Tom Swift's—

Must Use Legs…

By T. Edward Fox

Bud receives a strange invitation in the mail. When he shares it with Tom, the inventor is full of disbelief. His first response is, “What? That’s crazy!”

But the more his friend tells him about it, the more intrigued he becomes. Pretty soon his brain is in top gear trying to come up with the ultimate entry to a very special racing event.

Half way into creating their entry—with no assistance from any Enterprises sources—Tom discovers that there is one very weak link in the whole project: himself.

Can he find the time to not only get their entry ready, but find more time to get *himself* ready and able to handle the rigors of the forthcoming endurance test?

He has no problems with using his brains for just about everything he does, but this time he *must use legs!*

This story is dedicated to the men, women and children who introduced me to kinetic racing years ago. These are people who actually have full and busy lives but for the love of it all they make the time to make the machines that make this sport what it is. So, this is for the Hobarts, Junes, Flatmos, Rutabega Queens, and all the rest. You are all brilliant!

A SWIFT ENTERPRISES INVENTION STORY

Must Use Legs…

FOREWORD

Among the most entertaining sporting events I have ever attended was a race held each year in Northern California. It features people who have spent an entire year designing and constructing intricate racing vehicles that can test both their engineering acumen as well as their endurance.

In some ways the most advanced Indy car out there barely holds a candle to the achievements of these racers and the men and women who lovingly bring them to life.

Similar event across the country—and a few in other lands—can bring out spectators in the thousands. Spectators who are willing to subject themselves to nearly the same rigors as the participants in order to be able to watch everything.

If you ever get the opportunity to witness one… go! If you go and think to yourself, "I believe I could do that… do it! If you try it and fail the first time… you may get hooked so much that it doesn't much matter. Win, lose or draw. At least you were there.

So, what am I talking about? Read on and find out!

Victor Appleton II

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PART 1

TAKING UP THE CHALLENGE

"WHAT? That's crazy," the nineteen-year-old inventor, Tom Swift, said to his best friend. "Let me read that. You're making all that up!"

With a big grin, Bud Barclay, Tom's friend for the past three years, handed the paper over. "I'm telling you straight, skipper," he told Tom. "This has been really big stuff since back in the sixties. My folks used to make an annual trip to Northern California to watch the original."

Tom unfolded the page and read:

KINETIC RACERS COME HITHER!

THIS YEAR WE CELEBRATE THE 10TH ANNUAL
NORTH CAROLINA KINETIC RACE AND FATIGUEFEST!

YOU ABSOLUTELY MUST COME!

NEW COURSE — NEW CHALLENGES

THIS YEAR WE START IN ENGLEHARD AND STREET RACE,
SAND RACE, WATER CROSS (2 TIMES)
RUN A 3/4 MILE TIMED SPRINT AND
FINISH IN MANNS HARBOR THREE DAYS LATER.

AMAZE YOURSELF WITH YOUR PROWESS
AMUSE YOUR FRIENDS WITH YOUR ENTRY
ALARM YOUR PARENTS WITH YOUR DARING DO

REPRESENT!

JULY 15, 16 & 17TH

Tom refolded the page and handed it back. "Really? Seriously?"

Bud grinned even wider and nodded his head, eyes twinkling. "It's no joke. These people are an amazing group of everything from top flight mechanical engineers to bored housewives. This event plus at least a dozen others held around the country each year bring them all together. Some of the races, like the one I used to go watch, are based around some of the most outlandish man-propelled artworks you can imagine."

Tom raised an eyebrow at the mention of artwork.

"Really, Tom. Any year you might expect to see anything from giant dragons powered by a dozen people, lobsters with snapping claws with three or four guys inside, all the way down to two-man hammers and one-man, or woman, monster tricycles. It's an incredible sight!"

"So, where do they get these things?" the inventor asked, still trying to come to grips with the concept.

"They make them. Design, build and then pilot them over a course that can run along city streets, old highways, across sand dunes, up and down mud slopes and even across the water." Seeing Tom's upcoming question, Bud added, "Yes. They have to float as well as travel over pretty much any terrain you might imagine."

"Sounds like some really high-tech vehicles," Tom commented. When Bud shook his head he asked, "They're not high-tech?"

"Nope. Really tricky, but not much more complicated than multi-speed bicycles. Arm, leg and wriggling body powered and every one of them must have pedals and a chain of some sort. Plus, they have to carry everything they need for the entire course right onboard."

"What about for the water crossings?"

"Right onboard." Bud gave his friend a really big smile. "Support vehicles are encouraged but only to bring along your own cheering section. No tools, spares or alternate equipment. It really is great. Even the failures are a lot of fun." He sat staring at Tom with an expectant look.

Seeing the look, Tom said, "And, you're going to suggest that I give you time off to enter this… this race thing."

"Again, I have to answer, nope. What I want is for *you* to take some time away from trying to save the world over and under the water and traveling the universe and build a killer kinetic racer with me. Oh, and then run the course *also* with me. You know? A team."

Tom thought about it for a full minute before venturing, "It would take a lot of time to do this. I mean, how long do most of the entrants spend on their vehicles?"

"Well, for the really artsy races, up to the full year leading up to the next race. But, some of the other races, and I've been led to believe that this one in North Carolina is in that group, people are told they can do all the planning and designing they want all year long, but they can't actually start building their racer until thirty days before race day."

