

2005 Laser Survey

Electronic Levels (beam coverage greater than 1,000 feet)

Manufacturer	AGL LASERSOURCE	AGL LASERSOURCE	AGL LASERSOURCE	AGL LASERSOURCE	CST/berger	LaserMark by CST/berger	David White by CST/berger
Model	EAGL 1000	EAGL 100	EAGL 20	Beamer 6	57-LM800DI	LMH	3150
Date of introduction	1996	2004	2001	2005	Jan-05	Aug-01	Aug-03
Beam type	Infrared	Infrared	Visible split beam	Visible split beam [1]	[1]	Visible 650 nm laser diode	[2]
Beam coverage	2,000 ft	2,000 ft	2,000 ft	1,600 ft	2,000 ft	Up to 2,000 ft	Up to 2,000 ft
Rotation speed	600 rpm	600 rpm	600 rpm	Variable 100 to 600 rpm	Variable	600 rpm	Variable: 150, 300, 600 rpm
Compensation or self-leveling type	Compensation	Electronic self-leveling	Electronic self-leveling	Electronic self-leveling	Electronic	Electronic self-leveling	Electronic self-leveling
Compensation or self-leveling range	± 10 arc minutes (± 1/6°)	± 7% (± 4°)	± 4% (± 2.2°)	Horizontal/vertical ± 5°	± 5°	± 5°	± 5°
Self-leveling speed	N/A			< 30 seconds	1/4 second	0.5 minutes	0.5 minutes
Accuracy							
- Degrees	7 arc seconds	± 10 arc seconds	± 10 arc seconds	± 10 arc seconds	± 10 arc second		
- Variance per 100 feet	± 1/24 in	± 1/16 in	± 1/16 in	± 1/16 in	1/16 in	± 1/16 in	± 1/8 in
Power source	4 D alkaline or NiCd	4 D alkaline or NiCd	6 V lead acid	6 V lead acid	Ni-Cad rechargeable pack	4 D alkaline	4 D alkaline batteries
Battery life	z						
- Alkaline	90 hours	100 hours				± 70 hrs	±70 hrs
- Rechargeable	45 hours	50 hours	35 hours	20 hours	15 hours	± 30 hrs	±30 hrs
Operating temperature	14 to 122° F	14 to 122° F	14 to 122° F	14 to 122° F	22 to 120° F	22 to 120° F	22 to 120° F
Water and dust sealed?	IPX4	IPX4	IPX4	IPX7	IPX7	IPX4	IPX4
Warranty	1 year; 2nd year opt. \$99	1 year; 2nd year opt. \$99	2 years; 3rd year opt. \$99	1 year; 2nd year opt. \$99	2 years	2 years	2 years
Laser Sensor included	Yes	MR50 or LS-44	MR50 or LS-44	MR50 or LS-44	Yes	Yes	Yes
- Price if purchased separately	\$315	\$150 or \$295	\$150 or \$295	\$150 or \$295	\$295		
Package price	\$1395 alk/\$1530 NiCd	\$1,395	\$2265 or \$2410	\$2895 or \$3040		\$995	\$1345
Reader Service Number	1	2	3	4	5	6	7

Manufacturer	Laser Reference Inc.	Leica Geosystems	Mikrofyn Positioning Products	Mikrofyn Positioning Products	Mikrofyn Positioning Products	Mikrofyn Positioning Products	SOKKIA
Model	L4+	Rugby 100LR	ML 15i	ML 2H	ML 2	ML 2VD	LP30A
Date of introduction	Mar-99	Nov-02	2003	1998	1998	1998	Feb-03
Beam type	633 nm highly visible	708 nm invisible laser diode	635 nm high powered visible [3]	670 nm visible	670 nm visible	635 nm visible	Infrared laser diode
Beam coverage	2000 ft	2500 ft (770 m)	> 2600 ft dia.	> 2600 ft dia	> 2600 ft dia	> 5200 ft dia.	2000 ft dia
Rotation speed	0-450 rpm	300/600 rpm	30/60/180/360/600 rpm + Scan	300 rpm	300 rpm	300 rpm	600 rpm
Compensation or self-leveling type	Compensated self-leveling	Electronic self-leveling	Self-leveling - (horizontal & vertical)			Self-leveling - (Horizontal & vertical)	Compensation
Compensation or self-leveling range	± 10 arc minutes	± 5∞	± 9%	± 18%	± 18%	± 18%	± 10 arc minutes
Self-leveling speed		Typical: <10 seconds	Typical < 8 seconds	Typical < 8 seconds	Typical < 8 seconds	Typical < 8 Seconds	Instant when rough leveled
Accuracy							
- Degrees	± 10 arc seconds	± 10 arc seconds or better	± 10 arc seconds	± 10 arc seconds	± 10 arc seconds	± 10 arc seconds	7 arc seconds
- Variance per 100 feet	± 1/16 in	± 1/16 in (1.5 mm)	< 1/16 in (1.7 mm)	< 1/16 in (1.7 mm)	< 1/16 in (1.7 mm)	< 1/16 in (1.7 mm)	1/25 in
Power source	4 C alkaline or rechargeable	4 D-cell, NiMH Pack	NiCad or NiMH 1 hour charge [1],[2]	NiCad or NiMH 1 hour charge [1],[2]	NiCad or NiMH 1 hour charge [1],[2]	NiCad or NiMH 1 hour charge [1],[2]	4 D-cell alkaline or NiCd
Battery life							
- Alkaline	60 hours	60 hours					90 hours
- Rechargeable	20 hours	35 hours	30 hours	30 hours	30 hours	30 hours	40 hours
Operating temperature	0 to 122° F	-4 to 122∞ F (-20 to 50∞ C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	14 to 122° F
Water and dust sealed?	Resistant	IPX6	IP67	IP67	IP67	IP67	IPX4
Warranty	3 years	2-year knockdown warranty	2 years	2 years	2 years	2 years	1 year
Laser Sensor included	No	Yes	Yes, HS 14 w/ RC radio full 2-way	Yes, HS 10	Yes, HS 10	Yes, HS 10	Yes
- Price if purchased separately	\$225	\$150 to \$325	\$495	\$325	\$325	\$325	\$285
Package price	\$995	\$1420 to \$1650	\$1775	\$2495	\$2695	\$2995	\$1495
Reader Service Number	8	9	10	11	12	13	14

Numbers in brackets refer to notes (see page 55).

