



Spitfire 2000 Scanner

User's Manual

7720056.00 — Rev. 1
November 2022

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

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Warranty

The Spitfire 2000 Scanner has been designed and manufactured as a high quality instrument.

Inspect the unit thoroughly upon receipt for evidence of external or internal damage that may have occurred during shipment. Notify the carrier making the delivery immediately of any damage, since the carrier is normally liable for damage in shipment. Preserve packing materials, waybills, and other shipping documentation in order to establish damage claims. After notifying the carrier, contact Evident so that we may assist in the damage claims, and provide replacement equipment, if necessary.

Evident guarantees the Spitfire 2000 Scanner to be free from defects in materials and workmanship for a period of one year (twelve months) from date of shipment. This warranty only covers equipment that has been used in a proper manner as described in this instruction manual and has not been subjected to excessive abuse, attempted unauthorized repair, or modification. DURING THIS WARRANTY PERIOD, Evident LIABILITY IS STRICTLY LIMITED TO REPAIR OR REPLACEMENT OF A DEFECTIVE UNIT AT ITS OPTION. Evident does not warrant the Spitfire 2000 Scanner to be suitable of intended use, or fitness for any particular application or purpose. Evident accepts no liability for consequential or incidental damages including damage to property and/or personal injury. In addition to our standard one year warranty, Evident also offers an optional two year warranty (call for further details).

This warranty does **not** include transducers, transducer cables, or battery. The customer will pay shipping expense to the Evident plant for warranty repair; Evident will pay for the return of the repaired equipment. (For instruments not under warranty, the customer will pay shipping expenses both ways.)

In this manual, we have attempted to teach the proper operation of the Spitfire 2000 Scanner consistent with accepted flaw detection techniques. We believe the procedures and examples given are accurate. However, the information contained herein is intended solely as a teaching aid and should not be used in any particular application without independent testing and/or verification by the operator or the supervisor. Such independent verification of procedures become more important as the criticality of the application increases.

For these reasons, we make no warranty, expressed or implied, that the techniques, examples, or procedures described herein are consistent with industry standards nor that they will meet the requirements of any particular application. Evident expressly disclaims all implied warranties of merchantability and of fitness for any particular application.

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1 Preparation for Operation

What's in this section?

- 1.1 General Description
- 1.2 Unpacking the Scanner
- 1.3 Operating Environment
- 1.4 Instrument/Scanner Compatibility
- 1.5 Instrument/Scanner Cables

1.1 General Description

The Spitfire 2000 Scanner is a hand-held eddy current scanner powered by the Nortec® series of eddyscopes. Optimum signal to noise ratios are a function of the low noise axial rotary transformer.

This scanner is non-indexing with variable speeds rotating at 600-3000 revolutions per minute (rpm). The Spitfire 2000 is designed to meet all medium to high speed scanner applications requirements and is used for inspection of fastener holes and for the examination of first-layer flaws by using a special surface probe similar to a pencil probe.

A wide selection of probes may be used with the Spitfire 2000. All probes are reflection types with differential coil configurations.

The scanner is represented on screen by a horizontal line. The line is nearly flat when no flaws are detected. When a flaw is detected, the demonstrates vertical displacement. The horizontal position of this indication shows the angular position of the flaw. The left side of the screen (zero degrees) corresponds to the top of the scanner (opposite from the handle), while the middle of the screen (180 degrees) is toward the handle.

When the scanner is in use, only the vertical channel is displayed. Thus, the instrument rotation should be set for maximum displacement of the flaw in the vertical direction on the impedance plane before proceeding to the sweep setting.

1.2 Unpacking the Scanner

All cartons should be opened and inspected upon receipt. Contents should be inspected for damage that may have occurred during shipping. If damage is

noticed, contact the carrier and retain the damaged materials until inspection can be performed by a representative of the carrier.
 If the Spitfire 2000 is shipped frequently from site to site, the carton and cushioning should be retained for transporting the scanner.

