

MAGNETIC PARTICLE INSPECTION ACCESSORIES

Quick Break Tester / Shot Timer

Model QB-2 – P/N 622646
Model SHOT TIMER – P/N 622901



OPERATING INSTRUCTIONS

US Patent Pending – US60838615



A Division of Illinois Tool Works Inc.
3624 WEST LAKE AVENUE ■ GLENVIEW, ILLINOIS 60026
TEL 847.657.5300 ■ FAX 847.657.5218
www.magnaflux.com

INTRODUCTION

The MAGNAFLUX® QB-2 Quick Break Tester and SHOT DURATION TIMER are the new industry standards.

Quick Break Unit Features are:

- **Quick Break Digital Readout** - Displays peak quick break voltage, in a quantitative way, facilitating detection of possible degradation of quick break feature in mag unit due to equipment aging or malfunction. The QB-2 allows the recording of quick break voltage for tracking the trend of the quick break status. It also ensures quick break voltage up to 29 volts.
- **Precision reference air coil transducer** - Gives reliable, repeatable indications of quick break intensity. It is manufactured under controlled conditions, checking for accuracy of inductance, turns, and DC resistance.
- **Microprocessor controlled** - Accurate signal capture and peak detection.
- **Low Battery Detection** - Ensures unit will not operate if battery does not have sufficient charge.

Why Use the MAGNAFLUX Quick Break Tester over others?

Until recently, it appears that the only method of quick break detection widely used in the industry for the past 30 years has been a tester, which utilizes a neon bulb or more recently, an LED. Both of these types of testers only provide a qualitative indication of quick break, a go/no go indication. The LED and Neon indicators are subject to uncontrolled variation due to environmental and manufacturer differences. Also these devices are designed for coils under 25" ID, 5 turns. The QB-2 gives a wider range of capability. The QB-2 is the most accurate device for consistent repeatability.

Shot Timer Features (QB-2 and SHOT TIMER):

- **Shot time Detection** - Reads shot time with 10 ms resolution on the display. Detects how long magnetic field is present.
- **LCD digital readout** – Displays Shot Time in a quantitative way, and facilitates the detection of possible degradation in a mag unit, due to equipment malfunction.
- **Precision reference transducer** - Gives reliable, repeatable indications. It is manufactured under controlled conditions, checking for accuracy of inductance, turns, and DC resistance.
- **Microprocessor controlled** - Accurate signal capture and peak detection.
- **Low Battery Detection** - Ensures unit will not operate if battery does not have sufficient charge.

OPERATING INSTRUCTIONS

Front Panel Controls and Indicators

PWR "ON/OFF" Switch -	Push once to turn unit on, push again to turn unit off.
"RESET" Pushbutton -	Push to reset display to be ready for another quick break reading.
TRANSDUCER INPUT JACK	Plug RCA phone plug from transducer cable in.
LCD DISPLAY	Allows instant viewing of quick break voltage. Reading will be held until "reset" pushbutton is pressed.

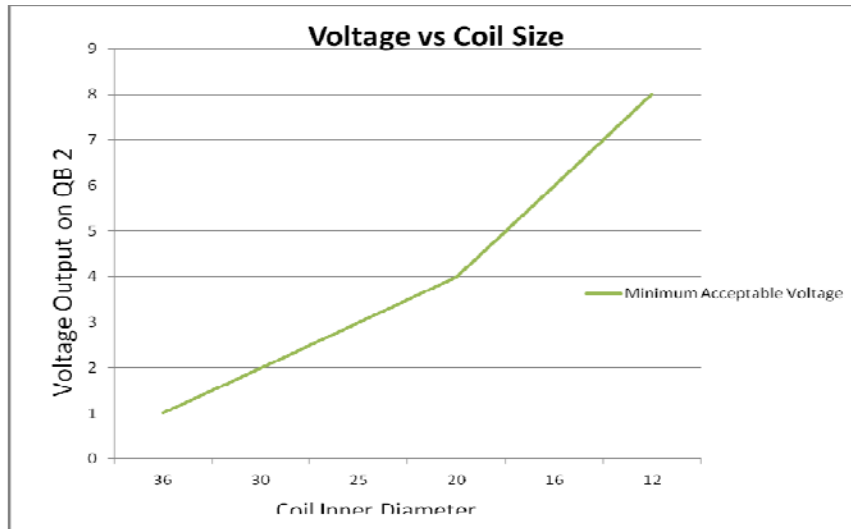
Rear Panel (Underside of Unit) – FOR QB-2 ONLY

Quick Break Reference Table - Allows quick verification if mag unit is meeting the Mil SPEC 6867C for a given coil size.

