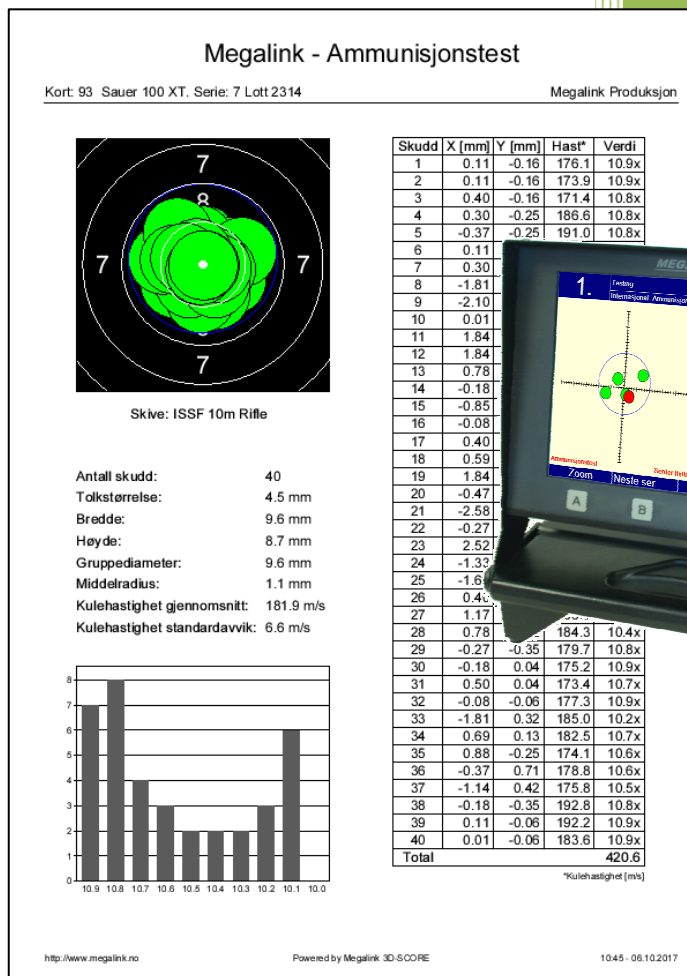


2017

User manual for ML2000 Ballistic test



Megalink AS
V17.55



User manual for ML2000

Ballistic test

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1 General

With targets from Megalink it is easy to test weapon and ammunition. The system generates a report with key parameters and graphical plot of the shots. With the Megalink 3D-Score the speed of the projectile is also measured.

The ballistic test can be done with the Megalink color display unit (monitor) or with a target connected to your computer running MLShoot.

When activating ballistic test mode all the shots are moved so the average point of impact corresponds to the center of the target. Values and parameters are updated continuously.

2 Ballistic test on display unit (monitor)

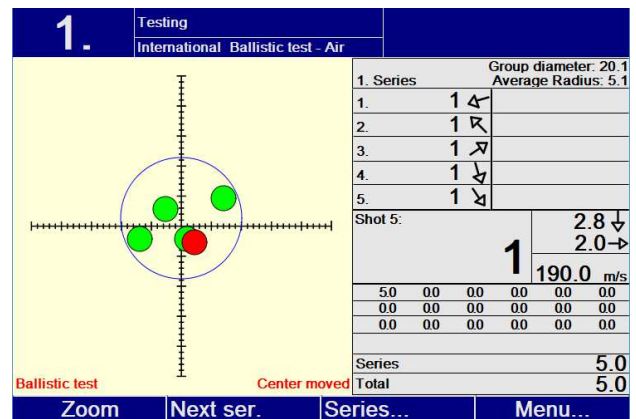
To use ballistic test mode on the Megalink display unit this must be of type color monitor and be updated with software 17.55 or newer.

2.1 Course of fire

The course of fire named **Testing** contains 20 series with the space of 99 shot in each and thus recommended for ballistic testing.

2.2 Target

Any target can be used. To show a cross with mm as unit of measure select the target named **International Ballistic test**. Simulated distance is supported.



2.3 Activate ballistic test mode

To move the average point of impact to the center of the target select **Menu → Ballistic test mode**. The text “Ballistic test” and “Center moved” will appear in red.

The average point of impact is now moved to the center of the target. Values and sum are recalculated. The values will be continuously updated as shots are registered on the target.

To deactivate ballistic test mode select **Menu → Ballistic test mode** again.

2.4 Series details and parameters

Group diameter and average radius is shown on the upper right of the screen. Group diameter is also shown as a blue circle on the plot. For more details select **Series → Series details**. The following parameters are shown:

- Gauge size in mm
- Width + height in mm
- Group diameter in mm
- Average radius in mm
- Average speed of projectile in m/s (3D-Score)

For shot details select **Series → Shot details**. The following parameters are shown:

- Value
- X: mm from the center horizontally
- Y: mm from the center vertically
- Speed of projectile in m/s (3D-Score)
- Gun X: The horizontal position of the gun relative to the center of the target in cm
- Gun Y: The vertical position of the gun relative to the center of the target in cm
- Time: Time of shot detection

2.5 Printout

If a computer with MLRange (version 17.55 or newer) and a printer is connected a report from the current series can be printed. Select **Menu → Print**. Ballistic test mode must be activated to be able to print the ballistic test report.

