



MiniMite Scanner

User's Manual

DMTA-10100-01EN — Rev. D
Former manual part number 7720078.00
September 2022

This instruction manual contains essential information on how to use this Evident product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed. Keep this instruction manual in a safe, accessible location.

EVIDENT SCIENTIFIC INC., 48 Woerd Avenue, Waltham, MA 02453, USA

Copyright © 2022 by Evident. All rights reserved. No part of this publication may be reproduced, translated, or distributed without the express written permission of Evident.

The information contained in this document is subject to change without notice.

Part number: DMTA-10100-01EN

Rev. D

September 2022

Printed in the United States of America.

All brands are trademarks or registered trademarks of their respective owners and third party entities.

Table of Contents

Important Information — Please Read Before Use	5
Intended Use	5
Instruction Manual	5
Device Compatibility	6
Repair and Modification	6
Safety Symbols	6
Safety Signal Words	7
Note Signal Words	8
Safety	8
Warnings	8
Battery Precautions	9
Regulations for Shipping Products with Lithium-Ion Batteries	11
Equipment Disposal	11
BC (Battery Charger - California, USA Community)	11
CE (European Community)	12
UKCA (United Kingdom)	12
RCM (Australia)	12
WEEE Directive	12
China RoHS	13
Korea Communications Commission (KCC)	14
EMC Directive Compliance	14
FCC (USA) Compliance	14
ICES-001 (Canada) Compliance	16
Warranty Information	16
Technical Support	17

- Introduction 19**
- 1. Preparation for Operation 21**
 - 1.1 Scanner Overview 21
 - 1.2 Unpacking the Scanner 22
 - 1.3 Operating Environment 22
 - 1.4 Instrument/Scanner Compatibility 23
 - 1.5 Instrument/Scanner Cables 23
- 2. MiniMite Operation 25**
 - 2.1 Controls 25
 - 2.2 Inserting a Fischer Probe 26
 - 2.3 Inserting a LEMO Probe 26
 - 2.4 Filter Settings 28
- 3. Applications 29**
 - 3.1 Inspecting an Aircraft Fastener Hole – General Procedure 29
 - 3.2 Inspecting Fastener Holes with a Rotating Scanner – NORTEC 600S and
NORTEC 600D Models 32
- 4. Maintenance and Troubleshooting 41**
 - 4.1 Preventative Maintenance 41
 - 4.2 Cleaning the Scanner 41
 - 4.3 Troubleshooting 42
- 5. Specifications 43**
- List of Figures 45**
- List of Tables 47**

Important Information — Please Read Before Use

Intended Use

The MiniMite is designed to perform nondestructive inspections on industrial and commercial materials.



WARNING

Do not use the MiniMite for any purpose other than its intended use. It must never be used to inspect or examine human or animal body parts.

Instruction Manual

This instruction manual contains essential information on how to use this product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed. Keep this instruction manual in a safe, accessible location.

IMPORTANT

Some of the details of components illustrated in this manual may differ from the components installed on your device. However, the operating principles remain the same.

Device Compatibility

Only use this device with the approved ancillary equipment provided by Evident. Equipment provided by Evident and approved for use with this device is described later in this manual.



CAUTION

Always use equipment and accessories that meet Evident specifications. Using incompatible equipment could cause equipment malfunction and/or damage, or human injury.

Repair and Modification

This device does not contain any user-serviceable parts. Opening the device might void the warranty.



CAUTION

In order to prevent human injury and/or equipment damage, do not disassemble, modify, or attempt to repair the device.

Safety Symbols

The following safety symbols might appear on the device and in the instruction manual:



General warning symbol

This symbol is used to alert the user to potential hazards. All safety messages that follow this symbol shall be obeyed to avoid possible harm or material damage.



High voltage warning symbol

This symbol is used to alert the user to potential electric shock hazards greater than 1000 volts. All safety messages that follow this symbol shall be obeyed to avoid possible harm.

Safety Signal Words

The following safety symbols might appear in the documentation of the device:



DANGER

The DANGER signal word indicates an imminently hazardous situation. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, will result in death or serious personal injury. Do not proceed beyond a DANGER signal word until the indicated conditions are fully understood and met.



WARNING

The WARNING signal word indicates a potentially hazardous situation. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in death or serious personal injury. Do not proceed beyond a WARNING signal word until the indicated conditions are fully understood and met.



CAUTION

The CAUTION signal word indicates a potentially hazardous situation. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, may result in minor or moderate personal injury, material damage, particularly to the product, destruction of part or all of the product, or loss of data. Do not proceed beyond a CAUTION signal word until the indicated conditions are fully understood and met.

Note Signal Words

The following note signal words could appear in the documentation of the device:

IMPORTANT

The IMPORTANT signal word calls attention to a note that provides important information, or information essential to the completion of a task.

NOTE

The NOTE signal word calls attention to an operating procedure, practice, or the like, which requires special attention. A note also denotes related parenthetical information that is useful, but not imperative.

TIP

The TIP signal word calls attention to a type of note that helps you apply the techniques and procedures described in the manual to your specific needs, or provides hints on how to effectively use the capabilities of the product.

Safety

Before turning on the device, verify that the correct safety precautions have been taken (see the following warnings). In addition, note the external markings on the device, which are described under “Safety Symbols.”

Warnings



WARNING

General Warnings

- Carefully read the instructions contained in this instruction manual prior to turning on the device.
- Keep this instruction manual in a safe place for further reference.

- Follow the installation and operation procedures.
- It is imperative to respect the safety warnings on the device and in this instruction manual.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment could be impaired.
- Do not install substitute parts or perform any unauthorized modification to the device.
- Service instructions, when applicable, are for trained service personnel. To avoid the risk of electric shock, do not perform any work on the device unless qualified to do so. For any problem or question regarding this device, contact Evident or an authorized Evident representative.
- Do not touch the connectors directly by hand. Otherwise, a malfunction or electric shock may result.
- Do not allow metallic or foreign objects to enter the device through connectors or any other openings. Otherwise, a malfunction or electric shock may result.



