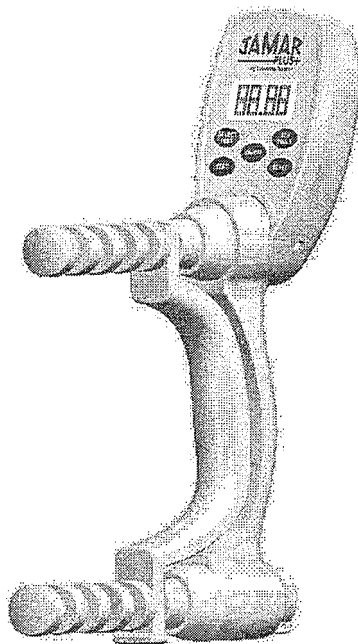


JAMAR[®] PLUS + HAND DYNAMOMETER

From

Performance Health[®]

Sammons Preston[®]



USER'S GUIDE

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OVERVIEW

The JAMAR[®] Hydraulic Hand Dynamometer has been used for over 40 years to measure grip strength.

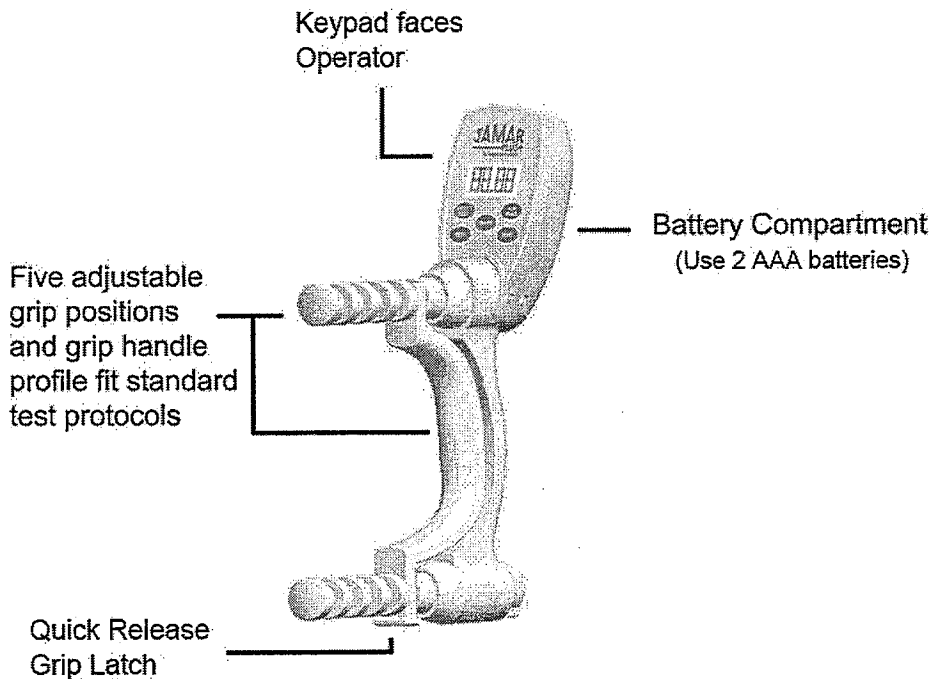
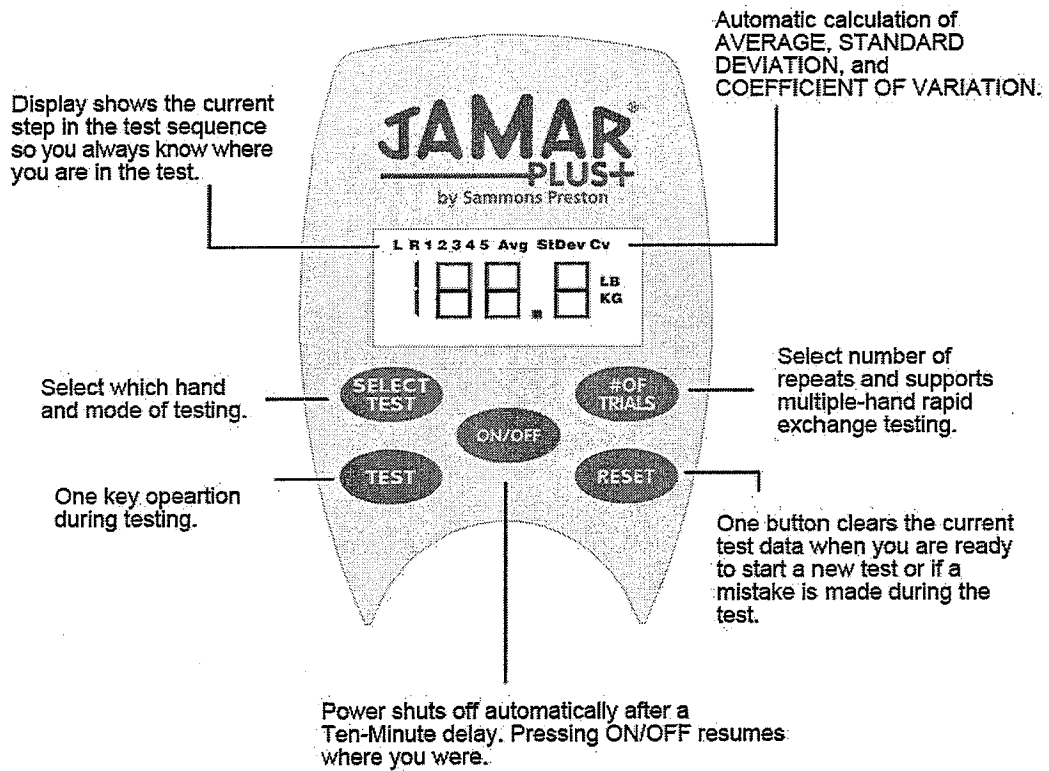
Now Sammons Preston has redesigned the Jamar to make it easier to use.

