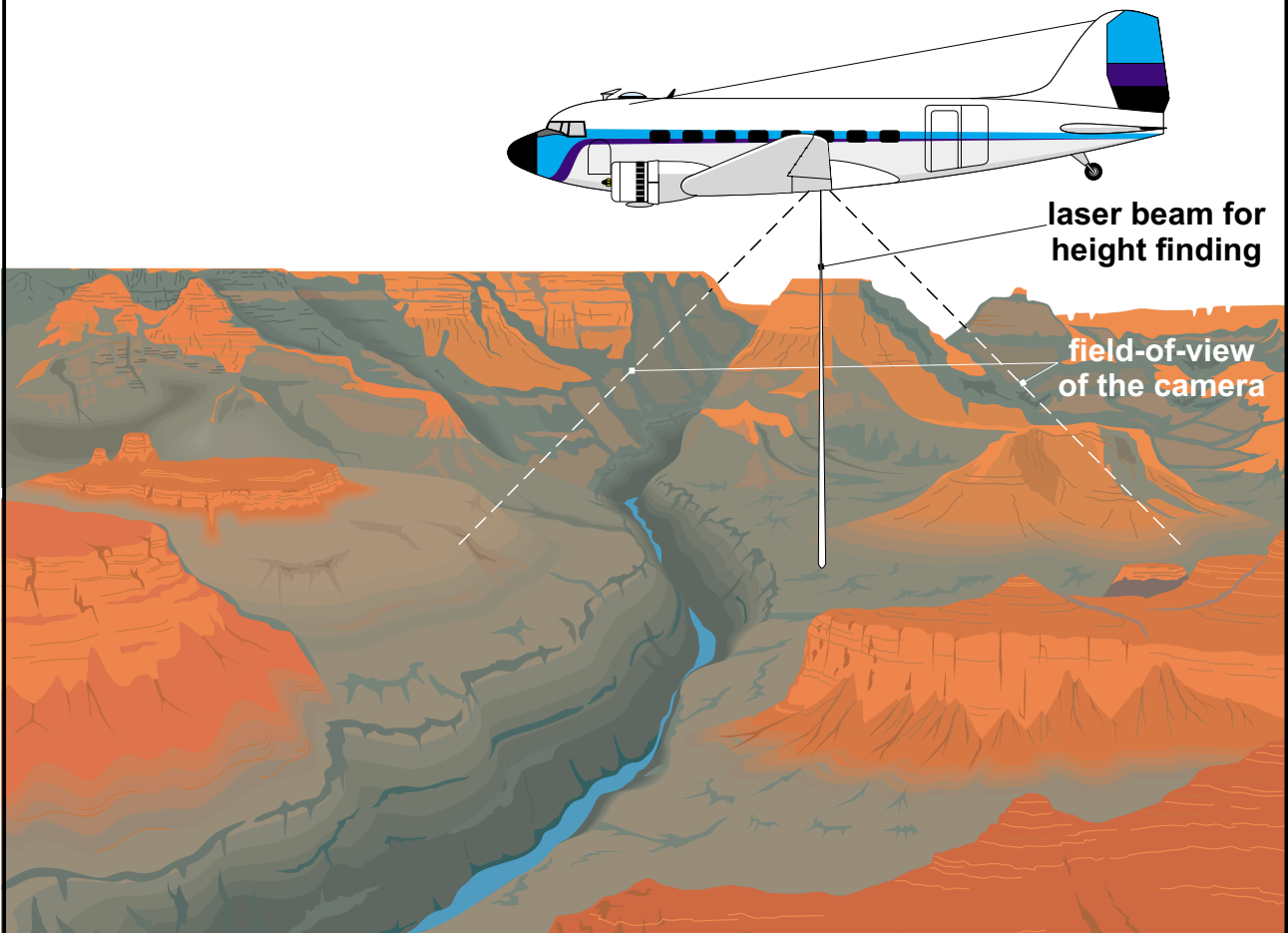


Applications of **RIEGL** Laser Instruments

Problem: Altimeter for aerial photography

Solution: Down-looking laser rangefinder on board of plane



Key features:

- ✓ High accuracy
- ✓ Narrow measuring beam
- ✓ Continuous measurement with high data updating rate
- ✓ RS232 data interface

Related applications:

- ✎ Height-of-flight measurement of helicopters, balloons, etc.
- ✎ Height measurements from ground to flying objects

Performance:

- ✎ LD90-3800HiP-LR:
maximum range 2500 m, accuracy 2.5 cm
- ✎ FG21-HA:
maximum range 1200 m, accuracy 10 cm
- ✎ LD90-3800-FLP:
maximum range 750 m, accuracy 5 cm
- ✎ LD90-3300HR:
maximum range 500 m, accuracy 5 cm

(Continued on the next page)

Applications of **RIEGL** Laser Instruments



Video camera

Mapping camera

FG21 looking downwards

Measured actual height (in meters):

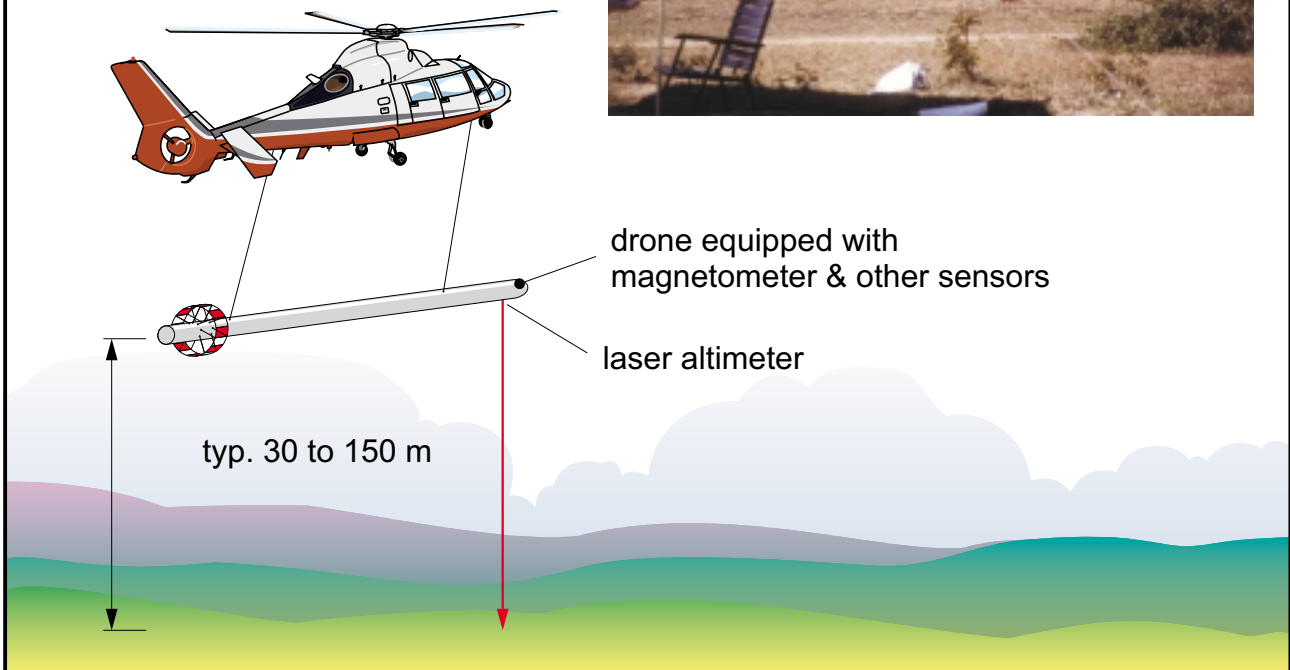
59,5	65,0	69,0	72,5	77,0	80,5	86,0	92,0	97,0	99,5	104,5	109,0	187,5	229,0	Starting phase
279,0	356,5	456,0	465,5	472,0	477,5	571,5	596,5	609,0	658,0	635,5	635,0	634,5	Horizontal flight	
632,5	629,0	627,5	627,5	625,5	623,5	620,0	617,0	615,5	615,5	614,0	616,0	611,5		
609,5	609,5	608,5	610,0	614,0	615,5	616,5	614,5	612,5	609,0	606,5	605,5	604,5		
605,0	604,0	605,5	607,5	611,0	614,5	619,0	622,5	629,0	631,0	632,5	634,0	634,0		
694,0	670,0	681,0	682,0	682,0	647,5	637,0	628,0	625,5	624,0	622,5	620,5			
618,5	618,5	616,5	621,0	620,0	619,5	597,0	616,5	626,5	632,5	637,5	635,0	637,5		
642,0	647,0	663,0	671,0	665,5	665,0	662,0	675,0	687,5	689,5	695,5	702,0	706,5		
702,0	711,5	712,5	717,5	719,5	723,0	729,5	735,0	738,0	733,0	730,5	728,0			
730,5	733,5	737,5	737,5	741,0	771,5	824,5	837,0	839,0	721,0	727,5	727,5			
721,0	717,5	717,5	717,0	718,0	724,0	745,5	737,0	747,0	748,0	749,0	759,0	AERIAL PHOTOGRAPHY		
753,0	752,5	753,5	753,5	754,5	753,5	749,5	752,5	753,0	759,0	760,0	761,5		755,0	
756,0	754,5	752,0	753,5	750,5	748,5	744,0	736,0	726,5	720,5	730,5				
728,0	727,0	726,0	722,5	724,0	726,5	729,5	728,0	708,0	721,5	720,0	712,0		707,5	
707,5	705,0	697,5	703,5	699,5	695,0	706,5	693,5	575,0	570,5	564,0	556,0			