WARNING

Electrical Warning

The device must only be connected to a power source corresponding to the type indicated on the rating label.



CAUTION

If a non-approved power supply cord not dedicated to Evident products is used, Evident will not be able to ensure the electrical safety of the equipment.

Battery Precautions



CAUTION

- Before disposing of a battery, check your local laws, rules, and regulations, and follow them accordingly.

- Transportation of lithium-ion batteries is regulated by the United Nations under the United Nations Recommendations on the Transport of Dangerous Goods. It is expected that governments, intergovernmental organizations, and other international organizations shall conform to the principles laid down in these regulations, thus contributing to worldwide harmonization in this field. These international organizations include the International Civil Aviation organization (ICAO), the International Air Transport Association (IATA), the International Maritime Organization (IMO), the US Department of Transportation (USDOT), Transport Canada (TC), and others. Please contact the transporter and confirm current regulations before transportation of lithium-ion batteries.
- For California (USA) only:
The device may contain a CR battery. The CR battery contains perchlorate material, and special handling may be required. Refer to <http://www.dtsc.ca.gov/hazardouswaste/perchlorate>.
- Do not open, crush, or perforate batteries; doing so could cause injury.
- Do not incinerate batteries. Keep batteries away from fire and other sources of extreme heat. Exposing batteries to extreme heat (over 80 °C) could result in an explosion or personal injury.
- Do not drop, hit, or otherwise abuse a battery, as doing so could expose the cell contents, which are corrosive and explosive.
- Do not short-circuit the battery terminals. A short circuit could cause injury and severe damage to a battery making it unusable.
- Do not expose a battery to moisture or rain; doing so could cause an electric shock.
- Only use an external charger approved by Evident to charge the batteries.
- Only use batteries supplied by Evident.
- Do not store batteries that have less than 40 % remaining charge. Recharge batteries to between 40 % and 80 % capacity before storing them.
- During storage, keep the battery charge between 40 % and 80 %.
- Do not leave batteries in the MiniMite unit during device storage.

Regulations for Shipping Products with Lithium-Ion Batteries

IMPORTANT

When shipping a Li-ion battery or batteries, be sure to follow all local transportation regulations.



WARNING

Damaged batteries cannot be shipped through normal routes — DO NOT ship damaged batteries to Evident. Contact your local Evident representative or material disposal professionals.

Equipment Disposal

Before disposing of the MiniMite, check your local laws, rules, and regulations, and follow them accordingly.

BC (Battery Charger - California, USA Community)



The BC marking indicates that this product has been tested and complies with the Appliance Efficiency Regulations as stated in the California Code of Regulations Title 20, Sections 1601 through 1608 for Battery Charger Systems. The internal battery charger within this device has been tested and certified pursuant to the California Energy Commission's (CEC) requirements; this device is listed on the online CEC's (T20) database.

CE (European Community)



This device complies with the requirements of directive 2014/30/EU concerning electromagnetic compatibility, directive 2014/35/EU concerning low voltage, and directive 2015/863 which amends 2011/65/EU concerning restriction of hazardous substances (RoHS). The CE marking is a declaration that this product conforms to all the applicable directives of the European Community.

UKCA (United Kingdom)



This device complies with the requirements of the Electromagnetic Compatibility Regulations 2016, the Electrical Equipment (Safety) Regulations 2016, and the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012. The UKCA marking indicates compliance with the above regulations.

RCM (Australia)



The regulatory compliance mark (RCM) label indicates that the product complies with all applicable standards, and has been registered with the Australian Communications and Media Authority (ACMA) for placement on the Australian market.

WEEE Directive



In accordance with European Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE), this symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately. Refer to your local Evident distributor for return and/or collection systems available in your country.



China RoHS

China RoHS is the term used by industry generally to describe legislation implemented by the Ministry of Information Industry (MII) in the People's Republic of China for the control of pollution by electronic information products (EIP).



The China RoHS mark indicates the product's Environment-Friendly Use Period (EFUP). The EFUP is defined as the number of years for which listed controlled substances will not leak or chemically deteriorate while in the product. The EFUP for the MiniMite has been determined to be 15 years.

Note: The Environment-Friendly Use Period (EFUP) is not meant to be interpreted as the period assuring functionality and product performance.



电器电子产品有害
物质限制使用
标志

本标志是根据“电器电子产品有害物质限制使用管理办法”以及“电子电气产品有害物质限制使用标识要求”的规定，适用于在中国销售的电器电子产品上的电器电子产品有害物质使用限制标志。

（注意）电器电子产品有害物质限制使用标志内的数字为在正常的使用条件下有害物质等不泄漏的期限，不是保证产品功能性能的期间。

产品中有害物质的名称及含量

部件名称		有害物质					
		铅及其化合物 (Pb)	汞及其化合物 (Hg)	镉及其化合物 (Cd)	六价铬及其化合物 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
主体	机构部件	×	○	○	○	○	○
	光学部件	×	○	○	○	○	○
	电气部件	×	○	○	○	○	○

产品中有害物质的名称及含量

部件名称	有害物质					
	铅及其化合物 (Pb)	汞及其化合物 (Hg)	镉及其化合物 (Cd)	六价铬及其化合物 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
附件	×	○	○	○	○	○
本表格依据 SJ/T 11364 的规定编制。 ○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T26572 规定的限量要求以下。 ×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T26572 规定的限量要求。						

Korea Communications Commission (KCC)



Seller and user shall be noticed that this equipment is suitable for electromagnetic equipment for office work (class A) and it can be used outside the home. This device complies with the EMC requirements of Korea.

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

EMC Directive Compliance

This equipment generates and uses radio-frequency energy and, if not installed and used properly (that is, in strict accordance with the manufacturer's instructions), may cause interference. The MiniMite has been tested and found to comply with the limits for an industrial device in accordance with the specifications of the EMC directive.