"I've got to give this some thought," Tom told him.

"That's all I'm asking for."

At dinner that evening Tom mentioned the race to his family.

His sister, Sandy, exclaimed, "Oh. That's great! Bud's been trying to get up the nerve for two years to get you involved. We went up to the one-day event in Freeport, Maine, last year. It was fantastic!"

He looked at her as if he didn't know her. "Wait. You've been to one of these? I've never heard of them."

Chuckling, his father said, "Just because you haven't heard of them doesn't mean they haven't existed for years and years."

"Dear," his mother, Anne, said, "your father and I went out to the one in Prescott, Arizona a few years back. Remember when we left you and Sandy with Mrs. McNabb? I think you were thirteen then."

Tom did remember the kindly but very hard of hearing old Scottish woman who lived across Shopton. He smiled to himself recalling how she had taught him to cheat at solitaire. It had been a quiet week filled with swimming trips to Lake Carlopa and his first foreign culinary experiences with several of her favorite recipes.

Sandy made a face as she remembered those same foods including a homemade mutton sausage and a few things she hoped she would never have to taste again.

"Oh, sure. You went to one of these, huh? And, it was

fun?"

"It was, as Bud sometimes says, a blast, Son," Damon Swift replied. "And, some of the most imaginative small-scale engineering I have ever seen. Those folks really squeeze the most they possibly can into those man-powered vehicles. You really ought to do this."

When Tom still looked a little skeptical, his father added, "You've gotten so used to having the best and most modern technology at your beck and call, it might do you a world of good to go back to basics! Stretch your brain as well as stretching your legs."

That, Tom considered as he got ready for bed later in the evening, made a certain amount of sense. If he was truthful with himself, his reliance on automated systems and teams of experts at Enterprises with access to the latest machinery and technologies available to them had made him feel a little less connected to things than he preferred.

He picked up his phone and dialed Bud's number. "Hey, flyboy," he said when the Enterprises test pilot answered. "You've got a kinetic partner. I'll set up a few things to run without me and then we can take over The Barn by day after tomorrow."

There was a pause and a small sigh from the other end. "Actually, Tom, we can do any level of planning and design using whatever we have available, but when it comes to the build, the rules say 'no' to any sort of professional facility. Back yards, garages, work sheds and even rented space, but the organizers want a fairly level playing field, and some place they can pop into without notice to make sure nobody is cheating."

"Ah, and they wouldn't be able to do that at Enterprises, would they?"

"No. But I do know of an old barn-like structure on some private property. The owner ought to be able to give us a key to the place; it's been locked up for years and years."

"How big? Actually that kind of goes for how big is this barn-like structure of yours and how big are we going to make this vehicle?"

"Hmm. As to the barn, I'll have to call your dad tomorrow and ask him—"

"Dad? Why would he know… oh. Are you talking about the old Swift property by the lake?"

Bud laughed. "You caught me. Yes. I've already cleared it with your kind father. He is more than willing to let us have full access for the duration. He's even prepared to get Internet access strung out to the house so we can use it for an office."

"So, you knew I'd cave in and join you, didn't you?"

"I had an ace up my sleeve in case you hesitated too much longer," Bud admitted. "And, she is going to be part of the design and build team so we get at least a little artsy and make something that is appealing as well as functional."

"Bash?" Tom asked. Bashalli Prandit was Tom's girlfriend and was a trained artist. She was exceptionally

talented and had been responsible for some of the design work of a few of Tom's projects during their two-year courtship.

"The very lady. I will be bringing on a special, personal assistant. Blond, vivacious and she'll kill me if I don't ask her to be part of this."

It was Tom's turn to laugh. He knew that Bud and his sister were so serious about each other that people wondered when they would finally go ahead and get engaged. He also knew that she would make both his and Bud's lives a misery if Bashalli was part of the team and she wasn't.

Two days later, on Saturday and exactly forty-eight days before the race, the four drove to the old Swift homestead. Tom always felt a small chill when visiting the site of two generations of Swift inventors from Barton Swift—inventor of such devices as the first underwater turbine capable of driving a torpedo, and a submarine that used electomagnetic drive plates in addition to front and rear propellers—and his son, the original Tom Swift for whom Tom, three generations farther down the line, was named.

The house had been opened the day before and technicians from the phone company had installed a new phone line along with high-speed Internet access while a housecleaning service had aired out and cleaned up the little three-bedroom cottage.

While the girls set up the office with supplies they brought with them, Tom and Bud walked to the large barn. Because proximity to the lake meant that most metal tended to rust, the massive padlock on the large, double doors was changed every year; it opened without any problems. The massive doors, however, had not been lubricated for at least a half decade and took considerable force to swing open on their rusty hinges.

Bud pulled a can of spray oil from a satchel he was carrying and liberally shot it into the bottom and middle hinges. "Guess I'll have to see if we have a ladder to get those upper ones," he said, swinging the nearest door back and forth to loosen it.

Tom pointed to one that led from the main floor up to what had been a hayloft a century earlier. "It's old and I wouldn't trust it without testing it, but that's all we have right now. Do the rules say anything about getting some folks out from Enterprises to get this place up and running?"

