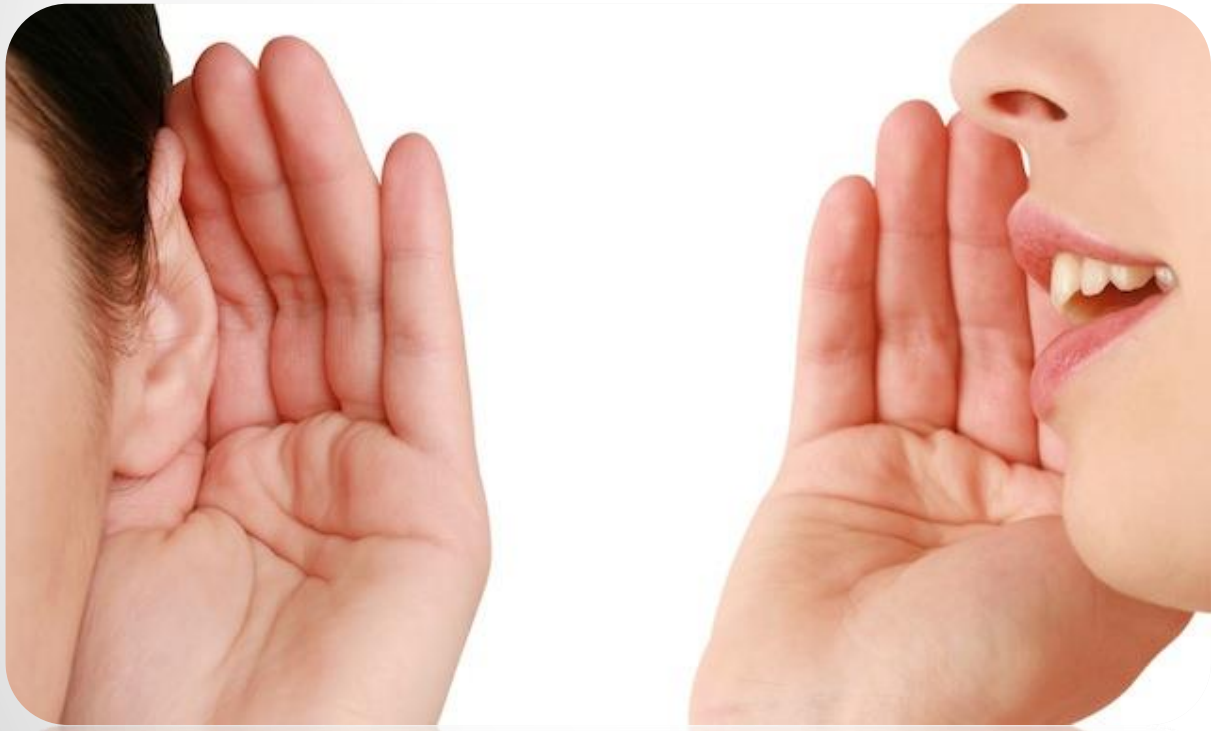
American Water Works Association
California-Nevada Section

