, but it wouldn't support her claim that she'd heard a human voice. She put on the headphones, praying that the sound would come again.

But it didn't. With growing despair Janet strained to hear it. Only the normal rumblings of Jupiter were coming through. Not a whisper, not a squeak from the missing

astronauts. Fifteen minutes after her telephone call, the door opened and Sir Bill stalked in.

"Well?" he demanded.

"I'm afraid there's nothing else come through, sir," Janet confessed, "but I'm certain it was someone speaking. Look at the roll, sir."

The professor walked over to where the endless length of paper churned out the oscillograph. Silently he ran a length of it through his fingers, studying the record carefully. He paused at one part and spent some minutes examining the trace.

"You see, there was something, sir," the girl pointed out desperately.

"Yes, but this doesn't mean it was a voice you heard," Sir Bill retorted. "A pity you didn't have the sense to switch on the recorder. Pass the headphones. I'll have a spell."

Janet handed them over, praying that the sounds she'd heard would be repeated. She knew that, though he hadn't said so, the professor believed that it was her imagination, or wishful thinking, that had ascribed to the novel sounds the quality of a human voice. He sat there silently, not very happy at having been disturbed at such an hour. At the end of ten minutes he removed the headphones.

"I'll get back to bed," he said shortly. "Next time you hear any of these 'voices' of yours, don't forget to switch on the recorder."

Janet's heart sank. She knew that Sir Bill was angry with her, although he was too polite to show it. Evidently he didn't believe her, and that hurt badly. If only he'd heard just a faint sound, she would be justified in having disturbed him. As Sir Bill, with a quick glance at the various instruments, made his way towards the door, Janet slipped on the headphones despondently. The professor had his hand on the door handle when she heard it again.

"Sir," she almost squealed, "I've got it again. Come and

listen, quickly."

Sir Bill paused irresolutely. He'd better settle this once and for all or the wretched girl would be dragging him out of bed all night long. He strode towards the table and took the proffered headphones, prepared to give Janet the length of his tongue for another false alarm.

But he didn't. As Sir Bill settled the phones on his head his face changed and he swallowed hard. Janet's heart leapt. So he'd heard it, too. Now, perhaps he'd believe her.

"I think you're right, Janet," the professor said, and the girl glowed at the use of her Christian name. "It certainly sounds like speech. Is the recorder on?"

"Yes, sir," Janet replied happily, "I have it running."

Sir Bill listened intently, his face puckered in the effort to concentrate on what he was hearing. In the end he was convinced. He whipped off the headphones and picked up another telephone.

"Get the staff to report at once," he barked to the station telephone operator. "Call those fellows in from the Venus job," he ordered Janet.

While she was hurrying from the main control room down a corridor to another smaller room where two men were doing some experiments with Venus, Sir Bill was twisting knobs and pressing switches in an attempt to bring in the sounds he heard more clearly. Within a few minutes other members of the observatory staff arrived and shared in the general air of excitement. The whole of the resources of the establishment were concentrated on picking up the Jupiter signals. Janet, now retired into the background, watched with pride the trained scientists at work trying to follow up her discovery.

Professor Sir Bill, visibly elated, grabbed a phone.

"Get me the Cape," he barked, "I want to speak to Sir George Benson."

The sounds from Jupiter had now been switched over to

the loudspeaker and could be heard all over the control room. In spite of the efforts of the staff, nothing like a human voice could be heard. Instead there was just the age-old chatter of the giant planet.

"Let's hear the recording," Sir Bill requested as he waited for his call to come through. The playback confirmed his opinion, and he jiggled the phone impatiently.

"Come on, come on," he muttered. The seconds ticked by.

"Benson?" Sir Bill said suddenly into the phone. "Evans of Jodrell Bank here. We've picked up something from the direction of Jupiter. Can't say exactly what it is yet, but it might be your missing crew. It's very faint and mixed up with the other noises, but it could be a message."

"Thank God!" breathed the voice at the other end of the line. "You've given me new hope. Do all you can, Bill, to pick it up. Even if you can't get the words it will confirm that Godfrey and his crew are still alive."

"I'll do my best. Seems as if it's coming through at intervals. One of our girls here"—Janet glowed at this reference to her—"picked it up just over a half an hour ago. We've got every gadget we possess on the job. Stand by, and I'll call you back later."

"Wait a bit, Bill," Sir George said urgently. "Can you beam something back to them? Ask them to try Morse. You may get that better."

"Will do," Evans answered. "It will take about ten minutes to switch over to transmission, but we'll do it and then switch back again. Stand by."

At the professor's request the men in the telescope's control room, now numbering twenty, busied themselves with the changeover. In slightly less than the time stated the giant dish of the radio telescope was ready to beam its message of hope across the millions of miles of space. Would it be picked up by the four young men at such a vast distance?

Thousands of miles away, at Cape Kennedy, Sir George Benson's face had changed. After the harrowing days that had passed, here was a faint gleam of hope. Could it be that Chris and his companions were still alive and trying to speak to him? If only he could be certain that Jodrell Bank wasn't mistaken he'd divert Mars III and take the consequences. Meanwhile he'd get Dr. Rosenberg along and warn him of the possibility.

The American in charge of the Mars expedition had joined his chief by the time Sir Bill came through again. Benson waved Dr. Rosenberg to another hand receiver.