Bud took out the twenty-page booklet that had arrived the week before. Knowing that Tom would give in, he had already entered them weeks earlier and paid the entry fee out of his own pocket. When Tom had asked about any such fee, Bud had just said, "It's not for the money, skipper. It's for the glory of the competition." This was the race motto and really hadn't answered the inventor's question, but he had not pursued it further.

"Actually," he said answering Tom's question, "these folks aren't too strict about most things. They just don't want big business pumping money into any of the vehicles. You can accept up to five thousand dollars in services and materials but you also have to carry one pound of advertising materials for the company sponsoring you for every fifty bucks they provide. Five

thousand dollars equals a hundred extra pounds, and in this game pounds equal penalty. Everything any entrant needs to know is right here in the rule book."

They were interrupted by a little shriek from outside the building. Rushing out they found the two girls clutching onto each other. As soon as the boys came out, they disentangled and Sandy made a big show of brushing herself off and straightening her blouse.

"It's nothing," she declared. "A squirrel ran across my foot is all. Just startled me. I'm fine. Just fine. *Fine!*"

Bashalli was trying to keep a straight face. She also had been startled but not frightened by the furry rodent's scamper.

She said, "Things have been taken care of inside and the office is running. Both computers have been tested and you have access to the world. Has the fun started yet?"

Bud looked at Tom and then motioned toward the inventor with his head. For the first time in many, many months, Tom Swift looked relaxed and ready to enjoy the forthcoming experience.

"Oh, yeah. It's started!"

PART 2

THE BUILD STAGE

THE REST of the day was spent sitting in the office, a room that had once been the front parlor. Bud and the girls spent the time making a list of everything they felt was needed to get into the design phase while Tom sat to one side in contemplation. Periodically he would suggest a special tool or component he felt might be needed.

After checking Bud's rules booklet Tom determined that it was okay to "borrow necessary tools and design materials" from an outside source without having it count against your allowable sponsorship funding. He made a note of the three design applications he would bring over later that afternoon. With them, he was certain that coming up with a design that made the absolute most of the two-man crew would be a cinch.

Until, that is, Bud pointed out the asterisk and the footnote that precluded using computer programs unless you wrote them yourself. Although he had made substantial improvements in two of them, Tom could not claim to have 'written' them.

"It is supposed to be done the old fashioned way, skipper. Paper, rulers, protractors and brains."

"And," Sandy added because she had read the booklet the night before, "no batteries, solar panels, internal or external combustion engines or other non-human-powered means of generating locomotion or kinetic

energy."

Tom's ears perked up. "What was that last bit?"

"Uh, no non-human-powered stuff?"

Turning to Bud, he requested, "Read me the exact phrasing, please."

The dark-haired teen complied by pulling the booklet out and flipping to the appropriate page. He read quietly down the list, finally coming to, "Ah, here it is. Neither vehicles nor pilots shall incorporate or utilize any means of locomotion that is not powered by the human body including internal and external combustion engines, electrical storage devices such as batteries or provide any electrical current to motors even through use of pedaled generators or solar panels." He dropped the hand holding the booklet. "Is that the part you wanted?"

Tom nodded and gave the three of them a rather sly smile.

"Something's whizzing around that brain of yours, isn't it?" Bud asked narrowing his eyes. He recognized all the signs that Tom was thinking about something that no doubt would turn out to be phenomenal and possibly life changing. Or, race changing at the very least.

Glancing down at the booklet in Bud's hand, Tom asked, "Does that have a contact number in case you have any questions?"

Both Bud and Sandy nodded in unison. Bud handed the rules to his friend without questioning him. Sandy began asking, but Bud cut her off by placing a gentle hand on her forearm.

Bashalli sat in her chair watching the invisible gears turning in her boyfriend's head. A few years earlier she would have scarcely believed that she could derive pleasure from just watching one person, but it was fascinating to her now.

Tom took out his cell phone and stepped outside to make a call.

"Is this Mr. Dwayne Brown?" he asked when the call was answered.

"Uh-huh. Who's calling?" The voice on the other end wasn't rude or abrupt but Tom could tell that the man was used to short and complete answers.

"My name is Tom Swift. You may have heard of my family's company, Swift Enterprises. The reason for my call is to ask for some verification regarding one of the rules for the kinetic race in North Carolina. Can you help me?"

"Ah," the man said, his voice, softening. "A pedal head. Of course I've heard of you Mr. Swift. You have quite the reputation. I'm just perusing my list of entries and don't see you on the list. I could probably make an exception and add you, but the deadline for entries—"

"Oh," Tom said trying not to interrupt, but doing so anyway. "I'm entered but under the name of Barclay. Bud Barclay."

"Well. There you are. Or, rather there your Mr. Barclay is. Is that a pseudonym of yours? It isn't that we mind,

and you have every right to protect your identity, it is just that I need to know for the official records. I hope you understand."

Tom gave him an explanation about Bud and his family's familiarity with the original kinetic sculpture race in California. He quickly got to the point of the call.

"I've been looking at the rulebook and have a question about how far I might push rule four."

The man chuckled. "Well, tell me what you've got up your sleeve and I'll give you both my opinion as well as an official ruling."

"I realize that kinetic in these races has come to be synonymous with pedaling the vehicles, and I see from rule nine that pedals must be directly connected to a chain drive or equivalent."

