

Ultrasonic Diagnostic Tool

Users Manual

Read this manual thoroughly before use

PRINCIPLE

Moving parts, liquids and gases cause turbulence or friction. This turbulence or friction can then produce high frequency ultrasonic waves whose frequencies are normally higher than 20kHz and are far above the range of human hearing. The ultrasonic waves can travel in air and their intensity will attenuate rapidly as their propagation distance increases. Ultrasonic waves are highly directional, this directional aspect of ultrasonic waves allows one to isolate a suspect signature sound from other background noises and detect its exact location.

This Ultrasonic Diagnostic Tool operates on the principle mentioned above, it uses advanced ultrasonic sensing technology and converts inaudible ultrasonic sound into an audible sound which bears a close likeness to the natural incoming sample; for example, a gas leak sounds like a " hiss " and a defective bearing sounds like a " clicking or chatter ". Since this tool is tuned to listen to the ultrasonic range, it is unaffected by everyday sounds such as wind, voices, and traffic.

This Ultrasonic Diagnostic Tool is easy to carry and operate, and its detection result is accurate and reliable. It is very useful in preventive maintenance, trouble shooting, quality control and diagnostics in the automotive, industrial, manufacturing and process industries.

GENERAL DESCRIPTION

This tool is a very useful diagnostic test tool which can reduce downtime and maintenance related costs of the tested equipments. Through the detection of ultrasonic sound, this tool can be used to inspect and check such items as ignition systems, vacuum problems, air brake systems, bearings, gear trains, cam and tappet assemblies, internal combustion engine valving and piston blow-by, gaseous piping and ducting, seals in refrigerated van bodies, air ducts, hydraulic systems, Freon leaks, and many other components.

This tool consists of an ultrasound receiver, a tone generator, an air probe, a contact probe and a headphone.

The receiver is sensitive only to ultrasonic energy in the frequency range of 36000 to 44000Hz. The energy is amplified by internal circuitry and converted to audible sounds (available through the headphone) and an intensity reading on the red LED display.

The tone generator is used with the ultrasound receiver to check for faulty seals in nonpressurized enclosures, such as automotive cabin windows/doors/roofs, etc.

APPLICATIONS

This Ultrasonic Diagnostic Tool can be used to efficiently investigate the five major areas of repair and preventive maintenance in the automotive, industrial, and etc.

1. Air/Vacuum Leaks

Both vacuum and compressed air leaks from a hole down to 0.127mm create an energy packet or wave front, which can result in an ultrasonic emission with a differential of 1 psi.

2. Gas and Liquid Turbulence

Turbulence associated with steam trap and internal valve leaks, cavitation, and blockages in liquid and air/gas lines.

3. Electrical Discharge

Electrical discharge associated with insulation breakdown, tracking, corona, and arcing.

4. Mechanical Wear

Condition of mechanical wear in bearings, valves and race assemblies, shafts, gears and etc. Also accurate indication of proper lubrication in anti-friction bearings.

5. Sound Generation

The Receiver can be used in conjunction with Tone Generator to detect container cracks and seals, door seals and compartments.

INSTRUCTION

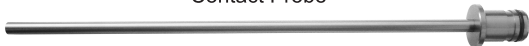


Tone Generator



Receiver

Contact Probe



Air Probe





Headphone

Receiver

The Receiver incorporates audio feedback and a 10 bar LED indicator for visual intensity of signal. It has a permanently fixed 33mm directional receiver port, 3.5mm stereo jack and a rotary on/off volume control switch. It is powered by a 9V battery.

The LED display allows the user to zero in on a steady state source of ultrasonic sound when locating a gaseous or vacuum leak or using the Tone Generator. The ultrasonic intensity indicated on the LED display will increase when you get closer to the location of the leak/noise source.

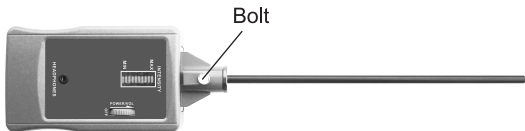
Simply use the method described in Step 5 of the **Basic Operational Procedure** section to test the performance of the Receiver. If no sound is heard, replace the battery.

Probes

Both the air and contact probes are precision parts, designed to optimize the response of the Receiver when needed. The 30cm air probe serves to extend reach or to facilitate isolating a leak among multiple suspect areas.

Before you connect the air or contact probe to the Receiver, you must rotate the bolt of the Receiver anticlockwise to back it. Insert the connecting end of the probe into the receiver port of the Receiver, then rotate the bolt clockwise to fix the probe (refer to the following figure).

Note: Do not modify the probes in any way and never use the probes for unintended purposes.



Tone Generator

The Tone Generator emits a warble output centered at 40kHz for use in testing seal integrity in non-pressurized vessels. The human ear cannot hear this output, so the Tone Generator must be used in conjunction with the Receiver.

