System 87 Machine Gun Chronograph and Target

Users have asked for a modern system to measure muzzle velocity, rate-of-fire, and target scoring for automatic weapons. The venerable Oehler Model 82 has done this for thirty years, but it runs under DOS, communicates via RS-232, and uses an obsolete 9-pin printer. Oehler's new system runs under Windows XP or later, communicates through an USB port, writes test reports in .pdf format and exports both the results and raw data as an Excel file. Operator interface is similar to the Oehler System 85. The System 87 now includes a firing simulator built into the package. The simulator provides simulated velocity screen signals along with simulated microphone signals for system set-up, operator training and performance verification. The microphone signals form a predefined group at the target. The battery powered simulator is electrically independent of the measurement system.

In the System 87, the muzzle velocity and targeting functions are concurrent during the burst, but the two functions remain independent of each other. This robust system reliably gives both velocity and target information during the test. The system can measure velocities and rate-of-fire without using a target; it can measure target performance without using velocity screens; or it can measure ROF using only one microphone. Times-of-flight and exact correlation between velocities and impact point can be computed from recorded raw data in the leisure of post-processing.

The System 87 measures muzzle velocities and rates-of-fire using photo-electric screens near the muzzle. The system records the time of each response signal from each screen. All recorded times are referenced to the time of the first recognized event. The system also records the arrival of the Mach cone of each bullet at each of four down-range microphones The microphones are arranged at the four corners of the target square and the scoring area is the circle within the square. The system computes the apparent impact point of each round using the observed arrival times, the air temperature, and expected projectile velocity at the target. Both the procedure and the microphones have been proven for over thirty years with the Oehler Model 82.

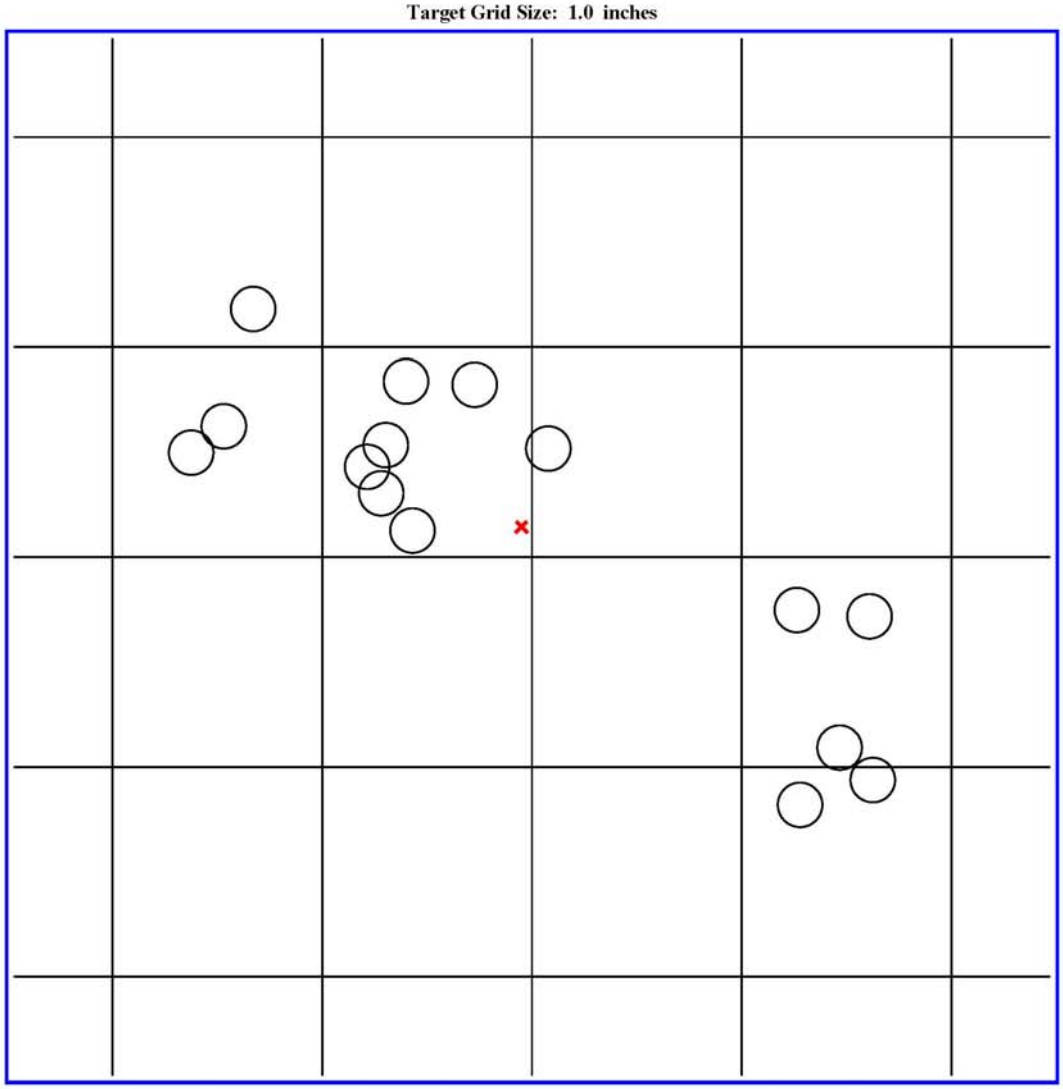
The System 87 records up to 10,000 rounds per minute through a target of 1 meter diameter, 6,600 rounds per minute through a target of 2 meter diameter and 4,400 rounds per minute through a 3 meter diameter. Precision is approximately 0.15% of target diameter. For each round, it provides epoch time at muzzle start screen, muzzle velocity, ROF at muzzle, epoch time at target, ROF at target, and target coordinates. The system will accommodate up to 400 rounds in a burst. Results are displayed at the operator's computer and are automatically stored as a *.pdf* report. Test conditions along with both processed and raw data are automatically stored to an Excel file.

