

A Secret Story About the Yagi Antenna

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[Editor's note: Although completed in February of 1989, Prof. Gentei Sato sent the manuscript for this article to the *Magazine* in March, 1991. He has correctly entitled it a story, for it blends elements of history, the development and use of what is probably the most widely-used antenna design, personal experience, remembrance, and a detective story which spans 45 years. English is not Prof. Sato's "native" language, and yet (as usual) he has succeeded in conveying a subtlety of meaning and style which are beyond that found in the writings of most, regardless of which language they first learned to speak. He requested that I edit the article, and if, in doing so, I have erred on the side of trying to preserve as much of his original language as possible at the expense of clarity, the fault is totally mine. This is a somewhat more personal contribution than the *Magazine* usually publishes, and it should be read as such. It is also a story which has its roots in a world war, and, of necessity, it is told from the perspective of Prof. Sato's country's part in that war. WRS]

1. Introduction

The Yagi-Uda antenna is widely employed as a TV receiving antenna, not only in our country, Japan, but also in every country of the world. Though this antenna was invented in 1926, it was not highly evaluated in our country, where it was invented, and nobody took care of it.

The Pacific War occurred in the winter of 1941. When our Army occupied Singapore in the spring of the succeeding year, it became clear from a note thrown away by a British soldier that this antenna was employed by the British in radars, which were new weapons. Thus, our Army, scientists, and engineers were all surprised. The present manuscript describes the Yagi-Uda antenna, and a secret story about this note.

2. Invention of the Yagi-Uda Antenna, and Its Practical Use in Europe

Today, in 1989, looking around towns, TV receiving antennas are erected on the roofs of every house, and they are gathered and look literally like a wood. This situation looks like large dragonflies, which perch on roofs. This antenna is called a Yagi antenna, or a Yagi-Uda antenna, after its inventors. This antenna was invented by Prof. Yagi and Instructor Uda (his official post at that time), both being with Tohoku University in Sendai City, in the end of the Taisho era. Both of these teachers each later became a Professor Emeritus. Since the invention of this antenna, there were only two cases in which this antenna was put into practical use before the end of the war, in 1945. That is, the first case was its use in a radio circuit between Sakata and Tobishima Island, located 40 km offshore from Sakata, in Yamagata Prefecture. The second case was between Niigata City and Sado Island, located 50 km offshore from Niigata. This antenna received little attention in our country. However, in Europe and the United States of America, this antenna had been steadily put into practical use for radars, blind landing of airplanes, and the like.

It was when our Army carried Singapore, a British-held territory in February, 1942, three months after the out-break of the Pacific War in December, 1941, that our country first knew of the fact that this antenna was put into practical use and employed in foreign countries. To our surprise, our enemy had put this antenna, invented by our country, into practical use, as a most important new weapon. This is an old story, 47 years ago from now, that is, when the author was a student in a middle school, which was by no means forgotten.

The rumor that the conquest would be completed before National Foundation Day (as it is named now, called the Kigensetsu at that time), that is, February 11, 1942, had been spread through the town. At that time, vessels from our country waited offshore, while they sailed off the coast of Singapore. A party of engineers, who were sent in order to investigate the military facilities and weapons of the Army of the United Kingdom as quickly as possible, had been on board in one vessel among them, and Technical Major Bunsaku Shiomi was a member of that party.

3. The Defeat in the Pacific War, Radar, and the Yagi Antenna

Before the war, there was a Navy officer¹ who had declared that, "It is impossible to plunge into the war without a device which detects a target using electromagnetic waves," and "The plunge into the war without 'a DENTAN' is most thoughtless." He was a section chief in the Navy General Staff Office at that time. He was Rear-Admiral Ryusaku Yanagimoto, who shared his lot with the aircraft carrier of which he was captain, the *Soryu*, in the Midway Sea battle, later on.

DENTAN is an abbreviation for a radio locator, that is, a radar.

The Japanese Navy lost many aircraft carriers, which distinguished themselves gloriously in war in the Pacific Ocean and in the Indian Ocean, in this Midway Sea battle. By this, the stream of the war between Japan and the United States of America began to reverse its flow. Though the death in battle of Rear Admiral Yanagimoto, who was a scarce officer, having a profound knowledge of electromagnetic-wave weapons, as a combat officer of the Japanese Navy, must have given a fresh determination to the people who were in charge of weapons, it was thought that the death implied the tendency of victory or defeat in the war.

It is not too much to say that our forces yielded to the radars of the enemy in that war.

The Pacific War began in the winter, when the author was a fourth-year student of the middle school, and the defeat came in the summer, when the author was a first-year student of a university. Since the author

¹See, e.g., Michizo Sendo, "The whole aspect of secret weapons," in Yoji Ito, *Hara Shobo*, Second Part, Chap. 1-4, June 1976.

graduated from Tohoku University in 1947, and has been engaged in research on antennas for a time of not less than 40 years, I have the most interest in Yagi antennas. I heard, fragmentarily, that it was from the enemy side, just after the surrender of Singapore, that this antenna was made known to our country, and wanted to know the details of this affair. But I was busy, and time passed. I was informed that the source was a note which a prisoner, named Newmann, had possessed. What I had to do next was to see the note. But not a clue was found at all, and ten to twenty years passed in vain.

4. The Surrender of Singapore, and a Note which Mr. Newmann, a Radar Operator of the Enemy, had Possessed

It was on February 15, 1942, three months after the war began that the Japanese Army occupied the Singapore fortress, which was the strong point of the United Kingdom for dominating the Orient, and was said to be inexpugnable for one hundred years. At that time, our armies captured a radar of the Army of the United Kingdom. Also, at that time, a note of a radar operator named Newmann was discovered. The characters, YAGI ARRAY, were written everywhere in this note. Though the Army understood that this radar had considerably superior performance, they could not understand the words "YAGI ARRAY," written here and there, in the note by any means. Whether the word was pronounced as "yaji" or as "yagi," they could not understand it. Then, they took the radar operator from the prison, and examined him about the meaning of the word, "Yagi." It is said that the radar operator said that the word Yagi was a name of a person "...of your country," and with his blue eyes, winked.

This anecdote is based on the paper, "Recollection of fifty years" (The *Journal of the Science and Engineering Department of Kanagawa University*, March, 1970), written by Prof. Shintaro Uda, one of the inventors of the Yagi-Uda antenna: the Yagi antenna, for short.

This prisoner was Newmann, Master Sergeant of the Army of the United Kingdom, who was in the prison at Shinagawa, in Tokyo. At that time, Prof. Hidetsugu Yagi was the President of the Tokyo Institute of Technology.

In the Pacific War, our armies suffered a lot of damage from radars, our enemy's new weapons. Our aircraft were discovered by the enemy's radars from a distance, and shot down, by falling into the enemy's ambush. Our fleet was submerged in the sea by suffering from abrupt firing in a moonless night. The existence of radars governed life and death in sea and air battles. At the Smithsonian Institution in Washington, DC, the author observed the models of the atomic bombs which were dropped on Hiroshima and Nagasaki. I learned that on the atomic bombs were mounted Yagi arrays, which determined the height of explosion. The enemy had developed Yagi arrays in this way and used them as weapons. Mr. Kozaburo Shindo³ (former professor of the Shibaura Institute of Technology), who looked to Prof. Yagi for guidance, told that it was a very lamentable and ironical fact that the Yagi array was not used in our country, where it was invented, but it was used as an enemy's weapon, thereby yielding many victims.

