



THE YOUNG TOM SWIFT JR. CHRONICLES

Young, Gifted and Swift!

By T. Edward Fox

Tom Swift, Jr. is about to celebrate his 9th birthday and is ready and raring to follow in the footsteps of his famous father and grandfather. The only thing holding him back is World War II and his father's belief that there just isn't any time that can be taken away from the war effort to ensure Tom's safety.

Tom is tired of just sitting around and dreaming of all the famous inventions he will produce... if his dad ever lets him. So, armed with several boxes of wires, tubes and other circuitry—and realizing that his mother would never allow him to design or build a bomb—he sets out to build a powerful video radio; a device that he might be able build that will aid the soldiers in the European and Pacific theaters of war.

Fate and great inventor's genes lend a hand and Tom makes amazing progress. Is he capable of designing something that will help the military? Is it something that will put his name on the map? Or, is it just going to be another old radio?

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This book is dedicated to young boys and girls who dream of following their parents. Whether it be eventually taking over the family business, joining the military, or whatever, I thank all of you who can get through your teen years and still want to "do what Dad (or Mom, of course) does."

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FOREWORD

A talented author who has chronicled a couple of Tom, Jr.'s exploits—including his first truly major project, the Nuclear Hyperplane—asked a simple question: “If Tom suddenly made a name for himself at the age of eighteen, what the heck did he do before that?”

Of course, that is a bit paraphrased, but I hope you get the point. And, it is a very good question. Obviously, his father started out fairly simply with a modification to a butter churn, but he did a number of things well before he turned eighteen.

If, as they say, the apple doesn't fall far from the tree, then our Tom Jr. should have been doing amazing things before he turned into a teenager. I am happy to tell you that he, indeed, did.

This story is not about his first invention—an automatic winder for the family cuckoo clock—nor is it about his other small mechanical inventions like his clockwork griddle cake turner or his improved vacuum cleaner impeller. It is the story about his very first electronic project. The one that really sparked his desire to visit strange places, meet unknown people, and make things that truly helped people.

Victor Appleton II

CHAPTER 1 /

But, Dad!

“NO, TOMMY. I'm very sorry, but what with the war going on and all our efforts going to our nation's military, the Swift Construction Company just can't give you your own laboratory and an assistant.”

Tom Swift, Jr. sat on the corner of his father's desk at the company that bore the family name. His father was the world famous inventor and industrialist, Tom Swift, Sr. A man responsible for dozens of inventions and improvements to existing machines and processes over the years.

Tom, Jr. looked at his father and sighed. His lower lip beginning to quiver, he said, “All I asked for was some space to do some experiments with and maybe someone to help me when I can't figure something out. Golly... it isn't as if I was asking you to help me.”

His dad looked at Tom and the stern scowl on his face vanished. “*What am I doing?*” he thought to himself. “*I had every opportunity to play and experiment when I was young. Have I become so jaded that I won't let my own son have the same opportunities?*”

To Tom he said, “All right. I know that I promised you a workshop of your own at the house and I sort of didn't get around to building it for you.” He watched his son's face begin to brighten. “Here is my offer to you. We have a couple of prefabricated storage sheds over behind the factory building number two. I'll have your uncle Ned find a couple men to take one down and truck it over to the house sometime next week. They'll set it up in the back yard, out by the kennels.”

Tom jumped off of the desk and ran around the hug his father. “Great, Dad! You're the niftiest! And I've already got

a couple old soda bottle crates in the storm cellar that have lots of neat stuff. Oh, wow. I'm gonna invent something really big and important. Just you see!"

Trying to hide the smile that was about to burst out of his face, his father added, "And, I can give you a few extra boxes and cartons of some of our electronic gear. You know, things like some radio tubes and power transformers and wire and all that sort of things. Do you have some ideas about what you want to build?"

Tom, Jr. thought for a minutes and then shook his head. "Not yet, but I'll come up with something."

He gave his father a second hug and then ran out of the office, down the hallway and out into the large parking lot where he had left his bicycle.

All the way home, young Tom's mind raced even faster than he could pedal. What *could* he build? Some sort of electrical weapon that could seek out the Nazis and their nasty leader, Hitler? Maybe zap him in the trouser seat every time he had a bad thought or killed another American?

By the time he arrived at the Swift house, he still had no solid idea, but he believed that once he could lay out all of the gears and pulleys and the vacuum tubes and stuff his father would provide, that something would just have to come to him.

His beautiful mother, Mary, and his obnoxious little sister, Sandy, were waiting for him with a plate of fresh baked gingerbread cookies and a glass of milk.

As Tom sat down at the kitchen table and reached for his glass, Sandy stuck her tongue out at him and made a face. Like practically all little sisters, she really looked up to her brother, even though he was just thirteen months older.

And, like most big brothers, Tom was merciless when it came to teasing his sister when they were at home, but

would fight anyone that tried to hurt her when they were out.

"Did you father tell you how sorry he is that he can't give you any place to invent?"

"Golly, Mom. Dad is having a work shed delivered here and I'll be in there the rest of the summer and I'll come up with a really neat invention that will help win the war and—" Mary Swift placed two fingers gently over Tom's mouth. "Slow down, take a breath and make individual sentences when you speak. You know better than to run on and on like that."

He grinned, sheepishly. "Sorry, Mom. Anyway, I'm gonna come up with a real doozy!"

Mary sighed. "Will you at least promise me one thing?" she asked, recalling many instances from years before. "If you do invent something really good, promise that you will not go racing off in it, or sailing pell mell across Lake Carlopa at a hundred miles an hour or soaring off to South America and goodness only knows what sort of terrible adventure?"

"Yeah!" was all that Sandy cared to contribute to the conversation.

"Mom, you know that I'll always stay around here. I've heard the stories about how Dad almost killed himself every time he invented something. He says he was always safe and you say he was always one step away from the undertaker's office. I promise that I won't every do something dangerous. Promise." And he crossed his fingers over his heart.

Mary smiled at him and ruffled his hair as she got up. Turning to the sink, she said in a very low voice, "And that promise will last for no more that five or ten years at the most." She sighed again.

The following Tuesday a large Swift Construction Co. truck pulled into the driveway, and three men off-loaded a num-

ber of wall and roof panels. In less than an hour, the new ten-by-fifteen foot shed was complete and standing next to the family kennels were several hunting and retrieving dogs were kept.

One of the dogs, Boomerang—a mastiff with droopy ears and a faraway look—had taken exception to the appearance of the men and had let out a series of growls. These lasted until one of the men took a large bone out of the truck and tossed it over the fencing.

Boomerang lay down and spent the rest of the afternoon gnawing on his new prize.

Tom was elated to see the shed completed. He had watched the entire process from beginning to end and had already figured out a better system of attaching the panels rather than the series of nails and screws used by the men.

As they prepared to leave, Tom gave each of them a twenty-five cent piece, his allowance for the past three weeks. He knew it wasn't much, but he wished them to know how grateful he was.

Within minutes of their departure he had begin dragging out the heavy soda bottle crates that held his treasures. As the shed came with built-in brackets for shelves all around, he also brought out several pieces of wood from the family garage and set them in place.

Soon, he sat in one corner of *his shed* and began dreaming of all the wonderful things he might do. First, he knew that he needed a workbench. "*No good inventor can do anything important without a good workbench,*" he thought.

