

Technical Description of the Mechanical Pencil

1. GENERAL DESCRIPTION

The Mechanical Pencil is a mechanical writing instrument that uses erasable lead rods to draw or write text, designs, and symbols on mediums such as paper and wood. The Mechanical Pencil is most commonly used for drawing pictures and writing text on paper. It costs \$3.99 plus tax.

The Mechanical Pencil can be held in the palm of a hand and is made of hi-impact plastic. Approximately one-third of the Mechanical Pencil is wrapped with soft black rubber for comfortable gripping between the thumb, index, and middle finger while writing or drawing.

The cone cap, located at the bottom, provides a pointed opening where lead rods can be ejected for writing. The pocket clamp holder, located at the top, can clamp around T-shirt breast pockets allowing for hands-free carrying and easy access.

The eraser, inserted at the top, can erase lead particles from paper, wood or other mediums it has been applied. The eraser can also be removed allowing it to be replaced. When the eraser is removed, it also provides an opening where lead rods can be loaded into the hollow barrel of the Mechanical Pencil.

Aluminum and hi-impact plastic is used for the internal mechanical assembly that is designed to ejects lead rods out of the bottom of the Mechanical Pencil (see Figure 1).

The Mechanical Pencil measures:

- **5.5** inches in length
- **0.5** inches in diameter



Figure 1: The Mechanical Pencil

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2. DESCRIPTION OF MAIN PARTS

The Mechanical Pencil (see Figure 2) consists of two main components:

- 1 the gripping assembly
- 2 the barrel assembly



Figure 2: Main Components of the Mechanical Pencil

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2.1 GRIPPING ASSEMBLY

The gripping assembly (see Figure 3) is a hollow rubber and chrome casing designed to protect the internal mechanisms and to hold the 0.012-inch lead rods. The rubber casing is a finger grip used to hold the Mechanical Pencil while writing. The gripping assembly is attached to the barrel assembly.

The gripping assembly measures:

- **2.5** inches in length
- **0.5** inches in diameter

The gripping assembly consists of three main components:

- 1 the rubber-gripping barrel
- 2 the cone cap
- 3 the lead rod outlet



Figure 3: The Gripping Assembly

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2.1.1 RUBBER-GRIPPING BARREL

The rubber-gripping barrel (see Figure 4) is a holding device used to hold the Mechanical Pencil between the thumb, index finger and middle finger while writing or drawing. The rubber-gripping barrel wraps around the hourglass barrel; tapers in at the middle which allows it to grip the bottom middle finger joint; has a ribbed casing to enhance gripping performance, and is made of soft black rubber designed for comfortable gripping during prolonged periods of use.

The rubber-gripping barrel measures:

- **1.75** inches in length
- **0.5** inches in diameter



Figure 4: Rubber-Gripping Barrel

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2.1.2 CONE CAP

The cone cap (see Figure 5) is a hollowed cast casing designed to protect the mechanical lead rod holder located inside, and to align the 0.012-inch lead rods with the lead rod outlet. The cone cap is made of hi-impact plastic, coated with a silver chrome finish, and is screwed clock-wise on to the hourglass barrel.

The cone cap measures:

- **0.75** inches in length
- **0.375** inches to **0.125** inches in diameter

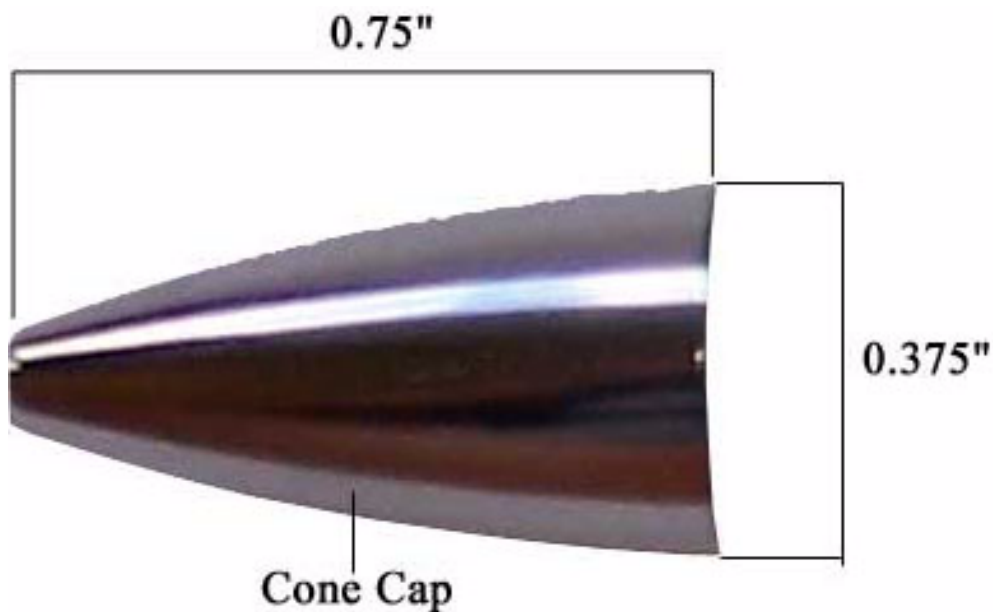


Figure 5: Cone Cap

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2.1.3 LEAD ROD OUTLET

The lead rod outlet (see Figure 6) is a hollowed cast casing designed to wrap around the 0.012-inch lead rods. The lead rod outlet strengthens the 0.012-inch lead rods and prevents them from breaking while writing. The lead rod outlet is made of hi-impact plastic, coated with a silver chrome finish, and is connected to a white plastic fitting inside the cone cap.

The lead rod outlet cap measures approximately:

- **0.0866** inches in length
- **0.0781** inches to **0.0313** inches in diameter

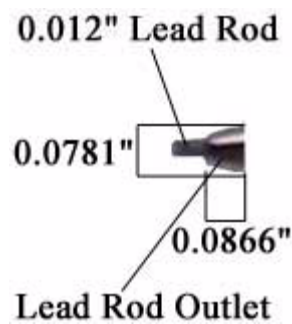


Figure 6: Lead Rod Outlet

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2.2 BARREL ASSEMBLY

The barrel assembly (see Figure 7) is a hollow plastic casing designed to protect the internal mechanisms, and to hold the 0.012-inch lead rods and eraser. The barrel assembly is also fitted with a chrome pocket clamp holder. The barrel assembly rests on the index finger, helps balance the Mechanical Pencil while writing, and is attached to the gripping barrel.

The barrel assembly measures:

- **2.75** inches in length
- **0.5** inches in diameter

The barrel assembly consists of four main components:

- 1 the hourglass barrel
- 2 the pocket clamp holder
- 3 the lead rod ejector
- 4 the removable eraser

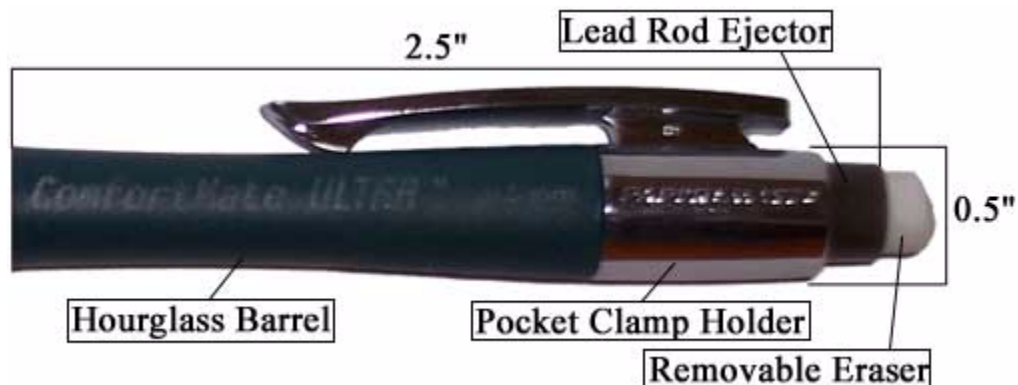


Figure 7: Barrel Assembly

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2.2.1 HOURGLASS BARREL

The hourglass barrel (see Figure 8) is a hollowed cast casing designed to store the 0.012-inch lead rods and to balance the Mechanical Pencil on the index finger or knuckle while writing. The hourglass barrel is made of green high-impact plastic. All parts, excluding the lead rod outlet and removable eraser, attach to the hourglass barrel which is the main body of the Mechanical Pencil.