"Right…"

"However, strictly speaking, kinetic energy is simply the energy something has due to its own motion."

"Uh-huh…"

"So, how far can I push the true meaning of kinetic energy?"

The man asked Tom to describe what he had in mind. Less than a minute later he was laughing and Tom could hear the sound of him slapping his leg.

"Oh! That's wonderful. Absolutely. Oh, *please* do that. If it works it will revolutionize these races. Even if it doesn't, it will prove to be a real crowd pleaser. Let me just give you the standard 'It's your first time,' words of advise. We had an entry here the first year that was fairly unique. A full-size Flintstone-mobile complete with giant rollers for tires. For floatation as well come to think about it. Anyway, they had a unique approach. Instead of a chain, they carefully hand-knotted a hemp rope every two inches and then carved wood gears to accept the knots. It was great. Unique!"

"What was their problem? Was the rope against the rules?"

"Oh, no. We considered it a chain equivalent. They forgot, and this is the advice to you, forgot all about the course. Specifically the two water crossings. They made it across the half-mile bay on day one and parked for the night. Pretty hot evening and it dried everything out. Good for clothing, not so good for hemp rope."

Tom knew what he was about to hear.

"They woke up the next morning to a rope drive that had shrunk so much that they couldn't turn their pedals or the wheels. We had to give them a variance to make another one with some borrowed rope and give them a late start time for the second leg."

Tom assured Mr. Brown that he would not fall into that sort of trap, thanked him for the information and support, and said goodbye.

"Before you go," the organizer said, "may I ask if you will allow us to make it known that you are participating in this year's race, or do you just want to show up an give the crowd a thrill?"

Tom opted for the latter. “I won’t make it a secret once we get there, but I wouldn’t want any other participants to hold back because they knew I was going to be involved.”

He went back inside and told Bud and the girls that he was ready to roll up his sleeves and get started.

It was agreed that Tom would provide design and measurement drawings by the end of the first week or so and then work side-by-side with Bud, Sandy and Bashalli during the thirty-day build phase.

He and Bud took over one of the computers while the girls dragged the other one into what had been the old dining room. There, they began trying to come up with a motif for the art part of the vehicle. Although not strictly necessary for this race, most entries had some sort of interesting and fun component to the vehicle.

By the time the build began, Tom and Bud had ordered and picked up all of the aircraft-grade aluminum tubes and necessary welding equipment for the structural elements of the racer. The tubes were already measured and marked for each cut and identified by a color code and number to correspond with the large drawing Tom had run off on a printer/plotter at Enterprises.

On Race-minus-30 they cut, trimmed and welded the basic chassis of their racer. Although he had filled Bud in on his secret plans he had not informed the girls about the unique feature their racer incorporated.

When they entered the construction barn, Sandy pointed at the frame. “Why the heck does the frame bend around like that in the middle? Looks like you’re planning on sitting it on a giant beach ball. You’re surely not thinking of making this a uni-wheel, are you?”

“Now, Sandra,” Bashalli told her, “I am certain that Thomas has something much more interesting to go in that round space. Although, it *is* rather wide. What *does* go in there?”

“Kinetic energy,” was all he would tell them.

By the time Race-minus-22 came around the complete structure of the frame along with the two-man cockpit were complete. Every joint had been ground down and polished. Four wheels taken from several used bicycles Bud had procured were mounted in the four corners and two small, wide wheels had been welded to each side—one over the other—in between. It almost looked ready to drive away.

Tom and Bud would sit near the very front of the vehicle and on opposite sides of the eight-foot-wide frame. Each had pedals and a strong yet light chain that traveled through a strange set of belts and cones.

“It is a constant velocity transmission,” he explained. “If we pedal at, well, let’s say one hundred turns a minute, when the racer is just starting up, or when it is going slow, the belts slide down into new positions on those cones and acts just like the changeable gears of a bicycle. Then, as less force but greater speed is required, the belts move around and you the necessary extra power and speed without pedaling any faster or harder.”

Bashalli looked at the point just half-way to the back where the chains stopped. “You do not have enough

length in the drive chains, Thomas. They will not reach all the way to the back axle."

Tom smiled and them walked over and gave her a hug. "Well spotted, but that's the beauty of this racer, and the reason for that circular area underneath. All will be revealed in nine days. It will be much better to see things in action when I explain."

"Okay, but what are those extra little fat tires for?" she inquired.

"Well, we need to cross mud and sand. I figure that the best thing for that is going to be using tracks. Like a tank. We will carry two lightweight plastic tracks that can be slipped over the big, drive tires and will be supported in the middle by the smaller ones."

He explained that the treads were being built at Enterprises and would be delivered in the next day or two. "We will need to carry about fifteen pounds of advertising for Enterprises to cover their expense."

"Is Enterprises paying for them?" Bud asked.

"No, I am."

"Then, we don't have to worry about the money. Anything out of our own pockets is free, so to speak."

While Sandy and Bashalli continued working on the embellishments to the racer—a series of thick and thin wires looped, twisted and formed into special shapes then covered with bright silver Mylar along with an odd, silver-painted papier-mâché head and body—Tom also asked them to construct a wide skirt to go around the lower chassis. He provided them with a pattern and some rubberized fabric, but no explanation.