²"Army" was the word by which the Japanese Army called themselves. Incidentally, the Japanese Navy called themselves the Imperial Navy.

³Kozaburo Shindo, "Thinking of Prof. Hidetsugu Yagi," *Electronic News*, 72, May 1976.

During the war, I, a student of Tohoku University, served as an assistant in experiments on a Yagi array, on a boat floating on the Matsushima Bay. After that, I have been doing research on antennas consistently since graduation from the university. Newmann's Note, in which material on Yagi arrays was said to be written, has often come across my mind. Though I had glanced at a short news item on Newmann's Note, I had no means for verifying whether it was preserved at that time or not, and, of course, I had never seen it.

Twenty to thirty years since the war's end have swiftly passed away, and I have grown from a young student to a researcher of medium standing, and become an elderly person. At this time, I was prompted by a desire and a sense of duty, so that I wanted to look over Newmann's Note at any cost, and I had to see it, by all means.

Though I had inquired of many persons, especially engineers, scholars, persons engaged in the Army and Navy, and persons of the Japan Defense Agency, about Newmann's Note, no one had seen Newmann's Note, even if someone knew the name of Mr. Newmann. Newmann's Note was just a note of imagination.

At the meeting on the discussion entitled, "The history of the Electrical Communications Laboratory of Tohoku University," held among professors of electric fields of Tohoku University, on November 13, 1957, Professor Kenzo Nagai stated as follows: "Yagi antennas had not [been] employed so much till the defeat of the war. The invention of Yagi antennas will be carried out in Taisho age. Even if fifteen years elapsed after the Yagi antenna was patented, it was not employed. Then, the patent expired. After that, we were, at first, surprised at the fact that Yagi antennas were in use in foreign countries." Also, Prof. Emeritus Heiichi Nukiyama said that some arrays were seized at Singapore—Professor Koike translated the confiscated pamphlet as best as he could here, by which it was verified that the arrays were Yagi antennas.

Professor Koike is Yujiro Koike, an Associate Professor at that time. It is said that Professor Koike translated Newmann's Note. But, Newmann's Note (this was called exactly, Newmann's Document) was missing, after that.

5. Newmann and his Note recorded in Material of the Japan Defense Agency

The Showa sixty-second year (1987) falls on the 100th anniversary of Hertz, a German scientist verifying an electromagnetic wave, and in commemoration of this 100th anniversary, a symposium related to antennas was held at Wurzburg, in Germany, in March, and, subsequently, at York, in England. Wurzburg is the name of the town which is located at the entrance to the famous Romantic Road in southern Germany. This place name was also used as the code name of a superior radar, developed in Germany during World War II. Submarines of Germany and Japan transported the radar across the oceans to Japan, as a reference for the development of weapons of an allied power, Japan. The details are reported in the books entitled *Messenger of Deep Sea*, written by Akira Yoshimura (Bungeishunjusha, April, 1980), and *Phantasmal Wurzburg*, written by Seiichi Tsuda (CQ Publishing Co., Ltd., December,

⁴Record of a discussion meeting of the Electrical Communication Department of Tohoku University, special issue for the 50th anniversary of the foundation "Research on Electrical Communications" Electrical Communications Laboratory of Tohoku University, August, 1985.

1980). Now, a plurality of books concerned were exhibited and sold at the meeting of a society in York, where the 100th anniversary for the verification of electromagnetic waves was held, and I noticed the following book related to radars. The book was one entitled *Technical History of the Beginning of RADAR*, written by S. S. Swords; it was a technical history of radars in the early times. It was published by Peter Peregrinus Ltd., London, in the preceding year, that is, 1986. In the book, the history of not only the United Kingdom, but also the United States of America, Germany, the Soviet Union, and so forth, is recorded, with photos. Of course, several pages are assigned to radars of our country, at the sixth section of the fourth chapter, entitled, "Beginning of Radar in Japan". This book has 300 pages, but the description of radars in Japan is very simple. But, among the reference literature, the following report was found: "Gijutsu Shiryō (Technical Reports) No. 82, 1978," subtitled "Radar development of the Japanese Army during WWII: anti-air radar Tago Type 2, Tago Revised Type 4," issued by Boei Cho Gijutsu Kenkyū Hombu Gijutsubu Chosaka. In other words, the report was edited by Beoi Cho Gijutsu Kenkyū Hombu Gijutsubu Chosaka, and I did not know that such a report had been published. After I came back to Japan, I investigated it. It was the following report: Technical Report No. 82, 1978, "Development of radars in the Japanese Army during the World War II: Anti-air radars Tago Type 2 and Tago Revised Type 4, Issued by Inquiry Section, Department of Technology, Headquarters of Technical Research, Japan Defense Agency." The object of the published item was written as "The word for the publication" by Masatoshi Nakama, a technical developer of the Department of Technology, Headquarters of Technical Research, Japan Defense Agency (in charge of guided weapons), a former Technical First Lieutenant of Tama Military Technical Laboratory, the second section.

This report was prepared ten years ago. Since the report was circulated only among the concerned departments, and was not particularly announced to the public—or I did not catch sight of the report even if it was announced—it was a report which I saw for the first time. Turning the pages, its fifth chapter was entitled, "Research, trial manufacturing, and complete provision of electromagnetic wave locators of our country during World War II," and it was described therein that its writer was the former Captain Masahiko Okamoto. By the way, "the electromagnetic wave locator" means radar. On the fortieth page of the report, I caught sight of the word, "Newmann."

Reading the report with much attention, the following description can be found:

"Just in that time, Singapore was surrendered, and a note, one of the spoils of war, was sent to the technical headquarters from the Weapons Department of the South Forces in about July 1942, for the reason that such a strange matter was found and it would serve as some reference. This note was found in a wastepaper basket in a barracks of Singapore after the surrender, and entitled, "Newmann's Document."

and furthermore,

"This was a Corporal Newmann's property. It turned out, strangely, that he was committed to the prisoners' camp at Shinagawa in Tokyo at that time. I met him and asked various questions. But, I could not receive proper answers because he was not so much informed on a technical level, but served exclusively in operation since he arrived at his post with equipment, carried after receiving hastily crammed disciplines in the United Kingdom."

and moreover, subsequently,

"Some weapon's circuits and performance were written in the form of a memo in the note. At a glance, it seemed to me that one of them was a circuit diagram of a sound locator (for an artillery corps, in field operations), and another was that of a radio locator. When I carried the note back home and read it carefully, it became clear that the equipment had a name called S.L.C. (capital letters of Search Light Control), and was an electromagnetic wave weapon which directed enemy's aircraft in place of conventional search lights."

A radio locator is a word in a hostile language, that is, English. For the first time after the defeat, I knew the word of radar, that is, an abbreviation of Radio Detection and Ranging. The description about Newmann was the only one described above. Incidentally, the following was described about the former Major Masahiko Okamoto:

"My superior officer at that time was a section chief of the third section of the second division of the technical headquarters (instrument squad), Colonel Gunji Kobayashi. I was a research member under the section chief (an artillery Captain)."