"Evans here, George. We're just getting the signal again, but we still can't be sure. Hang on and I'll get you linked up.

The crackle and rumble of Jupiter came over those miles of wire as the Director and his deputy listened intently. Then, faintly, they heard the other sound that had given them so much hope. Was it someone speaking, or was it some trick at atmospherics? It would be too cruel if this were a false alarm. All they could do was to wait with what patience they could muster while Jodrell Bank's message winged its way towards the giant planet. Then they would see if it got a response.

18

In the cabin of Jupiter I a hard battle was being fought. It was the struggle against despair. With complete certainty the quartet knew that long before their ship had limped its way to Earth's orbit their supplies of oxygen and food would be exhausted—and they would all be dead, of course.

No wonder, then, that their cheerfulness was forced, that their light-hearted chatter wasn't natural. Still—it helped. Above all they must not let their thoughts dwell on what might, or might not, have happened if Chris had been left behind.

Promptly every thirty minutes Chris repeated his broadcast, but there was no way of knowing whether it was getting through to Earth. Two hours after the first message, the crew began to hope and listen for some response. If only they could be sure their messages would get home and the data they had collected would be of use. If only they could speak to someone—anyone—from Earth, then perhaps they could face the end with more courage.

There was little for them to do, for there were few instruments left in the cabin. Even if there had been more to occupy them they would have spent the time waiting for a return signal. Until the first two hours were up, they knew it was impossible to get a reply. But now that there had been time for their broadcast to reach Earth and for an answer to come back they felt compelled to listen for the slightest sound from home.

"Maybe they haven't heard us yet," Tony said hopefully. "Let's keep listening."

Half an hour later the four astronauts went almost crazy

with delight. Faintly over the loudspeaker had come a voice from home. It was the most wonderful sound they had ever heard.

"This is Jodrell Bank. Jodrell Bank calling Jupiter I," the voice said. "We are getting a signal on your wavelength and from your direction. It is too indistinct to understand. If you receive this message, will you acknowledge with Morse. Cape Kennedy has been informed."

"Yippee!" yelled Morrey. "Good old Jodrell."

"We can always rely on it," the delighted Chris agreed.

"Sir George will know we are still alive," observed Serge happily.

"Who's any good at Morse?" Tony laughed, knowing that he himself was the most proficient.

"What can we transmit the Morse with?" asked Chris, sobering down a little. "We haven't a buzzer or anything else that would do, as far as I know."

In answer the cabin was filled with a series of piercing whistles, some long, some short. They came from the lips of Tony, who took a secret pride in this skill.

"All right. I'm convinced," Chris laughed, putting his hands over his ears. "If Tony's ear-splitting blasts don't get through, we have nothing that will. Now let's see if we can draw up a condensed message to save Tony blowing out his front teeth."

With the help and advice of his companions Chris drew up a short, succinct message that explained their position and their proposal to transmit as much data as possible.

"Can you manage that?" Serge asked.

"Easily," Tony answered confidently. "Shall I start?"

"Yes," Chris agreed. "The sooner we let Control know how things stand, the better."

So Tony began the weird broadcast, translating the words Chris had written down into a series of his famous blasts. At

last it was over.

“There was hardly any need for a radio,” Morrey said, grinning.

“Can I have a drink of glucose? My throat feels like a layer of gravel,” Tony said modestly.

Tired and unshaven, Sir William Evans paced restlessly backwards and forwards among his beloved instruments. Outside, the sun was shining. The huge steel structure of the telescope, its bowl now pointing almost overhead, glinted in the bright light. The staff waited tensely. This delay in radiating over such vast distances was nerve-wracking. By now a reply should be coming in to the request to transmit in Morse—that is, if there really was someone trying to get a message through.

“Nothing?” Sir Bill asked for the hundredth time, and for the hundredth time the reply was the same. Nothing.

“Wait a bit, though. This might be it,” the man at the huge bank of instruments said quickly. He switched to loudspeaker and the sounds from Jupiter filled the room. Faintly, but distinctly, they could hear a series of long and short sounds. What they were made by, no one there could tell, but there was no doubt about it. It was Morse!

Sir Bill raced over to where one of the men was spelling out the message as it came in. He bent over the man’s shoulder and looked eagerly at the pad.

“Jupiter I calling Jodrell Bank,” the pencil had written. "Your message heard clearly. Our ship has taken off but is three degrees off course. Ion motor running. Velocity now one hundred and four thousand. Oxygen sufficient to last twenty days. Will therefore transmit as much data as possible while still functioning. Stand by for further messages.” That seemed to be all—but it was enough. Without any doubt, now, it was the crew of the Jupiter expedition that had made the broadcast. Sir Bill didn’t have to wait long before the voice of Sir George Benson answered

the phone.

"That clinches it, Carl," Benson said grimly to Dr. Rosenberg. He passed over the paper on which he'd written down the message from Chris and his friends. Rosenberg read it silently and then nodded.

"Okay, George. It's up to you," he agreed.

"Warn your fellows, will you, Carl?" Sir George said briskly. "I'll get a course worked out. Let me have the Mars III position as of one hour from now."

