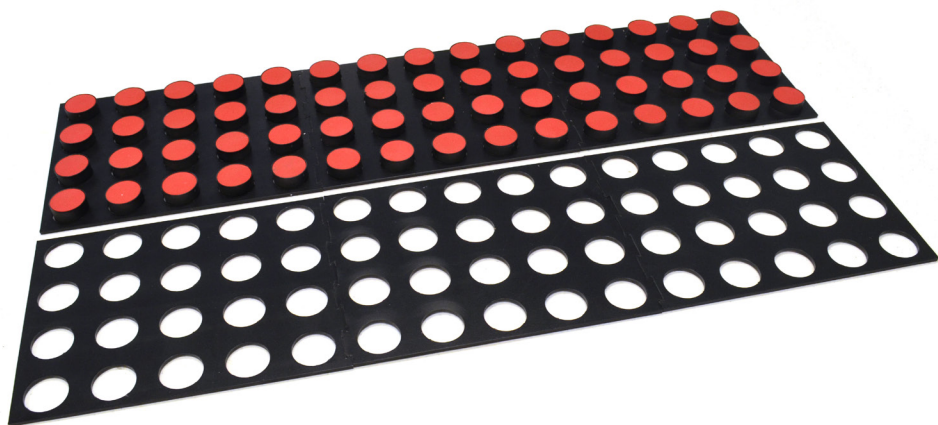


# ***Complete Minnesota Dexterity Test Examiner's Manual***



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# ***The Complete Minnesota Dexterity Test***

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## ***The Complete Minnesota Manual Dexterity Test (CMDT) Model 32023A***

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## Preface

### Introduction

The Complete Minnesota Dexterity Test (CMDT) is a frequently administered, standardized test for the evaluation of a subject's ability to move small objects various distances. This manual is a guide demonstrating the proper test procedure for each test battery. The test administrator must read and follow the manual completely to insure that standardization has occurred and that the test results are accurate. **Note: Failure to follow the manual may affect the subject's test scores, making the test invalid.**

### Theory and Application

The Minnesota Manual Dexterity Test (CMDT) is used to measure a subject's simple but rapid eye-hand coordination as well as arm-hand dexterity. In general, the CMDT measures gross motor skills.

Many approaches have been developed to classify motor skills. Each classification system is based on the general nature of the motor skills relating to some specific aspect of the skills. Magill considers three systems, in which motor skill classification is based:

1. The precision of the movement
2. Defining the beginning and end points of the movement
3. The stability of the environment

The CMDT incorporates all three of these systems in its 5 different test batteries.

The CMDT can be used for many testing applications. Physical Therapy, Occupational Therapy, vocational evaluation, and pre-employment screening are four generalized uses of the CMDT. Other applications for the CMDT can be found by doing a bibliography search.

Physical and Occupational Therapists use the CMDT for injury rehabilitation. The CMDT is a tool used to obtain baseline data on a patient. This test can also be used to document patient progress and/or degree of disability.

Vocational evaluators use the CMDT to determine a subject's ability and aptitude for certain work-related applications and for recommending job placement that requires manual dexterity. The CMDT is also used to develop a specific training program that will give an individual the skills to complete a job task that requires manual dexterity.

Human Resource Directors and Temporary Staffing Agencies use the CMDT as a pre-employment screening and selection tool. An applicant's performance on the CMDT can indicate their ability to perform in a job/task that requires manual dexterity. **Note: It is strongly recommended that the testing organization show a correlation between a subject's performance on the CMDT and a subject's performance in the specific job task.** This may be accomplished by testing subjects currently working in a specific job task who are high performers and low performers. Then test the same subjects using the CMDT. The high performer should score higher on the CMDT than the low performers.

## Administration

**Before administering the CMDT, the test administrator is advised to carefully read this section of the manual.** As with any standardized test, it is important to follow the directions very closely. If the CMDT is to be used as a basis for employee selection, the test must be administered to all applicants according to the standardized test procedure. If the test is not given identically, irrelevant factors may affect test scores. In order to reduce the variability among test administrators, specific details regarding the arrangement of materials and the testing procedures are presented below.

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The test administrator is advised to practice the administration of the CMDT before giving it for selection purposes. The amount of practice needed in order to become comfortable with the testing process is dependent upon the test administrator's previous testing experience. The test administrator should practice the CMDT until he or she is able to perform each of the tests at an above-average speed for demonstration purposes.

**Note: The test administrator will be demonstrating to the test subject what is expected of him or her before each test.**

## Timing

When using an ordinary watch or wall clock, it is recommended that the test administrator say the word "READY," pause, and then say "GO" at the instant that the second hand reaches a landmark point on the clock. For example, the test administrator may want to start on one of the five second marks. Make sure to pick a starting point on the clock that is easy to read. After the test administrator says, "GO," immediately write down the subject's starting time in minutes and seconds. As soon as the subject finishes, record the finishing time above the beginning time and calculate the difference by subtracting. This calculated number is the subject's test score. **Note: 2 minutes and 30 seconds = 150 seconds. Scoring is interpreted by total seconds for any given number of trials.**

## Test Batteries

The MMDT includes instructions for 2 test batteries:

1. Placing Test
2. Turning Test
3. Displacing Test
4. One-Hand Turning and Placing Test
5. Two-Hand Turning and Placing Test

The Placing Test and the Turning Test are the most commonly administered test batteries. Each test battery is listed in the next section separately. The directions are presented in a step-by-step format. All directions the test administrator reads to the subject are printed in **BOLD Italics** and are framed in "quotation marks". Make sure to read through the directions to ensure that they are clearly stated to the test subject.

