Update on the elastic physical modeling system

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INTRODUCTION

This system is still under construction, but basic operation has been verified. The control and data gathering sections are updated to make use of the latest available technology. A brief description of these areas follows.

Transducer Positioning Control

The transducers are moved and positioned using Sigma stepping motors running in half-step mode. This gives an absolute positioning accuracy of .03 mm. (.001 inch) The motor controller chips are Cybernetics CY550s, which allow for interactive positioning and interrogation of current location. The control PC can off-load some of the position calculations to these chips which will then operate in a stand-alone mode. The complete system uses six controllers and stepping motors, two each for X axis, Y axis and Z axis. Limit switches are used for zero location, safety stops and collision avoidance. Figure 1 shows a schematic diagram of the complete modeling system.

Data Acquisition

The new data acquisition system uses high speed analog to digital converters which have just become available. These are 12 bit, 10 MHz devices manufactured by Signal Processing Technology. The increase from 8 bit acquisition to 12 bit will provide greatly increased signal to noise ratios and better definition of the low level signals. By using a summing system and vertically stacking 16 shots, an equivalent 16 bit integer word can be generated.

Data acquisition rates are any multiple of 100 ns, set as a parameter by the control PC. Data are written to a FIFO at the full acquisition rate, then transferred to the PC by DMA for stacking. The next phase will include the summing / display control system which will then pass the final trace to the control PC.

The preamplifier for the received signal is variable gain and not as yet fully calibrated. The amplifier has been designed to allow for gated AGC or ramped / programmed gain if desired.

After summing, data are stored on disk in the PC for later transfer to the processing workstations via the department's thinnet system. An option is to use NFS software to store directly on a remote disk.

The elastic modeling system ,as reported in CREWES Research Report Volume 3 is a hybrid of two Wang 32B flatbed plotters.The center of the bed has been removed to accommodate models 1m long x .6m wide x .6m thick. Although designed to perform surface experiments it can also be adapted for transmission experiments. Figure 2 shows

two photos of the elastic modeling system. Figure 3 shows a side view schematic of the modeling table with the alternate transducer position for transmission experiments.

