

FIELD NOTES

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Welcome to Fieldnotes

Land Surveying: The Technical Evolution That Leads to Ceaser

Land surveying has always been the discipline that turns raw terrain into reliable, actionable data. From ancient geometric methods to today's integrated geospatial workflows, the profession has advanced through continuous innovation in measurement science, instrumentation, and data management. Ceaser represents the modern expression of that evolution — a connected, field-ready platform built for accuracy, efficiency, and audit-ready control.

From Early Geometry to Geodetic Science

Early surveyors used rope baselines, right-angle triangles, and astronomical observations to establish boundaries and align structures. By the 17th to 19th centuries, surveying became a quantitative science supported by national triangulation networks, precision theodolites, baseline corrections, least-squares adjustments, and the establishment of national datums and height systems. These principles still underpin modern geospatial accuracy.

The Electronic and Satellite Era

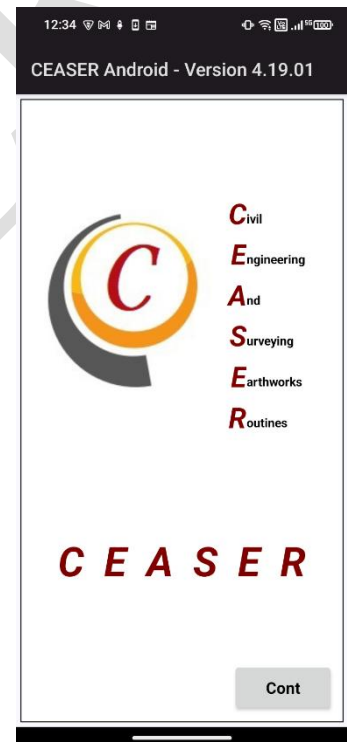
EDM and total stations introduced millimeter-level measurement, digital data capture, and one-person robotic workflows. GNSS expanded capabilities with static control, RTK and NRTK centimeter accuracy, and PPP global positioning. Remote sensing added UAV photogrammetry, terrestrial and aerial LiDAR, dense 3D point clouds, and automated terrain modeling. Surveying shifted from point-by-point measurement to high-density spatial intelligence.

The Modern Challenge — Integration and Delivery

Surveyors now work across GNSS, total stations, UAVs, CAD, GIS, and cloud platforms. The challenge is no longer capturing data — it is managing, validating, and delivering it efficiently. In the early days, portable computing on Psion devices gave surveyors their first taste of automated field calculations. However, as the profession evolved, Ceaser transitioned to the modern Android platform to handle massive data sets with zero lag. This mobile software evolution was profoundly accelerated by the arrival of the Emlid Reach GNSS family (and other GNSS systems), which acted as a primary catalyst for modern high-precision workflows by making multi-band RTK and IMU tilt natively accessible and highly mobile. This is where Ceaser fits naturally into the profession's evolution.

Ceaser — Built for the Modern Surveyor

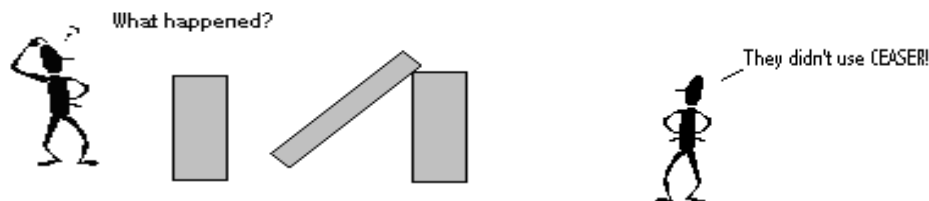
Ceaser unifies field measurement, computation, and team coordination into a single, reliable environment. It offers accurate geometry engines, real-time cross-sections and corridor analysis, integrated GNSS and Total Station workflows, cloud-synced projects, audit-ready metadata, and a fast, intuitive, offline-capable interface. It is designed for real-world field conditions with structured data capture, robust error handling, and reliable performance on rugged devices. Ceaser does not replace traditional surveying principles — it amplifies them.