MIL6867C Table V - Voltage induced by Magnetizing Coils

Size of Coils	Voltage Peak Reading
12 inches	8 volts
16 inches	6 volts
20 inches	4 volts
25 inches	3 volts

***Must measure at 15000 ampere – turns.
The 5 turn coil should be at 3000 amps.***



Use chart for voltages on coils not defined by
Mil Spec 6867C

BASIC OPERATION

Quick Break Voltage Measurement - FOR QB-2 ONLY

The Quick Break QB-2 is intended to be used with 3 phase full-wave DC output horizontal wet inspection units. It is designed to help the operator determine if the mag unit under test meets quick break.

On the front panel of the Quick Break unit check and/or actuate the following:

- "Clamp transducer (17" long rod) between headstock and tail stock of mag unit, centering the transducer in the mag unit coil. Move the mag unit coil horizontally on the unit rails until the mag unit coil is in the center of the rod. **IT IS VERY IMPORTANT TO CENTER THE TRANSDUCER PICK UP COIL IN THE X, Y and Z AXIS OF THE MAG UNIT COIL, IN ORDER TO GET AN ACCURATE READING.** You can mark the tailstock and headstock where probe is located(scribe the circumference of the rod where it touches the headstock and tailstock pads) in order to have good repeatability the next time you do the quick break test.
- Plug RCA phone plug from transducer coil into the jack located on the lower left corner of the front panel of the digital display measuring unit. Locate the measuring unit away from the Mag Unit coil by at least 2 feet, preferably by holding the display unit in front of Mag unit below push bar.
- Push "ON/OFF" pushbutton located on lower right corner of front panel. LCD display will display a series of messages as the unit powers up:

1.	S/I QB1	Indicates which model you have.
2.	REV. 1.1	Indicates software version, you may have a later version indicated by a higher number than 1.1.
3.	Threhld	Indicates trigger threshold voltage value selected> this is not a user settable option. Default value is .3 volts.
4.	Val=0.3	Threshold is .3 volts.
5.	"Ready!!!"	Ready to accept a quick break test.

The QB-2 is now ready to test for quick break.

1. Turn on mag unit under test, and select "coil" output. Set mag unit shot timer to 0.5 seconds, DO NOT SET LONGER THAN 2.5 SEC. OR SHORTER THAN .5 SECONDS FOR PROPER TEST RESULTS.
2. The output current of the mag unit must be adjusted to provide 15,000 ampere-turn field strength...For a 5 turn mag unit coil, this would correspond to a mag shot current of 3000 amps. If you are unsure of how many turns your mag unit coil is, consult the manufacturer. It is very important to establish a 15000 ampere-turn field strength. Most coils are 5 turns, but make sure as some coils can be more or less than 5 turns. IF IN DOUBT CONSULT THE MANUFACTURER OF THE COIL. DO NOT PROCEED WITH THE TEST IF YOU ARE NOT SURE OF THE NUMBER OF TURNS ON THE COIL.
3. If you did a mag shot in the preceding step to set up the output current, then the QB-1/QB-2 has already captured a quick break reading. Note that once the QB-1/QB-2 has been triggered by a coil mag shot, the display will read "ACQ/TRG" while it is computing the quick break voltage. There is approx. a 2 sec. delay after triggering until the display indicates the quick break voltage, as the microcomputer is analyzing the waveform. Push the reset button on front of QB-1/QB-2 panel, and you are ready for another reading.
4. Do another mag shot, and check that the output current reaches the correct value...Now read the quick break voltage indicated on the LCD display on front of QB-1/QB-2. Note this voltage. Also note that the LCD display has a resolution of .1 volts, so 4 volts will be displayed as 4.0. If the actual quick break voltage exceeds 29.7 volts, the display will read ">30V_OVR".
5. Repeat steps 2 and 3 until you have done a mag shot and checked the quick break voltage 5 times, noting each reading. Don't forget to push the "reset" button on the QB-1/QB-2 after every reading is noted, in order to be ready to take another reading.
6. Now that you have 5 quick break readings, take the lowest value, and look at the table printed on the underside of the QB-1/QB-2. Look for your coil size, and compare the minimum quick break voltage in the table to the lowest reading you took previously. If your last reading is above the minimum value indicated in the table for your coil size, then you pass the MIL SPEC 6867C quick break test. MAKE SURE YOU MEASURE YOUR COIL SIZE!! IT IS THE INSIDE DIAMETER OF THE COIL.
7. We recommend for safety reasons, that you take at least .5 volt of margin, when using the quick break table. *For example*, if you read a quick break voltage of 4 volts, using a 20" ID coil, and the table says that the minimum voltage for quick break is 4 volts, you may conclude that you pass (marginally) the quick break test. But we would suggest that you make sure to read a quick break voltage of at least 4.5 volts in this example (USING 20" COIL) from the QB-2 to ensure well passing the test.
8. Mag units which utilize coil contactor drop out to ensure quick break usually indicate a quite high quick break voltage (15v to 25v, depending on coil size), well over the minimum values. This is normal for these type of units. What is important to track with these type of units is the trend of the quick break voltage over time (from month to month). It should also be noted that with this type of unit, the quick break voltage indicated may vary from shot to shot by as much as 1 to 2 volts.