Northern CA/NV - Electronic Metering Workshop

Greg Land
Product Manager - Metrology

- Ultrasonic Technology Overview

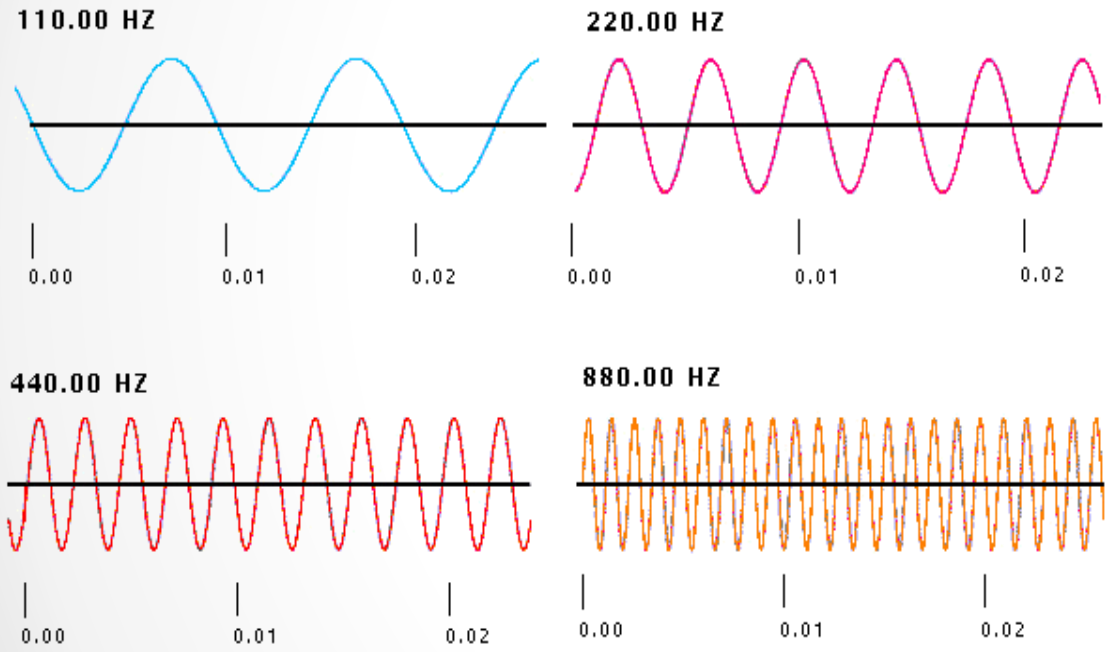
Science of the Technology



Basic Operating Principle is *Sound*:

- Sound is an energy with a specific, measurable signature

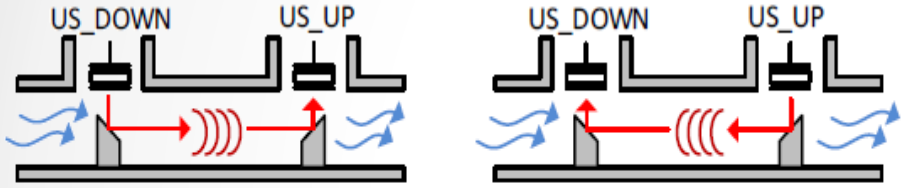
Science of the Technology



Basic Operating Principle is *Sound*:

- Sound is an energy with a specific, measurable signature
- Sound generating/collecting devices, known as **transducers,** measure a precise tuned frequency for how long it takes to travel a set distance.

Science of the Technology



$$t_{down} = \frac{L}{c_0 + v} \qquad t_{up} = \frac{L}{c_0 - v} \qquad v \approx \frac{\Delta t * {c_0}^2}{2 * L}$$