By the time his father came home that evening, Tom had cobbled together a rough work table. Tom, Sr. came out to the shed and looked around.

"You've done a wonderful job, Son," he told the beaming Tom. "It occurred to me that you might want a substantial

workbench and a tall stool to sit on, so I am having the men come back tomorrow with those. I think they might need to take down one of the walls to get it all in, but that shouldn't take too long."

As soon as his father left, Tom decided to try his idea about making the panels easier to remove and replace. Taking out six heavy hinges from one of his boxes, he attached them to one of the panels and to each of the panels to the right and left. He was certain that once the screws and nails were removed, that a set of hinge pins would do exactly the same thing.

The next morning he proudly showed the delivery men his new system. They were very impressed and even helped to tighten the screws that held the hinges in place. Tom's hands had been a little too weak to finish the job.

He apologized that he didn't have any more money to give them as a gratuity. One man, Paul Bennet, was a long-time employee and told Tom, "No worry about that, Tom. You just invent something that tops your old man and we'll all consider that more than ample payment." He tousled Tom's hair and then left.

Tom spent the rest of the day arranging all of his materials, including the contents of five boxes provided by his father, in all of the drawers and cubbyholes in the workbench and on his shelves. By dinnertime, he was almost as hungry as he was proud of his accomplishments that day.

"Any ideas what you will tackle first, Son?" his father asked at dinner that evening.

Tom shook his head as he chewed on a piece of the stew beef he had crammed into his mouth. Swallowing it, he said, "I've got to get everything really organized, Dad, before I can invent something. You told me that no inventor worth his salt made anything out of a mess."

Tom, Sr. smiled at his wife. “Your mother tells me that you promised her you wouldn’t do anything reckless or dangerous. Right?”

Tom nodded.

“So, I will expect you to be very careful of anything you put together. I will help run a permanent electrical line out to the shed this weekend. Until then, you will have to do everything by daylight.”

They spent the rest of dinner talking about what the senior Swift was working on. “Of course, I have to keep some of this secret because we never know who might be listening, but suffice it to say that we may have discovered a way to keep out flying boys safe when the time comes to drop bombs right on Hitler’s house.”

Tom got up with his father the next morning and could barely keep still while Mary made him his oatmeal.

“Tom,” his father cautioned him, “you can’t invent anything on an empty stomach. Your brain just doesn’t work right without a good meal in your gut, so you sit there and eat. Your things will all be waiting for you when you finish.”

Five minutes later, Tom had gulped down his steaming-hot bowl of oatmeal and had practically flown out the back door and into his shed.

He sat down and took stock of everything he had. The night before, while trying to go to sleep, his brain had raced around attempting to come up with something exciting to create. In the end, he thought that his parents wouldn’t let him do anything with a gun or make a new type of explosive—not even one so small yet powerful that a bomber could drop ten thousand cherry-size bombs that would wipe out entire enemy cities.

Tom closed his eyes and tried to force himself to think about what he could make. “What,” he asked himself, “do

our brave boys need?”

He went back to the house and asked his mother for a few pieces of paper to take notes on. On the way out, Sandy began pestering him. “What are you doing, Tommy? Can I come out and play in your house? Why don’t you let me help you? It isn’t fair that you get a play house and I don’t. If you don’t let me play in your play house, I’m gonna tell Mommy and she’ll let you have it good!”

Being almost eight inches taller than his sister, Tom bent over so they were eye-to-eye and told her, “Some day, Sandy, I’m gonna bean you really good. I’m doing important work and you just want to play with your doll. So, leave me alone or something.”

With that, he ran back out of the house.

Sitting at his workbench Tom began taking a few notes.

What ~~solgers~~ soljers solders need:

Better guns

Good food

Bullet proof uniforms

He stopped taking notes and looked at the last item. “*Now that,*” he thought, “*would really be something they could use. I wonder how you make something bullet proof but still be able to bend?*” He thought back to the only thing he had ever seen that was bullet proof; a new type of glass that his father had developed for banks and armored trucks.

But, he remembered that it was almost a full inch thick. No soldier would ever be able to wear something like that. He went back to his list.

Tiny bombs that can be thrown farther than

grenades or shot with slingshots

Again, he realized that his father and mother would not be likely to let him experiment with explosives. He considered scratching through it, but decided not to.

Flying telescope to spy on enemy

Now, that one had some promise. His father already made airplanes that flew higher than the German guns could ever reach. If he could just make a new telescope, maybe one with a camera, that could be put inside of a plane and flown over the enemy...

“Oh, drat!” he thought. He had remembered a demonstration of an aerial camera with high-powered lens that his father had described just a few months previous.

He amended his listing:

Flying telescope ~~to spy on enemy~~ with movie camera

That might be a different sort of invention. Then an idea hit him like a bolt of lightning.

“I’ll bet nobody ever made a camera that could radio the pictures back to the command post so they could see exactly what the plane was flying over right then!”

Once more he amended his last entry:

Flying telescope ~~to spy on enemy~~ with movie camera and radio transmitter

That was it. That was going to be Tom’s first real invention. A camera and radio system that would send back immediate pictures to the commanders so they could direct their troops right to the enemy strongholds.

After all, Tom remembered when he and his father and mother went to the World’s Fair just three years earlier and saw the new television system from the Radio Corporation of America.

Although just a tiny screen and fairly blurred, Tom had been enthralled, along with the thousands of others that had seen the exhibit. Tom still had the little card that he had been given when a pretty lady had asked him to come up from the audience and sit on a stool and have his picture transmitted from a very large electric camera right onto the small screen.

It had been signed by the exhibit director himself, Joseph Dagostino. Tom was very proud of that little card and had pinned it to his wall right above his bed.

“I’ll bet I can make a better television system that will be clearer and doesn’t require big cables and all sorts of equipment to get the pictures to a screen a mile or more away.”

Tom ran back to the house and pulled out one of the Britannica Encyclopedia volumes from his father’s study. He flipped through the pages until he found the part about airplanes. A few minutes later he came to the disappointing part that told him war airplanes flew at more than four miles high.

He located several other volumes and, asking his mother if she thought it would be alright, he took them out to his workshop and began reading.

Fortunately, Tom’s parents introduced him to reading at an early age, so by the time he turned six and began primary school, he was already reading at a third-grade level. Now, at almost nine, he read books meant for people in their teens and even early adulthood.

He took note after note from his readings and soon worked up a series of figures that he felt sure would show him how

serious a job his proposed radio camera system might be.

That evening he sat with his father and explained what he had discovered and asked the older man for help in doing the complex mathematics involved in deciphering all of his research and coming to a numerical conclusion.

Tom, Sr. had shown his son how to use a slide rule more than a year earlier, so he read off numbers and suggested what sort of computations might be best.

After more than an hour Tom had come up with the answer he wanted. His camera would need to transmit almost five times more information that normal radio waves could handle.

Dejected, he looked at his father. Tom, Sr. said, "It only means that today's radio and the wavelengths used today are not adequate. There is nothing that says that someone, perhaps you, won't come upon a way to increase the capabilities so that your radio camera idea can work."

Tom went back to his shed and sat deep in thought. After almost another full hour an idea began sneaking into his thoughts. Nothing that he could lay a mental finger right on, but there was a glimmer of something.

He picked up his pencil and began to doodle on one of his sheets of paper. He started off with a representation of a plane and far below the ground with a radio tower. He drew a lightning-shaped line from one to the other. "*Obviously,*" he thought, "*that's the radio beam.*" He drew another next to it and then another.

