

DYNAMIC TESTING FACILITIES

Earthquake Resistant Structure
Research Center (ERS)
Institute of Industrial Science
University of Tokyo

The research project of "Dynamic Failure of Structures and Structural Elements" was launched in 1971 by the members of Earthquake Resistant Structure Research Center (ERS) at the Institute of Industrial Science, University of Tokyo. The objective of this project was to investigate the dynamic behaviour of structures and structural elements during earthquake for establishing an advanced method of earthquake resistant design of structures such as buildings, bridges, dams and other structures.

For this purpose, the dynamic testing facilities have been installed at the Chiba Experimental Station of the Institute of Industrial Science.

The facilities consist of the following three sub-systems:

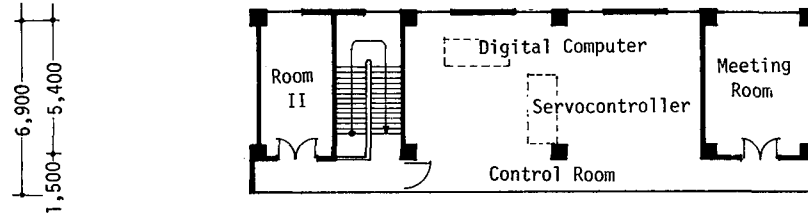
- a) Sub-system for dynamic loading.....Electro-hydraulic actuators and testing floor
- b) Sub-system for vibration test.....Shaking table
- c) Sub-system for data analysis.....Digital computer and data convertors

Several kinds of the dynamic tests have been performed since 1971. The "Computer-Actuator On-line System" to analyze the non-linear earthquake response by the closed loop system consisting of a) Sub-system for dynamic loading and c) Sub-system for data analysis has been also developed.

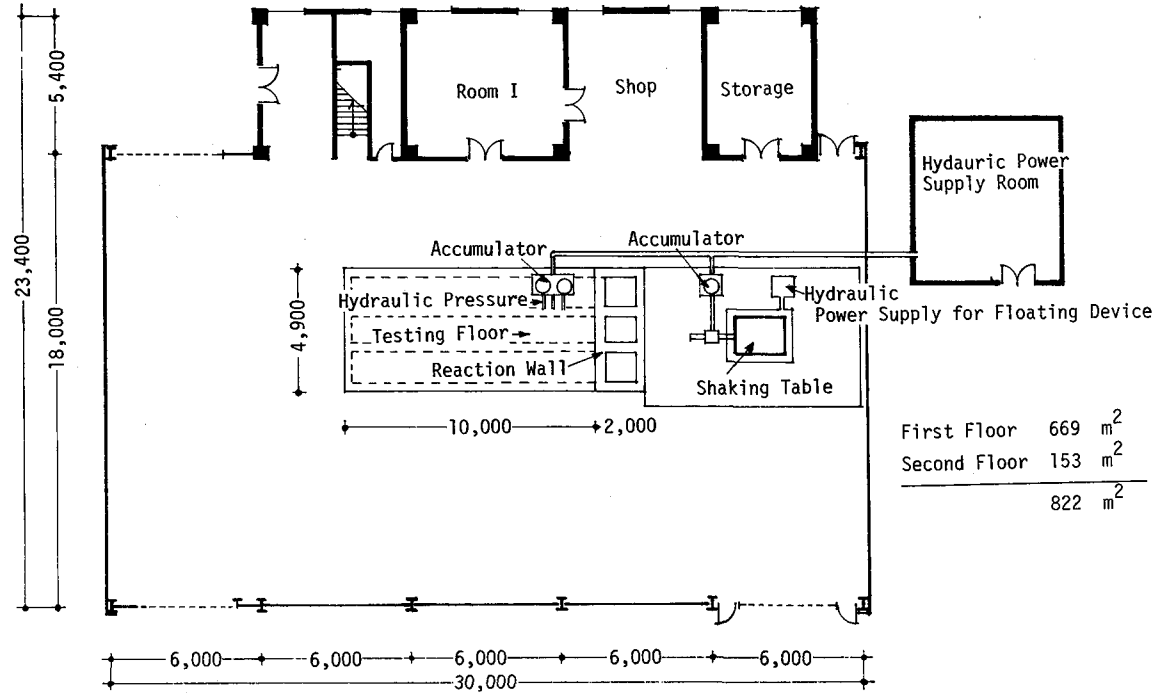
The specifications of the equipments are:

