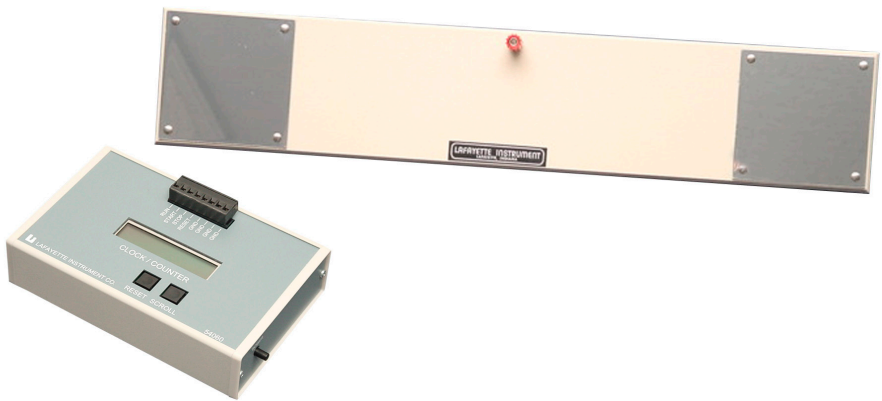


# ***Lafayette Stylus Tapping Test User's Manual***



P.O. Box 5729  
Lafayette, IN 47903 USA  
Tel: (765) 423-1505 • (800) 428-7545  
Fax: (765) 423-4111  
[info@lafayetteinstrument.com](mailto:info@lafayetteinstrument.com)  
[www.lafayetteinstrument.com](http://www.lafayetteinstrument.com)

# Lafayette Instrument Stylus Tapping Test

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## System Description

Finger tapping speed (FTS) will be measured in these studies as the number of taps a subject can make on a metal plate with a metal stylus in a 20-second period. A more accurate name for the measurement might be "stylus tapping speed". It is hoped that the measurement will inform us as to a subject's motor function, and serve as a useful covariate in the analyses of trail-making and digit symbol substitution measurements.

### Equipment to be used:

1. Countdown timer (can be set to count down from 20 seconds to zero) (LIC #00041) (not included)
2. Electronic timer / counter (detects when its input contacts are connected by an electrical circuit for a period of at least 10 milliseconds) (LIC #54060)
3. Corded plastic stylus with metal tip
4. 18" tapping board with set metal plates at each end (LIC #32012)
5. A handheld pushbutton switch (normally open) for the experimenter to enable counting of taps by the timer / counter (LIC #54350)

## Basics of Operation

There is no danger in the voltage (1.5 volts) and current used by the equipment, so if the subject touches the metal tip of the stylus, the metal plate, or both at once, he/she will feel nothing. Some subjects may need to be assured of the safety of the equipment.

The subject should be seated comfortably with his/her forearm resting on a table, as if preparing to write with pencil on paper. The subject should hold the stylus firmly, like a pencil would be held, with fingertips on or touching the black band near the metal tip. Note: the subject should NOT be allowed to hold the stylus loosely, or to hold it far from the metal tip, as a drummer might hold a drumstick. When the subject makes taps, the stylus must not be able to "bounce" on or drag across the metal plate, or a tap may fail to be counted accurately.

The subject should make *easily audible* taps of the metal tip of the stylus on the metal plate, with his/her forearm and wrist remaining in contact with the table. The motions of tapping should be similar to those of making dots on a paper with a pencil. Movements confined to the wrist, hand, and/or fingers should therefore produce each tap. If the subject does not seem to make taps in the proper position or with the proper technique, you should briefly demonstrate the correct rapid tapping to the subject.

Note that the experimenter's switch must be depressed and all proper connections must be made for the counter to detect taps.

## Required Equipment and Use

1. Tapping Board
  - a. The Tapping Board is an 18" board with fixed metal plates at each end. A red jack for a banana plug is located in the center of the board near the top.
2. Stylus
  - a. The red pen shaped stylus will create the electrical impulse needed to record a tap against the metal plate on the tapping board. The stylus should be held like a pencil, placing the fingers on or near the black band. The stylus should be held firmly to create accurate taps on the tapping board. A gray cord is connected to the stylus. The end of the wire connects to the "run" on the screw terminal of the timer / counter.