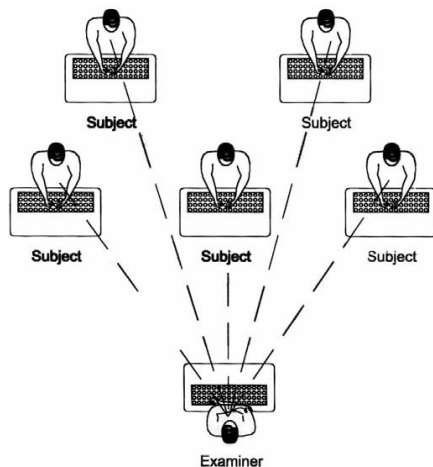
**Remember: Ask the test subject if they have any questions about the test.**

## Practice

One trial should always be given for practice. **Note: The test administrator should demonstrate the test to the subject before starting the practice trial.** Four test trials in addition to the practice trial are highly recommended. The fewer trials administered, the less test score reliability. For individual testing, norms are provided for interpreting a total score based on two, three or four test trials. Group testing norms are based on three and four test trials only.

## Group Testing

If the CMDT is to be administered to a group, the test administrator should demonstrate the test on a separate board located in front of the subjects as he or she reads the directions to the group. Figure 1 below illustrates



**Figure 1:** This picture shows an example of an optimal group testing arrangement. **Note: The test administrator should be able to observe all test subjects.**

one arrangement that permits the test administrator to oversee the testing of many subjects during group testing.

Tip: GROUP TESTING promotes competition among peers, which is good when testing a subject's ability to manipulate objects as quickly as possible. However, an individual CAN do just as well when tested individually, but he must be appropriately motivated. Motivation given by the test administrator is encouraged and necessary. Without appropriate motivation, the subject is apt to loaf along and thus not earn a score that demonstrates the subject's true potential. Overall, there is greater reliability in a group testing situation, even if only two subjects are in the group.

Special Group Instructions are available on page 6.

## Supplies Needed

You will need the following supplies or items in order for the Complete Minnesota Manual Dexterity Test (CMDT) to be a consistent, standardized test:

1. Complete Minnesota Manual Dexterity Test Model 32023A
  - Instruction Manual
  - 2 test boards
  - 60 black and red plastic disks
  - Tablet of score sheets.
2. Testing table that should be between 28 and 32 inches in height. Note: The subject will stand at the table throughout the administration of the CMDT.
3. Stopwatch or clock that reads in seconds. A stopwatch or interval timer is highly recommended, especially for group testing. Tip: When you are using an ordinary watch or wall clock, please read the paragraph in the ADMINISTRATION section of the manual that offers further instructions concerning start and stop times.

## Test Procedures

### General Instruction

The test administrator should have the CMDT in the starting position on the table before the arrival of the subject. Note: All subjects must stand during the duration of the test trials. The score sheet should be placed on the table directly in front of the test subject. When the subject(s) arrives and is standing comfortably in front of the table, say:

***"You must enter your name, the date, and your dominant hand in the spaces provided on the score sheet. Today's date is \_\_\_\_\_. Do not fill out any other part of the form."***

Give an overview of the CMDT by saying:

***"The series of tests that you are going to take will measure your eye-hand-finger coordination and gross motor skills. The tests are timed, so you must complete each as quickly as you can."***

Now administer the first test to be given in the series.

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## Special Group Instructions

If the test administrator determines that the subjects should enter their own times on the score sheet, then the following directions must be read to the group:

***"On the score sheet, there are some spaces you will use to write in the time it takes you to complete each test. Notice that there are 5 sections and that the sections have boxes that say "Practice Trial," "Trial 1," "Trial 2," "Trial 3," and "Trial 4." As you are finishing each test, I will be counting the seconds aloud like this: 55, 56, 57, 58, and so on. I want you to write down the number of seconds that you hear me say just as you finish each trial. I will tell you where to write the number before you begin each trial. Now, put the pencil and score sheet to one side making sure that it is out of your way."***

**Tip:** As the first subject is near the end of the practice trial, you should read the number of seconds aloud as an example to the subjects of what they should expect to hear. For every trial during each test, you must show the group where they should enter their times in seconds onto the score sheet.

## Placing Test

**Starting Position:** Put the first board on the table about 10 inches from the edge. Insert the disks into the holes in the board. Place the other board directly in front of the first board. The two boards should be touching each other and have their ends in a straight line. They should now be about 1 inch from the edge of the table nearest to the subject. This is the starting position for the placing test. Figure 3 below illustrates this position.

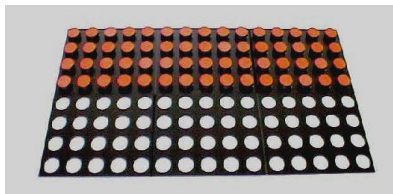


Figure 3: Starting position for the Placing Test.

Begin by saying and demonstrating:

***"The object of this test is to see how fast you can put the disks from the top board into the holes of the bottom board using only one hand. You will want to use your dominant hand."***

Demonstrate as you read the following instructions. Note: If you are facing the subject across the board, remember to demonstrate on your LEFT because the instructions pertain to the subject's RIGHT. Also remember that TOP to the subject is BOTTOM to you. You should start your demonstration slowly and increase speed as you speak.

***"You must begin on your RIGHT. Pick up the bottom disk and insert it into the top hole of the board closest to you. Now, you must pick up the next disk above the empty hole on the first board, and so on in the right column. You will move from right to left on this test. Once you complete one column, repeat the previous sequence in the second column until you have filled the entire bottom board."***

Continue demonstrating until two columns have been filled. Now, remove the eight disks from the bottom board and put them back in place into the holes in the top board.

***"You may hold the board with your free hand if you wish to do so. Do you remember the order in which you pick up the disks and place them down?"***

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If the instructions must be repeated, point to the disks in the order that they should be picked up and then point to the disks in the order that they should be placed into the holes in the board.

***"You must make sure that all of the disks are fully inserted into the holes of the board before the trial is complete. If you dropped a disk, you must pick it up and insert it into the proper hole before the time is stopped. Your score will be the total number of seconds it takes to complete several trials. We will record the time for each trial separately. When you finish one trial, we must rearrange the boards into the starting position before starting another trial. Please do not touch the disks until you hear further instruction."***

Start the stopwatch or log the time as soon as you say the word, "GO." During the practice trial, you can provide assistance to the subject if necessary.

