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## CMIN 400-K Inspector Ultrasonic Inspection Kit

### Features

- *Detect Pressure and Vacuum Leaks ... Including Compressed Air*
- *Check Steam Traps and Valves Quickly and Accurately*
- *Detect Arcing, Tracking and Corona in Electric Apparatus*
- *Test Bearings, Pumps, Motors, Compressors, etc.*

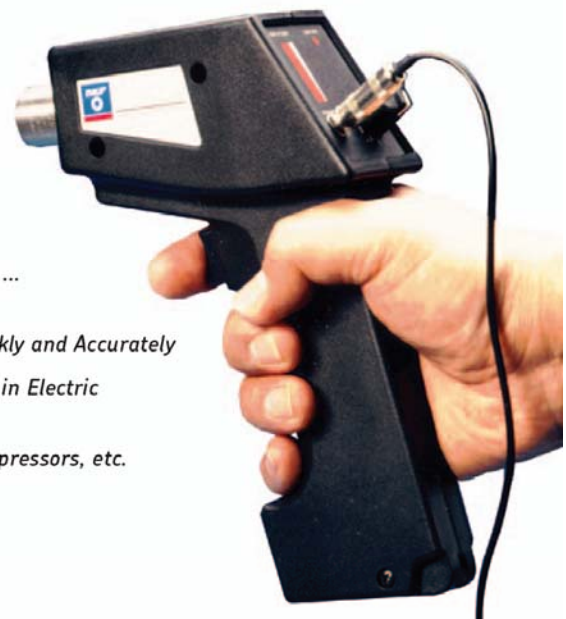
### Introduction

The Inspector 400 Ultrasonic Probe senses high frequency sounds produced by operating equipment, leaks and electrical discharges. It electronically translates these signals by a heterodyning process, making them audible, so that a user can hear these sounds through a headset and see them as intensity increments on a meter.

The Inspector 400 can **complement your condition monitoring program** by providing you with the following capabilities:

#### **Pressure/Vacuum Leaks**

As any gas (air, oxygen, nitrogen, etc.) passes through a leak orifice, it generates a turbulent flow with detectable high frequency components. By scanning the test area with



the Inspector 400, a leak can be heard through the headset as a rushing sound or noted on the meter bar graph indicator. The closer the instrument is to the leak, the louder the rushing sound and the higher the meter reading. Should ambient noise be a problem, a rubber focusing probe may be used to narrow the instrument's reception field and to shield it from conflicting ultrasounds.

#### **Valve**

Valve activity such as leakage or blockage can be accurately checked while the valve is on line. Properly seated valves are relatively

quiet while leaking valves produce a turbulent flow as the fluid moves from the high pressure side through the leak to the low pressure side. Due to a wide sensitivity and ultrasonic frequency, all types of valves even in noisy environments can be accurately tested.

#### **Valve Stems**

Valve stems may be quickly tested for leaks to atmosphere.

#### **Steam Trap Inspection**

Major steam trap manufacturers have recommended ultrasound inspection of steam traps as one of the most reliable methods available. By converting the ultrasonic elements of a working steam trap into the audible range, the Inspector 400 allows users to hear through headphones and see on a meter the exact condition of a steam trap while it is on line. Blowby, machine gunning, oversized traps or line blockage are all easily detected.

The Inspector 400 markedly reduces confusion from extraneous sounds or from heat transfer, even when traps are extremely close together.

#### **Electrical Inspection**

**Arcing and corona discharge** emit ultrasounds at the site of emission. This electrical discharge can be located quickly by scanning the area with the Inspector 400. The signal is heard as a frying or buzzing sound in the headset. As with

pressure or vacuum leak detection, the closer the instrument is to the discharge, the more intense the signal.

Test switch gear, transformers, circuit breakers, buss bars, relays, junction boxes, insulators, and other electrical gear.

#### **General Mechanical Inspection**

The Inspector 400 ultrasonic probe can detect the early stage of a machine's mechanical malfunction. NASA research has demonstrated that ultrasound monitoring will locate potential bearing deficiencies before they are detected by the traditional heat and vibration methods. With the Inspector 400, users hear the sound quality of a bearing as well as monitor amplitude changes on the meter. This complements other monitoring instruments and adds to the ability to trend, troubleshoot and confirm potential bearing problems.

General mechanical inspection is easy with the Inspector 400 and with very little training, users can learn to test bearings within minutes. Current vibration programs can achieve enhanced diagnostic ability with the Inspector 400.

**Prevent over-lubrication** with the Inspector 400 by simply lubricating only until the meter reaches a specified level. Over lubrication is one of the more common causes of bearing failure.