FEATURES:

- ◇ **Precision Electronic Load Cells** eliminate the possibility of oil leakage that sometimes occurred with hydraulic units. The unit allows measurement from 0 to 200 lbs (90Kg)
- ◇ **Easy-to-Read Display** helps configure a specific test protocol, and provides step-by-step prompts through the testing process. The display will always show the next step in the test, even for rapid exchange protocols. In addition, the JAMAR PLUS + saves the previous test, saving time if the same test protocol is used each time. Up to 5 tests/trials can be conducted with each hand without reset.
- ◇ **AVERAGE, STANDARD DEVIATION, and COEFFICIENT OF VARIATION** are automatically calculated. Hand to hand rapid exchange tests are separately calculated for each hand.
- ◇ Individual test readings and all calculations can be reviewed multiple times. The display shows which reading is being displayed to reduce error.
- ◇ **Power Saving Mechanism** gives several months of operation in daily use, using only two (2) included standard AAA batteries.

These features, along with the rugged design of the new JAMAR PLUS + Hand Dynamometer, help complete each test more quickly and efficiently resulting in less chance for error in performing calculations and transposing data.

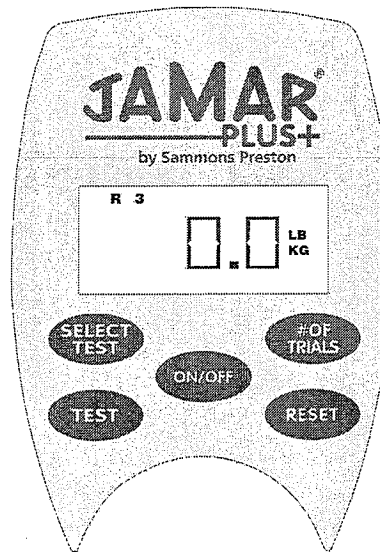
CONTROL PANEL



SET-UP/TEST

Power ON

Press the [ON/OFF] key on the face of the JAMAR PLUS+. The display will appear as shown below, with the display showing the most recent test protocol. The default test protocol is "R" (Right) "3", which means the test protocol is set for the Right Hand with three (3) repeats.