Electronic Levels (beam coverage greater than 1,000 feet)

Manufacturer	Topcon	Topcon	Trimble	Trimble	Trimble	Trimble
Model	RL-H3A	RL-H3CL	LL300 Laser Level	LL500 Laser Level	LL600 Laser Level	HV6011/HV6022 [1]
Date of introduction	Mar-02	Jan-05	Apr-04	Mar-02	May-02	May-02 and Dec-02
Beam type	Visible red laser diode	Visible red laser diode		1 mW, 670 nm visible	1 mW, 670 nm visible	5 mW, 635 nm visible
Beam coverage	2300 ft (700m)	2,000 ft (610 m)		1,600 ft	2,600 ft	2,600 ft
Rotation speed	600 rpm	600 rpm	600 rpm	600 rpm	600 rpm	0.50-600 rpm
Compensation or self-leveling type	Electronic w/Liquid compensator	Electronic	Electric self-leveling	Compensation	Electronic self-leveling	Electronic self-leveling
Compensation or self-leveling range	± 3 degrees	± 3°	5°	± 11 arc minutes	5°	5°
Self-leveling speed	.5 degree per second	N/A		Instant when roughly leveled	10°/minute	10°/minute
Accuracy						
- Degrees	± 8 arc seconds	± 10 arc seconds	± 18 arc seconds	± 10 arc seconds	± 10 arc seconds	± 10 arc seconds
- Variance per 100 feet	3/64 in (1.3mm)	<1/16 in (1.7 mm)	± 1/16 in	± 1/16 in	± 1/16 per 100 ft	± 1/16 per 100 ft
Power source	4 D cells	4 C-cells	4 D-cell, alkaline	Alkaline or NiCad	Alkaline, NiCd or NiMH	Alkaline, NiCd or NiMH
Battery life						
- Alkaline	120 hours	60 hours	90 hours	55 hours	50 hours	50/30 hours
- Rechargeable	60 hours	N/A	45 hours	40 hours	50 hours	50/30 hours
Operating temperature	-4 to 122° F (-20° to 50° C)	-4 to 122° F (-20 to 50° C)	-20 to 50° C	-20 to 50° C	-20 to 50° C	-20 to 50° C
Water and dust sealed?	Yes		Yes	Yes	Yes	Yes
Warranty	2 years	1 year	1 year	2 years	2 years use and abuse	1 year
Laser Sensor included	LS-70B [1]	LS-70B [1]	Yes	Yes	Yes	No/yes
- Price if purchased separately	\$365 [2]	\$365 [2]	Contact Trimble Representative	Contact Trimble Representative	Contact Trimble Representative	Contact Trimble Representative
Package price	\$1695	\$1195	Contact Trimble Representative	Contact Trimble Representative	Contact Trimble Representative	Contact Trimble Representative
Reader Service Number	15	16	17	18	19	20

Electronic Levels (beam coverage up to 1,000 feet)

Manufacturer	AGL LASERSOURCE	AGL LASERSOURCE	AGL LASERSOURCE	AGL LASERSOURCE	AGL LASERSOURCE	CST/berger	LaserMark by CST/berger	Laser Reference, Inc.
Model	EAGL 400	Agatec GAT220	Agatec LT200	Agatec LT300	Agatec A510S	57-LMH-CU	LM1000	L4
Date of introduction	1996	2005	2005	2005	2005	Feb-02	Mar-03	Aug-97
Beam type	Infrared	Visible laser diode	Visible laser diode	Visible split beam [1]	Visible split beam [1]	650 nm visible diode	[2]	670 nm visible, use with receiver only
Beam coverage	1000 ft	1,000 ft	1,000 ft	1,000 ft	1,000 ft	360°	Up to 1,000 ft	1500 ft
Rotation speed	600 rpm	0, 90, 600 rpm	0, 90, 600 rpm	0, 90, 600 rpm	0, 90, 150, 300, 450, 600 rpm	600 RPM	[3]	600 rpm
Compensation or self-leveling type	Compensation	Electronic self-leveling [3]	Electronic self-leveling	Electronic self-leveling	Electronic self-leveling	Electronic	Compensated	Compensated self-leveling
Compensation or self-leveling range	± 10 arc minutes (± 1/6°)	± 10% (5.7°)	± 10% (5.7°)	Horizontal and vertical	Horizontal/vertical	± 5°	± 5°	10 arc minutes
Self-leveling speed	N/A			± 10% (5.7°)	± 10% (5.7°) [3]	1°/4 seconds	3 seconds	
Accuracy								
- Degrees	7 arc seconds	± 20 arc seconds	± 20 arc seconds	± 20 arc seconds	± 20 arc seconds	± 27 arc seconds		10 arc seconds
- Variance per 100 feet	± 1/24 in	± 1/8 in	± 1/8 in	± 1/8 in	± 1/8 in	5/32 in	± 1/8 in	± 1/16 in
Power source	4 D alkaline or NiCd	2 D alkaline or NiCd	NiCd rechargeable	NiCd rechargeable	2 D alkaline or NiCd	4 D-cell	Ni-Cad cartridge pack	4C alkaline or rechargeable
Battery life								
- Alkaline	90 hours	160 hours			160 hours	75 hours	N/A	70 hours continuous
- Rechargeable	45 hours	40 hours	40 hours	40 hours	40 hours	30 hours	12+ hours	24 hours continuous
Operating temperature	14 to 122° F					22 to 120° F	22 to 120° F	0 to 122° F
Water and dust sealed?	IPX4	IP64	IP67	IP67	IP64	IPX4	IPX4	Resistant
Warranty	1 yr; 2nd yr opt. \$99	1 year	1 year	1 year	1 year	2 years	1 year	3 years
Laser Sensor included	Yes	Yes	MR50 or MR80S	MR50 or MR80S	Yes	Yes	Yes	Yes, R7
- Price if purchased separately	\$315	\$150	\$150 or \$225	\$150 or \$225	\$225	\$295	\$899	\$225
Package price	\$1145 alk/\$1280 NiCd	\$845	\$1095 or \$1170	\$1495 or \$1570	\$1295	\$899	\$749	\$995
Reader Service Number	21	22	23	24	25	26	27	28

Numbers in brackets refer to notes (see page 55).