And, then the idea came right to the front of his brain.

Why a single radio wave? If one couldn't carry enough information, why not two or three or even ten? Why not divide the information and send it over multiple radios and all into something that could reassemble it into a single television picture?

Why not?

CHAPTER 2 /**First Attempts**

TOM ran into the house and told his father about his thoughts. Part way through his breathless description, his father suddenly sat forward, his eyes growing wide with excitement.

Although he secretly felt that it would be years before something such as Tom's radio camera might be viable, he was nonetheless excited at the prospect. "Tom. That's great! You will need a great deal more in the way of tubes and other parts than I have already given you. Tomorrow, I'll ask your uncle Ned to put together a large packing crate full of things you might be able to use."

Next morning, Tom sat at the breakfast table absently stirring his oatmeal while it cooled. Sandy was eating a piece of wheat toast with some of Mary Swift's apricot preserves, looking at her brother.

Finishing one piece, she held out her plate with the other half to Tom. "Wanna piece of toast, Tommy?"

Tom looked over at her. She had a look that told Tom she probably wanted something. She usually only wanted to share things with Tom when she wanted something.

"Hmmm? What do you want, Sandy?" he asked.

Sandy sat there looking at her brother. Even at the age of seven, she had figured out that her brother was suspicious of her motives. Her brows furrowed as she thought about how to ask him her questions.

"Tommy. I love you," she stated, trying to look the picture of innocence.

Mary looked at her children. She knew something was going on, but was grateful that her two offspring got along with one another so well.

"What do you want, Sandy," Tom repeated, this time taking the offered piece of toast even though he knew he was committing himself to something.

"Well, Phyllis Newton is coming over today and she's bringing her doll and I've got my doll and we want to play house and everything—" She paused to take a breath. "—So I wondered if we could use your play house and have a tea party and play house with Phyllis's doll and my doll and the tea party set that Gramma Nestor gave me last Christmas and we'll be really careful and not touch nothing and—" "Not touch anything, dear," corrected her mother.

"—not touch anything and we'll be really quiet and you won't know that we are there and—"

Tom held up a hand to stop her. Before he said anything, he looked at this mother to see if she could help him, but she had busied herself with putting the breakfast foods away in the shelves and her refrigerator.

"Sandy," Tom began, trying to sound calm. "I've got a lot of important stuff to do in there today. This is kind of like the most important day. How about this? You and Phyllis can play in my room. There's a lot more floor space. You just have to promise that you won't let her draw anything on my chalkboard. Alright?"

The last time Tom had allowed Sandy and Phyllis to use his room, his sister's friend had drawn hearts all over the board—including right on top of some notes he had jotted down—and put things like, 'P and T' and 'Phyl loves Tommy' all over it.

As he thought back to that he shuddered and let out a little, "Yuck!"

Sandy looked to their mother for support, but found none. "I think Tommy is giving you a very good deal, Sandy. He is very busy in his work shed and so I believe you should take his offer."

Sandy's shoulders sagged and she said, "Phooey. Alright. We'll play in Tom's room," and so saying got up and left the kitchen.

"You know, Tom, Phyllis Newton is very sweet on you. And she is a very nice girl. Very polite and always does what her parents say."

"Ah, Mom. She's all wet." With that, Tom left to go to his work shed.

He began looking through one of this father's volumes on electrical circuitry trying to find radio circuits for both reception as well as transmitting. By that afternoon, and just as the Swift truck was delivering a quite large crate of additional things, he had begun drawing out a diagram of a radio transmitter.

Tom still wasn't certain if it would be possible to create a radio that might broadcast on multiple wavelengths simultaneously, or whether he would need to create several strong transmitters plus a means of separating the original television signal into different components.

His first thought was to try a multiplexing transmitter and receiver. He reasoned that a single device might be capable of splitting the information and broadcasting it over two transmitters to a single receiver just as the early stereo radio pioneers had done.

His father reminded him that weekend that in the case of stereo audio broadcasts, it was the use of separate microphones, amplifiers and transmitters that the miracle was possible.

Tom thought on.

He built two small radio transmitters, barely capable of reaching more than a few dozen yards. To these he added sound microphones and amplifiers. Within the first week he had created his own small stereo radio station broadcasting in the 1110 KHz and 1120 KHz bands.

His own monaural radio could be tuned to pick up one or the other, but he wasn't satisfied until a full ten days later when he had combined two small AM-band radios together in a single wooden case. To each he added a speaker placed on opposite ends of the case.

While the result was interesting, he felt that it would be a waste of time trying to accomplish nothing more than other, better-equipped companies had already been doing.

But, he felt that he was heading down the correct path.

With his father's permission and assistance, Tom placed a person-to-person long-distance phone call to an engineer his father knew at the DuMont television laboratories. He asked the man about the differences in sending visual signals rather than audio ones and found out that very powerful radio tubes were necessary, far more powerful than those Tom had in his work shed.

After agreeing to send Tom a few diagrams, Tom thanked the man and hung up.

"Dad? Do you have any klystron tubes at the Construction Company?" Tom asked the next morning.

"Uh, I believe we have quite a few of both," came the reply. "Why do you ask?"

Tom told him about his intent to create a more powerful transmitter, one capable of carrying signals at a higher frequency than radio. "It will be a very high frequency, Dad. But, I need to have a klystron tube and a lot of electrical power."

Thinking back to his youth, Tom's father chuckled. "You know, your grandfather had a man named Garret Jackson and a whole building dedicated to the creation of steam, mechanical and electrical power, Tom. Grandfather needed lots of power, and I was always rigging up ways of sending it to my own shop."

"Can I have one?" Tom asked. "I mean, may I have a klystron tube?"

"Before I find one for you, I want you to research all about them. You do know, for instance, that the more powerful ones create so much heat that they need to have a water cooling system?"

Tom admitted that he had not known that fact.

"Well, you spend a few days or a week in study and then we'll see."

And, Tom spent that next week pouring through all of the books in his father's private library that might help him as well as going twice to the Shopton Public Library and going through many of their reference books.

The librarian, who had been very much against allowing a small boy have access to her very important volumes, gave in quickly when pointed out more than a dozen inaccuracies in her card catalog file system.

In one great volume written by the scientist, John 'Logie' Baird—a Scotsman who was being credited with the actual creation of what became television—Tom found much of what he wanted. He used that week's worth of allowance buying a large packet of paper with grids printed right on the paper along with a special three-sided ruler.

When he finally sat alone in his workshop looking through all he had copied or written based on his own thoughts, his head practically swam.

There were so many things to consider about klystron tubes. Some inherent dangers that he knew would send his mother into fits, but he felt certain his father already knew. That being the case, Tom knew that there could be nothing gained from keeping those facts from the great man. The two 'inventors' had a serious discussion that evening in his father's study.

"I am proud of you for telling me about the dangers. And, yes... I did know about all of them. You show great maturity for an eight-year-old in not trying to keep those secret." He smiled at his son.

Tom smiled back. "Should I let Mom know about them?"

With a look of mock horror, Tom, Sr. leaned back and whispered, "Oh, goodness, gracious, no! Just promise me that you will allow me to look over everything you build before you turn it on or even hook it up to the power. Alright?"

Tom agreed.

The next day was Saturday so Tom knew he would need to wait until Monday before receiving his precious klystron tube.