You will now begin the first trial by saying:

***"Put your hand on the first disk. READY, GO!"***

When the subject is finished with the trial, log the time in seconds in the space provided on the score sheet. Now, you must move the bottom board (now filled with disks) to the top and move the unfilled board to the bottom. Remember: The boards should be about on 1 inch from the edge of the table. The boards should now be in the starting position for the next trial of the Placing Test. You can begin the next trial by saying:

***"Put your hand on the first disk. READY, GO!"***

Repeat the above procedure until all of the desired trials are completed. You should encourage the subject between every trial by stating the appropriate sentence:

***"Remember, you are being timed, so complete each trial as quickly as possible."***

OR,

***"You did a good job, but I believe that you can complete the next trial faster."***

And on the last trial,

***"This is the last trial and should be your best time."***

At the end of the last trial, you will say:

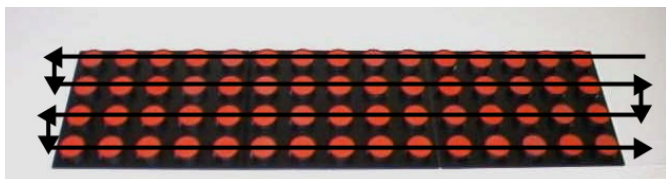
***"That's all for this test."***

If you are going to give another test, you should let your subject know that he or she will be taking a different test now. At the completion of the Placing Test, the board and disks should be in the correct starting position for the Turning Test or Displacing Test.

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## Turning Test

**Starting Position:** Put one of the boards on the table about 1 inch from the edge closest to the subject. Insert all of the disks into the holes in the board with either the RED or BLACK side facing UP (the color must be consistent on the whole board). You should now be in the starting position for the Turning Test, which is illustrated below in Figure 4.



**Figure 4:** Starting position and sequence of rows with directions of travel for the Turning Test.

Begin by saying:

***“The object of this test is to see how fast you can pick up the disks with one hand, turn them with the other hand, and replace the disks back into the holes on the board.”***

You should start your demonstration slowly and increase speed as you speak. Figure 4 illustrates the sequence of rows and the direction of travel in the Turning Test. **Note: If you are facing the subject across the board, remember to demonstrate on your LEFT because the instructions pertain to the subject’s RIGHT. Also remember that TOP to the subject is BOTTOM to you.** Demonstrate as you read the following instructions.

***“With your LEFT hand, pick up the block from the upper right-hand corner. Turn the disk while passing it to your RIGHT hand and return it into the original hole in the board with the BOTTOM side facing UP. You must work to your LEFT across the board on the top row.”***

Continue to demonstrate until you complete the entire TOP row. As you start to demonstrate the second row, say:

***“Now with your RIGHT hand, pick up the first block in the second row. Turn the disk while passing it to your LEFT hand and return it into the original hole with the BOTTOM side facing UP. You will work to your RIGHT until you complete the entire row.”***

The subject always picks UP the blocks with the hand that LEADS and put them DOWN with the hand that FOLLOWS. Continue demonstrating the test in its entirety.

***“As you work back to the LEFT in the third row, you will use your LEFT hand to pick up the disk and your RIGHT hand to return it back to the original hole. Working back to your RIGHT on the fourth row, you must use your RIGHT hand to pick up the disk and your LEFT hand to return it.”***

You should finish the test at a moderate speed. All of the disks must be turned so the same color is facing UP. The board should now be in the original starting position.



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***"You must make sure that all of the disks are fully inserted into the holes of the board before the trial is complete. If you dropped a disk, you must pick it up and insert it into the proper hole before the time is stopped. Your score will be the total number of seconds it takes to complete several trials. We will record the time for each trial separately. When you finish one trial, the board and disks should already be in the starting position for another trial. In other words, the opposite color on the disks is now exposed. Please do not touch the disks until you hear further instructions."***

Start the stopwatch or note the time as soon as you say the word, **"GO."** During the practice trial, you can provide assistance to the subject if necessary. You will now begin the first trial by saying:

***"Put your LEFT hand on the disk in the top righthand corner of the board. READY, GO!"***

When the subject is finished with the trial, log the time in seconds in the space provided on the score sheet.

**Remember:** The board should be about 1 inch from the edge of the table. You can begin the next trial by saying:

***"Put your LEFT hand on the disk in the top righthand corner. READY, GO!"***

Repeat the above procedure until all of the desired trials are completed. You should encourage the subject between every trial by stating the appropriate sentence:

***"Remember, you are being timed, so complete each trial as quickly as possible."***

OR,

***"You did a good job, but I believe that you can complete the next trial faster."***

And on the last trial,

***"This is the last trial and should be your best time."***

At the end of the last trial, you will say:

***"That's all for this test."***

If you are going to give another test, you should let your subject know that he or she will be taking a different test now. At the completion of the Turning Test, the board and disks will be in the correct position for the Displacing Test.

## Displacing Test

**Starting Position:** Put one of the boards on the table about 1 inch from the edge closest to the subject. Insert all of the disks into the holes in the board with either the RED or BLACK side facing UP (the color must be consistent on the whole board). You should now be in the starting position for the Displacing Test. Figure 5 illustrates this position.



**Figure 5:** Starting position and sequence of columns with direction of travel for the Displacing Test.

When the scores of an individual on two or more different tests are to be combined into a composite (sum or average) score, raw scores must first be given a scale value. This can be done by reference to one of the scales at the left side of the chart in Appendix A or B. This must also be done when the difference in score on two tests is to be interpreted, i.e., when one wishes to judge whether an examinee made a better score on one

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test than on another. This is a major function of the norm charts, for the relative value of scale scores shows visually which are the better and poorer test scores for a subject. The primary function of the norm chart is to assist users in dealing graphically with the scores of an individual as sums, differences and averages. The charts are not designed to furnish a final basis for establishing critical scores.

