



A White Paper on a Facet of the Industrial Growth Sector

COUGARS AND CHEETAHS AND BUFFALO, OH MY!

The Emergence of the Mine-Resistant Vehicle Market

Defense & Security

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The Emergence of the Mine-Resistant Vehicle Market

Executive Summary

Mine-resistant (or blast-resistant) vehicles occupy a historically sleepy market niche between tactical vehicles such as the Humvee and combat vehicles such as the Bradley and Abrams. The DoD's increased recognition of the vehicles' superior IED survivability, however, has unleashed billions of dollars of planned near-term spending and generated a wave of investor enthusiasm. The purpose of this white paper is to help investors get a handle on the rapidly evolving military requirements and myriad overlapping programs and industry partnerships, with an eye toward sizing the opportunity, understanding timing and assessing likely winners and losers.

- **MRAP production alone to drive \$3-4 billion of revenue over the next two years:** We expect the Mine-Resistant Ambush Protected (MRAP) program spigot to be turned on full blast over the next six to eight weeks, when the first round of higher volume production and support contracts are awarded. The DoD's stated MRAP requirement has grown to more than 7,700 vehicles to be produced at a rate up to and possibly over 400 vehicles per month. Including support, we estimate MRAP contract awards could total \$8-10 billion over the next 12-24 months.
- **JLTV and other future programs to support the market long term:** There are a number of less publicized Army and Marine Corps mine-resistant vehicle programs that will be better defined and, in some cases, awarded over the next six months. We estimate these are worth another \$1-2 billion in revenue over the next three to five years. Following on the heels of these programs is the largest vehicle program of all, the Joint Light Tactical Vehicle (JLTV), which will replace the Humvee and has the potential for a multi-decade production run worth \$20 billion or more.
- **Market still up for grabs, but early leaders emerging:** Given the Pentagon's overriding focus on fielding MRAP vehicles as soon as possible, we anticipate volume awards to at least 2-4 companies, with preference toward those that have demonstrated production capacity and already received pre-production orders (General Dynamics, BAE Systems, Force Protection and Protected Vehicles/Oshkosh). MRAP winners will be best positioned to pursue JLTV.
- **Force Protection best-positioned pure-play:** Force Protection's Cougar and Buffalo vehicles largely define this vehicle class as it exists currently in the United States and have received a majority of pre-MRAP orders as well as a good share of the early production orders. As a result, we expect Force Protection (with its GD joint venture) to capture more than 50% of MRAP orders and to be well positioned for other mine-resistant vehicle opportunities, including JLTV.
- **General Dynamics a likely winner:** Although historically more focused on the combat vehicle market, GD has production capacity, capital and customer credibility, and the company appears well positioned to leverage its partnerships to become a force in the mine-resistant vehicle market. We believe MRAP will generate incremental EPS of \$0.03-0.05 in 2007 and \$0.06-0.10 in 2008, of which none is yet included in our estimates or guidance.

INVESTMENT HIGHLIGHTS

Mine-Resistant Demand Jostling Staid Tactical Vehicle Market

The demand for mine-resistant vehicles has emerged and grown so quickly that along with tremendous opportunities for new contenders it is creating a great deal of uncertainty in the usually quiet and predictable tactical vehicle market. Until 2005, the mine-resistant vehicle segment in the United States occupied a small niche between tactical vehicles (those used to move supplies and soldiers behind the battlefield) and combat vehicles (those used to fight the enemy on the battlefield). The realities of today's asymmetric warfare, in which the battlefield is no longer as clearly defined, has resulted in a surge of demand for mine-resistant vehicles that is worth \$8-10 billion over the next couple of years and is expected to bring unit production from a few dozen per year to 400 or more per month.

Currently Available Mine-Resistant Vehicles

Company	Vehicle	Program Opportunities	Service	Comment
Textron	M1117	ASV	Army	In service
		MRAP Cat I	Joint	Winners to be determined 2Q07
		MRAP Cat II	Joint	Winners to be determined 2Q07
		MMPV	Army	Winner take all, decision expected 3Q07
Force Protection	Cougar	JERRV	Joint	Sole sourced to Force Protection, evolved into MRAP Category II
		MRAP Cat I	Joint	Winners to be determined 2Q07, JV with General Dynamics
		MRAP Cat II	Joint	Winners to be determined 2Q07, JV with General Dynamics
		MMPV	Army	Winner take all, decision expected 3Q07
		Unspecified	Various	Pre-JERRV small quantity requests came in not tied to any contract vehicle
	Buffalo	MPCV	Army	Awarded summer of 2001, upped with war needs
		MRAP Cat III	Joint	Sole-sourced late 2006
General Dynamics	RG-31	MRAP Cat I	Joint	Winners to be determined 2Q07, BAE OMC (South Africa) sub-contractor
		MRAP Cat II	Joint	Winners to be determined 2Q07, BAE OMC (South Africa) sub-contractor
		MMPV	Army	Winner take all, decision expected 3Q07, BAE OMC (South Africa) sub-contractor
		Unspecified	Army	Orders placed in 2006 and early 2007, BAE OMC (South Africa) sub-contractor
BAE Systems	RG-33	MRAP Cat I	Joint	Winners to be determined 2Q07
		MRAP Cat II	Joint	Winners to be determined 2Q07
		MMPV	Army	Winner take all, decision expected 3Q07
Oshkosh	PVI-Alpha	MRAP Cat I	Joint	Winners to be determined 2Q07, Vehicle is Protected Vehicles design
		MMPV	Army	Winner take all, decision expected 3Q07, may be competed by Protected Vehicles
	Bushmaster	MRAP Cat II	Joint	Winners to be determined 2Q07, Teamed with ADI(Australia)/Thales
Protected Vehicles	Golan	MRAP Cat I	Joint	Winners to be determined 2Q07, Teamed with Rafael (Israel) with Oshkosh on production
		MRAP Cat II	Joint	Winners to be determined 2Q07, Teamed with Rafael (Israel) with Oshkosh on production