Tip: Install a PDF printer on the computer. Then each report can be saved as an PDF file.
Avoid printing on paper – Think green.

2.6 Starting monitor in ballistic test mode

The monitor can be started directly into ballistic test mode. Select **Menu → System setup → Advanced → Ballistic test config**.

3 Ballistic test on a computer with MLShoot

To use all the functions of the ballistic test mode in MLShoot this must be of version 17.55 or newer.

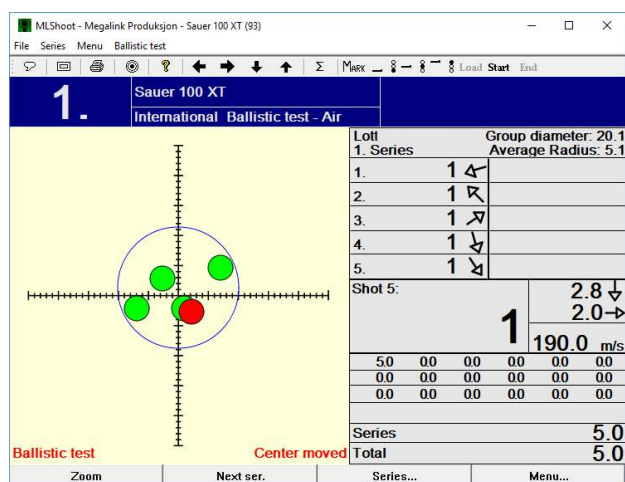
In the menu bar a new menu with the name “Ballistic test” has appeared. This menu gives easy access to the functions needed.

3.1 Ballistic test config

In the menu bar select **Ballistic test** → **Ballistic test config** to set up the testing.

There are several options:

- Course of fire
- Target
- Actual distance
- Simulated distance
- Name cards – Activate to enter the name of the shooter/name of weapon on each card. Is printed on the report.
- Name series – Activate to enter lot number or similar on each series.
- Plot GPR circle – Activate to draw the blue group diameter circle on the plot.
- BTS mode on startup – Activate to force MLShoot to start in ballistic test mode.



3.1.1 Course of fire

The course of fire named **Testing** contains 20 series with the space of 99 shot in each and thus recommended for ballistic testing.

3.1.2 Target

Any target can be used. To show a cross with mm as unit of measure select the target named **International Ballistic test**. Simulated distance is supported.

3.2 Activate ballistic test mode

To activate ballistic test mode and move the average point of impact to the center of the target press the **F12** key on your keyboard (alternatively select Ballistic test → Ballistic test mode in the menu). The text “Ballistic test” and “Center moved” will appear in red.

The average point of impact is now moved to the center of the target. Values and sum are recalculated. The values will be continuously updated as shots are registered on the target.

To deactivate ballistic test mode press the F12 key again.

3.3 Series details and parameters

Group diameter and average radius is shown on the upper right of the screen. Group diameter is also shown as a blue circle on the plot. For more details press the **F8** key on your keyboard or select **Series** → **Series details** in the menu. The following parameters are shown:

- Gauge size in mm
- Width + height in mm

- Group diameter in mm
- Average radius in mm
- Average speed of projectile in m/s (3D-Score)

For shot details press the **F9** key on your keyboard or select **Series → Shot details**. The following parameters are shown:

- Value
- X: mm from the center horizontally
- Y: mm from the center vertically
- Speed of projectile in m/s (3D-Score)
- Gun X: The horizontal position of the gun relative to the center of the target in cm
- Gun Y: The vertical position of the gun relative to the center of the target in cm
- Time: Time of shot detection

3.4 Naming the scorecard and series

By pressing the menu item *New card* a dialog will appear asking you to enter the name of the card. Enter the name of the shooter or name of the weapon here.

When selecting next series a dialog will appear asking you to enter the name of the series. Enter lot number of similar here.

The information will appear on the report.

3.5 Printout

Press **Ctrl + P** on your keyboard or select Print in the ballistic test menu to print a report from the current series.

In the print dialog some options can be selected:

- Color print – Print the target and shots in color
- Plot group diameter – Draw the group diameter circle on the plot
- Print in 1:1 – Plot the shots in actual size

Ballistic test mode must be activated to be able to print the ballistic test report.

Tip: Install a PDF printer on the computer. Then each report can be saved as an PDF file. Avoid printing on paper – Think green.

3.6 List of keyboard shortcuts

| | |
|-----------------|---|
| F12 | Activate/deactivate ballistic test mode |
| ← | Select the previous series |
| → | Select the next series |
| F2 | New card |
| F3 | Change name of card |
| F4 | Change name of series |
| F8 | Open series details |
| F9 | Open list of shot details |
| Ctrl + P | Print report |

3.7 Basic use of MLShoot

For installing and basic use of MLShoot please see the document *ML2000UserManual-MLShoot – PC based personal target with MLShoot*.