Begin by saying:

***"Remove the disk from the upper left-hand corner (the top hole in the first column) and put it to the side. This is the starting position for the Displacing Test. The object of the test is to see how fast you can move the blocks from one hole to another. You can use either hand for this test."***

The best way to instruct the subject about the test procedure is to stand next to them and demonstrate as you read though the following directions. Refer to Figure 5.

***"Fill the top hole with the disk directly below it. Now this leaves the second hole in the first column empty. Then, fill this empty hole with the disk directly below it, and keep doing this until the bottom hole in the first column is empty. Now, fill the bottom hole with the bottom disk from the second column. In the second column, keep filling each empty hole with the disk above it (this will be moving in the opposite direction of the first column), until the top hole is empty. Fill the top hole in the second column with the disk directly to the right in the third column, and continue moving the disks in the manner until you have worked across the whole board."***

Make sure to end your demonstration with a pointing motion indicating the remaining disks. The test subject is simply moving one disk to fill the empty hole left from the previous disk and so on. Make sure that the empty hole is in the upper lefthand corner.

***"You must make sure that all of the disks are fully inserted into the holes of the board before the trial is complete. If you dropped a disk, you must pick it up and insert it into the proper hole before the time is stopped. Your score will be the total number of seconds it takes to complete several trials. We will record the time for each trial separately. When you finish one trial, we must rearrange the boards into the starting position before starting another trial. Remember to move the disk in the top left-hand corner to fill the hole in the bottom right-hand corner. Please do not touch the disks until you hear further instructions."***

Start the stopwatch or note the time as soon as you say the word, "GO." During the practice trial, you can provide assistance to the subject if necessary. You will now begin the first trial by saying:

***"Put your hand on the disk just below the empty hole in the left-hand corner of the board. READY, GO!"***

When the subject is finished with the trial, log the time in seconds in the space provided on the score sheet. Remember: The board should be about 1 inch from the edge of the table. You can begin the next trial by saying:

***"Now fill the hole in the lower right-hand corner of the board with the disk from the upper left-hand corner. Put your hand on the disk just below the empty hole in the left-hand corner of the board. READY, GO!"***

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Repeat the above procedure until all of the desired trials are completed. You should encourage the subject between every trial by stating the appropriate sentence:

***"Remember, you are being timed, so complete each trial as quickly as possible."***

OR,

***"You did a good job, but I believe that you can complete the next trial faster."***

And on the last trial,

***"This is the last trial and should be your best time."***

At the end of the last trial, you will say:

***"That's all for this test."***

If you are going to give another test, you should let your subject know that he or she will be taking a different test now.

## One-Hand Turning and Placing Test

**Starting Position:** Put the first board on the table about 10 inches from the edge. Insert the disks into the holes in the board. Place the other board directly in front of the first board. The two boards should be touching each other and have their ends in a straight line. They should now be about 1 inch from the edge of the table. This is the starting position for the One-Hand Turning and Placing Test. Figure 3 on page 7 illustrates this position.

Begin by saying and demonstrating:

***"The object of this test is to see how fast you can pick up the disks from the top board, turn the disks over, thus showing the other color of the disk, and place them into the holes of the bottom board. This is to be done using only one hand. You will want to use your dominant hand."***

You should start your demonstration slowly and increase speed as you speak. Note: If you are facing the subject across the board, remember to demonstrate on your LEFT because the instructions pertain to the subject's RIGHT. Also remember that TOP to the subject is BOTTOM to you. Demonstrate as you read the following instructions.

***"You must begin on your RIGHT. Pick up the bottom disk and insert it into the top hole of the board closest to you, while turning the disk over to expose the other color. Now, you must pick up the next disk above the empty hole on the first board, and so on in the right column. You will move from right to left on this test. Once you complete one column, repeat the previous sequence in the second column until you have filled the entire bottom board."***

Continue demonstrating until two columns have been filled. Remember: The subject must be turning the disks over to expose the other color. Now, remove the 8 disks from the bottom board and put them back in place into the holes in the top board.

***"You may hold the board with your free hand if you wish to do so. Do you remember the order in which you must pick up the disks and place them down?"***

If the instructions must be repeated, point to the disks in the order that they should be picked up and then point to the disks in the order that they should be placed in the holes in the bottom board.

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***"You must make sure that all of the disks are fully inserted into the holes of the board before the trial is complete. If you dropped a disk, you must pick it up and insert it into the proper hole before the time is stopped. Your score will be the total number of seconds it takes to complete several trials. We will record the time for each trial separately. When you finish one trial, we must rearrange the boards into the starting position before starting another trial. Please do not touch the disks until you hear further instructions."***

Start the stopwatch or log the time as soon as you say the word, "GO." During the practice trial, you can provide assistance to the subject if necessary.

You will now begin the first trial by saying:

***"Put your hand on the first disk. READY, GO!"***

When the subject is finished with the trial, log the time in seconds in the space provided on the score sheet. Now, you must move the bottom board (now filled with disks) to the top and move the unfilled board to the bottom. Remember: The boards should be about 1 inch from the edge of the table. The boards should now be in the starting position for the next trial of the Displacing Test. You can begin the next trial by saying:

***"Put your hand on the first disk. READY, GO!"***

Repeat the above procedure until all of the desired trials are completed. You should encourage the subject between every trial by stating the appropriate sentence:

***"Remember, you are being timed, so complete each trial as quickly as possible."***

OR,

***"You did a good job, but I believe that you can complete the next trial faster."***

And on the last trial,

***"This is the last trial and should be your best time."***

At the end of the last trial, you will say:

***"That's all for this test."***

If you are going to give another test, you should let your subject know that he or she will be taking a different test now.

## Two-Hand Turning and Placing Test

**Starting Position:** Put the first board on the table about 10 inches from the edge. Insert the disks into the holes in the board. Place the other board directly in front of the first board. The two boards should be touching each other and have their ends in a straight line. They should now be about 1 inch from the edge of the table. This is the starting position for the Two-Hand Turning and Placing Test. Figure 3 on page 7 illustrates this position.

