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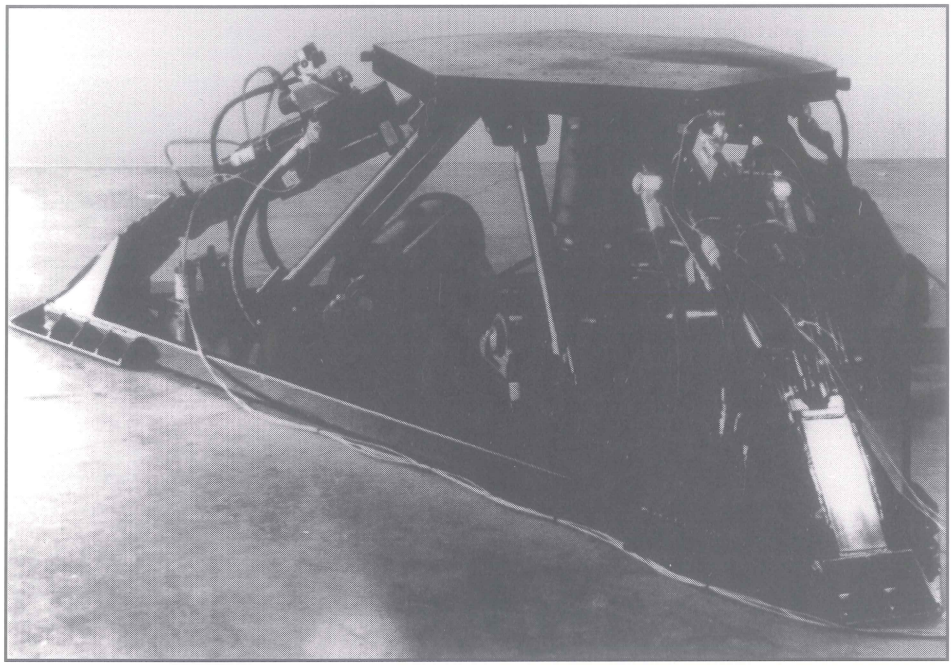

An ANCO R-7 Shake Table Installed in the New SCE Seismic Qualification Lab

ANCO Delivers Shake Table Laboratory for SCE Commercial-Grade Dedication Program

REGULATORY CONCERNS

Southern California Edison (SCE) is a leader in the nuclear industry's trend to procure and dedicate commercial-grade equipment. Facilities in SCE's new Commercial-Grade Dedication Laboratory, which serves the San Onofre Nuclear Generating Station, includes a 1,500 sq-ft seismic qualification laboratory provided by ANCO. Tom Herring, SCE Supervisor of Procurement Engineering, explained that because of the decrease in the number of nuclear-grade vendors, SCE has changed its procurement practices. Ten years ago most components were purchased from vendors with quality assurance programs meeting *10 CFR 50, Appendix B* guidelines. Currently, many required components are unavailable from qualified vendors; and utilities must procure and dedicate (qualify) commercial-grade equipment for use in safety-related applications. This is a significant change from the regulatory and procurement practices of ten years ago and has been under close scrutiny by the NRC, as discussed in *Generic Letter 91-05.*

ECONOMIC INDUCEMENTS

Mr. Dick Clift, SCE Lead Project Engineer, stated "in order to meet the requirements of 91-05, SCE has committed to providing its commercial-grade laboratory with *chemical, civil, mechanical, electronic, and seismic* qualification capabilities. The costs of seismic qualification using external laboratories were high, and we had numerous cases where the turnaround in critical situations was too slow. Consequently, we decided to procure our own seismic shake table. We expect costs will *break even in less than 3 years,* and there is the immediate benefit of having the facilities available whenever we need them."

DESIGN REDUCES TIME & COST

The **ANCO R-7 shake table**, (pictured at left), was installed at SCE's Mesa facility (San Clemente, CA) in November 1992. A proprietary ANCO design, the R-7 is an upgraded version of the R-5 table which ANCO has used for ten years in its own facilities for seismic qualification of nuclear power plant equipment. Using three actuators, a triple torque tube and air bag suspension, the R-7 can produce statistically independent motion in any of three axes, simultaneously or sequentially, with peak displacements of $\pm$ 4 inches, peak velocity of 45 inches/sec, and peak acceleration of 3-10 g's (for test specimen weights of 500 - 1,500 pounds). Spectral accelerations in excess of 30 g's on a 5% damped response spectrum can be achieved. Equipment with base dimensions of up to 5 ft by 6 ft can be accommodated. With these capabilities, approximately *80% of SCE's seismic qualification testing (per IEEE-344) can be performed in-house.* The ability to test triaxially *eliminates the need to rotate the test specimen.* This reduces test *time, cost, and unnecessary fatigue* on the test item.

