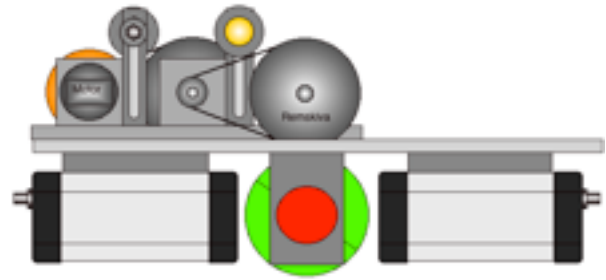
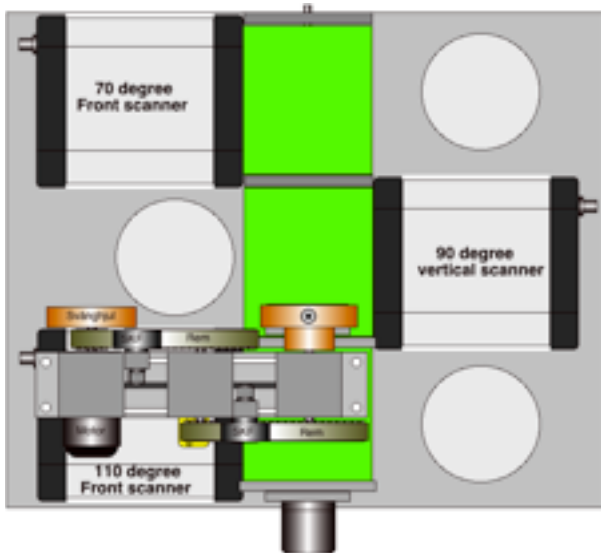


Presentation of idea of the system



There are several ways to get more points at surface in air borne scanning. All systems use scanners with a single scan path and this gives some limitations of what can be measured at surface.

One limitation is the limited see behind corner capability and here a scanner with several scanners in same unit that use different angles will be a bit better.

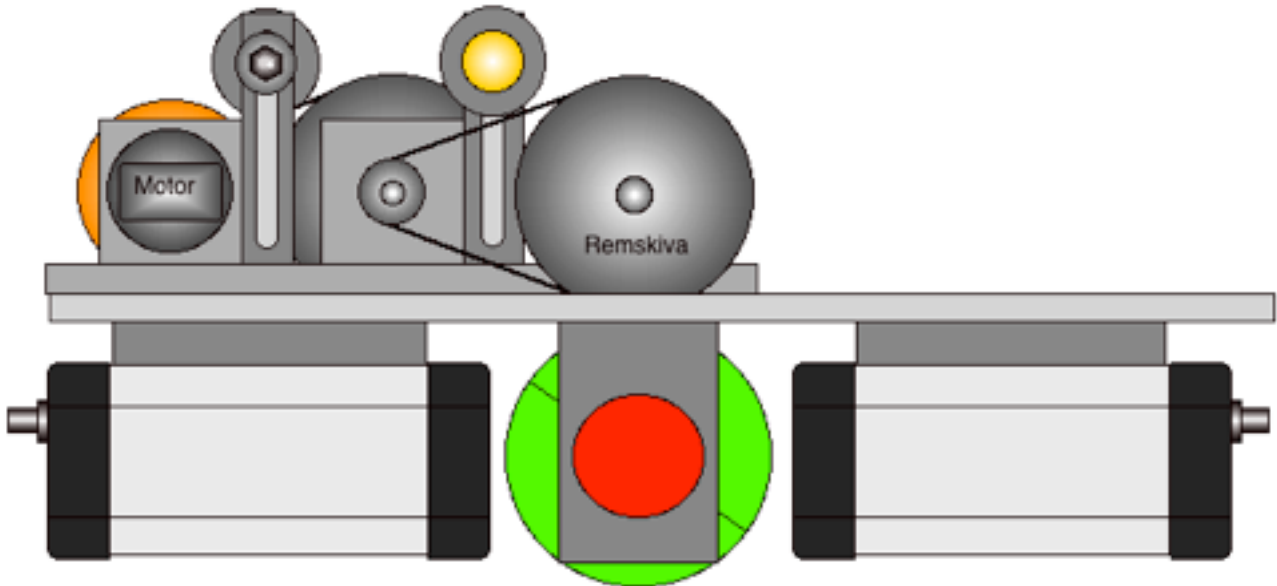
Drawing on top shows the idea to use a system with one shaft and in same shaft we have 3 mirrors a bit differently angled. Here we propose a ± 20 degree extra scanned swath + the normal 90 degree scanned angle most use today.