## b. Remote Initiate Control

- i) The Remote Initiate Control Button is the silver hand held control with the black button on top. This control is used to start and stop the timer / counter. The cord from the remote initiate will split at the end and connect to the "gnd" (ground) of the black screw terminal of the timer / counter.

While the other wire will have a banana plug on the end and will plug into the red jack on the tapping board.

## 3. Timer Counter

### a. The timer counter is the device used to record the output of the tapping board and stylus.

- i) The counter will count the number of taps made by the contact of the stylus to the metal plate on the tapping board
- ii) The timer will record the amount of total time the stylus is in contact with the metal plate on the tapping board.

### b. The power switch is located on the right side of the device

- i) Once the power is turned on the LCD screen on the face of the device will read Lafayette Instrument Co., followed by the question "Input Type Config?" For this test, you will need to answer no. You can do this by pressing the button directly under the word no.

### c. The two buttons on the face of the timer / counter will allow for reset, and scroll between the time and the count.

- i) The button on the left is used to reset the time/count
  - Once the reset button has been pushed the count and time will be cleared and can not be recovered
- ii) The button on the right is used to scroll between the count and time.
  - Time is initially displayed on the screen. If you push the scroll button (Right Button) once the display will show the count. To return to the time, press the button again.

*Note: Scrolling between the count and time will not change the results of the test. These numbers will only disappear once the reset button is pressed.*

### d. The pin connector located on the top of the timer / counter will connect to the black rectangular screw terminal.

- i) The screw terminal may be removed for easy storage of the timer / counter. However, leaving the screw terminal connected during storage will not effect the device.
- ii) The screw terminals can be tightened or loosened with the Flathead end of the screwdriver, provided in the tapping board test kit.

## 4. The Robic countdown timer will be used to time the test

### a. The three buttons on the countdown timer (CDT) control the timer

- i) When holding the CDT the button on the top left will set minutes
  - To set the minutes press the button the number of minutes desired
  - Note: Holding the button down will cause the minutes to increase at a more rapid pace.
- ii) The button to the right is used to set the seconds
  - To set the seconds press the button the number of seconds desired
  - Note: Holding the button down will cause the seconds to increase at a more rapid pace.
- iii) Pressing both the left and right buttons simultaneously will reset the CDT to 00:00
- iv) Once you have started the test do not press the top buttons while the CDT is counting down, as this will cause the time to increase.
- v) The oblong button under the LCD display on the CDT is used to start and stop the timer.
  - When the time expires (display shows 00:00) an alarm will sound. Press this button to silence the alarm. The CDT will automatically reset to the previously selected countdown time. (To clear the time follow 4.1.3)

## 5. Double ended screw driver

## Equipment List

### **The equipment will be packaged into five parts**

1. The Tapping board (32012)
2. The Counter/Timer (54060)
3. The Robic CDT (00041) Optional (not included)
4. The black screw terminal with wires attached to the ground and run
  - The Stylus with wire attached to Run
  - The Remote initiate with one wire attached to Ground and the other with a banana plug attached
5. Double ended screw driver

## Checking the Equipment / Setup

1. Make sure the equipment is not damaged. If equipment appears damaged see trouble shooting.
2. Make sure the wires are tightly fastened into the screw terminal
3. Plug the black screw terminal block into the pin connector on the timer / counter
4. Plug the banana plug of the stylus into the red jack on the tapping board
5. Turn the timer counter on. (When counter is on Lafayette Instrument Company will appear on the display.)
6. Once the LCD readout asks "input type config?" press the button under No.
7. The LCD should read "time: 000.000 sec".
8. Once the setup is complete, you may test the counter by tapping the stylus on the tapping board. This should result in the time and the counts being recorded.
9. Check to make sure the time and count are being recorded
  - 9.1 If the timer / counter display does not increase in value, see trouble shooting guide
10. Reset the timer / counter to 0 – This device is ready for testing
11. Set the CDT to the desired time
12. Follow Test Procedure

