

**PAP-1009**

**Test Results of a Cox Piro-Swivel Flowmeter**

By

Chief, Hydraulics Branch

HYDRAULIC INVESTIGATIONS  
AND LABORATORY SERVICES  
**OFFICIAL FILE COPY**

February 1978



UNITED STATES GOVERNMENT

# Memorandum

Memorandum

Denver, Colorado

TO : Chief, Division of Water Operation and Maintenance **DATE:** February 21, 1978

FROM : Chief, Hydraulics Branch

*Piro-Swivel*

**SUBJECT:** Test Results of a Cox Flowmeter

The Cox Piro-Swivel manometer velocity gage was tested in the Hydraulics Branch laboratory to determine its accuracy in several sizes of pipe. The velocity of the meter was compared with the average velocity computed from measured discharges through the laboratory system.

The sensing head of the meter was placed one-fourth inch below center of pipe as specified in the manufacturer's instructions. A minimum of 10 pipe diameters of straight pipe was provided upstream from the meter. The meter was tested in 4-, 8-, and 12-inch nominal inside diameter steel pipes. A vertical traverse was also made to obtain a velocity profile for each pipe.

Comparisons of the measured velocity with the computed velocities are as follows:

1. The indicated velocity through the 4-inch pipe varied from 4 percent less than the computed velocity at 2 ft/s (computed) to 2 percent less at 9 ft/s.
2. The indicated velocity through the 8-inch pipe varied from 1 percent greater than the computed velocity at 2 ft/s to 5 percent greater at 9 ft/s.
3. The indicated velocity through the 12-inch pipe varied from 11 percent less than the computed velocity at 4 ft/s to 3 percent less at 9 ft/s. The error was as much as 58 percent near a computed velocity of 2 ft/s.

The curves for the vertical traverse show essentially the same velocity from the centerline to 1 inch below center for the 4-, 8-, and 12-inch pipes. Therefore, the manufacturer's suggested placement is reasonable.

Attached are curves comparing the indicated velocity with the computed velocity, and the vertical velocity distribution for each pipe.