CHOOSING THE HAND TO BE TESTED

Press the [RESET] key to clear any test which might be in progress. Then press the [SELECT TEST] key to step through the available choices. Press [SELECT TEST] for these choices:

| <u>Choice</u> | <u>Display Shows</u> |
|---------------|----------------------|
| Left | L |
| Right | R |
| Left & Right | L R |
| 1.5 RX 10 | 1.5 RX 10 |
| RX 3.0 10 | RX 3.0 10 |

CHANGING THE NUMBER OF TRIALS

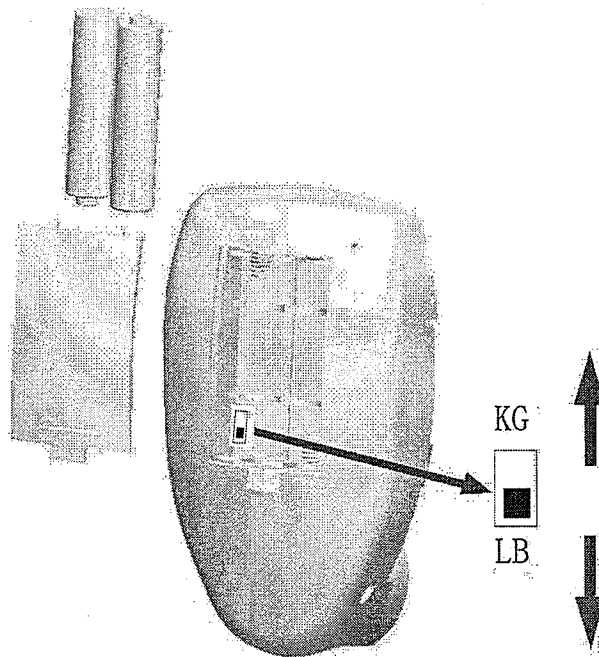
Press the [RESET] key to clear any test which may be in progress. Then press the [# OF TRIALS] key to step through the available choices. These choices are:

| <u>Choice</u> | <u>Display Shows</u> |
|---------------|----------------------|
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 1.5 RX 20 | 1.5 RX 20 |
| RX 3.0 20 | RX 3.0 20 |

Practice changing the hand selection and number of grip repeats to see how these functions work. Once test protocol is changed, the JAMAR PLUS + Hand Dynamometer retains the current protocol until changed. The current test protocol setting is not affected by turning the power OFF or by pressing the [RESET] key.

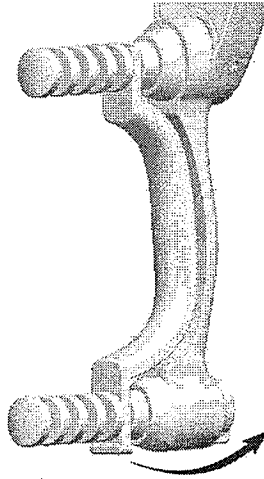
Note: If the batteries are allowed to run down after the Low Battery indicator comes on, or if they are removed from the instrument for a period of more than approximately one (1) minute, the instrument may return to the default factory test protocol, "R 3". If this happens, simply replace the batteries and reset the desired test protocol.

SELECTING POUNDS OR KILOGRAMS



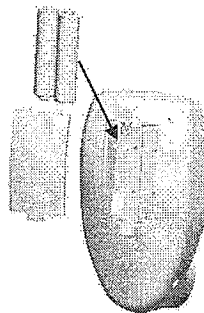
ADJUSTING GRIP POSITION

The grip handle may be placed in any of five (5) positions to accommodate the size and comfort of the user's hand. Push the lower end of the handle so that the slotted portion rotates away from the lower shaft (See diagram below). Making sure not to drop the handle, allow it to separate from the top shaft. Determine the appropriate grip position and replace the top part of the handle on the top shaft. Rotate the lower part of the handle onto the lower shaft until it clicks into place. The special ball detent on the lower part of the handle helps prevent the handle from separating from the shaft during normal use.