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Electronic Levels (beam coverage up to 1,000 feet)

Manufacturer	Laser Reference Inc.	Leica Geosystems	Leica Geosystems	Mikrofynd Positioning Products	SOKKIA	SOKKIA	SOKKIA
Model	L5	Rugby 100	Rugby 200	ML 10x	LP31A	EL40HV	MP40
Date of introduction	May-00	Feb-02	Feb-03	2003	Feb-03	Jun-02	2-Jun
Beam type	635 nm highly visible	635 nm visible laser diode	635 nm visible laser diode	650 nm visible	Infrared laser diode	Visible laser diode	Visible laser diode
Beam coverage	1000 ft	1,000 ft (305 m)	1,000 ft (305 m)	> 1050 ft dia	800 ft dia	1,000 ft dia	1,000 ft dia
Rotation speed	0-450 rpm	300/600 rpm	60/120/300/600 rpm	600 rpm	600 rpm	130/530 rpm	0 to 530 rpm
Compensation or self-leveling type	Compensated self-leveling	Electronic self-leveling	Electronic self-leveling	Self-leveling	Compensation	Self-leveling	Self-leveling [1]
Compensation or self-leveling range	10 arc minutes	± 5°	± 5°	± 9%	± 10 arc minutes	± 9 arc degrees	± 9 arc degrees
Self-leveling speed		Typical <10 seconds	Typical <10 seconds	Typical < 8 seconds	Instant when rough leveled	< 30 seconds	< 30 seconds
Accuracy							
- Degrees	30 arc seconds	± 18 arc seconds or better	± 10 arc seconds or better	± 10 arc seconds	10 arc seconds	± 15 arc seconds	± 15 arc seconds, H & V
- Variance per 100 feet	± 3/16 in	± 3/32 in. (2.6 mm)	± 1/16 in. (1.5 mm)	< 1/16 in. (1.7 mm)	1/16 in	1/8 in	1/8 in
Power source	2 D alkaline or rechargeable	4 D-cell, NiMH Pack	4 D-cell, NiMH Pack	NiCad or NiMH 1 hour charge [1],[2]	4 D-cell alkaline or NiCd	2 C-cell alkaline or NiCd	2 C-cell alkaline or NiCd
Battery life							
- Alkaline	70 hours continuous	60 hours	50 hours		90 hours	160 hours	160 hours
- Rechargeable	24 hours continuous	35 hours	30 hours	30 hours	40 hours	40 hours	40 hours
Operating temperature	0 to 122° F	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	14 to 122° F	14 to 122° F	14 to 122° F
Water and dust sealed?	Resistant	IPX6	IPX6	IP67	IPX4	IPX4	IPX4
Warranty	1 year	2-year knockdown warranty	2-year knockdown warranty	2 years	1 year	1 year	1 year
Laser Sensor included	Depends on package	Yes	Yes	Yes, HS 10	Yes	Yes	Yes
- Price if purchased separately	\$150	\$150 to \$325	\$150 to \$325	\$325	\$285	\$245	\$245
Package price	\$649	\$1125 to \$1455	\$1520 to \$2000	\$995	\$1195	\$925	\$1295
Reader Service Number	29	30	31	32	33	34	35

Manufacturer	SOKKIA	SOKKIA	Topcon	Topcon	Topcon	Trimble	Trimble
Model	EL400H	MP400	RL-H3C	RL-H3B	RL-H3CS [3]	LL200 Laser Level	LL300 Laser Level
Date of introduction	Nov-04	Nov-04	Jan-02	Mar-02	Jan-03	Apr-02	Feb-04
Beam type	Visible laser diode	Visible laser diode	Visible red laser diode	Visible red laser diode	Visible red laser diode	Infrared	Infrared
Beam coverage	1,000 ft dia	1,000 ft dia	980 ft (300 m)	1300 ft (400 m)	980 ft (300 m)	1,000 ft	1,000 ft
Rotation speed	0 to 600 rpm		600 rpm	600 rpm	600 rpm	N/A	550 rpm
Compensation or self-leveling type	Self-leveling	Self-leveling [1]	Electronic	Electronic w/liquid compensator	Electronic	Compensation	Compensation
Compensation or self-leveling range	± 9 arc degrees	± 9 arc degrees	± 3 degrees	± 3 degrees	± 3°	± 30 minutes	± 5°
Self-leveling speed	< 30 seconds	< 30 seconds	N/A	N/A	N/A	Instant when roughly leveled	
Accuracy							
- Degrees	± 15 arc seconds	± 15 arc seconds, H & V	± 15 arc seconds	± 10 arc seconds	± 15 arc seconds	± 15 arc seconds	± 18 arc seconds
- Variance per 100 feet	1/8 in	1/8 in	< 3/32 in (2.3 mm)	< 1/16 in (1.7mm)	< 3/32 in (2.3 mm)	± 3/32 in	± 3/32 in
Power source	2 D-cell alkaline	2 D-cell alkaline	4 C cells	4 D cells	4 C cells	1 D-cell alkaline	4 D-cell or optional NiCad
Battery life							
- Alkaline	160 hours	160 hours	60 hours	120 hours	60 hours	100 hours	90 hours/45 NiCad
- Rechargeable	40 hours	40 hours	N/A	60 hours	N/A	N/A	
Operating temperature	14 to 122° F	14 to 122° F	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	-23 to 50° C	-20 to 50° C
Water and dust sealed?	IPX4	IPX4	Yes	Yes	Yes	Yes	Yes
Warranty	1 year	1 year	1 year	1 year	1 year	1 year	1 year
Laser Sensor included	Yes	Yes	LS-70C	LS-70B [1]	LS-70C	Yes	Yes
- Price if purchased separately	\$175	\$245	\$195	\$365 [2]	\$195	Contact Trimble Representative	Contact Trimble Representative
Package price	\$950	\$1350	\$895	\$1295	\$1195 [3]	Contact Trimble Representative	Contact Trimble Representative
Reader Service Number	36	37	38	39	40	41	42

