



Operations Manual

Read16 Android Alignment Software

March 2020



**HAMAR
LASER**®
ALIGN WITH THE BEST

HAMAR LASER INSTRUMENTS, INC.
www.hamarlaser.com

Five Ye Olde Road, Danbury, CT 06810
Phone: (800) 826-6185 Fax: (203) 730-4611

WARRANTY

Hamar Laser Instruments, Inc., warrants each instrument and other articles of equipment manufactured by it to be free from defects in materials and workmanship under normal use and service, its obligation under this warranty being limited to making good at its factory any instrument and other article of equipment which shall, within one year after shipment of each instrument and other article of equipment to the original purchaser, be returned intact to Hamar with transportation prepaid, and which Hamar's examination shall disclose to Hamar's satisfaction to have been thus defective; other than this express warranty, Hamar neither assumes nor authorizes any other persons to assume for it any other liability or obligation in connection with the sale of its products.

This warranty is not applicable to instruments or other articles of equipment manufactured by other companies and limited by a warranty extending for less than one year. In such an event, the more limited warranty applies to said instrument or article of equipment.

This warranty shall not apply to any instrument or other article of equipment which shall have been repaired or altered outside the Hamar factory, nor which has been subject to misuse, negligence, or use not in accord with instructions furnished by the manufacturer.

The software described in this manual is furnished under a license agreement and may be used or copied only in accordance with the terms of the agreement. It is against the law to copy the software on any medium for any purpose other than the purchaser's personal use.

The information in this manual is subject to change without notice. No part of this manual may be reproduced by any means, electronic or mechanical, without written permission from Hamar Laser Instruments, Inc.

**© Copyright Hamar Laser Instruments, Incorporated, 2020
5 Ye Olde Road, Danbury, Connecticut 06810**

Table of Contents

Read16 Software for PDAs.....	1
Launching the Read16 Manual	2
Using the Read16 Program	3
Preferences Screen	3
Data Averaging	3
Targets Screen	4
Choosing a 2-Axis Target Display.....	4
Read Screen.....	5
Value	5
OFF TGT	6
COM ERR Readout Displays	6
Low Battery Warning	6
Blank Target ID	6
ZERO and Absolute Mode.....	7
Details Button - Target Status.....	8
Averaging.....	8
Read Screen – Popup Mode.....	9
Excessive Light Warnings	9
Two-Point Buck-In Screen	10
Using 2-Point Buck-In Screen for 3-Point Buck-In (Flatness)	13
3-Point Buck-In Procedure Using One Target.....	13
3-Point Buck-In Procedure Using Three Targets.....	14
Roll Alignment Buck-in Screen.....	15
Transfer Laser Buck-in Procedure	15
Record Screen.....	16
Saving the Data File	17
Copying Files from the Nomad PDA	17
Appendix A – A-1519/1520 Type II Wireless Targets - Overview	19
Identifying Target Features	19
Using the Target as a Height Gage.....	20
Appendix B – Setting the Target System ID and Target Network ID (A-1519/A-1520 Targets, A-910-900/2.4, A-910-2.4ZB)	21
Setting the System ID.....	21
Appendix C – Restoring the Read16 Software	22
Appendix D – Reinstalling the ZigBee Radio Module.....	24

Read16 Software for PDAs

Read16 is an alignment program that runs under Android™ on handheld PDAs. Currently, it is only supported on the Nomad 5 PDA (1280x720 displays).

Read16 acts as a multi-target readout when used with Hamar Laser's A-1519-2.4ZB and A-1520-2.4ZB Wireless Targets and L-730/L-740 Series scanning lasers, providing a graphic display for basic alignment functions.

This manual assumes that you are familiar with the operation of the PDA and the Android operating system.

To open **Read16**, click the Hamar Laser Logo on the Home Page or Apps page, as shown in Figure 1.

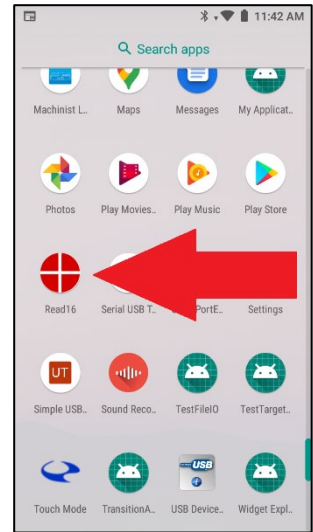





Figure 1 – Read16 Application in Apps screen

To navigate through **Read16**, use the pull-out tab on the left side of the screen by swiping the screen from the left side.

-  Alternately, you could press the **:** button on the top right of the screen, then select **OPEN MENU**, or
-  Select the three bars  in the upper left part of the screen (see Figure 2).

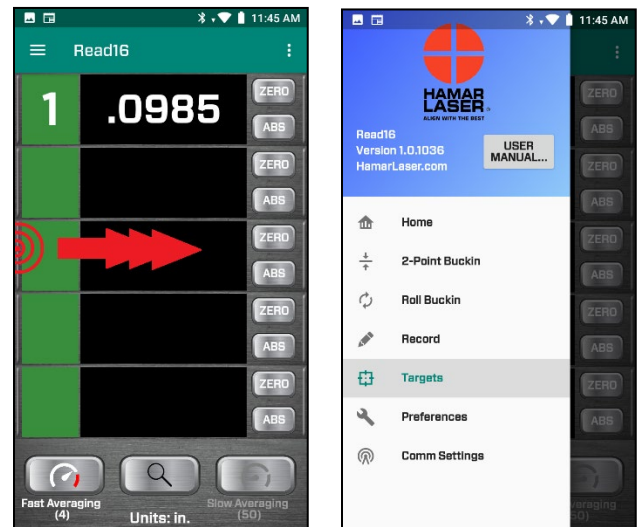


Figure 2 – Swipe from left edge to open MENU

If you want to return to the previous Screen, press the BACK button on the PDA.

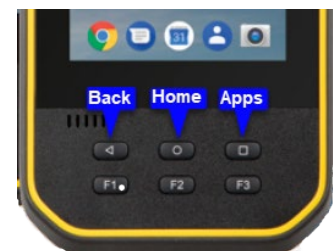


Figure 3 – BACK, HOME and APPS buttons on PDA

Launching the Read16 Manual

The **Read16** manual is installed on the Nomad PDA. To launch the manual, open the menu by swiping from the left or and press **USER MANUAL**. Before performing an alignment, it is suggested that you view each program screen and follow the descriptions of the features in this manual.

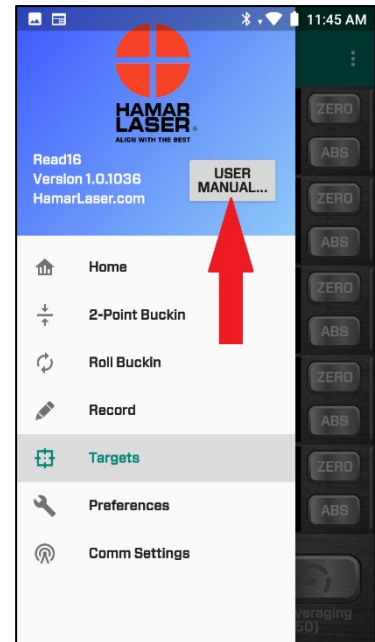


Figure 4 – *Opening the User Manual*

Using the Read16 Program

Preferences Screen

When starting to use **Read16**, establish **Preferences** first. Select **Preferences** from the menu to make changes.

- **Display Units** – Select the preferred units to be displayed: *INCH* or *MM*.
- **Resolution** – Select the number of decimals to display for all target values.

Note: *The maximum number of digits for INCH is 5, for MM, 4.*

Data Averaging

Readings received from the target are averaged in order to reduce the amount of data noise (fluctuation) seen on the displays. Typically, noise can come from atmospheric turbulence or vibration of the surfaces where the laser or target sit. On the **Home** screen, users may choose one of three possible settings: *BI- Fast*, *BI-Slow* and *Measure*.

