

Recommend Ultrasonic Procedures for Compressed Gas Leaks Survey

I. Introduction

To create a successful compressed air leak survey there should be a planned and organized approach. First, determine what the organization wants to accomplish with this survey. Is it going to be a one-time investment or a continuous on-going program? Is the need to perform the survey to reduce energy costs or improve production or both?

If the goal is to have an on-going survey, be sure to set up a workable schedule. For some this will be once a month to others once a year and still others may choose something in between.

What about equipment? Perform an audit or compressed air review to determine the need for compressed air and related equipment. Has the use of compressed air grown due to expanded production or equipment requirements or has the demand increased due to air loss?

What about looking for alternative utilities? For example, can electric controllers be used in place of compressed air, what types of compressors are being used? Have compressors with variable speed drives been considered? Are there alternative compressor types that can be more economical?

It will be important to educate other employees about the effective use of compressed air. Everyone needs to understand that wasted air is not free. When waste hits the bottom line, it has an impact on the profitability and health of the company.

Before you begin your survey create a plan. Here are some suggestions:

1. Try to limit the leak test area to a manageable size. Don't be overly ambitious. The leak survey program will be more effective if only one area at a time is inspected and leaks repaired before moving to the next area.
2. Walk the plant, section by section to determine the best strategy and most efficient use of time. Starting the survey at the compressor area and move out from there is a best practice.
3. When walking the plant and planning the survey:
 - a. Pay attention to and note air waste practices.
 - b. Note the location of obvious leaks.
 - c. Note potential safety hazards.
 - d. Determine what equipment you will bring, such as flashlights, ladders, etc. to complete the survey.
4. Select the inspection equipment to complete the survey effectively and safely. This might include specialized modules such as the LRM (Long Range Module), the UWC (Ultrasonic Wave Concentrator or parabolic microphone), and or a TFSM (Telescopic Flexible Scanning Module) for high or hard to reach places.

5. Set up a tag system. Use tags and hangers that can be attached to the leak location. The tags should have numbers or codes that can be used for record keeping and location identification.
6. Decide how comprehensive the test results and reports need to be. Perhaps take a digital photograph of the leaks with the tags attached. If the plan is to quantify the leaks in terms of CFM and cost, you will need a digital instrument and can generate a report from the DMS Software. It is also possible to use the Leak Survey App available for both Android and Apple OS.
7. Be sure to install a system of leak reporting and follow up to be sure the leaks are repaired. When the survey is completed and the repairs are finished, re-test to be sure the leaks have been repaired properly and that no new leaks were created during the repair.
8. If leaks have been present for a long time before your survey, it is common for pressure in various parts of the plant has been increased over time. Re-check those areas and bring the pressure down to the appropriate level.

II. Instrument Set-up

A. Analog

1. Ultraprobe 100

- a. Plug in headphone
- b. Check/replace batteries
- c. Set sensitivity at -70
- d. Check sensitivity
 1. Place headphones over ears
 2. Turn instrument on
 3. Rub fingers in front of scanning module & observe the meter. The meter should respond full scale and you should hear the rubbing through the headphones.

2. Ultraprobe 2000

- a. Perform Sensitivity Validation
- b. For Ultraprobe 2000 set sensitivity at Fixed Band
- c. For Ultraprobe 2000 Set Meter Response to Log
- d. Start at Sensitivity level 10
- e. Plug in headphones, and place over the ears

B. Digital

1. Ultraprobe 3000

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

- e. Check Battery level

2. Ultraprobe 9000

- a. Be sure the memory is cleared from instrument
- b. Perform Sensitivity Validation
- c. Leave instrument in R for Real-Time mode (this is the default)
- d. Set Frequency to 40 kHz
- e. Click to Sensitivity Mode
- f. Check Battery level

3. Ultraprobe 10,000

- a. If a DMS route has been established, download route to the CF or 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 scanning module into the front of the Ultraprobe. Align the four pins and push the module straight in DO NOT Twist. Ensure the scanning module is completely pushed in.

NOTE: For normal distance scanning, select “SCM” (Scanning Module) under “Module type” in the set up menu

NOTE: For long range scanning, select “LRM” (Long Range 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 "Leak 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 (SCM) or (LRM).
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 "Auto" appears.
17. Press sensitivity knob to choose "Auto".
18. Press **Enter** to exit.
19. Press sensitivity knob until the "S" is flashing.
20. Rotate the sensitivity knob until "S=70".
21. Press sensitivity knob until the "KHz" is flashing.
22. Rotate the sensitivity knob until it reads "40 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 CF or 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 scanning module into the front of the Ultraprobe. Align the four pins and push the module straight in DO NOT Twist. Ensure the scanning module is completely pushed in.