Apart from a little mumbling and grumbling about 'not being let in on it!' and 'when is he going to tell us?' they worked like troopers.

The day finally arrived when Tom pulled up in a truck he borrowed from Swift Enterprises. He and Bud climbed up into the back and tilted up a large metal disk. It was almost six feet tall and about four inches thick with a series of more than a hundred holes in the middle.

They rolled it down a makeshift ramp—a length of 2x8 wood—and into the barn. Tom returned to the truck and pulled up another round device, this one looking like the blades inside of a jet turbine, but obviously made from a very lightweight material. He picked it up and carried it into the barn.

"Bash, San. I'll make you a deal. If you will go pick up some lunch, Bud and I will spend the next hour getting this into place and then I'll give you a small demo. Deal?"

"Okay, but you eat what we get. No special orders!" Sandy told him as the girls walked over and climbed into Sandy's little compact car.

"So, I know what this is supposed to be," Bud told him, "but I would appreciate knowing enough about how it works to not look like an idiot in front of Sandy and Bash."

As they assembled the new components Tom filled him in.

"This turbine on top is exactly that. It will be attached using ten metal sliders that bolt around the perimeter of the bottom wheel, which from its weight you might have guessed is a flywheel. When we need downward airflow, we lower the turbine and snap it down using these latches," he pointed at the devices sitting next to the turbine wheel," and it seals to the flywheel. As the wheel turns, the turbine forces air down and through the holes in the wheel and gives us a lot of downdraft."

A spark of recognition lit Bud's eyes as he now realized precisely what Tom had in mind. When he asked if his assumption was correct, Tom nodded.

"Why the flywheel, though?" he asked.

"Easy. This is a kinetic race. Kinetic energy is what something that is moving has. A big flywheel like this gives us a huge amount of kinetic energy, and before you ask, I made a call to the organizer and he loved the idea."

They completed the assembly and installed the wheel, sliders, latches and the turbine system and had it working a few minutes ahead of the return of the girls. Once they ate, he asked everyone to stand around the vehicle.

"When Bud and I pedal, or even if just one of us is pedaling, the transmission takes the rotation of the chains, redirects it sideways and to a central gear there on top of the shaft of the new assembly. That spins what is best described as a combination energy storing wheel and a turbine fan. If we just need to move forward over pavement or even a dirt road, we engage another chain to take rotational energy from the wheel and transfer it to the front and rear wheels. Oh, yes. This is a four-wheel drive racer. It has to be in order to properly use the treaded tracks."

"What about when you must cross the water portions of the course?" Bashalli asked.

"That's when we lower the turbine blades, spin up the wheel and all the air is shoves down goes through the flywheel and up we bob."

"Well, I'll be," Sandy said pointing to one side. "That skirt you had us make isn't for decoration or to hide anything… you're turning this into a hovercraft!"

Tom gave his sister a hug until Bud stepped forward, tapped him on the shoulder, and said, "You've got one of your own. Let me congratulate this beauty for her most excellent answer."

After hugging Bashalli, Tom continued. "Sandy's right. It isn't going to be of much use to us for the roads or across the sand. As it is, it will take us all we have energy-wise to get the wheel spinning fast enough for the short time it will take to get across the water, but it should be very effective when we *are* on water. Plus, once we get it up to speed for road use it will only take one of us pedaling to keep it going so we can spell each other during the rest of the race."

Bashalli pulled away and faced Tom with a look of sadness. "Everything Sandra and I have done is going to ruin your balance I fear. Either that or it will just act like a big sail and push this wonderful craft over."

Tom gave her an encouraging smile and shook his head.

"I don't think so. For starters I've weighed everything you two have made. It only comes in at about eighty-nine pounds. That is more than compensated for by the flywheel. As far as being a sail, I have a plan for that."

He showed them a series of thin cables and pulleys that would be used to position the long and thin upper structure to take advantage of any wind. "It might even help on dry land. Even if it does nothing else, we can let the decorations swing with the wind so they won't overbalance us."

Bud slapped him on the back. "This is great! Makes the two hours of power riding I've been doing every morning worthwhile."

Tom's head swiveled around to look at Bud. "P-power riding? What do you mean?"

"You know. We're going to be pedaling for up to twelve hours a day for three days. Even with the kinetic wheel thing, we're still going to be doing a lot of it…." Something dawned on him and his face fell. "Oh, Tom. Don't tell me that you haven't been getting into shape for this. There are just eleven days until the race!"

PART 3

OUT IN THE *REAL* WORLD

TOM MADE a final check of all moving parts. He wasn't worried about mechanical breakdown on the road parts of the course, but there were the two stretches of water—a three-quarter mile protected area and a quarter mile tidal channel—plus one sandy portion and three separate wilderness paths.

What he worried about were all of the computations that had gone into the radical design. There were so many things that could go wrong with the transmission and with the tracks; so many chances for one component to not work the way it was needed.

To make matters worse, the training regimen Bud put him on had left no time to come down to North Carolina early; there was no time to drive and study the course. They had both ridden twice a day, every day, while the girls finished with the decoration of the racer. In between rides, the foursome completed the vehicle and gave it a cursory test. Everything worked, even the treads, so Tom had decided to test them with a short sand crossing near the lake and a quick jaunt across a mud field.