Oehler System 87 Sample Report

Test:	Initial_Test 7	**Gun:**	Ken's 22LR	**Load:**	CCI Stinger
Operator:	KO	**Mfg/Model:**	Ruger 1022	**Bullet Mfg:**	CCI
Test Bay:	Fredericksburg	**Caliber:**	22LR	**Bullet Wgt:**	30.0 grains
Muzl to Scr1:	8.2 feet	**Serial #:**	12796702	**Bullet Style:**	HP
Scr1 to Scr2:	3.75 feet	**Maximum ROF:**	500 RPM	**B.C.:**	0.300
Muzl to Trgt:	45.0 feet			**Powder:**	
Target Size:	42.5 inches			**Powder Wgt:**	10.00 grains
Target Velocity:	1500 fps			**Lot Number:**	
Temperature:	85 °F			**Primer:**	
Humidity:	78 %			**Brass:**	
Altitude:	1580 feet			**Max Avg Pre...**	
Baro Press:	29.92 in Hg			**Avg Velocity:**	
Test Date:	8/20/2011			**Note:**	
Test Time:	09:53				

File: I:\SharedDocs HBird1\87Test_20AUG11\TestData2.s87
Reports: C:\win_s87\ExportedReports\
Excel: C:\win_s87\ExportedData\

Target Grid Size: 1.0 inches



Rad SD: 1.39 inches **Group Size: 3.71 inches** **Mean Radius: 1.22 inches**

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SYSTEM 87 SHOT DATA

	Muzzle			Target			
Rnd	**Epoch Time**	**ROF**	**Vel12**	**Epoch Time**	**ROF**	**Horz**	**Vert**
1	0.000000	xxx	1687	0.00000	xxx	3.12	1.30
2	0.235373	255	1682	0.23539	255	4.65	0.50
3	0.412534	339	1692	0.41244	339	4.51	-0.13
4	0.585490	347	1650	0.58591	346	4.32	-0.40
5	0.758779	346	1687	0.75872	347	4.66	-0.28
6	0.948615	316	1669	0.94880	316	4.30	0.53
7	1.119687	351	1659	1.12002	350	2.77	1.61
8	1.301341	330	1651	1.30179	330	2.44	1.62
9	1.498339	305	1671	1.49851	305	2.25	1.21
10	1.669514	351	1663	1.66981	350	2.47	0.91
11	1.848975	334	1673	1.84912	335	2.34	1.32
12	2.045164	306	1671	2.04538	306	1.57	1.41
13	2.232490	320	1671	2.23265	320	1.41	1.28
14	2.409241	339	1667	2.40948	339	2.32	1.09
15	2.578193	355	1629	2.57895	354	1.71	1.96

SYSTEM 87 SUMMARY DATA

	Muzzle		Target		
	ROF	**Vel12**	**ROF**	**Horz**	**Vert**
Avg	328	1668	328	2.99	0.93
SD	27	16	27	1.18	0.73
HI	355	1692	354	4.66	1.96
LO	255	1629	255	1.41	-0.40
ES	100	63	99	3.25	2.36

Comment: Printed test reports are at least two pages long. Page 1 will contain test setup and target. Following pages will contain round-by-round results and summary.