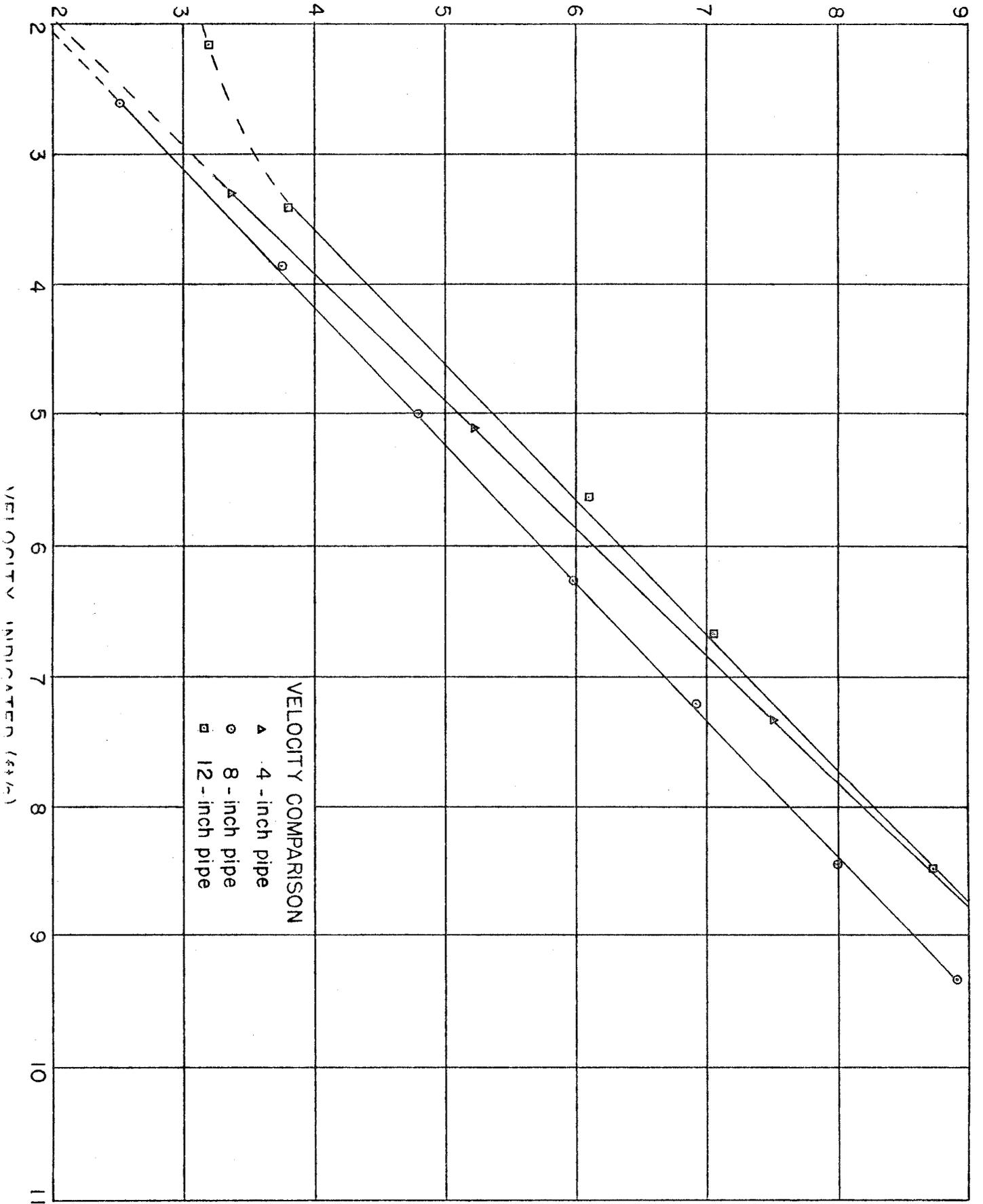
Attachment

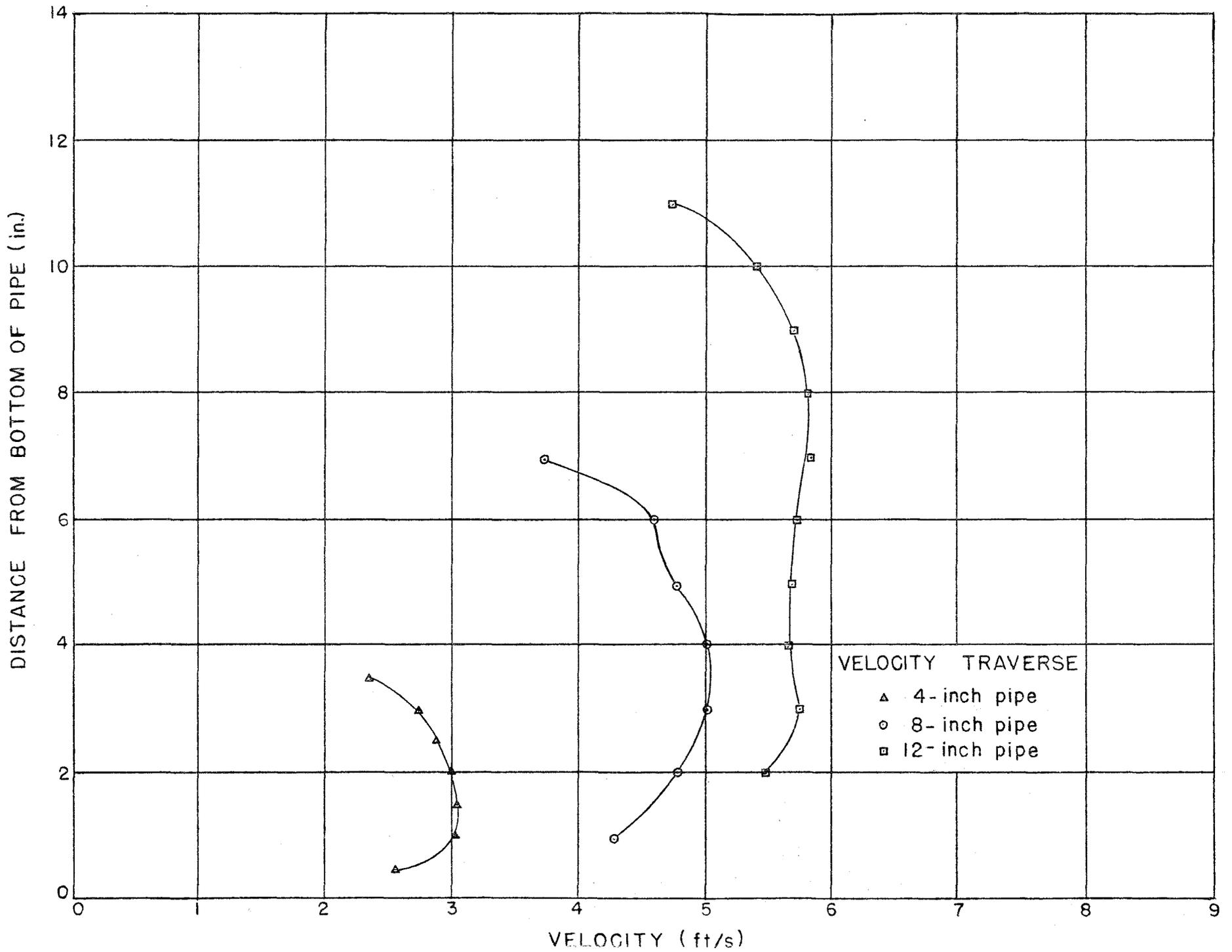


5010-110

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VELOCITY COMPUTED (ft/s)





