The Long Way

By GEORGE O. SMITH

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Don Channing stood back and admired his latest acquisition with all of the fervency of a high school girl inspecting her first party dress. It was so apparent, this affection between man and gadget, that the workmen who were now carrying off the remnants of the packing case did so from the far side of the bench so that they would not come between the director of communications and the object of his affection. So intent was Channing in his adoration of the object that he did not hear the door open, nor the click of high heels against the plastic flooring. He was completely unaware of his surroundings until Arden said:

"Don, what off earth is that?"

"Ain't she a beaut?" breathed Channing.

"Jilted for a jimcrank," groaned Arden. "Tell me, my quondam husband, what is it?"

"Huh?" asked Don, coming to life once more.

"In plain, unvarnished words of one cylinder, what is that ... that, *that*?"

"Oh, you mean the transmission tube?"

"How do you do?" said Arden to the big tube. "Funny-looking thing, not like any transmitting tube I've ever seen before."

"Not a transmitting tube," explained Channing. "It is one of those power transmission tubes that Baler and Carroll found on the Martian desert."

"I presume that is why the etch says: 'Made by Terran Electric, Chicago'?"

Channing laughed. "Not one found—there was only one found. This is a carbon copy. They are going to revolutionize the transmission of power with 'em."

"Funny-looking gadget."

"Not so funny. Just alien."

"Know anything about it?"

"Not too much. But I've got Barney Carroll coming out here and a couple of guys from Terran Electric. I'm going to strain myself to keep from tinkering with the thing until they get here."

"Can't you go ahead? It's not like you to wait."

"I know," said Channing. "But the Terran Electric boys have sewed up the rights to this dinkus so tight that it is squeaking. Seems to be some objection to working on them in the absence of their men."

"Why?"

"Probably because Terran Electric knows a good thing when they see it. Barney's latest 'gram said that they were very reluctant to rent this tube to us. Legally they couldn't refuse, but they know darned well that we're not going to run power in here from Terra—or anywhere else. They know we want it for experimentation, and

they feel that it is their tube and that if any experimentation is going to take place, they're going to do it."

The workmen returned with two smaller cases; one of each they placed on benches to either side of the big tube. They knocked the boxes apart and there emerged two smaller editions of the center tube—and even Arden could see that these two were quite like the forward half and the latter half, respectively, of the larger tube.

"Did you buy 'em out?" she asked.

"No," said Don simply. "This merely makes a complete circuit."

"Explain that one, please."

"Sure. This one on the left is the input-terminal tube which they call the power-end. The good old D. C. goes in across these two terminals. It emerges from the big end, here, and bats across in a beam of intangible something-or-other until it gets to the relay tube where it is once more tossed across to the load-end tube. The power is taken from these terminals on the back end of the load-end tube and is then suitable for running motors, refrigerators, and so on. The total line-loss is slightly more than the old-fashioned transmission line. The cathode-dynode requires replacement about once a year. The advantages over high-tension wires are many; in spite of the slightly higher line-losses and the replacement trick, they are replacing long-lines everywhere.

"When they're properly aligned, they will scat right through a mountain of solid iron without attenuation. It takes one tower every hundred and seventy miles, and the only restriction on tower height is that the tube must be above ground by ten to one the

distance that could be flashed over under high intensity ultraviolet light."

"That isn't clear to me."

"Well, high-tension juice will flash over better under ultraviolet illumination. The tube must be high enough to exceed this distance by ten to one at the operating voltage of the stuff down the line. Another thing, the darned beam can be made to curve by adjusting the beam plates in the tube. The boys in the Palanortis Jungles say they're a godsend, since there are a lot of places where the high-tension towers would be impossible since the Palanortis Whitewood grows about a thousand feet tall."

"You'd cut a lot of wood to ream a path through from Northern Landing to the power station on the Boiling River," said Arden.

"Yeah," drawled Don, "and towers a couple of hundred miles apart are better than two thousand feet. Yeah, these things are the nuts for getting power shipped across country."

"Couldn't we squirt it out from Terra?" asked Arden. "That would take the curse off of our operating expenses."

"It sure would," agreed Channing heartily. "But think of the trouble in aligning a beam of that distance. I don't know—there's this two hundred mile restriction, you know. They don't transmit worth a hoot over that distance, and it would be utterly impossible to maintain stations in space a couple of hundred miles apart, even from Venus, from which we maintain a fairly close tolerance. We might try a hooting big one, but the trouble is that misalignment of the things results in terrible effects."