Matters about Newmann came to be fairly clear by this report. I searched for mention of Newmann's Note or Newmann's Document by using this report as a clue, and hunting up some connections. But, there was no one who had seen Newmann's Note or Document. The note was a phantom, as it was.

6. From a Letter: "It was my fellow soldier, Major Shiomi, that found material on Yagi antenna in Singapore"

A meeting of Japan Radio Co., Ltd. was held in the spring of 1986, and, fortunately, I had a chance to talk with Mr. Keisuke Sato, of Nihon Koshuha Co., Ltd.

Japan Radio Co., Ltd., is a company that studied radars and manufactured them during the last war, and is still now a leading company in the field of radar technology in our country. When I served in Tohoku University, in the early years (in my 30s) of Showa, I visited Nihon Koshuha Co., Ltd., in Yokohama City, concerning a coaxial standing-wave measuring instrument produced by this company. I talked with Mr. Sato on my visit, including that the gentleman in charge of that company had been Mr. Genzo Yamada, who wore a wide belt, for Army officers. I learned that he was presently in charge of consultant business in the company. Several days later, I alighted from a train at Nakayama Station, on the Yokohama Railway Line, to visit the company, and saw Mr. Yamada, to apologize for my long silence of three decades (Photo 1). The measuring instrument was manufactured at this company through intensive studies, and was inevitable for adjustment and test of TV broadcasting antennas in our country, and also, I had owed much of my business to this instrument. Thereafter, I received from Mr. Yamada a long letter (dated April 3, 1986). In the letter, he described his past in detail, with very fine characters, how he had been an Army technical officer during the war period, and had taken charge of studies of the so-called "lethal ray" at that time, namely, "intensive radio wave" as expressed in technical terms, at present. It was also stated in the letter that literature had been introduced to them every week by Prof. Hidetsugu Yagi. To my surprise, there was such a shocking sentence in the letter: that "The man who discovered the material on Yagi antennas in Singapore was my fellow soldier Major Shiomi." I



Photo 1. Former Technical Captain, Genzo Yamada (r), and the author, Gentei Sato (l).

was excited by my possible chance to find a clue about Newmann's Note for the first time, when I read these characters. The first problem was how to know whether Major Shiomi was well and living or not. I felt as if a glimpse of a visionary Newmann's Note was emerging, faintly. As the result of my communication to Captain Yamada, I received his letter in answer (dated on September 11, 1987) saying that the present address of Major Shiomi is unknown, even whether he is alive or dead is uncertain, and Major Shiomi's fellow graduate, of Waseda University, answered to his inquiry that Major Shiomi was already dead. Thus, my sincere expectation of the emergence of Newmann's Note was completely negated. This letter says that, "The operation manual discovered by Mr. Shiomi in a trash box was material on the so-called SLC, which was received in Japan by Major Matsudaira (Mr. Yoriaki Matsudaira). Presently, I have a meeting with him every month. He is still alive and 77 years old, and he said he forgot how he handled this material after receiving it. Therefore, I was obliged to ask about this matter of some other likely persons, but I could not find any document evidencing this fact. If Lieutenant-Colonel Satake (later advanced to Colonel), introduced in "Phantom Radar, Wurzburg"⁵ were alive, I could ask him about this matter, but it is impossible. We were really surprised to know that this antenna had been employed as the antenna of a British radio wave weapon in the form of a Yagi array, and both Major Matsudaira and Lt. Col. Niizuma (still alive), in the same generation, understand that the above-mentioned matter is the SLC operation manual, discovered by Major Shiomi when Singapore was occupied by the Japanese Army. I suppose that the above-mentioned SLC material was the first instance recognized by persons in charge of radio wave weapons in the Japanese Army and Navy that a Yagi antenna was effectively used in the USA and England. I also suppose that recognition thereof as occupied materials took place earlier, in the case of the occupation of Manila. (This material belongs to the USA). The above story depends only on my memory, and may be somewhat apart from the real fact. I am afraid of and apologize to you for my useless answers. I beg your pardon on this matter."

As stated above, a considerably large amount of information was included.

Time passed, and the year 1988 came on. On a Sunday morning in the middle of January, I dared to take out the nominal list of the alumni association of

⁵Seiichi Tsuda, *Phantom Radar, Wurzburg*, CQ Publishing Co., Ltd., December 1981.

Waseda University, which I had at hand, because I was reminded that Major Shiomi had been recorded as a graduate of Waseda University. I was given this list a pretty long time ago by Mr. Sanae Kato, a graduate of Waseda University, who was the former managing director of Seki Shoji Co., Ltd.

This list is an old one, published in November, 1961, and Mr. Shiomi's name was easily found as a graduate from the Electric Engineering Department, as I had expected. He graduated from the Electric Engineering Department of the Science and Engineering Faculty of the university in March, 1931, and his name is recorded as follows among 27 classmates: "Bunsaku Shiomi, 264 Izumi, Komae-cho, Kitatama-gun, Nikkatsu Tamagawa Movie Studio." The address recorded in this twenty-year-old list as Komae-cho is presently Komae City, and he seemed to be well and working in the Nikkatsu Company. The year when he graduated from the university, 1931, was the year when the Manchuria Incident took place in September, and was considered the ignition point of a fifteen-year-war period which continued up to 1945, to the lost battle of the Japan-China War and the Pacific War. I had no means to know the carrier of the Bachelor of Engineering, Mr. Shiomi. But after his graduation at the university, it may be considered certain, from the letter of Captain Yamada, that he was an Army technical officer when the Pacific War was started. The list includes everybody's telephone number, if they have a home telephone, but his phone number was not recorded. But I dared to talk to the phone-number service, because I thought the service was not so busy because it was Sunday, and I expected that I could talk to his surviving family, about her husband or their father. I asked the appropriate telephone office about his phone number. After a little while, Miss Phone Operator's dry answer was heard, "There is no name, Bunsaku Shiomi, in the phone book." However, she immediately continued her talk: "Mr. Fumio Shiomi lives in 4-2-4 Izumi Honcho." I asked her his phone number, expecting that this gentleman was likely to be one of his relatives, living near his residence because of his address. I immediately telephoned this gentleman, and heard the voice of a male person through the phone. To my surprise, he was very soon found to be a son of Mr. Bunsaku Shiomi. To my further surprise, my wanted person was living in a separate house on the same site. I felt dreadful ecstasy to hear this information.

My wanted person had a separate telephone, and I was informed of this phone number. A certain time after I dialed the phone with my excited finger, a lady's voice was heard through the phone. The lady was Mrs. Shiomi, and her voice was steady. She showed me her favor, to usher me to him, while informing me of the present, unhealthy state of his body. As I had expected, an old man's voice was heard through the phone. It was very weak and hard to listen to; then his wife took the role of his substitute. Then, I forcibly made a promise to call on him, in the afternoon of the coming January 26, and cordially got off the phone. This event happened in the middle of January, 1988.