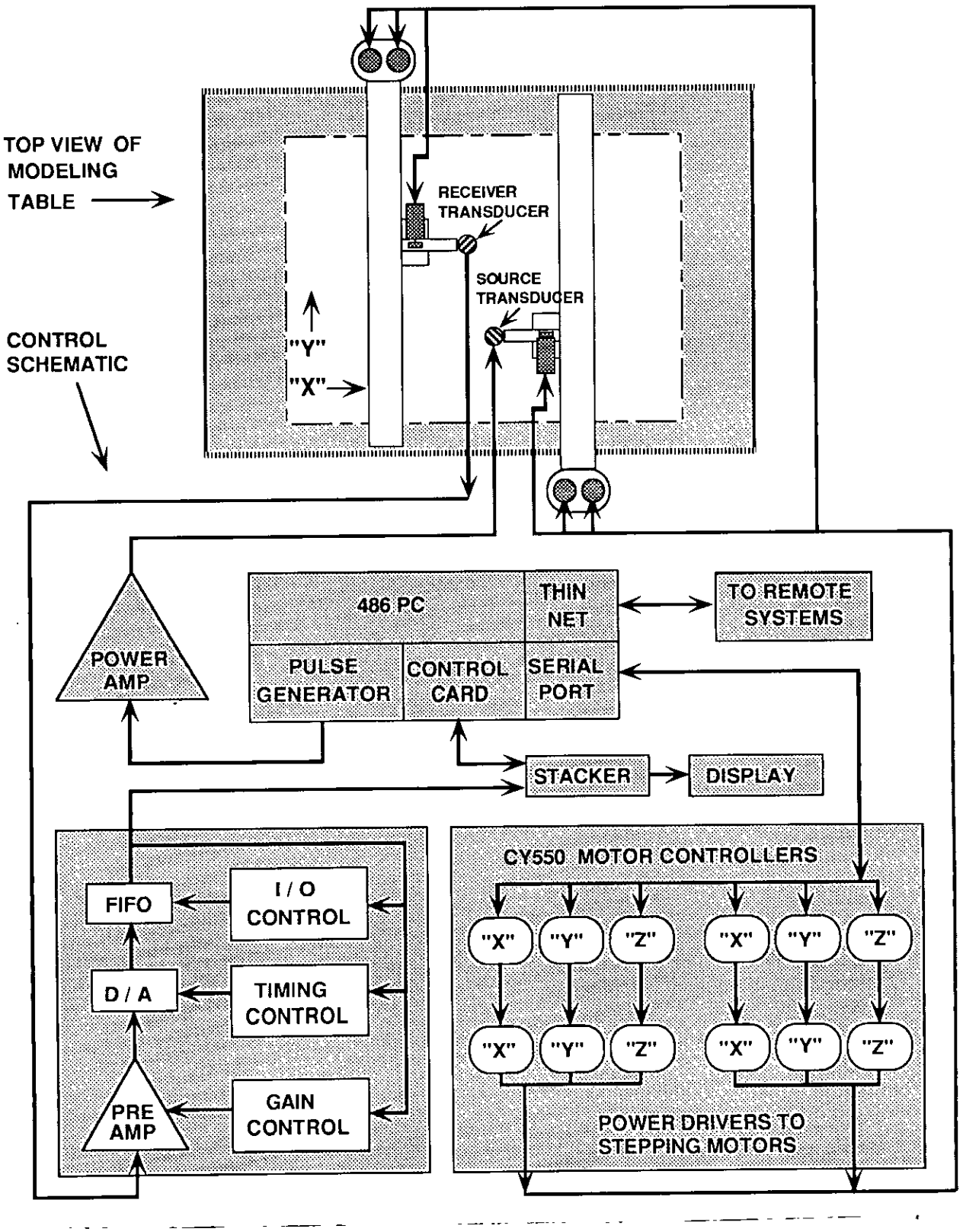

FIG.1 Schematic diagram of acqusition and control systems.