INSTALLING AND REPLACING BATTERIES

Turn the instrument so the Key Pad Operator faces front and the back of the Key Pad Housing faces toward you. Open the compartment cover and install two (2) AAA batteries. (Quality, alkaline or rechargeable batteries are recommended) Replace the cover after installation. Press the **[ON/OFF]** key on the face of the JAMAR PLUS + to ensure battery installation is correct. As the batteries approach the end of their life cycle, the "BATT" indication will be displayed on the instrument display. Batteries should be replaced as soon as this is displayed to ensure proper unit function.



PERFORMING GRIP STRENGTH MEASUREMENTS

1. **[LB/KG]:** The JAMAR PLUS + is originally set to display measurements in LB's. To change to KG, open up the battery compartment and move the frequency switch down to KG.
2. Adjust the grip handle to best suit patient comfort and test requirement (See Adjusting Grip Position, page 7).
3. Press the **[ON/OFF]** key to start the instrument.
4. Determine which hand will be used. Using the **[SELECT TEST]** key, scroll to the "L" (eft) or "R" (ight) icon to select the hand to be tested.
5. To select the number of test repetitions (up to 5) to be recorded for that hand, press the **[# OF TRIALS]** key. Each of the five numbers (1 through 5) will be displayed on the upper line of the display. Stop scrolling on the number which represents the number of tests to be taken.
6. Have the patient grasp the JAMAR PLUS + gently, so that the palm fits comfortably to the rear of the instrument and the fingers curl around the adjustable grip at the front of the instrument.
7. Press the **[TEST]** key to begin the test. Under the preset test protocol, start with the first test trial and the number "1" will appear and flash at the top of the display, indicating that the first test for the chosen hand is ready. Have the patient squeeze the grip and be ready to enter the second trial (if test protocol setting has more than 1 trial).
8. When the first test is completed, press the **[TEST]** key one time to scroll to the next test. Repeat the number of trials to complete the test cycle for the chosen hand.

Example: The right hand is chosen to perform four tests. Press the **[SELECT TEST]** key and scroll to the "R"(ight) icon. Press the **[# OF TRIALS]** key until the number "4" is displayed. Press the **[TEST]** key to begin the test. "R" and "1" will be displayed on the upper line. Have the patient perform the first test. Press the **[TEST]** key to move the display to "R 2". Have the patient perform the second test. Press the **[TEST]** after each test until all four tests have been performed.

9. When testing is completed for the chosen hand and the required data is recorded, press the **[RESET]** key to clear the previous test data. Repeat steps 4 through 9 for the remaining hand if desired.
10. To alternate left and right hand tests (i.e., L 1 – R 1, L 2 – R 2, L 3 – R 3, etc), press **[SELECT TEST]** until both the "L" and "R" are displayed. The instrument will

automatically alternate “L” and “R” hand test cycles.

11. Press the [ON/OFF] key to turn the instrument OFF when testing is complete and return it to a safe storage location.

RECORDING GRIP STRENGTH MEASUREMENTS

Upon completion of the desired tests for a patient's left and / or right hand, the therapist can select one of two methods for recording the data obtained by those tests.

1. After each individual test, the therapist may choose to record the data displayed on the instrument and perform subsequent calculations at a later date.
2. After all the test trials are completed, the therapist may choose to review the test results stored in the JAMAR PLUS™. All the test and calculation results can be viewed on the display by repeatedly pressing the [TEST] key. All results will be displayed in the sequence of: Test Trial 1, Test Trial 2... Test Trial N, AVG, STDEV, CV. There will be indicator icon shown in the display for each respective result.

CALCULATIONS

Three important calculations are performed automatically by the JAMAR PLUS +: Test Average, Standard Deviation, and Coefficient of Variation.

