

Report on the Technical Meeting of the History of Electrical Engineering,  
Institute of Electrical Engineers of Japan (IEEJ), Tokyo, Sept. 2011

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A technical meeting of the History of Electrical Engineering, Institute of Electrical Engineers of Japan (IEEJ) was held at Waseda University in Tokyo on September 5, 2011. A special session on “history of electrical engineering as technological literacy” was organized and four papers were presented in it. In general session, Yamada made a presentation on the development of mechanical differential analyzers in Japan, which is summarized below.

Development of Differential Analyzers in Japan (Summary)

Three mechanical differential analyzers were developed during and after war in Japan.

(1) Aeronautical Research Institute of the Tokyo Imperial University

Tatsujiro Sasaki et al. of Aeronautical Research Institute of the Tokyo Imperial University developed a prototype of a differential analyzer jointly with Showa Kookuu-keiki (aeronautical instruments), Tokyo, in 1942 for the first time in Japan. It consisted of four integrators, three input tables, an output table and a multiplier. The second prototype was built but was destroyed just before completion by fire during the war. After the war, Masaru Watanabe et al. tried to adjust and improve the first prototype to apply it to practical calculations and succeeded in doing some calculations. However, the machine was finally discarded as it was difficult to maintain high accuracy of it. Sasaki also built an analogue calculator for nine simultaneous equations (Wilbur machine) in 1944, which is exhibited at the National Museum of Nature and Science, Tokyo.

(2) Osaka University/Tokyo University of Science

The differential analyzer preserved in Tokyo University of Science (TUS) has a similar mechanical structure to that of Tokyo Imperial University's. Tatsujiro Shimizu of Osaka University used this machine for his research and published his papers in late 1940s. As Shimizu moved to TUS in 1961, the

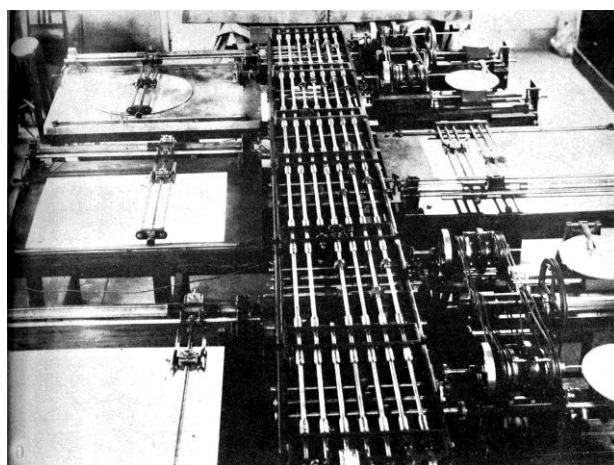


Fig. 1: Differential analyzer developed at Aeronautical Research Institute of the Tokyo Imperial University



Fig. 2: Differential Analyzer used at Osaka University and is now preserved by Tokyo University of Science

machine was transferred there. It consists of three integrators, an input table and an output table. This machine is currently preserved by TUS and is exhibited at Ridai Museum of Modern Science of TUS. As the name plate of Showa Kookuu-keiki was found on the machine during a search for certification, it seems to have built by that company in early 1940s about the same time as of the Tokyo Imperial University's. This machine was certified as Information Processing Technology Heritage by the Information Processing Society of Japan in March 2009. As materials are not available on the machine except two short Shimizu's papers and Showa Kookuu-keiki doesn't exist anymore, its birth is still unclear.

### (3) Institute of Industrial Science (IIS) of the University of Tokyo

Masaru Watanabe et al of Institute of Industrial Science (IIS) of the University of Tokyo developed an improved version of a differential analyzer in 1954 based on their research and experience on the prototype of the Tokyo Imperial University. It was equipped with eight integrators, three input tables and an output table. Input tables had an automatic curve tracking capability. It was used for doing orbit calculation of small rockets developed in 1950's by IIS. A torque converter, an adder and an automatic tracking head of the machine are preserved at the Historical Materials Archive of IIS of the University of Tokyo.

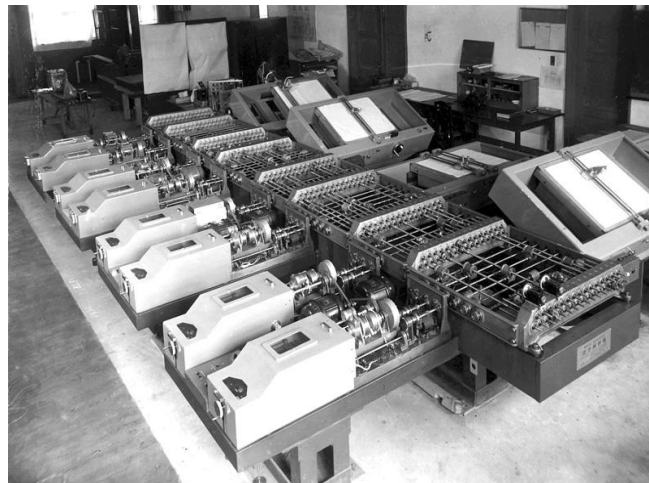


Fig.3: Differential analyzer developed at Institute of Industrial Science, University of Tokyo

### Program of Technical Meeting of the History of Electrical Engineering, IEEJ, September 5, 2011:

Special session on History of Electrical Engineering as Technological Literacy

R. Takayasu: History of Electrical Engineering as Technological Literacy

H. Tashiro et al.: Research about the background about Scientific Attainments of Elementary School Teachers

O. Kamei et al.: An Industrial History as Scientific and Technical Literacy

M. Maejima et al.: History of Science, Electricity and Society on New Science Textbooks for Junior High School Students

General session

A. Yamada: Development of Differential Analyzers in Japan