Late that afternoon, a half-hour test on Lake Carlopa proved many things: that they had the necessary endurance to make a crossing; that the flywheel and turbine could keep the hover skirt inflated and the racer up and floating across the water; and that they crossed the water but not very quickly.

That necessitated the last-minute design of a pair small propellers to add to the back of the craft. He and Bud were prepared to work at building and installing them all night long just two days before the race until Tom realized that the treads could do double duty. He abandoned the propellers and tried a second test on the lake with the treads attached to the wheels and sitting underneath the hover skirt. Instead of about half a knot per hour, the little racer hit almost two. They would make the wider crossing in about twenty-five minutes and the shorter one in under fifteen.

That was the good news. The bad news was that he ached all over and was beginning to doubt whether he would have the stamina to finish the full three days of the race.

Since transportation was totally at the discretion of participants, Tom decided to fly down late two nights before the race, offload the racer and let Slim Davis take the *Sky Queen* back to Shopton before anyone in the area knew it was there.

The completed racer was one of sixty-three entries in five categories. Each one had to compete in a one thousand foot sprint the evening before the race. This allowed the organizers to assign the categories and start times. Being in the fastest group it only came down to the luck of the draw that Tom and Bud started last in the group of eighteen.

Sandy and Bashalli were sad that their decorations didn't even get a mention. It wasn't hard to see why. Although the large rooster head and neck—the one Tom placed on a swivel so that it might present the least amount of resistance to whatever wind they might encounter—was shiny and attractive, it was tame by comparison to some of the more outlandish entries.

"And," Bud said as they headed to the motel rooms they rented that morning, "this is nothing. There's a guy out in California that creates a different giant head sculpture every year. Amazing colors, a head that swivels, eyes that open and close and look from side to side. Mouths that open and close and even one with a tongue that stuck out and flapped up and down."

Everyone assembled in the parking lot behind a single-story house currently used by a real estate company, rolling their entries to the start line minutes before getting their start signal… a loudspeaker broadcasting a fart noise.

When they pushed what Bud had christened the *Dizzy Chicken* up to the start line, Tom climbed in and strapped into his seat. Bud signed the logbook and got in opposite him, and then they began the process of getting the flywheel up to speed. Two minutes later and only at about half speed, the fart told them it was time to push off.

Tom pulled the lever engaging the wheels and the racer lurched forward, out of the driveway and made the right turn to head the three blocks to the highway. They immediately saw that traffic cones were set up as far as they could see giving the racers a special lane in which to run.

Bud had the entire route map on his tablet computer and had built a special waterproof case for it to sit in right in front of him. "We'll keep on route two-sixty-four for about thirteen miles. There's a rest stop at the eight-mile

point. It's not mandatory but the clock stops for up to thirty minutes of rest or repair."

Five minutes later they passed the entry that had taken off five minutes ahead of them. The three college students in their upside-down power drill were struggling, even on the relatively flat road. A minute later the drill rolled to a halt behind them.

Tom looked back. "Must have broken down. Hope that doesn't happen to us!"

As they neared the rest stop, what was actually just one of the many country lanes branching off from the highway, Tom was all for forging ahead, but Bud shook his head.

"Your face is getting red, skipper. I don't want you having problems later. We'll stop right on the road—that's allowed if you aren't doing repairs or adjustments—and I'll keep the wheel at a reasonable speed."

Once they stopped and a race official keyed in the code to put their timer into the hold state, Tom leaned back and stretched his arms and legs. Bud was right. If they had opted to continue to the next rest and repair stop there would have been little room to pull over in case of a mishap. Plus, he had to admit that he was tired.

Bud took the first ten minutes of their break time, Tom did five and then Bud did another ten while Tom made certain everything was still attached and tight. It was.

They left the rest stop six vehicles from the front. It seemed a good position, but Tom had to remind himself that this was a timed event and nobody could access the times of their rivals until the race had been completed, so they would never know where they stood in race.

They only passed two other racers on the way to the first changeover point. They were directed off the highway and down a rough trail through scrub grass and sandy soil until they arrived at the edge of the first water crossing. This was the mandatory three-hour rest point and lunches were served to all participants. Because of the inaccessibility, no fans or assistance vehicles were allowed at this point, but Tom could see hundreds of people along the beach on the shore opposite them where all vehicles would exit the water and prepare for the first all-sand leg of the course.

"We're going to have to rig up everything here, skipper," Bud reminded Tom.

"Yes, but once we exit the water we need to stop long enough to take off the hover skirt. Otherwise we'll be shooting sand up and all over ourselves. As it is, I am second-guessing myself about not making a lower cover to keep sand out of our transmission."

Near the end of the rest period another drawing was held and Tom and Bud were the number two entry to go into—or as in their case on top of—the water. They had attached the treads and the hover skirt during the break and were ready. They got the flywheel running and eased to the water's edge.

As other entrants looked on in envy, Tom and Bud pumped harder and the *Dizzy Chicken* soon rose a few inches and edged onto the water. When Tom engaged their wheels and treads an audible gasp went up as the two Enterprise men scooted away.

"Hey!" Bud said as he watched the water move past. "What gives? We didn't do this well on Carlopa."

