



OPERATION MANUAL

RD³ DIGITAL ELECTRONIC TAP HAMMER

WichiTech Industries, Inc.
Rapid Damage Detection Device (RD³)
Digital Electronic Tap Hammer

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Operations and Maintenance Manual

The RD³ is designed to be a low cost, simple device requiring minimum training for the detection and quantifying of damage in bonded structures. For those users familiar with the aluminum tap hammer, use of the RD³ will be second nature. Those of you who use the coin tap test, we suggest that you tap on a solid surface to become acquainted with the feel of the hammer. Before tapping on a part, know and understand the underlying structure. Remember that the RD³ can do harm to very thin layers of aluminum and carbon composite structures if excessive force is applied. WichiTech cannot assume responsibility for damage incurred to surfaces tested with the RD³.

Assumptions Made

The following assumptions are made regarding the user's knowledge and experience in the following areas:

- Knowledge of the design of the structure being tested
- Understanding of the basics of composite structures
- Knowledge of the English language
- Ability to make and understand relative numerical comparisons

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Overview

The RD³ Digital Electronic Tap Hammer was developed by the Boeing Defense & Space Group, patent No. 6,748,791, and is licensed for manufacture and sale exclusively by WichiTech Industries, 1-800-776-4277.

Getting Started

Check Package Contents

Locate Each Item In The List Below:

1. Pelican Storage Case
(Fig. 1)



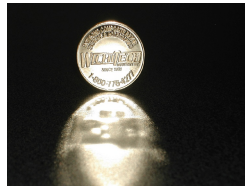
2. RD³ Electronics Module (EM)
(Fig.2)



3. Tap Hammer With Attached
Cord
(Fig. 3)



4. Additional 9V Battery (Not Pictured)
5. Complimentary WichiTech Tapping Coin (Fig.4)



Configure the RD³ For Use

Locate the RD³ Electronics Module (EM) (Fig. 2) and the Tap Hammer with Attached Cord (Fig.3). Connect the Tap Hammer cord to the EM by inserting the three (3) conductor connector into the EM socket labeled “Hammer Input” (Fig.5). Observe the Key Way for proper alignment. Do not force the connection. After making the proper connection, turn the EM switch to the “ON” position (Fig.6). Turning the EM “ON” before attaching the cord may not allow the EM circuitry to “zero” properly. Tapping with the hammer before attachment to the EM may result in either no reading or improper readings.



Fig. 5

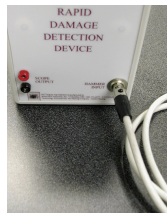


Fig. 6

warranted to be free of defects from workmanship and materials for a period of one year from the original date of purchase. Return the complete unit, freight prepaid, to the factory if any trouble develops during this one year warranty period. WichiTech will repair (or replace, at our option) without charge, any system, where factory inspection shows that the trouble was caused by defective workmanship or materials.

This warranty does not apply where:

- repairs to the system have been made or attempted by others;
- repairs are required because of normal wear and tear;
- the system has been abused, misused, or improperly maintained;
- alterations have been made to the unit.

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With the baseline established, parts may now be tested. The best method found is to hold the hammer at the end of the handle and, using a wrist motion rather than an arm motion, strike lightly. Do not strike the surface faster than once a second, as the circuitry requires approximately 1 second to reset. Do not allow the hammer head to “double bounce” as this is the same as striking too quickly and will result in erroneous readings.

The correlation between the hammer strike and the number displayed on the EM is one of quantitative indications of the local stiffness of the part being tested. The more rigid the part, the smaller the number. The larger the number when tapped along any chosen line, the greater the probability of a disbond, delamination, or void. The range will depend upon the material and type of structure, as well as the defect type, size, and depth. Numbers displayed with greater than 10% variance from numbers established during tapping are a good indication of a suspect area. Knowledge of the design of the part being tested is essential to identifying true flaws, as the substructure can increase rigidity and result in lower readings in that area.

Low Battery Indicator

In the lower left corner of the EM, there is a clear window overprinted with “LOW BATT” (Fig. 7). Originally, the RD³ was designed to use a rechargeable NiCAD battery. Problems were experienced with recharging the battery and shortened battery life. The NiCAD was replaced with a rechargeable Ni-M-H battery. Although the battery and charger worked well,

the industry changed how batteries and chargers work together. It is now necessary to remove the battery from the device before recharging. Since our Ni-M-H battery could not be removed, this became a problem. We now offer the RD³ with only one choice - a disposable 9V battery. Life expectancy is approximately 14 hours of continuous use. The “LOW BATT” light will indicate when a change is required. However, if readings deviate greatly, and the “LOW BATT” light is not on, it may be necessary to change the battery, since a minimum low threshold has to be maintained for the circuitry to provide relatively close readings.



Fig. 7

Replacing the Battery

Access to the battery is gained through a door on the back of the EM (Fig. 8). Remove the door in the direction indicated, remove the old battery, and insert a new 9V battery. Follow all manufacturer's instructions for battery storage and disposal.

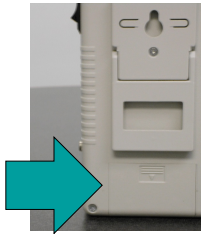


Fig. 8

Other Stuff

The RD³ manual part number is D1MAN003, Revision 08.31.06. This manual is copyrighted, all rights reserved. WichiTech Industries reserves the right to make changes and improvements to its products without providing notice.

Warranty

Each WichiTech Digital Electronic Tap Hammer is thoroughly inspected and tested before leaving the factory. The RD³ is

Now that the RD³ is properly configured, turn the ON/OFF switch, located on the upper right side of the EM, to the ON position.

Using the RD³

All strikes to the tested surface will be done with the rounded end of the hammer. While holding the hammer handle toward the handle end, lightly strike the surface to be examined and observe the number displayed on the EM. Note that strikes made with the hammer which do not reach the minimum set point (the tap is too light) will result in a "0" reading. However, the hammer is relatively insensitive to the magnitude, or forcefulness, with which the surface is struck. The circuitry of the hammer is designed to look at the wave form from time of impact of the hammer head, not the force of the impact.

Before the initial use of the hammer on a part to be tested, it is recommended that the hammer be tapped on a "known" surface (granite table in a test lab, test block, sampled good part, etc.) to establish a baseline. Since the RD³ yields relative measurements, it cannot be calibrated. This baseline measurement can be used to monitor battery decay, hammer circuitry, and overall operational condition of the RD³.