When it did arrive, he stared into the deep box with his mouth agape. Inside the box were four tubes: two klystron tubes and two other tubes that Tom later discovered were magnetrons, an alternative to the klystron.

He had already begun creating his first two-station transmitter so he cleared all of that off the workbench and spread out the multiple documents that had accompanied each of them. He soon figured out that his father had provided some of the smallest, weakest tubes available.

When he queried his father about this fact, the older Tom looked him right in the eye and said, "Tom. You are a genius. Far smarter than I was at your age. In fact, I think you are far smarter than I was at twice your age. But the fact remains

that you are not even nine years old and there are so very many things that can go wrong when dealing with electricity and radio waves and all that. Because I am busy at work six days a week, I can't be here to oversee you and make sure you don't make a small mistake that could harm you."

Tom was disappointed, but said that he understood his father's reasoning. "But, I'll never build a working airplane-mounted radio camera unless I can do things at higher power."

Nodding, his father sagely told him, "Tom. It isn't the point to make a full-fledged radio camera all ready to go to war. Most inventors, your grandfather and myself included, rarely built more than working or semi-working prototypes. All of the inventions I've made this past few years have been turned over to the War Department and from that point they have been perfected and built by people I've never even met."

He told Tom to keep at it and to do what every good inventor does: start small and work up from there.

With school starting back up in five weeks, Tom put his mind and his fingers into overdrive.

After requesting a second klystron to match one that had come in the large case, Tom built a dual-band transmitting setup that he believed could send radio signals at least a half mile. More research showed him that the two wave bands could be made even closer assuming that the receiver could be made to precisely discern between radio bands. Most of the radios he found or read about were barely capable of separating signals that were less than 20 KHz apart.

Again, not wishing to try to perfect something others already were working on, Tom set about working toward a transmitter and receiver that would be capable of carrying at least four wavelengths beginning somewhere around the one or even two megahertz range, a thousand times higher than

typical radio waves. His little klystrons could almost make one megahertz with the available power he had, but were technically capable of two or three times that if he could only get his father to let him bring the equipment to the Construction Company.

Each night his father looked over what Tom had put together that day. Several times he suggested more highly-rated capacitors or larger vacuum tubes to support any fluctuations in the power generated inside the transmitter.

One evening he found a bad mistake made by Tom and pointed it out. "This is exactly why your mother and I feel that you can't simply be left to your own devices, Son. With this tube wired the way that you have done, the anode is taking far too much power from that set of capacitors. Put any reasonable power through it and it would explode the tube!"

Tom was dumbstruck. He had been positive that he had researched it correctly. But as his father traced the circuit and the tube contacts, he realized that he had made a terrible mistake.

He felt so miserable about it that he didn't work on the circuit for two days.

When he finally went back to the shop, he fixed the problem and then completed the rest of the dual-band transmitter circuits. His father had promised to let him come to work that Saturday to hook up the circuit and test it in the bullet proof glass test chamber at the company.

While he waited for the weekend to come, Tom set about perfecting a receiver that could tune into signals in the megahertz range.

His first hope would have been that creating the same type of circuitry only working backwards would be the solution. In theory, that is exactly what was required. However, in execution the two circuits were very different.

When school started on the 31st of August, Tom's days became split. School between 8:30 AM and 3:00 PM, and then homework for an hour or sometimes two. His time in the workshop was frequently reduced to an hour or so before dinner and then two or three after the meal and before bedtime.

He made slow and steady progress through Thanksgiving that year.

Now that he was nine, his father and mother allowed him to carve the turkey. Actually, the war had reduced the availability of real turkeys, but Mr. Swift knew an old farmer who kept a few around for good friends. It was small and a little tough, but Tom relished being allowed to cut the bird.

School had been called off until the Monday after the holiday, so Tom had almost four entire days to devote to his equipment.

Several weeks earlier he had tested the basic transmitter and receiver at the Swift Construction Company. It had been after work hours when he and Tom, Sr. drove the family car back to the plant. Side-by-side, the two hooked everything up and checked each other's work.

Finally satisfied, Tom's father nodded toward the large blade switch that would send electricity through the maze of wires, tubes, resistors and capacitors inside of Tom's dual-wavelength transmitter.

His receiver was not complete but two individual single-station receivers were placed outside the safety box connected to separate speakers. Tom intended to transmit a staccato of Morse code-like 'dots' through one side of the transmitter and a siren-like sine wave through the other.

Crossing his fingers behind his back so his father could not see them, Tom pushed the insulated blade from the 'dead' side to the 'live' side.

In a few seconds they could both see the glow of the different tubes inside of the transmitter.

Satisfied that things looked to be alright, Tom next threw a second, smaller, switch. Almost immediately the 'dot dot dot dot...' sound came from the speaker to their left. With a grin wide enough, it seemed ready to jump right off of his face, Tom threw the second small switch.

The smile quickly left to be replaced by a frown. He looked at his set-up and immediately detected the problem. Almost without thinking he reached for a wire that had come loose from the second switch.

He was knocked backwards by his father's strong arm just before he would have received a severe shock.

"Oh," was all Tom could say as he got back to his feet.

"'Oh' is right, young man. What in the deuce were you thinking?"

Tom's head hung almost down to his chest. He could feel a hot tear coursing down his cheek. It wasn't from pain or even his father's rebuke. It was from the embarrassment he felt at having failed his father.

Tom, Sr. placed a reassuring hand on his son's shoulder. "Alright. Tell me what you are going to do now," he urged.

Tom wiped the tear from his face and reached over shutting off the first small switch and then the large, master power switch.

His father nodded, so Tom connected the loose wire and went back through the power-up sequence.

They both broke out in huge smiles as the 'dot dot dot dot...' sound was joined by the siren-like sine wave noise.

Success!

They shut down the transmitter and receivers and packed everything back to the Swift home.

The next weekend Tom knocked on the study door. His father bade him to enter.

“What’s going on, Son?”

“I’ve got a problem, Dad,” he told his father.

“What is it? Perhaps I can be of some help.”

“I’ve figured out a way to transmit signals at over one megahertz and to even receive them. What I haven’t figured out is a way to actually create the camera or the receiving television. What am I going to do?”

CHAPTER 3 /

Why Is It Doing That?

THE OLDER inventor looked at his son. “What is preventing you from building those?” he asked.

“It’s the two main tubes. The one for the camera that turns light waves into an electrical signal, and the cathode ray tube on the other end that shows the picture. Do you have any of those at work?”

His father promised to ask, but secretly knew that they only had a few on hand, and those were all in use on various projects. He had nothing to spare.

Tom spent the rest of the day building a simple step-up transformer so that he might take their household current and increase it up to the point where it might power his transmitter.

As he had promised, he had his father come out to check his work. And, though the older man approved, it took burning out several fuses before Tom found the adjustment that wouldn’t draw too much amperage.

With his new power source, Tom began a series of experiments to find tune the transmitter’s signals so that they used a narrower range of bandwidth.

He also built an add-on to the high-power transmitter that would enable him to send out signals at a very low bandwidth. it meant building a new antenna which he mounted to the top of his shed.

Sitting in their living room, Mary Swift saw Tom working on the shed roof. “Is what Tommy’s doing really safe, Tom?”

Tom, Sr. put his newspaper aside and looked at his wife. “I

can assure you that Tom is accomplishing some amazing things. So amazing, in fact, that I have done something that will assure that he has both an ample college fund as well as enough money to start his adult life.”