- 1) Electro-hydraulic actuators (No. 1 & No. 2)...Loading capacity is ± 30 tons for static and ± 20 tons for dynamic. Maximum stroke is ± 150 mm. Control parameter is displacement or load. Arbitrary displacement or loading history can be also commanded. Function generators for sinusoidal, triangular and rectangular waves are installed. Pumping capacity of hydraulic power supply is 300 ℓ/min . at the maximum pressure of 210 kg/cm^2 .
- 2) Electro-hydraulic actuator (No. 3)... Loading capacity is 100 tons for compression. Maximum stroke is 50 mm. Control parameter is load, or displacement.

- 3) Testing floor... Structural system is reinforced concrete introduced posttensioning. Floor size is 4.9m x 10.0m and allowable loading capacity is 50 t/m². Reaction wall of 6.0m in height can sustain the bending moment of 450 t·m.
- 4) Shaking table... Shaking table of 1.5m x 2.0m supported by the hydraulic floating system is driven by the electro-hydraulic actuator. The maximum driving capacity is 4.7 t·g and the weight of the table is 3.1 tons. Maximum stroke is ±75mm. The maximum velocity and acceleration without additional weight are 70 cm/sec and 1,500 gals, respectively. Control parameter is displacement or acceleration with feed back system by displacement, velocity and acceleration. Command wave are sinusoidal, triangular, rectangular, white noise and other arbitrary wave. Maximum frequency is 30 Hz.
- 5) Digital computer (HITAC 10-II)... Mini-computer with 12k words of central memory and 64k words extended core memory in magnetic drum.
- 6) D/A convertor... 4 channels convertor with minimum sampling time of 1 ms. per a sample without limitation of sample size. Level of output command is ±2.5V.
- 7) A/D convertor... 16 channels convertor with minimum sampling time of 1 ms. per a sample without limitation of sample size. Level of input command is ±10.0V.