**NOTE: It is highly recommended to run a few trial tests prior to testing subjects**

## Test Procedure

1. Confirm that the equipment is working, and that the subject can make rapidly repetitive taps which reliably register on the timer / counter.
2. Position the counter and timer so that the subject cannot see the display during the testing session
3. Determine the subject's dominant hand so that it may be tested first.
4. Reset the impulse counter (see equipment use).
5. Set the countdown timer for 20 seconds.
6. Say to the subject, "This is a simple test of how fast your hand and fingers are when you use an object like a pencil. When I tell you, begin tapping on the plate as rapidly as you can. Continue tapping until I tell you to stop. I will have you tap for approximately 25 seconds."
7. When you and the subject are ready, tell the subject to begin tapping

8. As soon as possible after tapping begins (but not until tapping has started), simultaneously start the countdown timer and press and hold the remote initiate button to enable the timer /counter to begin counting taps (timer counter will not record without this button being pressed down)
9. When the countdown timer reaches zero, release the remote initiate button to stop counting taps
10. Tell the subject to stop tapping
11. Record the tap count for the dominant hand
12. Have the subject transfer the stylus to his/her non-dominant hand, and reposition the metal plate for comfortable tapping with that hand
13. Reset the impulse counter (see equipment use)
14. Set the countdown timer for **20 seconds**
15. Say to the subject, "Once again, when I tell you, begin tapping on the plate as rapidly as you can and continue tapping until I tell you to stop."
16. When you and the subject are ready, tell the subject to begin tapping
17. As soon as possible after tapping begins (but not until tapping has started), simultaneously start the countdown timer and press and hold the remote initiate button to enable the impulse counter to begin counting taps
18. When the countdown timer reaches zero, release the remote initiate button to stop counting taps
19. Tell the subject to stop tapping
20. Record the tap count for the non-dominant hand

### Special Considerations

Tapping speed will typically slow shortly after a subject has been tapping continuously for several seconds, so you should not allow a prolonged period of "practice" or wait for the subject to reach his/her maximum tapping speed before beginning to count taps. You should, however, make sure that the subject has definitely begun repetitive tapping (made 2 or 3 taps in rapid succession) before starting the timer and enabling the counter with the switch. The goal of the measurement procedure is to assess the subject's tapping speed, not his/her reaction time to your "start" command.

Tapping speed is significantly effort-dependent. You should encourage subjects to tap as quickly as they can, but you should not suggest on any occasion that they try to tap faster than they did the last time, or that they try to "break their record". You should not say anything to the subject during the actual tap counting. You should, if possible, keep their exact tap counts hidden from subjects. You may be able to satisfy curious subjects by telling them that they "did just fine", and/or that their tap counts are within the range you expect to see.

Subjects may tap at a steady rate for the 20-second period, or may speed up and/or slow down one or more times. They may or may not tap with a noticeable cadence or rhythm. They may choose to tap continuously on the same spot on the metal plate, or may wander over the surface of the plate as they tap. You should not encourage any particular tapping "strategy". If a subject asks how he/she should try to tap, simply say, "You should tap in whatever comfortable way you think is fastest for you." Note: taps produced by subjects should be easily audible. Very soft touches of the stylus to the metal plate may lead to artificially high or inaccurate counts.

If a subject prematurely stops tapping because of momentary discomfort (cramp or pain), weakness, or fatigue, you should explain the abnormal measurement in the Comments section of the case report form. If a condition of the hand or wrist (arthritis, fracture, etc.) effectively prevents a valid tapping measurement from being made in one or both hands, this also should be communicated in the Comments section.

## Repeating Tap Counts

In the event that you have difficulty operating the equipment properly or the equipment seems to fail in some way, a tap count may be repeated. If a problematic tap count was with the dominant hand, you may choose to do the tap count with the non-dominant hand before repeating the tap count with the dominant hand. Whenever a tap count is to be repeated in the same hand, it should be preceded by sufficient delay time that the subject's hand is not still fatigued from the previous tap count.

If a subject appears to misunderstand the instructions; for example, if a subject stops tapping before you say to stop; (which you only do after you have released the switch to stop taps from being counted), the tap will be lower than it should be. A tap count may be repeated. You should not repeat a tap count simply because you or the subject feel that a higher count may be possible if the subject "tries harder".