Begin by saying and demonstrating:

***"The object of this test is to see how fast you can pick up the disks from the top board, two at a time (one in each hand), turn the disks over, thus showing the other color of the disk, and place them into the holes of the bottom board. This is to be done using BOTH hands."***

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Demonstrate as you read the following instructions. Note: If you are facing the subject across the board, remember to demonstrate on your LEFT because the instructions pertain to the subject's RIGHT. Also, remember that TOP to the subject is BOTTOM to you. You should start your demonstration slowly and increase speed as you speak.

***"You must begin on your RIGHT. Pick up the bottom two disks in the first column (one on top of the other), and insert them into the top 2 holes in the first column of the board closest to you, while turning the disks over to expose the other color. Now, you must pick up the next 2 disks above the empty holes on the TOP board, and so on in the right column. You will move from RIGHT to LEFT on this test. Once you complete one column, repeat the previous sequence in the next columns until you have filled the entire bottom board."***

Continue demonstrating until two columns have been filled. Remember: The subject must be turning the disks over to expose the other color. Now remove the eight disks from the bottom board and put them back in place into the holes in the top board.

***"Do you remember the order in which you must pick up the disks and place them down?"***

If the instructions must be repeated, point to the disks in the order that they should be picked up and then point to the disks in the order that they should be placed in the holes in the bottom board.

***"You must make sure that all of the disks are fully inserted into the holes of the board before the trial is complete. If you dropped a disk, you must pick it up and insert it into the proper hole before the time is stopped. Your score will be the total number of seconds it takes to complete several trials. We will record the time for each trial separately. When you finish one trial, we must rearrange the boards into the starting position before starting another trial. Please do not touch the disks until you hear further instruction."***

Start the stopwatch or log the time as soon as you say the word, "GO." During the practice trial, you can provide assistance to the subject if necessary. You will now begin the first trial by saying:

***"Put your hand on the first disk. READY, GO!"***

When the subject is finished with the trial, log the time in seconds in the space provided on the score sheet. Now, you must move the bottom board (now filled with disks) to the top and move the unfilled board to the bottom. Remember: The boards should be about 1 inch from the edge of the table. The boards should now be in the starting position for the next trial of the Displacing Test.

You can begin the next trial by saying:

***"Put your hand on the first disk. READY, GO!"***

Repeat the above procedure until all of the desired trials are completed. You should encourage the subject between every trial by stating the appropriate sentence:

***"Remember, you are being timed, so complete each trial as quickly as possible."***

OR,

***"You did a good job, but I believe that you can complete the next trial faster."***

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And on the last trial,

***“This is the last trial and should be your best time.”***

At the end of the last trial, you will say:

***“That’s all for this test.”***

You have now completed the last test battery of the Complete Minnesota Dexterity Test.

## ***Scoring and Interpretation of Data***

### ***Scoring***

The score on any test of the Complete Minnesota Dexterity Test (CMDT) is the total seconds required to complete the chosen number of test trials. Two, three or four test trials may have been administered. The practice trial time is not included in the total score.

### ***Composite and comparative scores***

When the scores of an individual on two or more different tests are to be combined into a composite (sum or average) score, raw scores must first be given a scale value. This can be done by reference to one of the scales at the left side of the chart in Appendix A or B. This must also be done when the difference in score on two tests is to be interpreted, i.e., when one wishes to judge whether an examinee made a better score on one test than on another. This is a major function of the norm charts, for the relative value of scale scores shows visually which are the better and poorer test scores for a subject. The primary function of the norm chart is to assist users in dealing graphically with the scores of an individual as sums, differences and averages. The charts are not designed to furnish a final basis for establishing critical scores.

### ***Interpretation***

The interpretation of CMDT scores is most appropriately based upon results from prior use of the test in specific selection applications. As pointed out in a previous section, Human Resources Personnel usually wish to classify job applicants into categories. The question then arises: How high or how low must a subject score be to place in one category rather than another? The answer to this question establishes a critical score. For example, an employer may decide that he will employ for certain types of jobs, applicants who score at or above the 75th percentile point and that he will not employ applicants who score below this. He has, by this decision, set the 75th percentile point as the critical score.

How such a decision was reached is an important matter, but the norms presented in Appendices A and B constitute an insufficient basis for such action. If applicants are plentiful, an employer can, of course, arrange them in such an order that the one scoring highest is at the top, the one scoring lowest is at the bottom and the others range between these two extremes. He then can fill his vacancies from the top of such a list—unless it should turn out that the most successful employees lie somewhere between two critical scores, or that they possess a certain pattern of abilities. Such is often the case.

Critical scores can be established systematically and accurately. A good procedure for doing this is to test all applicants routinely and then provide for a follow-up study. From the follow-up study, certain employees eventually can be classified into two categories—satisfactory and unsatisfactory, based upon actual performance on the job. Study of the test scores made by these two contrasting criterion groups will indicate which tests may justifiably be used and what critical scores make possible the most accurate prediction. Personnel selection then is established on a sound and practical basis.

## Technical Data

### Frequency Distributions

The nature of the frequency distributions that may be expected by administering the CMDT to a cross-sectional population-sample is illustrated by Figures 6 and 7. These distributions were accumulated in the period just prior to 1933 by administering the tests to employed and unemployed persons. The tests were administered as group tests. The norms presented in Appendix A for group testing are derived from these distributions.

### Reliability

Jurgensen (1943) determined reliability on four tests of the CMDT by correlating time on first and second trials and correcting with the Spearman–Brown formula. These results are presented in Table 1. Table 1 also includes estimates of the reliability of two-trial and four-trial tests based on Jurgensen's data.

### Validity

A report by Jurgensen (1943) concerns the use of the CMDT in a corporation that manufactures pulp, paper and paper specialties. The group tested was composed of men hired as converting machine operators in the paper mill. The work required occasional machine adjustments, but consisted chiefly in removing a specified number of tissue paper sheets from the machine, raising the top sheet to insert advertising material, and placing the package of sheets on a conveyer. All were right-handed, high school graduates, aged 18 to 31 years. Three supervisors independently rated each worker on a scale of 5. Ratings were converted to T-scores, and the sum of the three T-scores was used as the criterion of success. The reliability of the criterion measure, estimated by the Spearman–Brown formula, was 0.75. The four tests administered were the Placing Test, the Turning Test, the One-Hand Turning and Placing Test and the Two-Hand Turning and Placing Test. Two trials were administered for each test.

