

# TTD Test Report

## M113-HED at APG

### PRELIMINARY DRAFT

25 March 2004

#### Table of Contents

- 2.1 Safety / Initial Inspection
  - 2.2 Physical Characteristics
  - 2.3 Acceleration
  - 2.4 Braking
  - 2.5 Gradeability and Side Slope Operation
  - 2.6 Drawbar Pull
  - 2.7 Fuel Consumption
  - 2.8 Final Inspection
- Part 2: Description of Courses, notes on problems

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#### *DRAFT REPORT*

#### SECTION 2: DETAILS OF TEST

##### 2.1 SAFETY/INITIAL INSPECTION

###### 2.1.1 OBJECTIVES

The objectives of this test were:

- a. To ensure that the TTD and its components were free from defects that may compromise or limit vehicle capability or performance.
- b. To perform a hazard/safety assessment of the vehicle.
- c. To obtain preliminary oil and coolant samples.
- d. To install the instrumentation required for performance operations.

###### 2.1.2 CRITERION

None provided.

###### 2.1.3 TEST PROCEDURES

- a. An automotive safety inspection was conducted upon receipt of the TTD in accordance with Test Operations Procedure (TOP) 2-2-508 (ref A-2) and TOP 10-2-508 (ref A-3).
- b. Visual and functional inspections were performed on the TTD to determine vehicle readiness. Contractor assistance regarding daily vehicle maintenance and operation was provided.
- c. Initial odometer and engine hours were recorded.
- d. The fire suppression was verified.
- e. All fluid systems and lubrication points were serviced with the required fluids and lubricants. Preliminary oil and coolant samples were taken prior to test operations.
- f. No specific break-in mileage or operation was required according to the vehicle manufacturer. The engine had break-in oil supplied by the engine manufacturer when received at ATC. The vehicle manufacturer recommended that testing be initiated with the break-in oil. The band track currently installed had approximately 1500 miles of moderate speed operation primarily accrued on paved test tracks. ATC testing was initiated with this track. Failure criteria and track inspection procedures were provided in the Safety Statement for the TTD (ref A-1).

2.3.4 TEST FINDINGS

a. The times to specific road speeds for the TTD are presented in Table 2.3-1. The acceleration performance of the M113A3 was included for comparison. Table 2.3-2 presents the 0-100 ft, standing 1/8-mile, and 1/4-mile times for the TTD and the M113A3. Figure 2.3-1 shows the time-velocity performance graphically. The maximum forward speed achieved with the TTD was 57.8 mph. The maximum forward speed for the M113A3 was 41.2 mph.

TABLE 2.3-1. TIME-VELOCITY CHARACTERISTICS (TTD & M113A3)

Speed Interval mph	Time to Speed - seconds				
	TTD Run 1	TTD Run 2	TTD Run 3	TTD Run 4	M113A3
0 to 5	0.6	0.8	0.6	0.6	1.3
0 to 10	1.1	1.3	1.2	1.2	3.7
0 to 15	2.5	2.1	2.0	2.2	5.7
0 to 20	3.4	3.7	3.7	3.7	9.0
0 to 25	6.7	5.5	5.5	4.6	12.1
0 to 30	8.3	7.7	7.4	8.6	16.8
0 to 35	10.7	10.4	9.8	10.7	24.0
0 to 40	14.8	12.3	12.1	13.8	33.2
0 to 45	20.1	16.4	19.2	17.7	--
0 to 50	25.4	22.2	21.1	22.1	--
0 to 55	40.3	31.1	33.3	32.5	--

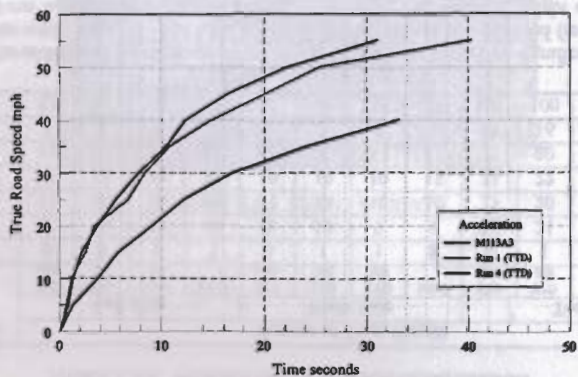


FIGURE 2.3-1. TIME-VELOCITY CHARACTERISTICS

TABLE 2.3-2. TIME TO SPECIFIC DISTANCE (TTD & M113A3)

Vehicle/run number	Time to specific distance - seconds		
	0 to 100 ft	1/8-mile	1/4-mile
TTD/Run 1	5.2	16.4	25.9
TTD/Run 2	4.7	15.5	24.6
TTD/Run 3	4.7	15.8	25.3
TTD/Run 4	4.7	15.7	25.0
M113A3/Best run	7.0	49.1	59.2

b. Hybrid specific performance to include buss voltage, motor generator and battery characteristics are presented in Table 2.3-3.

TABLE 2.3-3. HYBRID COMPONENT PERFORMANCE SUMMARY (TTD)

Run #	Buss Volts			MG Current		Battery Current		MG Power kW		Battery Power kW		Engine rpm		
	Min	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Min	Max	Avg
1	355	610	467	375	317	537	329	188	148	243	152	1478	1666	1553
2	360	615	473	371	304	563	266	185	143	261	123	1492	1666	1557
3	315	640	470	309	271	517	249	168	126	285	111	1490	1654	1572
4	355	625	471	316	262	508	323	161	120	236	147	1494	1660	1573

c. Graphic presentation of the motor generator and traction battery operation during the full throttle acceleration tests are presented as Figures 2.3-2 and 2.3-3.

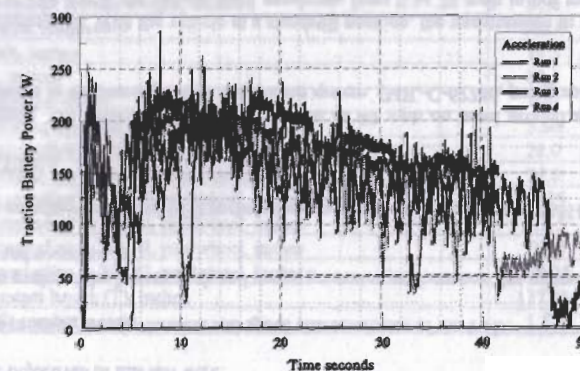


FIGURE 2.3-2. BATTERY POWER CHARACTERISTICS (ACCELERATION)