Tom smiled. "I added a steerable flap to the back of the skirt. See the lever under my knee?" Bud craned his neck over and saw what Tom was pointing at. "I can open or close the flap and move it about ten degrees from side to side. Pretty good, huh?"

They received a rousing cheer and lots of applause as they practically flew up the makeshift boat ramp on the other side and came to a halt in the changeover area. While Bud kept the flywheel going at high speed, Tom hopped out, unsnapped the hover skirt and rolled it up for stowing in the back of the craft.

Two minutes later they moved away on their treads on the two-mile sand leg of the race. There were a few rises to negotiate but the power provided by Tom's flywheel arrangement got them up and over everything in their way.

Fans, friends and families were already set up at the stop point. Sandy and Bashalli had been joined by Chow Winkler, two large tents and a portable kitchen built into the side of a van.

The girls were all laughs and squeals as they greeted the boys. Both Tom and Bud were dead tired but enjoyed the attention from their girlfriends and the congratulations they received from people in the gathered crowd.

The old Texas range cook was right in his element: a rough terrain, wide-open spaces and a hungry and appreciative crowd. He had been forewarned and brought along enough food to feed at least fifty.

As the flywheel slowly spun down, Tom and Bud sank onto cushions while the girls served them a late afternoon meal and ice-cold glasses of tea.

Over the next five hours all but three of the total number of entries made it. The college drill team had to pull out—shortly after they boys passed them—with a broken axle, one of the youth teams got cold feet before they could get wet feet and had bowed out before the water crossing, and the third entry sprung a leak fifty feet from the exit point and had been abandoned.

Her wet and tired crew walked out of the water to a rousing cheer from the crowd, and eight men waded out and attached a tow rope to the submerged racer so it could be pulled from the water.

It was a fun evening and an early night for all.

The second day saw everyone up, checked, adjusted and repaired as required, and back on the road by nine a.m. They drove out on the nearby access road and back onto the highway where Tom quickly realized that they were retracing about three of the highway miles they had traveled along the day before.

The first official stop was to be another eleven miles up the highway at an old forestry service station. Tom insisted on a premature stop a mile short of that point when he detected the smell of hot metal. Fearing it might be the flywheel he climbed out and lay on the ground feeling for heat. When he found nothing out of the ordinary he and Bud checked the entire rig.

As it turned out, the chain on Bud's pedals had been rubbing against a cross brace piece that had loosened up

at some point. Tom quickly had it back in place and tightened in no time, and he and Bud were back on the road before more than two entries could pass them.

The official stop was to be a two-hour one so Tom decided to allow the flywheel to wind down again. He and Bud ate with the rest of the contestants, then returned to the *Dizzy Chicken* and checked and tightened every nut and bolt.

He also took the opportunity to re-grease the flywheel and the various transmission components

The next part of the race was another grueling twelve-mile stretch of the highway, almost all the way up to Manns Harbor. What followed a thirty-minute optional rest was one of their forest routes and consisted of a rutted dirt road for about a full mile that deteriorated into a mud track—courtesy of ten gallons of canola oil, the local fire department and five tankers full of water—that was designed to test both man and machine.

Tom and Bud decided to try the forest leg using the treads but soon pulled over and rigged the hover skirt. It went very well for them, but they arrived at the point where the trail rejoined the paved road covered from head to waist in mud and muck.

There would be no place to clean up man or machine until their stop for the evening, so they rigged for road driving and pressed on, carrying an extra ninety or so pounds of mud. This final leg for the day was a route that took them through Manns Harbor, across the Virginia Dare Bridge and into a field near the Outer Banks Visitors Center.

They arrived at five in the afternoon near the front of the pack, and the last entry to make it came in a well past midnight.

Everyone was filthy from the mud, so they lined up on the appropriately named Water Point Road where facilities to wash yourself and your racer were provided.

Bashalli, Sandy and Chow volunteered to wash down the *Chicken* while Tom and Bud showered and changed into clean, dry and comfortable clothes. Both were absolutely bushed and discussed how they might make it through the following day.

Tom was astonished at the amount of water Bud was gulping down before bedtime. He wasn't very thirsty himself so he just had a can of soda water before dropping off.

When it came time to climb into the *Chicken* the next morning, Tom's leg muscles revolted. They both cramped up and he couldn't move. Sandy rushed to get the duty medic. When the woman saw Tom she said two things. "You, blondie, sit on those legs and get them straightened out. You. Mr. Crampy, hold out an arm; you're getting an IV!"

As she inserted the needle she gave to a weary but necessary lecture about keeping properly hydrated.

An hour later Tom's cramps had disappeared as had the medic. He and Bud had to take a fifteen-minute penalty for missing their start time, but got back on the road for the second-shortest leg of the contest. They coasted into the Dare County Regional Airport eleven minutes later where they were directed to the end of the main runway.

With no aircraft due for the next three hours, everyone was running a time sprint down to the far end. Although only four thousand feet, for Tom and Bud it meant getting the flywheel up to its fastest speed. They tore down the runway, exiting at the final crossing point and swung past the official's table where they were told they had the course record. If it held up they would be receiving a medal at the awards ceremony that evening.

Everyone sped across the Manns Harbor Bridge and then turned off to the right onto a two-lane road. A few miles further along Bud signaled to Tom to make the next left turn taking them down to a boat access ramp next to an inland tidal pond. The trick, they were told by the course proctor as they rigged the treads and hover skirt, was to judge the water's flow. The exit point was only twelve hundred feet away, but anyone thinking they could take a direct route was fooling themselves.