Test Average: Each reading taken for the left hand or right hand is recorded in memory for that hand. When the test is completed, the Therapist uses the [TEST] key, located in the lower left of the keypad, to review the average measure of the multiple test trials.

Standard Deviation: The JAMAR PLUS + calculates the standard deviation of reading taken. Use the [TEST] key to review the standard deviation of the multiple test trials.

Coefficient of Variation: To obtain disbursement data, the instrument divides the standard deviation by the average as shown below. Use the [TEST] key to scroll to the “CV” icon to display the result.

NORMATIVE GRIP STRENGTH DATA:

| | | <u>Males</u> | | <u>Females</u> | | <u>Males</u> | | <u>Females</u> | |
|------------|-------------|-------------------|-----------|-------------------|-----------|------------------|-----------|------------------|-----------|
| <u>Age</u> | <u>Hand</u> | <u>Mean (lbs)</u> | <u>SD</u> | <u>Mean (lbs)</u> | <u>SD</u> | <u>Mean (kg)</u> | <u>SD</u> | <u>Mean (kg)</u> | <u>SD</u> |
| 6-7 | R | 32.5 | 4.8 | 28.6 | 4.4 | 14.7 | 2.2 | 13.0 | 2.0 |
| | L | 30.7 | 5.4 | 27.1 | 4.4 | 13.9 | 2.4 | 12.3 | 2.0 |
| 8-9 | R | 41.9 | 7.4 | 35.3 | 8.3 | 19.0 | 3.4 | 16.0 | 3.8 |
| | L | 39 | 9.3 | 33 | 6.9 | 17.7 | 4.2 | 15.0 | 3.1 |
| 10-11 | R | 53.9 | 9.7 | 49.7 | 8.1 | 24.4 | 4.4 | 22.5 | 3.7 |
| | L | 48.4 | 10.8 | 45.2 | 6.8 | 22.0 | 4.9 | 20.5 | 3.1 |
| 12-13 | R | 58.7 | 15.5 | 56.8 | 10.6 | 26.6 | 7.0 | 25.8 | 4.8 |
| | L | 55.4 | 16.9 | 50.9 | 11.9 | 25.1 | 7.7 | 23.1 | 5.4 |
| 14-15 | R | 77.3 | 15.4 | 58.1 | 12.3 | 35.1 | 7.0 | 26.4 | 5.6 |
| | L | 64.4 | 14.9 | 49.3 | 11.9 | 29.2 | 6.8 | 22.4 | 5.4 |
| 16-17 | R | 94 | 19.4 | 67.3 | 16.5 | 42.6 | 8.8 | 30.5 | 7.5 |