Numbers in brackets refer to notes (see page 55).

Laser Sensors (hand-held or rod mounted)

Manufacturer	AGL LASERSOURCE	AGL LASERSOURCE	LaserMark by CST/berger	LaserMark by CST/berger	Laser Reference Inc.	Laser Reference Inc.
Model	MR50	MR80S	LD400	LD120	R6	R7
Date of introduction	2004	2000	Aug-99	Jun-02	May-00	Jun-00
Beam detection range	1.6 in (40 mm)	1.6 in (40 mm)	2.0-in	2.0-in	1.5 in	2 in
Beam detection precision	± 1/16, 1/8 in	± 1/16, 1/8 in	±1/16 / ±1/8 / ±1/4 in	±1/16 / ±1/8 / ±1/4 in	± 1/16 in	± 1/16, 1/8, 1/64 in
Beam detection channels	3	3	7	3	3	5
Beam detection display	LCD (front/back)	LCD (front/back)	LCD (front and back)	LCD (front and back)	LCD	LCD front, LED back
Beam detection angle	140°	90°	160°	160°	90°	120°
Audio beam detection signal	Yes	Yes	Yes	Yes	Yes	Yes
Laser status monitor and indication	No	No [4]	Manual only	Manual only	No	No
Power source	9 V battery	9 V battery	9 V battery	9 V battery	2 AA	9V
Battery life	50 hours	50 hours	Up to 3 months	Up to 3 months	100 hours	60 hours
Power shut-off	Yes, 5 minutes	Yes, 5 minutes	[4]	[4]	Yes, 30 minutes	Yes, 12 minutes
Remote display	No	No	No	No	No	No
Rod clamp	Screw & quick release	Screw-down	Heavy duty screw-down	Screw-down	Screw-down	Screw-down
Operating temperature			22 to 125° F	22 to 125° F		
Water and dust sealed?	IP64	IP64	IPX4	IPX4	Yes	Yes
Warranty	1 year	1 year	1 year	1 year	1 year	3 years
Price	\$150	\$225	\$295	\$195	\$150	\$225
Reader Service Number	43	44	45	46	47	48

Manufacturer	Leica Geosystems	Leica Geosystems	Leica Geosystems	Mikrofn Positioning Products	Mikrofn Positioning Products	SOKKIA
Model	Rod-Eye Pro	Rod-Eye Classic	Rod-Eye Mini	HS 10	HS 14 w/remote control	LR100
Date of introduction	Feb-02	Mar-04	Feb-02	2003	2003	Apr-00
Beam detection range	2 in (50 mm)	2 in (50 mm)	1.5 in (38 mm)	2 in	2 in	1 1/2 in
Beam detection precision	[2]	± 0.04, ± 0.120 in	± 0.08 in	± 1/16, ± 1/8 in	± 1/16, ± 1/8 in	± 1/32 fine; ± 1/8 coarse
Beam detection channels	7 plus initial audio indicator	5	3	5	5	5
Beam detection display	LCD (front and back)	LCD (front and back)	LCD	LCD front and back + LED	LCD front and back + LED	LCD (front and back)
Beam detection angle	± 45° (90°)	± 45° (90°)	± 45° (90°)	135°	135°	90°
Audio beam detection signal	Yes, high/low selectable	Yes, high/low selectable	Yes, high/low selectable	3 On/Low/High	3 On/Low/High	Yes, variable pitch
Laser status monitor and indication	Yes, laser low battery	No	No	No	Yes, 2-way radio controller [4]	No
Power source	2 AA batteries	2 AA batteries	2 AA batteries	9V alkaline	9V alkaline	9 V alkaline
Battery life	70+ hours	70+ hours	200 hours	3 months/ 200 hours continious	3 months/ 200 hours continious	100 hours
Power shut-off	[1]	Yes, 30 minutes	Yes, 30 minutes	Yes, 15 minutes	Yes, 15 minutes	5 min. after no signal
Remote display	No	No	No	No	Yes	No
Rod clamp	Yes, with reversible jaw	Yes	Yes	Universal w/ level vial	Universal w/ level vial	Screw type
Operating temperature	-4 to 140° F (-20 to 60° C)	-4 to 140° F (-20 to 60° C)	-4 to 140° F (-20 to 60° C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	14 to 122° F
Water and dust sealed?	Yes, 100%	Yes, 100%	Yes, 100%	Water proof	Water proof	IPX7
Warranty	3 years	2 years	2 years	2 years	2 years	1 Year
Price	\$325	\$250	\$150	\$325	\$495	\$285
Reader Service Number	49	50	51	52	53	54

Numbers in brackets refer to notes (see page 55).