FCC (USA) Compliance

NOTE

This product has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the product is operated in a

commercial environment. This product generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this product in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

IMPORTANT

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the product.

FCC Supplier's Declaration of Conformity

Hereby declares that the product,

Product name: MiniMite

Model: MiniMite-MR/MiniMite-CW

Conforms to the following specifications:

FCC Part 15, Subpart B, Section 15.107 and Section 15.109.

Supplementary information:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Responsible party name:

EVIDENT SCIENTIFIC INC.

Address:

48 Woerd Avenue, Waltham, MA 02453, USA

Phone number:

+1 781-419-3900

ICES-001 (Canada) Compliance

This Class A digital apparatus complies with Canadian ICES-001.

Cet appareil numérique de la classe A est conforme à la norme NMB-001 du Canada.

Warranty Information

Evident guarantees your Evident product to be free from defects in materials and workmanship for a specific period, and in accordance with conditions specified in the Terms and Conditions available at <https://www.olympus-ims.com/en/terms/>.

The Evident warranty only covers equipment that has been used in a proper manner, as described in this instruction manual, and that has not been subjected to excessive abuse, attempted unauthorized repair, or modification.

Inspect materials thoroughly on receipt for evidence of external or internal damage that might have occurred during shipment. Immediately notify the carrier making the delivery of any damage, because the carrier is normally liable for damage during shipment. Retain packing materials, waybills, and other shipping documentation needed in order to file a damage claim. After notifying the carrier, contact Evident for assistance with the damage claim and equipment replacement, if necessary.

This instruction manual explains the proper operation of your Evident product. The information contained herein is intended solely as a teaching aid, and shall not be used in any particular application without independent testing and/or verification by the operator or the supervisor. Such independent verification of procedures becomes increasingly important as the criticality of the application increases. For this reason, Evident makes no warranty, expressed or implied, that the techniques, examples, or procedures described herein are consistent with industry standards, nor that they meet the requirements of any particular application.

Evident reserves the right to modify any product without incurring the responsibility for modifying previously manufactured products.

Technical Support

Evident is firmly committed to providing the highest level of customer service and product support. If you experience any difficulties when using our product, or if it fails to operate as described in the documentation, first consult the user's manual, and then, if you are still in need of assistance, contact our After-Sales Service. To locate the nearest service center, visit the Service Centers page on the Evident Scientific Web site.

Introduction

This manual contains a description and general operating instructions for the MiniMite scanner.

The MiniMite is a handheld eddy current scanner powered by the NORTEC instrument. The MiniMite's primary use is to inspect flaws in airframe fastener holes after the fasteners have been removed.

The MiniMite scanner is available in two configurations: MiniMite Fischer (P/N: 9744738 [U8750012] shown in Figure i-1 on page 19) or MiniMite LEMO (P/N: 9744739 [U8750013]).



Figure i-1 The MiniMite scanner with Fischer probe

1. Preparation for Operation

Before operating the MiniMite scanner, review the details provided in this section.

1.1 Scanner Overview

The MiniMite scanner is a handheld eddy current scanner powered by the NORTEC instrument. The MiniMite enables an optimum signal-to-noise ratio because of its low-noise axial rotary transformer.

The MiniMite is a non-indexing scanner with variable speeds, rotating at 600–3000 revolutions per minute (rpm). The MiniMite is designed to meet all medium to high speed scanner application requirements. It is used for the inspection of fastener holes and for the examination of first-layer flaws. The MiniMite employs a special surface probe similar to a pencil probe.

Scanner data can be displayed in four modes (see Table 1 on page 21).

Table 1 Available modes

Mode	Instrument controls	
	DSP MODE	SWP MODE
Impedance plane	IMP	N/A
Split screen (both impedance and sweep mode)	SWP+IMP	AUTO Y
	SWP+IMP	EXT Y
Sweep	SWEEP	AUTO Y
	SWEEP	EXT Y
Waterfall	WATRFALL	N/A

1.2 Unpacking the Scanner

All packaging materials should be opened and inspected upon receipt. The contents should be inspected for damage that may have occurred during shipping. The MiniMite case contents are shown in Figure 1-1 on page 22. If damage is noticed, contact the carrier and retain the damaged materials until an inspection can be performed by a representative of the carrier.

If the MiniMite is shipped frequently from site to site, the carton and cushioning should be retained for transporting the scanner.



Figure 1-1 The MiniMite case contents

1.3 Operating Environment

The MiniMite scanner is designed as a portable accessory, and as such, requires no special site preparation before operation. As with all sensitive instruments, avoid dropping or suddenly jarring the scanner. The MiniMite should be protected as much

as possible from water and chemical splashes and rapid temperature changes, and it should be operated away from large electrical equipment that may interfere with the operation of its internal circuitry.

1.4 Instrument/Scanner Compatibility

The MiniMite scanner is fully compatible with the NORTEC 500, NORTEC 600, and NORTEC 2000 series instruments (“S” and “D” versions only).

1.5 Instrument/Scanner Cables

Cable details are provided in “Specifications” on page 43.

2. MiniMite Operation

This section outlines how to connect and use the MiniMite scanner.

2.1 Controls

The MiniMite handheld scanner is designed for easy operation with a minimum number of controls (see Figure 2-1 on page 25). This section describes the basic functions of the scanner controls. See “Applications” on page 29 for specific information on scanner setup.

