

Valve Inspection Procedure

I. Introduction

This method can be successfully used when valve/line pressure is not known. It is known as the A, B, C & D Method. The goal of this method is to establish the location of turbulence and then decide what that means about the valve being tested, i.e., open, closed, closed and leaking,

II. Instrument Set-up

A. Analog

1. Ultraprobe 100

- a. Check/replace batteries
- b. Insert Contact Module
- c. Plug in headphones
- d. Place headphones over the ears
- e. Turn instrument on

2. Ultraprobe 2000

- a. Insert Contact Module
- b. Perform Sensitivity Validation
- c. Set frequency to *25kHz*
- d. Set Meter Response to “Log” for a real time response
- e. Start at Sensitivity level 5
- f. Plug in headphones, and place over the ears

B. Digital

1. Ultraprobe 3000

- a. Insert Contact Module
- b. Be sure the memory is cleared from instrument
- c. Perform Sensitivity Validation
- d. Leave instrument in R for Real-Time mode (this is the default)
- e. Click to Sensitivity Mode
- f. Check Battery level
- g. Plug in headphones and place over the ears

2. Ultraprobe 9000

- a. Insert Contact Module
- b. Be sure the memory is cleared from instrument
- c. Perform Sensitivity Validation
- d. Leave instrument in R for Real-Time mode (this is the default)

- e. Set Frequency to 25 kHz
 - f. Click to Sensitivity Mode
 - g. Check Battery level
 - h. Plug in headphones and place over the ears
3. Ultraprobe 10,000
- a. If a DMS route has been established, download route to the CF/SD card.
 - b. If it is not DMS route based ensure CF/SD card is clear.
 - c. With the Ultraprobe turned off insert CF/SD card into the unit.
 - d. With Ultraprobe turned off insert contact module into the front of the Ultraprobe. Align the four pins and push the module straight in DO NOT Twist. Ensure the stethoscope module is completely pushed in.
 - e. Plug in headphones and place over the ears

NOTE: Select “STM” (Stethoscope Module) under “Module type” in the set-up menu

1. Turn on the Ultraprobe by pulling and holding the trigger in. Note: Pulling and holding the trigger again will shut the Ultraprobe off.
2. Press the sensitivity knob two times and rotate knob to "Setup Menu".
3. Press the sensitivity knob to select "Setup Menu".
4. Press the yellow Enter button to enter "Setup Menu".
5. Rotate the sensitivity knob until "Application Select" is highlighted in black.
6. Press the sensitivity knob to choose "Application Select".
7. Rotate the sensitivity knob to select "Steam Disabled". Disabled will be flashing.
8. Press the sensitivity knob to enable.
9. Once enabled, press the yellow "Enter" button to save/exit.
10. While in "Setup Menu" Rotate the sensitivity knob until "Module Type Select" is highlighted in black.
11. Press the sensitivity knob to choose "Module Type Select".
12. Rotate the sensitivity knob until the module that will be used for testing appears (STM).
13. Press sensitivity knob to select module.
14. Rotate sensitivity knob until "Instrument Setup" is highlighted in black.
15. Press sensitivity knob to choose "Instrument Setup".
16. Rotate sensitivity knob until "Manual" appears.
17. Press sensitivity knob to choose "Manual".
18. Press "Enter" to exit.
19. Press sensitivity knob until the "S" is flashing.
20. Rotate the sensitivity knob until "S=35".
21. Press sensitivity knob until the "kHz" is flashing.

22. Rotate the sensitivity knob until it reads "25 kHz".
23. The Ultraprobe is now ready to begin scanning.

4. Ultraprobe 15,000

- a. If a DMS route has been established, download route to the SD card.
- b. If it is not DMS route based, ensure SD card is clear.
- c. With the Ultraprobe turned off insert SD card into the unit.
- d. With Ultraprobe turned off insert the contact module into the front of the Ultraprobe. Align the four pins and push the module straight in. DO NOT Twist. Ensure the contact module is completely pushed in.