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Laser Sensors (hand-held or rod mounted)

Manufacturer	SOKKIA	SOKKIA	SOKKIA	SOKKIA	Topcon	Topcon
Model	R50	R81	MC550	MC500	LS-70A	LS-70B
Date of introduction	Nov-04	Nov-04	Nov-04	Nov-04	Jan-98	Jan-98
Beam detection range	1 5/8 in	1 5/8 in	5 in	6 3/4 in	2 in (50mm)	2 in (50mm)
Beam detection precision	± 1/16 fine; ± 1/8 coarse	± 1/16 fine; ± 1/8 coarse	± 3/32; ± 3/16; ± 1/2 in	± 1/4; ± 1/2; ± 1 in	± .04, ± .08 in [4]	± .04, ± .08 in [4]
Beam detection channels	3	5	5	5	11 [5]	11 [5]
Beam detection display	LCD (front and back)	LCD (front and back)	LCD and 2-color LED	LED	Proportional LCD, front & rear	Proportional LCD, front & rear
Beam detection angle	90°	90°	240°	360°	145°	145°
Audio beam detection signal	Yes	Yes	Yes, variable pitch	No	Yes	Yes
Laser status monitor and indication	No	No	No	No	Yes, HI alert & power [1]	Yes, HI alert & power [1]
Power source	9 V alkaline	9 V alkaline	2 AA alkaline	4 C-cell alkaline [5]	9 volt alkaline	9 volt alkaline
Battery life	100 hours	100 hours	160 hours	[4]	Approx. 3 months	Approx. 3 months
Power shut-off	5 min. after no signal	5 min. after no signal	30 min. after no signal	75 minutes	Auto, 30 minutes	Auto, 30 minutes
Remote display	No	No	No	Yes	Optional, LCD	No
Rod clamp	Screw type	Screw type	Screw type and magnetic	Screw type [2]	Quick release	Universal
Operating temperature	14 to 122° F	14 to 122° F	-4 to 120° F	-4 to 140° F	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)
Water and dust sealed?	IPX6	IPX6	IPX6	IPX6	Yes	Yes
Warranty	1 year	1 year	1 year	1 year	2 years	1 year
Price	\$175	\$245	\$695	\$1895	\$495 [2]	\$365 [2]
Reader Service Number	55	56	57	58	59	60

Manufacturer	Topcon	Trimble	Trimble	Trimble	Trimble
Model	LS-70C	HR100 Laser Receiver	HR300 Laser Receiver	HR500 Laser Receiver	CR600 Laser Receiver
Date of introduction	Jan-02	Nov-03	Nov-03	Mar-02	May-02
Beam detection range	2 in (50mm)	2 in	2 in	2 x 2 in	4.5 in
Beam detection precision	± .04, ± .08 in [4]	1/8 in	1/16 and 1/8 in	0.004 - 1/4 in	0.004 - 3/4 in
Beam detection channels	11 [5]	3	5	15	15
Beam detection display	LCD front	2 x LED	LCD and LED	LCD and LED	LCD & ultra-bright LED
Beam detection angle	145°	120°	130°	180°	270°
Audio beam detection signal	Yes	Yes	Yes	Yes	Yes
Laser status monitor and indication	Yes, HI alert & power [1]	No	No	Yes	Yes
Power source	9 volt alkaline	2 AA alkaline	2 AA alkaline	2 AA alkaline	3 AA alkaline
Battery life	Approx. 3 months	75 hours	140 hours	100 hours	100 hours
Power shut-off	Auto, 30 minutes	Yes	Yes	Yes	Yes
Remote display	No	No	No	No	No
Rod clamp	Standard	Yes	Yes	Rod and machine magnetic	Rod and machine magnetic
Operating temperature	-4 to 122° F (-20 to 50° C)	-20 to 50° C	-20 to 50° C	-20 to 50° C	-20 to 50° C
Water and dust sealed?	Yes	Yes	Yes	Yes	Yes
Warranty	1 year	1 year	1 year	2 years	2 years
Price	\$195	Contact Trimble Representative	Contact Trimble Representative	Contact Trimble Representative	Contact Trimble Representative
Reader Service Number	61	62	63	64	65

Numbers in brackets refer to notes (see page 55).

Grade Lasers

Manufacturer	AGL LASERSOURCE	AGL LASERSOURCE	AGL LASERSOURCE	CST/berger	CST/berger	David White by CST/berger
Model	A710	EAGL 310 & 310XR	EAGL 350	57-LM400-4	57-LM800GR	3175
Date of introduction	2003	1993	1993	Jun-99	Jan-05	Aug-03
Beam type	Visible split beam [1]	Visible laser diode	Visible laser diode	[5]	[5]	[5]
Beam coverage	1,000 ft	3,000/4,000 ft XR	3,000 ft.	Up to 2,000 ft	Up to 2,000 ft	Up to 2,000 ft
Grade capability and type	Dual axis/electronic	Dual axis/electronic	Dual axis/electronic	Dual	Dual	Dual
Grade range	-10% to 10% in X, Y, Z	-5% to 10%	-5% to 50%	± 10%	± 10%	± 10%
Grade entry method	Digitally with remote	Digitally	Digitally	Digitally	Digitally	Digitally
Remote operation	Yes, radio full 2-way	No	No	Remote capable	Remote capable	Remote capable
Grade alignment method	Visual sight	Scope optional	Scope optional	Peep sight	Peep sight	Peep sight
Self-leveling type	Electronic (horz. & vert.)	Electronic	Electronic	Electronic	Electronic	Electronic
Self-leveling range	± 10% (± 5.7°)	± 10% (± 5.7°)	± 10% (± 5.7°)	± 5°	± 5°	± 5°
Rotation speeds	[5]	Variable up to 1,000 rpm	Variable up to 1,000 rpm	100-1000 rpm	100-1000 rpm	100-1000 rpm
Accuracy at 0.00% grade						
- Degrees	± 20 arc seconds	± 10 arc seconds	± 10 arc seconds			
- Variance per 100 feet	± 1/8 in	± 1/16 in	± 1/16 in	± 1/8 in	± 1/16 in	± 1/16 in
Temperature compensated	No			No	No	No
Primary power source	NiMh rechargeable	12V rechargeable	12V rechargeable	4 D alkaline batteries	Ni-Cad rechargeable pack	4 D alkaline batteries
Current draw (Amps per hour at 600 rpm)				165-170 mA	165-170 mA	165-170 mA
Operating temperature	14 to 122° F	0 to 120° F	0 to 120° F	22 to 120° F	22 to 120° F	22 to 120° F
Water and dust sealed?	Yes, IP67	Yes, IPX7	Yes, IPX7	IPX4	IPX7	IPX4
Warranty	1 year	1 year	1 year	2 years	2 years	2 years
Laser Sensor included	No	No	No	Yes	Yes	No
Package price	\$3295	\$6240 or \$6790 XR	\$6740	\$1995	\$995	\$1995
Reader Service Number	66	67	68	69	70	71