The boys were considering themselves lucky as the tide flow had just changed from out to in and that meant a lot less possibility of ending up a mile off course. There was only a half-mile to play with in the direction they might be pushed.

But, as Tom reminded Bud as they pumped up the flywheel and turbine, filling the hover skirt, "We're not going to be affected much by the water, flyboy. We're going to be above it!"

As they expected, they made the crossing with no problems. Their elation, however, lasted only as long as they were on the water. Once at the opposite side they discovered the inflated skirt made it almost impossible to climb up the fairly steep opposite side. It took them three runs to get up enough speed to get the treads up and onto the shore and then into a gap in the trees and bushes.

While re-rigging for treads-only mode, Tom discovered that one of the tread segments on the left track had split. The cast plastic part was still holding together but he doubted that it would get them the half-mile through the trees and onto the all-but-invisible mile-long trail aiming back to the road. At that point he had planned that they could use the road tires that had worked for all paved surfaces.

This new damage put a crimp in those plans.

"I don't know what to do," he admitted to Bud. "About the last thing I supposed we'd have to do was repair the treads. It was probably that last push onto shore that did this one in."

Bud looked through the small repair and tool kit they packed for something that might suffice. He found nothing. "Next time we'll bring a tread repair kit," he said lightly. "Too bad I have no idea what might help us now."

"Oh," Tom said looking at his friend. He had seen what was and what *was not* in the repair kit. "That's easy. If I had a couple feet of good wire I could probably make a sufficient repair for this last bit."

Bud smiled, steepled his fingers as if praying and tilted his head up to the sky. "Oh," he intoned. "That's easy!"

"Bud. This is not the time to be mocking me," Tom said a bit crossly.

Still looking up, Bud repeated, "No, skipper. That's easy. Really easy, Tom. Look up and you'll see how easy it is!"

Tom gazed up and a smile broke out on his face.

Fifteen minutes later the *Dizzy Chicken* was beak-less and the stiff wire Bashalli and Sandy had used to form it was wrapped around several parts of the split tread and twisted tight.

Bud made Tom drink a twenty-four ounce bottle of sports drink before they hopped back in and pedaled the flywheel to speed. They took off, moving slowly and navigating by the compass application Bud's computer had in it, toward the nearest point where they might pick up the trail. It took an hour but they turned back toward the road and the one-mile trek to pavement.

The repair held. They removed the tracks and stowed them, then took the time for another big drink before pedaling on.

The last part of the race was back to and around Manns Harbor ending the race in a field behind the local post office and near the water.

It didn't matter who they may have come to see, everyone in the large crowd gave every entry the same cheering and applause as the remaining fifty-one entries came over the finish line during the following four and a half hours.

It would take a couple hours for the scores to be tallied so Tom and Bud found spots on the ground, covered their heads with hats, and took a nap.

Tom woke an hour later and wandered over to talk with a group of people.

""We have a tradition," the announcer, who Tom now recognized Dwayne Brown, told the crowd an hour later, "of giving you all the raw times before we tell you who got what penalty or what time taken off for winning certain segments. Here goes…"

He read off the entries in alphabetical order by the person whose name was on the form. Bud's name and their raw time was read off fifth. It sounded good and Tom became more and more pleased as more and more times were read off. In the end, they had the lowest time.

As awards and penalties were read out, Bashalli almost couldn't contain herself. She kept grabbing and squeezing Tom's arm until he was afraid it might be getting bruised. He put it around her shoulders and pulled her in close.

"And so, it is with great pleasure that I make one announcement for those few of you who haven't been paying attention. Team Barclay with their *Dizzy Chicken* was a two-man entry. That's the one with the spinning wheel underneath and the genius on top. Tom Swift was Mr. Barclays teammate." There was a round of applause and many in the audience who craned their necks trying to see the famous inventor.

"So, as you might expect, Tom and Bud came in with a record shattering total time, beating even the closest competitor by a full two hours!"

There was more cheering.

"Their total was twenty-nine hours, eight minutes and fifty-seven seconds."

Tom stood up and shouted out, "Can I make an announcement, please?" When the crowd silenced, he continued. "Bud and I had a lot of fun, but I don't want anyone to feel that we took an unfair advantage. We

followed each and every rule even though our flywheel might have pushed the envelope. So, with the greatest respect to the other contestants, we are removing ourselves from any consideration for prizes, glory or whatever. Thanks!" He sat down to some applause and a little laughter.

"Wow, folks," Dwayne Brown said over the P.A. "That's all kinds of gracious of Tom. However, as we all know—all of us except for Tom there, evidently—nobody gives a hoot who comes in first! This year's prize, a nineteen-sixty-five Rambler station wagon in practically drivable condition plus the coveted hug and kiss from this year's Rutabaga Queen, Jimmy French, goes to the team finishing dead in the middle… Jayne and her Giant Peach!"

The crowd erupted in applause and cheering.

Tom turned to Bud with a look of confusion.

Bud smiled. "You might have wanted to read the last page of the booklet, skipper. The 'middle entry is the winner' is spelled out in bold letters. Everything's in the rules!"