Here we have more points at surface where a single line scanner can not penetrate. We do also have 3 sensors and tripled speed in data collection. This makes a solution with less costly components possible.

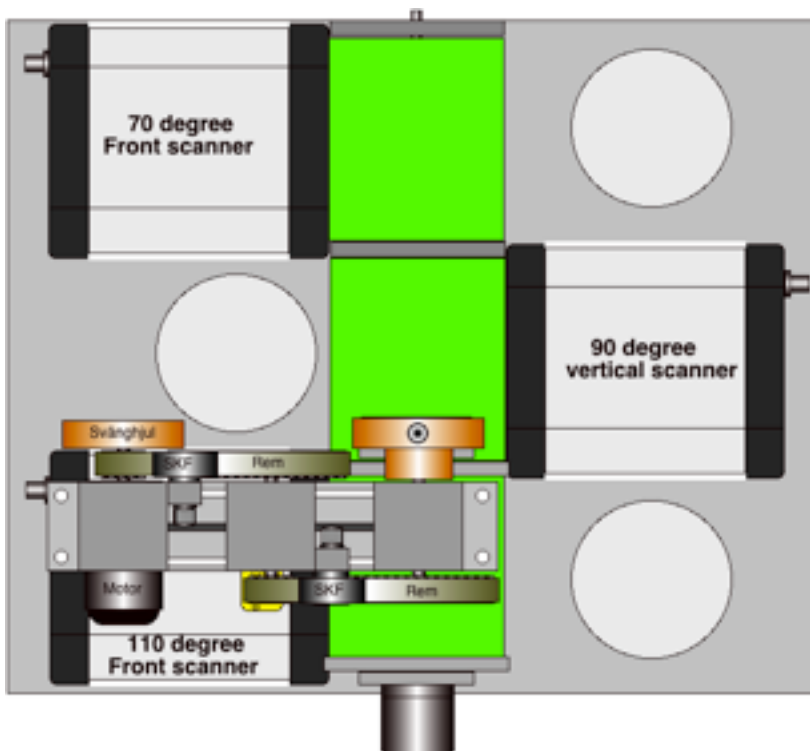
Here we show a system with 3 pcs of a 1500 meter high speed distance meter. Each unit makes up to 36 KHz in speed and each shot can be first and last pulse readings. This device have an accuracy of 5-10 cm at single shot definition and at ± 1 Sigma definition.

All is based on an old design where we add 3 scanners side by side and share some components like shaft encoders and motor. This system can scan a swath angle of about 60 degree and all shots are transmitted as we have no polygon wheel.

Here we have done a general drawing not very correct in smaller details but showing the concept.



Side view where 2 sensors are showed and one is hidden behind. Mechanics on top and mirror and sensor under the aluminum plate.



Top view of same system with distance meters visible. Here we see mechanics at right bottom but in fact it should be on other side of sensors.

Hopes can be for calibrated cameras as line scan cameras. Here lines can be set to exactly follow the scanned line of the laser so we have a hard lock of all data in position and timing.

All data are sent by USB 2.



Photo of the original system we use here and add extra sensors to get triple functions.

