

Recent tests on 3 16-bit digital strong-motion recorders

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A series of tests have recently been applied simultaneously to three newly-designed, 16-bit, digital strong-motion recorders. The instruments had been submitted in response to a request from the Taiwan government for bids to provide 100 recorders, the first part of a large effort in Taiwan to reduce the earthquake hazard there. Specifications were precise, and all three met them. The tests were designed to assist in the final selection, which was made by the Taiwan government. They were based primarily on the response of the recorders and their accelerometers to input from a shake table, providing both constant-frequency excitation (10 Hz, for example) and previously recorded earthquake excitation (the Capitola record from the 1989 Loma Prieta earthquake). Comparisons were made between the three instruments for such quantities as power spectrum, instrument response, the record from an input displacement pulse, and integration from recorded acceleration to displacement from an input boxcar displacement function (a sudden step and subsequent sudden return). Some comparisons showed a wide scatter, although it appeared that the recorders' data were not equally compatible with what the testing software expected. Some of the tests did not permit a knowledge of the correct answer, so that, for example, if two recorders had similar results it was not necessarily true that only the third recorder was faulty.