Source: DoD and company reports

Upcoming Tactical Vehicle Competitions

	Potential Size	Potential Value	Service	Estimated Award	Production Run
MRAP Cat I	7,700+	\$8bn+	Joint/ MC lead	2Q07	1-2 year delivery frame
MRAP Cat II			Joint/ MC lead		
MMPV	600-2,500	\$1.0-2.5bn	Army	3Q07	Accelerated deliveries
MPC	600	\$500-750mn	Marine Corps	2012	TBD
JLTV	50,000+	\$10-20bn+	Joint/ Army lead	2010	Decades long program

Source: DoD, company reports and Thomas Weisel Partners LLC estimates

Mine-Resistant Vehicle Opportunities – Where Will the Dollars Flow?

There are close to \$30 billion in existing and planned programs that incorporate a mine-resistant design into the vehicle, with up to \$10 billion of them to be decided this year. The acquisition process is moving so quickly that military planners have not had time to develop a clear and coherent acquisition strategy, which along with a great deal of overlap in vehicle requirements between the systems, leads us to believe that some of the smaller programs may be folded into the larger ones. Another issue with the speed of the acquisition process is that not all funding is yet in place—the Army and Marine Corps have gone to Congress to ask for another \$5 billion to fully fund their desired MRAP fleet.

- Mine-Resistant Ambush Protected (MRAP) Vehicle:** This program rapidly evolved from earlier efforts by the various services to buy small quantities of mine-resistant vehicles without an official contract vehicle in place. The individual efforts evolved into Joint Explosive Ordnance Disposal Rapid Response Vehicle (**JERRV**), which was funded by the Joint IED Defeat Organization (**JIEDDO**) through supplemental budgets, and into MRAP as the size of the requests increased. The number of MRAP vehicles planned is very fluid but currently stands at more than 7,700 vehicles with a potential value of more than \$8 billion. Full delivery is planned by late 2008/early 2009 or sooner if the industry can support it, although as the desired number keeps increasing we could see production stretching out further into 2009. Prototype contracts have been awarded to nine companies (i.e., any company the DoD thought may be capable of making the vehicles) and limited production contracts have already been awarded to those that were set to ramp up output. A final decision on which company will build MRAP is expected in 2Q07, and we expect 2-3 companies to receive the full-rate production awards, although the program is moving so fast it is difficult to gauge the Pentagon's thinking in terms of number or split of suppliers.
- Competitive Field Narrowing:** Of the nine companies contracted to deliver prototypes (two each for Category I and Category II), press reports indicate that one is running five months late and is expected to drop out (General Purpose Vehicles) and 3-4 others missed the March 27 delivery deadline but are expected to deliver their vehicles by the end of April. We consider missing the delivery deadline to be significant in a competition where rapid and reliable production abilities are a key factor.

MRAP Competitive Offerings

MRAP Categories	Vehicles (companies)		Comments
Category I	Alpha (OSK, PVI) *	RG-31 (GD, BA.L) *	Mine Resistant Utility Vehicle (MRUV)
	Cougar (FRPT/GD JV) *	RG-33 (BA.L) *	Seat up to 6 personnel
Category II	FMTV (AH, LMT)	TBA (NAVZ)	Used for urban operations
	Golan (PVI, OSK)	TBA (GPV)	
	ASV (TXT)		
Category III	Bushmaster (OSK)	RG-31 (GD, BA.L)*	Similar to JERRV
	Cougar (FRPT/GD JV) *	RG-33 (BA.L)*	Seat up to 10 personnel
	FMTV (AH, LMT)	TBA (NAVZ)	Multi-mission capable
	Golan (PVI, OSK) *	TBA (GPV)	
	ASV (TXT)		
Category III	Buffalo (FRPT)		Used for route clearance and ordinance disposal

* Pre-selection MRAP production contracts awarded
Source: DoD and company reports

MRAP Category I and II Contracts Awarded Through March 2007

Company	Prototype	Production Orders		Comment on Production Contracts
	Order	Cat I	Cat II	
Armor Holdings	4	--	--	
BAE Systems	4	15	75	From RG-33 family of vehicles
Force Protection	--	--	200*	Awarded prior to joint venture with General Dynamics
Force Dynamics	4	65	60	JV between Force Protection and General Dynamics
General Dynamics	4	10	10	From RG-31 family of vehicles, BAE sub-contractor
General Purpose Vehicle	4	--	--	
International Military and Government (Navistar)	4	--	--	
Oshkosh	4	100	--	Oshkosh is prime with Protected Vehicles Alpha vehicle
Protected Vehicles	4	--	60	Goloan vehicle, Oshkosh a sub-contractor for production
Textron	4	--	--	