- **Data Averaging (BI-Fast)** – Controls the number of samples used for the averaging for the *BI-Fast* (Buck-In Fast) selection on the **Home** screen. Use this for buck-ins (setups).
- **Data Averaging (BI-Slow)** – Controls the number of samples used for the averaging for the *BI-Slow* (Buck-In Slow) selection on the **Home** screen. Use this for long distance buck-ins.
- **Data Averaging (Measuring)** – Controls the number of samples used for the averaging for the **Record** screen. Use this when taking data. It uses a slightly better averaging algorithm to minimize noise.
- **Accel** – Select the approximate distance the target will be away from the laser. This flushes the buffer so the data will update faster when using higher sampling. The threshold is ± 0.002 in. (0.05 mm) per 10 ft. (3.3 m). Therefore, if the target value is over .002 in. from the average, the buffer will be emptied so that “good data” will be used. This is useful when first putting the target down each time to take a data point, where some large, non-relevant values will be detected by the target since it will start detecting the laser before it is set on the surface. It helps to get the actual measurement faster.

Comm Settings

Click on **Comm Setting** and a new screen displays with:

- **System ID** – The radios used in the A-1519/1520 ZigBee targets allow the ability to set different system IDs, so multiple sets of targets/lasers can be used in the same area. The **System ID** set here must match the System ID on the A-1519/1520-2.4ZBT targets. Click the **System ID** dropdown menu to change the System ID. When returning to the Read screen, wait 15-20 seconds for the change to take place.

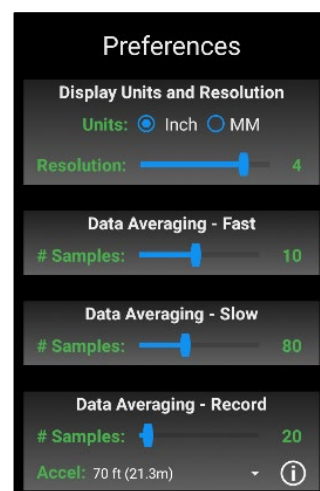


Figure 5 – Preferences Screen

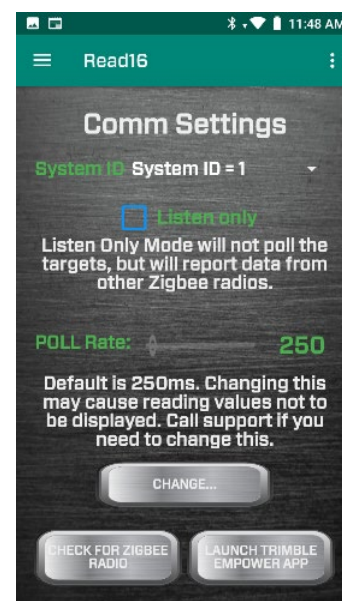


Figure 6 – Communications Settings

- **Poll Rate** – The rate at which the command for the target to send its data to the PDA is set. It is password protected and generally is not changed. Please contact Hamar Laser Support to get the password.
- **Check for ZigBee Radio** – This is a troubleshooting tool to see if the radio is working properly. It will pop up a message with the radio PCB ID if working properly.
- **Launch Trimble Empower App** – Checks to see if the Nomad radio module driver is working properly. To use this feature, each set of laser/targets must have its own unique System ID. See Appendix B on Page 21 to see how to change the System ID on the A-1519/1520 targets.

Targets Screen

Use the **Targets** screen to select each target ID for the displays in the **Read** Screen. Each **Display** field can be changed to a specific Target ID. The Target ID is shown on the side of the A-1519-2.4ZB/A-1520-2.4ZB target housing (see Appendix A beginning on Page 19) and is normally set by the factory and not changed.

The default setting for the **Read** Display is *Single-Axis Target*, showing Target IDs 1 to 5 with each display enabled. The default ID for each display is noted in the **Target** Display by “ID=#”.

To change a displayed Target ID, click the dropdown list (down arrow) and select the new Target ID. To disable a target display, select **DISABLED** from the top of the drop-down list.

Note: If only using three targets, select the Target IDs for the first three displays and disable the remaining displays. When disabling a display, the radio stops “polling” that target ID, so the target data update rate will increase for the other targets.

Choosing a 2-Axis Target Display

If using the R-1307-2.4ZB 2-Axis Readout with ZigBee communication capability, you can also display the data for 2-axis targets in **Read16**. To configure the displays, click the checkbox next to the *Chain* icon (chain link) and the two displays will be linked to a 2-axis target. You will need to pick the target ID to match the target ID set in the R-1307-2.4ZB. In this example, Displays 4 and 5 will be linked to an R-1307-2.4ZB Readout with a Target ID = 3 (see Figure 8).

Note: If you are not using single-axis targets, disable Displays 1 & 2 (or hit the link button for Displays 1 and 2 and disable Displays 4 and 5) to speed up data communication.

Here is an example of the **Read** Display being configured with two single-axis targets (#1 and #2) and a 2-axis Target with an ID=3.

For 2-axis displays, the display ID will change to:

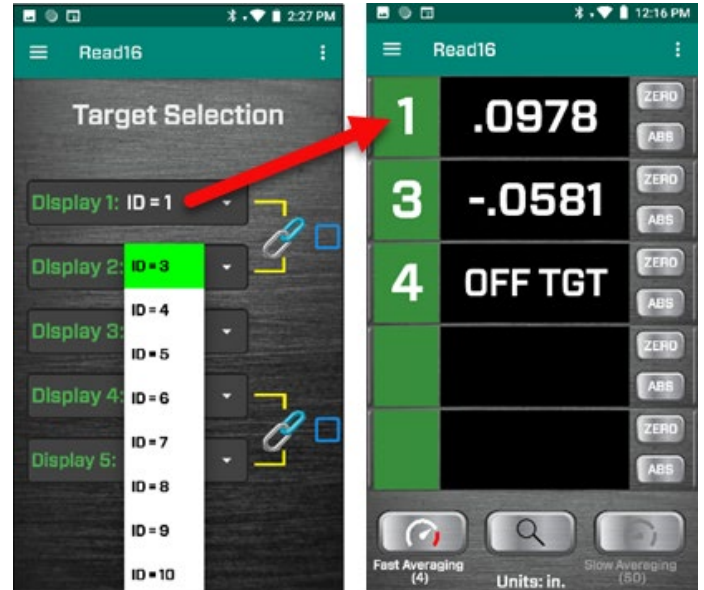


Figure 7 – Target Selection Screen

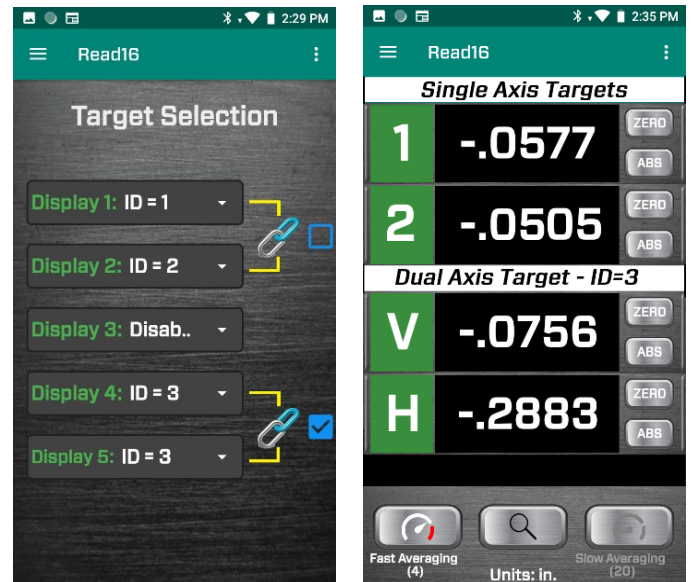


Figure 8 – Read16 Target display showing a 2-axis target selected for Displays 4 and 5

- V - Means the target's *vertical* axis
- H - Means the target's *horizontal* axis.

Read Screen

The **READ** Display screen provides a real-time numeric display of A-1519-2.4ZB/A-1520-2.4ZB Single-Axis Target data values or two 2-axis wired targets using the wireless function in the R-1307-2.4ZB Readout.

