SECTION 6—GROUND SYSTEMS TECHNOLOGY

OVERVIEW

This section addresses technologies, excluding weapons, associated with combat vehicle systems that enable those systems to be superior to opposing systems they need to defeat in combat. Military ground vehicles share many systems and technologies with commercial vehicles. Despite the high percentage of dual-use technologies, there are often unique physical and/or operational capabilities required for military vehicles. There are eight technology areas, of which the two identified in the box above contain technologies that are militarily critical. In the remaining six technology areas unique militarily critical technologies were not identified. These are: Human Systems Interfaces, Hybrid-Electric Propulsion Systems, Sensors, Structures, and Systems Integration. Some technologies related to ground vehicle systems are covered in other sections of the MCTL Gas turbine engines in Section 1; Guidance, Navigation and Vehicle Control in Section 7, Electric Armor in Section 11; Power Systems in Section 14; Sensors in Section 15; and Signature Control in Section 16. Technologies for further improving the stealthy characteristics of armored vehicle using composite and other unique materials will be covered in Developing Critical Technologies.

SECTION 6.1—ADVANCED DIESEL ENGINES

OVERVIEW

This subsection addresses technology for advanced Diesel engines for combat vehicle propulsion systems. The size of a vehicle's powerplant and transmission, systems that usually are at least partially under armor on an armored vehicle, are significant factors in determining the size and weight of a combat vehicle. Therefore, engine design goals that maximize an engine's power density contribute to minimizing vehicle size and weight reduction and are critical elements. Reducing the size and increasing the power output of a Diesel engine (power density) pushes the limit of many areas of design and technology, e.g., materials, high temperature lubricants, eliminating parasitic power loses, air movement, and so on. Requirements to increase fuel efficiency require increases in engine operating temperatures, which in turn impact the material selection, design and engine cooling systems. Decreasing the need for cooling (low heat rejection) leads to smaller engines and systems with more useable power. These technologies are critical to reach the desired goal of smaller, more efficient armored vehicles. The technologies under this heading include those for integrated tracked vehicle propulsion systems, automatic transmissions with integrated braking and regenerative steer systems for high speed tracked vehicles and for high density, compact Diesel engines. Technologies for low heat rejection diesel engines appear in the research and development volume.

Table 6.1-1. Advanced Diesel Engines Militarily Critical Technology Parameters

TECHNOLOGY	Militarily Critical Parameters Minimum Level to Assure US Superiority	Critical Materials	Unique Test, Production, and Inspection Equipment	Unique Software and Parameters	Export Control Reference
DIESEL ENGINE, GROUND VEHICLE	Box volume of 1.2 m^3. Power output > 750 kW based on 80/1269/EEC, ISO 2534. Power density > 700 kW/m^3.	None identified	None identified	None identified	WA ML 6, 22 WA Cat 9E USML VII CCL Cat 9E
INTEGRATED TRACKED-VEHICLE PROPULSION SYSTEMS	Power > 750 kW on Diesel fuels with power densities exceeding: 160 kW/m^3; 0.140 kW/kg	None identified	None identified	None identified	WA ML 6, 22 WA Cat 9E USML VII CCL Cat 9E
AUTOMATIC TRANSMISSIONS WITH INTEGRATED BRAKING AND REGENERATIVE STEER SYSTEMS FOR HIGH SPEED TRACKED VEHICLES	Power > 750 kW with input power densities exceeding: 800 kW/m^3; 0.600 kW/kg	None identified	High hot-hardness gear steels; Wear coatings; High temp friction materials.	None identified	WA ML 6, 22 WA Cat 9E USML VII CCL Cat 9E

SECTION 6.2—VETRONICS

OVERVIEW

This subsection addresses Vetronics (vehicle electronics) systems. Combat vehicles are becoming much more highly automated, have smaller crews, and will be more directly integrated into the battlefield command and control nets. In order to reduce the workload of combat vehicle crews to a level where the number of crew members can also be reduced, more extensive use of vehicle electronic systems is required. This equipment must have high reliability, ruggedness, and meet a requirement to operate and survive in an equipment-hostile environment. Flat panel weapons display technologies meet this need and are critical. These technologies are required in order to carry the heavy communications/display loads and meet rapid response requirements with large volumes of data in the combat environment. High resolution, compact, high density full gray scale and 24-bit color integrated into combat displays provide the ability to handle that volume of data and display it in a manner that meets the needs of the armored vehicle combat crew member to maximize available combat information.

Table 6.2-1. Vetronics Militarily Critical Technology Parameters

TECHNOLOGY	Militarily Critical Parameters Minimum Level to Assure US Superiority	Critical Materials	Unique Test, Production, and Inspection Equipment	Unique Software and Parameters	Export Control Reference
FLAT PANEL DISPLAYS	Resolution: 3072 □ 2048 dpi; Color: 24 bit; Full grey scale.	None identified	None identified	Source code for three-dimensional displays	WA ML 15 USML XII