The Director strode off into the computer room, and while he was waiting for the information from Dr. Rosenberg, he had the position of Jupiter I calculated from the sparse information he'd received. Of course it was obvious that the crew would no longer be alive by the time the ship came close to Earth. Could the rescue team in Mars III reach them before their oxygen gave out? That was the burning question in Sir George's mind. It was no longer a. question of diverting the Mars expedition and the possible reaction of UNEXA if he did. He was going to send the Mars boys on their mission of mercy if there was even a remote chance of success.

Rosenberg came in with the information Benson had been waiting for. He passed it on to the computer operator, who punched it out on tape and fed it into the machine. Of course any answer could be only an approximation and would have to be refined in the light of more accurate details from Chris. Still, the answer the Director would receive in a few seconds would be sufficient to tell him if Mars III could rendezvous with Jupiter I.

It could—just.

Sir George studied the maneuver that the computer had worked out. It should bring the two ships together in twenty days—just about the time Jupiter I's oxygen would be finished.

"Will you see to it, Carl?" Benson instructed his deputy.

Mars III was a very large ship. It had to be, for there were no fewer than eight men aboard. Four of them were crewmen under the command of Captain Yuill, who hailed from Glasgow. The other four were scientists whose main concern would be the attempt to discover the secrets of the Red Planet. This was probably the largest and most expensive expedition ever launched. But then it was confidently expected that the dividends would be fabulous.

The ship was well on its way, and both the crew and the scientists were becoming more excited as their great adventure loomed nearer. As the ship sped on, gently urged by its ion motor, the eight men passed many hours discussing the results of the two previous expeditions, speculating on what they themselves might find. Special equipment was carried to perform the many tasks that would face the expedition. Included in the cargo was a "blaster", a special type of rocket that could be used for excavating one of the buried cities of Mars. The idea for the blaster had come from the first expedition, led by an astronaut named Godfrey. They had successfully used the blast from their rocket motor to remove the overburden covering the remains of the ancient Martian civilization.

"It must have been a wonderful moment when Godfrey found that Martian building," declared Captain Yuill enviously, "but I expect we'll make some staggering discoveries ourselves."

"I just can't wait to get there," Hyatt, one of the scientists, said. This was the general feeling aboard the good spaceship Mars III.

"Message from the Cape," Goldsmith the radio man interrupted. "Dr. Rosenberg is calling you, Captain. I've told him you will be waiting when his message comes through."

"How long to wait?" asked Captain Yuill.

"Another eight minutes," Goldsmith replied, giving the

interval before a signal could reach them from Earth.

"I wonder what he wants," Captain Yuill mused. "There's nothing wrong with our flight program."

The crew and the four scientists continued their discussion on what might happen after they had set up their base on Mars. Would they succeed in unraveling some of the mysteries found by their predecessors? How much technical data would they be able to take back to Earth on their return? What fantastic heights had Martian civilization achieved before its eventual decline?

Captain Yuill slipped on the headphones as his companions continued their discussion. In a few moments now he'd be receiving his chief, Dr. Rosenberg. His hand held a pencil poised over a notepad so that he could write down any instructions the Deputy Director might give him.

Suddenly the others in the cabin saw the captain stiffen. They knew that the message from the Cape must be coming through. He began to write furiously on the paper before him. There was something about his attitude that captured the attention of his companions. The discussion died away and they sat in silence watching him. At last he finished writing.

"Message received," Captain Yuill said into the microphone. "I will repeat."

Then, to the utter astonishment of the scientists and the rest of the crew, he read back from his notepad that, by order of the Director and with the concurrence of UNEXA, the expedition to Mars was canceled and the ship was to be diverted to render what assistance it could to Jupiter I. There followed a series of technical instructions to bring about a change of course.

"I am to report when the operation has been completed and to stand by for further orders," the captain concluded.

"What on earth's happened?" burst out Hyatt. "Is the expedition really off?"

“It’s monstrous that our plans should be scrapped,” another of the scientists declared indignantly.

“What’s happened to Jupiter I?” asked Goldsmith. “Is she in trouble?”

“I know no more than you do,” Captain Yuill snapped back, for he, too, was a surprised and disappointed man, “but suppose we carry out orders and keep the questions till later?”

Silently, and with somewhat bad grace, the crew carried out the captain’s orders to change the course of the ship. The four scientists looked on glumly. All the exciting plans they had made, all the blood-stirring prospects of new discoveries were dashed and broken. Now they were to go on a long and tedious mission to assist another ship. Had somebody gone mad back at the Cape?

“Maneuver complete,” Captain Yuill barked into the microphone. “Standing by for further instructions—and information.”

The last two words of his message were all he dared in demanding the reasons for the cancellation of the expedition and the scrapping of all the elaborate plans. As a good officer he would carry out his instructions meticulously, but it did help a bit to know why.

In contrast to the excited discussion not long before, there was now a gloomy silence in the cabin while they waited for the reply from Earth. The captain switched over to the loudspeaker. Everyone might as well listen to what the Cape had to say.

When the loudspeaker crackled and spoke it wasn’t the voice of Dr. Rosenberg that sounded. Sir George Benson himself*was addressing them. The Director of UNEXA gave a brief sketch of the adventures of Jupiter I, of how the crew had barely managed to land their ship on Io, and to take off again back to Earth.