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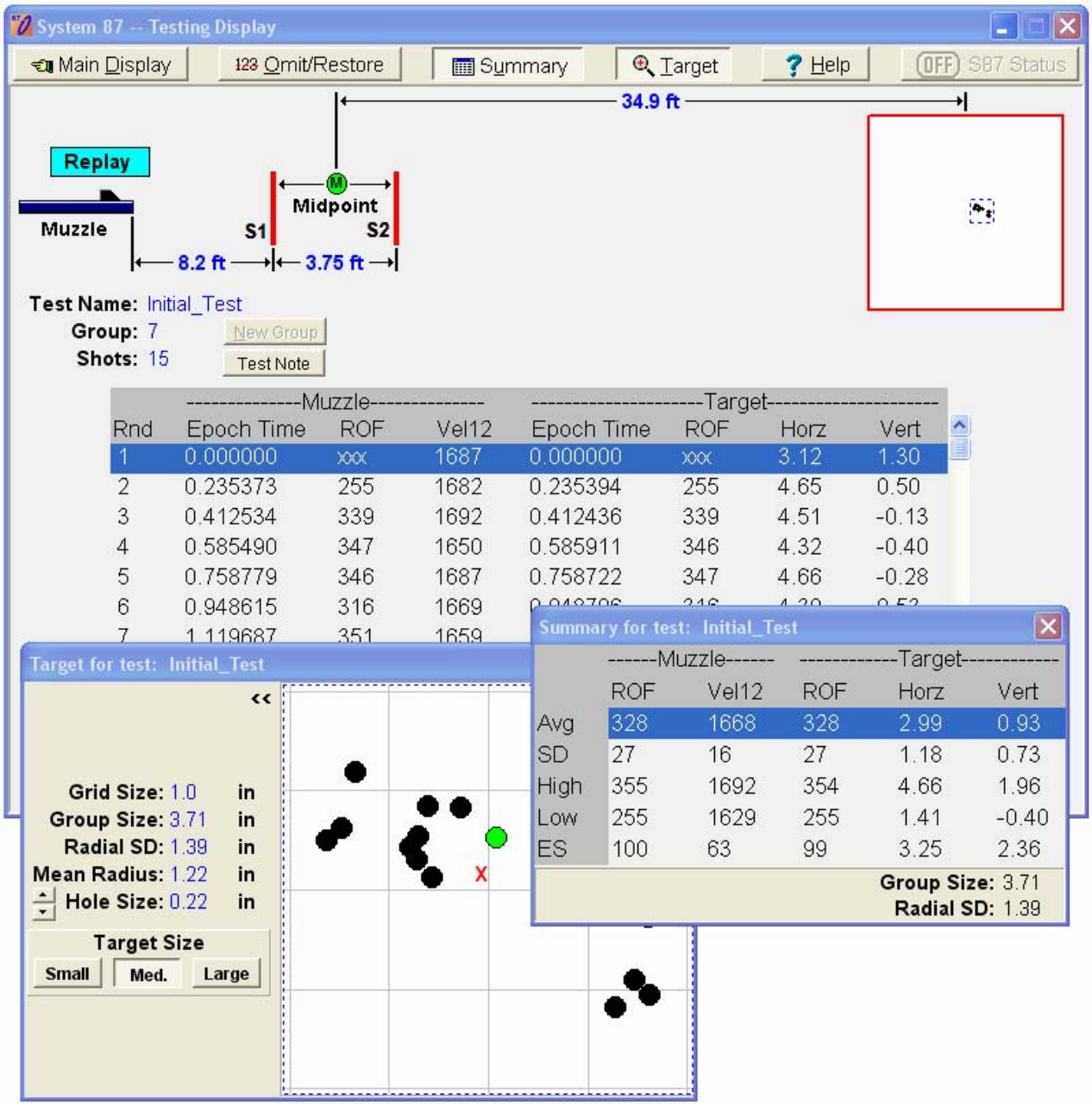
Sample Test Windows



System 87 Back Panel