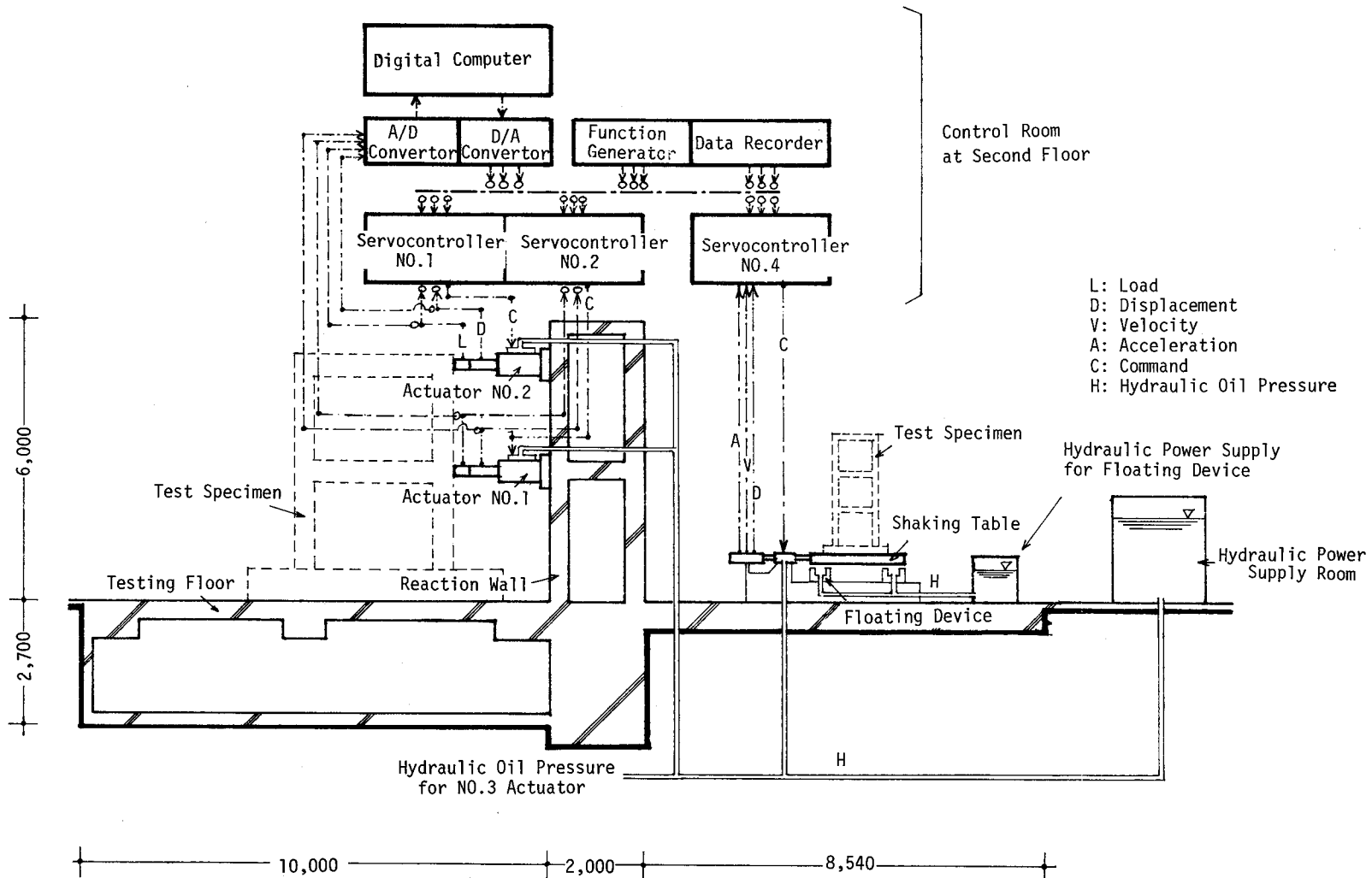


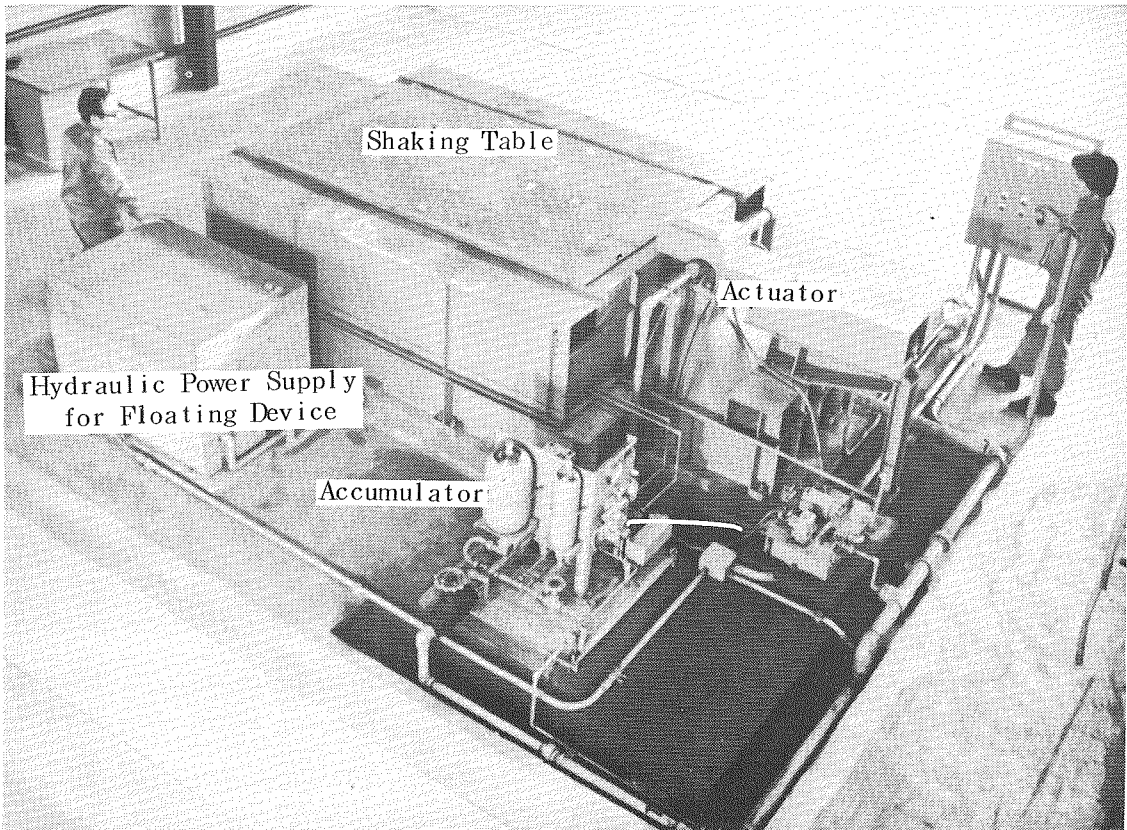
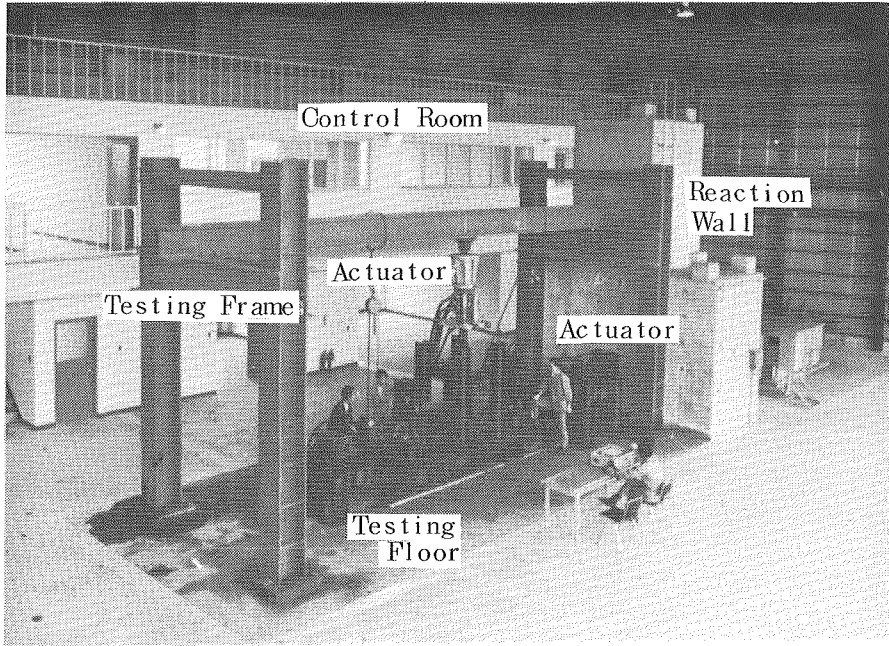
Second Floor