She looked at him with one eyebrow raised.

He continued. “His dual-band transmitter up in the megahertz range is groundbreaking. Truly groundbreaking. So, I took the liberty of copying his circuit diagrams and design, and have submitted them for a patent. In his name.”

“Oh,” Mary said brightly. “He’ll be so surprised. When will he hear about it?”

Her husband cleared his throat, a signal she well knew meant that he was about to be very serious.

“He won’t—no, actually it’s he *can’t* know until after the war. I love our son dearly but he is awfully impetuous. It is just impossible to trust that he wouldn’t tell someone. Right now, it is considered a top secret project that the War Department is very interested in.”

“What about the money side of things?”

He told her that the government agreed to fast-track the patent so it would take only a few weeks rather than the months or even a year or more that most patents required. “They are depositing the first payment for the patent use next week. By this time next Thursday, our little Tom will be worth more than ten thousand dollars.”

A hand shot to Mary’s mouth. “Oh, my!” she exclaimed.

“And, there will be at least three more payments like that. Even more if the invention is still used in peace time. And, I would wager that there will be other peaceful uses that several companies will pay to use the patent.”

Tom told his wife about a project that he and the Swift

Construction Company was currently working on that might also be able to use Tom, Jr.’s invention.

“Do you remember that horrible airline crash in Virginia a couple years back?”

“Of course I do, Tom. What a terrible thing to happen,” she replied remembering the loss of more than twenty lives when the pilot of a civilian airliner suffered a heart attack and died in mid-air. With no second pilot, the plane flew for another half hour before diving and crashing into the ground killing all aboard.

“And, you remember how I started to develop a system that would allow an air controller to take control of the plane and to land it from a remote location?”

“Yes.”

“And, do you recall that I was never able to make it work all that well because I just couldn’t get the radio connection to be strong enough and to pass along the wide range of information signals that were necessary?”

She nodded, and then her eyes went wide. “Oh, my! You mean that Tommy’s new radio equipment can do all that?”

Tom nodded at his wife. “That and more, honey. You see, the dual band nature means that we can send both the airplane’s flight information to the ground in a constant stream, but we can also now send a picture of what a pilot might see if he were in that plane. That was the piece I was missing. Unless you can actually see what is in front of the plane, any remote pilot is just making educated guesses at what they need to do.”

“And, you can’t tell him? He should know how much he is accomplishing.”

“Mary. I wish that I could. I really shouldn’t even have discussed this with you, but I know that you will be the soul of

discretion. Oh, he'll find out after the war, but for now he just needs to be kept out of the loop."

"Will you at least pay him for using his invention?" she asked.

"Absolutely. Assuming that I can actually use it, we will make a nice payment to his account and then turn everything over to the Government. They will have to make payments for each device they build after that."

He finished by telling her that the Swift company lawyer anticipated that the patent might be worth more than one hundred thousand dollars eventually.

Later, when Tom's father told him that there just weren't any cathode ray tubes or camera tubes available, Tom was very sad. He had hoped to be able to complete his radio camera system before the end of the school year.

Tom was getting a little discouraged. When he began his invention project he envisioned finishing something before Christmas. Now, he would be happy just to finish before July 4th.

A few days later a package arrived in the mail. Mary Swift called out the back door to Tom. "Tommy? Come in here. Something arrived for you!"

He put down the note pages he was reviewing with a sigh. "*I wish Mom would leave me alone,*" he thought as he slipped off of his stool and walked out of the shed.

His attitude changed completely when he saw the brown paper-wrapped parcel that had arrived. It was over three feet wide and about two feet square. Tearing away the twine and pulling off the paper, he eagerly opened the beaverboard box inside.

He pulled out the excelsior padding from the top and looked into the parcel with amazement. Nestled in more of

the padding material were two cardboard boxes. The longer one was labeled 'RCA Victor Company Iconoscope Tube' and the larger one was one of that same company's smaller cathode ray tubes, just what Tom would need for his receiver.

Sitting on top of the two inner cartons was an envelope bearing a single sheet of paper. The letter said:

Dear Tom Swift,

It is our understanding, from a highly reliable source, that you are engaged in a priority project for the Government.

Please find a pair of television tubes which we understand are vital to your work. It is our pleasure to present them to you at no charge. We merely ask that we be allowed to bid for your device(s) following the end of the war, providing they meet any of our needs.

Sincerely,

David Sarnoff

President, RCA Corp.

Tom's eyes were like saucers by the time he was finished. Seeing his reaction, Mary took the page gently from his fingers and read it.

She handed it back to the stunned youth and went to the living room where she placed a telephone call to her husband.

"Hmmm," he replied to her question about why the package had been sent. "I thought David was doing some reserve officer duty with General Eisenhower in Europe. Well, I'll look into it," he promised. Mary wasn't convinced that he hadn't already known about it.

She told Tom that she wanted him to wait until his father came home before taking his new treasures to the work shed. "I really want you to wait, Tommy. It took two large men to carefully bring that in here. It would be a tragedy if you dropped it."

He was disappointed but agreed to leave the large parcel on the table until that evening.

When Tom's father arrived home that evening, Tom could barely wait for him to get his hat and suit jacket off before dragging him to the kitchen and the table with the parcel.

After taking a quick look at the contents, Tom, Sr. whistled. "Well, well, well. It looks like my old friend came through for you, Son. David Sarnoff is a great man and is the head of the National Broadcasting Company. I ran into him a few weeks ago when I had to go into New York City. He was back from Europe for a few days."

He told his son how he had mentioned young Tom's desire to try to build a small television broadcasting station and a television receiver, and the military officer had chuckled. He told Tom, Sr. how he was fascinated by the prospects of visual transmissions as a young man and wholeheartedly approved of young Tom's desires.

"So, I guess he thought that sending you these tubes might help with what, I think I left the impression, is a burgeoning hobby."

They carefully carried the big parcel out to the work shed and unpacked its contents. Tom had two places in the workbench already prepared for such items so they slid them in and braced them carefully.

His father gave him a hug and told him, "Now, you need to be sure to do two things. First, tonight you will write a thank you letter to Mr. Sarnoff. Then, you need to promise to protect those tubes. I'm not certain of their exact worth, but I

believe that they both cost about the same amount as your mother and I pay on the mortgage for this house every four or five months!"

Tom crossed his heart and promised.

The following morning he set about memorizing each of the input connections and outputs on the tubes. Within a few hours he realized that he had no corresponding circuitry for at least two outputs on the Iconoscope tube and one on the cathode ray tube.

But, Tom was puzzled. His earlier investigations had shown that none of those inputs or outputs were required for his needs. Stumped, he locked his shed door and went to the house.

"Mom? Can I go to the library? I need to look at one of their electrical books."

"You may. I assume that you are going to ride your bicycle?"

He nodded.

"Fine. You just be sure to stay to the side of the streets and obey all of the street signs."

"Okay, Mom. I know you just want to protect me, but I *am* nine now. You know?"

Sandy began chanting, "Momsy, Momsy, protecting Tomsy. Momsy, Momsy, protecting Tomsy."

"Knock it off, San," Tom ordered his younger sister, but she was still chanting it as he headed out to the garage and got on his bike.

