Battery Tester

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Battery life depends upon several factors, such as, how many times a battery has been charged/discharged, as well as the depth of the discharge. The cycle service life with respect to the depth of discharge graph published by the manufacturer shows results in the capacity of the battery available verses the number of charge/discharge cycles for different levels of discharge. Typical numbers show that a battery would still have 100% capacity after 150 cycles being discharged 100%. Note, however, that for FIRST robotics this is a rare worse case scenario. For a battery to still have 100 % capacity at 50% discharge, 350 cycles can be made.

With this knowledge we should do a few things:

1. Do not let the battery discharge more than 30% (not concerning competitions of course) this will extend the battery life tremendously - almost 1000 cycles for a 30% discharge.
2. Monitor the number of charge/discharge cycles for each battery. - attach a label to each battery and mark off each time it is being charged.
3. During competitions, have a team member responsible for the battery charging, rotation, and updating each battery label.

Contrary to what you might expect, not all Exide batteries are created equal. We have received brand new batteries that did not perform well at all while older batteries performed much better. When you're in a match it's critical to be able to depend on your power source to perform up to advertised specs. Our tester started out as a way to evaluate the condition of our older, prior year batteries to tell us if we should order new spare Exides.

To test the capacity and condition of our batteries for competition, we created a simple battery tester that connected each battery to a .75ohm resistive load nominal 16 amp current draw at 12v (because of V=IR the actual resistance imposed by the load dropped off as the battery voltage dropped and ranged from 18 to 13 amps). The load was cooled by muffin fans, or it can be used to heat a light snack, such as, hotdogs. The circuit is quite simple. The battery connects directly to a large .75ohm resistive load via a circuit breaker panel and via a 20amp breaker to the muffin fans for cooling the load.