* Awarded simultaneously with MRAP Category III sole-source award for Buffalo, done under JERRV terminology

Source: DoD and company reports

- **Medium Mine Protected Vehicle (MMPV):** This is a companion to the Army's Mine Protected Clearance Vehicle (MPCV), which had been awarded in 2003. The program had been buying some BAE's RG-31 through GD for the MMPV role, but the Army has decide to hold a more formal competition as it moves its fleet goal from a few hundred to up to 2,500 vehicles (depending on how MRAP and JLTV turn out). We estimate the program has a potential value of more than \$2 billion over the next few years. The request for bids is expected in April 2007, with a winner take all decision expected in 3Q07.
- **Marine Personnel Carrier (MPC):** Born of the new reality of Marine Corps deployment for asymmetric warfare, the MPC is part of the services' long-term vehicle fleet strategy. The MPC would fit in between the JLTV and EFV—basically fulfilling the same role as MRAP. This remains a separate program, for now, with an initial requirement of 600 vehicles.
- **Joint Light Tactical Vehicle (JLTV):** This was the only major tactical vehicle contract up for competition prior to the surge in mine-resistant vehicles. It is the planned replacement for the HMMWV. While anyone capable of building a truck to military specifications has always been expected to compete for it, the growing influence of mine-resistant capabilities and the expected production volume of MRAPs are reshaping how companies are teaming up to compete. Initial estimates put the fleet size at 50,000 and a potential value of at least \$10 billion, with some estimates as high as \$20 billion including service and support for an even larger fleet.

JLTV Competitors

Known Participants	Comment
BAE Systems	Modeling and simulation work
General Dynamics/AM General joint venture	Both have done modeling and simulation work
Lockheed Martin with Armor Holdings	Provided technology demonstrator
Navistar	Provided technology demonstrator
Oshkosh	Modeling and simulation work
Textron	Modeling and simulation work

Source: DoD and company reports

Existing Niche Programs Get a Boost

In addition to the ongoing competitions, a couple of existing mine-resistant vehicle programs have seen a war-related boost as the services take advantage of existing programs of record to get more vehicles into the fleet.

- **Armored Security Vehicle (ASV):** First awarded to Textron in the late 1990s as patrol vehicles for military police, this program saw very limited production until a surge in funding in the FY05 supplemental budgets. We estimate that demand for this vehicle, the M1117, increased by at least 1,400 vehicles as a result of current operations.
- **Buffalo:** Force Protection's Buffalo has so far added 200 orders related to its sole source award for **MRAP Category III** vehicles and the Army's Mine Protected Clearance Vehicle (MPCV). Force Protection has also seen strong demand for its Cougar through the U.K. Mastiff and the Iraqi Light Armored Vehicle (ILAV) programs.

Competing Priorities Create Longer-Term Uncertainty

There is a growing concern that in its hurry to get vehicles to the battlefield the Pentagon is losing focus on its longer-term vehicle acquisition strategy, and there is an increasing chance that not all desired programs will see the light of day. There are a number of factors contributing to this uncertainty: (1) close similarity between vehicle requirements or incompletely defined requirements (MRAP and MMPV/MPCV close and JLTV expected to be similar); (2) "robbing Peter to pay Paul" may result as MRAP funds may end up being reprogrammed from other vehicle programs (the Pentagon still needs more than \$6 billion for the 7,700 vehicle target); (3) spending fatigue—the services and Congress may be reluctant to launch a new program (MMPV or JLTV) after spending billions of dollars on MRAP and (4) service and program rivalries.

Current and Planned U.S. Mine-Resistant Vehicle Programs

Program	Customer	Vehicles	Company	Potential Size	Comment
ASV	Army	M1117	Textron	2,730	Procurement had ebbed, now a surge in production Originally a military police patrol vehicle
MPCV	Army	Buffalo	Force Protection	180	Awarded in July 2001, production seen a recent increase Used to clear mine-fields and other ordinance
MMPV	Army	TBD	TBD	2,500	Will support MPCV, but requirement recently boosted to 2,500 Requirements expected to be close to MRAP, but winner take all
JERRV	JIEDDO	Cougar	Force Protection	Merged into into MRAP II	Short lived acquisition method for acquiring mine-resistant vehicles Funded through supplemental dollars and Joint IED Defeat Organization
MRAP Cat I	Joint MC managing	TBD	TBD	9,000	Multiple-vendor awards expected, nine prototype contracts awarded
MRAP Cat II	Joint MC managing	TBD	TBD	13,000	Multiple-vendor awards expected, nine prototype contracts awarded Evolved from JERRV
MRAP Cat III	Joint MC managing	Buffalo	Force Protection	200	Sole-sourced to Force Protection in late 2006 when MRAP began
MPC	Marine Corps	TBD	TBD	600	Very early in process, seen as part of MC vehicle triad with JLTV and EFV
JLTV	Joint Army managing	TBD	TBD	50,000+	Expect widespread competition, down-select to two for SDD then winner take all. Similar to MRAP Cat I, but lighter

Source: DoD and company reports

Is there a joint acquisition strategy? Service and program rivalry could have the largest impact as the services and program offices work independently of each other to get funding. Of the joint programs, MRAP is run by the Marine Corps while JLTV is run by the Army. These

programs are working toward opposite ends: MRAP wants to increase/extend procurement, while JLTV wants to move up production, which would create program overlap if both efforts are successful. It is not a good sign when MRAP is being billed as a gap-filler until JLTV is ready. In addition, the Army is in an independent pursuit for more ASVs and MMPVs, and the Marine Corps has a desire to start the Marine Personnel Carrier (MPC) program (which just happens to be very similar to MRAP). The services are not helping matters as they have now started discussing desired overall fleet buys (e.g., Army wants 18,000 vehicles) but not specifying the expected mix of MRAP/JLTV/MMPV.