It took more than two hours for him to locate the pages he needed, and they told him what he already believed he knew. "Now," he thought, "*I have to figure out if I have to do*

something with them, or if I can ignore them.”

A further search provided only sketchy information. The book had been written several years earlier and did not include information about the particular tubes in his possession. So, Tom resolved to ask his father that evening.

Mr. Swift was at a loss as well when asked. “My guess is that you will either just ignore them, as you would with smaller vacuum tubes where you only need a specific function from that tube. But,” and he cleared his throat meaningfully, “you might need to create some sort of blocking circuit or resistor for those, especially the inputs on the cathode ray tube.”

The next morning his father called home to speak with his son.

“Tom? I just got off of a long-distance call to the RCA laboratory. I spoke with a very nice technician who tells me that all you need to do is place one of the rubber boots that came in the box over each unused input or output. I assume that you still have the packaging they came in.”

Tom said that he did and promised to check for the rubber insulating pieces.

Five minutes later he had a small handful of them and was positioning them on the unused connectors.

For five straight days Tom worked on the circuits of his transmitter. He was very certain that he had mastered the radio transmission aspects. A recent test he and his father conducted, with assistance from Ned Newton in a truck parked ten miles away from the Construction Company, showed that the dual bandwidths were transmitting right in their assigned wavelengths and could both be received by a single receiver where they could either be sent to separate speakers or could be combined into a single audio channel.

With that part of the system ready, Tom concentrated on a

way to divide the video signals coming from the camera and sending each half via a separate wavelength.

Wishing to keep everything as secret as possible, Tom set his receiver up in his bedroom. He theorized that if he could make it work at seventy feet, he could make it work at seventy miles.

He was hard at work making adjustments to the transmitter early that afternoon.

Mary Swift knew that the old adage about ‘the mountain coming to Mohammed’ applied to young boys who needed a good lunch but were far too busy to bother. She balanced the tray on one arm and knocked on Tom’s shed door. “Room service, Tommy!” she called out.

She heard his stool scraping across the floor as he pushed back from the bench. In a few seconds, he opened the door. Seeing that the tray contained two of his most favorite lunch items, a bowl of her chili and a chicken sandwich, he grinned and let her in.

“Don’t you dare get use to this,” she advised him. “When you get married, you don’t want your wife to get angry with you when you expect special service like this.” She looked at him and he grinned.

“Thanks, Mom. You’re the greatest!”

“You’ve got that right,” she muttered under her breath. A little louder, she asked, “How is it going? And, keep in mind that I have been married to your father for a number of years and still don’t understand a lot about what he does.”

Tom spent a few minutes showing her his setup and explaining the basic functions. “What I’m trying to do is create a high-powered radio that will carry television pictures made through a really big lens and send it back from an airplane to the generals or admirals on the ground or the ocean.”

She was amazed at his ingenuity. Her son was proving to be as smart as his father. Leaving him to his lunch, she returned to the house, a big, proud smile on her face.

After finishing his chili, Tom made all of the final connections on his circuitry. He barely touched the sandwich.

He knew that he had promised his father that everything would be checked by the older, more experienced inventor, but Tom was just about to burst. He really wanted to just turn everything on and then be able to tell his father that he had been successful.

Eyeing the master power switch, Tom's right hand began to tremble with excitement. It was so close. So very close. All he had to do was to reach a little farther and give it a little flick.

He pulled his hand back as the final words of his grandfather, Barton Swift, popped into his head. The old gentleman and inventor had been lost—and was presumed to have perished—over three years earlier on a flight to South America.

Just before departing in the *White Cloud*, Swift Construction Company's last and largest airship, he had taken the six-year-old Tom aside and looked him right in the eye.

"I may be gone for quite some time, Tommy. Just as your father is my little boy, you are his. You probably know that he and I haven't seen eye-to-eye for some time, but I want you to remember this. I never lied to your father and he will never lie to you. And, when all is said and done, he never disobeyed me and I want you to promise me—swear on your beautiful little sister's life—that you will never disobey him."

Tom had seen the seriousness in the old man's eyes. Eyes that he never could look into again.

He had promised his grandfather then and there. And, although he was sorely tempted on many occasions, he never had disobeyed his father or lied to him.

So, Tom sat back and thought over his situation. He was absolutely certain that everything was ready. If only...

He snapped his fingers. "Why not?" he asked himself and ran to the house.

Mary Swift and Sandy had gone grocery shopping with Helen Newton and her daughter, Phyllis, in Helen's little Ford Prefect, a tiny car they had shipped back from England while on a trip in 1938.

Tom picked up the telephone and dialed his father's direct number. Mr. Swift's faithful, old secretary, Mrs. Barker, answered. She asked Tom if it was an important call, and he replied that it was very important, to him. She rang him through.

His father was impressed that Tom would check with him before acting. "Are you absolutely certain that you have everything hooked up correctly and that your setup is safe?"

"Yes, sir. I checked everything a second time. I'll even check a third, but please... please can I give it a little test? Only a couple minutes. Just long enough to run up to my room to see if it is transmitting?"

The older inventor well remembered the eagerness he always felt when he was ready to test something. "Alright, Tom. Get the garden hose ready in case you start a fire. But, remember that water and electricity don't mix. Be ready to pull the fuse from the box in the house in case of a problem."

Tom thanked his father and hung up. As Tom was running back to the shed, a thought occurred to his father. Unsure of the answer, he made a phone call to the technician at the RCA labs.

The answer shocked him. He tried to get Tom on the phone, but there was no answer. He raced from the office and jumped into his car. He had to stop Tom.

Back at the house, Tom had thrown the master power switch on the transmitter and aimed the camera system at the cover of a magazine he borrowed from the living room. Barely waiting for the system to warm up, he ran back to the house and up to his room.

In another minute he had the receiver powered up and all of the tubes glowed orange. He moved around to the front of the receiver and turned on the cathode ray tube and its associated circuits.

He was watching and watching, trying to see something on the screen. Minutes went by as he tried adjustment after adjustment, but he was only able to see a very hazy picture. He was about to give up when he heard a car squeal to a halt in the driveway and the sound of the side door being slammed open.

“Tom! Tom!” his father’s voice was yelling. Suddenly, all of the power in the house went out.

He ran downstairs calling out, “Dad! I’m here. Where are you?”

His father came around the corner, holding a big fuse bar in one hand.

“Oh, thank goodness. Are you alright?”

“Sure. Of course I am. Why?”

“It occurred to me that you had everything set up correctly, but you hadn’t made any shielding for your transmitter. I phoned the RCA people and found out that the transmitter would be sending out harmful radio waves.”

He explained that being too close could injure or even sicken a person. “We have to build the proper shielding—really just a metal box—to protect you and all of us before you try again.”

Tom was relieved that everything appeared to be alright and that his father was no longer worried.

“Let’s just keep this between the Swift men, okay, Tom?”

“Sure, Dad. Can I go out and check my transmitter?”

“Yes. Once the power is shut off everything will be fine.” They went to the shed where Tom looked over his equipment. He first carefully turned off his power switches before touching anything.

As he checked things over he absently reached over and picked up the sandwich from its plate.

“That’s very strange,” Tom thought. *“I wonder why the sandwich got warm. I’m sure I didn’t leave it in the sun. Hmmm?”*

CHAPTER 4 /**I Think I know What To Do With It!**

HE ASKED his father to touch the sandwich. Alarmed but intrigued, Tom, Sr. suggested that they leave the sandwich alone. “Just in case, Tom,” he said.