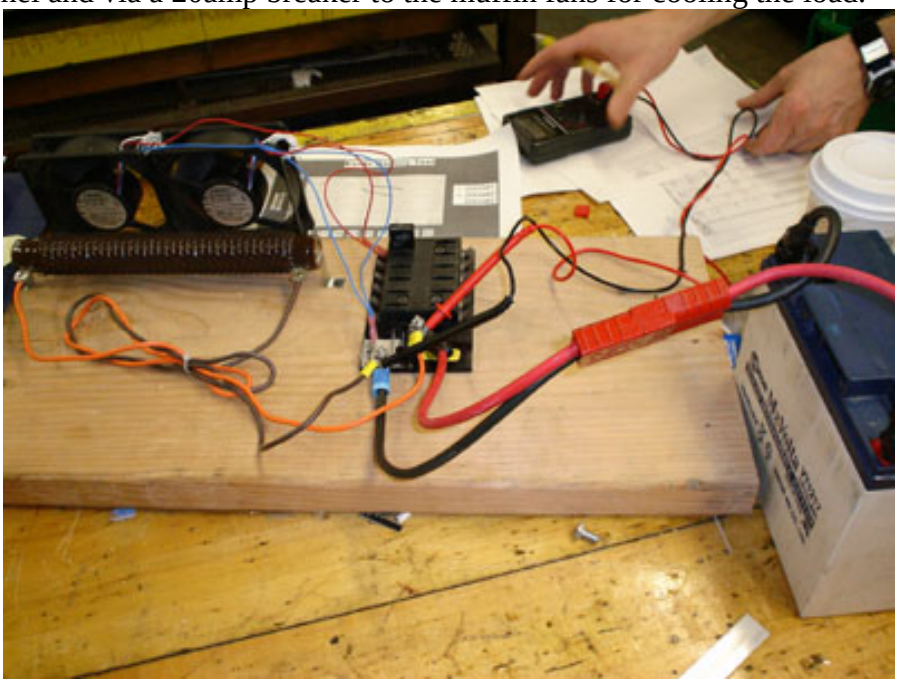


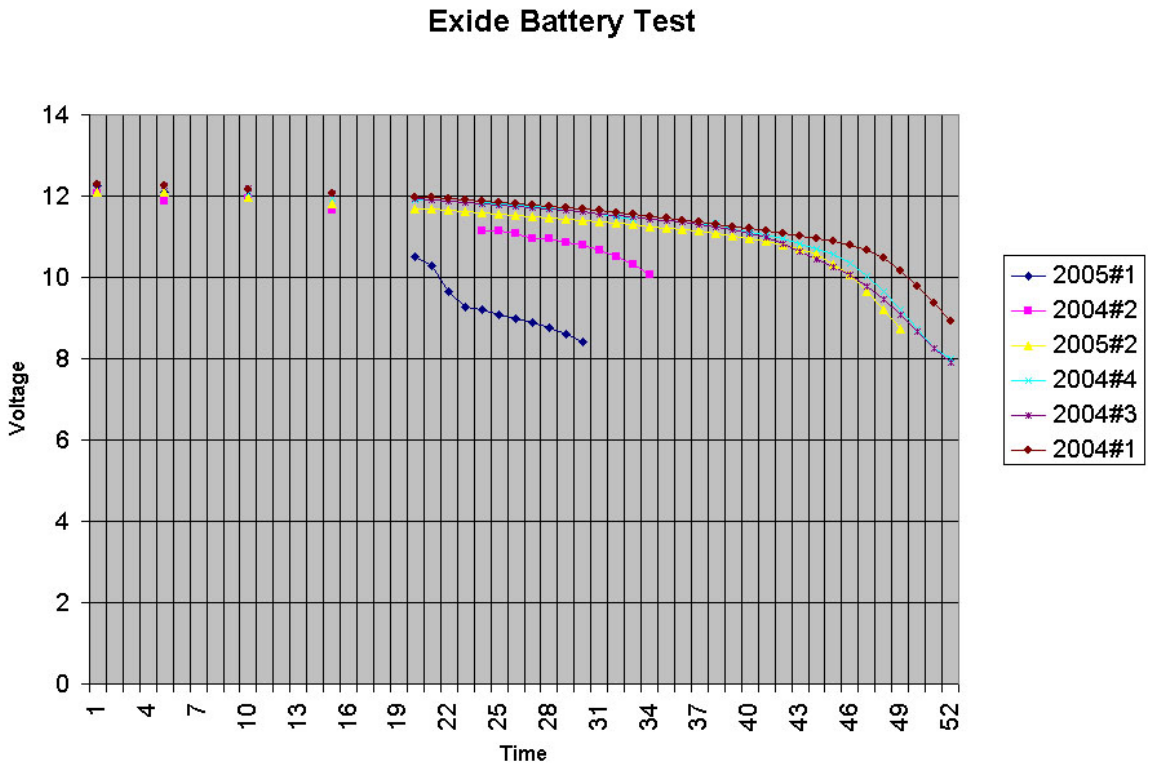
Photo is of a test being run on a non-competition practice battery.

Parts:

- Standard multi-meter
- Battery to be tested
- (2) Anderson Power Quick Disconnects
- Breaker Panel (pre-2005 style)
- 20a breaker
- 0.75 ohm power resistor
- (2) large muffin fans
- 18 awg wire and spade connectors for the fans
- 6 gauge wire and spade connectors for the load

In operation, a person measured the starting voltage then checked the voltage at periodic intervals until the voltage reached 10v, our arbitrarily chosen stopping point. 10v was chosen to represent a typical discharge during a competition match.

Here is a sample graph of data collected on a variety of batteries and the associated chart filled out by the tester. Based on these tests we found that one of our 2005 batteries was not up-to-par with some of our older batteries.



	Date: ___	2/1/05, 2/2/05					
	Operator:_	Team 358					
	Load: 0.75	Ohms					
	Battery #	**2005 # 1**	**2005 # 2**	**2004 # 1**	**2004 # 2**	**2004 # 3**	**2004 # 4**
	Time(Min)	**Volts**					
	(No Load) 0	12.7	13.53	12.89		13.23	13.3
	1	12.24	12.1	12.27	12.07	12.27	12.3
	2						
	3						
	4						
	5	12.1	12.11	12.26	11.88	12.26	12.25
	6						
	7						
	8						
	9						
	10	11.99	11.96	12.17	11.94	12.18	12.07
	11						
	12						
	13						
	14						
	15	11.73	11.82	12.07	11.64	12.07	11.95
	16						
	17						
	18						
	19						
	20	10.51	11.69	11.98		11.94	11.92
	21	10.3	11.67	11.96		11.91	11.9
	22	9.64	11.64	11.93		11.88	
	23	9.27	11.61	11.9		11.85	
	24	9.22	11.59	11.87	11.15	11.82	11.83
	25	9.08	11.56	11.84	11.13	11.79	11.81
	26	8.99	11.53	11.81	11.07	11.76	11.77
	27	8.89	11.5	11.78	10.96	11.72	11.74
	28	8.76	11.47	11.75	10.94	11.68	11.71
	29	8.6	11.44	11.71	10.86	11.65	11.66
	30	8.41	11.41	11.68	10.79	11.61	11.63
	31		11.37	11.64	10.66	11.57	11.56
	32		11.33	11.6	10.51	11.53	11.49
	33		11.3	11.55	10.31	11.49	11.44
	34		11.25	11.5	10.06	11.44	
	35		11.22	11.45		11.4	11.39
	36		11.18	11.4		11.35	11.36
	37		11.13	11.35		11.29	11.3
	38		11.08	11.3		11.23	11.34
	39		11.02	11.25		11.17	11.18
	40		10.96	11.2		11.09	11.11
	41		10.89	11.15		10.98	11.04
	42		10.79	11.09		10.83	10.95
	43		10.69	11.03		10.65	10.83
	44		10.56	10.96		10.46	10.7
	45		10.33	10.88		10.26	10.56
	46		10.06	10.79		10.06	10.35
	47		9.66	10.67		9.78	10.02
	48		9.2	10.48		9.47	9.65
	49		8.74	10.17		9.08	9.22
	50			9.79		8.68	8.73
	51			9.35		8.25	8.26
	52			8.92		7.91	7.99