The display numbers 1 through 5 refer to the corresponding Target IDs on the side of the targets. Up to five target data values can be displayed simultaneously. Each **READ** target display can show one of the following:

Value

A numeric value represents the position of the laser plane relative to the target centerline (see Figure 10). A *positive* reading indicates that the point on the surface being measured is *above* the laser plane reference; a *negative* reading indicates that the point is *below* the laser plane reference.



Figure 9 – Read16 Read Screen



Figure 10 – Single-axis Scan Target displaying positive (+) and negative (-) values

OFF TGT

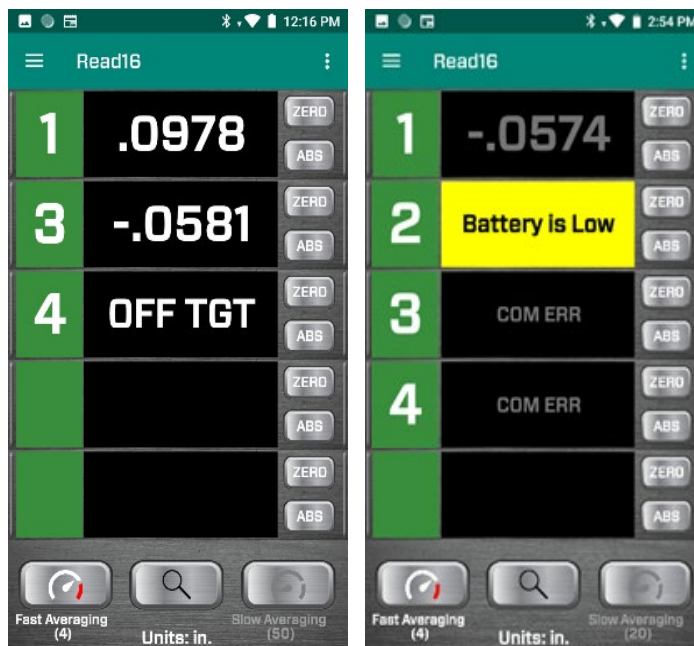
When the target stops detecting the laser beam, **OFF TGT** displays, which means the A-1519/1520 target is communicating normally with the PDA but the laser plane is *not* hitting the target. This could be due to the target not being pointed directly at the laser or something blocking the laser beam. When the target detects the laser plane, the display automatically updates to show the current value.

COM ERR Readout Displays

If **COM ERR** information is displayed in a target display, either a target is turned off or it is out of range of the ZigBee Receiver.

Low Battery Warning

The A-1519-2.4ZB/A-1520-2.4ZB Single-Axis Target features a battery-life indicator for each target to warn if a target's battery life gets too low. When the battery life is too low, **Read16** automatically displays a warning message.



Blank Target ID

If the target ID (white number in green box) is missing in a display, the target is *disabled* in the **Preferences** Screen. Go to the **TARGET** Screen to enable communication with the targets.

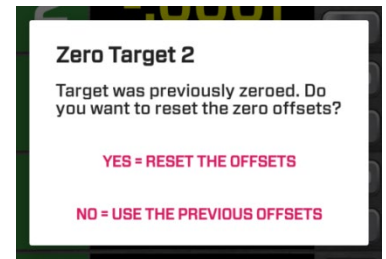
ZERO and Absolute Mode

The buttons located to the right of the target boxes are used to set the data display mode. Click on **ABS** or **ZERO** to toggle between ABSolute and ZERO modes.

- **Absolute Mode (ABS)**– the value indicates where the laser plane hits the target cell relative to the target's electronic centerline. The numbers in the display will be white.
- **Zero Mode** – when **ZERO** mode is selected, **Read16** applies an offset to zero the display. All target values then indicate the deviation of a given point relative to the zeroed value. To zero a target, place it on a reference point, wait a few seconds for the display value to settle down and hit **ZERO**. When the display value has been zeroed, it will turn yellow.

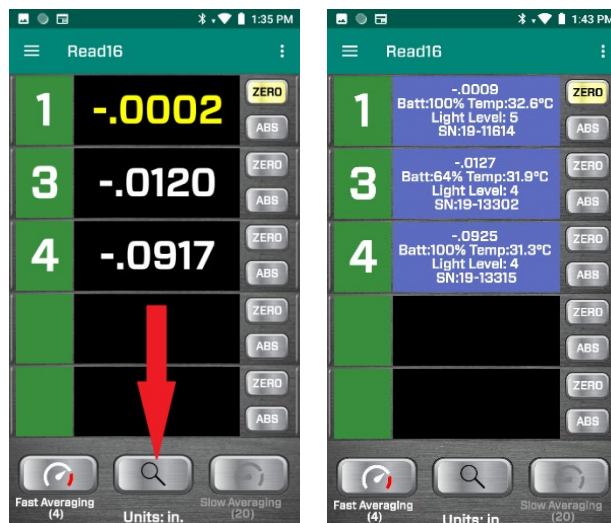
You can re-zero a point by clicking **ZERO**. A warning message displays asking if you want to re-zero or not (if you click **ABS** and then click **ZERO**, the same message displays).

To keep your existing Zero Offset, click **NO**.



Details Button - Target Status

Click the center icon button to view target details, such as battery life, internal temperature, light level and serial number. Click the button again to restore the standard display.



Averaging

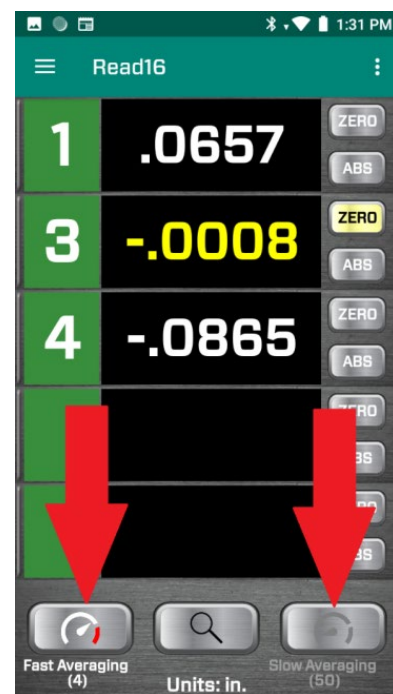
Located under the last display box is the *Averaging* selection area, where there are two buttons (**Fast** and **Slow**). Each display value under the button is an average of a user-selected number of data samples. The number of averages for each selection can be selected in **Preferences**. There are two average selection modes:

Fast Averaging(4) – This is “fast” averaging used for buck-ins. In the screen on the right, averaging is set to 4.

Slow Averaging (50) – This is “slow” averaging used for long-distance buck-ins. In the screen on the right, “slow” averaging is set to 50.

When severe turbulence or vibration exists in an alignment situation, the level of averaging should be increased to help smooth out the target fluctuations (measurement noise). In these situations, first try *Slow Mode*, and if that doesn't help, go to **Preferences** and select a higher value until the fluctuations decrease to desired levels. The higher the number of averages, the longer the data value will take to update.

Note: *In severe fluctuation environments, such as measuring in direct sunlight or near welding or safety lights, the averaging probably won't provide enough reduction in measurement noise. In these cases, the **source** of the fluctuations must be reduced.*



Read Screen – Popup Mode

If you need to see the display values from far away, you can pop up the displays in a *landscape* screen format to get bigger data displays. To pop up the displays, double-click the green area with the Target ID number on the left side of the display box.

To see displays 1 and 2 in the popup window, click **1** (green area) display.
To see 2 and 3 in the popup, click **2** (green area) display, etc.

To return to the portrait display, click **Exit**.



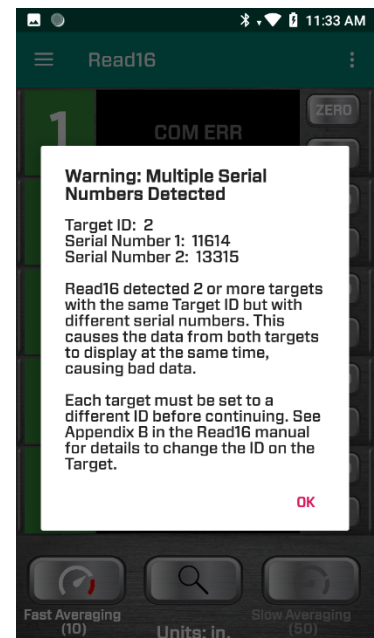
Figure 11 – READ Screen Popup showing Targets 1 and 3

Excessive Light Warnings

The A-1519-2.4ZB/A-1520-2.4ZB Single-Axis Target features an automatic background-light correction function for extremely accurate readings. The targets are able to subtract the effects that background light has on the readings to increase accuracy. Also, if the background light gets too bright for the target to get accurate readings, a warning message displays.