If we make the triple system as showed we expect

Weight about 15 Kg

Dimensions about 500x300x200 mm

Cost about Euro 60 K. for hardware only

Output 3X USB 2 for PC system

This is an older idea now implemented like this.

All is then known so risks are limited.



Triplescanners for airborne use

2012-08-27 Page 4 of 7

Alternative system earlier offered and in process for end 2012

Geomapper Quotation

Re earlier discussions and mails we hereby offer.

Geomapper is a 3D airborne laser radar system making a 3D database of what is under the flight path. Geomapper 10000/600 is a small high-speed model for smaller aircrafts and helicopters. All data are stored and post processed after the flight.

Geomapper system in short.

Under the fuselage we have a main frame for the scanner.

Here we have the laser radar unit and the vertical and front viewing cameras

The main frame has a universal bracket for installation to your aircraft.

Inside the aircraft we have a rack with 2 PC systems inside. Here we store all recordings and videos of the flight.

The system has an external INS/ Gyro system from your Novatel Span series. This system includes a high accuracy DGPS/ RTK positioning system used for geo referencing. When landed the database can be loaded over W-LAN to an external PC system for further processing.

Mainframe unit

Dimensions	200x300x400 mm (HxWxL)
Weight	About 10 Kg
Encapsulation	IP 44 level splash proof when installed under the aircraft Aluminium powder painted enclosure

Range	5 meter to 600 meter to a good reflective surface
Accuracy	+/- 5 Cm measured at +/- 1 Sigma
Speed	2 units a 5000 Hz each
Scanner	Oscillation mirror design
Scanner speed	Adjustable from 0 to 10 Hz/ cycles/sec
Scanning angle	Mechanically adjustable from 10-60 degree vertically
Speed control	Remote from panel inside the aircraft

Vertical camera	Colour 3 Mega pixels USB output
Field of view	60 degree horizontally
Calibration	Camera has adjusting capabilities for parallel view o the

Laseroptronix
Glimmervägen 8
E-mail info@laseroptronix.se

Telephone office 46-70-7140470
187 40 Täby Sweden
www.laseroptronix.se



Triplescanners for airborne use

2012-08-27 Page 5 of 7

scanner	
Front and rear cameras	Pixels can be defined to 3D spots from the scanner if processed correctly. Data is geo referenced.
Field of view	Colour 1 Mega pixel USB output 75 degree horizontally
Connection	2 cables with rugged connectors between the two units.
Cable length	4 meter in length
Ambient temperature	0 to + 50 Degree C in operation under a fuselage in wind 0-40 degree if operated in sunshine and no wind
On board rack	
Dimensions	300x500x300 mm
Weight	about 10 kg
Encapsulation	IP 44
Input voltage	230 VAC from separate inverter included in delivery
Input power	Less 400 W Typical 150-250 W
Power source engine	Your small battery charged by alternator in aircraft engine
2 pcs systems	Modern Pentium Min 2,66 GHZ
Operative system	Windows XP Application software in Lab view Camera with special software under Windows XP
Hard discs	Min 160 GB for system 2 pcs 400 GB for Video storage 1 pcs 400 GB for Data storage
DVD Burner	Yes for non-flight operation
Inputs	RS 232 for customers Novatel unit
GPS	We have an own GPS system for internal clock for video storage and time stamping. This is a small Garmin USB device.
Power supply	We deliver an inverter operating at 12 or 24 VDC that deliver 230 VAC to all onboard systems. Inverter is separate. Weight about 2 kg. Cables are 2 meter
Monitors	
1 pcs	10,4 inch high intensity screen with VGA input Touch panel capability
1 pcs	7 inch VGA screen for camera input control
Operators handle	Extra keyboard, roller ball mouse. Switch between computers.