Table 2 presents the correlations between the four CMDT tests and the success criterion. In addition to Jurgensen's data, Table 2 includes validity coefficients corrected for attenuation. Using the correlation coefficients in Table 2, a multiple R of 0.61 between two of the tests (Turning and One-Hand Turning and Placing) and the criterion was obtained.

### Intercorrelations

The intercorrelations among four of the tests are reported in Table 3.

### Correlation with Another Motor Skill Test

Table 4 reports correlations that have been obtained between two tests of the CMDT and the Pennsylvania Bi-Manual Worksample (Roberts, 1945).

# The Complete Minnesota Dexterity Test

## FREQUENCY DISTRIBUTIONS

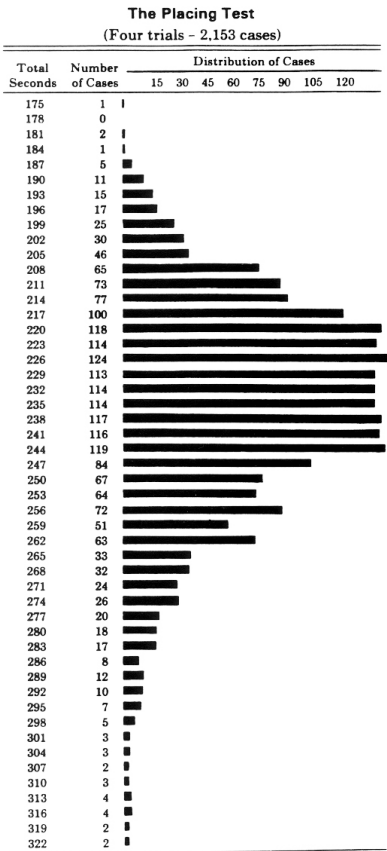


Figure 4 Frequency distribution of score on the Placing test.

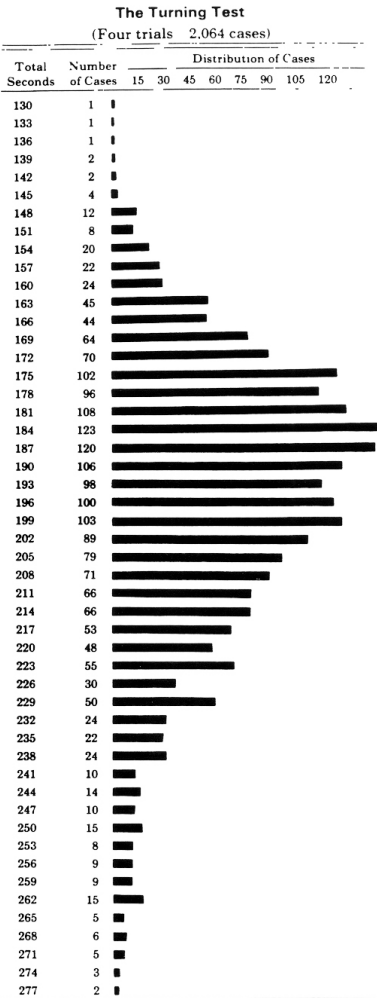


Figure 5 Frequency distribution of scores on the Turning Test.



## Technical Data

**Table 1: Reliability of the CMDT (n=212)**

Test	Two-Trial Reliability	Four-Trial Reliability
Placing	0.87	0.93
Turning	0.91	0.95
One-Hand Turning and Placing	0.95	0.98
Two-Hand Turning and Placing	0.94	0.97

**Table 2: Validity Coefficients (n=60)**

Test	Mean	Standard Deviation	Validity	
			Gross	Corrected for Attenuation
Placing	123.2	10.1	0.32	.40
Turning	98.9	9.3	0.46	0.55
One-Hand Turning and Placing	152.6	15.7	0.57	0.67
Two-Hand Turning and Placing	86.9	9.4	0.33	0.39

**Table 3: Intercorrelations Among Four Tests**

Test	Placing	Turning	One-Hand Turning and Placing	Two-Hand Turning and Placing
Placing	1.00	.52	.53	.46
Turning		1.00	.46	.55
One-Hand Turning and Placing			1.00	.64
Two-Hand Turning and Placing				1.00

**Table 4: Correlation Between the CMDT and the Pennsylvania Bi-Manual Worksample**

MRMT	Pennsylvania Bi-Manual Worksample	n	r
Placing	Assembly	477	.46
Turning	Assembly	473	.40

# The Complete Minnesota Dexterity Test

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## Appendix A

### Group and Individual Norms Based on Older Adult Unemployed

The norms and information presented in Appendix A are taken from the manual for the Minnesota Rate of Manipulation. These norms are based on the distribution of scores obtained from 3,000 cases tested by the Employment Stabilization Research Institute at the University of Minnesota. The sample was comprised largely of adult, older, unemployed people.

The unique feature of the norm chart is the use of several equated scales, so for interpretation purposes, conversion from one to the other is automatic. They are equated on the assumption of a normal distribution.

### Types of Interpretation Scales

Four scales are aligned on the left of the chart:

1. Percentile scale
2. Standard scale
3. Stanine scale
4. Verbal scale

The **percentile scale** is used when a score on a test is interpreted in terms of percent of the normative population surpassed by a subject making a particular score. The midpoint 50 on the scale is the median, representing that the score made by a subject was better than 50 percent of the normative population. In other words, percentile point 25 represents that a subject performed better than 25 percent of the normative population. Other percentile points are interpreted similarly.