TURNKEY OPERATION

As part of the seismic laboratory, ANCO delivered a three-processor computer system for table control and equalization, dynamic response monitoring, and relay chatter evaluation. ANCO also provided *Gardner Systems, Inc.* computerized hydraulic controls, the hydraulic power supply, table installation, software, and training for the SCE test facility staff. SCE is providing the table foundation and laboratory structure. The *unique symmetrical*

*(Continued: See **SCE Table Laboratory**)*

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ANCO Expands Its Seismic Shake Table Lab and Services

UPGRADED FACILITY

ANCO continues to expand seismic shake table testing services in its 5,200 sq-ft Culver City seismic testing laboratory facility. In 1992, ANCO consolidated and remodeled the laboratory and upgraded the facility's hydraulic and data acquisition systems.

LONG STROKE TABLE ADDED

In December 1992, ANCO installed its new R-8 long stroke (36 inch) shake table in its Culver City seismic laboratory. The first project using the R-8 will involve verification testing of a large displacement seismic isolation system under development by Bechtel Corporation.

The R-8 table complements five other existing ANCO shake tables (see triparite graph below for table input capabilities). The maximum acceleration achieved by a table is affected by payload mass. The plotted capacity for a maximum payload is in parentheses. Values are approximate as performance depends on which actuators are used as well as on the nature of payload dynamics. Achievable response spectra are several times those indicated in the graph, depending on frequency range and damping.

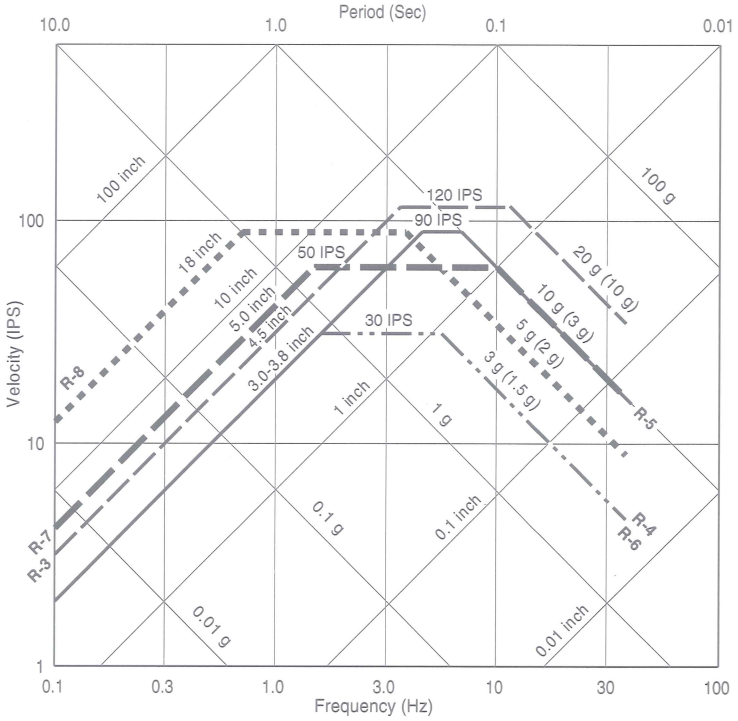
NUPIC APPROVED VENDOR

In October 1992, ANCO was audited and approved (under the new NUPIC format) by SCE's Nuclear Quality Assurance Group for seismic testing services.

For more information, contact Steve Keowen, Los Angeles

ANCO Engineers Shake Tables

Model	Table Size Feet (Meters)	Axes	Max Load (Tons)	Comments
R-3	4x4 (1x1)	Uni	1	High Level Sled
R-4	13x40 (4x12)	Bi	5	Independent 2 Axes Overhead Table
R-5	5 Dia (1.5)	Tri	2	Independent 3 Axes
R-6	10 Dia (3)	Tri	5	Independent 3 Axes
R-7	4 Dia (1.1)	Tri	1	Independent 3 Axes
R-8	5x5 (1.5x1.5)	Uni	2	Long Stroke Sled



SCE Table Laboratory .....(continued from front page)

downturning actuator design of the R-7 *allows installation on a simple at-grade flat foundation,* eliminating the need for a table "pit".

ANCO's President, Dr. Paul Ibanez, noted "we are pleased to help SCE achieve more effective and timely qualification capabilities, even though we will be potentially losing some qualification business. We look forward to continued service to SCE, including qualification of larger pieces of equipment, and assisting SCE to get the maximum benefit from their laboratory. This project has given us the opportunity to assemble one of the most unique, modern, capable, and cost-effective seismic shake table laboratories ever designed for in-house nuclear plant equipment qualification."

For more information, contact Dr. Paul Ibanez, Los Angeles

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