Force Protection an Early Standout

With an established fleet of almost 400 Buffalo and Cougar vehicles out in the fleet, Force Protection has become the *de facto* standard against which other vehicles are compared. This has come about through very favorable feedback from the troops, with numerous stories of how they walked away from an IED explosion thanks to their Cougar or Buffalo, and the subsequent use of either the term “Cougar” or “Buffalo” by high-ranking officers of the military when they refer to these vehicle classes in front of Congress or to the media. As a result, Force Protection has seen a steady stream of vehicle orders since 2004. In order to improve its competitive position for MRAP, Force Protection has formed the Force Dynamics joint venture with General Dynamics to compete its Cougar vehicles for Category I and II. Force Protection is experiencing some pressure from another small pure-play, with its South Carolina rival Protected Vehicles also getting pre-production MRAP orders for its Alpha and Golan vehicles, with production and support help from Oshkosh.

General Dynamics Well Positioned Via Partnerships

Although outside its traditional combat vehicle market, the growing similarities between tactical vehicles and armored vehicles, as well as the growing complexity of the programs, have made General Dynamics a natural partner in the increasingly competitive marketplace. Between its joint venture with Force Protection to compete the Cougar and its offering as prime contractor of BAE Systems RG-31 (more than 400 are already in service in Iraq and Afghanistan), we believe General Dynamics stands a good chance of participating in a significant portion of the MRAP program, none of which is included in management’s current guidance. We estimate upside potential of \$0.03-0.10 in 2007 and \$0.06-0.20 in 2008 based on steady production toward the current 7,700 vehicle target beginning in 3Q07 and running through mid-2009 (just over 300 vehicles per month), 15% fixed price margins and 25-50% share of MRAP production.

Another Adjacent Market for Lockheed Martin

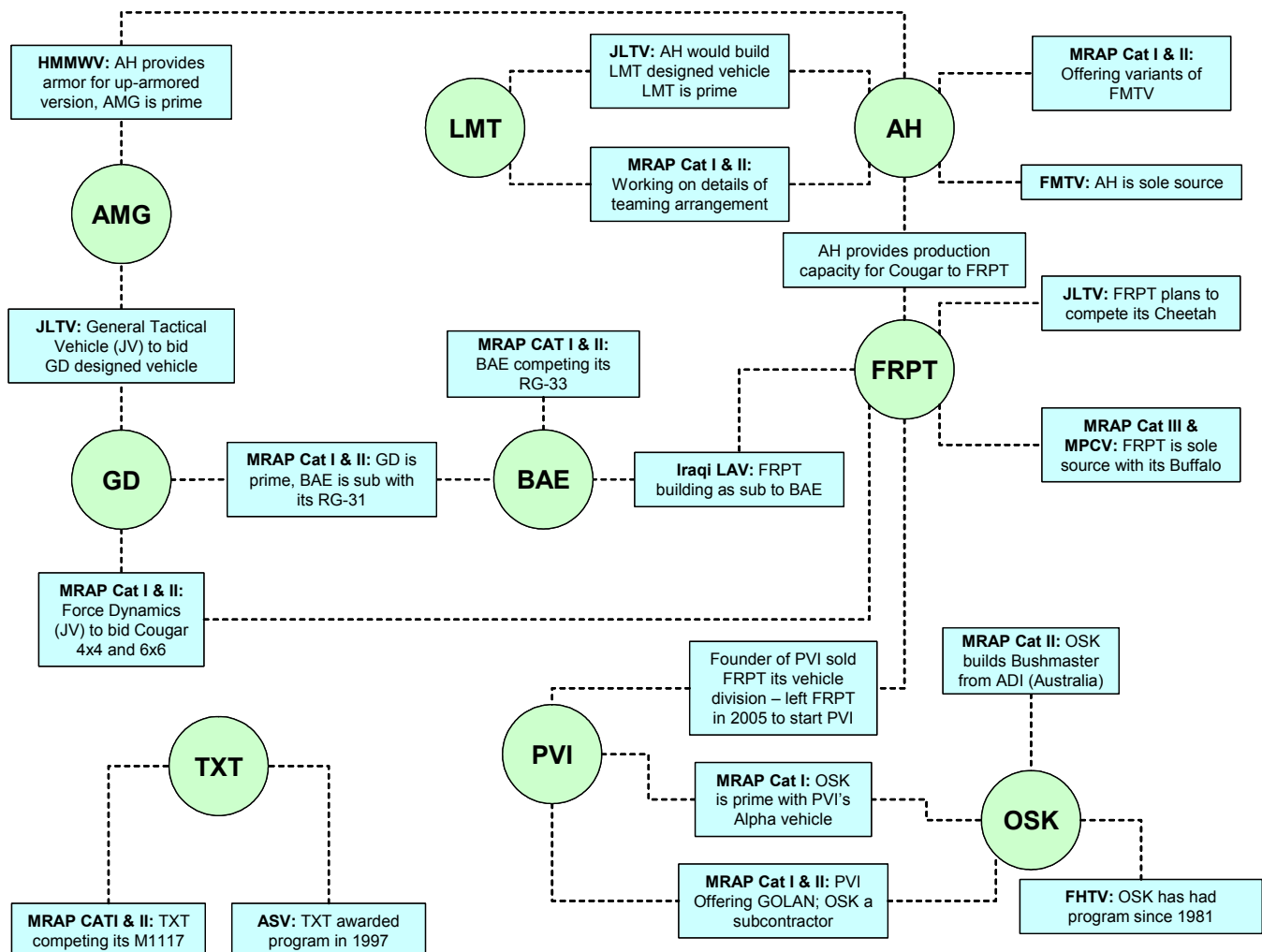
Building on its decision to pursue the JLTV program with Armor Holdings as a teammate, Lockheed Martin has joined with Armor Holdings again in its bid to compete for MRAP Category I and II. The teaming provides a great mix of Lockheed Martin’s systems integration expertise, ability to provide multiple mode communications equipment and hypersonic shock wave design experience (developed in space business but readily applicable to shielding explosions) with Armor Holdings’ vehicle design and production experience, as well as its armor fabrication capabilities. We do not expect this market to drive much near-term upside to LMT earnings, in part, because of the uncertain outlook for the FMTV derivative being bid by the