The **standard scale** is a statistical analysis of a subject's score. It is derived from the normal frequency curve. This curve is bell-shaped and not rectangular like the frequency curve from which the percentile scale is derived. Standard score 50, representing the mean (arithmetic average), is equated to percentile point 50. Similarly standard scores 45 and 55 are equated to percentile points 31 and 69 respectively. These points represent the maximum and minimum scores made by the middle 38 percent of the normative population. The difference between these two scores approximates the standard deviation (SD) to equal 10, on the standard scale. Furthermore, a standard score of 60 is a score one standard deviation above the mean, and a standard score of 30 is a score two standard deviations below the mean, if the distribution is normal.

The **stanine scale** is simply the standard scale divided into nine categories. It is useful when punching data into a card to be processed by an automatic sorting machine. Each category in the stanine scale, except the first and the ninth, is bounded by 5-point intervals on the standard scale.

The **verbal scale** is merely a scale of broad categories. Thus, a subject described as having very high ability would be an individual whose measured ability score falls above  $1\frac{1}{2}$  standard deviation (SD) from the mean. A high-ability subject's score will fall within a range of one SD from the mean. A subject described as having average ability would be an individual whose measured ability score falls within the range of  $\frac{1}{2}$  SD above and below the mean. A low-ability subject would fall within the range of one SD below the mean. A subject with very low ability would be an individual whose score falls under  $1\frac{1}{2}$  SD below the mean.

### Norms

In the CMDT Interpretation Chart, the first two columns of norms are used to interpret scores made when the Placing and Turning tests are administered as group tests, and when an examinee is given four trials. All other entries constitute norms for tests administered as individual tests. Separate norms are given for use when the examinee is administering four trials, three trials and two trials. Norms were derived from data furnished by: W. A. Ziegler, Clifford E. Jurgensen, Lindsey R. Harmon John R. Roberts, and Mary Bauman. (AGS, 1969)

## COMPLETE MINNESOTA DEXTERITY TEST - INTERPRETATION CHART

SCALES				GROUP TESTING 4 trials (seconds)		INDIVIDUAL TESTING (Total seconds by test)																	AVERAGE (Percentile)
VERBAL	STANINE	STANDARD	PERCENTILE			Four trials						Three trials						Two trials					
						Placing	Turning	Placing	Turning	Displacing	1-Hand Turning and Placing	2-Hand Turning and Placing	Placing	Turning	Displacing	1-Hand Turning and Placing	2-Hand Turning and Placing	Placing	Turning	Displacing	1-Hand Turning and Placing	2-Hand Turning and Placing	
Very high	9	70	99 -	193	150	199	154	153	230	126	149	116	115	173	96	100	77	79	116	65	99		
			98 -	197	156	204	158	157	239	132	153	119	118	189	100	102	80	81	120	68	98		
			97 -	201	158	207	161	160	244	135	156	121	120	184	102	104	81	82	123	69	97		
			95 -	205	164	212	165	164	251	140	169	125	123	189	106	107	84	84	127	71	95		
High	8	65	90 -	211	170	218	171	168	262	146	164	129	126	197	111	110	87	86	133	75	90		
			85 -	215	175	223	175	172	269	151	168	132	129	203	114	113	89	88	136	77	85		
			80 -	219	178	227	178	175	276	155	171	135	131	208	117	115	91	89	139	79	80		
			75 -	222	181	230	181	178	281	158	173	137	133	212	119	116	93	90	142	81	75		
Average	6	55	69 -	225	184	233	184	180	286	161	176	139	135	216	122	117	94	90	145	82	69		
			60 -	230	189	238	188	184	293	166	179	143	138	221	125	121	97	93	149	85	60		
			50 -	236	195	242	192	189	301	171	183	146	142	227	129	123	99	95	153	87	50		
			40 -	241	201	246	197	195	309	175	187	149	146	233	132	126	101	96	157	89	40		
Low	4	45	31 -	246	207	252	201	199	316	180	190	152	149	239	136	128	104	98	160	92	31		
			25 -	251	212	255	203	203	321	183	193	155	152	243	138	130	105	99	163	93	25		
			20 -	256	217	258	206	207	327	187	195	157	155	246	141	132	107	100	166	95	20		
			15 -	261	223	262	210	211	333	190	198	160	158	251	144	134	109	101	169	97	15		
Very low	2	35	10 -	267	230	266	214	216	340	195	202	163	162	257	147	136	111	103	173	99	10		
			5 -	279	243	273	220	229	351	202	207	167	172	265	152	140	114	106	179	102	5		
			3 -	286	253	276	224	239	358	206	210	170	179	270	156	142	116	107	182	105	3		
			2 -	293	260	281	226	244	364	210	213	173	183	274	158	144	118	108	185	106	2		
Very low	1	30	1 -	302	265	286	231	260	372	215	217	176	195	281	162	147	121	110	189	109	1		

# The Complete Minnesota Dexterity Test

## Appendix B

### Group Placing Test and Turning Test Norms for Young Adults

These norm tables are based on a sample of young people who were employed or seeking employment. The norms were established by 11,000 new cases tested. Scores of the 11,000 new cases, made up largely of younger people in their early employment careers, were collected. In one group, made up of 6,000 Minneapolis Public Library patrons, the median age was 19 years.

#### Placing Test

	Percentile Rank	Seconds for Three Trials	Standard Score
Very High	100		
	90	138	6.28
High	80	144	5.84
	70	148	5.53
Average	60	152	5.25
	50	155	5.00
	40	159	4.75
Low	30	162	4.47
	20	167	4.16
Very Low	10	174	3.72
	0		

#### Turning Test

	Percentile Rank	Seconds for Three Trials	Standard Score
Very High	100		
	90	109	6.28
High	80	114	5.84
	70	118	5.53
Average	60	121	5.25
	50	124	5.00
	40	127	4.75
Low	30	131	4.47
	20	135	4.16
Very Low	10	142	3.72
	0		

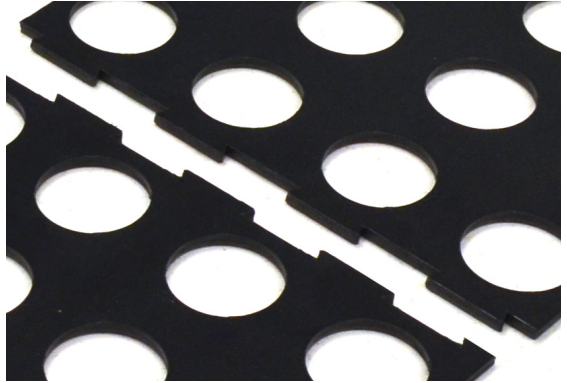
## Appendix C

### Instructions for Board Setup

The following are instructions for connecting the 3 parts of the Minnesota Manual Dexterity Test Board.