“Unfortunately,” Benson went on, "there is only enough oxygen for twenty days. We calculate that you can just make

contact in that time. Diverting your expedition is the only chance of saving the crew and getting back the valuable information they bring."

"So that's it!" someone said as the loudspeaker fell silent again. "I suppose Benson knows what he's doing."

"There's a chance to save the lives of some fellow astronauts," Captain Yuill snapped. "That's all that matters to me."

"Are you going to tell them, Benny?" Mr. Gillanders asked the Director. With Dr. Rosenberg, the Australian had followed the happenings of the last hour tensely. Should they let Chris and the others know what they were doing, and that there was an outside chance that they might be saved? Or would it be kinder not to bring them a hope that might, in the end, prove false?

"Let's wait a bit," Sir George answered. "We'll get more accurate information from both ships and make a more precise calculation of their flight paths. If the result confirm our first hopes, then I'll tell them. Will you both contact the ships and find out what you can?"

While Dr. Rosenberg went to speak to his Mars crew, Billy Gillanders addressed his friends in Jupiter I. He requested accurate information about their time of lift-off, direction, velocity, acceleration, etc. This was required before they transmitted any other data.

"Try voice transmission periodically," Mr. Gillanders concluded. "It will be so much quicker than Morse, though your signals came through quite well. By the way, what instrument did you use to make the signals?"

19

"Do you think they will understand us this time?" asked Tony.

"It won't be your fault if they don't," smiled Chris. "In two hours' time we'll know the answer."

"Is there anything else you want me to send?" Tony enquired.

"Not until we know it's getting through. Then there will be plenty."

The two hours went by slowly and there was no acknowledgment from Earth. No doubt Jodrell Bank would be out of range now, but other radio telescopes would be listening for them. Why didn't they reply from the Cape? If they had picked up Chris's first voice message, surely they would have received Tony's piercing Morse.

"I wonder what's gone wrong," Serge said anxiously after two and a half hours had passed. "Why don't they reply?"

Chris and his companions had, of course, no way of knowing that Tony's blasts had been understood and that the Cape was a scene of feverish activity. They were unaware that orders had already been flashed to the Mars expedition to change course in an attempt to effect their rescue. As minute after minute ticked by and there was no message saying they had been heard, the spirits of the quartet began to sink in spite of Chris's efforts to keep them up. When they were almost giving way to despair the loud-speaker awoke and the voice of Mr. Gillanders came through clearly.

So overjoyed were the crew when they realized that their Morse had been understood that the next part of the message hardly sank into their minds. But what was this? Billy Gillanders was requesting precise information about their

flight. What could it matter just exactly where they were? Why did the Cape want to know all this? Chris thought he had the answer. It was to keep them busy, to occupy their minds, to give them some activity that would help them as their last days went by. But so intoxicated were they all to know that they had established contact with Earth once more that Billy Gillanders's last question about their Morse instrument brought forth peals of laughter. Soon tears were coursing down their cheeks.

"Well, we'd better let them know what they want," Chris said at last, and he set about preparing the reply. Before Tony repeated his shrill performance, Chris spoke as distinctly as he could into the microphone. Then Tony translated the message into the high-pitched sounds he had broadcast before.

"Let's hope we don't have to put up with this much longer," laughed Morrey, passing Tony his well-earned tube of glucose.

At Cape Kennedy, now linked directly with the world's largest radio telescopes, the message from Jupiter I could be heard. This time it was an instrument in Australia that was picking up the signal. As voice transmission was still unintelligible, they were relying on the message in Morse. Comments were made that the crew of Jupiter I had done a good job of rigging up an efficient signaler. It mightn't be a bad idea to make Morse equipment standard in spaceships.

In the computer room Sir George Benson and his two deputies had fed the information from the two ships into the huge electronic machine. The calculation was a complicated one, for it had to allow not only for the direction, velocity and acceleration of both ships, but also for the effects of the gravity of Jupiter, Earth, Mars and Sun.

To avoid the discomforts of "light slip" as experienced by the Jupiter crew on the outward journey, an upper limit of two and a half million miles per hour was set. It was also

assumed that by the time the ships drew near each other Chris and his companions would be unable to steer their ship even if any power was left in the lateral rockets. Therefore, Mars III would have to swing towards the rendezvous point in a huge arc in order to travel in the same direction as its objective. The velocity of Jupiter I must, therefore, be carefully balanced between reaching its rescuer as quickly as possible, and not speeding too rapidly for Mars III to swing around and overtake it.

"Here it is," muttered Billy Gillanders as the computer began punching out the answer. The three scientists pored over the result.

"Whew!" whistled Dr. Rosenberg. "Some job!"

Captain Yuill was equally surprised by the complexity of the operation called for. It was certainly going to be a stiff test of his navigational abilities. And, of course, Mars III would be traveling much faster than had been planned for their original task. It would be uncomfortably close to the point when light begins to play tricks, as he had learned from reports of the crew he was now trying to save.

The scientists aboard Mars III were understandably despondent. Their exciting job had been halted and they were condemned to go along with the ship's crew as useless passengers. Captain Yuill would have no use for them in the desperate task which had been thrust upon him.

