Hexagon AS1 Scanner



Cable Connections:

- **1.** The Hexagon AS1 Scanner connects to the Connect Box (CB21).
- 2. Connect the trigger cable, and ethernet cable from the CB21 to the Tracker Controller.
- **3.** Connect the CB21 to the Host PC using the second Ethernet plug on the connect box.
- **4.** Use the power jumper cable from the Tracker controller to the CB21, connect the CB21 directly to power.

Required Versions List:

AS1

AS1 FW Release*	CB21 FW *	AP21 FW*	AT960 FW requirement*	LMF requirement*	Release date	WRTL
1.3.0.1362	1.0.0.720	1.0.0.1987	2.1.0.325	1.8.0.2250	June 2021	NO
1.3.0.1362	1.1.0.288	1.1.0.1257	2.2.0.295	1.9.0.2538	May 2022	YES

Figure 3-121. Current hardware compatibility list for firmware versions.

- SA version 2022.2 includes LMF 1.9
- RDS version RDS v6.2.1 must be installed.

Software configuration:

Computer Configuration:

- Verify that the Computer's Network Connect is set to 192.168.0.# (where # is >2 and <254)
- The Tracker IP defaults to 192.168.0.1

The AS1 system = 192.168.0.2 (fixed address)

Tracker Pilot Configuration (first connection only):

- Connect to the tracker through Tracker Pilot
- Import the Scanner .emsys files which contain the AS1 face compensations and define the target.
- Then disconnect from Tracker Pilot to allow SA to connect.

RDS Configuration:

 Starting in RDS 6.0 The tracker interface will automatically configure RDS for the tracker when you catch the beam using the AS1 or LAS. But if you need to configure it manually, go to the Connections panel and configure RDS to run with the AT960 as shown in below (Figure 3-122).

🎄 RI	OS Control Panel					×
ŵ	Summary	Connection				Advanced
~জ্	Connection	_ Instrument type		Link type		
\$	General parameters	O Absolute Arm (RA8) Control Pack	V	O Wired ethe	ernet	
*-	AS1		(RA7)			
	Access control	Feature Pack No	ne V			
0	About	 Multi Gage Leica Tracker (AT960) 				
	►.	IP address	192.168.0.1		つ Defa の Disco	ult ver
					×	Quit



Connection Process:

 Connect to the AT960 following the standard connection procedure. For more details refer directly to the tracker Quick-Start guide (see "Leica AT9x0" on page 109)

Using the AS1 In SA

The laser tracker interface will detect the AS1 as a reflector type au-

tomatically when you catch the beam, just like a T-probe or T-mac is auto-detected.

The scanner will initialize as it connects, you will see a progress bar as that occures (Figure 3-123), and you should then be able to begin and stop scanning using the trigger button.



Cloud Naming

Cloud naming is based upon the "group" name specified in the tracker interface. By default the cloud name will increment automatically each time the Scanner Button is Released. This auto-incriminating can be turned on/off through the tracker settings menu (Tracker>Settings>Leica AT960/930).

Button Programming

The AS1 offers 4 programmable buttons and 2 additional predefined buttons. The button functions for these buttons can be edited as needed (Tracker>Settings>Leica AT960/930).

Programmable Operations:

- A. Increment Cloud Name
- B. Decrement Cloud Name
- C. Increment Feature Selection (used for trapping)
- D. Decrement Feature Selection

Predefined Operations (these require an advanced login within RDS):

- E. Toggles Scanner's Active Scanning Profile
- F. Perform Auto-Exposure Compensation

The default operations are (Figure 3-124):

	General Tracker Settings ADM Search Parameters Seed Distance 300.0 in	×	
	LMF Tracker Settings T-Probe	×	
	Program Buttons		
	Line Scanners Auto-Increment Cloud Name (When Scanner Button Released)	Absolut	te Positioner Buttons X
Figure 3-124. AS1 Scanner button customization controls.	1=send every pt, 2=every 2nd pt, etc.	Button	Function
	Max 0.25 in	B C	Decrement Group
	Program Buttons Available MP Commands	D	Navigation Previous
	DK Cancel Stable Space (U.1 Lin		
	Home At Startup		

Cloud Thinning and Filtering

The AS1 can produce a lot of data very quickly. Depending on the application this can be reduced in order to keep a job size smaller. RDS offers as set of data controls for Point Sampling, Scanning Speed and exposure on the AS1 page. These settings can be saved as a customized profile that are called by name from an MP and toggle through with the "E" button on the ASI (Figure 3-125).