LMT/AH team for the MRAP. For the longer term we see growth potential as Lockheed Martin continues to leverage its system integration expertise to enter non-core markets.

Market Poised for Consolidation

As the players in the tactical and armored vehicle market jockey for the various MRAP contracts, a number of players have begun to establish relationships with other participants to improve their likelihood of participation. Since we believe that 2-4 supplier teams will be chosen for MRAP Category I and II, this would set the stage for consolidation if this same technology becomes a driving requirement for the JLTV program. We see General Dynamics and BAE Systems as the likely consolidators in this scenario, expanding their solid positions in the combat vehicle market into the mine-resistant space, with Force Protection and Protected Vehicles the most likely targets depending on their success with MRAP.

Current Company Relationships within the Tactical Vehicle Market



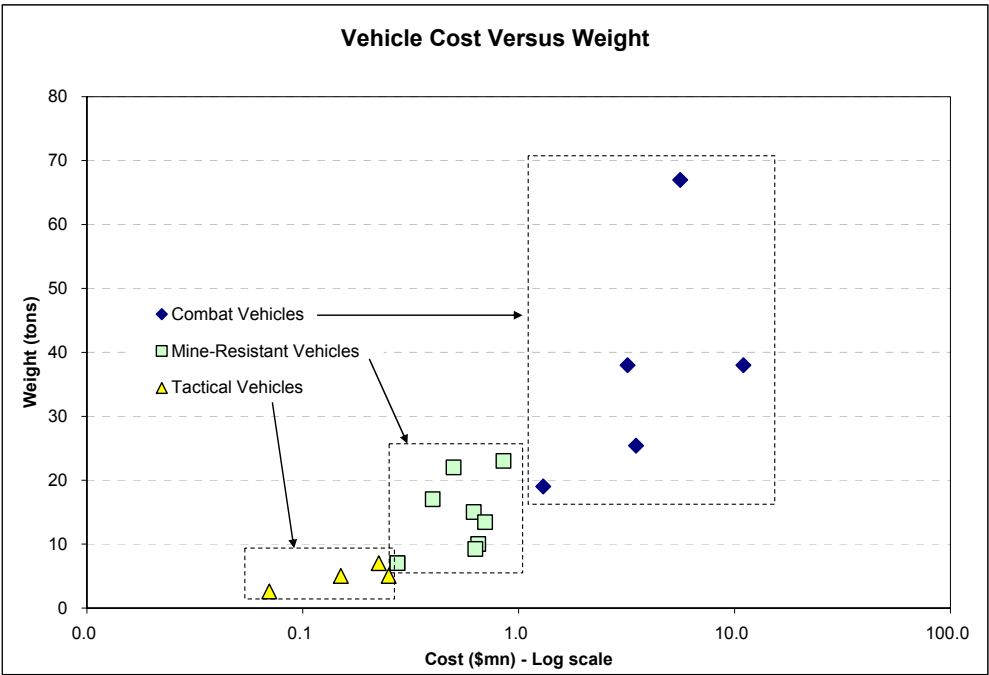
AMG: AM General
PVI: Protected Vehicles, Incorporated
Source: Company reports and Thomas Weisel Partners LLC

MARKET SPACE

The realities of the global war on terror, and specifically operations in Iraq and Afghanistan, have created the need for a new U.S. troop vehicle that fits between the traditional HMMWV (Humvee), which was originally designed to ferry troops around well behind the front line, and heavily armored combat vehicles such as the Stryker and Bradley. As initial efforts to add armor to the HMMWV have proved ineffective by both not providing adequate protection and by decreasing the mobility of the vehicle, the Pentagon is currently working on two fronts to remedy the issue. First, to get as much equipment out to the field as possible to protect the war fighter, the Pentagon has stepped up acquisition of readily available specialty vehicles originally designed for minefield maneuvers and clearance. For the longer term, the Pentagon is incorporating these requirements into the next-generation light tactical vehicle (HMMWV replacement) in an effort to create a more affordable vehicle for wider use.