7. A Visit to Mr. Bunsaku Shiomi, and the Discovery of Newmann's Document

In the afternoon of January 26, 1988, I called for a journalist, Mr. Hiroshi Matsuo, who was writing the biography of Professor Hidetsugu Yagi, so as to visit Mr. Shiomi's home together with him. I took the Odakyu Suburban Train from Shinjuku, and got out of it at Komae Station and met Mr. Matsuo there. At the entrance to our destination address, with a low concrete fence, there was a wooden doorplate, on which the name "Bunsaku Shiomi" was marked. We were guided by the

hostess into a Japanese room, where a foot warmer was provided. After a while, the host appeared, dressed in Japanese clothes. His voice, in salutation, was very weak. Photo 2 shows Mr. Shiomi. Our talks touched the nucleus of our visit, so as to ask questions on the topic of Newmann's Note. According to his explanation, he was not the discoverer of Newmann's Note, but Lieutenant-Colonel Akimoto, in the Army Air Defense College, was. This Lieutenant-Colonel discovered this note, thrown away in the trash-burning site of a golf course, where an anti-aircraft battery position of the British Army was built, when he passed this district immediately after the fall of the Singapore fortress, in the spring of 1942. The note included many drawings and electric circuits, that proved to be related to a radio-wave weapon radar, invented in the United Kingdom or Germany as a new weapon, and keenly watched by persons concern with military affairs in our country. The Lieutenant-Colonel who recognized the importance of the note entrusted Army Technical Major Bunsaku Shiomi, a specialist in electric engineering, with interpretation of the note. The Army judged that this data was a part of a radio-wave weapon, which was the enemy's top secret data, having high value as reference data, and drew up a certain number of copies of the note, through transcription on an English typewriter, then mimeographing and also photographing. This was the so-called "Newmann's Document." That was the story of former Major Shiomi. We listened to his story with breathless attention, so that we would never miss any single word of essential evidence. This was the real Newmann's Note. It was also found that the place where the note was thrown away was a trash-burning site, and not a wastepaper basket in a barracks.



Photo 2. Former Technical Major, Bunsaku Shiomi (January 26, 1987).

Then, how thus were the certain number of copies of Newmann's Document, which were drawn up, handled thereafter? Mr. Shiomi could give us only this answer in response to our question about the destinations of those copies, "I don't know." Since his answer was always, "I do not know," against any repetitive question, at last my tone became intense, like the tone of examination of prisoners of war, just like the negotiation between the Commander Tomofumi Yamashita, having gigantic physique, and demanding surrender of the Singapore fortress, and General Percival, of the British Defense Corps, having a thin physique. A painting showing a thrilling scene of the interview between both Japanese and British Generals, sitting on opposite sides of a table, is still a famous, celebrated one. Major Shiomi stood up staggeringly, to retreat to a separate room. After a while, he brought an object, something like an old document, and placed it in front of us, slowly. The characters, "Newmann's

Document," were printed on the cover of this old pamphlet. If it was a real one, the Newmann's Document of our fantasy was really in front of our eyes! It consisted of scores of pages in a vertically-long-size straw paper with its cover of aged, thin brownish- and reddish-yellow color, which was applied to the left side, stitched margin. I followed the characters on the cover. The name of the organization in charge of the edition, "June 22 1942, Southern Army Weapon Engineering Guiding Squad" and "Restricted" were noted on it.

8. Newmann's Document

Newmann's Document, concealed for more than 40 years, was now placed in front of my eyes. I turned its pages carefully, with my fingers apparently too steady, but with my heart excited. By opening the note, English characters printed on the overall first page, of a somewhat-yellowish straw paper, came into my eyes:

S.L.C THEORY

1. INTRODUCTION

1-1. Function of Equipment

The above English words were immediately translated into Japanese words in my brain. The top of the following sentence was, "The S.L.C. Equipment is designed for detection of aircraft...." Thus, this note proved to be related to S.L.C. i.e., Search Light Control, directly related to a search-light control radar, itself. This control was used for directing the light toward an enemy aircraft, by linking [the radar] to the search light.

My sight crept down the paper's surface, looking for the characters YAGI. At last, I found the characters YAGI, emerging in a large size. Subsequently, the characters "ARRAY" were observed.

"The transmitting aerial consists of a YAGI array mounted well above the projector barrel on outriggers."

This sentence says that one unit of the YAGI array was used for radar transmission.

The meaning of the word "array" is substantially, "to arrange (troops) in lines" or "arrangement," and this meaning has been converted to alignment of many metallic bars (of an antenna), to be translated to "alignment" or "arrangement," and is sometimes used as the meaning of "an antenna" itself. In our company, the word "aerial" has also been used in parallel for a long period, but it is presently standardized as "antenna." Meantime, the word "aerial" is frequently used in British books, imported since the end of war. The word "antenna" is mostly used the in the USA, and this word is presently also used in England. The word "array" is presently used in England, the USA, and also in Japan. The next sentence follows thereafter in Newmann's Document:

"The receiving aerial consists of Yagi arrays arranged above, below and on either side of projector barrel, the picking from these being combined in various ways at the switch unit mounted behind the fan unit."

"Yagi array" appears in this sentence, but this seems to be a misprint of "YAGI array". It can be found in this sentence that horizontal and vertical pairs of YAGI arrays, namely four units of a YAGI array, are used for receiving, so as to spot a target such as an enemy aircraft by using so-called lobe switching. Although more detailed material concerning the YAGI antenna is described thereafter in Newmann's

Document, the explanation shall be omitted here, because of too much specialized material.

One unit for transmitting, four units for receiving, that is, five units in total, of YAGI antennas are used here, where each unit consists of five pieces of metallic bar, thus forming the so-called 5-elements of the YAGI antenna. Photo 3, of a radar employing five units of this five-element YAGI antenna, is printed in a book titled *Radar*, issued from Hakusui-sha in August, 1953, and written by Mr. Piel David, Chief of the French Naval Radio Laboratory, translated by Mr. Yukio Nakamura under the heading "YAGI Antenna employed in British Radar for Searchlight," and its construction can be well understood with this photo.

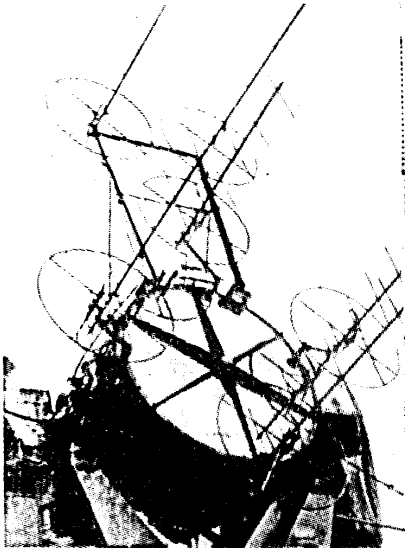


Photo 3. Yagi antenna employed in British radar for "Searchlight." (From a translation of the book *Radar*, written by Piere David and translated by Yukio Nakamura.)

Meanwhile, it is recorded in the above-mentioned Japanese Defense Agency's report that the No. 2 type radio locator, developed by the Army in October, 1942, was the S.L.C. introduced in Newmann's Document, and it was additionally provided with a range-measuring circuit, required for anti-aircraft shooting. Its construction consisted of one unit of the YAGI antenna for transmitting, and four units of the same for receiving. Thus, Newmann's Document was quite useful for radar development in our country.

In addition, Tohoku University participated in research on an improved mode of this unit and, in particular, Prof. Shintaro Uda (an official post at that time) was in charge of the antenna system.