A Legacy of precision, continued

From rope stretchers on the Nile to GNSS-equipped surveyors mapping modern infrastructure, the profession has always demanded accuracy and trust. Ceaser carries that legacy forward with smarter workflows, stronger data integrity, and a premium user experience. Surveying's mission remains unchanged: measure the world so others can build it. Ceaser is built for the surveyors who continue that mission today.

www.ceaser.xyz



Ceaser and Emlid Integration

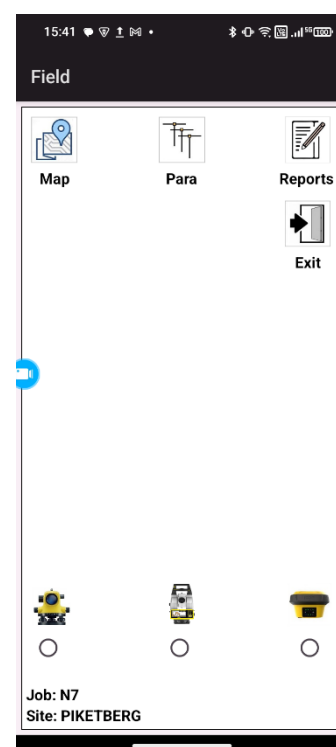
The land surveyor's main priority in the field is continuous accuracy, speed, and hardware freedom. Software should never lock a surveyor into expensive, proprietary ecosystems. High-precision GNSS hardware has entered a new era with the **Emlid Reach** family of receivers—offering sub-centimetre accuracy, multi-band satellite tracking, and IMU tilt compensation at a fraction of traditional equipment costs.

Ceaser now communicates natively with the full range of Emlid receivers, including:

- **Reach RS4 & RS4 Pro:** Emlid's flagship all-band (L1/L2/L5/L6) 672-channel RTK receiver with next-gen IMU tilt compensation, 2W dual-band radio, IP68 magnesium alloy body, and AR visual stakeout support.
- **Reach RS3:** Multi-band RTK receiver with IMU tilt compensation for fast, un-levelled topo and setting-out.
- **Reach RS2+:** Multi-band RTK base and rover unit engineered for long-range UHF and NTRIP operations.
- **Reach RX:** Compact, lightweight network RTK rover for rapid urban boundary and GIS work.

Technical Integration Highlights for Surveyors

1. **Direct Stream Processing (No Middleware Needed):** Ceaser connects directly to the Emlid receiver via Bluetooth, capturing high-rate NMEA-0183 spatial data streams in real time. You do not need to juggle separate third-party controller apps during field survey operations.
2. **On-the-Fly Coordinate Transformation:** Raw WGS84 geographic output from the Emlid Reach unit is instantly converted inside Ceaser into local grid systems, including South Africa's Gauss-Krüger / Lo coordinate system (Hartebeesthoek94 / WGS84 Datum), local site origins, or custom 3-point plane calibrations. Ceaser has nearly 5000 different coordinate systems in its database.
3. **IMU Tilt Compensation Utilization:** Ceaser reads tilt-corrected position vectors directly from the Emlid Reach RS4 and RS3 receivers. Surveyors can log boundary beacons on steep slopes, pick up manholes under obstructions, or take topo points along trench edges without having to level the pole bubble.
4. **RTK Quality Monitoring:** Ceaser continuously validates Emlid's RTK Fix status, dilution of precision (DOP), coordinate standard deviation, and active satellite count, preventing field logging if tolerances exceed project parameters.



Ceaser Features & Instrument Workflows

A survey project is hardly ever restricted to the use of one type of survey equipment. You will find yourself in situations where you need to change to a different survey instrument to accomplish your different tasks on site. You might find yourself on site levelling in benchmarks using your Digital Level, then placing holding-down bolt positions with your Total Station, and right after that running cadastral boundary checks or setting out batterboards using your **Emlid GPS** rover.