Menus and use of MLShoot are mainly identical to the menus and use of the Megalink display unit. See the document *ML2000UserManual-DisplayUnit – User Manual Display Unit (Monitor)* for more information.

4 Report

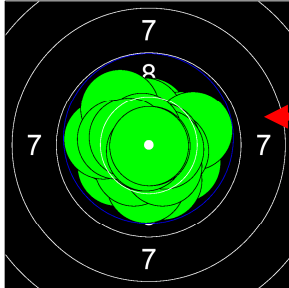
On print the following report for the current series will be generated.

Megalink - Ballistic test

Card: 93 Sauer 100 XT. Series: 7 Lott 2314

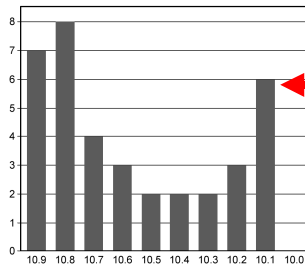
Megalink 1.0000000000000000

Description containing number and name of card and series.



Target: ISSF 10m Rifle

Number of shots: 40
Gauge: 4.5 mm
Width: 9.6 mm
Height: 8.7 mm
Group diameter: 9.6 mm
Average Radius: 1.1 mm
Average bullet speed: 181.9 m/s
Bullet speed standard deviation: 6.6 m/s



| Shot | X [mm] | Y [mm] | Speed* | Value |
|-------|--------|--------|--------|-------|
| 1 | 0.11 | -0.16 | 176.1 | 10.9x |
| 2 | 0.11 | -0.16 | 173.9 | 10.9x |
| 3 | 0.40 | -0.16 | 171.4 | 10.8x |
| 4 | 0.30 | -0.25 | 186.6 | 10.8x |
| 5 | -0.37 | -0.25 | 191.0 | 10.8x |
| 6 | 0.11 | 0.04 | 191.2 | 10.9x |
| 7 | 0.30 | -0.45 | 190.2 | 10.7x |
| 8 | -1.81 | -1.22 | 179.1 | 10.1 |
| 9 | -2.10 | 0.13 | 177.5 | 10.1 |
| 10 | 0.01 | 1.58 | 173.2 | 10.3x |
| 11 | 1.84 | 0.81 | 188.2 | 10.1 |
| 12 | 1.84 | -1.02 | 186.8 | 10.1 |
| 13 | 0.78 | -1.99 | 190.4 | 10.1 |
| 14 | -0.18 | -2.16 | 173.9 | 10.1 |
| 15 | -0.85 | -1.22 | 185.0 | 10.4x |
| 16 | -0.08 | -0.45 | 177.7 | 10.8x |
| 17 | 0.40 | -0.06 | 174.0 | 10.8x |
| 18 | 0.59 | 0.71 | 189.5 | 10.6x |
| 19 | 1.84 | 0.61 | 183.1 | 10.2x |
| 20 | -0.47 | 0.32 | 182.8 | 10.7x |
| 21 | -2.58 | 0.32 | 189.9 | 9.9 |
| 22 | -0.27 | 1.58 | 180.8 | 10.3x |
| 23 | 2.52 | 0.81 | 190.9 | 9.9 |
| 24 | -1.33 | 1.38 | 170.1 | 10.2x |
| 25 | -1.62 | 2.06 | 185.7 | 9.9 |
| 26 | 0.40 | 0.23 | 174.3 | 10.8x |
| 27 | 1.17 | -0.35 | 186.6 | 10.5x |
| 28 | 0.78 | -1.22 | 184.3 | 10.4x |
| 29 | -0.27 | -0.35 | 179.7 | 10.8x |
| 30 | -0.18 | 0.04 | 175.2 | 10.9x |
| 31 | 0.50 | 0.04 | 173.4 | 10.7x |
| 32 | -0.08 | -0.06 | 177.3 | 10.9x |
| 33 | -1.81 | 0.32 | 185.0 | 10.2x |
| 34 | 0.88 | -0.25 | 174.1 | 10.6x |
| 35 | 0.88 | -0.25 | 174.1 | 10.6x |
| 36 | -0.37 | 0.71 | 178.8 | 10.6x |
| 37 | -1.14 | 0.42 | 175.8 | 10.5x |
| 38 | -0.18 | -0.35 | 192.8 | 10.8x |
| 39 | 0.11 | -0.06 | 192.2 | 10.9x |
| 40 | 0.01 | -0.06 | 183.6 | 10.9x |
| Total | | | | 420.6 |

*Speed of bullet (m/s)

Plot of target with shots.

List of values, position and speed of projectile.

Series details.

Bar chart of values with 10.9, 10.8 etc.

5 Definition of parameters

Gauge size:

Diameter of the projectile.

Width:

Largest horizontal distance between two shots including size of gauge.

Height:

Largest vertical distance between two shots including size of gauge.

Group diameter:

Diameter of the smallest circle to encircle the shots.

Average radius:

The radius of one shot is the distance from the average point of impact to the center of the shot. The average is calculated by dividing the sum with the number of shots.

Average bullet speed:

Average speed of the projectile. Only shown if Megalink 3D-Score are used as target.

Bullet speed standard deviation:

The square root of the bullet speed variance.