t_{up}, t_{down}: Signal travel times TOF_{UP} and TOF_{DOWN}

$\Delta t = t_{up} - t_{down}$: $DIFTOF$

L: ultrasonic signal path length parallel to flow

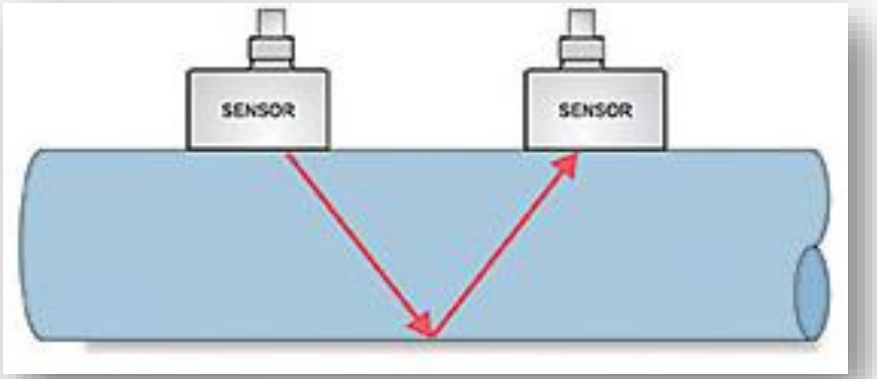
c_0: speed of sound in water

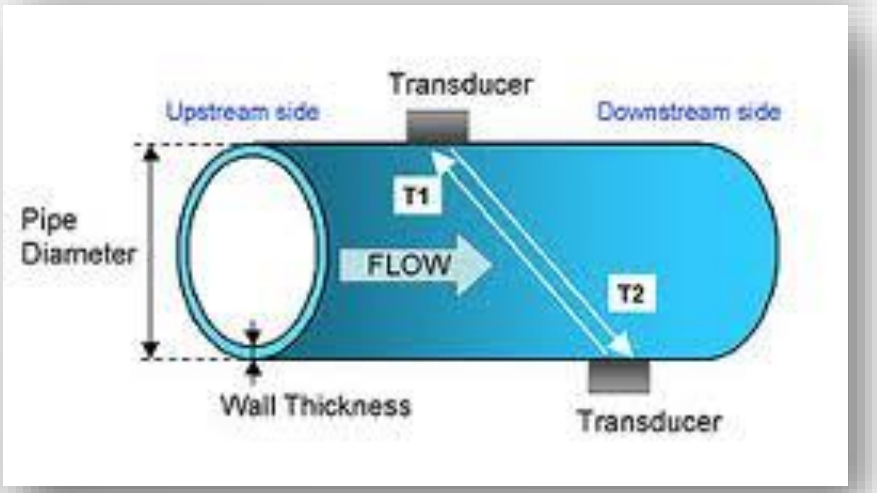
v: flow speed

Basic Operating Principle is *Sound*:

- Sound is an energy with a specific, measurable signature
- Sound generating/collecting devices, known as **transducers,** measure a precise tuned frequency for how long it takes to travel a set distance.
- The next step is to measure the travel time of the sound wave. This is done twice; once upstream, and once downstream.
- The difference equates to the velocity of the water in the pipe.

Science of the Technology





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Key Features & Benefits

Key Features	Ultrasonic	Turbine	Compound	Fire Assembly	Other
Solid-State (no moving parts)	•				
Sustained Accuracy	•				
Low Flow Measurement	•		•	•	•
High Flow Measurement	•	•		•	•
No Cross Over	•	•			•
Low Pressure Loss	•				•
Light Weight	•	•		•	
Does Not Require Strainer	•				
Multiple applications/services (fire or domestic)	•				
Internal Data Logging	•	Varies	Varies	Varies	Varies
Various Installation Orientations	•				
Integrated Smart Technology	•	Some	Some	Some	Some

Making the Right Choice

Propeller
Fire-Service Turbine
Multi-jet
Turbine
Single-jet
Compound
Mag
Fire-Service Assembly
Floating Ball
Ultrasonic
Positive Displacement

Making the Right Choice

- **3" TURBINE**
- 3 GPM Average Low Flow @ -5% - +1%.
- 5 GPM Normal Range @ + 1.5%

- 0.5 - 0.7 GPM Average Flow

- Toilets ('92): Up to 1.6 USG per flush
- Urinals ('92): Up to 0.5 USG per flush