Manufacturer	Laser Reference Inc.	Laser Reference Inc.	Leica Geosystems	Leica Geosystems	Leica Geosystems	Mikrofyn Positioning Products
Model	L1-AS	L1-ASm Magnum	Javelin-s	Rugby 400DG	Rugby 300SG	ML 11x
Date of introduction	Jan-94	Jun-03	Feb-02	Feb-05	Feb-05	2002
Beam type	670 nm visible use w/ receiver	670 nm visible use w/ receiver	635 nm visible laser diode	780 nm invisible laser diode	780 nm invisible laser diode	650 nm visible
Beam coverage	2000 ft	3000 ft	3000 ft (900 m)	2500 ft (770 m)	2500 ft (770 m)	> 1050 ft dia
Grade capability and type	Single grade, compound with optional adapter	Single grade, compound with optional adapter	[3]	Dual grade	Single grade	Single grade
Grade range	0-9.00%	0-25.00%	± 50% in both axes	-5% to 25%	-5% to 25%	0-10%
Grade entry method	Mechanical counter	Mechanical counter	Digital	Digital	Digital	Digitally
Remote operation	No	No	Yes	Yes	No	No
Grade alignment method	Sights on top of laser	Sights on top of laser	Auto alignment w/ prism	Built-in sights & telescope	Built-in sights & telescope	Built-in sights
Self-leveling type	Electronic servo motor	Electronic servo motor	Electronic	Electronic	Electronic	Electronic self-leveling
Self-leveling range	± 4°	± 4°	± 5°	± 5°	± 5°	± 9%
Rotation speeds	600 rpm	600 rpm	300 to 1200 rpm	"300, 600, 900, 1200 rpm"	"300, 600, 900, 1200 rpm"	600 rpm
Accuracy at 0.00% grade						
- Degrees	15 arc seconds	10 arc seconds	6 arc seconds	10 arc seconds	10 arc seconds	± 10 arc seconds
- Variance per 100 feet	± 3/32 in	± 1/16	1/32 in	1/16 in	1/16 in	< 1/16 in (1.7 mm)
Temperature compensated	Temperature stability tested	Temperature stability tested	No	No	No	Yes
Primary power source	4 C alkaline or rechargeable	4 C alkaline or rechargeable	NiMH pack	Alkaline or NiMH pack	Alkaline or NiMH pack	NiCad or NiMH 1 hour charge [1],[2]
Current draw (Amps per hour at 600 rpm)	60 hours continuous run	60 hours continuous run	300 ma	250 ma	250 ma	60 ma
Operating temperature	0 to 122° F	0 to 122° F	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)
Water and dust sealed?	Resistant	Resistant	IPX7	IPX7	IPX7	IP67
Warranty	3 years	3 years	1 year	1 year	1 year	2 years
Laser Sensor included	Yes, R7	Yes, R8	Yes	Yes	Yes	Yes, HS 10
Package price	\$2495	\$2995	Contact Leica Geosystems	Contact Leica Geosystems	Contact Leica Geosystems	\$1195
Reader Service Number	72	73	74	75	76	77

Numbers in brackets refer to notes (see page 55).

2005 Laser Survey

Grade Lasers

Manufacturer	Mikrofn Positioning Products	Mikrofn Positioning Products	Mikrofn Positioning Products	Mikrofn Positioning Products	Mikrofn Positioning Products	Mikrofn Positioning Products
Model	ML 13x	ML 14i	ML 3	ML 3VD	ML 4	ML 4B
Date of introduction	2004	2002	1998	1998	1998	1998
Beam type	650 nm visible	635 nm visible	670 nm visible	635 nm visible	670 nm visible	670 nm visible
Beam coverage	> 1050 ft dia	> 1050 ft dia	> 2600 ft dia	> 5200 ft dia	> 2600 ft dia	> 2600 ft dia
Grade capability and type	Dual grade	Dual grade	Single grade	Single grade	Dual grade	Dual grade
Grade range	0-10%	0-10%	0-10%	0-10%	-10% to 12%	-10% to 110%
Grade entry method	Digitally			Digitally	Digitally	Digitally
Remote operation	No	Yes, radio full 2-way	No	No	Yes	Yes
Grade alignment method	Built-in sights	Built-in sights	Built-in sights & telescope	Built-in sights & telescope	Built-in sights & telescope	Built-in sights & telescope
Self-leveling type	Electronic self-leveling - (H. & Vertical)	Electronic self-leveling - (H. & Vertical)	Electronic self-leveling - (H. & Vertical)	Electronic self-leveling - (H. & Vertical)	Electronic self-leveling - (H. & Vertical)	Electronic self-leveling - (H. & Vertical)
Self-leveling range	± 9%	± 9%	± 18%	± 18%	± 18%	± 18%
Rotation speeds	600 rpm	30/60/180/360/600 rpm + scan	600 rpm	600 rpm	100 to 900 in steps of 100	100 to 900 in steps of 100
Accuracy at 0.00% grade						
- Degrees	± 10 arc seconds	± 10 arc seconds	± 10 arc seconds	± 10 arc seconds	± 10 arc seconds	± 10 arc seconds
- Variance per 100 feet	< 1/16 in (1.7 mm)	< 1/16 in (1.7 mm)	< 1/16 in (1.7 mm)	< 1/16 in (1.7 mm)	< 1/16 in (1.7 mm)	< 1/16 in (1.7 mm)
Temperature compensated	Yes	Yes	Yes	Yes	Yes	Yes
Primary power source	NiCad or NiMH 1 hour charge [1],[2]	NiCad or NiMH 1 hour charge [1],[2]	NiCad or NiMH 1 hour charge [1],[2]	NiCad or NiMH 1 hour charge [1],[2]	NiCad or NiMH 1 hour charge [1],[2]	NiCad or NiMH 1 hour charge [1],[2]
Current draw (Amps per hour at 600 rpm)	60 ma	60 ma	60 ma	60 ma	60 ma	60 ma
Operating temperature	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)
Water and dust sealed?	IP67	IP67	IP67	IP67	IP67	IP67
Warranty	2 years	2 years	2 years	2 years	2 years	2 years
Laser Sensor included	Yes, HS 10	Yes, HS 14 w/ RC radio full 2 way	Yes, HS 10	Yes, HS 10	Yes, HS 10	Yes, HS 10
Package price	\$1395	\$1650	\$4400	\$4900	\$5000	\$6000
Reader Service Number	78	79	80	81	82	83