The door opened and Charley Thomas and Walt Franks entered.

"How's our playthings?" asked Walt.

"Cockeyed looking gadgets," commented Charley.

"Take a good look at 'em," said Channing. "Might make some working X-ray plates, too. It was a lucky day that these got here before the boys from Terran Electric. I doubt that they'd permit that."

"O.K.," said Charley. "I'll bring the X-ray up here and make some pix. You'll want working prints; Walton will have to take 'em and hang dimensions on to fit."

"And we," said Channing to Walt Franks, "will go to our respective offices and wait until the Terran Electric representatives get here."

The ship that came with the tubes took off from the landing stage, and as it passed their observation dome, it caught Don's eye. "There goes our project for the week," he said.

"Huh?" asked Walt.

"He's been like that ever since we tracked him down with the *Relay Girl*," said Arden.

"I mean the detection of driver radiation," said Channing.

"Project for the week?" asked Walt. "Brother, we've been tinkering with that idea for months, now."

"Well," said Don, "there goes four drivers, all batting out umpty-ump begawatts of something. They can hang a couple of G on a six-hundred foot hull for hours and hours. The radiation they emit must be detectable; don't tell me that such power is not."

"The interplanetary companies have been tinkering with drivers for years and years," said Walt. "They have never detected it?"

"Could be, but there are a couple of facts that I'd like to point out. One is that they're not interested in detection. They only want the best in driver efficiency. Another thing is that the radiation from the drivers is sufficient to ionize atmosphere into a dull red glow that persists for several minutes. Next item is the fact that we on Venus Equilateral should be able to invent a detector; we've been tinkering with detectors long enough. Oh, I'll admit that it is secondary-electronics—"

"Huh? That's a new one on me."

"It isn't electronics," said Channing. "It's subetheric or something like that. We'll call it sub-electronics for lack of anything else. But we should be able to detect it somehow."

"Suppose there is nothing to detect?"

"That smacks of one hundred percent efficiency," laughed Don. "Impossible."

"How about an electric heater?" asked Arden.

"Oh Lord, Arden, an electric heater is the most ineffic—"

"Is it?" interrupted Arden with a smile. "What happens to radiation when intercepted?"

"Turns to heat, of course."

"That takes care of the radiation output," said Arden. "Now, how about electrical losses?"

"Also heat."

"Then everything that goes into an electric heater emerges as heat," said Arden.

"I get it," laughed Walt. "Efficiency depends upon what you hope to get. If what you're wanting is losses, anything that is a total loss is one hundred percent efficient. Set your machine up to waste power and it becomes one hundred percent efficient as long as there is nothing coming from the machine that doesn't count as waste."

"Fine point for argument," smiled Channing. "But anything that will make atmosphere glow that dull red after the passage of a ship will have enough waste to detect. Don't tell me that the red glow enhances the drive."

The door opened again and Charley came in with a crew of men. They ignored the three, and started to hang heavy cloth around the walls and ceiling. Charley watched the installation of the barrier-cloth and then said: "Beat it—if you want any young Channings!"

Arden, at least, had the grace to blush.

The tall, slender man handed Don an envelope full of credentials. "I'm Wesley Farrell," he said. "Glad to have a chance to work out here with you fellows."

"Glad to have you," said Don. He looked at the other man.

"This is Mark Kingman."

"How do you do?" said Channing. Kingman did not impress Channing as being a person whose presence in a gathering would be demanded with gracious shouts of glee.

"Mr. Kingman is an attorney for Terran Electric," explained Wesley.

Kingman's pedestal was lowered by Channing.

"My purpose," said Kingman, "is to represent my company's interest in the transmission tube."

"In what way?" asked Don.

"Messrs. Baler and Carroll sold their discovery to Terran Electric outright. We have an iron-bound patent on the device and/or any developments of the device. We hold absolute control over the transmission tube, and therefore may dictate all terms on which it is to be used."

"I understand. You know, of course, that our interest in the transmission tube is purely academic."

"I have been told that. We're not too certain that we approve. Our laboratories are capable of any investigation you may desire, and we prefer that such investigations be conducted under our supervision."