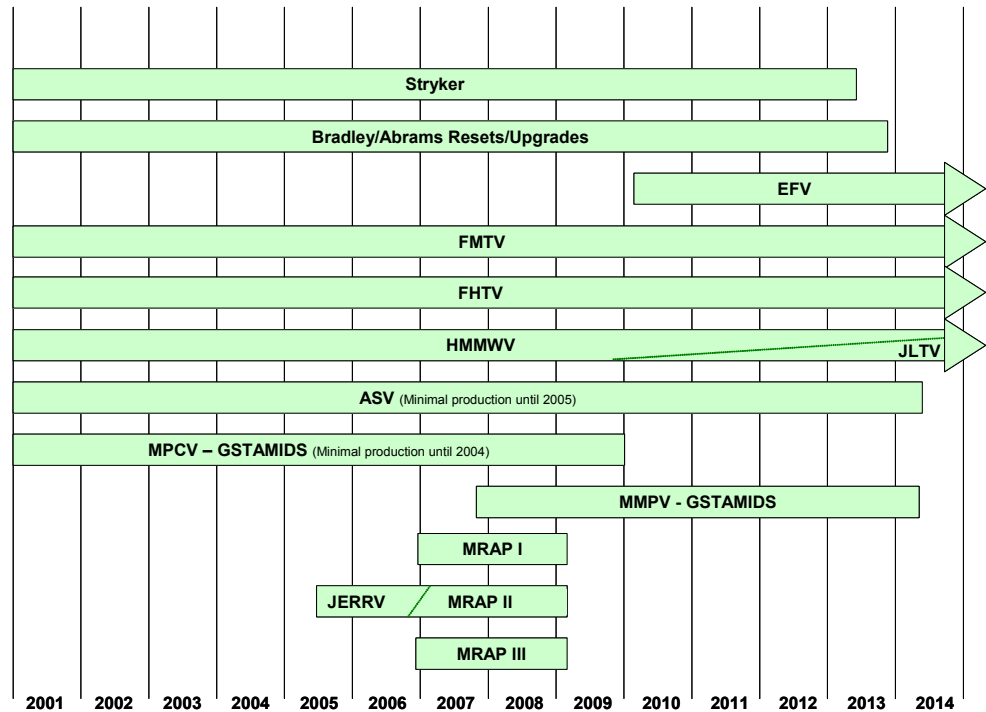
U.S. Military Tactical and Combat Vehicles

Combat Vehicles		Mine Resistant Vehicles		Tactical Vehicles	
Abrams	Bradley	MRUV (MRAP I)	JERRV (MRAP II)	HMMWV	FMTV
AAV7	EFV	Buffalo (MRAP III)		JLTV	FHTV
NLOS	Stryker	ASV		FCS - TBD	
FCS - TBD		GSTAMIDS (MMPV & MPCV)		FTTS derivatives?	



Source: Company reports and Thomas Weisel Partners LLC estimates

Major Tactical and Combat Vehicle Production Timelines



Source: DoD, company reports and Thomas Weisel Partners LLC

Emergence of Mine-Resistant Vehicles and MRAP

The stop-gap solution to help the war fighters in the field right now is the rapid acquisition of existing mine-resistant vehicles for use on patrols and transport within and around trouble spots in Iraq and Afghanistan. These vehicles are based off of South African designs first developed to clear and navigate minefields during the Bush Wars, with many of the companies producing them today continuing to have direct or indirect ties to South African developers and builders.

Programs of record: The DoD had been using two existing niche program contract vehicles for stepped-up vehicle procurement. The first of these vehicles is the Armored Security Vehicle (ASV), Textron's M1117 Guardian. The second contract vehicle is the Army's Ground Standoff Minefield Detection System (GSTAMIDS) program, which consists of two classes: (1) the Mine Protected Clearance Vehicle (MPVC), Force Protection's Buffalo and (2) the Medium Mine Protected Vehicle (MMPV), which has not been fully competed but has included GD/BAE's RG-31.

Creative contracting: As these vehicles were proven highly effective in saving soldiers' lives, the Pentagon began bringing in funds through more open-ended supplemental funding line items. One or two small orders came in not attached to any program, but once the Joint IED Task Force was set up, orders started flowing in for Force Protection's Cougar under the Joint Explosive Ordnance Disposal Rapid Response Vehicle (JERRV) moniker. In an effort to make it a program of record, the Pentagon put out an RFP for the Mine-Resistant Ambush Protected (MRAP) program, a joint program to be administered by the Marine Corps. In an effort to start getting vehicles to the troops quickly, and also to test manufacturers' ability to ramp-up production, the Marine Corps entered into low-rate IDIQ contracts with those that had proven