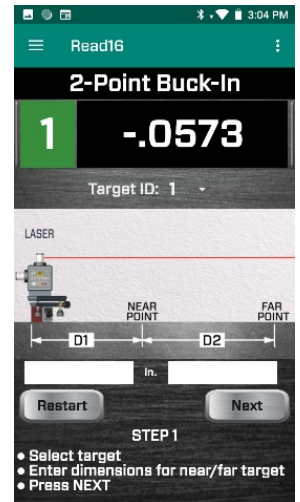
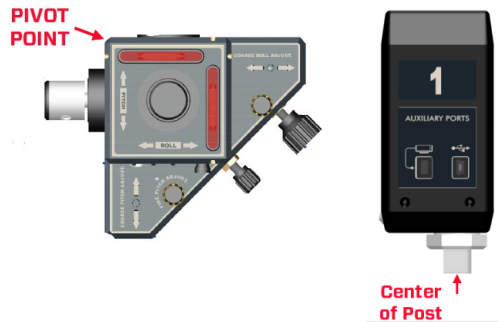
Note: *The use of target light shields (included with each target) may help reduce the excess background light. In outdoor applications, optional narrow-band light filters are required to block the sunlight so the target can detect the laser beam.*

If 2 targets are configured with the same ID, READ16 pops up a message informing you of the target ID number, the serial numbers for both targets and a warning message.



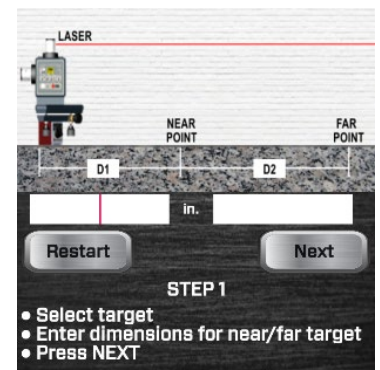
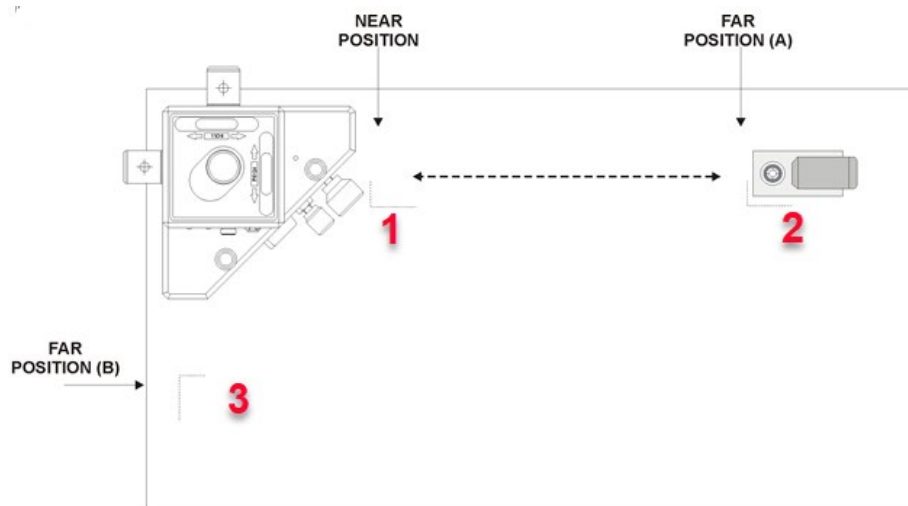
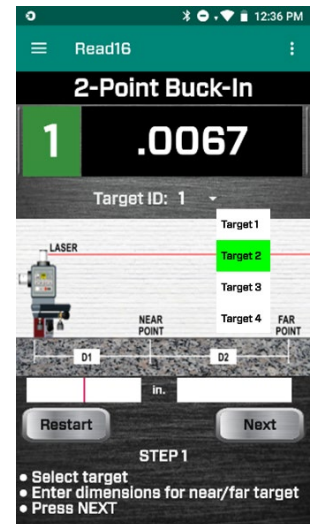
2-Point Buck-In Screen

The **2-Point Buck-in** Screen is used to make the process of making the laser parallel (bucked-in) to two reference points easier. The following short procedure requires measuring the dimensions between the target and laser. When done with this procedure, the laser will be “bucked-in” (made parallel to) two points on a surface.



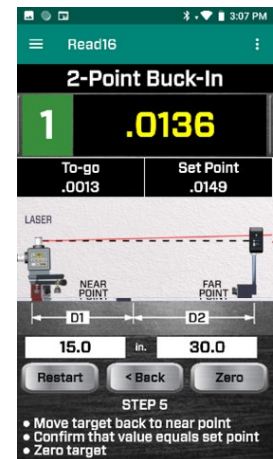
Step 1 – Setup

- Select the Target ID to use by using the dropdown menu.
- Select a location to place the laser.
- Select the *Near* and *Far* reference point positions on the surface to be measured.
- Measure the D1 dimension from the laser Pivot Point to the center of the target post on the *Near* reference point position.
- Measure the D2 dimension from the center of the target post on the *Near* reference point to the center of the target post on the *Far* reference point.
- Enter the two dimensions in the entry boxes by clicking the box (this opens the keyboard) and entering the value. After entering both values, click **Next**.

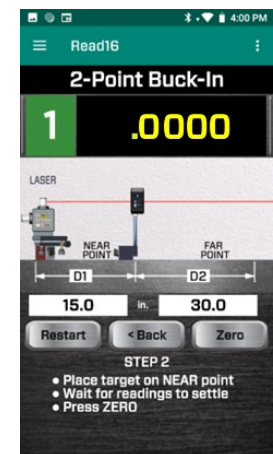


Step 2 – Zero Target and Record Data

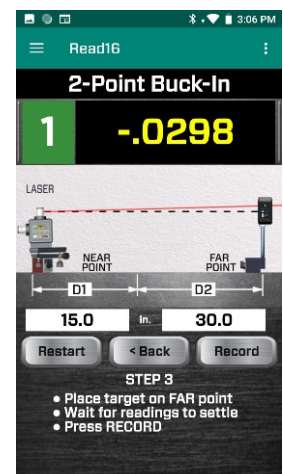
- a. Place the target on the *Near* point, enter Dimensions and press **Next**.



- b. When the displayed readings settle, tap **ZERO**. The display value is the number in the display area next to the green box with a 1.



- c. Place the target on the *Far* point. When the displayed readings settle, press **RECORD**.



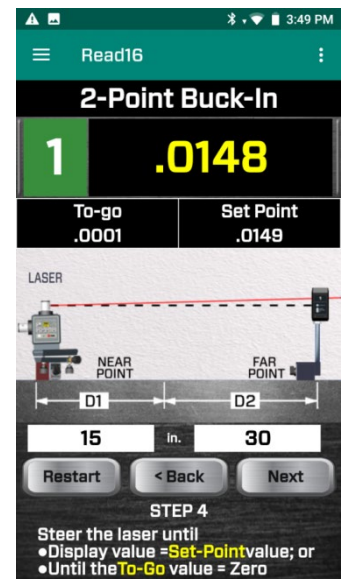
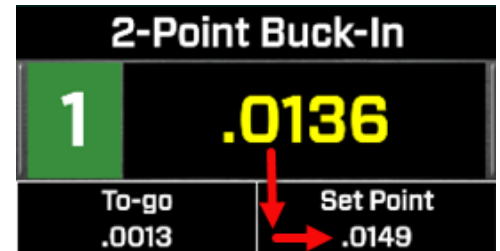
- d. Read16 calculates a **Set Point**, which is the value you want the target to read when you finish tilting the laser beam. This bucks-in the laser to the two reference points.

