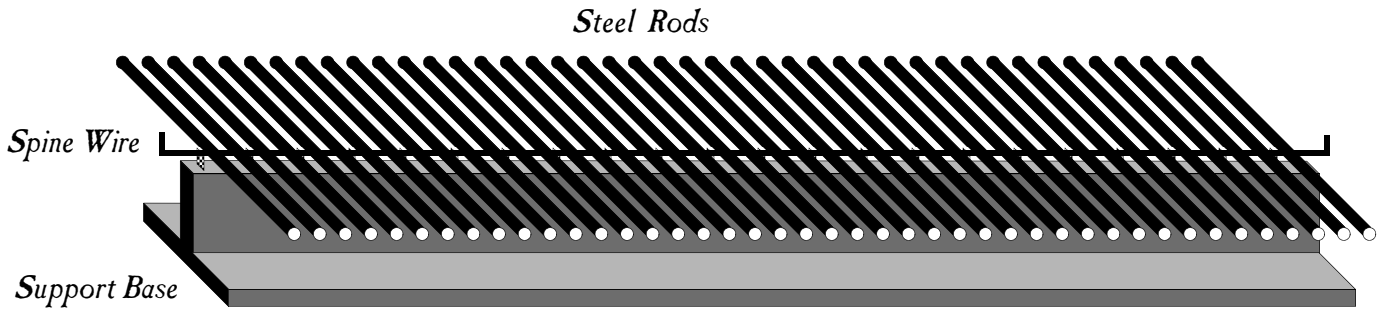
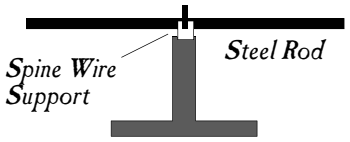
# DR. SHIVE'S AMAZING WAVE MACHINE

## DEMONSTRATIONS OF WAVE PROPERTIES

Name:_____ Per:_____ Date:_____ *P:CC* C-51, 31, 32




The wave machine (originally produced by Bell Laboratories), consists of a series of thin, uniform steel rods attached through their centers by a square steel spine wire. Collectively, they act as coupled torsional pendula (when twisted, the spine wire exerts a restoring torque).




Observe a wave pulse propagating through the machine.

ACTUAL OUTCOMES

PREDICTIONS
What effect would the following changes have on the way the wave traveled?

1. Longer or shorter rods.

2. Stronger or weaker spine wire.

3. Taller or smaller wave (vary the amplitude).

4. Longer or shorter wave (vary the wavelength).

Record your observations of the following phenomena in sketches and brief descriptions.

## REFLECTION

1. Reflection From a Free End.

2. Reflection From a Fixed End.

3. See the super-slinky reflection on *P:CC* at C-51. Is it a fixed end (slinky nailed to a board) or free end (slinky tied to a string attached to a board)? Watch the second showing to verify your prediction.

## SUPERPOSITION

1. Observe and record two pulses in the same orientation (up/up or down/down).

2. Do the pulses collide like billiard balls or pass through each other like ghosts?

a. Describe a demonstration that would help prove one hypothesis or the other.

b. Carry out the demonstration and record the results.

3. a. See the slinky wave "collisions" and computer-animated wave "collisions" on *P:CC* at C-31 and C-32.

b. Draw a "comic-strip" sequence showing what happens before, during, and after a sine crest and a square trough come together. (Ask the instructor to pause the display when the pulses "collide.")