FORCED OSCILLATIONS

PART I

- **RECORD DAMPING OF THE FREE OSCILLATOR**
  - ***OUTSIDE AND INSIDE THE CYLINDER (TWO SUBPARTS)***

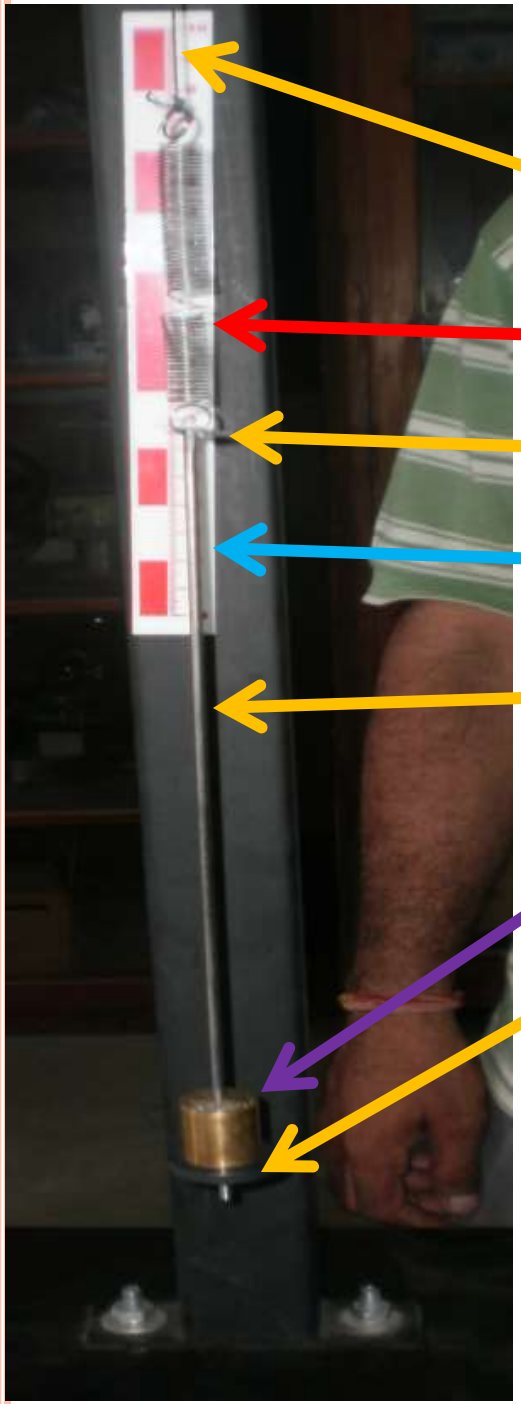
PART II

- **OBSERVE THE RESONANCE CURVE**

PRINCIPLE

- A MASS IS SUSPENDED BY A SPRING.
- THE MASS IS SET IN OSCILLATIONS AND THE DECAY IN THE OSCILLATIONS IS RECORDED. THIS YIELDS THE DECAY CURVE. THE NATURE DEPENDS ON THE LAW OF FRICTION (FOR EXAMPLE, DEPENDENT ON VELOCILTY OR INDEPENDENT OF IT).
- THE OSCILLATIONS ARE FORCED BY SINUSOIDALLY RAISING AND LOWERING THE UPPER END OF THE SPRING. THE AMPLITUDE OF OSCILLATION AS A FUNCTION OF THE DRIVING FREQUENCY IS RECORDED AND PLOTTED.