NOTE: For normal distance scanning, select "SCM" (Scanning Module) under "Module type" in the set up menu

NOTE: For long range scanning, select "LRM" (Long Range Module) under "Module type" in the set up menu:

1. Turn on the Ultraprobe by depressing the power button
2. Touch the "Setup" icon
3. Touch Preferences to adjust general settings of Ultraprobe
 - a. Enter 3 Alpha/Numeric Characters for the Inspector
 - b. Highlight "Module Type".
 - c. Select the module that will be used for testing. *SCM* or *LRM*.
4. Highlight "Instrument Setup". Choose "Auto"

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

5. Once back on the "Setup" screen, touch the "Application" icon.
 - a. Choose "Leak" and touch "OK" to save your setting and exit to the Setup page.
 - b. Touch "Exit" to return to the Home page.
6. Touch "dB Display" icon located in the top left corner
7. The main display is now visible
 - a. 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 highest setting. "70". Use the "up" blue arrow in the middle right of your screen to accomplish this.
- b. Touch "KHZ" in the top right corner. Adjust this to read "40 KHZ"
8. The Ultraprobe is now ready to begin scanning. Follow predetermined and/or loaded route

III. Scanning Procedure

A. UP 10,000

1. Insert the headphone plug into the jack located on the face of the Ultraprobe under the view screen.
2. 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

3. Rotate the sensitivity knob until "Store Record" is flashing.
4. Press the sensitivity knob to select "Store Record".
5. Press the sensitivity knob again until "S=#" is flashing
6. Use the Gross to Fine method to scan area for air leaks. Adjust sensitivity to pinpoint the leak
7. Once the general leak location has been identified, the rubber focusing probe should be placed over the SCM to help eliminate competing ultrasound and to pinpoint the exact location of the leak.
8. Pull back from the leak location to a distance of 12-15" from the tip of the rubber focusing probe.
9. Adjust the sensitivity until the decibel reading is steady.
 - a. Press the yellow **Enter** button to save the dB.

NOTE: Ultraprobe will automatically advance to the next test point in sequence once sound dB is saved

10. Once the leak route or survey is complete download the route back to the DMS software. From here it is possible to generate reports to quantify leak size and costs (refer to Software Tutorials online to execute your objective)

B. UP 15,000

1. Insert the headphone plug into the jack located on the face of the Ultraprobe under the view screen.

2. Make sure the correct equipment number and test point is displayed on the view screen.
3. **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. Use the Gross to Fine method to scan area for air leaks. Adjust sensitivity to pinpoint the leak
7. Once the general leak location has been identified, the rubber focusing probe should be placed over the SCM to help eliminate competing ultrasound and to pinpoint the exact location of the leak.
8. Pull back from the leak location to a distance of 12-15” from the tip of the rubber focusing probe.
9. While pulling the trigger, adjust the sensitivity until the decibel reading is steady. Release the trigger when it is.
10. 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.
11. Once on the main screen, touch the **blue** *Save* icon to save the dB.

NOTE: Ultraprobe will automatically advance to the next test point in sequence once sound dB is saved.

12. Once the leak route or survey is complete download the route back to the DMS software. From here it is possible to generate reports to quantify leak size and costs (refer to Software Tutorials online to execute your objective)

C. Test Materials

1. Suggested Materials to Bring
 - a. Writing pad and pen/clipboard
 - b. Flashlight
 - c. Wipe rag
 - d. Tags & Hangers
 - e. Marker Pen
 - f. Digital camera
2. Suggested Accessories
 - a. Long Range Module (or Parabolic Microphone)
 - b. Rubber Focusing Probe

D. Inspection

1. Safety
 - a. Be Aware and Observe all Safety Procedures
 - b. Wear appropriate clothing and other protective gear as required.
 - c. Follow all confined space procedures when entering such conditions

2. Pre-Inspection
 - a. Walk test area, use compressed air system diagram to assist in the planning of the route.
 - b. During walk-through:
 1. plan your scan strategies
 2. note air wasting activities such as abuse, valves kept open, etc.
 3. Note and tag obvious leaks
 4. Take a note of any additional items you may need for an efficient test such as a hi-low or ladder, keys to open locked cabinets (observe lockout-tag out procedures if called for)

3. Inspection
 - a. Perform inspection by testing one area at a time in your planned route.
 - b. use the “Gross-to-Fine” leak procedure
 - c. use shielding methods when confronted with competing ultrasounds
 - d. confirm the leak location by:
 1. scanning around the suspect leak area in all directions (360°)
 2. sealing the Rubber Focusing Probe against the leak area
 - e. Tag the leak
 - f. Take digital photos of the leak with a tag if desired
 - g. (3000/9000/10,000/15,000 users) \
 1. Store leak data and download to Ultratrend DMS
 2. Generate Air Survey Report from the DMS, or use the Leak Survey App on an Android or Apple OS device.

E. Post Inspection

1. Check software to see if repairs have been completed
2. Retest repaired leaks
3. Ultraprobe 3000/9000/10,000/ 15,000 users: check off properly repaired leaks on Leak Survey Report that was generated.
4. Update compress gas software with repaired leaks entered
5. Issue report showing:
 - a. # of leaks found
 - b. # leaks repaired
 - c. CFM loss/ CFM saved
 - d. dollars saved by survey
 - e. recommendations
 - f. schedule future surveys