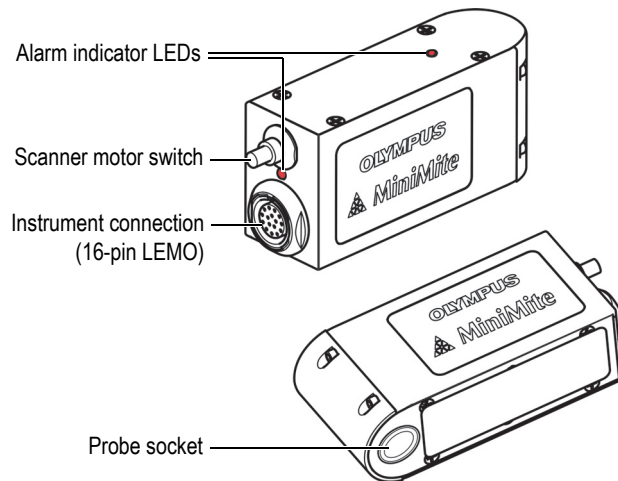


Figure 2-1 The MiniMite controls

2.2 Inserting a Fischer Probe

To insert a Fischer probe

- ◆ Insert the Fischer probe with the red dot on the scanner aligned with the red line on the probe body (see Figure 2-2 on page 26).

NOTE

Light lubrication of the probe o-rings is recommended for insertion and removal of the probe. Remove the probe from the scanner after use because probes left in the scanner for prolonged periods of time may be difficult to remove.

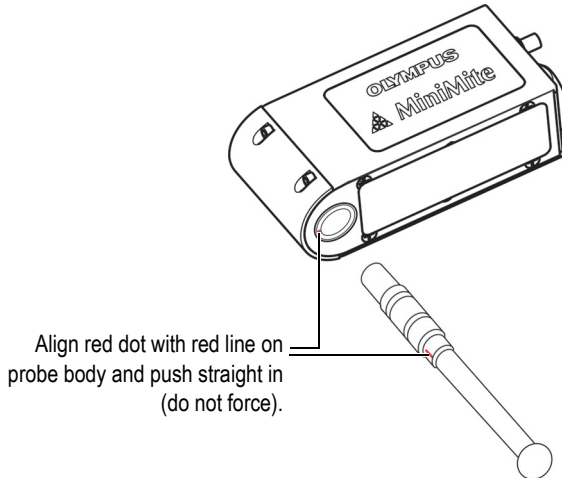


Figure 2-2 Inserting a Fischer probe

2.3 Inserting a LEMO Probe

To insert a LEMO probe

1. Make sure that the collet is loose before inserting the probe.

To loosen the collet, grip the larger ring and turn the smaller ring counterclockwise.

2. Align the halves of the LEMO connector and push the probe straight in (see Figure 2-3 on page 27). Do not force it.
3. Tighten the collet by gripping the larger ring and turning the smaller ring clockwise to secure the probe.

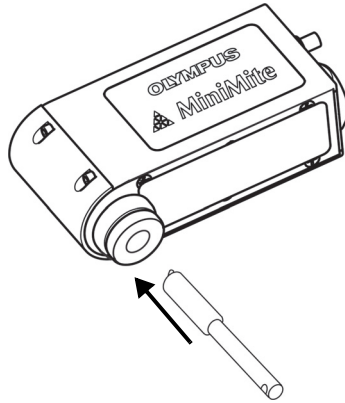


Figure 2-3 Inserting a LEMO probe

4. After tightening the collet, be sure that the probe is held securely in place. An inadequately tightened collet may lead to detachment of the probe during the test.

Probes using LEMO connectors are built to extremely precise tolerances. The MiniMite requires that probes comply with factory tolerances. Evident cannot guarantee proper retention of probes in the collet mechanism when probes manufactured by other companies are used.



CAUTION

This scanner is rated to operate up to 3000 rpm. Probes that are mechanically unbalanced, damaged, or too large in diameter may cause excessive vibration, break, or become disengaged from the scanner spindle, which could potentially cause human injury or equipment damage. Evident is not responsible for injuries or damage caused by this occurrence.



CAUTION

To avoid injury and equipment damage, do not operate expandable style probes at high speeds. Centrifugal force may cause the probe to break apart suddenly, sending out flying debris.

2.4 Filter Settings

Evident recommends that you perform a PowerLink confirmation with the scanner to load the factory default scanner settings. These settings should function properly for most scanner applications.

3. Applications

This chapter provides example inspection applications for the MiniMite scanner.

3.1 Inspecting an Aircraft Fastener Hole — General Procedure

This section guides you through an eddy current application.

The NORTEC MiniMite is a lightweight handheld eddy current probe scanner (rotator) that operates from 600 rpm to 3000 rpm and is powered directly from a NORTEC instrument.

The NORTEC MiniMite scanner's primary use is to inspect flaws in airframe fastener holes after the fasteners have been removed.

This inspection method uses the instrument display, which sweeps from 0° on the left to 359° on the right of the display (and at 360° returns to 0°). The angular position of a flaw indicator is determined clockwise, with 0° (zero degrees) occupying the space directly opposite the scanner handle.

Equipment used:

- MiniMite scanner, Fischer version
- SPO 5965, 6.4 mm (0.25 in.) probe
- TB-16 test block, 6.4 mm (0.25 in.)
- Scanner cable (P/N: 9122090)
- Teflon tape, 6.4 mm (0.25 in.)

To inspect an aircraft fastener hole

1. Connect one end of the cable to the NORTEC instrument and the other end to the MiniMite scanner.
2. Apply tape over the coils of the probe. Use only enough tape to enable a good fit.
3. Completely, insert the probe in the scanner using caution to align the connectors and to avoid unnecessary force.
4. Turn on the NORTEC instrument.
5. When the PowerLink screen appears, press the A key (**CONTINUE**).
The MiniMite scanner sets up the NORTEC instrument with the following parameters:
 - Frequency: 500 kHz
 - Gain: 65 dB
 - Angle: 60°
 - Position: 50 % vertical and horizontal
 - Low-pass filter: 500 Hz
 - High-pass filter: 200 Hz

NOTE

These are approximate settings that you may adjust. The LEMO MiniMite setup is identical, except a SPO 3564 probe is used.



CAUTION

Use care when testing with this method. If the scanner is misaligned with the hole, the probe or shaft may be bent.

6. Inspect the hole in the test block:
 - a) Turn on the scanner by pressing the button on its handle.
The impedance plane analysis is displayed.
 - b) Insert the probe into the test block. When the probes moves across the flaw, a large signal peak is displayed (see Figure 3-1 on page 31).