The Tone Generator is powered by a 9V battery. If the green indicator (LED) on the Tone Generator is on, the unit is emitting ultrasound. Verify the Tone Generator's operation with the Receiver.

Receiver and Tone Generator Guidelines

1. Avoid handling Receiver or Tone Generator roughly.
2. The carrying case should be used for protection and transportation whenever possible.
3. The port openings of Receiver and Tone Generator contain the heart of the tool's operation, a precision transducer/transmitter. During use, guard against any foreign substance or liquid from entering these areas.
4. The Receiver and Tone Generator are not waterproof and should be protected from any liquid.
5. To save battery power, make sure each unit is turned off when not in use.

OPERATING INSTRUCTIONS

Safety Precautions

Although this tool allows you to concentrate on diagnosing a problem in a fast and effective way, never lose awareness of your surroundings.

1. Keep a safe distance from moving parts and electrical areas.
2. Never over reach or de-stabilize your footing while using this tool.
3. To avoid personal injury, be wary of nearby moving object(s) while wearing the headphone.
4. Do not use the air or contact probe as a lever, pry bar, or for other unintended applications.
5. Do not use the contact probe to diagnose electrical problems or touch it to any live conductor.

Basic Operation Procedure

1. Insert the plug of the headphone into the jack on the front face of the Receiver.
Note: Do not wear the headphone before you turn on the Receiver.
2. Select the air or contact probe as needed (see the **Using Air or Contact Probe** section).
3. Turn the rotary knob forwards to turn on the Receiver, it will sound a click. Watch for the LED bar to settle to the bottom position.

4. Wear the headphone and adjust its volume with the rotary knob until you can just hear the background noise (hiss). Please note that increasing the volume does not increase the Receiver's detection sensitivity. Setting the volume too high can lead to operator fatigue.
5. When using the air probe, point the probe in the direction of your free hand while lightly rubbing your forefinger and thumb together about 60cm away. The response should be the sound of sandpaper on wood. You can vary the distance and increase/decrease the level of volume accordingly. While performing this test, familiarize yourself with the directional sensitivity of the probe while sweeping the probe past your fingers at various distances.
6. When using the contact probe, adjust the volume to an appropriate level while lightly rubbing your finger along the tip of the probe rod.
7. The tone generator is used with the ultrasound receiver to check for faulty seals in nonpressurized enclosures, such as automotive cabin windows/doors/roofs, etc. Turn on the ultrasound tone generator and place it in the enclosed environment to be evaluated. (If the space of the enclosed environment is large, place the tone generator near the suspect area of the exterior of the enclosed environment, and point its emitting opening to this suspect area.) Make sure that you have enclosed the environment to be evaluated, then turn on the receiver and sweep it around the suspect area to check the leakproofness.

SCANNING TECHNIQUES

Using LED Graph on Receiver and/or Headphone For Locating Leaks

The ultrasonic signal's intensity is indicated through the LED graph and/or volume of the headphone, so you can locate the leak according to the LED graph indication and/or the volume of the headphone. Decrease the volume of the headphone as you get closer to the leak. When the sound gets louder, repeat the process until you have pinpointed the location. Please note that the volume control is independent of the intensity indication of the LED display during an inspection.

For slight leaks, the LED bar graph may not move up from the first position. In this situation, use the headphone to locate the leak as described above.

Using Air or Contact Probe

According to the type of inspection, use the air or contact probe to optimize the response of the Receiver. The air probe is best for detecting ultrasounds associated with a pressure leak or an electrical corona. The contact probe is best for detecting the ultrasounds generated from within a casing such as in a gear, bearing, valve, steam trap housing, and etc.

SPECIFICATIONS

Battery: 9V battery, 6F22 or equivalent, 2 pieces (one for Receiver and one for Tone Generator)

Frequency Response: 36000Hz to 44000Hz

Operating Environment: Temperature: 0°C to 40°C
Relative Humidity: < 75%RH

Storage Environment: Temperature: -10°C to 50°C
Relative Humidity: < 85%RH

Size: Tone Generator: 177×84×36mm
Receiver: 172×84×36mm

Weight: Tone Generator: about 157g (including battery)
Receiver: about 182g (including battery)

BATTERY REPLACEMENT

Both the Receiver and Tone Generator use a 9V battery each. Alkaline batteries are required. When replacing battery, do not strain or pinch wires.

Always remove the battery during a period of long storage.

NOTE

1. This manual is subject to change without notice.
2. Our company will not take the other responsibilities for any loss.
3. The contents of this manual can not be used as the reason to use the meter for any special application.

DISPOSAL OF THIS ARTICLE

Dear Customer,

If you at some point intend to dispose of this article, then please keep in mind that many of its components consist of valuable materials, which can be recycled.

Please do not discharge it in the garbage bin, but check with your local council for recycling facilities in your area.