However, perhaps because of their enforced idleness, the four scientists had time to think of the unfortunate astronauts in Jupiter I. It was horrible to think that in less than twenty days Godfrey and his crew would have perished. What would their last hours be like when, one after another, they expired through lack of oxygen? And, of course, the Jupiter crew expected their fate. The scientists wondered whether, in the same circumstances, they would have had the courage to meet their own end. Much as they would have liked to carry out the Mars venture, how could they object to this attempt to save human life?

To Captain Yuill and his crew the rescue effort was more personal. There was an unwritten law among the brotherhood of astronauts that all should help each other, that one astronaut should sacrifice all—even life itself—to help another. The natural disappointment in having an exciting mission terminated was succeeded by a fierce determination to help Godfrey and the members of his crew.

The crew of Mars III had a busy time. After changing course, checking it with Polaris, they had to open up the ion motor to the full. Constant contact had to be kept with Dr. Rosenberg at Cape Kennedy. Plans had to be worked out for action when the two ships met. It was this final phase that worried Captain Yuill the most.

"I think Control is coming through again," announced Serge, who was on radio watch. It was some hours later and the first exuberance of their contact with Earth had given way to a quiet feeling of relief. They wouldn't feel quite so alone when the bad time came. Perhaps by then they would be able to converse normally with their friends instead of by means of Tony's deafening whistles.

"Wonder who it will be this time," Morrey speculated. "Switch on the loudspeaker, Serge. We'd all like to hear whose voice it is."

"Control calling Jupiter I," the loudspeaker said. It was the voice of Sir George Benson.

"Control calling Jupiter I. This is important. You must try to conserve your oxygen as much as possible. Reduce physical activity to a minimum and lie down as much as possible. Report your situation every three hours."

"Now what's the use of that?" grumbled Morrey. "Even if we rested the entire time we couldn't spin out the oxygen by many hours. And what does he want our position for?"

As if in answer to his complaint, Sir George's voice spoke again.

"We have diverted the Martian expedition. Mars III is headed towards you at maximum thrust. There is just a possibility that it will reach you before your oxygen gives out. That is why you must reduce your consumption to the lowest possible amount. Even a few hours extension may make all the difference. Your voice transmission, although better, is still not strong enough. Until we advise you otherwise, keep transmitting in Morse. Over."

It was a long time before any of the crew spoke. Then it was Tony who broke the silence.

"Sir George does mean it, doesn't he? He wouldn't tell us if there wasn't any chance, would he?" he asked in a cracked voice.

"No. You can be sure of that," Chris answered quietly. "Of course he's had to give us some reason why were to save oxygen and keep reporting our position. Still—I don't think he would have done that unless he believed there was a reasonable chance of Mars III getting here in time."

It was almost too good to be true. Having accustomed themselves to the idea of their fate, the crew had now been told of the possibility of rescue. Sir George would not have allowed them to know this unless he thought Mars III could make it. If only there was something they could do for themselves. But it seemed that all they could do was to report regularly—and to breathe as little as possible. Chris cut their excited chatter short and asked them to be calm. Talking too much consumed oxygen. Then, too, the high pitch of Tony's babbling had shown that hysteria was not far away.

One day passed. Then two. Then three. It was on the fourth day that the receivers on Earth were able to understand the vocal messages from Jupiter I.

"Thank goodness for that," Morrey declared with a grin. "Now we won't have to listen to Tony's performance."

To be able to speak with and be understood by their friends at the Cape gave the quartet a great lift. After the

marvelous news that they had a chance of survival, life in the cabin had become Very irksome. The rigid routine planned to cut down the use of oxygen restricted their movements and even their speech. Chris insisted that the instructions laid down by Control should be followed. So it was that each of them spent many tiresome hours with nothing to do, just lying down—and thinking.

Conditions were better aboard Mars III. Here there was no restriction on the use of the vital gas. The main occupation was feeding Control with hourly reports of the ship's position, and the execution of the occasional orders to adjust their course.

At Cape Kennedy things were different. Here was the nerve center of the greatest rescue attempt that the world had ever known. Sir George Benson and his colleagues, right down to the most junior assistant, were all united in this supreme effort to wrest four young men from the jaws of death. Everyone put in long hours, and most members of the staff hung about the rocket center, even in off-duty time, so that they could keep in touch with the progress of the two ships.

The titanic undertaking had captured the imagination of the whole world. Regular bulletins issued from Cape Kennedy were instantly flashed to every country on Earth. Newspapers, radio and television saw to it that almost every man, woman and child was kept informed of the progress made. Innumerable talks and newspaper articles explained just what was being attempted, so that the man in the street almost felt that he was participating in the errand of mercy himself.

Benson and his deputies studied the charts and recordings passed to them from the main control room. As time went on their hopes rose and faded. Sometimes, it seemed, the attempt was doomed to failure. At others it seemed that this audacious venture would succeed. In spite of inner turmoil Sir George always appeared calm when he met the crowds of reporters and broadcasters who now besieged the Cape.

It was on the tenth day that Jupiter I received the order to shut down its ion motor and to coast along at just over two million miles an hour.

"But we can go much faster," the puzzled Tony pointed out. "Why won't Sir George let us?"

"Because Mars III has to turn and overtake us," Chris pointed out. "You can bet Uncle George has the best plan worked out, with the help of the computer."