SPATIALANALYZER USER MANUAL

🕸 RE	OS Control Panel				×
1	Summary	₩ AS1			Advanced
X	Connection	Scanner type	AP21 #430048 - AS1 #1422		
ġ.	General parameters				
٠	A <mark>Ş</mark> 1			Check	Align
	Access control	- Scanning profile Active profile	Customized		
0	About	Profile image		Save as	Delete
		┌ Scan settings ———			
		Point sampling	50 % ▼		
		Exposure level	•		,° 🗧 53 %
		Exposure mode	User defined	Angle of incidence	70.0
		Scanning speed	300 Hz	High gain	
					💥 Quit

Figure 3-125. RDSAS1Configuration page where different scan modes can be defined

The tracker interface offers an additional level of control also in the *LMF Tracker Settings* dialog (Figure 3-124).

- Thinning Factor. This provides a means to decrease the density of the scans sent to SA. This can be helpful when dealing with slower computer performance or when looking to collection less data over a large area. It is particularly helpful when using a 300Hz scan is rate.
- Min Angle Filter. This is a more advance filter option that considers the curvature of a scan line. This provide a means to keep data on transitions and edges while filtering out excess data on flat, featureless regions. It offers two controls a *Minimum Angle* in degrees to define the flat regions, which considers the angle between 3 adjacent scan points in a progression along a scan line, and a *Max* distance value which ensures that points are returned within this maximum threshold. This ensures some data is returned on wide flat expanses (Figure 3-126).



Figure 3-126. Scan showing the results of using the Min Angle Filter

Proximity Triggers

Instrument >> Automatic Measurement >> Auto-Correspond with Proximity Trigger is supported with the AS1. No added controls or settings are needed. Just select the mode from the SA menu and set the desired parameters. SA will recognize the probe definition (which is set automatically when locked onto one of the AS1 reflectors) and just allow you to scan to collect auto-prox measurements.

Available MP Commands

In addition to commands available for AT960 control, the AS1 can be controlled dynamically using a selection of string commands passed to the instrument using the command *Instrument Operational Check*. While connected to RDS you can access the available MP commands through the **Tracker>Settings>Leica AT960/930** (Figure 3-127).

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	LIMF Tracker Settings ×	AS1 MP Commands ×
Figure 3-127. Examplelistofavail- able string command for MP based configuration.	T-Probe	Set Scan Profile BuiltIn.Default Set Scan Profile Custom.100Hz Set Scan Profile Custom.AOI 30 Set Scan Profile Custom.AOI OFF Set Scan Profile Custom.Customized Set Scan Profile Custom.Usret Get Reflector Position Start Scan Stop Scan
	Max Distance 6.35 mm Program Buttons Available MP Commands OK Cancel	Coyp MP Command(s) to Clipboard

- Set Scan Profile []. Sets the Active Scanning profile to the specified definition.
- Get Reflector Position. Will return the XYZ location of the AS1 with respect to the current SA working frame.
- Start Scan. Initiates a scan.
- **Stop Scan.** Stops the currently active scan.

The list contains complete MP commands that can be copied directly using the Copy MP Command(s) to Clipboard button, and pasted directly into an MP.

The one thing to keep in mind is that the name of the Set Scan Profile strings correspond to the available Active Scanning Profiles defined within RDS and the resulting commands will then need to reflect those definitions on the system you are using.

Robotic Automation using the Leica AT960 with AS1 Scanner

A series of MP Command Strings have been added in support of the LMF.IO capabilities. These command strings can be used through the MP/SDK command Instrument Operational Check.