| | L | 78.5 | 19.1 | 56.9 | 14 | 35.6 | 8.7 | 25.8 | 6.4 |
| 18-19 | R | 108 | 24.6 | 71.6 | 12.3 | 49.0 | 11.2 | 32.5 | 5.6 |
| | L | 93 | 27.8 | 61.7 | 12.5 | 42.2 | 12.6 | 28.0 | 5.7 |
| 20-24 | R | 121 | 20.6 | 70.4 | 14.5 | 54.9 | 9.3 | 31.9 | 6.6 |
| | L | 104.5 | 21.8 | 61 | 13.1 | 47.4 | 9.9 | 27.7 | 5.9 |
| 25-29 | R | 120.8 | 23 | 74.5 | 13.9 | 54.8 | 10.4 | 33.8 | 6.3 |
| | L | 110.5 | 16.2 | 63.5 | 12.2 | 50.1 | 7.3 | 28.8 | 5.5 |
| 30-34 | R | 121.8 | 22.4 | 78.7 | 19.2 | 55.2 | 10.2 | 35.7 | 8.7 |
| | L | 110.4 | 21.7 | 68 | 17.7 | 50.1 | 9.8 | 30.8 | 8.0 |
| 35-39 | R | 119.7 | 24 | 74.1 | 10.8 | 54.3 | 10.9 | 33.6 | 4.9 |
| | L | 112.9 | 21.7 | 66.3 | 11.7 | 51.2 | 9.8 | 30.1 | 5.3 |
| 40-44 | R | 116.8 | 20.7 | 70.4 | 13.5 | 53.0 | 9.4 | 31.9 | 6.1 |
| | L | 112.8 | 18.7 | 62.3 | 13.8 | 51.2 | 8.5 | 28.3 | 6.3 |
| 45-49 | R | 109.9 | 23 | 62.2 | 15.1 | 49.8 | 10.4 | 28.2 | 6.8 |
| | L | 100.8 | 22.8 | 56 | 12.7 | 45.7 | 10.3 | 25.4 | 5.8 |
| 50-54 | R | 113.6 | 18.1 | 65.8 | 11.6 | 51.5 | 8.2 | 29.8 | 5.3 |
| | L | 101.9 | 17 | 57.3 | 10.7 | 46.2 | 7.7 | 26.0 | 4.9 |
| 55-59 | R | 101.1 | 26.7 | 57.3 | 12.5 | 45.9 | 12.1 | 26.0 | 5.7 |
| | L | 83.2 | 23.4 | 47.3 | 11.9 | 37.7 | 10.6 | 21.5 | 5.4 |
| 60-64 | R | 89.7 | 20.4 | 55.1 | 10.1 | 40.7 | 9.3 | 25.0 | 4.6 |
| | L | 76.8 | 20.3 | 45.7 | 10.1 | 34.8 | 9.2 | 20.7 | 4.6 |
| 65-69 | R | 91.1 | 20.6 | 49.6 | 9.7 | 41.3 | 9.3 | 22.5 | 4.4 |
| | L | 76.8 | 19.8 | 41 | 8.2 | 34.8 | 9.0 | 18.6 | 3.7 |
| 70-74 | R | 75.3 | 21.5 | 49.6 | 11.7 | 34.2 | 9.8 | 22.5 | 5.3 |
| | L | 64.8 | 18.1 | 41.5 | 10.2 | 29.4 | 8.2 | 18.8 | 4.6 |
| 75+ | R | 65.7 | 21 | 42.6 | 11 | 29.8 | 9.5 | 19.3 | 5.0 |
| | L | 55 | 17 | 37.6 | 8.9 | 24.9 | 7.7 | 17.1 | 4.0 |