**General mechanical inspection** of pumps, motors, compressors, gears and gear boxes: All types of operating equipment may be inspected with the Inspector 400. Since

*Left to right: Valve Leakage, Pressure / Vacuum Leaks, Mechanical Inspection and Tank Leakage.*



the Inspector 400 works in a high frequency, short wave environment, problems such as cavitation in pumps, compressor valve leakage or missing gear teeth may be heard and isolated.

Reciprocating compressor valve analysis has also become successful with the Inspector 400 and therefore many engine analyzer companies now offer instruments with an ultrasonic input port.

## Heat Exchangers, Boilers and Condensers

In-leakage or pressure leakage can be readily located with the Inspector 400. Fittings, valves, flanges are all easily scanned for leakage. The high frequency, short wave nature of ultrasound allows operators to pinpoint the location of a leak in high noise environments. Condenser tubes and heat exchanger tubes may be tested for leakage through two (2) methods: **Vacuum** and **Pressure**.

### Vacuum

The tube sheet is scanned for the telltale rushing sound produced as the leak draws air into the tube.

### Pressure

Additional testing may be performed when the system is off-line utilizing air pressure around the tube bundle and scanning for the rushing sound produced from the leaking tube.



## Available Kit Includes

### Inspector 400 Ultrasonic Probe Stethoscope/Scanner Kit Includes:

- Inspector 400 ultrasonic probe pistol housing with LED bar graph meter, 8 position sensitivity selection, low battery indicator.
- Scanning module.
- Rubber focusing probe.
- Stethoscope module.
- Lightweight foam lined headset.
- 9 volt alkaline battery (replaceable).
- Cordura/nylon soft pack carrying case.
- Comprehensive instruction manual.

Application	Kit Number	CMIN 400-K
Pressure and Vacuum Leak Detection		✓
Valve Seat Leak Detection		✓
Exhaust System Leaks		✓
Heat Exchangers, Boilers, Condensers		✓
Steam Trap Inspection		✓
Bearing Testing		✓
Gear/Gear Box Inspection		✓
General Mechanical Inspection and Troubleshooting		✓
Tanks, Pipes, etc., Leak Testing		✓
Electrical Inspection		✓

## Inspector 400 Ultrasonic Probe

CMIN 400-K

### Specifications

**Construction:** Hand-held ABS pistol type ultrasonic processor, stainless steel sensor enclosures

**Circuitry:** SMD/Solid state hybrid heterodyne receiver

**Frequency Response:** 20–100 kHz (centered at 38–42 kHz)

**Indicator:** 10 segment LED bar graph (red)

**Sensitivity Selection:** 8 position precision attenuation

**Power:** 9 volt alkaline battery

**Low Battery Voltage Indicator:** LED

**Headset:** Lightweight foam lined double headset wired monophonic impedance; 16 ohms

**Probes:** Scanning Module stainless steel unisonic (single transducer) piezoelectric crystal type; Stethoscope/Contact Module stainless steel plug-in type with 5.5" stainless steel waveguide

**Rubber Focusing Probe:** Shields stray ultrasonic signals and focuses detected signals

**Response Time:** 300 millisecond

**Ambient Operating Temperature Range:** +32°F to +120°F (0°C to +50°C)

**Relative Humidity:** 10 – 95% noncondensing at up to +86°F (+30°C)

**Storage Temperature:** 0°F to +130°F (-18°C to +54°C)

**Dimensions:** Height: 5.25" (133mm)  
Width: 2.00" (50mm)  
Length: 8.00" (203mm)

**Weight:** 11 oz (0.3 kg)

**Carrying Case:** Cordura/nylon soft pack with die cut foam

### Ordering Information

CMIN 400-K Inspector 400 Ultrasonic Probe Stethoscope/Scanner Kit.

### Accessories and Replacement Parts

CMAC 8600-1 Lightweight Foam Lined Headset

CMAC 8600-2 Deluxe Noise Isolating Headphones

CMAC 8600-3 Deluxe Noise Isolating Headphones to be worn with Hardhat

CMAC 8600-4 Utility Belt with Holster

CMAC 8600-5 Patented Liquid Leak Amplifier, Case of 12 x 8 oz Bottles, (Used for extremely low level leaks  $1 \times 10^{-6}$  mil/sec)

CMAC 8600-6 Stainless Steel Unisonic Scanning Module

CMAC 8600-7 Stainless Steel Stethoscope/Contact Module.

CMAC 8600-8 Stethoscope Extension Rods

CMAC 8600-9 Rubber Focusing Probe



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