Subjects should not try to count their taps as they make them, as this may cause them to tap more slowly than they would if not trying to count the taps. If you suspect that a subject is tapping at a rate significantly less than he/she is capable of because he/she is counting taps, you should tell the subject to try to tap without counting and repeat the tap count.

If a subject raises his/her arm up from the table during the tap count, then tapping may begin to reflect the use of significantly different musculature. In order to obtain uniform measurements, if this is observed, you should ask the subject to keep his/her arm flat on the table and the tap count should be repeated.

If the subject appears to drag the stylus across the plate while tapping, and the timer increases without audible taps, the counts may be artificially high. Stop the count. Demonstrate to the subject the proper tapping motion, while explaining the motion is like making dots on a paper. Repeat the count.

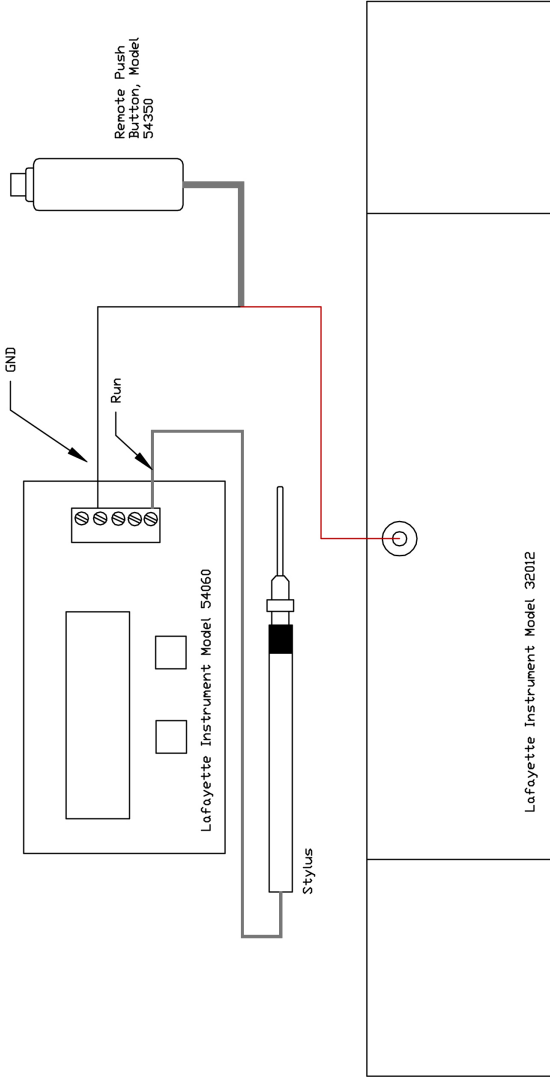
## Trouble Shooting

In the case the equipment does not work properly:

1. Check to make sure all wires in the screw terminal are connected
  - If wires are loose or have pulled out use the Flathead screwdriver provided to readjust the wires in the screw terminal block.
  - If the wires are totally pulled out see Equipment use section of this guide to determine the proper location to place the wires.
2. Check the connection of banana plug to the red jack on the tapping board.
3. Check to make sure the screw terminal block is firmly connected to the pin connector on the timer counter.
4. Make sure the timer counter is turned on.
  - If the LCD on the timer / counter does not come on when the power button is pressed, you may need to replace the batteries.
  - To replace the battery unscrew the plate on the side of the timer / counter. Take out the old AA battery and replace it with a new one. Reset the plate and replace the screws, making sure they are snug.
5. Make sure no wires have pulled loose from either the stylus, or the remote initiate.
6. Check for obvious damage to any of the equipment.
7. If you have followed these steps and the equipment is still not working properly or appears to be damaged contact Lafayette Instrument Co. @ 1-800-428-7545