Connections:

Connect LMF IO []. Establishes a connection to the CB21 (Control Box) at the IP address specified by [] ([] not part of string). This command, like all LMF_IO commands, will work whether connected to the AS1 via RDS, or to the AP21 via LMF. But the normal operating mode is with an RDS connection to the AS1 scanner. "AT960Simulator" can be used as an IP address to open the LMFIO simulator.

- Disconnect LMF IO. Removes the connection to the CB21 Digital IO Interface.
- Is Robot Program Active. Checks if a robot program is running. Returns "Success" if the RobotProgramActive I/O value is TRUE (1). Returns Partial success if RobotProgramActive I/O value is FALSE (0). Returns failure if SA cannot read the Robot-ProgramActive I/O value.
- Send Robot Go [timeout]. Sets the RobotGo bit to 1. Waits for the robot program to set RobotPositionReached to 0 (the timeout is expressed in seconds) Set RobotGo back to 0
- Wait For Robot Position Reached []. Waits for the robot program to set RobotPositionReached to 1 (the timeout is expresed in seconds, 0 = no timeout!)

Switching control:

- Switch to LMF/RDS. This command forces a connection either to RDS or LMF (enter LMF or RDS). In addition to switching to the desired interface, this command will also deactivate the Auto Switching. If the connection to the specified interface is already established, this command will deactivate AutoSwitching and immediately return as success
- Toggle LMF<>RDS AutoSwitching []. This command toggles the Auto switching between LMF and RDS On and Off.

Basic status information:

- Get Reflector Position. This command records the position of the prism of the currently locked on face of the AP21. This command will create a point on the tree view with the name defined on the interface. This is normally used to define the lock-on positions.
- AutoLock On/Off. Toggle Powerlock On/Off. It works while being connected with either interface RDS/LMF
- Valid Distance. When locked on the AS1, this command will return success if the Scanner is ReadyTo Measure. Can be used before calling «Scan Start» to ensure that the scanner is Ready.

Scanning Controls:

- **Start Scan.** Starts the measurement, this is equivalent to pressing the trigger on the scanner.
- **Stop Scan.** Stops the measurement, this is equivalent to releasing the trigger on the scanner
- Set Scan Profile []. Sets the RDS scan Profile by name. The available profiles can be found on General Tracker Settings>Leica

AT960/930>Available MP Commands (Figure 3-127).

- Set Line Scn Thinning Factor []. Sets the thinning factor for line scanners.
- **Toggle Line Scan Min Angle Filter On/Off.** Turns the curvature based filter on and off.
- Min Angle Filter [] Degrees [] Max Distance mm. Sets the parameters for the curvature based filter.

Addition Stand alone MP Commands

- Get Instrument Target Status. Returns the Name and SN of the AP21 and AS1. And which face is currently locked on. This command is used to verify wether the correct target and face is locked on. It works with both LMF and RDS
- Point At Target. Drives the tracker to the specified Target. Can be called while being connected with either interface RDS/LMF

Probing in an Automated Setup

For now it's recommended to Switch to LMF (using Instrument Operational Check «Switch to LMF»), when probing operations are performed. While being connected to LMF all existing commands are working:

- Measure
- Position to Target
- Measurement Profile Selection
- Target Selection, etc...

Once probing is finished the user can switch back to RDS (using Instrument Operational Check «Switch to RDS»), to start the scanning operations.

The main disadvantage of this is that it takes some time to disconnect from one interface and connect to the other.

Wireless Real-Time Link

RDS 6.2 or later offers a Wireless Real-Time Link (WRT). This utility allows a user to replace the trigger cable between the tracker controller and CB21 box with a wireless connection. To enable this, two WRTL boxes are needed, one connected to the CB21 and one connected to the tracker controller and communication is established through RDS.

With multiple trackers in use at the same time there may be a need to change the change the Radio channel used for the connection. This can be done within RDS or by used the following MP commands:

• Get WRTL Channel and Status. Returns the status of the connec-

tion and the assigned channel

• Set WRTL Channel. This command changes the current channel assignment to the specified value.