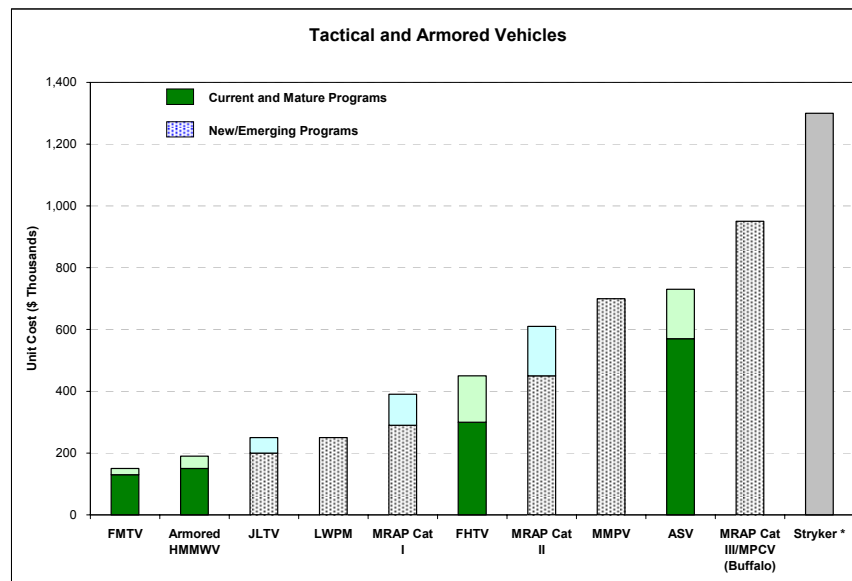
low-risk vehicles and production capacity. This method provides vehicles as quickly as possible, and also lets the Marines run side-by-side tests of the vehicles—a necessary step for creating a program of record and also helpful in heading off any contract protests.

JLTV – A Long-Term Solution

The Army had already been working on the Future Tactical Truck System (**FTTS**) and Joint Light Tactical Vehicle (**JLTV**) programs as these issues emerged, but it was early enough in the process to still fit blast protection and increased survivability into the requirements. Since the FTTS program is intended as a technology development program for later generations of the Family of Medium Tactical Vehicles (**FMTV**) and Family of Heavy Tactical Vehicles (**FHTV**), the focus has been on the HMMWV replacement, the JLTV.

Cost of MRAP a long-term issue: Although the overriding immediate concern is saving soldiers' lives, the Pentagon would not be able to afford using an MRAP class of vehicle as a replacement for the entire HMMWV fleet. A basic HMMWV costs approximately \$80K, with an up-armored version typically amounting to \$150K, while a Cougar and its like can range from the mid-\$300K on up to \$950K for a Buffalo. With MRAP filling the gap, and JLTV production not slated to start until 2010, the Pentagon believes the industry has enough time to finish a clean sheet design that can be made for less than MRAP-type vehicles, with the DoD targeting a cost of \$200-250K for front-line versions of the JLTV. The JLTV will also be single source, allowing for much easier logistics and support of the program versus the MRAP program, in which the number of contractors and vehicles for each class is yet to be determined.

U.S. Tactical and Armored Vehicle Relative Cost



* Note: Stryker is the lowest cost U.S. Infantry Fighting Vehicle (IFV) and is shown for comparison purposes
Source: DoD, company reports and Thomas Weisel Partners LLC estimates

MRAP – Possible Disruptive Program?

With a tremendous focus on getting up toward 7,800 MRAP vehicles fielded by the end of 2008, and no real Congressional opposition (what politician would stand in the way of a program that is proven to increase the safety of soldiers), the services have been piling up their efforts to increase funding for MRAP procurement. The Marine Corps and the Army have both put MRAP high on their unfunded priority lists, for a combined request of an additional \$5 billion in funding for FY08. This would come close to funding the 6,700 vehicle fleet the services were targeting as of February 2007 (the 4,100 vehicles highlighted in the November 2006 MRAP RFP were not fully funded, and the target has since increased to 7,774). Many industry insiders see this as only the beginning, with the total number only increasing as the war continues.

Growth in Stated MRAP Requirement, by Service

	Nov-06	Feb-07	Mar-07
Marine Corps	1,022	3,700	3,700
Army	2,500	2,500	2,500
Navy	538	538	544
Air Force	0	0	697
Special Forces	0	0	333
Total	4,060	6,738	7,774

Joint Requirements Oversight Council reviewing requested levels
Source: National Defense

Internal DoD oversight may increase: As the scope of this program grows, senior Pentagon officials are discussing elevating the status of the program, which would result in increased oversight by top brass. Program managers are concerned as the program was originally established under new rules intended to allow quick acquisition of urgently needed equipment, and increased oversight could slow down the process.