Meanwhile, a statement of gratitude such as, "At the last chance, I say many thanks to Dr. Shigetaro Chiba and Mr. Shuzo Takahashi, who gave me much favor for my work of translation and Denkitsushin Kenkyusho (Electric Communication Research Lab) Library which gave me the chance of my data collection," appears in the "Translator's Introduction" of *Radar*, translated by Mr. Nakamura. Dr. Shigetaro Chiba, who appears in this introduction, is a former Professor at Tohoku University. He stayed in a room adjacent to ours, when I was staying in Aone Hotspring in Miyagi Prefecture, together with my grandmother and others, when I was only 4 or 5 years old. I remember that he assisted me

in catching locusts perching on a tree in the garden. Mr. Shuzo Takahashi had his literary work, titled *Radar*, issued from Koyosha in January, 1953, in co-operation with Mr. Yoji Ito, and on page 143, his evaluation concerning the British radar is written in such a manner as, "Performance of this unit is unsatisfactory because of poor azimuth resolution caused by its long wavelength and small size of antenna system, but its structure is quite simple to be worthy of receiving reputation of the result of excellent design." I had the chance of meeting the author of this book, Mr. Takahashi, at a meeting held by Navy "old boys," ten and several years ago.

The following books include matters concerning Newmann: *100 Persons Established Novel Japan*, supervised by Kazuo Okouchi, Soichi Oya, Mainichi Press, January, 1966, and *Hidetsugu Yagi and Electric Communication Engineering*, written by Norihisa Okuda.

The next description can be read in this editorial, as a sketch for expressing the state at that time. "Japanese Army attacking Singapore and Colehidore each captured one set of British and American ground fixed radio wave warning apparatus and antiaircraft radio wave locator. These four radars were extremely precious trophies for engineering troops in the Japanese Army and Navy, trying to exert their full resources to put radars into practical use. Simultaneously with these actual apparatuses, one volume of a note possessed by some radar operator was discovered in Singapore. The name of this radar operator was Newmann, and his rank was Private or Lance Corporal and the performance of the radar and the process of operation were carefully noted in this note. This was the note of training he had received....That note was the so-called 'Newmann's Note,' and every person concerned with this weapon shed tears of ecstatic joy."

Now, the scene returns to the room with a foot warmer in Mr. Shiomi's home. During this period, Mr. Matsuo exhibited his journalistic air, by asking Mr. Shiomi precisely, so as to note his answer in his notebook with a ball-point pen. I looked through the document roughly, and immediately started to copy the points with a soft 2B pencil in the note book I brought with me.

I asked Mr. Shiomi to lend me this document many times, but he repeated his strict rejection every time. It took several hours for me to draw up its perfect copy, although the copying speed was like that of an airplane. I was very tired. I also felt some impatience. His wife entertained me with tea and cake. Time passed fast, second by second, and the fade-out of sunlight was felt, heartlessly.

Technical Major Mr. Bunsaku Shiomi, Imperial Army of Japan, having his insignia of rank with gold stripes and one star in the past Pacific War, and holding his dignity with a saber, must have considered this Newmann's Document a military secret, and it was still a secret military document for him, and still so, then, even though forty years or more had passed since the end of the war.

Milord Major Shiomi was a mirror of the Imperial Army. When the evening was approaching, I said to him, while sitting in my correct manner, in a posture of perfect surrender, that I could not complete a perfect copy of the document. Probably, my sincere and active spirit may have impressed him to allow me to borrow the document, at last. Photo 4 (left side) is Newmann's Document, and Photo 5 shows its cover page, covering 57 pages in total. In addition to Newmann's Document, one sheet of straw paper, including a mimeo-

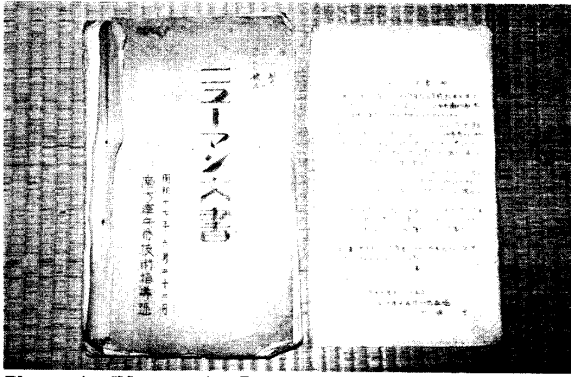


Photo 4. "Newmann's Document" (l), and "Report of Newmann's Document" (r).

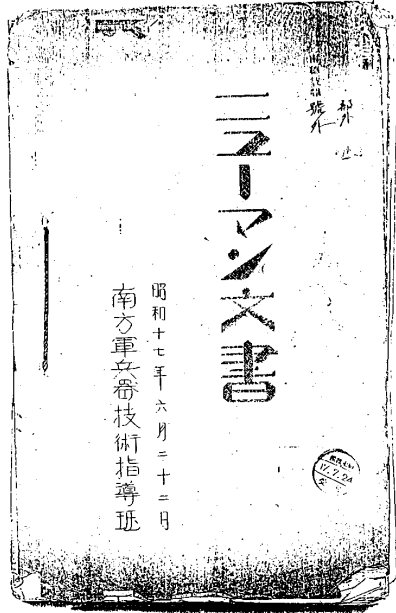


Photo 5. Cover page of Newmann's Document.

ニーマン文書ノ引

本書ハ昭和十七年三月ニ刊行軍用技術資料中佐ノ
 新田通彦ノ撰ニ由リ左記ニ如ク昭和前期南洋
 軍用機ニ對シテ採得ノ成果トシテ

本誌ハS.L.C., V.I.E., C.D./C.H.L. 及他種通
 信機ニ關シテ採得ノ資料A.O.C. (兵器部) 等
 ニ關シ HEWMANNノ撰ニ由リ採得ノ資料ニ
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 ニーマン文書

ト全ク

昭和十七年六月二十五日
 南方軍用技術指導班
 大嶋 平

Photo 6. Report of Newmann's Document.

graphed description of its history, titled "Report of Newmann's Document," was attached, which is shown in Photo 4 (right side), and the total word are shown in Photo 6. This report was written in Kanji (Chinese characters) and Katakana (Japanese phonetic symbols), including neither accent marks nor punctuation marks, according to the custom of military reports in those days, then rather hard to read. Those marks are preferably interposed and shown below.

"Report of Newmann's Document

"This note was discovered by Lt. Col. Akimoto, in charge of the Army Air Defense College, when he was guided around the enemy's anti-aircraft battery position in Shonan Holland Village, at his request, on his way in passing Shonan on the 20th of March, 1942. This note is a pocketbook including descriptions of S.L.C., V.I.E., C.D./C.H.L. and other communications equipment, and was possessed by a soldier called Newmann, who belonged to R.A.O.C. (possibly, called 'Weapons Troop'). On its cover page, it was prescribed that this note should belong to the government, because it is a military secret document, although it was issued for the private use of Newmann. S.L.C., V.I.E., C.D./C.H.L. are all components of an electric weapon which he thought was the highest secret, and thus had a high value as reference data.

"No S.L.C. proved to be present in Shonan. Actual articles [examples] of other components were obtained there. Since this note was an extremely important reference book, as stated above, its copying process was entrusted to military government troops, and its photos were obtained by the efforts of the Navy. Furthermore, reproduced copies were completed by the aid of the Aircraft Engineering Troop.