545,5	552,5	548,0	522,0	518,5	495,0	456,0	470,0	420,0	408,0	414,5	387,0		404,5	
379,5	399,0	369,0	381,5	381,0	392,5	378,5	379,0	370,5	381,0	366,5	333,5		324,0	
308,0	297,5	293,0	289,5	278,5	270,5	268,0	263,0	263,0	266,0	268,0	272,5		270,0	
301,5	306,0	310,5	296,5	319,5	327,5	310,0	319,5	326,0	380,0	400,0	401,5		414,5	
442,5	439,5	441,0	485,5	495,5	494,0	515,0	530,0	539,0	531,0	545,0	541,5		543,5	
544,5	534,5	528,5	528,0	542,0	509,5	498,0	495,5	490,5	489,0	492,5	489,0	484,0		
477,5	469,0	461,5	458,0	429,0	246,0	148,5	250,0	254,0	261,0	267,0	272,5	277,5		
282,0	284,5	289,5	294,0	298,5	302,5	305,0	312,0	317,0	327,5	330,5	334,0	336,5		
340,5	414,5	441,0	439,5	441,0	440,5	419,0	441,5	440,0	442,5	437,0	440,0	441,0		
439,5	434,0	432,5	428,0	422,5	433,5	334,5	430,5	431,5	426,5	432,5	429,5	429,0		
428,0	423,0	426,5	424,5	422,0	409,0	410,5	417,0	416,0	412,0	411,5	408,0	407,0		
405,5	403,5	402,5	401,5	400,0	397,5	395,0	392,5	388,5	384,5	379,5	376,0	357,5		
353,5	352,0	351,0	346,5	345,0	345,5	343,5	355,0	352,5	355,5	367,0	374,5	381,0		
385,5	388,0	363,5	394,5	393,5	368,0	199,0	371,5	376,0	380,5	409,5	416,0	426,5		
426,5	422,5	416,5	522,0	521,5	522,0	521,5	521,0	521,0	523,5	524,5	518,5	517,0		
506,0	500,0	492,5	489,0	476,5	474,5	469,5	468,5	471,5	473,5	474,0	478,0	482,5		
488,5	492,5	495,5	498,5	500,5	503,5	539,5	538,0	530,0	524,0	523,0	522,0	506,0		
372,0	358,5	344,5	331,5	329,0	328,5	327,5	328,0	340,5	334,5	337,5	335,5	310,0		
337,0	327,5	321,0	321,0	321,0	320,5	314,0	313,5	314,0	312,5	309,0	294,0	291,0		
280,5	271,0	260,5	255,0	233,0	210,5	201,5	191,5	183,5	173,5	167,0	158,0	151,5		
141,5	135,5	107,0	92,0	87,5	79,5	71,0	47,0	40,0	28,0	20,0	15,0	Landing phase	