1.3 Operating Environment

The Spitfire 2000 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 RA200 should be protected as much as possible from water and chemical splashes and rapid temperature changes and should be operated away from large electrical equipment that may interfere with the operation of internal circuitry.

1.4 Instrument/Scanner Compatibility

Table 1: Instrument/Scanner Compatibility

Nortec 19ell	Nortec 24	Nortec 1000	Nortec 2000	WorkStation/ PowerStation 210/215/220
Spitfire 2000 1200 rpm	Spitfire 2000 1200 rpm	No	Spitfire 2000 600-3000 rpm	Spitfire 2000 600-3000 rpm
19/A Scanner 1200 rpm	19/A Scanner 1200 rpm	No	19/A Scanner 1200 rpm	19/A Scanner 1200 rpm
Spitfire 2000 Scanner 1200 rpm	Spitfire 2000 Scanner 1200 rpm	No	Spitfire 2000 Scanner 600- 2400 rpm	Spitfire 2000 Scanner 600- 2400 rpm
PS4 Scanner 1- 1500 rpm	PS4 Scanner 1- 1500 rpm	PS4 Scanner 1- 1500 rpm	PS4 Scanner 1- 1500 rpm	PS4 Scanner 1- 1500 rpm
PS-5AL Scan- ner 60-240 rpm	No	No	PS-5AL Scan- ner 60-240 rpm	PS-5AL Scan- ner 60-240 rpm
MiniMite Scan- ner 1200 rpm	MiniMite Scan- ner 1200 rpm	No	MiniMite Scan- ner 600-2400 rpm	MiniMite Scan- ner 600-2400 rpm

1.5 Instrument/Scanner Cables

The table below determines the cable for interfacing your Nortec instrument and scanner.

Scanner	Spitfire 2000	19/RA	RA 2000	MiniMite	PS-5AL	PS-4
Nortec 19ell	9122091	9113660	9122091	9122091	0217389	9109977
Nortec 24	9122091	9113660	9122091	9122091	N/A	9109977
Nortec 1000	N/A	N/A	N/A	N/A	N/A	0222129
Nortec 2000	9122090	9122084	9122090	9122090	9122090	0222129
WorkStation/Power-Station 210/215/220	9122090	9122084	9122090	9122090	9122090	9122226

All cables are standard with straight connectors and a standard length of eight feet. If a special cable with a different length or right angle connector is desired, call your representative.

2 Spitfire 2000 Technical Data

What's in this section?

Technical Specifications

Table 2: Specifications

Speed Range	Variable, 600-3000 rpm in 10 rpm steps (Nortec 2000 and WorkStation/PowerStation); fixed at 1200 rpm on Nortec 19e, 19ell, 24.
Speed Control	Instrument controlled
Frequency Range	200 kHz-6 MHz
Probe Connector	4-pin Fischer
Signal Coupling	Rotary transformer
Operating Voltage	24 VDC (typical)@3000 rpm
Stall Torque	30 oz. inches (@24 VDC, 5690 rpm)
Torque Selection	Switchable among three (3) ranges (low, medium, high)
Mounting	Hand-held, pistol grip, finger hook, or special fixture
Orientation	No restrictions
Alarm	Red LED indicator, rear and top of case front
Cable Connector	16-pin LEMO
Size	6" long x 1.7" diameter (without handle)
Weight	1 pound (without probes, handles, or cables)

3 Spitfire 2000 Control Descriptions

What's in this section?

- 3.1 Introduction
- 3.2 Motor Control
- 3.3 Torque Control
- 3.4 Cable Connections
- 3.5 Alarm Indicators
- 3.6 Probe Insertion
- 3.7 Filter Settings

3.1 Introduction

The Spitfire 2000 hand-held scanner is designed for easy operation with a minimum number of controls. The following section describes the basic functions of the scanner controls. Consult the instrument operation manual for specific information on scanner setup.



Figure 3-1: Spitfire 2000 Scanner

3.2 Motor Control

The Motor Control switch is the green button located at the rear and to the right of the cable connector. The scanner uses an ON/OFF contact switch to turn the motor ON and OFF.