One day later Captain Yuill in the rescue ship was ordered to commence the vast sweep that should bring Mars III up behind her quarry. With his ion motor still at full blast, the captain gave one of his lateral rockets the gentle touch that would send the great ship into the beginning of a great arc. Every six hours he must repeat the process, each time turning his ship through a few degrees.

On the fourteenth day Chris was ordered to turn his ship through one hundred and eighty degrees, and to start up the ion motor to decelerate Jupiter I. But when he switched on a lateral rocket nothing happened. Nor with the next, or the next. Every one capable of turning the ship was exhausted. It was impossible for Jupiter I to slow down!

"That does it," Billy Gillanders groaned when Chris had reported his inability to carry out Control's order. "No hope now, is there?"

"I don't know," confessed Sir George. "It means, of course, a completely new flight program. For all practical purposes Jupiter I is helpless. The approach is entirely up to Mars III, and the problem is—can it get near enough in time?"

Captain Yuill was happy to report that everything on his ship was functioning normally. There had been no trouble on turning into the arc. The process should be completed in a few more hours, and then his ship would actually be behind the Jupiter rocket. Should he run his chemical motor for the extra velocity needed to overtake his disabled quarry?

The computer said “no.” All the power of the Mars III chemical motor would be needed for the landing maneuver. The use of any fuel would jeopardize the whole expedition. So the approach would have to be made by the ion drive alone.

It was a great thrill for the crews of the two ships when, on the eighteenth day, they were able to speak to each other directly. Because of restrictions on movement and speech, Chris and his friends couldn’t talk with Captain Yuill and his crew as much as they would have liked. Still—it gave their morale a very welcome boost to know that their rescuers were drawing nearer.

“How far are we apart?” asked Tony, using up some of his ration of conversation.

“Six million miles,” Chris answered.

“And how quickly are they overtaking us?”

“By one hundred thousand miles an hour,” Chris said tersely.

It required no great mathematical skill to discover that for Mars III to reach them would take some sixty hours—several hours more than their oxygen supply would last.

Despair reared its ugly head once more among the crew.

20

"You must each keep sufficient oxygen in your space suit bottles to last one hour," the voice of Sir George Benson ordered urgently. "You will require this when you transfer to Mars III."

Inside the cabin Chris and his companions lay listlessly on the floor. Because their rocket was coasting along in free fall, they had each fastened themselves down to prevent floating about the compartment. The air had definitely changed within the last few hours, and with the fall in the oxygen content of the atmosphere, the temperature had risen. They were all perspiring and their breathing was becoming difficult.

Tony looked at his friends.

"If I released my hour's supply of oxygen," he thought, "it would make things so much easier for the others."

Precisely the same thoughts were running through the minds of the others, and each one guessed it. Any move to sacrifice his own oxygen supply by any one of them would be prevented by the rest. All they could do, it seemed, was to lie there and wait.

On Earth radio and television bulletins were broadcast every hour. Every scrap of news from Cape Kennedy was seized upon avidly. The world waited breathlessly while the tense drama was playing out in space. Sir George Benson and his staff, all drawn and red-eyed from fatigue and strain, scarcely ever left the control room. They followed the progress of the two ships almost minute by minute. Benson knew that his, alone, was the final decision. Could the crew of Mars III save Chris and his friends? Or would eight lives

be endangered to save four? Benson felt that the eyes of the world were upon him as he directed this tremendous task.

Aboard Mars III Captain Yuill and his experienced crew knew the hazards of their job. If only they could bring the two ships to within reasonable distance of each other, the first obstacle would be over. But only the first—and there were many more lined up before the undertaking would be complete. The captain, in spite of his doubts, spoke cheerfully and confidently to Chris and his companions.

"You laddies have caused us a wee bit of trouble," he told them. "Our nice picnic on Mars is canceled because you're limping a bit. But we'll get you back, never fear."

"Thanks," gasped Chris. "Sorry about—your—picnic. You'll be—very welcome."

The captain pursed his lips as he heard the gallant reply. Even over the radio Godfrey's voice betrayed the ordeal he and his crew were undergoing. How much longer could they last? Captain Yuill wondered anxiously. It would be many hours before he could reach them.

As he finished speaking Chris let go of the microphone, which floated away from him. He and his crew were dressed in their space suits except for their helmets. Each had a small cylinder which contained one hour of Life—oxygen. The temptation to gulp in lungfuls of that vital gas was great, but they resisted it sternly. Even though Tony appeared to be semi-conscious they must not fritter away their last chance of survival.

Although he had been frustrated in the attempt to sacrifice himself for his friends, Chris would gladly have emptied his own cylinder to make breathing easier for the others. But he knew that as long as any of them had the power to prevent him, he wouldn't be allowed to do it. Just as he would stop any of his crew doing the same. How far away was Mars III? With the radar out of action there was no means of knowing.

In the Cape Control weary men watched the narrowing

gap with anxiety. There was nothing more they could do. Now it was up to Captain Yuill and his crew to snatch the Jupiter crew from the jaws of death—if they could. Even the scientists of Mars III had been pressed into service, and while he continued to broadcast encouraging words to the disabled ship, the captain studied his instruments with anxiety.