Parameters: measurement time 0.2 s
measurement rate 1 s, externally triggered

Applications of **RIEGL** Laser Instruments

Problem: Exact altimeter for geodetical measurements

Solution: Laser distance meter LD90-3 measuring downwards



Advantages:

- ✓ Very high accuracy
- ✓ Narrow measuring beam
- ✓ High measurement resolution
- ✓ Continuous measurement with fast data update rate via RS232 data interface

Performance:

- ✗ Measuring range:
LD90-3300HR up to 300 m
LD90-3800-FLP up to 750 m
- ✗ Accuracy:
LD90-3300HR typ. ± 25 mm
LD90-3800-FLP typ. ± 50 mm

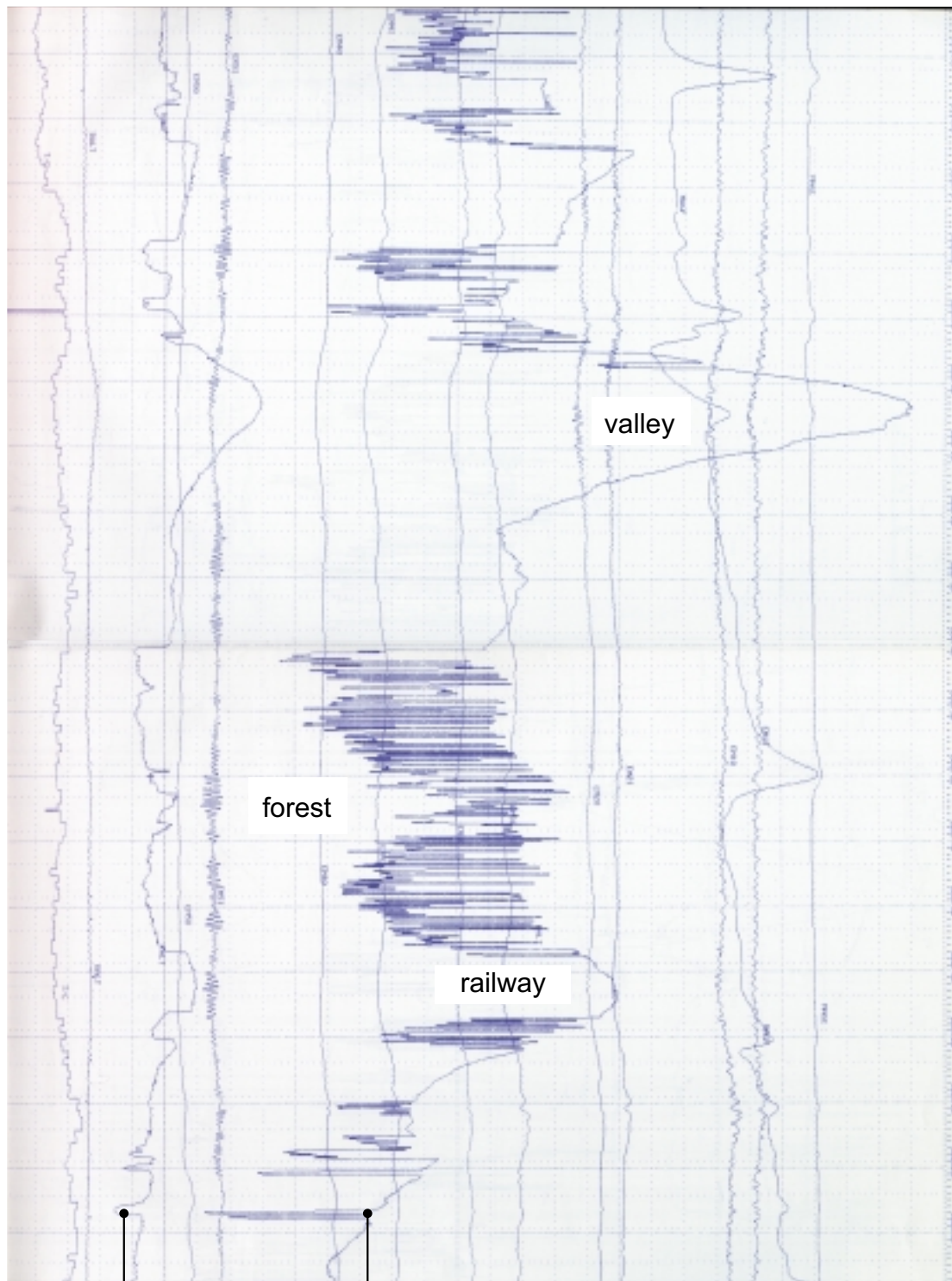
Related Applications:

- ☞ Altimeter for aerial photography
- ☞ Height-of-flight measurement of helicopters, balloons, etc.
- ☞ Height measurement from ground to flying objects

(Continued on the next page)

Applications of **RIEGL** Laser Instruments

Several sensor data vs. laser & radar altimeter data:



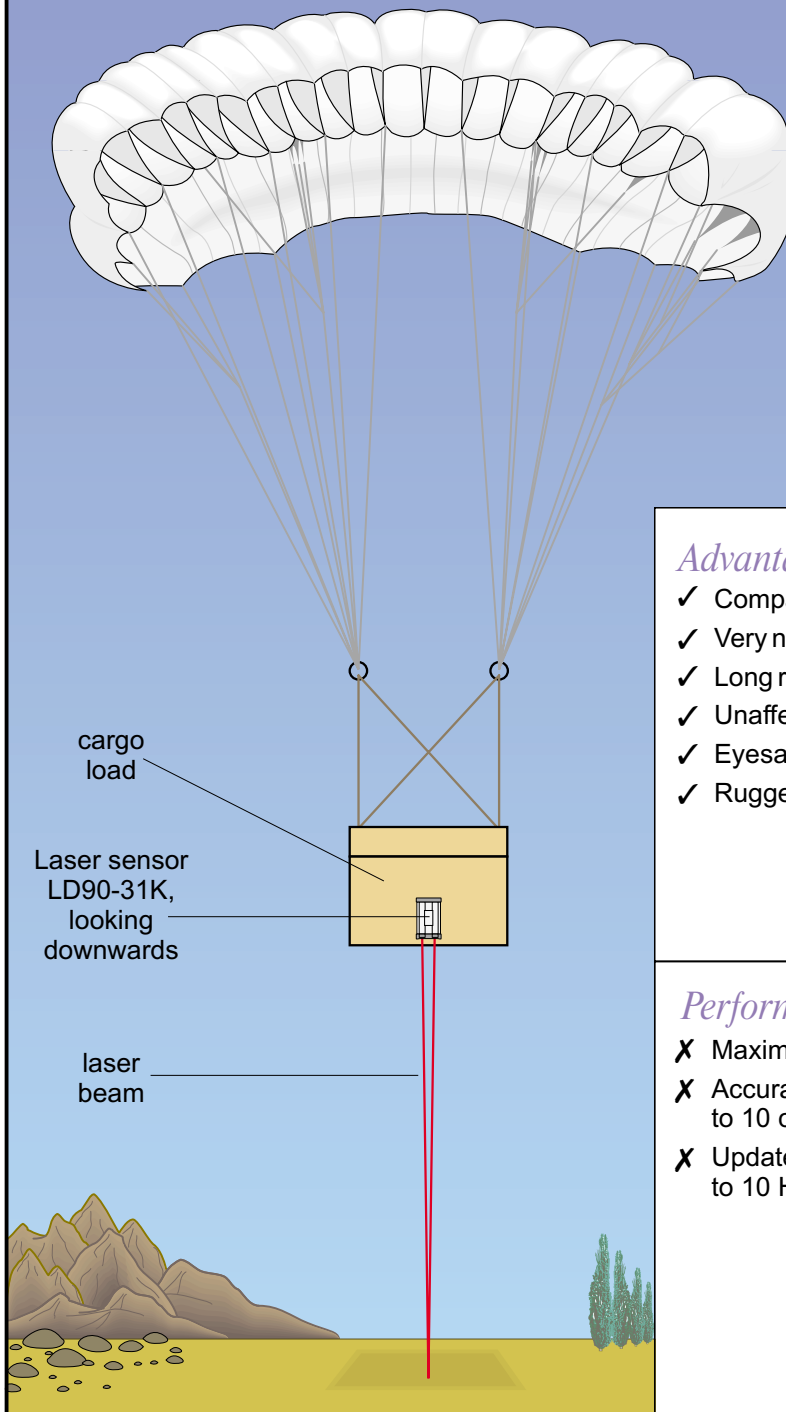
radar altimeter data

laser altimeter data

Applications of **RIEGL** Laser Instruments

Problem: A GPS based guidance, navigation and control system (GN&C) guides an automatic parafoil with a heavy cargo load to a desired landing location. Accurate real time distance measurement from the platform to ground is required to plan course, landing trajectory and initiate landing maneuvers.

Solution: The LD90-31K is mounted on the platform providing the GN&C with very accurate distance measurement to the ground.



Advantages:

- ✓ Compact and lightweight package
- ✓ Very narrow beam
- ✓ Long range capability
- ✓ Unaffected by incident angle of beam to ground
- ✓ Eyesafe
- ✓ Rugged (released in free fall from 6000 m)

Performance:

- ✗ Maximum range: typically 1500 meters
- ✗ Accuracy: typically 0.5 meters at max. range to 10 cm at min. range
- ✗ Update time: typically 0.5 hertz at max. range to 10 Hz at min. range

(Continued on the next page)



RIEGL
LASER MEASUREMENT SYSTEMS

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Applications of **RIEGL** Laser Instruments



RIEGL
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