1. Turn on the Ultraprobe by depressing the power button
2. Touch the "Setup" icon
3. Touch Preferences to adjust general settings of Ultraprobe
4. Enter 3 Alpha/Numeric Characters for the Inspector
5. Highlight "Module Type".
6. Select the module that will be used for testing. *STM*
7. Tap the box with the *STM* to remove highlighted area.
8. Use down arrow to locate "Instrument Setup."
9. Highlight "Instrument Setup".
10. Choose "Manual."

NOTE: *It is important to touch "OK" to save your settings.*

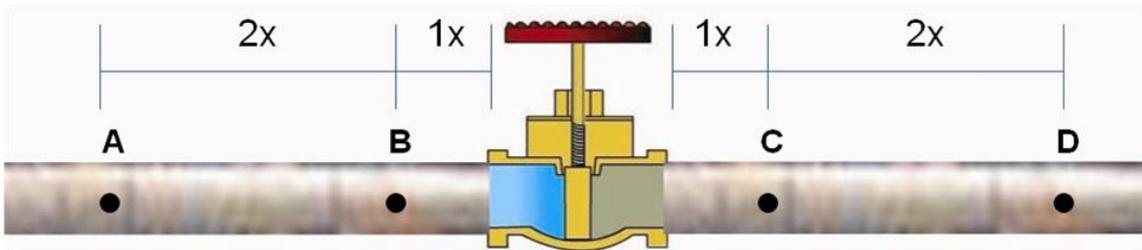
- e. Once back on the "Setup" screen, touch the "Application" icon.
 1. Use down arrow to locate "Valves".
 2. Choose "Valves" and touch "OK"
 3. A message will appear "Changing application will cause data to be clear, Continue?" Choose "Yes" to save your setting and exit to the Setup page.
 4. Touch "Exit" to return to the Home page.
- f. Touch "dB Display" icon located in the top left corner
- g. The main display is now visible
 1. Touch the "S = ##" to adjust sensitivity. A square rectangle will appear around the letter and number. This indicates that it is ready to be adjusted. It is a best practice to adjust sensitivity to its mid-range - "35". Use the "up" blue arrow in the middle right of your screen to accomplish this.
 2. Touch "kHz" in the top right corner. Adjust this to read "25 kHz"
- h. Plug in headphones and place over the ears.
- i. The Ultraprobe is now ready to begin data collection. Follow predetermined and/or loaded route.

NOTE: When getting decibel from new test point, sensitivity may need to be adjusted. Touch the *S=##* and tap the direction needed (up or down) based on the flashing arrow until a decibel (dB) appears on the screen.

III. Inspection Procedure:

A. Single valve inspection: At all times, it is recommended that the inspector listen to the valve flow/no flow sound quality through headphones while performing the valve test.

1. The inspection points: 2 upstream, and 2 downstream.
2. The first test point (A) is 3X pipe diameter distance (i.e., a 12" pipe diameter would give the first test point a distance of 36" from the valve). The second test point (B) upstream of the valve would be 1X pipe diameter (i.e. if pipe diameter is 12", then the test point would be 12" upstream of the valve).
3. Downstream test points would be the mirror image of the upstream test points, with 3rd test point (C) being 1X pipe diameter distance downstream of the valve and the 4th test point (D) would be 3X pipe diameter distance downstream of the valve.



4. Take readings at A, B, C, D and then compare readings. The outcomes are as follows:
 - If Test Point C is the Loudest, LEAK-BY is Present.
 - If Sound Attenuates from Test Points A - D, the Valve is CLOSED.
 - If Readings Are the Same or Similar, the Valve is OPEN.
 - If D is Higher Than A, B, and C, The Ultrasonic Source is Downstream. Incorporate Test Point E. Check Downstream and make determination if flow exists past the valve. If so, does that mean the valve is open or leaking by severely? Usually the answer is Yes, as long as there is no New introduction of flow from another source such as a "Tee" in to the pipe after the valve that is being tested.
5. Record the decibel value and translated (heterodyned) ultrasound signal of each valve test point on the instrument or a suitable recording device and download to a computer and display using Ultratrend DMS and Spectralyzer software.