While Tom put the matter with the warmed food out of his head, his father thought about it quite a bit. How had the food become much warmer than the surrounding air in the shed? Was the food safe?

He spoke twice with technicians at RCA before coming to a conclusion. He and Mary talked about it that evening as they lay in bed.

Mary sighed. “Looks as if our little Tommy is becoming a full-fledged Tom Swift. Is he really this smart?”

“Let me put it this way. At Tom’s age I was still trying to do things like make a better butter churn. He is at the point where he is pioneering radio-electrical work.”

Tom’s mother smiled. “I remember how smart you were when I first met you. You did some amazing things with that motorcycle and motorboat of yours,” she reminded him.

“Well, yes, but Tom is so far ahead of me that my bet is by the time he reaches our advanced age, he’ll have already flown higher than anyone ever. Perhaps even to the very brink of outer space.”

“Oh, I hope not. I have enough worries when you go off on some expedition or another.”

As he lay there, Tom, Sr. thought about his son’s accomplishments. “*My guess is that after the war scientists like Bob Goddard and that German man, Brown or something,*

will be working to get us into space. Tom will beat them all!”

After almost a half hour, he had reached a decision. He would be speaking with the Swift lawyer in the morning.

Tom spent his Friday and most of Saturday building a complete shield container that would keep any of the micro-sized radio waves from escaping the circuitry and would only allow them to travel up to the antenna for broadcast.

Mr. Swift had driven back to the Construction Company Friday evening to bring home more sheets of galvanized steel that he helped young Tom bend and shape into what was needed to complete the job. As it took shape they both admired Tom’s work.

“It’s beginning to look very professional, Son,” his father complimented him.

On Saturday, Tom finished his dinner and was about to go back to his shed when the dogs in their kennels began barking furiously.

Mr. Swift motioned Tom to remain in the house. He picked up a small handgun from a drawer in the living room and walked to the back door. Peering out of the window in the door, he could see nothing in the yard. The kennels were now hidden behind Tom’s work shed and though he could not see the dogs, he could hear them.

Their barks and baying were beginning to wind down, a sign that whatever had set them off had either left the vicinity, or was just a false alarm from canines ready for their evening walk.

He opened the door and walked toward the shed. As he neared it, he could see that Tom evidently left the door open when he came in for dinner. He checked the dogs and the rest of the yard, finding nothing. He returned to the house.

“No, sir. I closed that door. I really did,” Tom replied when his father chided him for the supposed oversight.

Tom raced out the back door before his parents could stop him and went straight to the shed. By the time his father caught up twenty seconds later, Tom was sitting on the floor of the shed, tears running down his cheeks.

“It’s gone!” he wailed.

“What, Son?”

“My television receiver,” Tom said sniffing and running his arm over his face. “Someone came in and stole my receiver. It was sitting right there on the bench!”

Mr. Swift looked at the bench. It was obvious that something had been dragged from its place in the center of the bench to the edge.

They closed up the shed and went to the house. Still sobbing, Tom told his mother and sister about the theft. He ended by stating, “I bet it was that Davey Petri. He’s been giving me a bad time at school.”

“How would he know about your project?” his mother asked.

“A month or so back I was telling a couple boys about my shed.” He looked at his father and said, “I promise I didn’t say anything about what I was doing, Dad. But, Davey was standing there listening and sneering at me. He told everyone that I was probably lying about it and bet that I would never amount to anything.”

He told them all how he had felt the anger rise in his face, but had not confronted the other boy.

“Well, son, without any positive idea of who stole your receiver, we can’t really go to the police. I’m sorry. I know you lock the shed up at night. From now on, you will need to do

that even if you just come into the house for a glass of water.”

“Davey Petri is a creep,” declared Sandy from her position sitting next to her mother. “I hate him!”

Even Tom had a difficult time not smiling at her assertion. Tom and his father went back out to the shed where they took stock of everything Tom had in it, while Mary went to the kitchen to wash up after dinner.

Sandy sat deep in thought on the davenport. She really hated Davey Petri at that moment. Nobody should ever do bad things to her big brother! She made plans about what to do.

An hour later as the four Swifts sat in the living room, there came a knock on the front door.

Tom, Sr. opened the door and was surprised to see a trio of people on their porch. Two men and a boy, about young Tom’s age stood there.

He greeted them, asking, “What can I do for you, officer?”

“Sir. I am patrol Corporal Slater, Shopton P.D. You *are* Tom Swift, the inventor?”

Mr. Swift nodded. Tom came up beside his father to see what might be happening.

“Well, this gentleman is Mr. Petri from a couple blocks over. And this,” he pointed to the boy who Tom could see had been recently crying and had a wet patch in the front of his pants, testimony to the fright he was feeling, “is his son. Are you missing anything?”

Mr. Swift looked down at Tom before answering. “Well, as a matter of fact, we had a recent breakin of a work shed in our back yard. Whoever it was took a piece of equipment we are working on for the Government.”

Mr. Petri blanched. "Excuse me," he said and walked quickly to the police patrol car. He reached into the open trunk and picked up a piece of equipment, bringing it back to the porch.

Tom's eyes went wide and he was about to yell out but his father placed a heavy hand on his shoulder and gave it a hard squeeze. He closed his mouth.

"Is this yours?" Corporal Slater asked.

Tom, Sr. nodded. "It is. May I have it, please?"

Mr. Petri carefully handed it over. "My son thought he was pulling a prank when he took this. Said it was just a piece of worthless junk your son made. I hope that's true."

"Actually, this is a piece of equipment being developed for the War Department. It is part of a top secret project. While we should have placed a heavy lock on the door, the fact is that your son stole an extremely important piece of equipment."

While Tom, Sr. had wanted his words to have a great effect on the young Davey, they were received like a beating with a baseball bat by the boy's father.

Meekly, he inquired, "Did he break anything?"

A quick look showed that several of the smaller tubes were cracked or shattered, and the cathode ray tube was damaged.

"I'm afraid that there is significant damage, Mr. Petri. A number of the smaller tubes are damaged—"

"Oh. I have a lot of radio tubes. I would be glad to replace anything that Davey broke," he interrupted the senior Swift.

Mr. Swift pointed to the damage at the back end of the cathode ray tube. When he told Mr. Petri the replacement

cost, the man almost fainted. "That—that's more than I make in two months!" he gasped.

"Do you want to file a charge against the boy, Mister Swift?" the officer asked.

Shaking his head, he replied, "I'm not sure to what end." He looked at the terrified boy. "Do you understand how important it is that America wins the war in Europe and in the Pacific?"

With new tears running freely, Davey nodded.

"Your father will, I am certain, have words with you when you get home. There is nothing I can do except to tell you that anything people do that hurts the war effort here at home, can mean that our brave men in uniform might die. You must promise us all, including this policeman, that you will never do anything mean or bad again. Do you understand?"

Davey choked out an apology and was soon led back to the patrol car by his mortified father.

Corporal Slater nodded to Tom and his father. "You should thank your wife for calling us with the Petri boy's name. I really hope that what he broke can be repaired. Have a nice evening."

They closed the door and returned to the living room.

"Mary? You called the police?"

"Why, no, dear. I didn't," she replied.

"But, the officer said that a woman called and—" He broke off and looked at his young daughter. Sandy, for her part, was the picture of innocence sitting there playing with her doll.