The hourglass barrel measures:

- **1.75** inches in length
- **0.5** inches to **0.375** inches in diameter



Figure 8: Hourglass Barrel

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2.2.2 POCKET CLAMP HOLDER

The pocket clamp holder (see Figure 9) is a fastening device designed to carry the Mechanical Pencil by clamping around T-shirt breast pockets. The pocket clamp holder consists of a cap that fastens to the top of the hourglass barrel and a flexible plastic clamp that extends from the cap. The Mechanical Pencil clamps around T-shirt pockets by sliding between the hourglass barrel and the flexible plastic clamp. The pocket clamp holder is made of high-impact plastic and coated with a silver chrome finish.

The pocket clamp holder measures:

- **1.75** inches in length
- **0.5** inches in diameter

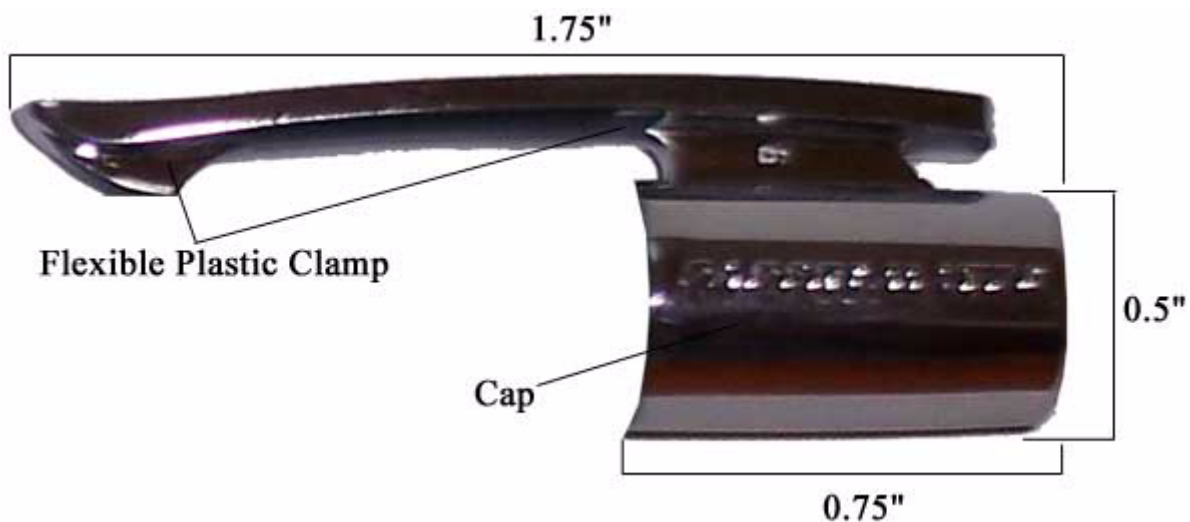


Figure 9: Pocket Clamp Holder

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2.2.3 LEAD ROD EJECTOR

The lead rod ejector (see Figure 10) is a retracting button used to hold the removable eraser and to eject 0.012-inch lead rods through the lead rod outlet located at the bottom of the Mechanical Pencil. The lead rod ejector is made of black hi-impact plastic and internally connected to the hourglass barrel.

The lead rod ejector measures:

- **0.25** inches in length
- **0.375** inches in diameter

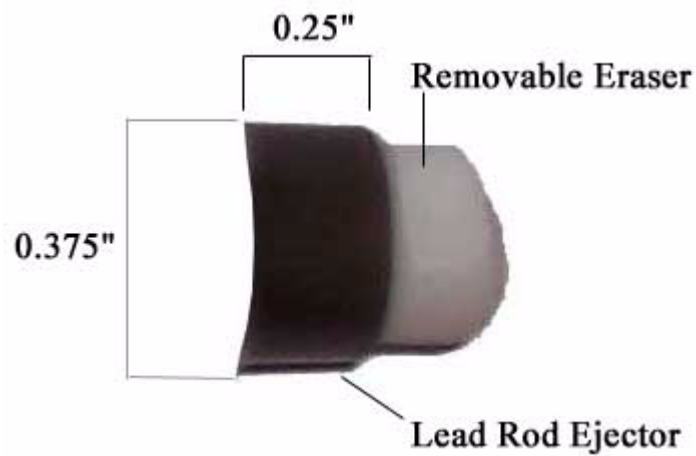


Figure 10: Lead Rod Ejector

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2.2.4 REMOVABLE ERASER

The removable eraser (see Figure 11) is a cylindrical rubber plug that fits into the lead rod ejector opening and is used to remove lead particles on paper. The removable eraser is made of white rubber.