"This note is, in particular, titled 'Newmann's Document,' for the sake of the name of NEWMANN, who was a military user and offered a huge amount of reference data to the Imperial Military.

June 25, 1942, Taku Oshima
 Southern Army Weapon Engineering Guiding Squad"

After the occupation of Singapore City, the Japanese Army named it Shonan.

Important portions of Newmann's Document are shown in Photos 7, 8, and 9.

Immediately after I returned home, I phoned Captain Genzo Yamada to report to him the state of my visit to Major Shiomi, including my actual viewing of Newmann's Document. Several days later, I wrote a long letter of gratitude to him, with a photo of Major Shiomi in his foot warmer, enclosed in the letter. I received his answering letter on March 22, 1988, which said: " Mr. Sato, your enthusiasm made sure of the address of Mr. Shiomi, and I was able to see the S.L.C. literature (it reminded me of Newmann's Document). I was really pleased with my long life, because I could borrow this phantasmal literature from Mr. Shiomi, to actually view it with my eyes. Thanks to you, I was able to see Mr. Shiomi again, 20 years after the last time. I couldn't, of course, hear his (Shiomi's) former talk of mighty tone, but both of us had dazzled eyes when our talk touched on the topics in these days, and we continued to talk for almost two hours. Mr. Shiomi is 80 years old, while I am 75 years old, and with regard to the last school carrier, mine was a professional school (Hamamatsu Higher Technical School), and Mr. Shiomi's was a university (Waseda), and he was my senior by two years in the Army Tama Laboratory. Both of us have spent most of our springtimes of life as minions of Japanese Militarism,

1. INTRODUCTION.1-1. Function of Equipment.

The S. L. C. Equipment is designed for detection of aircraft and is arranged for the rapid laying of a S/L Beam on any selected aircraft. The maximum range at which the equipment is operated is dependent upon the nature of target aircraft and its height, but good response will usually be obtained for any aircraft within the normal range of the S/L beam.

The accuracy of laying is better than plus or minus 2° of solid angle for elevations greater than 20°, at lower elevations the bearing accuracy is unimpaired but the accuracy of elevation may be somewhat reduced.

1-2 Outline of Method Used.

A small ultra-short wave transmitter working at a frequency between 204 and 214 Mc/s. sends short period pulses of R.F. power at a rate of 1,500 to 2,500 per second. These pulses together with any reflected pulses from aircraft are picked up on a receiver and the wave-form of the resultant signal shown on a CRT (Selector unit) on which a time-base distributes the reflected pulses according to their ranges.

The receiving aerial array is such that its radio beam is continuously deflected a few degrees away from the light beam direction and may be made to rotate about it. The path of the beam thus forms the surface of a cone with the apex at the projector and its axis coincident with the light beam direction.

The selected echo signal is isolated by means of a signal selector (electrovalve) current, and the laying of the projector is carried out to equalise the signal amplitudes in opposite pairs of the cardinal directions of the radio beam, i.e. to make the axis of the cone coincide with the target direction. The comparison of the signal amplitudes from complementary beam directions is made by feeding rectified and smooth signal voltages to opposing deflector plates of CRT. (Bearing and Elevation limits). The signals are periodically switched successively to the different deflector in synchronising with rotation of the radio aerial beam.

1-3 The Layout of the Set.

The equipment is built around a standard projector, AA.70cm. MK VI and derives its power from a 2000 cycles per second, 80 volt motor generator set, the input to the motor being taken from the generator 22 KVA which supplies power for the projector. The transmitter and its power supply unit are built into the compartment in the lower half of the left hand (received from rear of barrel) trunnion arm of the projector. The receiving circuits are fitted into the right hand trunnion arm compartment. There are three display units each consisting of a small box containing a CRT and its associated circuits. The selector unit, is mounted on the right hand rear of the projector and has a seat for its operator. The elevation unit is at the left hand rear of the projector and also has a seat of elevation. The bearing unit is fitted at the end of the control arm and is used by the bearing operator standing on the ground.

The transmitting aerial consists of a YAGI array mounted well above projector barrel on outriggers. The receiving aerial

Figure 7a. First page of Newmann's Document.

under the name of the Japanese Emperor. I had deep feeling in view of the destiny and life of human beings...."

This letter says that, after our visit, Captain Yamada also visited Major Shiomi, after a 20-year interval, and they talked to each other with dazzled eyes while reflecting upon the matters of those days. Major Shiomi seemed to be weak when we visited him, but his wife phoned me that he became hale and hearty at the chance of our visit. I suppose that two old former Army technical officers, having celebrated 80 years and 77 years, respectively, might have new, deep emotion in talks of their reminiscences of their manhood.

Mr. Yamada's letter also included, "...I beg your pardon to let me have the address or phone number of Mr. Mano, if you know them. He was my direct, senior officer in the Tama Laboratory, until April, immediately before the end of the war".

"Mr. Mano" means Technical Major Kunio Mano, who graduated from Tohoku University in 1934. He became an associate professor, and was my direct supervisor when I was a research assistant, after graduating from the same university in 1947.

9. The Invention of Yagi-Uda Antenna, its Patent and its Presentation in Academic Society

The so-called Yagi-Uda antenna was invented in our country, but it was placed in practical use for a wide range of applications in foreign countries, like England and the USA. This antenna, of high performance, has been named the "Yagi Antenna" by foreign countries.

Professor Shintaro Uda went to the USA in 1951, six years after the end of the war, so as to inspect the science and technology in the USA. The start of TV broadcasting in our country was two years after his visit to the USA, but he noticed comprehensive propa-

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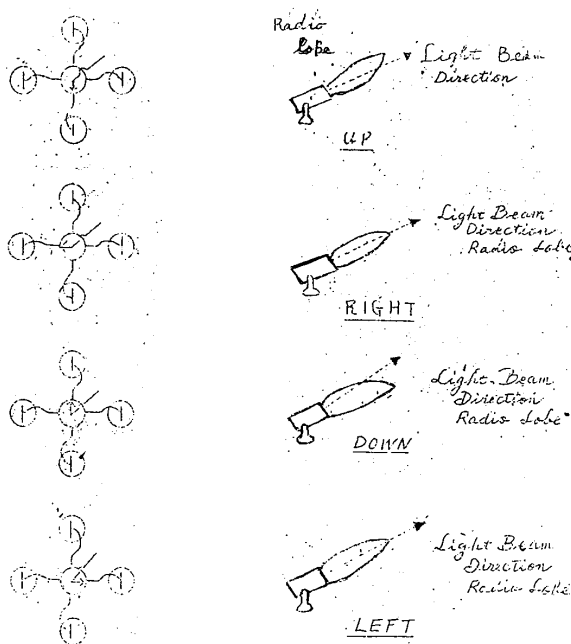
The transmitting aerial consists of a YAGI array mounted well above projector barrel on outriggers. The receiving aerial

Figure 7b. What the photocopy shown in Photo 7a says.

gation of TV had been achieved in the USA at that time. Professor Uda explained the state at that time as follows: "Passing through the Golden Gate, on board, arriving at San Francisco Port, I landed. However, as soon as I entered the city, my heart was twisted with joy when I saw many antennas achieved by [my] efforts mounted on the roofs of private houses all around. I myself have been obliged, so far, to be humiliated as the carrier of this antenna being distinguished by being utilized by the enemy as a war weapon. The same antennas are now standing on the roofs of private houses in front of my eyes! As well known now, this antenna is presently used on a world-wide scale. I have heard that the late Mr. Mikimoto, the King of Pearl, talked big, 'I will tighten the necks of all ladies in the world with necklaces of my

pearls;' meanwhile my antenna is now erected on every house in the world, although I did not particularly try [to implement] such a plan. This is the ex-officio profit of a researcher, and I give thanks for my undeserved luckiness."