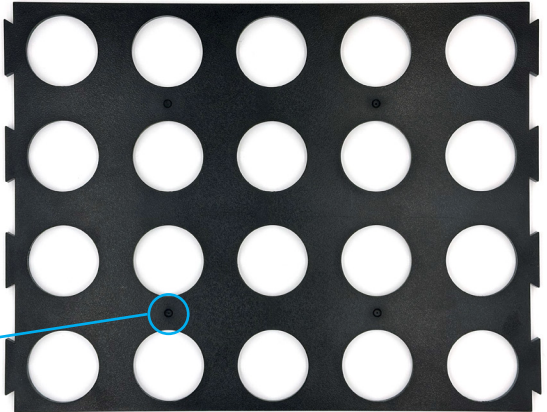
#### Step 1: Observe Connection Slots

At right is a photo of the slotted connection area of the MMDT board. Line up the slots with the corresponding connector.



**NOTE:** Ensure (on each of the boards) the face with the injection mold markings is facing downward.

Injection mold marking



#### Step 2: Align Slots with Connectors

Place the connectors of one board over the corresponding slots of the other as shown in the photo at right.

#### Step 3: Push Down Connectors

Lightly push down each connector with your fingers until it is flush. Repeat steps 2 and 3 for the final board.



# The Complete Minnesota Dexterity Test

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## References

- American Guidance Service (1969). *Minnesota Rate of Manipulation Test: Examiner's Manual*. Circle Pines, Minn.
- Jurgensen, C. E. (1943). Extension of the Minnesota Rate of Manipulation Test. *Journal of Applied Psychology*, 27, 164-169.
- Magill, R. A. (1989). *Motor Learning Concepts and Applications*. Iowa: William C. Brown Publishers.
- Roberts, J. R. (1945). *Pennsylvania Bi-Manual Worksample: Examiner's Manual*. Circle Pines, Minnesota: American Guidance Service.

## Replacement Parts and Reordering Information

We at Lafayette Instrument Company continue our service after the sale by offering the following replacement parts for the MMDT:

Disks..... Model 32031  
Board..... Model 1-04811  
Manual..... MAN186  
Score Sheets.....Model 32032

We can be contacted from 8:00am -5:00pm Monday through Friday for pricing and ordering.

# Examiner's Manual

## Complete Minnesota Manual Dexterity Test Score Sheet

### Model 32023A

## Quick Reference Averages (50 Percentile) in Seconds Based on Number of Trials

	Placing Test	Turning Test	Displacing Test	1-Hand Turning & Placing Test	2-Hand Turning & Placing Test
Two Trials*	123	99	95	153	87
Three Trials* ^	183	146	142	227	129
Four Trials*	242	192	189	301	171

\* Data taken from the INTERPRETATION CHART

^ Data found in APPENDEX B for Group Testing averages based on three trials.

### Subject Record

Name: \_\_\_\_\_

Dominate Hand: Right / Left

Reason for Administrating: \_\_\_\_\_

Test Administrator Name: \_\_\_\_\_

Test Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

### Scoring Grid Based on Number of Seconds

	Practice Trial	Trial One	Trial Two	Trial Three	Trial Four	Total Seconds	Score A**	Score B**
Placing Test								
Turning Test								
Displacing Test								
1-Hand Turning & Placing Test								
2-Hand Turning & Placing Test								

\*\* Refer to the INTERPRETATION CHART and choose from the various SCALES.  
You can use the Verbal Scale, Stanine Scale, Standard Scale, or Percentile Scale.  
The Verbal Scale and Percentile Scale are the most commonly used.

# Terms and Conditions

## Worldwide Headquarters

Lafayette Instrument Company  
3700 Sagamore Parkway North  
Lafayette, IN 47904, USA

Tel: (765) 423-1505

Fax: (765) 423-4111

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

## European Office

Tel: +44 1509 817700

Fax: +44 1509 817701

[sales@campdeninstruments.com](mailto:sales@campdeninstruments.com)

## Placing an Order

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

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

## Exchanges and Refunds

No item may be returned without prior authorization from Lafayette Instrument Company and a Return Materials Authorization (RMA#) number which must be affixed to the shipping label of the returned goods. The merchandise should be packed well and insured for the full value. 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 Materials Authorization Number (RMA). When returning instrumentation for service, please contact Lafayette Instrument to receive an RMA number. Your RMA number will be good for 30 days. Address the shipment to:

Lafayette Instrument Company  
RMA# XXXX  
3700 Sagamore Parkway North  
Lafayette, IN 47904, USA.

Shipments cannot be received at the PO Box. All items should be packed well and insured for full value. An estimate of repair will be given prior to completion. We must receive a copy of your purchase order via email before non-warranty repair work can commence.

## 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 contact the Lafayette Instrument Customer Service Department for repair or replacement of the damaged merchandise.

## Limited Warranty

Lafayette Instrument Company warrants equipment to be free of defects in material and workmanship for a period of one year from the date of shipment, except as provided hereinafter. 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. 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.
2. This warranty does not cover damage to components due to improper installation by the customer.
3. Consumable and/or expendable items, including but not limited to electrodes, lights, batteries, fuses, O-rings, gaskets, and tubing, are excluded from warranty.
4. Failure by the customer to perform normal and reasonable maintenance on instruments will void warranty claims.
5. 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.