



**IEEE Nagoya section
Shizuoka University**

**Dedication Ceremony
for
IEEE Milestone
“Development of
Electronic Television,
1924 – 1941”**



**At 13:30 – 14:00 on November 12, 2009
In Front of the Bust of Prof.K.Takayanagi
Shizuoka University, Hamamatsu**

University)

6. Special Lectures: • Yasuharu Suematsu (Professor emeritus, Former President of
Tokyo Institute of Technology)
“Beginning of Development of Electric Television and
Development of Displays”
• Alexander Magoun (Director of Sarnoff Library)
“History of Television”
7. Closing remark Takato Nakamura (Executive, Shizuoka University)

(III) Celebration Party (17:30 – 19:30)

Date: November 12, 2009

Place: Hamamatsu Meitetsu Hotel

1. Opening address: Hidenori Mimura (Director of Research Institute of Electronics,
Shizuoka University)
2. Toast: Tadashi Yanagisawa (Dean of Faculty of Engineering, Shizuoka University)
3. Congratulatory addresses: * Hitoshi Ohkubo (Former Chairman of IEEE Nagoya
Section)
 - * Eiju Matsumoto (Vice-Chair of IEEE JCHC)
 - * Minoru Hagino (Former Director of Research Institute of
Electronics, Shizuoka University)
 - * Representative of Hamamatsu Photonics
 - * Keiichi Kubota (Director of Technical Laboratories of
NHK)
 - * Kyoichi Nakamura (President of Alumni, Faculty of
Engineering, Shizuoka University)
 - * Invited speaker
4. Closing remark: Yukihiro Ito (Dean of Faculty of Informatics, Shizuoka University)

IEEE Milestone: Development of Electronic Television, 1924 - 1941

Professor Kenjiro Takayanagi is one of the pioneers for the development of television in its early stages. Most of his pioneering work was achieved independent of activities in Europe and United States of America because at the time, world communication was poor. His pioneering achievements in the development of television from 1924 – 1941 are as follows.

- 1924 Prof. Kenjiro Takayanagi started his research program of television(p.71 of [1]).
- 1925 Innovated a high-performance Braun tube with a thermal electron emission source and grids for a television receiver.
He employed new ideas: a thermal electron emission source instead of the usual (at that time) cold emission source (gas discharge source) and grids to control electron beams, leading to the high-performance Braun tube for television.
- 1926 On December 25 he succeeded in transmission of a Japanese alphabet “い (i)” on the Braun tube using a Nipcow disc.
- 1929-1930 Invented an amplification method of signals in wide frequency range and applied for patents.
He invented a signal amplifier in a frequency range of 20 Hz–100kHz, leading to a possibility of transmission of 20 pictures/sec with 10,000 pixels.
- 1930 Innovated a high-vacuum Braun tube with multiple control poles and applied for patent.
This and the Bell oscillograph made by Dr. Frank Gray were the Braun tube with the highest performance at the time.
- 1930 On December 27 he applied for a Japanese patent “Transmission apparatus using an accumulating method”.
He invented this independently without any information from Europe and USA, although the idea of a charge storage device was quite common by this time: for example, the patent of Dr. Zworykin on December 29, 1923.
- 1931 Invented independently a magnetic deflection method of electron beams for a television Braun tube.
He applied this for his television system, resulting in receiving most precise television pictures in the world in 1931. Although W.Rogowski and W.Grosser (Germany) built and operated a tube with magnetic focus and deflection in 1925, the Western Electric gas-focused tube probably was more stable and consistent in its operation and continued to be the most widely used oscillograph tube.
- 1931 He and his group transmitted television pictures of 10,000 elements (80 lines) at 20 frames/sec on wavelength of 84.5 meters from the radio station JOAK in Tokyo.
- 1932 He invented a sawtooth wave generator using a multi-poles vacuum tube.
The similar circuit based on this invention is applied to a modern television set. Von Ardenne stated in his patent in 1931 that since sine-wave scanning caused severe problems in the images, he recommended a sawtooth scanning for both the horizontal and vertical movements.
- 1932 Exhibited a television system using Nipcow disc and Braun tube at the 4th Invention Fair held in Tokyo on March 20 – April 10.
- 1935 Succeeded in making his first Iconoscope in October (p.79 of [2]).
A photograph of Iconoscope camera made by Prof. Takayanagi is seen and the

first picture transmitted by the camera is shown.

- 1935 Made an all-electronic television system on 12 November.
- 1937 Invented a signal generation apparatus synchronized with interlaced scanning on July 12 and applied the Japanese Utility Model.

This interlaced scanning on the odd number line is also employed for a modern television set. The interlaced scanning on the odd number line was applied to his all-electronic television system, although the interlaced scanning had been applied by Bandall C. Ballard (Radio Corp.), Schröter (Telefunken), and von Ardenne for the mechanical television system in 1932 and had been employed by Farnthworth (even-line interlaced), RCA (two-to-one), EMI, R.D.Kell and A.V.Bedford (even line interlacing system, 1935), Telefunken, and Philco.

- 1939 His group in NHK (Japan Broadcasting Corporation) established the first television station and succeeded in broadcasting.
- 1941 NHK directed by Professor Takayanagi started public experimental broadcasting once a week in May and stopped it at the end of June because of the war.

The above pioneering achievements were independently made by Professor Takayanagi and his group at Hamamatsu Technical College (now Shizuoka University). These efforts greatly advanced the technology of Japanese television and related industries, which have eventually become one of the world's leaders.

Many honors for his pioneering and outstanding achievements in the development of television were given to Professor Kenjiro Takayanagi. Some of them are as follows.

- (1) Honored by "The committee of honor of the world's first international festival of television arts and science" in recognition of his outstanding contribution to the advance of television as a medium of international understanding at Montreux, Switzerland on May 1961.
- (2) Awarded the Order of Culture (the highest award for culture and science in Japan) on November 3, 1981.
- (3) Made an Honorary Member of the Society of Motion Picture and Television Engineers in recognition of his long and distinguished career in the pioneering research and development of television on October 15, 1988.

Citation in the IEEE Milestone plaque

Development of Electronic Television, 1924-1941

Professor Kenjiro Takayanagi started his research program in television at Hamamatsu Technical College (now Shizuoka University) in 1924. He transmitted an image of the Japanese character い (i) on a cathode-ray tube on 25 December 1926 and broadcast video over an electronic television system in 1935. His work, patents, articles, and teaching helped lay the foundation for the rise of Japanese television and related industries to global leadership.