Step 3 – Tilt the Laser to Make Display Value Equal to the Set Point

- a. There are two ways to use the *Set Point*:
 - **To Go** – This is the amount the laser beam needs to be tilted until the *Far* point value is equal to the *Near* point value. Here you will tilt the laser until the **To Go** value is zero within your tolerance.
 - **Set Point** - This is the value you want the main display value to be set to. The laser is bucked-in when the display value equals the Set Point. In this example, you want the display value of .0136 to be equal to .0149 (Set Point).
- b. Move the target back to the *Near* point and the *display* value should be equal to the **Set Point**.
- c. If not, then repeat Steps 2 and 3 until the display values are the same at both the *Near* and *Far* points. The laser is now bucked-in to the two reference points for a line on a surface.
- d. Make sure to zero out the display on the *Near* point when the laser is bucked in.

To measure the flatness (vertical straightness) in a *line* between the *Near* and *Far* points, move the target to another point on the surface and the display value will be a measure of that point's alignment relative to the reference points.

To measure a surface *plane*, you will need to find a third reference point and repeat Steps 1, 2 and 3 until the target reads zero on *all three* reference points. When the laser is bucked-into three points, the entire surface can be measured (rather than just one line on the surface).



Using 2-Point Buck-In Screen for 3-Point Buck-In (Flatness)

The 3-Point Buck-In procedure requires adjusting the laser plane to be parallel to three points on the surface being measured; for example, a tabletop, a surface plate, or a way surface. Any three points on a surface may be used, however Hamar Laser recommends the “L” setup illustrated in Figure 12.

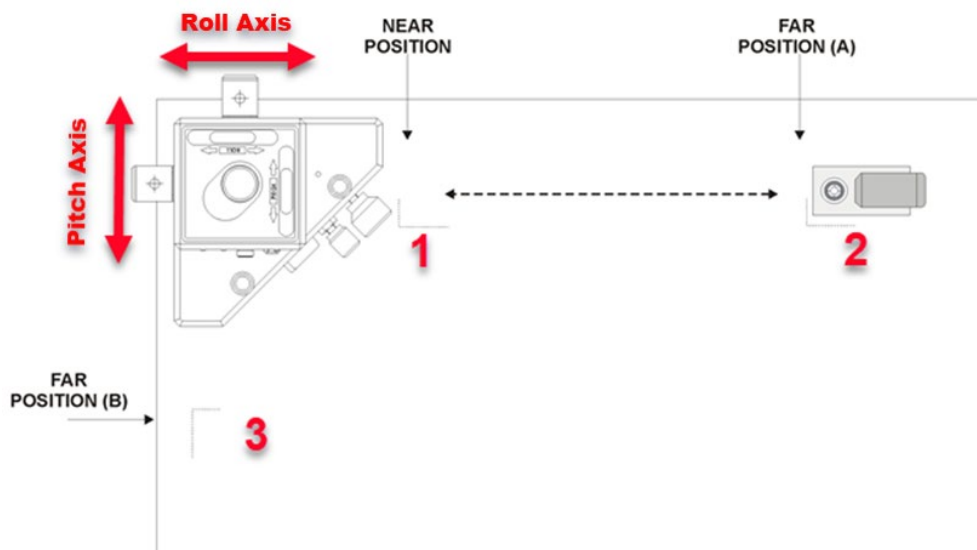


Figure 12 – 3-Point Buck-In Using one Target and the “L” Setup

When performing this procedure, it is best to place the laser source in a position that is as close to the near target position as possible. The third target position should be approximately 90 degrees to these two points.

3-Point Buck-In Procedure Using One Target

1. Follow Steps 1-3 above using the 2-Point Buck-In Screen for the *Roll Axis*
2. With the target zeroed on Point 1, move the target to Far Position B (Point 3) and tilt the *Pitch Axis* on the laser until the readout reads zero. Use only the laser adjustment knobs that face the target when tilting the laser beam.
3. Recheck the readings at the Near Position (1) and at Far Positions A (2) and adjust to zero if necessary.
4. When target reads zero in all 3 locations without adjustment, the laser plane is parallel to three points on the surface and it can be measured for flatness by moving the target to any point on the surface. You can also measure a second surface for parallelism by moving the target to that surface and measuring its flatness.



3-Point Buck-In Procedure Using Three Targets

This method requires three targets. The procedure is basically the same as with one target, but it saves the time required to move a single target to the three different footprints.

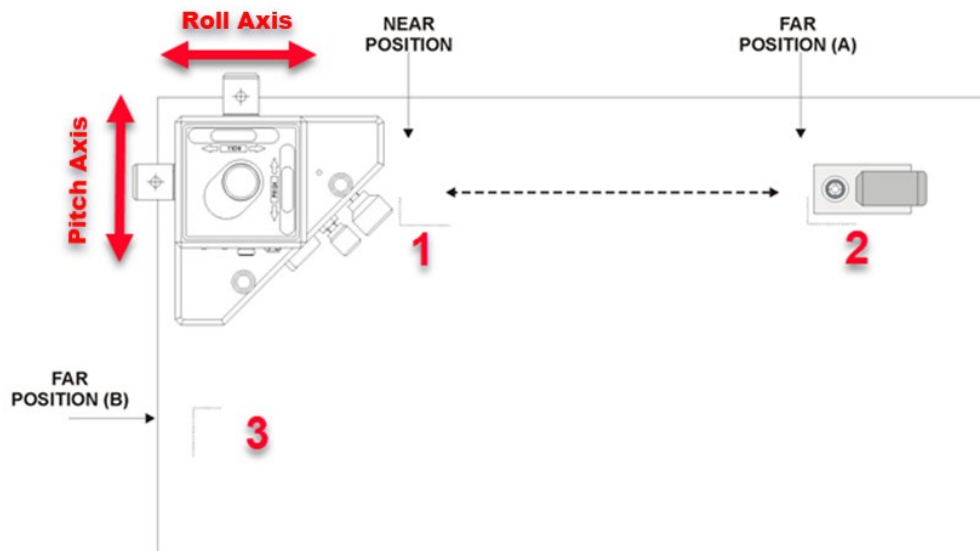


Figure 13 – 3-Point Buck-In Using Multiple Targets

Using the **Read** Screen, zero all three targets, one at a time, on Near Position (1).

1. Place two of the targets on the other two positions (Points 2 and 3).
2. Tilt or aim the laser until all three readouts read the same numbers and the same sign. In the example above, let's say Target 1 is on Point 1, Target 2 on Point 2 and Target 3 on Point 3. It is best to start with the target that is farthest from the laser (Point 2) and tilt the laser until the Target 2 value equals the Target 1 value.
 - a. In the example above, you would first look at the values for Target 2 and tilt the *Roll Axis* until the Target 2 value equals that of Target 1.
 - b. Adjust the *Pitch Axis* until the Target 3 value equals Target 1.
 - c. Recheck the Target 2 value to make sure it is still the same as Target 1. If not, repeat the process.
3. When all three target values are the same, the laser plane is parallel to all three points. To measure for flatness, zero one target on the near point and move to the desired locations.

Roll Alignment Buck-in Screen

The **Roll Buck-In** Screen is used to align the laser plane (usually the side or rear plane) to reference targets in roll alignment. Using the *Yaw* axis knob, the goal is to align one of the vertical laser planes on the L-743/L-733/L-742W/L-732W laser parallel to the offset-centerline reference targets. Please refer to the Hamar Laser's Training Manual for a more detailed description of roll alignment.