UNITED STATES GOVERNMENT

# Memorandum

Memorandum

Denver, Colorado

**TO :** Chief, Division of General Research  
Attention: 1530

**DATE:** October 13, 1977

**FROM :** Chief, Division of Water Operation and Maintenance

**SUBJECT:** Testing of a Cox Flow Meter

The Division of Water Operation and Maintenance has recently acquired a Cox Piro-Swivel Manometer Velocitygagge manufactured by C. W. Cox, Inc. of South El Monte, California. This instrument, which is portable and readily installed in the field, was acquired primarily to facilitate the measuring of discharge from wells during pumping tests.

Please test the flow meter for accuracy of measurement in several sizes of pipe, including 2-, 4-, 6-, 8-, 10-, and 12-inch nominal inside diameter standard steel pipe. Enclosed is literature describing the instrument. Please contact either Lynn Johnson or Herbert Ham, ext. 3539, for further details and to arrange for delivery of the flow meter to the laboratory. Charge this work to 210-0981-8010-001-02-0-0.

*B. B. Richard*

Enclosure



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WATER MEASUREMENT SYSTEMS

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## *Cox Piro-Swivel Manometer Velocitygage*

### EASY INSTALLATION

1. Easily installed in vertical position.
2. Can be installed on high pressure lines without disturbing pressure.
3. Calibrations available for 2" - 2½" - 3" - 4" - 5" - 6" - 8" - 10" & 12" inside diameter (I.D.) pipes.

### EASY OPERATION

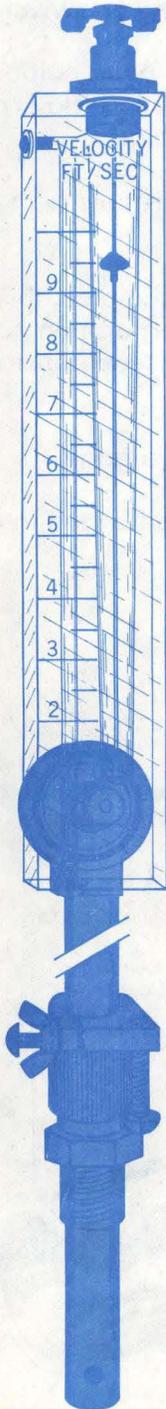
1. Direct reading in velocity ft./sec.
2. Engraved gauge fully visible.
3. A simplified method of measuring the velocity of water.

### DURABILITY

1. Pressures to 250 pounds per square inch.
2. Scale calibration engraved.
3. All other parts hard drawn polished brass & plexiglass.
4. O-ring packed.
5. Accurate precision instrument.
6. One moving part.

### USES FOR PIRO-VELOCITYGAGE

1. Industrial & private water & power companies for customer service.
2. Irrigation districts to check deep well and booster pumps & diversions from main canals.
3. Municipalities to watch accuracy of totalizing meters and make studies of the water systems.
4. Ranches to measure distribution of water to each crop.
5. Colleges for laboratory and field work, portable test instrument.
6. Geological surveys to analyze ground water conditions.
7. Water treatment — swimming pools.
8. Chilled water flow air conditioning, refrigeration plants.



# Cox Piro-Swivel Manometer Velocitygag

## INSTALLATION AND OPERATION INSTRUCTIONS For Installation in Top of Pipe

Drill and tap  $\frac{1}{2}$ " iron pipe size in top side of pipe, which may be at any angle, or vertical to receive the instrument, so that it will stand **vertical** and be 10 pipe diameters or more down stream from preceding ells, bends, valves, etc., and 3 or 4 pipe diameters upstream from downstream obstructions. Plexiglass manometer must be set vertical by rotating on swivel joint.

Screw the gage into tapped hole and slide through to opposite side of pipe, pull out  $\frac{1}{4}$ " less than one half the pipe diameter and lock with the clamp. Rotate so that flow arrow points in the direction of flow and so face of instrument is parallel with the pipe.

Bleed all air out of top and read underside of float indicator. Calculate results with circular slide rule. Instructions are on back of it.

If it is necessary to install or remove the instrument while pressure is in the pipe, this may be done by installing a  $\frac{3}{4}$ " corporation cock in the top of pipe. Adapt the corporation cock to receive the flowgag by using a pipe coupling or whatever fitting may be needed. Install the Piro-Flowgag then open the corporation cock and slide gage through.

To remove pull gage out to stop pin, close corporation cock and remove gage.

Pipe may be at any angle from horizontal to vertical and water may be flowing in either direction. Swivel instrument can be set to meet the conditions.