Some fifty thousand miles still separated them, but the signal from Jupiter I was quite plain on the screen of the powerful radar. In five or six hours the two ships would be at their closest. It was then that the most critical and nerve-wracking part of the rescue attempt must be made. The empty void between the two ships must be crossed and Godfrey and his crew must be brought back to the safety and ample oxygen supplies of Mars III.

Captain Yuill was seriously concerned about how he could get from his vessel to the other, for he'd insisted from the start that he himself should do the job. The small pressure jets that could be attached to his space suit were suitable only for short bursts. They were designed for propelling astronauts about the rocket when it was necessary to do work outside. It was certain that they would not be sufficiently powerful to propel him to any speed from one ship to the other. So he must try to get the two as close as possible and trust to luck.

"Do you think we shall make it?" Goldsmith asked his chief a long two hours later.

Captain Yuill made sure that the radio was switched off before he replied. He didn't want the Jupiter I crew to become alarmed at this stage.

"It's going to be a near thing," he confessed. "If they can hold out for another two or three hours we can get alongside. But whether we shall be close enough to jump across I don't know. If we're more than five miles apart these space suit jets will be insufficient."

The men in Mars III fell silent. It would be tragic indeed if

they came so near to Jupiter I and were prevented from saving Godfrey and his crew.

Now Serge had become unconscious as well as Tony. Only Morrey struggled bravely to keep Chris company. In a way Chris wished Morrey would succumb too, for then he'd be able to release his own precious oxygen without resistance. How slowly time was passing. Every labored breath seemed to last an eternity. Great waves of blackness came sweeping over him, and Chris knew that this was the onset of oblivion. He could no longer reply to Captain Yuill or even say a word of encouragement to Morrey.

"Put on your helmets. I'll be coming for you soon," the confident voice of Captain Yuill sounded over the radio.

Thank God! Chris thought. Maybe we shall pull it off after all.

With a tremendous effort he pulled on his own helmet and switched on the precious oxygen. For a few seconds he gulped in the life-giving gas. As soon as he felt his strength returning, he went to assist Morrey, who seemed unable to manage on his own. Then he turned to Tony and Serge, and while they were all recovering Chris set about the final preparations for abandoning ship. He collected tape recordings and log books and packed them into a metal cylinder which he fastened to his waist. Then he switched over the radio so that they could speak from their helmets, through the ship's apparatus, to Mars III.

"Helmets on. We're all ready for you. How long will you be?" he asked Captain Yuill. For the first time in weeks he felt hopeful and excited.

If Chris was feeling relieved, Captain Yuill was getting more anxious. The ships were now almost abreast but fifty miles apart. By using his lateral rockets in conjunction with his retro rocket in the nose, the captain had maneuvered his ship carefully. It was an even more delicate operation to narrow the gap, for Mars III had not been designed to make a rendezvous in space. Just the slightest touch of the laterals

would be sufficient to reduce the distance. Too much would send his ship shooting away from Jupiter I. He gave the laterals a short burst, praying that it wouldn't be too much. Now that the minutes of Chris Godfrey's last hour were ticking away, he couldn't afford to spend the time making several attempts to approach.

"I must get within five miles," Captain Yuill muttered to his anxious crew. The astronauts in Jupiter I had already used up fifteen minutes of their last sixty.

"Well, what is it?" the captain snapped at Goldsmith.

The radio operator, his face set grimly, turned from the radar to his chief.

"Seven and a half," he said briefly.

Captain Yuill beat his head in despair.

"Blast! Blast! Blast!" he exploded.

Why hadn't the Mars III captain replied? Chris asked himself the question repeatedly as the radio remained silent. Captain Yuill knew they had only sixty minutes' supply in their oxygen bottles. When he told them to put on their helmets he must have been ready to come for them. Surely Mars III was coasting along outside. Why, then, didn't the captain tell them he was on his way?

Thirty minutes left. It was as much as Chris could do to speak calmly to his companions. To give them something to do he had the foul air pumped out of the cabin to equalize the pressure inside and out. Then the hatch was opened and they peered through anxiously to catch sight of the rescue ship. It was nowhere to be seen—and the time was racing by.

"What did I just say?" demanded Captain Yuill.

"You said 'Blast, blast, blast'," Hyatt informed him patiently.

"That's it!" the captain yelled, losing his usual composure.

“We’ll use the blaster to get across to Jupiter I.”

The other occupants of the cabin looked at him in astonishment. Then the possibilities of his suggestion dawned on them and they began to discuss it excitedly. Yes, the blaster—that small, torpedo-like rocket designed for blasting away the top covering of the buried buildings of Mars—might well carry a rescuer across the space between the ships.

“It's our only chance,” declared the captain firmly. “The blaster will provide sufficient energy to make the crossing quickly. I can use my small jets for guidance.”

There followed a feverish ten minutes while the crew and scientists worked to turn the blaster into a ferry vehicle. At last, less than ten minutes before the fateful hour was up, Captain Yuill was assisted through the air lock and was dropped out into space astride the six-foot torpedo.

As he floated along a few yards away from his ship, the captain gazed around. Away to his left was the sun, at which it was dangerous to look. Beneath and above were countless points of light shining brilliantly against a black velvet backcloth. Away to the right he saw what he was looking for —the small but distinct shape of the disabled spaceship. He worked his suit jets till the blaster was pointing in the right direction. Then he pressed the firing switch, and almost fell off his strange steed as the motor burst into life.