Manufacturer	Mikrofn Positioning Products	SOKKIA	Topcon	Topcon	Topcon	Topcon
Model	ML 4VD & ML 4BVD	UL300	RL-H2Sa	RL-H1Sa	RT-5Sa	RT-5B
Date of introduction	1998	Nov-04	Jan-02	Jan-02	Jul-98	Oct-98
Beam type	635 nm high powered visible	Visible laser diode	Visible laser diode	Infrared diode	Visible laser diode	Visible laser diode
Beam coverage	> 5200 ft dia	1000 ft dia [3]	2300 ft (700 m)	2300 ft (700 m)	4000 ft (1600 m)	4000 ft (1600 m)
Grade capability and type	Dual grade	Dual-axis electronic	Single and Dual slope, encoder	Single slope, encoder	Dual slope, encoder	Dual slope, encoder
Grade range	-10% to +12% or -10% to 110%	± 10% in X and Y	-8% to 8%	-5% to 10%	± 50%, no tilt required [6]	± 10%
Grade entry method	Digitally	Digital remote keypad	Digital	Digital	Digital (unit & remote)	Digital (unit & remote)
Remote operation	Yes	Yes	No	No	Yes, 2-way communication [7]	Yes, 2-way communication [7]
Grade alignment method	Built-in sights & telescope	Peep	Manual, sighting scope	Manual, sighting scope	Automatic, SmartLine [8]	Manual, sighting scope
Self-leveling type	Electronic self-leveling - (H. & Vertical)	Electronic	Electronic	Electronic	DLX digital-liquid [9]	DLX digital-liquid [9]
Self-leveling range	± 18%	± 10%	± 5°	± 5°	± 5°	± 5°
Rotation speeds	100 to 900 in steps of 100	[6]	300/600/900 rpm	300/600 rpm	300/600/900/1200 rpm	300/600/900/1200 rpm
Accuracy at 0.00% grade						
- Degrees	± 10 arc seconds	10 arc seconds	± 10 arc seconds	± 10 arc seconds	± 5 arc seconds	± 5 arc seconds
- Variance per 100 feet	< 1/16 in (1.7 mm)	± 1/8 in	less than 1/16 in (1.7 mm)	less than 1/16 in (1.7 mm)	less than 1/32 in (1 mm)	less than 1/32 in (1 mm)
Temperature compensated	Yes	No	No	No	Yes [10]	Yes [10]
Primary power source	NiCad or NiMH 1 hour charge [1],[2]	Internal NiMH	Rechargeable NiMH	4 D cells	Rechargeable NiCad	Rechargeable NiCad
Current draw (Amps per hour at 600 rpm)	60 ma		175 ma	175 ma	175 ma	175 ma
Operating temperature	-4 to 122° F (-20 to 50° C)		-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)	-4 to 122° F (-20 to 50° C)
Water and dust sealed?	IP67	IP67	Yes	Yes	Yes	Yes
Warranty	2 years	1 year	2 years	1 year	2 years	2 years
Laser Sensor included	Yes, HS 10	No, 3 models available	LS-70B	LS-70B	LS-70A	LS-70A
Package price	\$5500/\$6500	\$3295	\$4995	\$3295	\$7695	\$6995
Reader Service Number	84	85	86	87	88	89

Numbers in brackets refer to notes (see page 55).