The removable eraser measures:

- **0.375** inches in length
- **0.25** inches in diameter

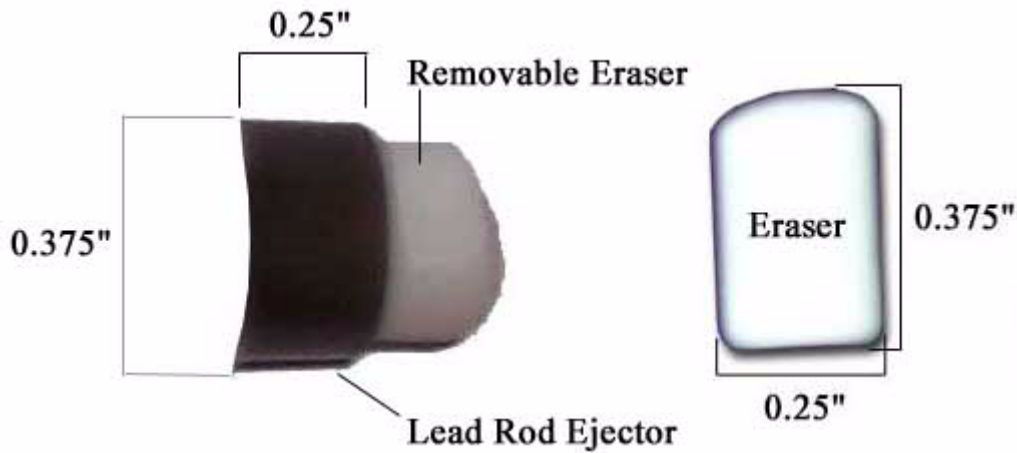


Figure 11: Removable Eraser

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3. CONCLUSION

The Mechanical Pencil is a precision writing instrument that is easy to use and maintain. It has the physical features of a pen and uses lead to write like a pencil, but does not have the limitations of traditional lead and wood pencils. Its affordable price makes it a good purchase for most users. The Mechanical Pencil can be purchased at retail outlets such as: WallMart, Staples, Shoppers Drug Mart, arts and craft stores and many other stores that supply business related supplies.

3.1 CYCLE OF OPERATION

To write with the Mechanical Pencil, make sure at least one 0.012-inch lead rod has been loaded into the hollow barrel (see Figure 12).

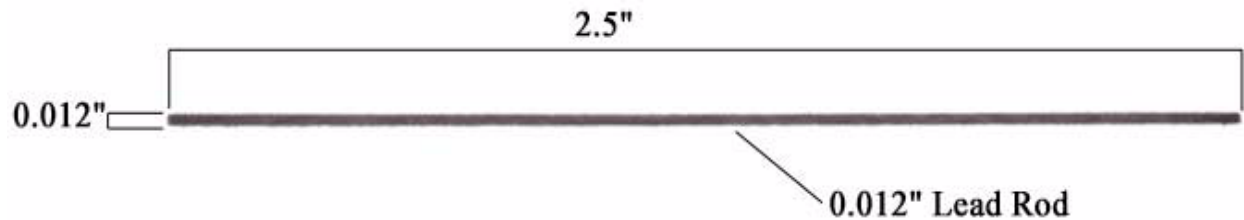


Figure 12: 0.012-inch Lead Rod

The eraser can be removed by pulling on it using the thumb and index finger. Worn down erasers can also be replaced with new ones. Once the eraser has been removed, the 0.012-inch lead rods can be loaded into the opening (see Figure 13).

