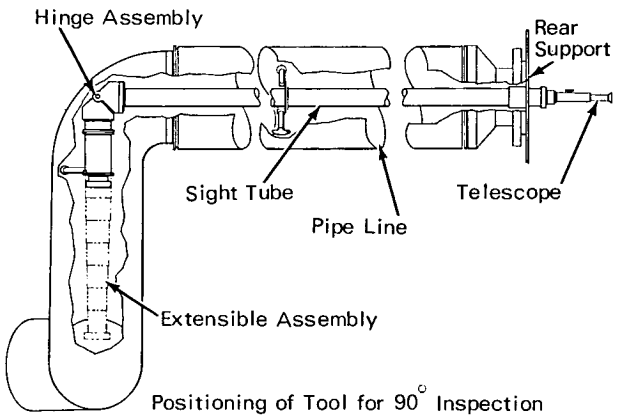
NASA TECH BRIEF

Marshall Space Flight Center

Optical Inspection Tool for Interior Surfaces of Fluid Lines

A specialized tool (see figure) enables the visual inspection of interior bore surfaces of pipe lines having sharp bends and blind runs. The tool is equipped with an adjustable, hinged optical head to permit viewing of the bore surfaces at angles from 0° to 115° to the principal axis of the sight tube. An illumination-reflector assembly and a telescope at the end of the sight tube are included for magnification of the bore surface details.



Positioning of Tool for 90° Inspection

The optical head incorporates an extendible assembly consisting of a series of eight straight nesting tubes that slide within one another. At the end of the smallest-diameter tube is a light bulb illumination unit and a conical mirror for 360° scanning of circumferential strips of bore surface. The image of each surface strip is reflected by the mirror along the optical axis of the extendible assembly toward a flat mirror mounted on the hinge shaft inside the hinge assembly. The flat mirror is spring-loaded for clockwise rotation and can be positioned angularly by means of a draw wire leading back to the telescope viewing end. A clamp on the draw wire located on the rear support is tightened to lock the flat mirror in the desired position, depending on the angular bend (60°, 90°, or 115°) of the line. In a blind run, the flat mirror picks up the image from the conical mirror and reflects it toward the viewing end. A length of flexible tubing runs across the top of the hinge assembly to convey a pressurized gas for expanding the extendible assembly to the far end of the blind run. Successive borestrips are scanned through the telescope by pulling on the draw wire to retract the extendible assembly to fixed incremental positions. For 0° inspection, the latter assembly is fully retracted and the inspection is performed as the tool is slowly moved along the bore.

Note:

Requests for further information may be directed to:

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Patent status:

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Category 06