“Look!” yelled Tony over his radio.

He was pointing to a moving spot of light that seemed to be coming in their direction. As the others found it, they could see a tiny tail of fire projecting from the point of light.

“What is it?” asked Serge. “It’s much too small for Mars III.”

“Whatever it is I—hope it’s—here soon,” gasped Morrey. “My bottle—is nearly—empty.”

Yes, without doubt, the strange object was coming towards them rapidly, and they could almost make out its

shape.

"It's someone riding a small rocket," Serge said, torn between his curiosity about the object and anxiety for Morrey, who seemed on the point of collapse.

A minute later they knew that Serge was right for they had the incredible sight of a space-suited figure sitting calmly astride a small rocket. Even as they watched, Captain Yuill turned his charger tail-first so that he could decelerate it. Not a minute too soon the captain maneuvered the blaster towards the open hatch. Then he calmly jumped off it and fastened it to Jupiter I, just as if it were a horse in a Western film. Eager hands assisted the captain through the hatch, and he and Chris clasped hands for a poignant moment.

"Quick! Morrey," Chris called over the radio.

Captain Yuill took in the situation at a glance. Swiftly he detached from his back one of the oxygen bottles he'd brought and in a moment had it pouring gas into Morrey's helmet. By the time he had recovered the others had all fitted the fresh cylinders Captain Yuill had brought and were ready to leave.

"I can only take you one at a time," the voice of the captain said. By common consent Morrey went first, and it was a great relief to Chris to hear, a few minutes later, that his friend was safely aboard Mars III and that the intrepid captain was on his way back. True to tradition, Chris was the last to leave his ship. With the cylinder of records clasped tightly to him, he joined Captain Yuill on his fiery charger and together they rode across the plains of Space.

"On parade, everyone," ordered Captain Yuill.

He had just taken off the headphones after a lengthy session with the Cape. Whatever did he want? Chris wondered. As captain of the ship all, including the rescued astronauts, were under the Scot's command. Of course "on parade" was a mere form of words, for though it was large as such things go, the cabin of Mars III was well filled by its

twelve occupants. Scientists and astronauts waited curiously for the captain's next words.

Captain Yuill glanced at the paper on which he'd scribbled some notes. Then he cleared his throat and in his best "official" tone addressed the waiting men.

"As captain of this ship" he began, "I have been instructed by the Director of the United Nations Exploration Agency to make the following statement.

" 'In recognition of their outstanding services in the cause of Science the Governments of the United Kingdom, the United States of America, and the Soviet Union have been pleased to make the following awards:

" 'To Christopher John Godfrey, for acts of the greatest heroism and the most conspicuous courage in circumstances of extreme danger—the George Cross. SEC

" 'To Morrison Kant for outstanding valor—the Congressional Medal of Honor.

" 'To Serge Smyslov, for the highest courage and attention to duty—the award of Hero of the Soviet Union.' "

There was a long pause. They were all astounded. But was that all? Then, with a flashing smile, it came.

" 'To Anthony Hale for acts of great bravery—the George Medal.' "

"Gentlemen, may I be the first to congratulate you?"

To say that Chris and his friends were stunned at the news would be nothing less than the truth. All four looked completely blank as the captain's words sank into their minds. Long before they realized what had happened they were surrounded by a throng of men, led by the beaming captain, who were thumping them on the backs, shaking their hands vigorously, and all talking at the same time.

For once in their lives Chris, Tony, Serge, and even Morrey were completely speechless. Their mouths were open but no words came.

"This calls for a wee celebration," Captain Yuill declared, and from a locker he produced tubes of liquid that were not an official issue—champagne.

The handclasp between Sir George Benson and Chris Godfrey was the only sign of emotion. Neither would have betrayed his feelings, for worlds, although to both this was a tremendous moment. It wasn't even necessary for the Director to say he was glad to see Chris and his crew back safely. All four knew what their return meant to their old friend.

After the first awkward moments tongues were loosened and Sir George, Billy Gillanders and Dr. Rosenberg plied the returned astronauts with a thousand questions. Of course, all the answers would probably be found in the official records, but the Director and his deputies couldn't wait.

For Captain Yuill and his crew there was the greatest praise, but the Scot modestly avoided the reporters who fought to get to him. He was content that the lives of four fellow astronauts had been saved, and that the brotherhood of space had stood firmly together.

"What would you say was the thing that worried you most?" Sir George asked some time later.

Chris thought for a few moments.

"Well, of course, there was the light slip," he answered, "but I think one of the most trying things was waiting for a reply to our messages across space. It's pretty awful not being able to carry out a backwards and forwards conversation just when you need it most."

"I guessed you might say that," Sir George answered thoughtfully. "Well, I have some news for you. It's possible that We've hit upon a method of instantaneous communication irrespective of distance. It's telepathy. I can't tell you any more about it yet, but it will play an important part in your next voyage. Oh—and you'll be taking a strange passenger with you."

“Our next voyage?” asked Chris wonderingly.

“Yes. There hasn’t been time to tell you about it yet, seeing that you’ve been back on Earth for less than two hours,” Benson smiled. “However, I’ll tell you this. Your next excursion will be a mission to Mercury.”