Triplescanners for airborne use

2012-08-27 Page 6 of 7

Output

When landed we have stored a database in spreadsheet style. (Excel style)

When recording we create 5000 lines per sec vertically. This is set by the fastest event in the system. This the altimeters which do 5000 Hz /ea

There are columns for each sensor/ input

- One column gives the angle of laser beams from the encoder
- One column gives the Novatel data string including GPS clock.
- 2 columns gives range data from altimeters

When landed these data can be moved to an other computer for additional processing in suitable software.

The video recorder use GPS clock as reference for images

Vertical camera and the 2 other cameras are stored in J-peg format.

All images can be traced by GPS clock and compared with same-clocked data from database.

Options

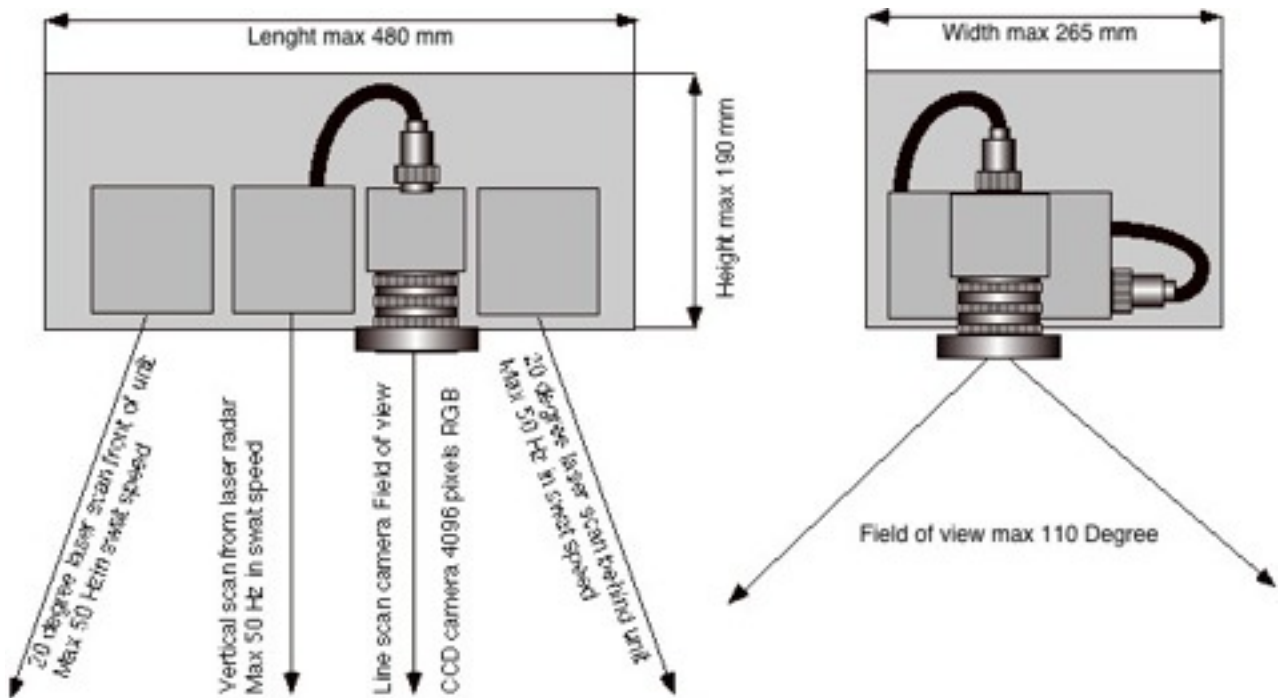
We can offer more complete software for post processing. If so we need more info about what you have today and what you need for the future

Price All parts as offered is Euro 147 500 ex works Täby office

Warranty 12 months from delivery ex works

Payment conditions 40% at order
30% after acceptance tests in Sweden
10% when delivered to the forwarder against stamped documents
10% 30 days after delivery from Stockholm airport

Freight Ex works (about 100 kg in box by airfreight about USD 1000)



Principal drawing of this device.

Allan Jansson Laseroptronix Sweden