"We are not going to encroach on your power rights," explained Channing.

"Naturally," said Kingman in a parsimonious manner. "But should you develop a new use for the device, we shall have to demand that we have complete rights."

"Isn't that a bit high-handed?" asked Don.

"We think not. It is our right."

"You're trained technically?" asked Don.

"Not at all. I am a lawyer, not an engineer. Mr. Farrell will take care of the technical aspects of the device."

"And in looking out for your interests, what will you require?"

"Daily reports from your group. Daily conferences with your legal department. These reports should be prepared prior to the day's work so that I may discuss with the legal department the right of Terran Electric to permit or to disapprove the acts."

"You understand that there may be a lot of times when something discovered at ten o'clock may change the entire program by ten oh six?"

"That may be," said Kingman, "but my original statements must be adhered to, otherwise I am authorized to remove the devices from your possession. I will go this far, however; if you discover something that will change your program for the day, I will then call an immediate conference which should hurry your program instead of waiting until the following morning for the decision."

"Thanks," said Channing dryly. "First, may we take X-ray prints of the devices?"

"No. Terran Electric will furnish you with blueprints which we consider suitable." Kingman paused for a moment. "I shall expect the complete program of tomorrow's experiments by five o'clock this evening."

Kingman left, and Wes Farrell smiled uncertainly. "Shall we begin making the list?"

"Might as well," said Channing. "But, how do you lay out a complete experimental program for twelve hours ahead?"

"It's a new one on me, too," said Farrell.

"Well, come on. I'll get Walt Franks, and we'll begin."

"I wonder if it might not be desirable for Kingman to sit in on these program-settings?" said Channing, after a moment of staring at the page before him.

"I suggested that to him. He said 'No'. He prefers his information in writing."

Walt came in on the last words. Channing brought Franks up to date and Walt said: "But why would he want a written program if he's going to disallow certain ideas?"

"Sounds to me like he's perfectly willing to let us suggest certain lines of endeavor; he may decide that they look good enough to have the Terran Electric labs try themselves," said Channing.

Wes Farrell looked uncomfortable.

"I have half a notion to toss him out," Channing told Farrell. "I also have half a notion to make miniatures of this tube and go ahead and work regardless of Kingman or Terran Electric. O.K., Wes, we won't do anything illegal. We'll begin by making our list."

"What is your intention?" asked Wes.

"We hope that these tubes will enable us to detect driver radiation, which will ultimately permit us to open ship-to-ship two-way communication."

"May I ask how you hope to do this?"

"Sure. We're going to cut and try. No one knows a thing about the level of driver-energy; we've assigned a selected name for it: Subelectronics. The driver tube is akin to this transmission tube, if what I've been able to collect on the subject is authentic. By using the transmission tube—"

"Your belief is interesting. I've failed to see any connection between our tube and the driver tube."

"Oh sure," said Channing expansively. "I'll admit that the similarity is of the same order as the similarity between an incandescent lamp and a ten dynode, electron-multiplier such as we use in our final beam stages. But recall this business of the cathode-dynode. In both, the emitting surface is bombarded by electrons from electron guns. They both require changing."

"I know that, but the driver cathode disintegrates at a rate of loss that is terrific compared to the loss of emitting surface in the transmission tube."

"The driver cathode is worth about two hundred G-hours. But remember, there is no input to the driver such as you have in the transmission tube. The power from the driver comes from the disintegration of the cathode surface—there isn't a ten thousandth of an inch of plating on the inside of the tube to show where it went. But the transmission tube has an input and the tube itself merely transduces this power to some level of radiation for transmission. It is re-transduced again for use. But the thing is this: Your tube is the only thing we know of that will accept subelectronic energy and use it. If the driver and the transmission

tubes are similar in operational spectrum, we may be able to detect driver radiation by some modification."

"That sounds interesting," said Wes. "I'll be darned glad to give you a lift."

"Isn't that beyond your job?" asked Channing.

"Yeah," drawled Farrell, "but could you stand by and watch me work on a beam transmitter?"

"No—"

"Then don't expect me to watch without getting my fingers dirty," said Farrell cheerfully. "Sitting around in a place like this would drive me nuts without something to do."

"O.K., then," smiled Don. "We'll start off by building about a dozen miniatures. We'll make 'em about six inches long—we're not going to handle much power, you know. That's first."