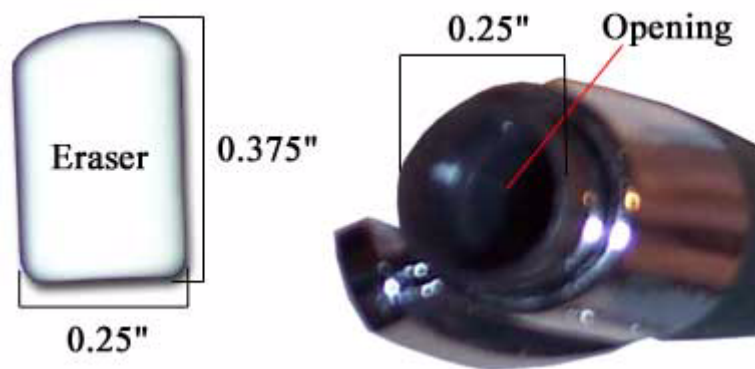


Figure 13: Opening to Load 0.012-inch Lead Rods

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The 0.012-inch lead rods can then be loaded into the barrel of the Mechanical Pencil (see Figure 14).

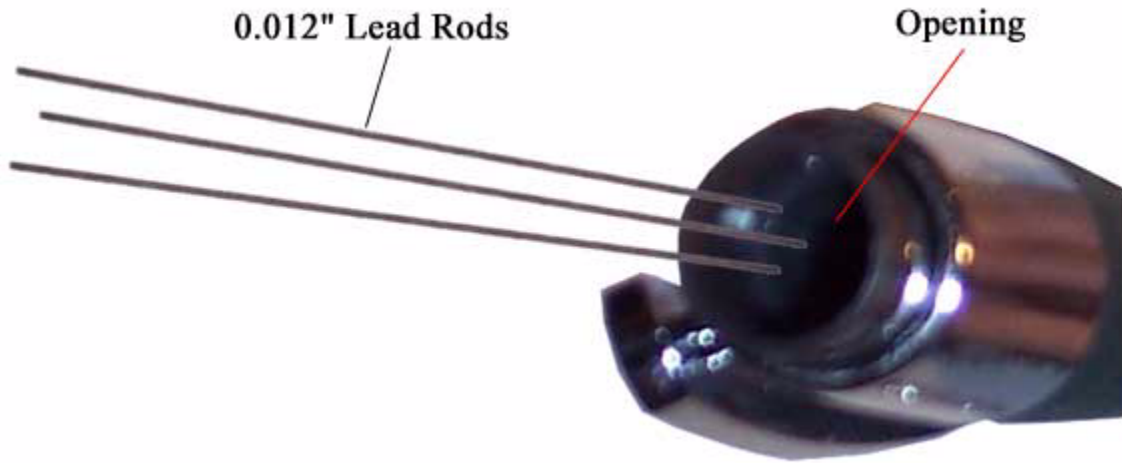


Figure 14: Loading 0.012-inch Lead Rods

After the 0.012-inch lead rods have been loaded, use the eraser to plug the opening and stop the 0.012-inch lead rods from falling out. A 0.012-inch lead rod can then be ejected out of the lead rod outlet once the lead rod ejector has been pressed down by the thumb (see Figure 15).



Figure 15: Ejecting 0.012-inch Lead Rod

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The Mechanical Pencil can either be held in the right or left hand using the thumb, index finger, and middle finger (see Figure 16).



Figure 16: Holding the Mechanical Pencil for Writing

By gently applying pressure between a piece of paper and the 0.012-inch lead rod, text or symbols can be drawn on the paper by moving the Mechanical Pencil in the desired direction. Mistakes can be erased by turning the Mechanical Pencil upside down and rubbing the eraser back and forth against the text or symbols.

3.2 VALUE OF THE MECHANICAL PENCIL TO THE USER

The Mechanical Pencil is a precision writing instrument that has several advantages over traditional lead and wood pencils. A summary of its key features reveals its value to the user. First, the Mechanical Pencil can last a life time because the 0.012-inch lead rods can be purchased separately and be replaced. Second, the thin 0.012-inch lead rods allow for detailed writing and drawing unlike traditional pencils that have to be continually sharpened and lose their edge while writing or drawing. Third, because the Mechanical Pencil never has to be sharpened, it never decreases in size. Traditional pencils can become cumbersome after they have reached a certain length making writing and drawing difficult and sometimes frustrating. Finally, the rubber-gripping barrel prevents callus buildup under the bottom middle finger joint when writing or drawing for prolonged periods of time.