Figure 3-2: Motor Control Switch

3.3 Torque Control

A three-position slide switch located at the rear and to the left of the cable connector selects torque range. This range limits the amount of power the motor can apply to the probe.

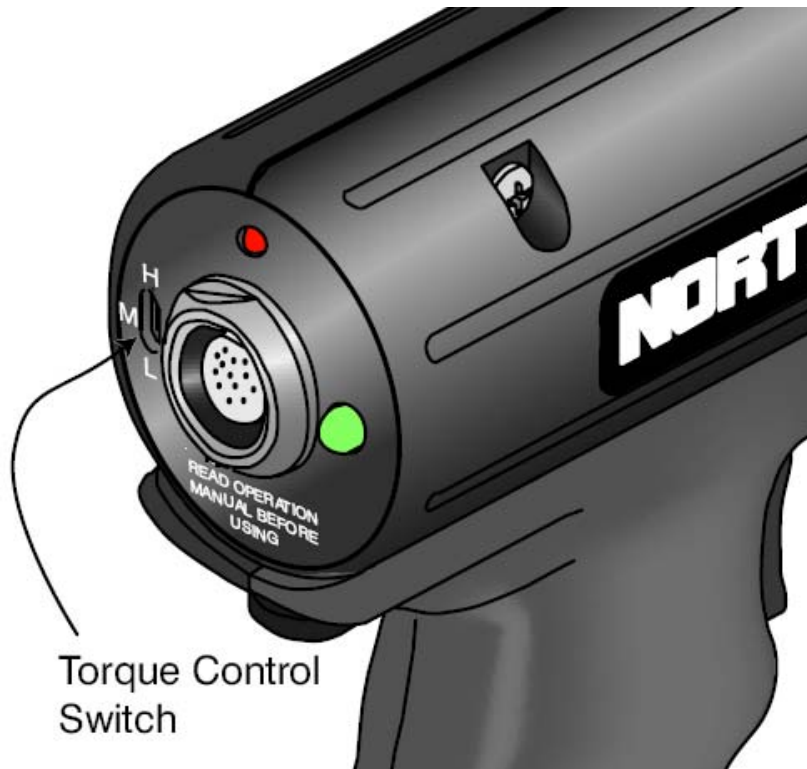


Figure 3-3: Torque Control Switch

(L): Lowest setting; slight drag can cause the motor to turn OFF; used with delicate probes and fragile parts.

(M): Mid torque setting; moderate drag can cause the motor to turn OFF; for general use.

(H): Highest torque setting; maximum drag can cause the motor to turn OFF; for more robust probes and parts and protects motor and instrument.

3.4 Cable Connections

The cable connection (16-pin LEMO) is located at the rear of the scanner. When attaching the cable, note the red orientation dot on the cable connector and the red dot at the top of the cable socket. These dots align when the cable is properly attached.



Figure 3-4: Cable Connection

3.5 Alarm Indicators

The Spitfire 200 has two alarm indicators. One LED is located at the rear of the scanner and the other at the front next to the probe connection. In the alarm state, LEDs' illuminate.



Figure 3-5: Alarm Indicators

3.6 Probe Insertion

Before inserting a probe, be sure to lock the rotary portion of the transformer in place. The Probe Shaft Lock is located under the nose of the scanner.

Note: Do not attempt to lock the probe shaft while the scanner is in motion.



Figure 3-6: Probe Shaft Lock

Align the red dot at the end of the scanner rotor with the scanner nose alarm LED and lock into place. Align the red dots and insert the probe in the scanner rotor.



Figure 3-7: Probe Insertion

Note: Light lubrication of the probe O rings is recommended. Remove the probe from the scanner after use to avoid later removal difficulty.

Note: Do not operate expandable style probes at high speeds. Centrifugal force may cause the probe to break and send out debris.

Note: This scanner is rated to operate at up to 3000 rpms. Probes that are mechanically unbalanced, damaged, or too large in diameter may cause excessive vibration, break, or become disengaged from the scanner spindle. Evident is not responsible for damage caused by this occurrence.

3.7 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.