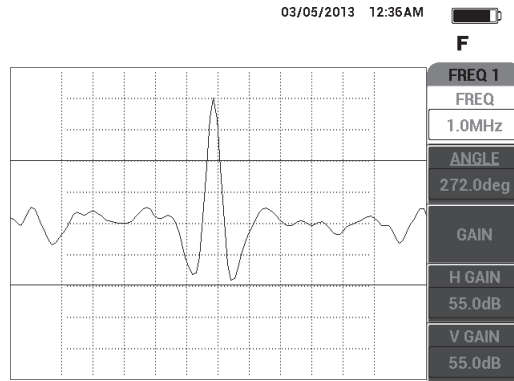


Figure 3-1 Example display for aircraft fastener hole inspection

- c) Rotate the signal so that it displays mostly in the vertical plane by pressing the “**ANGLE**” key and using the knob to rotate the signal to a vertical axis. The probe must remain in the hole and centered over the flaw during this rotation.
7. Press the **DISP** key twice to access the Sweep menu. Press the “**SWEEP**” key twice to turn on the external sweep.
8. Examine the signals.
 - Signal screen appearance depends on the relative alignment of the scanner and the test standard. Rotating the scanner or the test standard changes the indicated position.
 - With the back of the scanner pointed toward you, visualize the top of the scanner as 0° , the right side as 90° , the bottom as 180° , and the left side as 270° .

3.2 Inspecting Fastener Holes with a Rotating Scanner — NORTEC 600S and NORTEC 600D Models

This procedure is intended for the general-purpose inspection of aircraft fastener holes in aluminum material, and has been prepared for a 12.70 mm (0.50 in.) diameter hole. At the end of this section, more details are provided for ferromagnetic (steel) material hole inspection as well as the new NORTEC 600's Figure 6 versus Figure 8 filter response.

Inspection materials are shown in Figure 3-2 on page 32.



Figure 3-2 Materials—fastener holes with rotating scanner

The following products are used in this procedure:

- MiniMite Fischer rotating scanner; P/N: 9744738 [U8750012]
- Rotary-hole probe: self-adjusting, Universal type, with Bell backshell, 12.70 mm (0.50 in.) diameter, self-expanding, 50.8 mm (2 in.) working length; operating frequency 200 kHz to 3 MHz, Fischer 4-pin connector, reflection differential coil configuration; P/N: SUB-28-32 [U8600488]
- Eddy current hole standard for demonstration purposes (not certified); P/N: RSTD-10135 [U8863213]

To set the initial NORTEC 600 configuration

1. Connect the probe to the rotating scanner (align the red marks on the connectors), and connect the scanner cable to both the rotating scanner and the NORTEC 600 PROBE connector.
2. When prompted, select **CONTINUE** (A key) to accept the PowerLink settings.
3. Select the application:

- ◆ If you are using software version 1.09 or higher, the application selection menu automatically opens. Select **Bolt Hole** with the knob, and then press

✓ to accept.

OR

If you are using an earlier version of the software, press the ADV SETUP

menu key () once, and then select **APPL SELECT** (A key) to open the application selection menu. Select **Bolt Hole** with the knob, and then press

✓ to accept (see Figure 3-3 on page 33).

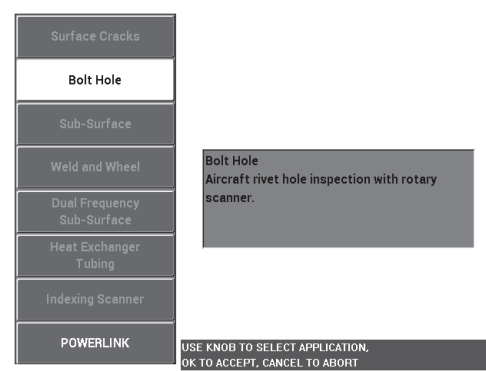


Figure 3-3 The Bolt Hole application

To calibrate the signals

1. Insert the probe into the “bad” hole on the standard (there are two 12.70 mm [0.50 in.] holes: one without defects and one with a long axial notch), making sure to properly align the probe with the hole, and then press the A-LIFT NULL key

().

Note that the scanner should be stopped when nulling the instrument.

2. Hold the probe in the hole and properly aligned on the long crack. If this is your first scan, start the rotating scanner motor by pressing the switch at the back of the rotating scanner.

The signal on the impedance plane (right side) should display the defect signal and the lift-off signal (also referred to as the probe-motion signal). Depending on the probe diameter used, the lift-off signal may appear smaller or bigger, and sometimes the signal may be difficult to see on the screen.

If the probe is correctly aligned in the hole, the lift-off amplitude is normally decreased, but if the probe is slightly misaligned, it will result in an increase in lift-off signal. However, make sure that you do not tilt the probe too much, since this could cause damage (see Figure 3-4 on page 34).

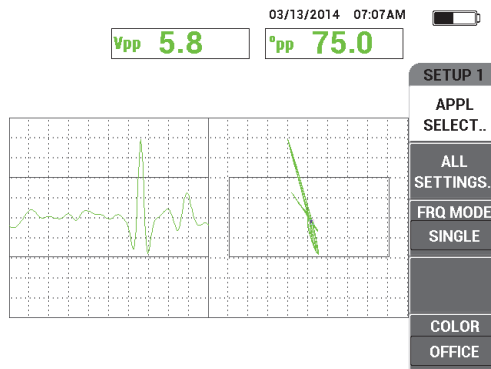



Figure 3-4 The bolt-hole signal

3. Set the signal angle according to one of the following two alternative methods. Before proceeding, check which method is better suited to your needs:
 - **First alternative:**

While holding the probe (still rotating) in the bad hole, press the ANGLE key () and then adjust the angle with the knob in order to rotate the lift-off noise to a horizontal position (see Figure 3-5 on page 35).