# Model 35000 User's Manual

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Tapping Board

REF. DWG. NO.	TITLE		
N/A	Lilly Tapping Test Setup		
DO NOT SCALE PRINT UNLESS OTHERWISE SPECIFIED	DRAWN	TOE	DATE
	CHK'D.		10/16/01
MATERIAL	DATE		
MAX. TOLERANCES .XX = ± 0.10 .XXX = ± 0.05 ANGLE = ± 0.5°	LAFAYETTE INSTRUMENT CO. 3700 SAGAMORE PARKWAY, NORTH LAFAYETTE, IN. 47904 PH. (765) 423-1505 FAX (765) 423-4111		
SHEET METAL TOLERANCES .XX = ± 0.020 .XXX = ± 0.010 ANGLE = ± 0.5°	PART NO. N/A		
THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF LAFAYETTE INSTRUMENT CO. NO. PARTS OR EQUIPMENT TO BE COPIED, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS OR DEVICES WITHOUT PERMISSION.	REV.		FORM SHEET-A
	SHT. 1 OF 1		0

HANDLE PARTS WITH CARE. PARTS MUST BE FREE FROM SCRATCHES, BURRS, CHIPS, DIRT AND TOOL MARKS.  
ALL ALUMINUM, STAINLESS STEEL AND PLASTIC SHEET MATERIAL MUST BE COATED WITH PROTECTIVE FILM. BLANKS MUST BE CUT WITH PROTECTIVE FILM ON INDICATED SIDE OF MATERIAL. PROTECTIVE FILM MUST BE LEFT IN PLACE UNTIL DELIVERY.

Lafayette Instrument Company is the sole provider of the equipment for this test configuration. If you have questions concerning the equipment or its use please contact Lafayette Instrument Company.

# Terms and Conditions

## LIC Worldwide Headquarters

Toll-Free: (800) 428-7545 (USA only)

Phone: (765) 423-1505

Fax: (765) 423-4111

Email: [sales@lafayetteinstrument.com](mailto:sales@lafayetteinstrument.com)

[export@lafayetteinstrument.com](http://export@lafayetteinstrument.com) (Outside the USA)

## Mailing Address:

Lafayette Instrument Company

PO Box 5729

Lafayette, IN 47903, USA

## Lafayette Instrument Europe:

Phone: +44 1509 817700

Fax: +44 1509 817701

Email: [esuals@lafayetteinstrument.com](mailto:esuals@lafayetteinstrument.com)

## Phone, Fax, Email or Mail-in Orders

All orders need to be accompanied by a hard copy of your purchase order. All orders must include the following information:

- Quantity
- Part Number
- Description
- Your purchase order number or method of pre-payment
- Your tax status (include tax-exempt numbers)
- Shipping address for this order
- Billing address for the invoice we'll mail when this order is shipped
- Signature and typed name of person authorized to order these products
- Your telephone number
- Your email address
- Your FAX number

## Domestic Terms

There is a \$50 minimum order. Open accounts can be extended to most recognized businesses. Net amount due 30 days from the date of shipment unless otherwise specified by us. Enclose payment with the order; charge with VISA, MasterCard, American Express, or pay COD. We must have a hard copy of your purchase order by mail, E-mail or fax. Students, individuals and private companies may call for a credit application.

## International Payment Information

There is a \$50 minimum order. Payment must be made in advance by: draft drawn on a major US bank; wire transfers to our account; charge with VISA, MasterCard, American Express, or confirmed irrevocable letter of credit. Proforma invoices will be provided upon request.

## Exports

If ordering instrumentation for use outside the USA, please specify the country of ultimate destination, as well as the power requirements (110V/60Hz or 220V/50Hz). Some model numbers for 220V/50Hz will have a "CC" suffix.

## Quotations

Quotations are supplied upon request. Written quotations will include the price of goods, cost of shipping and handling, if requested, and estimated delivery time frame. Quotations are good for 30 days, unless otherwise noted. Following that time, prices are subject to change and will be re-quoted at your request.

## Cancellations

Orders for custom products, custom assemblies or instruments built to customer specifications will be subject to a cancellation penalty of 100%. Payment for up to 100% of the invoice value of custom products may be required in advance. Cancellation for a standard Lafayette Instrument manufactured product once the product has been shipped will normally be assessed a charge of 25% of the invoice value, plus shipping charges. Resell items, like custom products, will be subject to a cancellation penalty of 100%.