First Floor

First Floor	669	m ²
Second Floor	153	m ²
	<hr/>	
	822	m ²



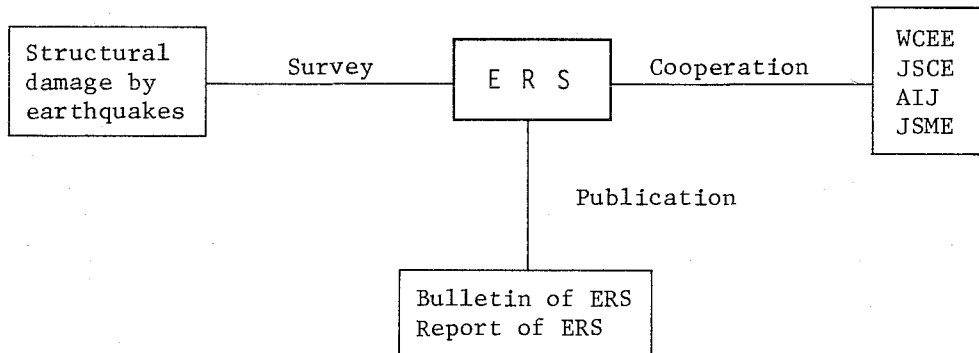


Published by The Earthquake Resistant Structure Research Center
Institute of Industrial Science
University of Tokyo
22-1, Roppongi 7 chome
Minato-ku, TOKYO
106 JAPAN
Phone (03)-402-6231

© 1975

Earthquake Resistant Structure Research Center (ERS) is an organization for cooperation of researchers in the various branches of structural engineering in the Institute of Industrial Science, University of Tokyo. Its activities concern with fundamentals of the earthquake resistant structure and specific items in the fields of civil, structural and mechanical engineering.

Activities of ERS



WCEE : The World Conference of Earthquake Engineering

JSCE : The Japan Society of Civil Engineers

AIJ : The Architectural Institute of Japan

JSME : The Japan Society of Mechanical Engineers