Kingman viewed the list with distaste. "There are a number of items here which I may not allow," he said.

"For instance?" asked Channing with lifted eyebrows.

"One, the manufacture or fabrication of power transmission tubes by anyone except Terran Electric is forbidden. Two, your purpose in wanting to make tubes is not clearly set forth. Three, the circuits in which you intend to use these tubes is unorthodox, and must be clearly and fully drawn and listed."

"Oh spinach! How can we list and draw a circuit that is still in the embryonic stage?"

"Then clarify it. Until then I shall withhold permission."

"But look, Mr. Kingman, we're going to develop this circuit as we go along."

"You mean that you are going to fumble your way through this investigation?"

"We do not consider a cut-and-try program as fumbling," said Walt Franks.

"I am beginning to believe that your research department has not the ability to reduce your problems to a precise science," said Kingman scornfully.

"Name me a precise science," snapped Channing, "or even a precise art!"

"The legal trade is as precise as any. Everything we do is done according to legal precedent."

"I see. And when there is no precedent?"

"Then we all decide upon the proper course, and establish a precedent."

"But I've got to show you a complete circuit before you'll permit me to go ahead?"

"That's not all. Your program must not include reproducing these tubes either in miniature or full size—or larger. Give me your requirements and I shall request Terran Electric to perform the fabrication—"

"Look, Kingman, Venus Equilateral has facilities to build as good a tube as Terran Electric. I might even say better, since our business includes the use, maintenance, and development of radio tubes; your tubes are not too different from ours. Plus the fact that we can whack out six in one day, whilst it will take seventy-three hours to get 'em here after they're built on Terra."

"I'm sorry, but the legal meaning of the patent is clear. Where is your legal department?"

"We have three. One on each of the Inner Planets."

"I'll request you to have a legal representative come to the Station so that I may confer with him. One with power of attorney to act for you."

"Sorry," said Channing coldly. "I wouldn't permit any attorney to act without my supervision."

"That's rather a backward attitude," said Kingman. "I shall still insist on conducting my business with one of legal mind."

"O.K. We'll have Peterman come out from Terra. But he'll still be under my supervision."

"As you wish. I may still exert my prerogative and remove the tubes from your possession."

"You may find that hard to do," said Channing.

"That's illegal!"

"Oh no, it won't be. You may enter the laboratory at any time and remove the tubes. Of course, if you are without technical training

you may find it most difficult to disconnect the tubes without getting across a few thousand volts. That might be uncomfortable."

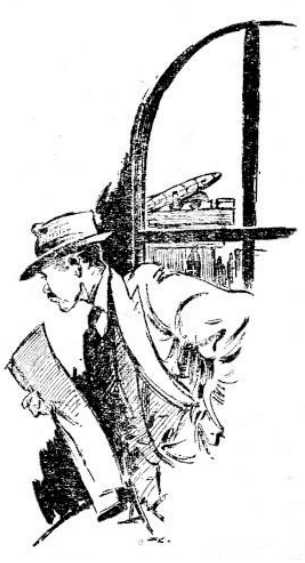
"Are you threatening me?" said Kingman, bristling. His stocky frame didn't take to bristling very well, and he lost considerable prestige in the act.

"Not at all. I'm just issuing a fair warning that the signs that say: DANGER! HIGH VOLTAGE! are not there for appearance."

"Sounds like a threat to me."

"Have I threatened you? It sounds to me as though I were more than anxious for your welfare. Any threat of which you speak is utterly without grounds, and is a figment of your imagination; based upon distrust of the Interplanetary Communications Company, and the personnel of the Venus Equilateral Relay Station."

Kingman shut up. He went down the list, marking off items here and there. While he was marking, Channing scribbled a circuit and listed the parts. He handed it over as Kingman finished.



"This is your circuit?" asked the lawyer skeptically.

"Yes."

"I shall have to ask for an explanation of the symbols involved."

"I shall be happy to present you with a book on essential radio technique," offered Channing. "A perusal of which will place you in possession of considerable knowledge. Will that suffice?"

"I believe so. I can not understand how; being uncertain of your steps a few minutes ago, you are now presenting me with a circuit of your intended experiment."

"The circuit is, of course, merely symbolic. We shall change many of the constants before the day is over—in fact, we may even change the circuit."