The damping device he has constructed looks a little like a pantograph, a machine used by draftsmen that allows them to copy drawings to different scales. It is made of brass and consists of two arms connected to two articulating joints. Both joints consist of electrically controlled servosystems: direct-current motor, a gear box, and a potentiometer.

This damping device will be used to allow a person with tremor to try to copy a model letter he will see on a computer-generated cathode-ray tube (CRT) display. At the same time, the screen will show the letter he is drawing for comparison with the model. The person grasps a stylus attached to one of the arms of the damping device and attempts to copy on a table the shape of the model letter displayed on the CRT screen. The potentiometers are connected mechanically to the arms, and a change in angular motion made by the patient changes the position of the potentiometer rotor and, through a computer, the amount of voltage supplied to the motor. The motor will provide, in return, a rotational force proportional to the tremor and opposite in direction.

Since the change in angular motion of the damping device's arm is proportional to the oscillations of the person's tremor, the motor's movement will oppose these oscillations and consequently damp them out.

That, at any rate, is the theory behind the device. It has not yet been evaluated. "The big problem," says Larry Korba, "is to calculate the coefficients." The frequencies of tremors of this kind are between 5 and 10 cycles per second. In the damping device, the potentiometer determines the position, velocity, and acceleration of the joint to be damped. A computer takes that information and calculates the appropriate drive signal to be applied to the motor for correction or damping of movement.

Korba has been held up in his work by the slow supply of some necessary components, but hopes to have the device in full operation sometime in 1982. It will then be tested on individuals with pathological tremors. If it works, besides making possible muscular movements that users previously found impossible, the device could have a long-term curative effect in some types of tremor. However, this would obviously not be possible in cases in which physiological damage had occurred, for example in Parkinson's disease or some types of brain or nervous system injury.

The computer used with the damping device is a small, personal type now widely available in retail outlets. Korba's colleagues in the Medical Engineering Section, notably Dr. Jim Swail, Nelson Durie, Peter Nelson, and Robin Black, are studying other applications for such computers, for example their use by the physically handicapped.

Two possibilities for those who cannot manage the conventional keyboard are an expanded keyboard with more space between the keys and a joystick movement that would move a cursor right or left to point to letters showing at the bottom of the screen.

Another application of interest is computer-generated speech for the blind that would allow the computer to tell them what's on the screen, thus permitting the blind to do text editing. □

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**Larry Korba demonstrates his adaptive damping system. The device can assist in diagnosis and therapy of muscular tremors and lead to design improvements in other devices for the handicapped, such as this open-format keyboard.**

**Larry Korba fait la démonstration de son système d'amortissement adaptatif. Ce dispositif peut aider à diagnostiquer et à traiter certains tremblements musculaires et conduire à l'amélioration d'autres équipements destinés aux handicapés comme, par exemple, ce clavier spécial.**