TV broadcasting was started for the first time in our country on February 1, 1953, two years after Professor Uda's inspection of the USA. The contracted number of viewers was only 866, surprisingly. Propagation of TV was gradually developed since that time, and that of black-and-white TV was developed explosively at the opportunity of the wedding ceremony of the Japanese Prince with Miss Michiko Shoda, in April, 1959. Further, the propagation of color TV was widely extended at the opportunity of the Tokyo Olympic



DETAILS OF SWITCHING
SEQUENCE

Figure 8. Switching sequence for Yagi antenna shown in Newmann's document.

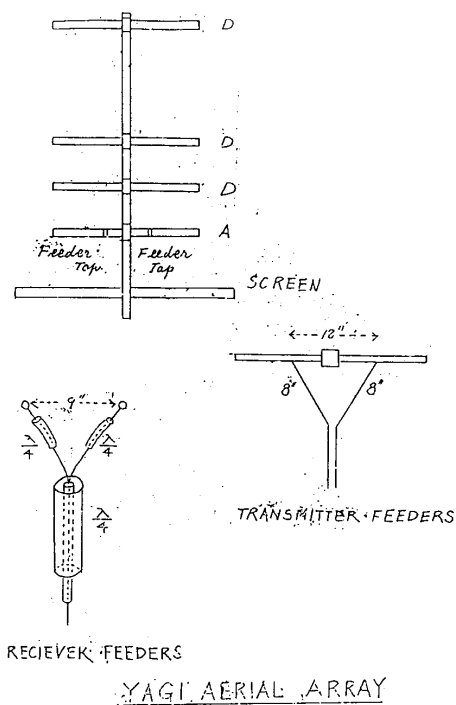


Figure 9. Drawings of Yagi antenna shown in Newmann's Document.

Games, held in October, 1964, and up to the present time. Most of these TV receivers employ the Yagi-Uda antenna. The Yagi-Uda antenna was first used, in our country, for radio communications on an isolated island, and was used in the enemy's radar during the past war; it is now being used in many TV receivers in the world. This antenna, having creative high performance, had a patent applied for under the title of "Radio Wave Directivity System," with the name of Hidetsugu Yagi, on Dec. 28, 1925, and Patent No. 69115 was approved in 1926. A huge number of these antennas was manufactured and sold for TV reception recently, but no royalty has been paid, because the patent rights had already expired.

With regard to this antenna, information about it was published in the *Proceedings of the Imperial Academy*, under the title, "Projector of the Sharpest Beam of Electric Waves," in February, 1925, with the joint names of Hidetsugu Yagi and Shintaro Uda. Subsequently, in March, 1926, a paper entitled, "On the Wireless Beam of Short Electric Waves (No. 1 Report)" was published in the *Journal of the Institute of Electrical Engineering*, under the single name of Shintaro Uda. The research reports had been issued continuously up to the No. 11 report, until July, 1929. Meanwhile, the date of the invention of the Yagi-Uda antenna was assigned to March, 1926, when the No. 1 report was published.

In addition, a paper entitled, "Beam Transmission of Ultra-short Waves," was published in the *Proceedings of the Institute of Radio Engineers (USA)*, with the single name of Hidetsugu Yagi.

10. Newmann's Document, Lieutenant-Colonel Seiichi Niizuma, and First-Lieutenant Norihisa Okuda

The National Foundation Day, February 11, (Saturday) has already passed, this year. Although the status of Newmann's Document has occupied my brain for a long period of years, I am going to finish writing this manuscript by February 15, this being the date of surrender of Singapore.

Now, here is what happened on Sunday, February 12, of this year (1989), the latter one of the continuous double holidays subsequent to the National Foundation Day. I remembered the name of Lieutenant-Colonel Seiichi Niizuma, written when he was alive, in the letter from Mr. Yamada which I received in September, 1987. I dared to phone him directly, although I had never yet seen him. He said he had graduated from the Physics Department, Faculty of Science, at Tokyo University, on the way to his career as an Army technical officer, and he had been a classmate of the late Professor Isao Oshida, who was the former dean of the Science and Technology Faculty at Sophia University, where I have my work. His voice was very young and energetic. But he answered me that he had not had the experience of reading Newmann's Document, and the document might be possessed by Mr. Okamoto, who was dead already. I was instructed that Mr. Okamoto is Major Masahiko Okamoto, who wrote the above-mentioned Defense Agency manuscript in 1978, and who was a graduate of the Electric Engineering Department at Kyoto University. On just the next day, February 13 (Monday), I saw Mr. Norihisa Okuda, who wrote the matters concerning Newmann in the preceding Section 8. He was introduced as a science critic in the column for introducing authors in the above-mentioned *Hidetsugu Yagi and Electric Communications Engineering*. During talking with him for several minutes, I learned that he had entered Sendai First Middle School in 1931. Therefore, he was my senior schoolmate. I made sure that he had known the Principal, Takaaki Kodaira.

Naturally, he knew the principal, and readily introduced the following anecdote⁶:

The story took place in the year next to the start of the Pacific War, that is, near autumn in 1942. Compositions concerning aeronautical matters were collected publicly under the sponsorship of the Asahi Press, and with back-up by Army Air Headquarters. The Sendai First Middle School won the first prize, and it was decided that one glider was to be donated to the school as a prize from the Inspector General. Mr. Okuda also went to the school, together with the staff of the Asahi Press. Principal Kodaira stood high on the stage to make an impassioned speech, such as, "Lieutenant Okuda presents himself here today as the deputy of the Army Air Inspector General; he was a senior of our school, who studied in this lecture hall ten years ago." This event took place a half year after the Prince of Wales was attacked and sunk by Captain Hachiro Takeda, as I heard from Principal Kodaira. At that time, I had already advanced to a higher school. And, concerning the Sendai First Middle School, both Mr. Takeo Sugimoto and Tomoshiro Seki, who did experiments under the control of Professors Yagi and Uda, when the Yagi-Uda antenna was invented, proved to be graduates of this school.

Meanwhile, Mr. Okuda brought a file of old data used during wartime. Most of the contents were issued from the investigation section of Army Air Headquarters, and included those data concerning the rocket V-type bombs, which attacked England from the German mainland, and the super-large bombing airplane (B-29), called the "Flying Fortress of the USA," which bombed and burned cities to the ground in our country. Among many other, old data, several sheets of memo paper (B4 size), on which the characters of "Army" were printed, and typed with a Japanese typewriter, were found. "SLC THEORY" was typed on the cover sheet, and the phrase, "SLC THEORY, Introduction," appeared on the next page. This was a complete translation of Newmann's Document. This material consisted of 17 sheets in total, including the cover page, with none of the figures. Photo 10 shows the beginning of the material. This one includes none of the characters for explaining the name of the organization of issue and the date, besides the fact that Army stationary was used. Is this the one translated by Associate Professor Yujiro Koike, of Tohoku University? The total Japanese translation was discovered two days before the schedule for stopping my pen. After the war, I received a lecture on vacuum-tube engineering by Associate Professor Koike (later, Professor, and then Professor Emeritus) when I was a student.