## Exchanges and Refunds

Please see the cancellation penalty as described above. No item may be returned without prior authorization of Lafayette Instrument Company and a Return Goods Authorization (RGA#) number which must be affixed to the shipping label of the returned goods. The merchandise should be packed well, insured for the full value and returned along with a cover letter explaining the reason for return. Unopened merchandise may be returned prepaid within thirty (30) days after receipt of the item and in the original shipping carton. Collect shipments will not be accepted. Product must be returned in saleable condition, and credit is subject to inspection of the merchandise.

## Repairs

Instrumentation may not be returned without first receiving a Return Goods Authorization Number (RGA). When returning instrumentation for service,

please call Lafayette Instrument to receive a RGA number. Your RGA number will be good for 30 days. Address the shipment to:

Lafayette Instrument Company

3700 Sagamore Parkway North

Lafayette, IN 47904, USA.

Shipments cannot be received at the PO Box. The items should be packed well, insured for full value, and returned along with a cover letter explaining the malfunction. An estimate of repair will be given prior to completion ONLY if requested in your enclosed cover letter. We must have a hard copy of your purchase order by mail or fax, or repair work cannot commence for non-warranty repairs.

## Damaged Goods

Damaged instrumentation should not be returned to Lafayette Instrument prior to a thorough inspection. If a shipment arrives damaged, note damage on delivery bill and have the driver sign it to acknowledge the damage. Contact the delivery service, and they will file an insurance claim. If damage is not detected at the time of delivery, contact the carrier/shipper and request an inspection within 10 days of the original delivery. Please call the Lafayette Instrument Customer Service Department for repair or replacement of the damaged merchandise.

## Limited Warranty

Lafayette Instrument Company warrants equipment manufactured by the company to be free of defects in material and workmanship for a period of one year from the date of shipment, except as provided hereinafter. The original manufacturer's warranty will be honored by Lafayette Instrument for items not manufactured by Lafayette Instrument Company, i.e. resell items. This assumes normal usage under commonly accepted operating parameters and excludes consumable products.

Warranty period for repairs or used instrumentation purchased from Lafayette Instrument is 90 days. Lafayette Instrument Company agrees either to repair or replace, at its sole option and free of part charges to the customer, instrumentation which, under proper and normal conditions of use, proves to be defective within the warranty period. Warranty for any parts of such repaired or replaced instrumentation shall be covered under the same limited warranty and shall have a warranty period of 90 days from the date of shipment or the remainder of the original warranty period whichever is greater. This warranty and remedy are given expressly and in lieu of all other warranties, expressed or implied, of merchantability or fitness for a particular purpose and constitutes the only warranty made by Lafayette Instrument Company.

Lafayette Instrument Company neither assumes nor authorizes any person to assume for it any other liability in connection with the sale, installation, service or use of its instrumentation. Lafayette Instrument Company shall have no liability whatsoever for special, consequential, or punitive damages of any kind from any cause arising out of the sale, installation, service or use of its instrumentation. All products manufactured by Lafayette Instrument Company are tested and inspected prior to shipment. Upon prompt notification by the Customer, Lafayette Instrument Company will correct any defect in warranted equipment of its manufacture either, at its option, by return of the item to the factory, or shipment of a repaired or replacement part. Lafayette Instrument Company will not be obliged, however, to replace or repair any piece of equipment, which has been abused, improperly installed, altered, damaged, or repaired by others. Defects in equipment do not include decomposition, wear, or damage by chemical action or corrosion, or damage incurred during shipment.

## Limited Obligations Covered by this Warranty

1. In the case of instruments not of Lafayette Instrument Company manufacture, the original manufacturer's warranty applies.
2. Shipping charges under warranty are covered only in one direction. The customer is responsible for shipping charges to the factory if return of the part is required.
3. This warranty does not cover damage to components due to improper installation by the customer.
4. Consumable and/or expendable items, including but not limited to electrodes, lights, batteries, fuses, O-rings, gaskets, and tubing, are excluded from warranty.
7. Failure by the customer to perform normal and reasonable maintenance on instruments will void warranty claims.
8. If the original invoice for the instrument is issued to a company that is not the company of the end user, and not an authorized Lafayette Instrument Company distributor, then all requests for warranty must be processed through the company that sold the product to the end user, and not directly to Lafayette Instrument Company.

## Export License

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