Reduce Non-Revenue Water

- Unmetered consumption
- Inaccurate meters
- Damaged meters
- Frequent repairs

All lead to non revenue water

Reduce Non-Revenue Water

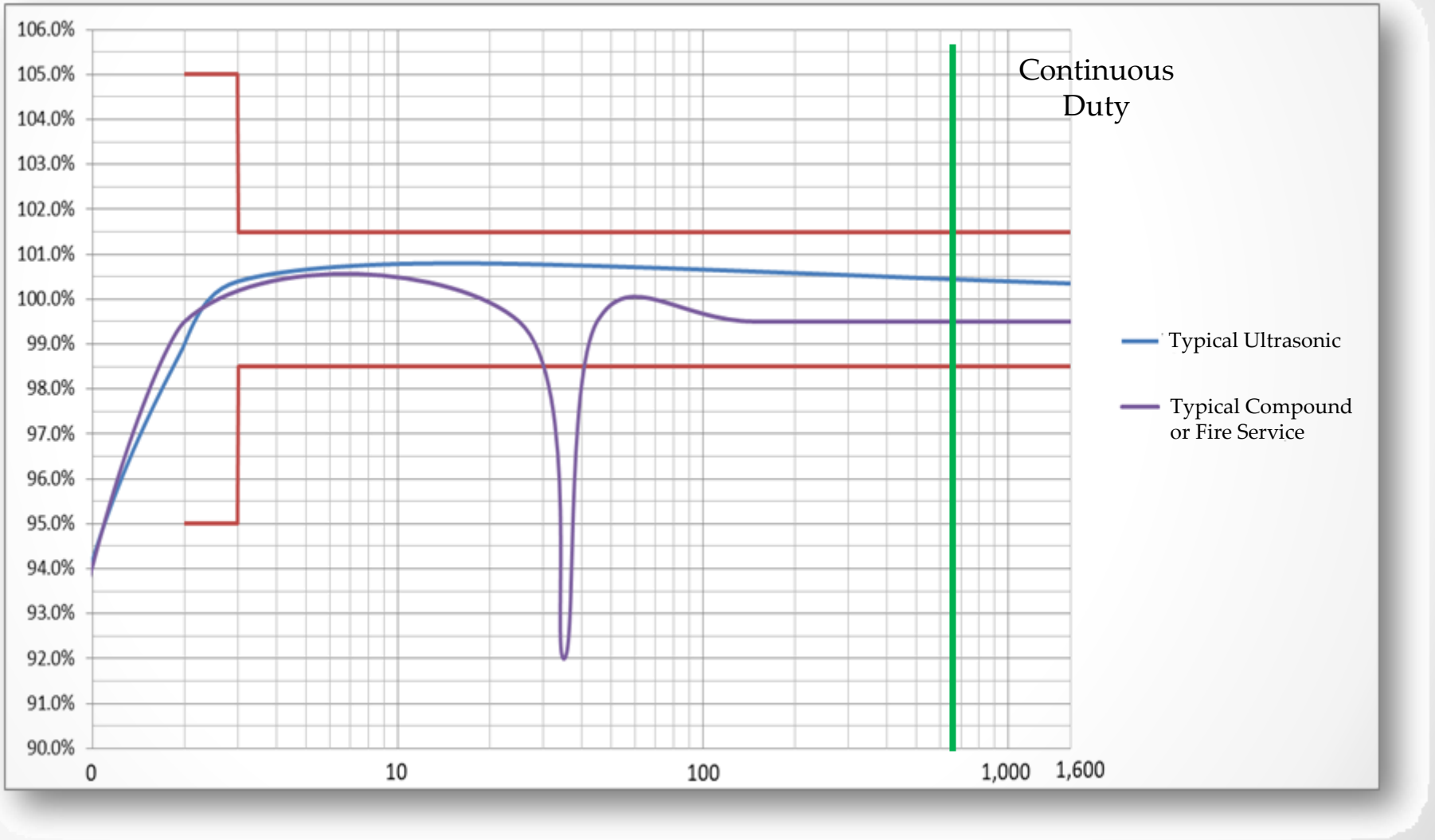
ELIMINATES:

- Installing the wrong meter type
- Gradual decrease in accuracy
- Accuracy losses due to cross over
- Excessive maintenance costs
- High overhead & inventory costs
- High installation costs

Ease of Installation

- Turbines up to 80% heavier
- Compounds up to 300% heavier
- Fire Assemblies up to 1800% heavier
- Less need for heavy equipment
- Reduced vault size lowers initial costs

Cross Over & Continuous Duty



Fair and Reliable Billing

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Questions?

Thank you

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