11. Conclusion

I was born in the suburbs of Sendai City, in March, 1926. This year, and also this month, strange to say, coincides with the time when Professor Hidetsugu Yagi and Professor Shintaro Uda, at Tohoku University in Sendai, invented the Yagi-Uda antenna which later became so well-known, and was published in academic society. Thus, I had the very strange opportunity to be born in the same place and the same year and the same month as those of the appearance of this well-known antenna. Furthermore, I have had a splendid chance to later be trained for about ten years under the guidance of both professors. Thus, I have come to consider antennas to really be my treasure, belonging to my destiny. My home is very close to the homes of these professors, and their children and I studied in

⁶Norihisa Okuda, "Remembrance (Sugasugashi Note)" Graduation from Sendai First Middle School in March, 1936, the 50th Anniversary Bulletin by members of Shoshichi.

図 10 理論

緒言

1. 發振 諸元

図 10 發振ハ航空機探知ヲ目的トセテ特定ノ目標ヘ探照燈

光ヲ速カニ向ケル操作ヲテアル。發振ガ使用セラルル積大範圍ヘ目標航空機ノ性質、高度ニ依ルガ光軸ノ俯仰ノ範圍内デアドンナ航空機ニ就テモ良好ナ結果ガ得ラレル範圍ノ精度ハ高低角 30° 以上デハ立体角 $\pm 30^\circ$ ヨリ良好デ低イ所デハ方向精度ハ密ヘレナイガ高低ノ精度ハ若干低下スル

2. 使用方法ノ大意

300乃至 314MHz ノ周波數デ發振スル小サナ短波發振器ガ一秒間 1500乃至 3500回ノ割合デ高周波電力ヲ短時間ノ衝擊 (impulse) トシテ送ツテキル。コレヲノ衝擊ヘ航空機ノ反射ニヨル衝擊ト共ニ受信機ニ受ケラレ「ブラウン」管ニ綜合波形トナツテ見ケラレル。コソデ時間軸ハ反射衝擊ヲソノ距離ニ應ジテ分布サセル

受信空中線ハソノ受信軸ヲ光軸ヨリ若干常ニ傾ケソノ廻リニ回轉シ得ル操作ヲテアル。コノ受信軸ノ行路ハ探照燈ノ焦點トシ軸ハ光軸方向ニ一致スル圓錐ノ表面トナル。想定反射個體ヘ探照個體 (電氣的ストロボスコープ) 電流ニヨツテ取り出サレ高周波軸ノ兩主軸ニ於ケル個體電壓ヲ等シクスル探照燈ガ向ケラレル即チ目標方向ニ圓錐ノ軸チ一致セシメルノデアル。個體電壓ヲ整流シ平滑化シテ個體電壓チ

Figure 10. Japanese translation of Newmann's Document.

the same primary school, while remaining mutual friends as senior and junior students and, naturally, I keep good relationships with them now, still. I think it is really an act of Providence, and my strange fortune, that such a person as me is obliged to draw up, by the National Foundation Day in February, 1989—formerly called "Kigensetsu" (the Anniversary of the Emperor Jinmu's Accession)—something about Newmann's Document, which gave evidence of the excellence of the Yagi-Uda antenna to my country for the first time, while reminding me of the year of 1942, when a rumor such as the conquering of Singapore was adrift in the town.

Further, the details concerning Newmann's Document were broadcast from Nippon Hoso Kyokai (Japan Broadcasting Corporation) Educational TV under the title, "Radiowave Research and Its Locus in Japan—100 Years Since the Discovery of Radiowaves," from 8 o'clock to 45 minutes past 8 o'clock in the evening of December 18, 1988, in the era of the late Japanese Emperor. The man who made plans for this broadcast program was Mr. Kotaro Itami, NHK educational program director.

I would like to say many thanks, for helping me in drawing up this manuscript: first, to Mr. Bunsaku Shiomi, who treasured Newmann's Document; to Mr. Genzo Yamada and Mr. Keisuke Sato, who provided distinguished advice, to give the hint of its discovery; and also to Mr. Hiroshi Matsuo, Mr. Norihisa Okuda, and Mr. Kotaro Itami. I also express my deep gratitude to Mr. Osamu Takahashi, Mr. Seiichi Niizuma, and the former Navy engineer, Mr. Hiroshi Shinkawa, and Mr.

Masatoshi Nakama, who gave me all sorts of instructions through the telephone.

Meanwhile, I repeated my inquiry to the concerned sections in the Japan Defense Agency about the presence of "Newmann's Document," but the answer was negative every time.

However, I can not be sure that only one copy of Newmann's Document was drawn up. If any copy were present besides the one treasured by Mr. Shiomi, it would be very fortunate. If such a copy (or copies) might be found as the result of the TV broadcast or this, my manuscript, I would be extremely happy.

In Sendai City, I handed a reproduced "Newmann's Document" to Tohoku University, where the Yagi-Uda an-

tenna was invented, so as to have it stored in its library, today, on February 15, 1989. Also, I am going to ask Mr. Bunsaku Shiomi to have the original, now treasured in his hands, kept in custody by some appropriate organization, or contributed to the public, so that it can be perused widely by the people at large.

Gentei Sato
February 15, 1989

P.S. The author has been informed that Mr. Bunsaku Shiomi contributed Newmann's Document to Tohoku University in June, 1990.

[Prof. Sato has also donated a copy of Newmann's Document to the Antennas and Propagation Society.]

Editor's Comments continued from page 6

sions on the market, has a paper holder which really works. SRW also makes the absolute best 3.5" disk boxes for traveling, in my experience.

Some final thoughts: If you're looking for a powerful but quite intuitive desktop publishing program for the Mac, try *Publish It!* It has a very capable built-in word processor, and a novice can learn to be productive with it in an hour. The only caution is to remember to save your work: the program will let you exit without doing so. If you use vugraphs and you haven't tried Microsoft's PowerPoint (on the Mac, yes, but especially on the PC under Windows 3.0+), you're probably wasting time and producing lower-quality vugraphs. If want a marvelously pleasant but totally addictive game, find *Ishido: The Way of Stones* (no, not my way, but...never mind) (Accolade, 550 S. Winchester Blvd., San Jose, CA 95128; (408) 985-1700). You can learn how to play it

in 10 minutes, and become reasonably proficient in five games. I'm convinced it also has *at least* as much subtlety to masterful play as Go.

Winding down. Hopefully, you'll receive this issue just as you're leaving for the London, Ontario meeting. I hope I see you there. If you're there—or even if you're not—get in touch with me or one of the other members of the *Magazine* Staff, and let us know what you like, what you don't, and what you would like to see in these pages. The purpose is communication, and that is always much more productive if it is bi-directional. By the way, it's not too early to start planning for the 1992 meeting, in Chicago. The call for papers is in this issue.

In the northern hemisphere, this issue will also mark the start of summer. Many try to pause, reflect, and rejuvenate during this time. I hope you are able to do so, and enjoyably, as well. *Rosa*