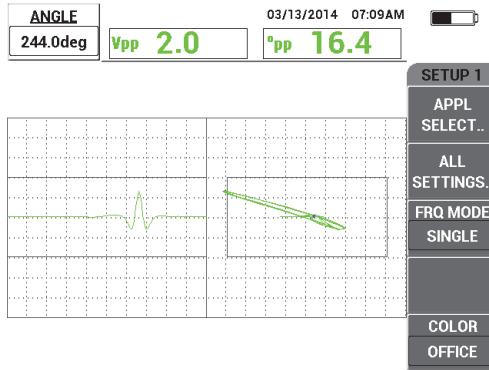


Figure 3-5 Adjusting the lift-off noise (first alternative)

— **Second alternative:**

If the surface of your sample is made of the same material as the material of the hole to be inspected, this alternative is usually more practical and easier. While the scanner is rotating the probe, simply gently touch the surface of the sample with the head of the probe, and adjust the signal angle so that the tip of the signal extends to the right of the impedance plane (see Figure 3-6 on page 35).

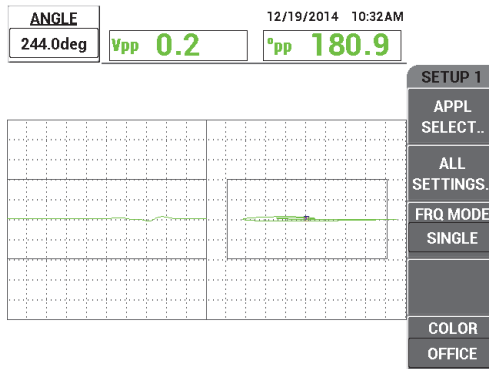


Figure 3-6 Adjusting the lift-off noise (second alternative)

- Press the GAIN key (**dB**), and then decrease the gain with the knob in order to keep the entire crack signal within the screen area.

A good practice is to set the signal's maximum deflection to 10 % of the screen's horizontal deflection (see Figure 3-7 on page 36).

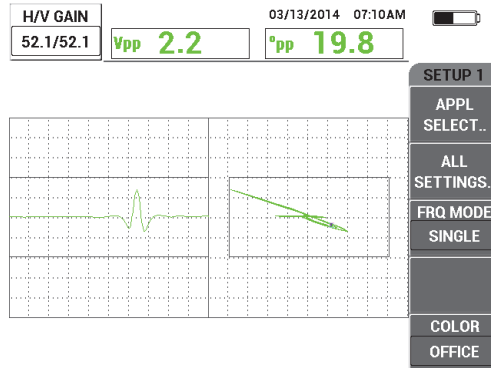


Figure 3-7 Adjusting the gain

- Press the GAIN key (**dB**) two more times to access the V GAIN parameter, and then adjust the vertical gain with the knob until the signal reaches the top of the screen, which is 100 % screen height (see Figure 3-8 on page 36).

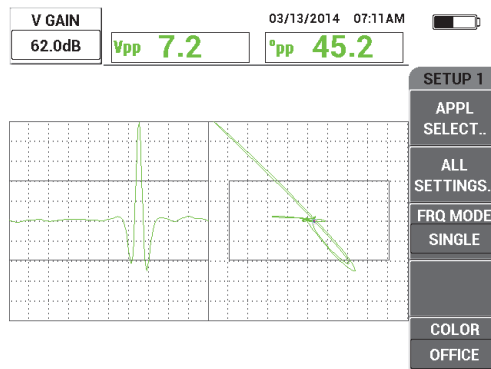





Figure 3-8 Adjusting the vertical gain

At this point, the configuration is nearly finished.

6. If required, fine-tune the filter values by pressing the MAIN FILTER menu key () twice to access the **HI PASS** (A key), **LO PASS** (B key) or **SCAN RPM** (E key) parameters and adjusting these parameters while maintaining the probe rotating in the bad hole.
Note that the NORTEC 600 features a constant “figure-6” rotating bolt-hole signal response. In theory, filter adjustment is unnecessary, and only the scanner speed (**SCAN RPM**) needs to be adjusted.
7. If the flaw appears at an inconvenient location in the sweep (strip chart) view on the left, press the DISP menu key () and adjust the **SYNC ANG** (D key) with the knob until it is in a satisfactory location.

To fine-tune the instrument settings for aluminum

1. Depending on your requirements, set the alarm parameters, horn, or external horn (louder).
2. Check if any other display modes, such as the **IMP** and the **WATERFALL** display modes, might be useful for your purposes.
3. Press the FULL NEXT key () to toggle to the full-screen mode, and then insert the probe into the bad hole.

The results should resemble the image in Figure 3-9 on page 38. The list of all parameters for aluminum is shown in Figure 3-10 on page 38.

Note that the value of the maximum signal amplitude and signal angle is displayed by default.

NOTE

For more details about alarms, screen options, or details about the readings or their position in the impedance plane display, see the *NORTEC 600 User's Manual*.

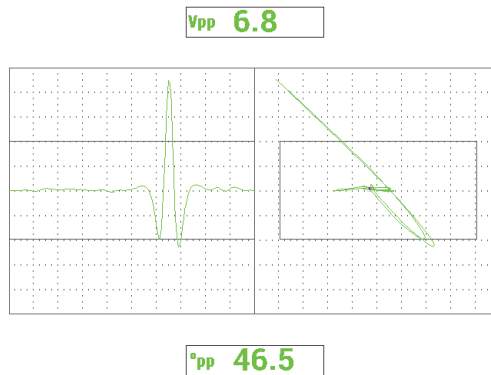


Figure 3-9 The full-screen mode for fine-tuning the settings

SINGLE FREQUENCY			
FRQ MODE	SINGLE	FREQ	500KHz
ID	MINIMITE-F	ANGLE	244.0deg
SERIAL #	946	H GAIN	52.1dB
PRB CONN	LEMO-16	V GAIN	62.0dB
PRB DRV	MEDIUM		
HI PASS	125Hz	H POS	50%
LO PASS	400Hz	V POS	50%
CONT NUL	OFF		
DSP MODE	SWP+IMP	SHAPE 2	SWEEP
GRID	10X10	TOP	70.0%
PERSIST	OFF	BOTTOM	30.0%
D ERASE	0.1sec	LEFT	10.0%
SWP ERS	ON	RIGHT	90.0%
SWP MODE	EXT Y	SHAPE 3	POLAR
SWP TIME	0.010sec	RADIUS	25.0%
SYNC ANG	0deg	HORZ	50.0%
SCAN RPM	1500RPM	VERT	50.0%
		W START	1
		W END	32
		W ERASE	MANUAL
		W CURSOR	1