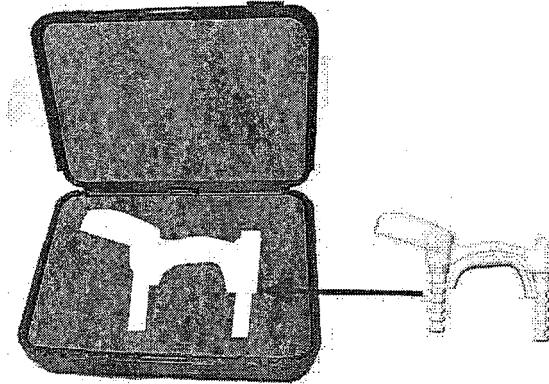
CALIBRATION

The unit should be returned to Sammons Preston after 12 months of use for recalibration. Contact Sammons Preston at 800-228-3693 to arrange for service.

CARE AND STORAGE

The JAMAR PLUS + is an electronic instrument and should be cared for in a manner suitable for its function and components. Store the instrument when not in use in a safe location to prevent inadvertent damage. Use a clean, damp cloth and mild detergent for cleaning.

When not in use, the instrument should be stored in the black case provided. Care should be taken, however, to prevent undue stress to the grip posts, as this may damage the post mountings or electronic components.



SERVICE AND WARRANTY

The JAMAR PLUS + is a fully self-contained unit which should provide many years of accurate, dependable service to the user, and contains a (1) year warranty from its date of purchase. Should you experience any questions or problems regarding this instrument, phone or write to the address below:

Distributed by:
Performance Health Supply Inc.
28100 Torch Parkway, Ste. 700
Warrenville, IL 60555, USA
Phone: 800-323-5547
Fax: 800-547-4333



Quick Reference Guide

- ◇ **[ON/OFF]** Turns Jamar on/off.
- ◇ **[SELECT TEST]** Scrolls to desired test.
- ◇ **[# OF TRIALS]** Choose desired # of trials.
- ◇ **[TEST]** Used to start test and to move between tests
- ◇ Press the **[TEST]** key after each trial to move to the next test.
- ◇ When testing is completed for the chosen hand, use **[TEST]** key to review the test data. The display will show in order Average, Standard Deviation, and Coefficient of Variation.
- ◇ Press **[RESET]** key to clear the previous test data. Reselect testing mode, if needed.
- ◇ Press **[ON/OFF]** key to turn off the Jamar and return it to a safe storage location.

Example # 1 – (LR 3):

Test patient's grip strength 3 times for both left and right hands.

- ◇ Press **[ON/OFF]** key to turn on the Jamar.
- ◇ Press **[SELECT TEST]** key until both the "L" and "R" are displayed at the upper left corner of the screen. "L" is for the Left Hand and "R" is for the Right Hand.
- ◇ Press **[# OF TRIALS]** key until number "3" is displayed on the screen next to the "L" and "R". You will see (L R 3). This signifies you will be testing the Left and Right Hands 3 times.
- ◇ Press **[TEST]** key to start the test.
- ◇ "L 1" will be flashing on the screen. Have the patient squeeze the grip handle with his left hand. Once completed, press **[TEST]** key to move to the next test. The display will flash "R 1". Have the patient perform the test on his right hand. Press **[TEST]** again to move to the "L 2" test and so on until all 6 tests are completed. (L1, R1, L2, R2, L3, R3).
- ◇ Once all 6 tests have been completed, press **[TEST]** key once and the screen will display **AVG** for the 3 left hand tests. Press **[TEST]** once again and the screen will display **AVG** for the 3 right hand tests.
- ◇ Continue to press **[TEST]** key to display the results as follows: **ST DEV** for 3 left hand tests, **ST DEV** for 3 right hand tests, **CV** for 3 left hand tests, **CV** for 3 right hand tests, **L1** test result, **R1** test result, **L2** test result, **R2** test result, **L3** test result, **R3** test result. Continue pressing **[TEST]** key to scroll back to **AVG** for 3 left hand tests.
- ◇ Press **[RESET]** key to clear results.
- ◇ To perform a new test, press **[SELECT TEST]** to scroll to the desired test. Use the **[# OF TRIALS]** key to select the desired number of trials.

Example # 2 – (RX 3.0 20):

Test patient's grip strength 20 times for either the left or right hand

- ◇ Press **[ON/OFF]** key to turn on the Jamar.
- ◇ Press **[SELECT TEST]** key until "RX3.0" is displayed.
- ◇ Press **[# OF TRIALS]** key until number "20" is displayed. Left or Right hand will be tested in a Rapid Exchange scenario – 20 times in 3 second intervals.
- ◇ Press **[TEST]** key to start the test.
- ◇ A number "1" will flash and a beep will sound on the screen to start the test. The patient will squeeze the handle.
 - **NOTE:** Each trial must be completed in the time interval chosen.
 - ◆ 3.0RX - 3.0 seconds,
 - ◆ 1.5RX – 1.5 seconds.

- ◇ A beep will sound after 3 seconds. After 3 seconds, the beep will sound again to indicate the start of another test. Repeat the procedure until all 20 trials are completed.
- ◇ The screen will display **AVG** for these 20 trials. Press **[TEST]** to display the **ST DEV** for 20 trials, **CV** for 20 trials, 1st trial test result, 2nd trial test result through the 20th trial test result. Pressing **[TEST]** again will show the **AVG** for 10 trials.
- ◇ Press **[RESET]** key to clear all the results.