He looked at his wife, who only raised an eyebrow and bat-

ted her eyelashes at him. He then turned to Sandy who, sensing something, looked at him and said, "I love you, Daddy!" and she slid off of the davenport and picked her doll up, heading for the stairs. "Nighty-night!"

Tom was sitting on the floor with his broken receiver. He had been making a list of the various tubes he would need for the general circuit board. He knew that he had all but one, and that one could be purchased at the local radio shop for about thirty-five cents.

But, it was the cracked back end of the cathode ray tube that dismayed him the most. He couldn't tell if the vacuum had been broken. If it had, the tube might still be salvaged, repaired by a trained technician and the vacuum reestablished.

That is, of course, if the internal components had not been damaged. Tom had no way to tell.

Mr. Swift sat down next to him and they discussed Tom's findings. "Let me take that to the Construction Company on Monday, Son. I think that your uncle Ned has a test rig that can tell us the extent of the damage. Tell me, though. How close were you getting before this setback happened?"

"Setback?" Tom could scarcely believe his ears much less get the word out. "It's just about ruined everything!"

"Now, Tom. I want to tell you something that is another of those many things you have to remember the rest of your life. Ready?"

Tom nodded, the sadness evident in his face.

"There are never any ruined projects. There are only setbacks that cannot only be overcome, but they can and frequently are learning experiences. Do you understand what I mean?"

Tom thought he did, so he nodded.

"Tell me, then. What does that mean in this instance?"

Taking a deep breath, Tom said, "It means that if I got this far once before that I can do it again. And, that I may learn something from this that will help me do better the next time. Is that it?"

Chuckling, his father ruffled his hair, saying, "Yes. That's exactly it. Now, let's get this back to your work shed and get the door locked for the evening. I'll stop by the hardware store on Monday and get you an even better one than you have right now."

Over the course of several days, Tom spent more and even more time in his work shed. And, now that he had the metal shielding in place, he had begun to tinker with the quality of the video signal.

The picture tube had been repaired and returned to him just two days after the theft.

One afternoon he raced back down from his bedroom yelling, "Yipee!" and almost scared his mother to death.

"What?" she asked as he skipped around the kitchen where she was making a casserole for their dinner.

"I've done it, Mom! I've really done it! I have a picture that is clear enough to even read the magazine over."

He told her about the adjustment he had made that morning to the antenna. "All I did was to focus the antenna down so it sends a signal right to my bedroom and doesn't spread it all around. And, now I'm getting a great picture!"

He practically dragged her upstairs to show her the screen of his receiver. Sure enough, Mary Swift could read the part of an article on laundry bluing that Tom had his camera pointed at. Though still slightly grainy, everything was distinct enough to be read.

She clasped Tom to her and hugged and hugged him. "I am so proud of you, Tom. And, I promise that I will always call you Tom from now on. No more Tommy. You're a real inventor. Oh, your father is just going to burst he'll be so happy for you!"

Tom went out and turned off his equipment. He wanted it to be fresh for when he showed his father.

The demonstration that night was an even better success. Not certain why, Tom was happy to see that the signal came through even clearer at night than by day.

Tom, Sr. explained that it had to do with the interference generated by the sun. It emits its own radio waves. Once we turn away from it, those interference waves go away."

Tom wanted to know what he should do next.

"Well, you need to be sure that your circuit diagrams are complete and accurate. Then, you will need to create a complete parts list of everything. After that, we need to create a detailed drawing of both the transmitter and the receiver along with notes on how each part works."

Tom foresaw a daunting set of tasks ahead.

"Don't worry about the drawing. I'll have Peter Hale come over tomorrow. He does all of the diagrams for patents at the Construction Company. He'll do a great set of designs for you, then we'll bundle everything together and have the Swift lawyers do their patenting magic!"

Because Tom, Sr. had taught his son well, Tom had already been keeping detailed notes and drawings. It took him only two days to gather or create everything needed other than the detailed drawings.

Peter Hale, a talented artist originally from San Francisco, California, dropped by the first morning and looked over Tom's transmitter and receiver. He asked to have the shed to

himself for the remainder of the day so he might work without interruption. By four o'clock he had completed the necessary drawings and brought them in for Tom to check. He looked them over and proclaimed them to be perfect.

"Then, sign the bottom of each page and I'll have our legal department make certified photostatic copies which you'll need to countersign tomorrow. After that..."

"...It is in the hands of the patent office, I guess," Tom completed the statement.

Mary Swift used most of that week's meat ration coupons and purchased and prepared a whole chicken for a celebration dinner.

After the meal, she told the rest of the family of her promise to no longer call her son, "Tommy."

"So, no more Tommy. Okay, Sandy" Tom?

"Tommy-no-more, Tommy-no-more," Sandy began chanting.

Tom rolled his eyes. "Ah, gee, San! Cut it out."

"Tommy-no-more, Tommy-no-more, Tommy-no-more," she kept going.

Tom, Sr. took his son to the Swift Construction Company that next day so that Tom could re-sign the copies of the drawings that would be filed with the U.S. Patent Office. The main company lawyer shook his hand and congratulated him. "We should hear back on the initial decision in a month or so. Guess you'll be back in school by that time. Well, the cogs of Government 'ere run slow," he said.

One week later, his father came home and took Mary Swift into his den. Closing the doors he told her the news. She was both thrilled as well as sad. She knew what had to be done. It hurt her, but Tom assured it was for the best.

Dinner was fairly quiet. Sandy had shortened her chant so that it was sounding more like “Tommy-no-mo” and insisted on spouting it off every time one of their parents slipped up and called their son, Tommy.

That evening, Tom, Sr. came into his son’s room as the boy was getting ready for bed. “I’m afraid that I have some news for you, Son, and you’re probably not going to like it.”

“What, Dad?”

“It turns out that the Government has just awarded a patent to an inventor who has designed a dual-bandwidth television transmitter and receiver. Something that the Army Air Corp. is going to build and put into a new type of reconnaissance airplane.”

He could see the gut-wrenching disappointment pummeling his only son and it practically tore him apart. Tom tried to explain how it was all part of the invention process.

It only served to disappoint young Tom even more.

“But, if I had just done things faster. If I had more supplies. A lot of things. It would have been me. It would have been my invention.” He was silent for several minutes. His father sat on the side of his bed, waiting until Tom was ready to speak.

“Dad,” Tom finally said. “Does this happen to you?”

Mr. Swift let out a rueful chuckle. “Oh, Tom. You can’t imagine how many times. I’ve probably invented two dozen things that I prepared to patent, only to find out that someone else registered theirs only days or weeks before. It goes with the territory.”

“So, what do I do now?” Tom asked his father.

“What every good inventor does. You take what you’ve built and you dissect it. See what is in there that is unlike

anything the other man has. Then, you try and see what you might do with that. If it is a good invention, there might well be individual parts that can be patented.”

Tom slowly nodded his head.

“Even if you can’t make any money from this first invention, you might be able to use it as a springboard for your next one. And, there will be many, many others for you!”

Tom looked out his window for a minute and then a curious look crossed his face.

“What is it, Tom?” his father asked, seeing a look that Tom’s mother would instantly recognize.

“I think that something new and good will come out of all this after all,” young Tom said.

“If I can somehow take out the klystron and some of the other circuitry, and build a special box for it, I’ll just bet that I could make Mom a really great sandwich warmer!”