SINGLE FREQUENCY			
ALARM 1	FRQ1 NEG	RDG1 TYP	VPP
ALARM 2	FRQ1 NEG	RDG1 LOC	TOP CNTR
ALARM 3	OFF	RDG2 TYP	DEG PP
		RDG2 LOC	BOT CNTR
		TIME WIN	0.5sec
HORN	OFF	CAP MODE	INSTANT
DWELL	0.0sec	CAP DLY	5.0sec
EXT HORN	ON	AOUT PWR	OFF

PRESS [A] FOR FIRST COL., [B] FOR SECOND COL., [C] FOR THIRD COL., [E] FOR NEXT. PRESS [A] FOR FIRST COL., [B] FOR SECOND COL., [E] FOR PREV.

Figure 3-10 The list of all parameters for aluminum

To fine-tune the instrument settings for ferromagnetic material (steel)

1. Perform the above configuration and calibration steps on the steel standard with a good and bad hole.
2. Observe the following possible differences when using a ferromagnetic material (as compared to aluminum):
 - A different lift-off (probe motion) angle in the good hole
 - A different notch angle in relation to the lift-off (closer to 90°)
 - Lower gains in general

- Possibly identical H and V gains

An example for a steel hole is shown in Figure 3-11 on page 39. The list of all parameters is shown in Figure 3-12 on page 39. Note that compared to the signal for aluminum material, the impedance plane signal of ferromagnetic material has a reverted figure.

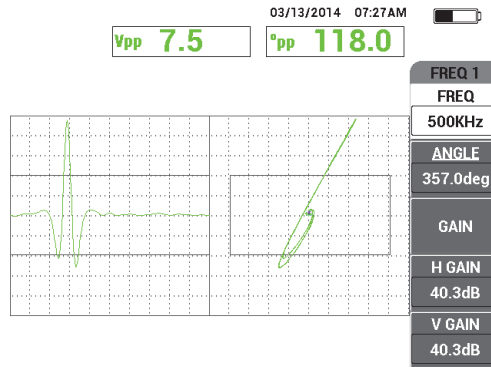



Figure 3-11 An example display for a steel hole

SINGLE FREQUENCY			SINGLE FREQUENCY		
FRQ MODE SINGLE	FREQ 500KHz	SHAPE 1 BOX	ALARM 1 FRQ1 NEG	RDG1 TYP VPP	
ID MINIMITE-F	ANGLE 357.0deg	TOP 70.0%	ALARM 2 FRQ1 NEG	RDG1 LOC TOP CNTR	
SERIAL # 946	H GAIN 40.3dB	BOTTOM 30.0%	ALARM 3 OFF	RDG2 TYP DEG PP	
PRB CONN LEMO-16	V GAIN 40.3dB	LEFT 10.0%		RDG2 LOC BOT CNTR	
PRB DRV MEDIUM		RIGHT 90.0%		TIME WIN 0.5sec	
HI PASS 125Hz	H POS 50%	SHAPE 2 SWEEP	HORN OFF	CAP MODE INSTANT	
LO PASS 400Hz	V POS 50%	TOP 70.0%	DWELL 0.0sec	CAP DLY 5.0sec	
CONT NUL OFF		BOTTOM 30.0%		AOUT PWR OFF	
DSP MODE SWP+IMP					
GRID 10X10					
PERSIST OFF					
D ERASE 0.1sec					
SWP ERS ON					
SWP MODE EXT Y	W START 1	SHAPE 3 POLAR	EXT HORN ON		
SWP TIME 0.010sec	W END 32	RADIUS 25.0%			
SYNC ANG 0deg	W ERASE MANUAL	HORZ 50.0%			
SCAN RPM 1500RPM	W CURSOR 1	VERT 50.0%			
PRESS [A] FOR FIRST COL, [B] FOR SECOND COL, [C] FOR THIRD COL, [E] FOR NEXT.			PRESS [A] FOR FIRST COL, [B] FOR SECOND COL, [E] FOR PREV.		

Figure 3-12 The list of all parameters in ferromagnetic material

Filter Type — Figure 6 or Figure 8 Signals

The most recent digital filtering technology used on the NORTEC 600 includes improvements to the filter system. The NORTEC 600 features a new parameter, named **FILT TYP** (filter type), which is accessed using the C key—after pressing the

MAIN FILTER menu key () three times. This parameter determines the way the signal is distorted (or not distorted) in the impedance plane.

The default filter type is a Figure 6 (**FIG 6**) signal, which has a needle-like shape and is widely employed in the industry. This Figure 6 filter automatically adjusts the signal phase in order to achieve the typical Figure 6 response, regardless of high- and low-pass filter settings. This constant Figure 6 filter response enables much quicker and easier tuning of the NORTEC 600 filter system, and it makes it possible to eliminate unwanted signals rather than trying to achieve the proper signal shape.

The Figure 8 (**FIG 8**) filter type is generated using filters that are almost completely nondistorting. This filter type is useful when using absolute rotating probes or in special engine-inspection applications. The Figure 8 filter is also the default filter type for nonrotating applications such as surface inspection.

Figure 3-13 on page 40 shows the Figure 6 response on the left and the Figure 8 response on the right. Both images have been obtained using the same probe in an aluminum hole with very similar gain and angle settings.