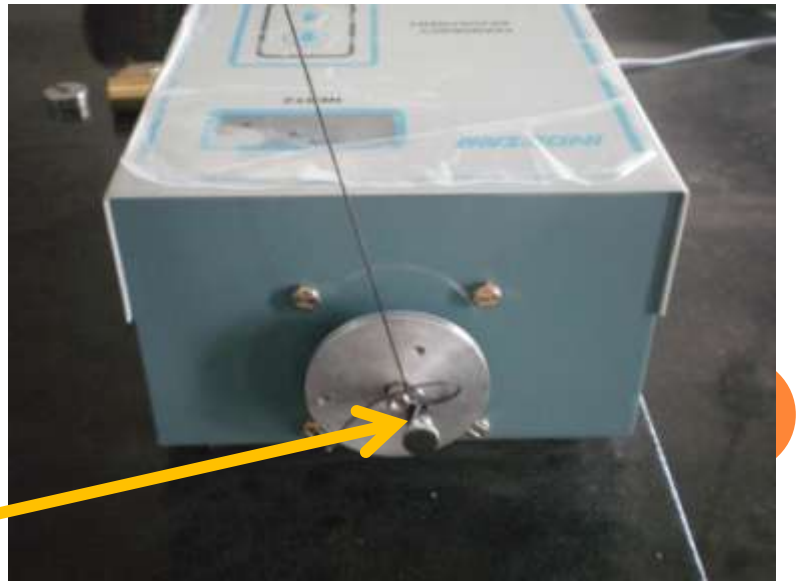
PROCEDURE



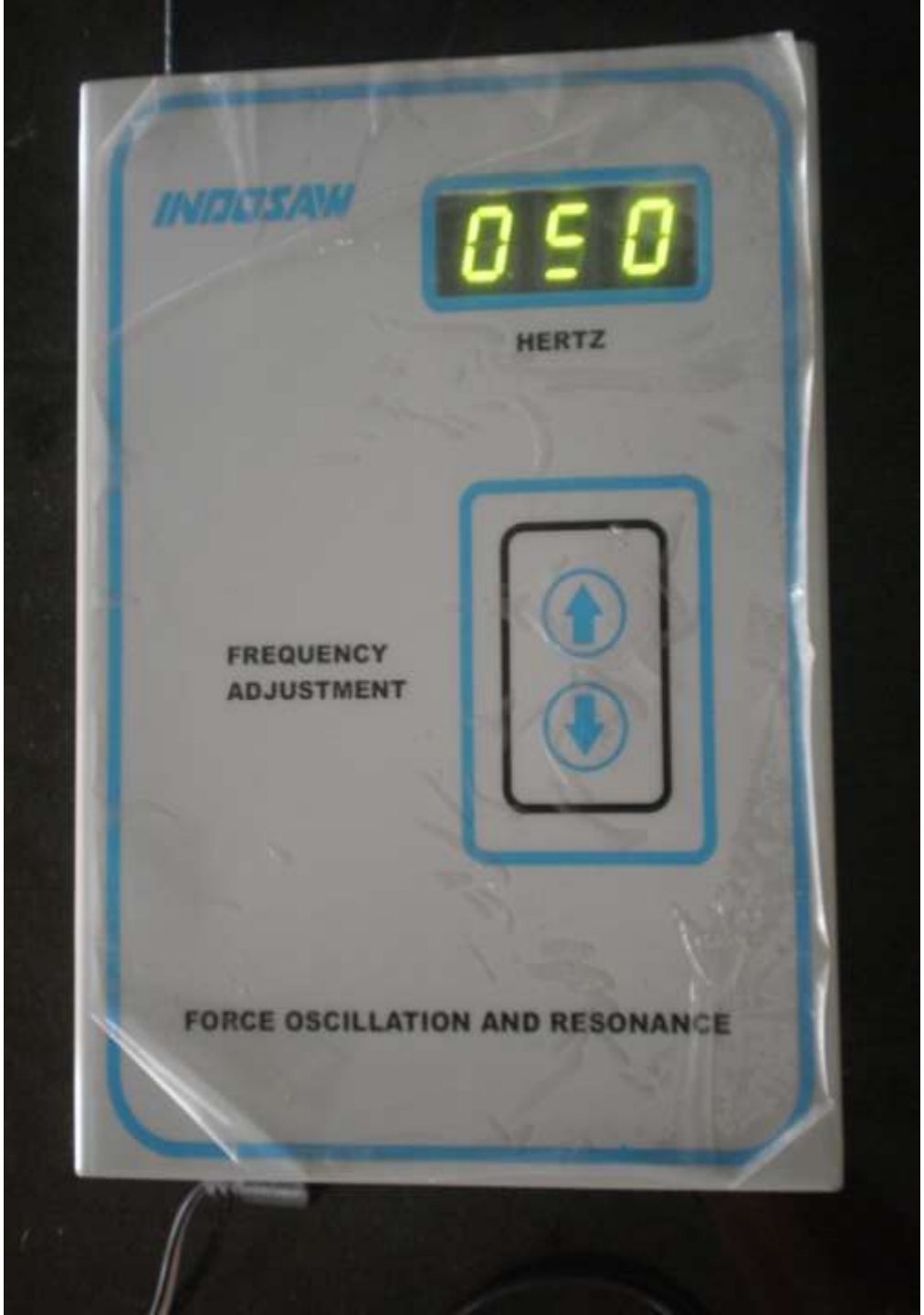
- STRING
- SPRING
- POINTER
- SCALE TO READ
- ROD
- WEIGHT
- STOPPER DISC

(PREVENTS WEIGHT FALLING DOWN)