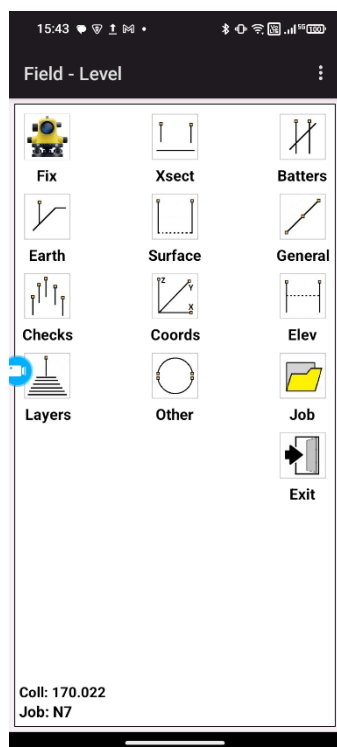
It is for situations like these that we have made **CEASER** flexible. It is now possible to swap between different types of surveying equipment by merely tapping on the required type of equipment without any issues or loss of data. CEASER will remember the setup parameters for each instrument and use the appropriate setup info according to the instrument selected.

Flexible Instrument Fixing Options

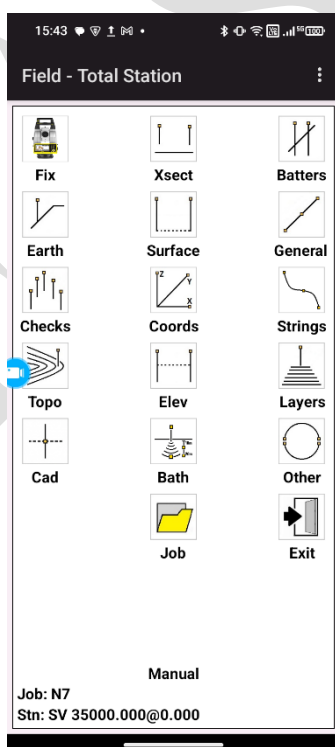
Different setup (fixing) options are available depending on the type of instrument selected:

- **Level:** Collimation, Backsight, Intermediate, Foresight, Profile Peg, Line Levelling.
- **Total Station:** Known Station, Unknown (Resection), Stake & Offset, Station Height, Orientate, Set Bearing, Polar Fix.
- **Emlid GPS:** Satellites (NMEA Stream), Calibrate NMEA, Setup Base, Setup Rover, Topo, Calibrate, Fix A Point.

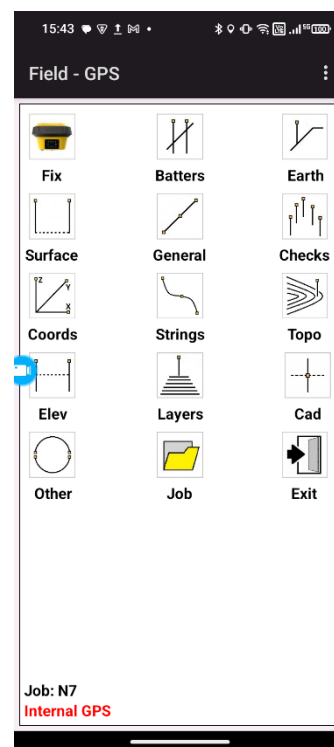
Fix your instrument once, irrespective of which instrument you are using, and CEASER will remember each instrument's setup parameters:



Level



Total Station



GPS

The program uses the same **Design Database** and stores the Field results in the same Database irrespective of the instrument used.

Let us take the case where you need to place Profile Pegs for a Design Surface. By selecting a different type of instrument, you will have a different screen layout, but it is still the same Profile that you are setting out.

Real-Time GPS Tracking Features

An additional advantage with the Emlid GPS integration is that you can trace your design parameters in real time. By leveraging Emlid's rapid RTK update rates and advanced IMU tilt capabilities directly on-site, surveyors can perform fluid, continuous tracking without ever needing to pause and level the pole. This ultra-low latency allows Ceaser's real-time design tracking features—such as live cross-section batter calculations, instant shoulder checks, and dynamic DTM/TIN stakeouts—to calculate and display results instantaneously as you move your Rover along the selected design feature.

Design Features supported in Real Time:

- Batters
- Earthworks Check
- Design Widths
- Edge Shifts
- Shoulders
- Pivot Points
- Layer Checks
- Strings
- Terraces
- TIN Models
- Asbuild Surveys
- Rehabilitation.....etc.