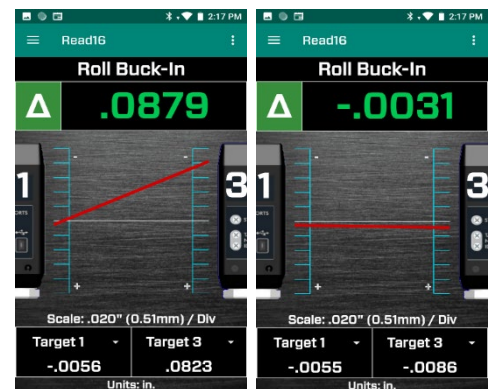
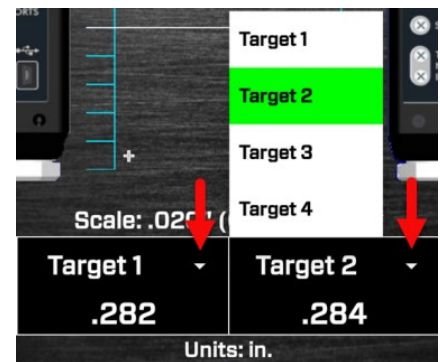
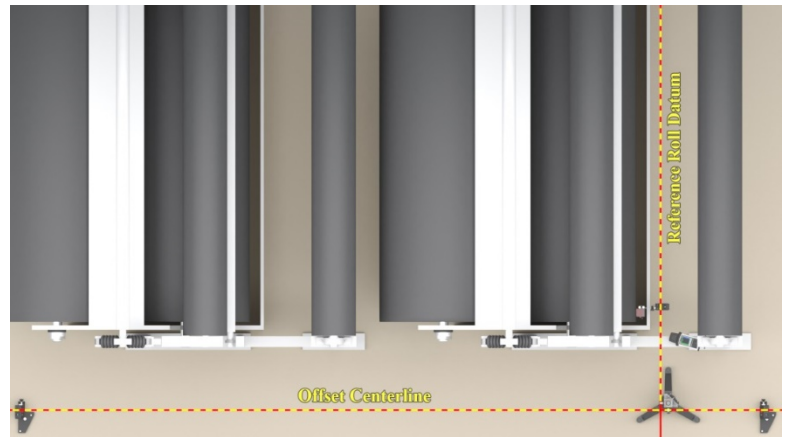


Transfer Laser Buck-in Procedure

This procedure is used to transfer the laser to a new section of the machine using the **Roll** Screen, assuming the laser has already been bucked-in to the reference roll and the reference targets have been set up.

To transfer the laser to another section of the machine:

1. Move the laser to the new section of the machine.
2. With the laser rotation turned off, rotate the spindle by hand and roughly align the laser to the two reference targets until you see the laser beam hit in the window on both reference targets.
3. Using the dropdown menus (*ID = X*), select the target IDs for the reference targets. Typically, Target #1 is used to measure the rolls and #2 and #3 are used as the reference targets.
4. Power on the laser. A display value in green displays. This value is the difference between the values of the two target IDs selected above. This value is a measure of how far out of alignment the laser plane is to the reference targets.
5. Use the *coarse* and *fine* (L-743, L-742W) *Yaw* adjustment knobs on the laser base until the display value is zero or within your buck-in tolerance.
6. As you adjust the laser, the laser line angle updates, indicating whether the laser is getting closer (angle is decreasing) or farther away (angle is increasing) from being parallel to the reference targets.
7. When the display value is at zero (or within your tolerance), the laser line is parallel to the white centerline, indicating the laser is now bucked-in to the two reference targets. You can now measure the roll on the machine for alignment.



Record Screen

The **Record Screen** is used to record data points. You can record up to 500 data points and save the data in an XML or CSV (Excel) format:

- **CSV** – Comma separated values. Commonly used for import to programs such as Microsoft Excel.
- **XML** – Extensible Markup Language. This format can be opened by a number of programs, including Internet browsers.

Read16 records these parameters:

- data point number
- target value
- date/time
- units

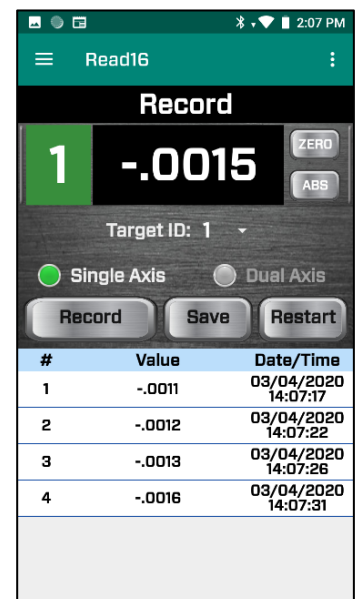
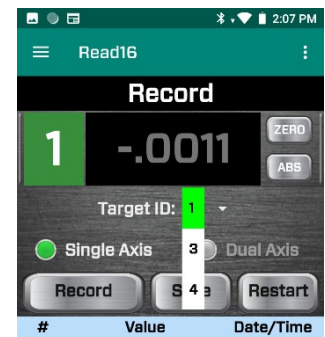
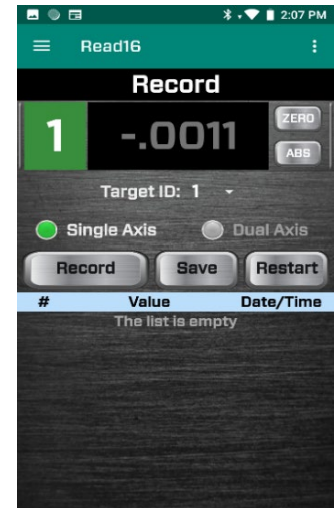
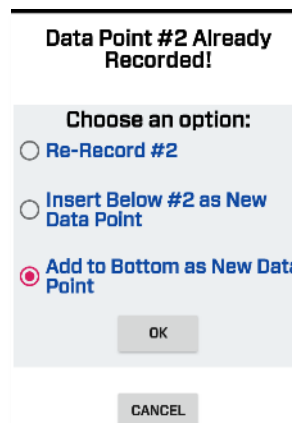
The number of digits shown in the display area is set by the value in the **Preferences Screen** (see Page 3).

To record data:

1. Select the target ID that you want to record by clicking on the dropdown menu for **Target**.
2. Click
 - **Single Axis** for A-1519-2.4ZB/A-1520-2.4ZB Single-Axis Targets, or
 - **Dual Axis** for recording the data of a 2-axis target using the R-1307-2.4ZB Readout.
3. Move the target to the first data point, wait a few seconds for the readings to settle down and tap **RECORD** to record a data point. A value and the date/time appear in the display area.
4. Move the target to the next point and repeat.

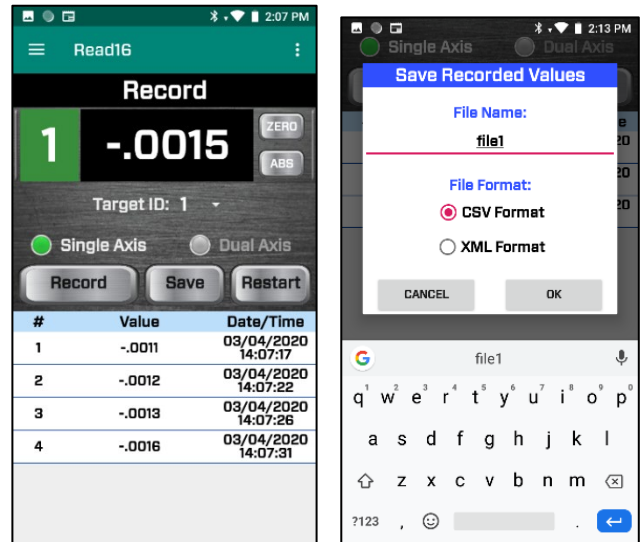
To re-record a point, click on the row in the data table and click **RECORD**. A warning message provides the following options:

- **Re-Record** – records the new data over the old point.
- **Insert Below** – records the data point and inserts it below the selected item.
- **Add to Bottom of List** – records the data point at the end of the set of data.
- **Cancel** – closes the window and does not record the data point.



Saving the Data File

Once all data points are recorded, press **Save**. The program will prompt you for a file name.