Shot Time Measurement - FOR QB-2 AND SHOT TIMER

1. This function is available on the QB-2 as an added feature. It is designed to work with ONLY 3 phase full wave DC output mag units. The SHOT TIMER tester can be used on any unit with shot time greater than 0.4 seconds.
2. At the same time as the QB-2 is being triggered, during a mag shot to read quick break voltage, it is also measuring the mag shot duration in the coil.
3. At the end of the mag shot, the QB-2 display will alternately display the quick break voltage (indicated by a number "VAL=X.X" volts in the display), and the shot time (indicated by a number "@x.xx SEC" in the display). The frequency of alternation between the 2 different types of readings is 2 sec, to allow you enough time to observe and record the readings. Be careful not to confuse the 2 different readings. The SHOT TIMER unit will display and hold the shot time detected.
4. After noting the readings taken, you can push the "RESET" button, to reset. The tester is now ready to take another sample with a new mag current shot.

What things you can interpret from using the QB-2?

By measuring and keeping track of the trend of quick break voltage, you may be able to detect problems with your mag unit:

- If your unit uses contactor drop out on the coil circuit to ensure good quick break, you may see the quick break voltage decreasing over time if the coil contactor contacts, springs or other associated controls are degrading. Such a trend would indicate it's time to check the contacts and springs in the contactor, as well as any auxiliary contacts that may be used to aid in obtaining quick break. Determining whether your unit utilizes this older method of developing quick requires looking at the unit schematic, and or consulting with the manufacturer. Many older primary current control units fall into this category. You may also be able to verify "coil contactor drop out" at the end of the mag shot by listening for a loud clunking sound at the beginning and end of the mag shot, or by observing the coil contactor visually during the coil mag shot, by removing the back panel of the unit (which should only be done by qualified electrical maintenance personnel).
- If your unit does not use contactor drop out to ensure quick break, the quick break voltage is "more or less", guaranteed by design, but it still needs to be checked regularly to ensure conformance. Even with these modern secondary control scr type mag units, contactor drop out is sometimes used for very large coils (over 25" inside diameter), to ensure good quick break, but this method is not preferred as it has a tendency to degrade the contacts on the coil contactor over time. QB is not defined for coils over 25" in diameter. Within the controller display, the following error codes may appear. These codes, their meaning, and the actions to be taken are described below:

ERROR MESSAGES AND SPECIFICATIONS

LOW BATTERY:

Display indicates this message when the 9 volt battery is too low to continue. Turn off unit and replace battery using a high quality long life battery. We recommend using a lithium battery such as "Ultralife U9VL-FP", which will give 45 hours of continuous operation. A standard alkaline battery will only give 12 hours of operation. To replace the battery, unscrew the four front panel screws located at the very extreme ends of the 4 corners of the front panel. Then gently pull the front panel up and away from the case bottom. Located on the back side of the pc board is the battery holder. Gently pry the battery out of the holder at the end of battery opposite its connection terminals. Re-install the new battery the same way, inserting the end with the connectors on it first into the battery holder, and then gently pressing down the other end of the battery, into the plastic holder. You may have to gently pry open the plastic width of the battery holder at the connection end, when using a 9V battery which is a little larger than usual. Normally, it is best to send the unit in for recertification when the lo batt message is indicated, and we will replace the battery for you at the time of calibration.

SPECIFICATIONS:

Accuracy of voltage indication as measured thru direct injection of dc voltage source at transducer input jack is 1% of reading, +/- 2 counts on display least significant digit. The resolution is .1 volts.

Accuracy of shot time indication (on QB-2 model only) is 2% of reading, +/- 2 counts on display least significant digit. Resolution is .01 second. Timing range is .40 to 2.80 sec for QB-2 and .40 to second 5 seconds for SHOT TIMER.

The transducer coil on the probe is precision wound, with very accurate inductance and dc resistance...never try to use any other type of probe than the one provided by us with the QB-2/SHOT TIMER tester.

Battery life is approx 45 hours continuous operation when using a 9V lithium battery. With a alkaline battery, the life is reduced to approx. 12 hours continuous use.

CARE AND USE:

As with any precision instrument, care must be taken when handling this device. Although it is robust, do not immerse or splash the transducer coil probe or the digital measuring unit with any liquids.

Do not strike the transducer coil probe or digital measuring unit against any objects, or drop them on the floor.

Do not insert the digital display measuring unit directly inside or near the end of the Mag Unit coil.

CALIBRATION:

Periodic calibration is advised once per year. The battery will also be replaced during this service. Call Magnaflux Customer Service Department at 847-657-5300 or email ndt@magnaflux.com. Please send back both transducer probe and LCD display meter.