IV. On/Off Valves:

On/off valves are usually checked for position, open or closed, or for leakage in the closed position. Valves are tested with the ultrasonic unit utilizing the contact module. The first step in testing a valve for leakage is to visually confirm if the valve is closed or in the off position. The valve is then tested for leakage.

This is accomplished by first contacting 2 points upstream of the valve (test point A and B) and adjusting the sensitivity to read about 50 percent by reading the dB Value in the Digital Instruments. A and B are the baseline. The downstream side is then contacted at two test points: C & D. The sound intensity of the baseline (A and B) is compared to test point C. Test point D is measured to insure there is no other ultrasonic sound from downstream of the valve.

If reading D is lower than C, the valve test is valid and if C is the loudest decibel of all, then leak by is present. If reading D is higher than C, this means that ultrasonic sound is being transmitted from a point downstream. If possible, this ultrasonic sound must be either “tuned out” or shut off to get a proper test of the subject valve. When it is not possible to turn off or tune out a downstream structure borne ultrasound, find the source of the highest reading in order to determine its effect on the outcome.

V. Manifold Valve Inspection:

Basically, this is the same procedure as above. The only consideration is that it may not be possible to use two test points as described. In this instance, test immediately upstream of the valve and compare to a test point on the valve body, which may be used as a downstream test point. Select a point as close to the valve seat as logistically possible and record the results.

VI. Testing Valves with the UP10000 and UP15000

NOTE: *Set up and testing with analog and digital units other than the UP10000 and the UP15000 are outlined above.*

*The Ultraprobe 10,000 and 15,000 are both equipped with a specific mode (aka. “**The A, B, C, D and sometimes E Method**”) for testing valves. To enter this mode there are two options. If a valve route is built in the DMS and uploaded to the instruments, it will automatically operate in the “valve testing” mode as long as the “Instrument Setup” is set to “Automatic” not “Manual.” This mode allows the user to enter 4 different dB readings at each test point. (this “test point” is the valve itself)*

A. UP 10,000

1. Insert the headphone plug into the jack located on the face of the Ultraprobe under the view screen.
2. Set application mode to “Valve”.

NOTE: *This happens automatically if a valve route is uploaded from DMS to the instrument.*

3. Make sure the correct equipment number and test point is displayed on the view screen.

NOTE: If it is not a DMS based route, start at Record #1. This is displayed as “001 Rec” on the UP10,000

4. Rotate the sensitivity knob until “Store Record” is flashing.
5. Press the sensitivity knob to select “Store Record”.
6. Press the sensitivity knob again until “S=##” is flashing
7. Adjust the sensitivity until the decibel reading is steady.
8. Press the yellow **Enter** button to save the dB.

NOTE: *Ultraprobe will automatically advance to the next test point in sequence once sound dB’s for points A, B, C, AND D are saved.*

9. Once the route or survey is complete download the route back to the DMS software. From here it is possible to generate reports.

B. UP 15,000

1. Insert the headphone plug into the jack located on the face of the Ultraprobe under the view screen.
2. Set application mode to “Valve”.

NOTE: *This happens automatically if a valve route is uploaded from DMS to the instrument, if “Instrument Setup” is set to “Automatic,” not “Manual.” If not, the user can navigate to the set-up menu to manually choose the “Valve” application.*

3. Make sure the correct equipment number and test point is displayed on the view screen.

NOTE: If it is not a DMS based route, start at Record #1. This is displayed as “REC=1” on the UP 15,000.

4. On the main screen, be sure that both the *Save* icon and *Camera* icon are display in the lower left side of the screen.
5. Touch the “S=##” to allow for sensitivity adjustment.
6. While pulling the trigger, adjust the sensitivity until the decibel reading is steady. Release the trigger when it is.
7. If you want to take a picture or pictures of the location, touch the *Camera* icon and follow the prompts to capture and save an image.
8. Once on the main screen, there will be 4 fields that can be populated. They are **A, B, C, and D.**
9. Once you have captured the dB on the screen, touch the field next to the letter **A.**
10. Repeat the same steps to fill in **B, C, and D.**

11. Touch the **blue** *Save* icon to save the record when finished with that test point.
12. Once the route or Group is complete, download the route back to the DMS software.