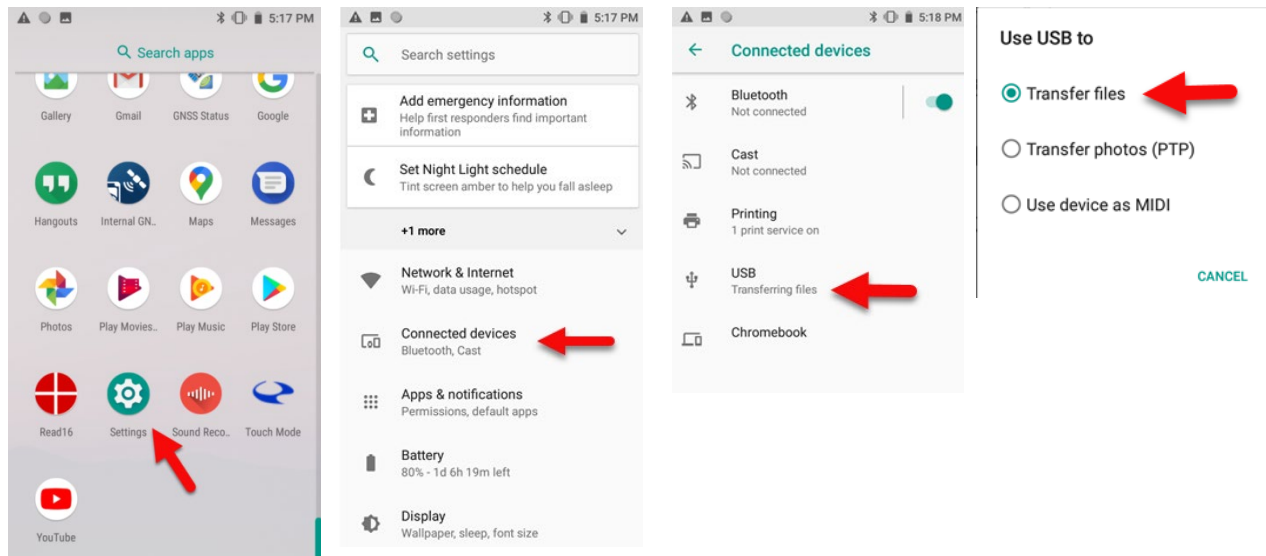


The files will be saved in the following folder:

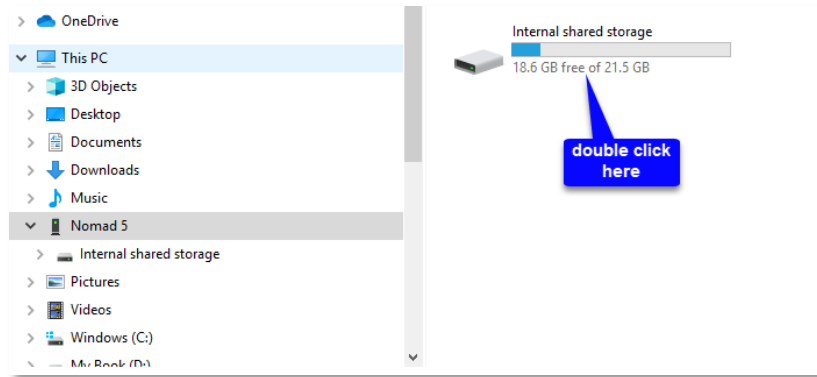
Internal shared storage\Android\data\com.hamarlaser.read16\files\Documents

Copying Files from the Nomad PDA

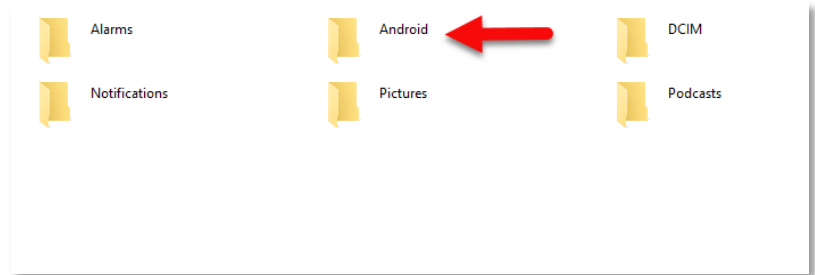
1. Connect the PDA using the provided USB-C connector
2. From the Apps screen on the PDA, select **Settings**
3. Click **Connected Devices**
4. Click on **USB Transferring Files**
5. Select **Transfer Files**. A Windows popup with File Explorer displays, showing the folder.



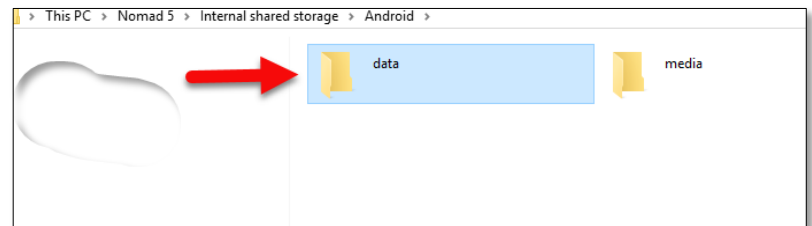
6. In the Windows popup, double-click on the “**Internal shared storage**” icon.



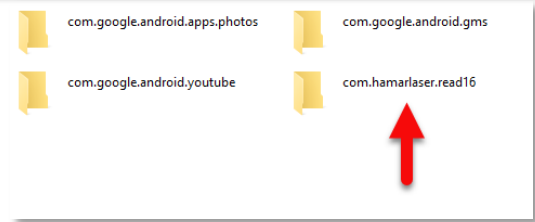
7. Open the **Android** folder.



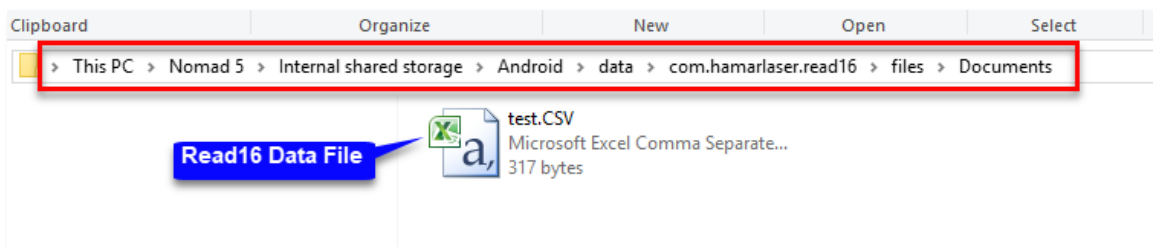
8. Open the **Data** folder.



9. Locate the **com.hamarlaser.read16** folder and open it.



10. Open the **Files** folder, then open the **Documents** folder, where the Read16 data files are located. There are two formats:
- *.CSV – this is an Excel format that you can open in Excel.
 - *.XML – this is a format that can be used in a lot of program, including browsers.



Appendix A – A-1519/1520 Type II Wireless Targets - Overview

The A-1519/1520 Type II Universal Wireless Targets incorporate new features and provide greater capabilities than previous wireless targets offered by Hamar Laser. New features include:

- Built-in radio transceiver, available in either 900 MHz or 2.4GHz ISM band
- Internal Li-Polymer rechargeable battery with twice the capacity of previously offered targets
- Rechargeable through a plug-in power supply or an optional charging station/cradle
- Field-Programmability: System ID and Target Network ID programmable via rotary DIP switches. Firmware Updates, Calibration and Other Parameters configurable through the USB Port, using the A-1519/1520 Configuration Utility.
- Three data communication modes: Wireless (Radio), RS-485 and USB
- Auxiliary Port for future expansion, such as a numerical display or external temperature sensor
- Improved Background light noise suppression
- Internal dampening by averaging of two to 64 laser position scans

Identifying Target Features



(1) Right Side Auxiliary Ports	(2) Front View	(3) Left Side ID Switches	(4) Rear View
1-1 Auxiliary Port. Expansion Port. 1-2 USB Port. Used to update target firmware, upload calibration data, configure operating parameters and run diagnostics. Can also be used as a Data I/O port, compatible with standard applications.	2-1 Target Status LEDs. <i>Steady</i> when the laser scanner is detected and all conditions are normal. <i>Blinks</i> at different rates when an abnormal condition is detected. 2-2 Battery Charging Indicator. 2-3 Low Battery Indicator. 2-4 Position Sensor Aperture Window. 2-5 Optional Light Shield Mounting Holes (4x).	3-1 System ID rotary switch used to set the System ID Group Number 0-9. 3-2 Target Network ID. Used to set the Target Network ID from 01 to 99.	4-1 Radio regulatory information. 4-2 RS-485 and plug-in power supply connector. 4-3 Serial Number Label.