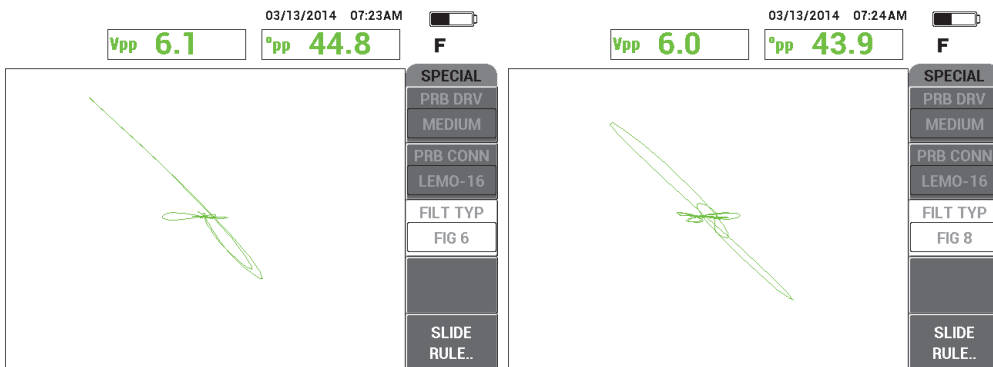


Figure 3-13 Comparing the Figure 6 (*left*) and Figure 8 filter signals

By setting **LINK** to **ON**, you can enable the dynamic high- and low-pass filter settings while you adjust **RPM** to maintain the signal response.

4. Maintenance and Troubleshooting

This chapter provides details about MiniMite scanner maintenance.

4.1 Preventative Maintenance

Depending on operating conditions, the MiniMite scanner may require periodic cleaning (see “Cleaning the Scanner” on page 41).

If you are using a Fischer probe, lightly lubricate its o-rings to make it easier to insert and remove the probe. Be sure to remove the probe from the scanner after use because probes left in the scanner for prolonged periods of time may be difficult to remove.

4.2 Cleaning the Scanner

The MiniMite’s external surfaces can be cleaned when needed.

To clean the scanner

1. Ensure the scanner is turned off.
2. Disconnect all cables.
3. To bring the scanner back to its original finish, clean the housing with a soft cloth.
4. To remove persistent stains, use a damp cloth with a soft, soapy solution. Do not use abrasive products or powerful solvents that could damage the finish.
5. Wait until the scanner dries completely before reconnecting the cables.

4.3 Troubleshooting

Table 2 on page 42 contains a list of possible problems and solutions.

Table 2 Troubleshooting

Problem	Possible cause	Solution
Scanner does not operate.	Cable is not connected.	Check cable connections.
Probe comes loose or does not rotate.	Probe is not correctly installed.	<ol style="list-style-type: none"> 1. Check if probe is fully inserted. 2. Check if any probe o-rings are missing or damaged (MiniMite Fischer scanner). 3. Check if collet is sufficiently tightened (MiniMite LEMO scanner).
	Probe size is incorrect.	Check probe compatibility and size to match scanner's probe type and size requirement.
Probe vibrates excessively.	Probe is incompatible or too large.	Check probe type and size.
	Probe is mechanically unbalanced.	Check straightness of probe shaft. If it is bent, repair or replace the probe. (Make sure that the probe is correctly aligned with the hole to prevent probe or shaft bending.)

5. Specifications

This chapter provides the MiniMite scanner's technical specifications.

Table 3 Technical specifications

Category	Parameter	Value
Size and weight	Size (L × H × W)	81 mm × 38.1 mm × 27 mm (3.18 in. × 1.5 in. × 1.06 in.)
	Weight	Under 195 g (7 oz.)
Environmental conditions	Operating temperature	-10 °C to 50 °C (14 °F to 122 °F)
	Storage temperature	-20 °C to 70 °C (-4 °F to 158 °F)
	IP rating	Designed to meet requirements of IP50
Connections	Cable connector	16-pin LEMO
	Probe connector	4-pin Fischer or 4-pin LEMO
Technical data	Speed range	Variable, 600 rpm to 3000 rpm in 10 rpm steps
	Speed control	Instrument controlled
	Frequency range	200 kHz to 6 MHz
	Signal coupling	Rotary transformer
	Operating voltage	24 VDC (typical) at 3000 rpm
	Orientation	No restrictions
	Alarm	Red LED indicator, rear and top of case front

Table 4 Scanner configurations and accessories

Part description	Part number	Order number
MiniMite Fischer scanner configuration	9744738	U8750012
MiniMite LEMO scanner configuration	9744739	U8750013
Cable	9122090	U8800076

List of Figures

Figure i-1	The MiniMite scanner with Fischer probe	19
Figure 1-1	The MiniMite case contents	22
Figure 2-1	The MiniMite controls	25
Figure 2-2	Inserting a Fischer probe	26
Figure 2-3	Inserting a LEMO probe	27
Figure 3-1	Example display for aircraft fastener hole inspection	31
Figure 3-2	Materials—fastener holes with rotating scanner	32
Figure 3-3	The Bolt Hole application	33
Figure 3-4	The bolt-hole signal	34
Figure 3-5	Adjusting the lift-off noise (first alternative)	35
Figure 3-6	Adjusting the lift-off noise (second alternative)	35
Figure 3-7	Adjusting the gain	36
Figure 3-8	Adjusting the vertical gain	36
Figure 3-9	The full-screen mode for fine-tuning the settings	38
Figure 3-10	The list of all parameters for aluminum	38
Figure 3-11	An example display for a steel hole	39
Figure 3-12	The list of all parameters in ferromagnetic material	39
Figure 3-13	Comparing the Figure 6 (<i>left</i>) and Figure 8 filter signals	40

List of Tables

Table 1	Available modes	21
Table 2	Troubleshooting	42
Table 3	Technical specifications	43
Table 4	Scanner configurations and accessories	44