THE **STRING** IS DRIVEN BY A **MOTOR** WHOSE SPEED CAN BE **CONTROLLED**



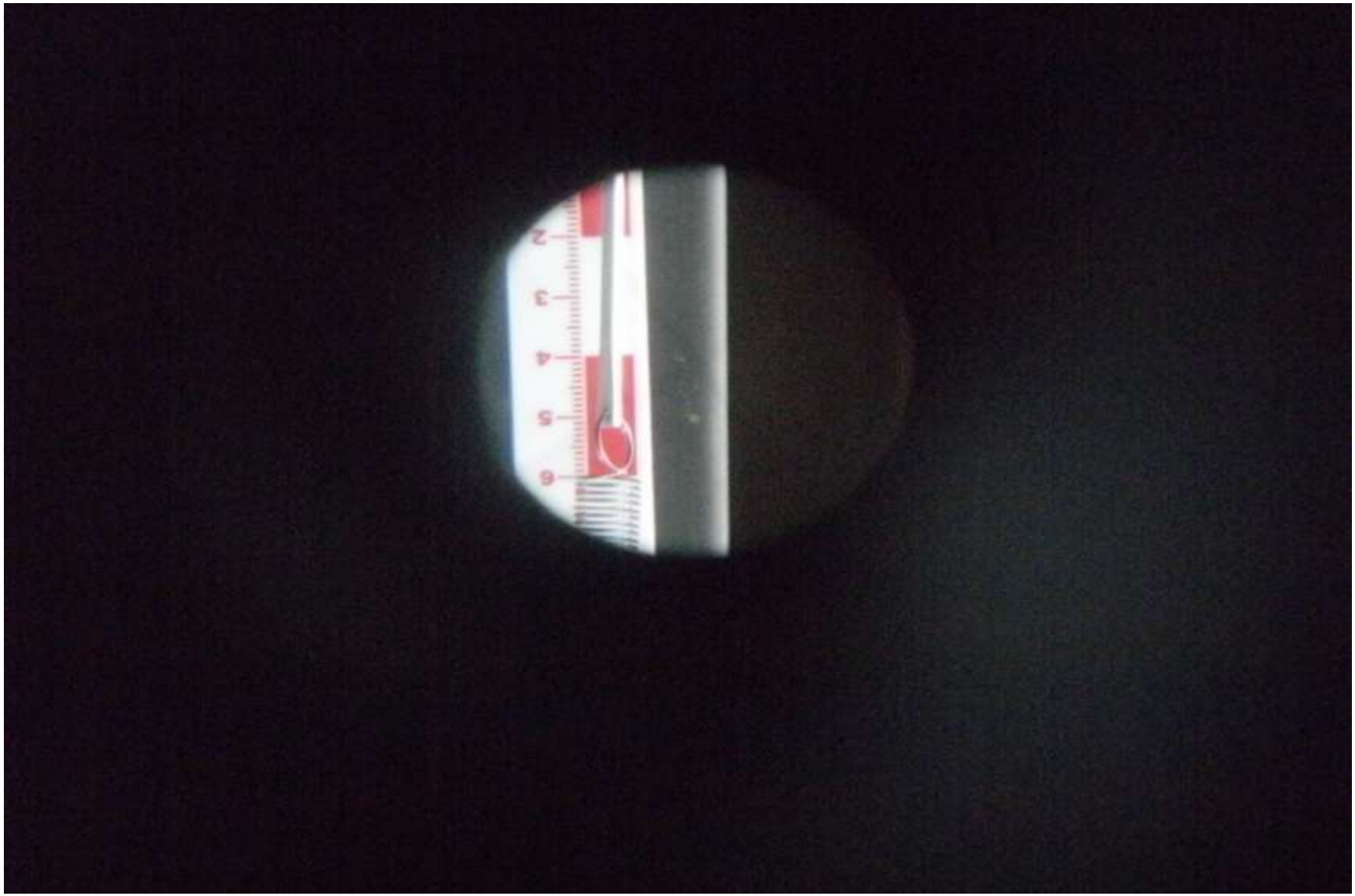
ONLY THE NEAREST HOLE BE USED



THE **FREQUENCY** OF THE MOTOR CAN BE INCREASED (DECREASED) BY PRESSING THE **UP** (DOWN) ARROW. IT IS IN **HERTZ**

AS SEEN IT IS 0.50 Hz

TO REDUCE THE **PARALLAX** A TELESCOPE IS USED TO RECORD THE POSITION OF THE UPPER END (OR THE POINTER) OF THE ROD. THE SCREW ALLOWS TELESCOPE TO CHANGE ITS DIRECTION



THE READING IS 5.2!

(WHY DOES IT LOOK UPSIDE DOWN?)

PART I

- REMOVE THE MASS AND THE ROD ASSEMBLY OUT OF THE CYLINDER
- WHILE LOOKING THROUGH THE TELESCOPE ASK YOUR PARTNER TO PULL THE MASS AND RELEASE IT. NOTE THE INITIAL READING AND THE READINGS AFTER EVERY N'TH OSCILLATIONS (COULD BE 10) SO THAT THERE IS APPRECIABLE DAMPING.
- REPEAT THIS PART OF THE EXPERIMENT INSIDE THE CYLINDER WITH THE LID ON.
- IS THE DAMPING IN THESE TWO CASES EXPONENTIAL OR LINEAR?

EXPLAIN THE RESULT CITING APPROPRIATE PROBLEMS FROM KLEPPNER & KOLENKOV

PART II

- KEEP THE MASS AND ROD INSIDE THE CYLINDER, SWITCH ON THE MOTOR. NOTE THE FREQUENCY AND THE CORRESPONDING AMPLITUDE OF OSCILLATION.
- VARY THE FREQUENCY (FROM 0.50 TO 3.00 Hz AT REGULAR INTERVALS) AND NOTE THE CORRESPONDING AMPLITUDE OF OSCILLATION.
- IF THE OSCILLATIONS GO OUT OF THE RANGE (HITS AT TOP OR BOTTOM) MOVE AWAY TO THE NEXT FREQUENCY.