Figure 14 -- Universal Wireless Targets

Using the Target as a Height Gage

The Targets can be easily converted to a height gage by attaching precision spacers and the spherical tip to the base of the target. Since the center of the target has been set to a tightly controlled dimension, the exact dimension from laser plane to the measured surface can be obtained. Optional precision spacers are available in 1 in. (25.4 mm), 2 in. (51 mm), 3 in. (76 mm) and 6 in. (154 mm) sizes, all of which are accurate to .0003 in. (0.008 mm).

The precision spacers screw into the threaded hole in the base of the target where the shaft for the magnetic base is normally installed. The spherical tip screws into the bottom precision spacer. Multiple precision spacers can be screwed together to ensure that the target reaches the laser plane, but the spherical tip, which is used to touch the surface being measured, must be on the bottom.

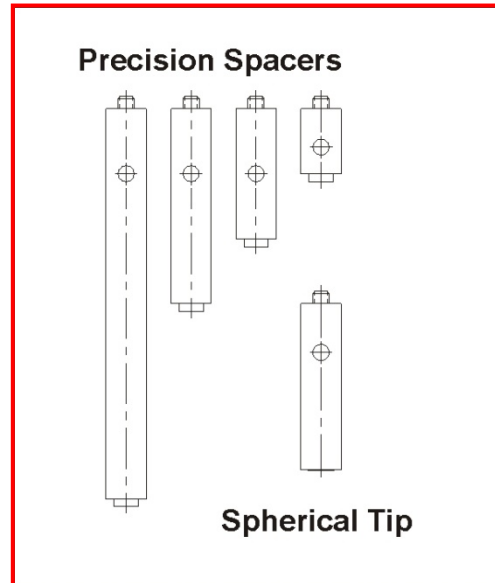


Figure 15 --*Precision Spacers/Spherical Tip*

Appendix B – Setting the Target System ID and Target Network ID (A-1519/A-1520 Targets, A-910-900/2.4, A-910-2.4ZB)

The System ID is a Radio Network Address that is used by the Radio Communications Protocol to filter unwanted data from other radio transceivers and targets using a different address. Only targets and radio transceivers that are set to a matching System ID can communicate with each other.

Because no two targets with the same System ID can transmit simultaneously, it is necessary for each target to be programmed to respond only when it is being addressed. The Target Network ID is the target address on the communications network. Under Host (computer) control, the radio transceiver transmits a message called a *polling request* that contains the Target Network ID of one specific target. All targets receive all polling requests, but only the target with a Network ID matching the ID contained in the polling message will reply (Transmit Data to the Host).

There are three rotary DIP switches located on the right side of the target, shown in Figure 16.

- The uppermost switch sets the System ID.
- The two lower switches are used to set the target network ID.

Setting the System ID

Note: Before selecting a System ID, ensure that it is not already in use by another system within the radio coverage area.

Using a small screwdriver, rotate Switch 1 to align the arrowhead with the System ID number (0-9). Figure 16 shows the System ID switch set to 1.

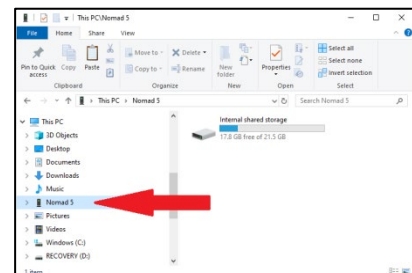
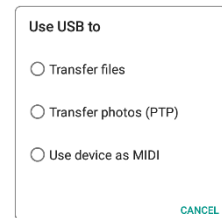
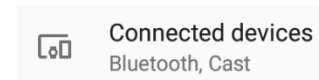
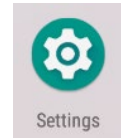


Figure 16 – System ID Switch set to 1

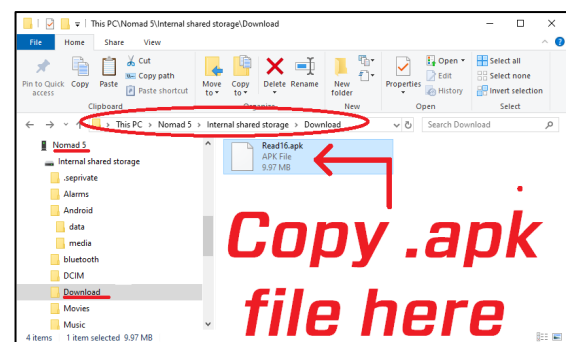
Appendix C – Restoring the Read16 Software

Android applications are distributed via **.apk** files.

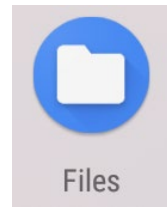
1. Un-install any previous version of Read16.
 - Start the **Settings** app that comes standard with your PDA.
 - Select **Apps and notifications**.
 - Select **See all apps**.
 - Tap **Read16**
 - Select **Uninstall**
2. Copy new Read16 **.apk** file to the PDA
 1. Connect USB cable to the PDA and a Windows PC.
 2. On the PDA, open **Settings** app.
 3. Select **Connected Devices**
 4. Select **USB Connected**
 5. Select **Transfer Files**.
3. On a Windows PC, open Windows Explorer and locate your PDA. If it's not visible within 20 seconds, press **F5** to refresh the Windows Explorer display.



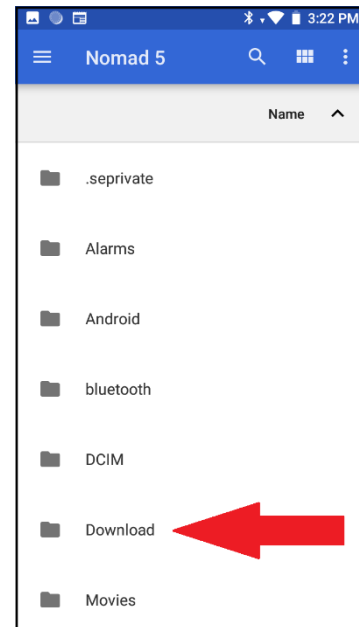
4. Paste the new **.apk** file into the **Download** folder on the PDA.



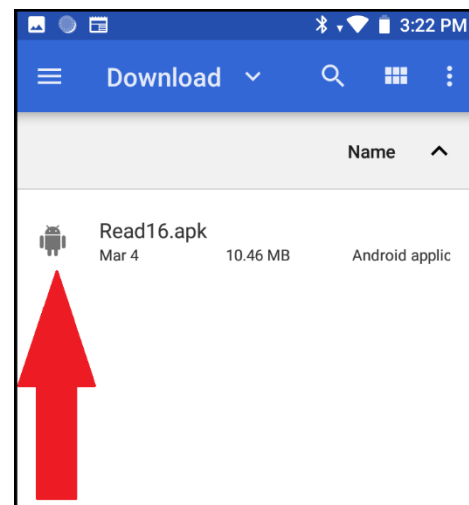
5. On the PDA, open the **Files** app.



6. Navigate to the **Download** folder.



7. Tap the **.apk** file to install the application.



Appendix D – Reinstalling the ZigBee Radio Module

If HLI Support determines there is a problem with the ZigBee radio, follow this procedure for replacing the ZigBee Radio Module to restore communication.

1. Disconnect Nomad PDA from PC and Shut PDA off

Power menu: Hold down the **Power** key for about two seconds to display a message box. Tap **Power Off**.



2. Remove the ZigBee Radio Module.

Using a suitable screwdriver, unscrew the two screws that hold the module to the PDA.



3. Gently remove the ZigBee Radio module by sliding it out.



4. Replace the new radio module in the housing

Remove 2 screws on *both* sides of the housing as shown. The housing comes apart, showing the radio PCB card.



5. Pull out and replace the USB Zigbee Radio Module from the USB port in the housing.

- Remove the 2 mounting screws holding the circuit card to the housing – see below.
- Gently pull the USB Zigbee Radio Module from the USB port in the housing as shown below.
- Replace with the new USB Zigbee Radio Module.
- Reassemble as shown above.