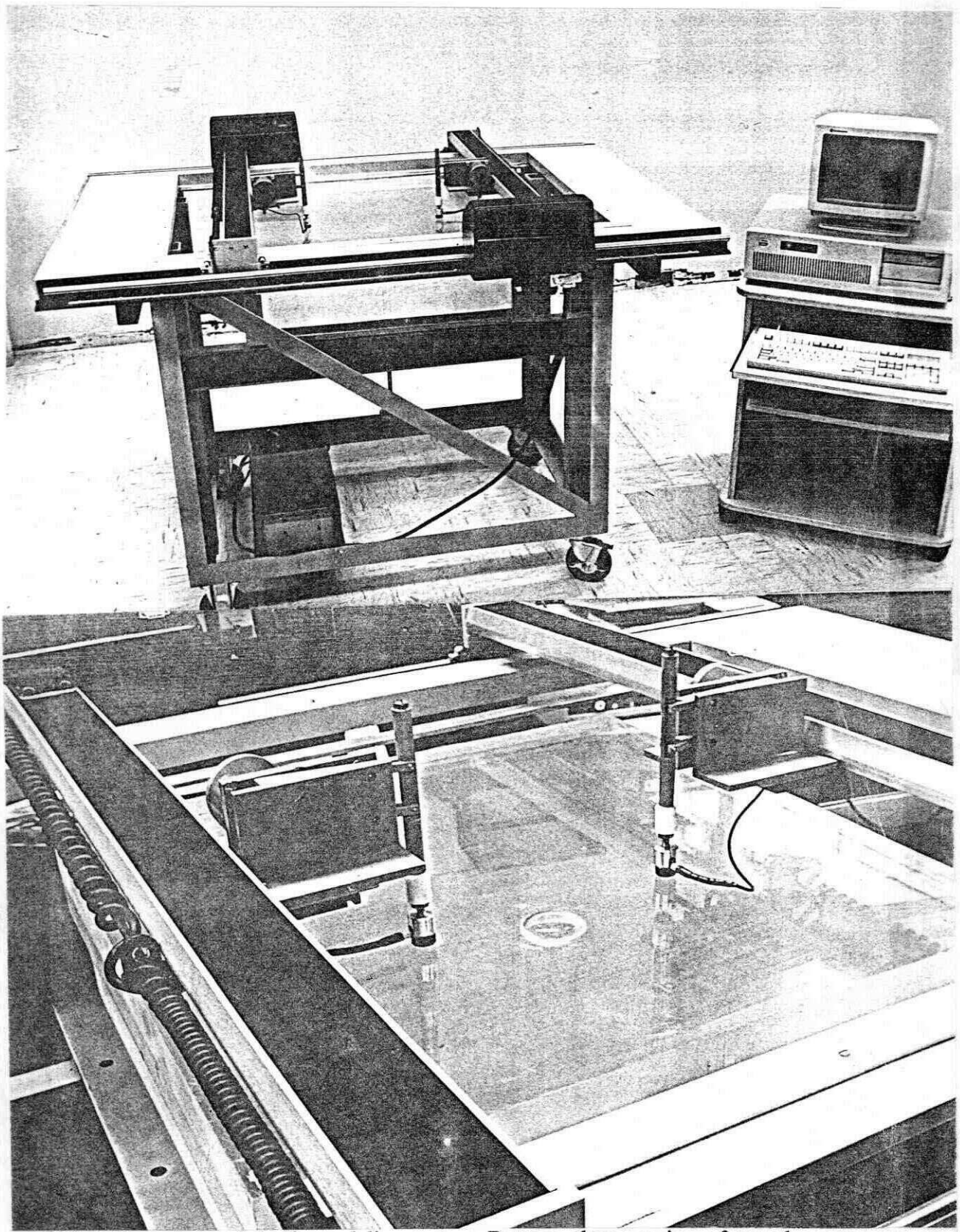

FIG 2. Top, photo of elastic modeling system. Bottom, close up view of transducers on a sideswipe model in a P-SH configuration.

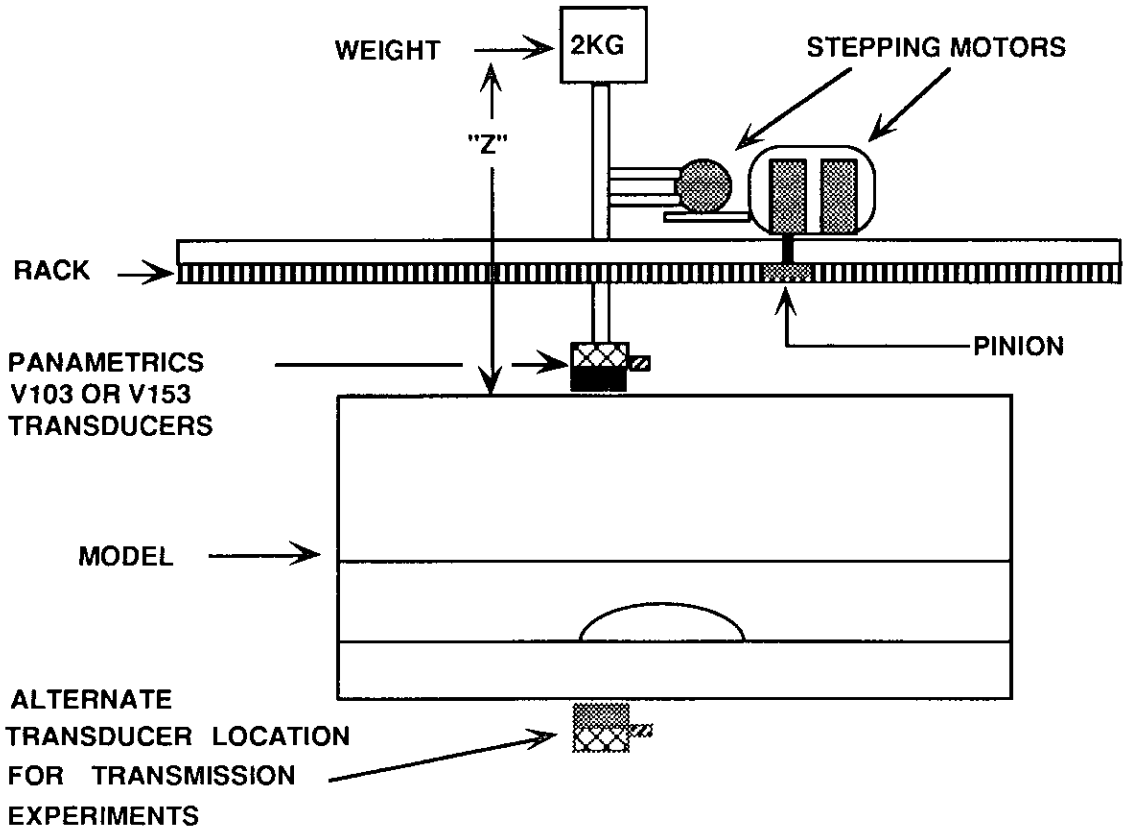

FIG.3. Side view of elastic physical modelling system.