Grade Lasers

Manufacturer	Trimble	Trimble	Trimble	Trimble	Trimble	Trimble	Trimble
Model	Gplus Grade Laser	1242 Grade Laser	GL710 Grade Laser	GL720 Grade Laser	GL722 Grade Laser	GL742 Grade Laser	GL762 Grade Laser
Date of introduction	1999	2000	Jan-02	Jan-02	Jan-02	Feb-04	Feb-04
Beam type	635 nm visible	635 nm visible	670 nm visible	670 nm visible	670 nm visible	670 nm visible	670 nm visible
Beam coverage	2,600 ft	2,600 ft	3,000 ft	3,000 ft	3,000 ft	3,000 ft	3,000 ft
Grade capability and type	Single	Single	Single	Dual	Dual	Dual	Dual
Grade range	0.1 to 25%	0.1% to 25%	-0.5% to 25%	[2]	[2]	[3]	[4]
Grade entry method	Digitally	Digitally	Digitally	Digitally	Digitally with remote	Digitally with remote	Digitally with remote
Remote operation	N/A	N/A	N/A	N/A	Yes, radio full 2-way	Yes, radio full 2-way	Yes, radio full 2-way
Grade alignment method	Visual sight	Visual sight	Telescope	Telescope	Automatic	Automatic	Automatic
Self-leveling type	Compensation	Electronic self-leveling	Electronic self-leveling	Electronic self-leveling	Electronic self-leveling	Compensation	Compensation
Self-leveling range	± 11 arc minutes	up to 10% grade	Grade range	Grade range	Grade range	Up to 25%	Grade range
Rotation speeds	0/50-300/600 rpm	0/50-300/600 rpm	300/600/900 rpm	300/600/900 rpm	300/600/900 rpm	300/600/900 rpm	300/600/900 rpm
Accuracy at 0.00% grade							
- Degrees	± 8 arc seconds	± 8 arc seconds	± 4.6 arc seconds	± 4.6 arc seconds	± 4.6 arc seconds	± 4.6 arc seconds	± 1.5 arc seconds
- Variance per 100 feet	< ± 1/16 in	<±1/16 in	± 1/32 in	± 1/32 in	± 1/32 in		
Temperature compensated	No	No	Yes	Yes	Yes	Yes	Yes
Primary power source	Alkaline or NiCad	Alkaline or NiCad	NiMH or NiCad	NiMH or NiCad	NiMH or NiCad	Alkaline or NiCad	Alkaline or NiCad
Current draw (Amps per hour at 600 rpm)	120 alkaline/45 NiCad	80 Alkaline/24 NiCad	30 NiMH/20 NiCad	30 NiMH/20 NiCad	30 NiMH/20 NiCad	30 NiMH/20 NiCad	30 NiMH/20 NiCad
Operating temperature	-20 to 50° C	-20° C to 50° C	-20° C to 50° C	-20° C to 50° C	-20 to 50° C	-20 to 50° C	-20 to 50° C
Water and dust sealed?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Warranty	2 years	2 years	2 years	2 years	2 years	2 years	2 years
Laser Sensor included	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Package price	Contact Trimble Representative	Contact Trimble Representative	Contact Trimble Representative	Contact Trimble Representative	Contact Trimble Representative	Contact Trimble Representative	Contact Trimble Representative
Reader Service Number	90	91	92	93	94	95	96

2005 Laser Survey Notes

AGL LASERSOURCE

1. Beamer 6, A510S, LT300, and A710 have a split beam for that's left and right adjustable for 90° layout and vertical plumb. These lasers also have scan mode for interior use.
2. GAT220HV has electronic self-leveling in horizontal, and semi-automatic leveling in vertical mode. Price for this model: \$1,020.
3. A510S has ability to match slope in two axes (manual or semi-automatic modes).
4. MR80S detector also functions as a remote control for most Agatec lasers.
5. 60, 150, 300, 450, 600, 700 rpm.

CST/BERGER

1. 635 nm visible split-beam w/ plumb down.
2. Visible dual-beam 635 nm laser diode.
3. Variable: 150, 300, 600, 1000 rpm
4. Auto after 6 minutes of inactivity.
5. Visible split-beam 635 nm laser diode

LEICA GEOSYSTEMS

1. Yes, 30 min, 24 hours, continuous on
2. ± 0.02, ± 0.04, ± 0.08, ± 0.120 in.
3. Compound dual grade, optical encoder.

MIKROFYN POSITIONING PRODUCTS

1. All Mikrofyn lasers use the Makita tool type 7.2 v battery stick. NiCad \$30/NiMH \$45. Features 1 hr fast recharger.

Standard chargers: 130 v AC charger or 12 v DC charger.

2. External power - 12 v DC optional on all Mikrofyn units.
3. ML 15i includes a high powered diode & beam quality that is suitable for the most demanding interior application.
4. The Mikrofyn HS 14 sensor is a combination sensor and 2-way radio remote controller that provides full control of the transmitter from the handheld sensor. All information transmitter controls are shown on the HS 14 display. The HS 14 notifies the user if the transmitter (ML 14 & ML 15) has been distributed. The HS 10 is a standard type sensor for use with any rotating laser. The HS 10 and MS 14 offer the same sensor feature/benefits.

SOKKIA

1. MP40 and MP400 Multipurpose Lasers automatically levels in horizontal and vertical modes, and include plumb beam, scanning and chalkline modes.
2. An optional Magnetic boom is available for the MC500.
3. The UL300 can be used in horizontal and vertical modes, includes a plumb beam, and has scanning modes.
4. 75 hours dim; 50 hours bright.
5. Or external.
6. 60, 150, 300, 450, 600, 720 rpm.

TOPCON

1. When used with the Topcon RL-H3A, RL-H3B, FT-5Sa and RT-5Sb models, the sensor notifies the user if the laser transmitter has been disturbed (HI alert) and when the laser

power source begins to run low.

2. Price includes Quick Release rod clamp, deduct \$20 for screw type rod clamp.
3. Includes ability to slope beam plane to match grade.
4. Two position.
5. 11 channels include on-grade, five each above and below grade, and off sensor high and low.
6. RT-5Sa does not require any accessories or tilting of unity for any grade setting.
7. All functions can be controlled with wireless remote control with 2-way communication up to 25 feet away from unit, 1-way communication up to 300 feet.
8. Smartline automatically aligns the grade access using Topcon's patented scanning technology to locate a target placed on the ground up to 300 feet away from the unit.
9. DLX is a patented hybrid self-leveling system that combines high-speed electronics with liquid compensation stability. No leveling screws are required.
10. Temperature sensors and monitoring software continually check instrument and perform compensation adjustments based on specific performance criteria.

TRIMBLE

All Trimble instruments featured in this survey are Spectra Precision Lasers.

1. Horizontal and Vertical Laser.
2. ± 10% x-axis, -0.5% to 25% y-axis.
3. ± 5% x-axis, -0.5% to 110% y-axis.
4. ± 5% x-axis, -0.5% to 10% y-axis.

PARTICIPATING MANUFACTURERS

AGL Lasersource
www.agl-lasers.com

CST/berger
www.cstsurvey.com

Laser Reference Inc.
www.proshotlaser.com

Leica Geosystems
www.leica-geosystems.com

Mikrofyn Positioning Products
www.positioningproducts.com

Sokkia
www.sokkia.com

Topcon
www.topconlaser.com

Trimble
www.trimble.com