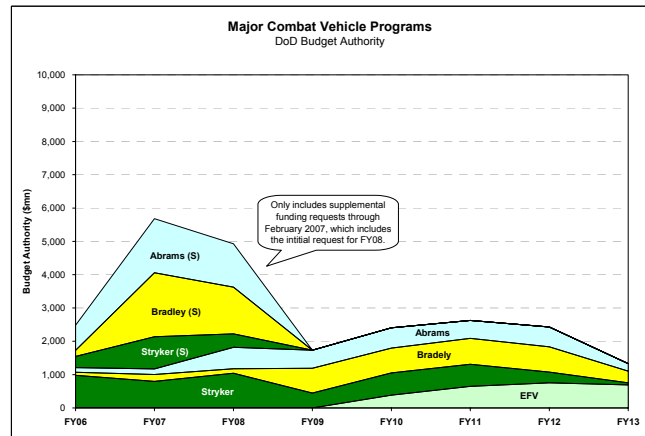
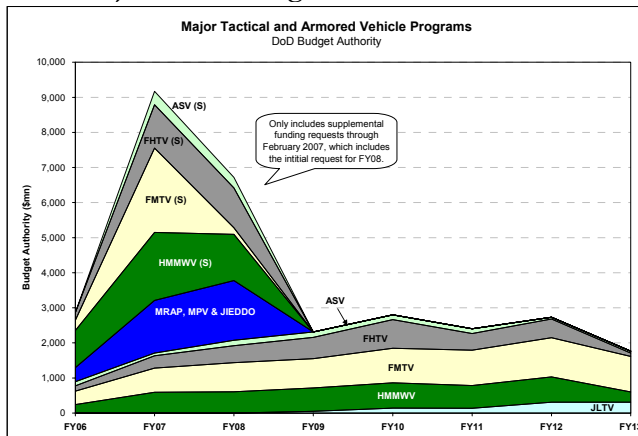
Encroaching on other programs: The rapid implementation of MRAP, along with the growth in scope of using mine-resistant vehicles, has potential implications for other military tactical and combat vehicles.

- **Expeditionary Fighting Vehicle (EFV):** This program to replace the Marine Corps' current fleet of AAV7 amphibious assault vehicles originally had a target size of 1,013 vehicles, but following the latest Quadrennial Defense Review, that number was reduced to 573 in part because the Marines decided it needed a higher mix of mine-resistant patrol vehicles (now MRAPs and maybe MPC – see below) to meet its mission. Current AAV7 vehicles were being pulled into service as in-land patrol vehicles, but their lighter armor (to remain buoyant) and flat bottoms (to maintain speed in the water) make them less effective against IEDs and RPGs. The EFV, while exhibiting big technological advances over the AAV7, is still subject to the same design requirements that make amphibious assault vehicles sub-optimal for in-land patrol.
- **Medium Mine Protected Vehicle (MMPV):** While MRAP is based off of the very same technical requirements as the MMPV (given that it was the best technology available to meet the need), the Army is still working hard to keep the MMPV program on track. The MMPV is a very task-specific vehicle, supporting the Future Engineer Force (FEF) in mine clearance operations, and as such only one variant is needed—helping to bring down logistics and

support costs. Another issue may be one of program control, since the Marine Corps is overseeing MRAP, the Army is keeping its MMPV program on the front burner including the requirement for up to 2,500 vehicles over the next few years. One potential issue could be if the MMPV award (expected July 2007) and subsequent production are delayed to pay the bills for MRAP and/or to wait and see if MRAPs could be delegated to the MMPV role following a drawdown in troop levels.

- Joint Light Tactical Vehicle (JLTV):** Like the MMPV, the JLTV will be “winner take all” in order to reduce the support requirements that would be needed to support multiple models for each variant—a reality that can be dealt with in the short term with MRAP in order to save lives, but a more formidable cost when you are talking about a fleet of 50,000 or more vehicles. While we would expect the JLTV to continue, as the MRAP is too heavy to meet rotorcraft mobility requirements for the JLTV, a prolonged run of MRAP procurement could affect the timing and size of the JLTV purchase as well as divert the Army’s vehicle procurement resources. Perhaps as a result of this encroachment, the Army is working to accelerate the start of JLTV production two years to 2010 versus 2012.
- Marine Personnel Carrier (MPC):** As this program is yet to be fully defined (the first industry day is set for late April 2007), it is unclear if this vehicle will be phased in to replace MRAP or if it will be independent. Born out of a platform realignment following the last Quadrennial Defense Review, the MPC is intended to increase the number of mine-resistant vehicles available for in-land patrols. The Marines currently use AAVs for inland patrol since that is all it has available, even though AAVs are not designed to protect against IEDs or larger caliber projectiles. The overall number of EFVs (AAVs’ expected replacement) expected to be procured has been reduced in part because of the post QDR review.

DoD Projected Funding Plans for Tactical, Armored and Combat Vehicle Procurement



Note: (S) denotes funding from either Title IX or supplemental budget request
Source: DoD and Thomas Weisel Partners LLC estimates

Generous Funding Environment

In 2006-2007, as vehicles started to show signs of wear and tear as a result of heavy operational tempo in Iraq and Afghanistan, supplemental funding began to ramp up to refurbish and reset these vehicles. It is in this rich vehicle funding environment, combined with the high casualty

rate from roadside bombs, that the Army and Marine Corps began to realize the benefits of their mine-protected vehicle fleet and order larger quantities of existing platforms. With FY07 being the first real step up in vehicle funding to replenish vehicle stocks, we expect that future supplemental budget requests in FY08 and beyond would continue this trend for 2-3 years beyond a drawdown in troop levels.

Mine-Resistant Funding Very Fluid and Growing

Commanders began to gain more of an appreciation for the increased safety of these vehicles as more of them arrived in theater. This has begun a virtuous circle of increasing demand as more products are delivered, with the services continuing to increase their procurement targets for MRAP vehicles as can be seen by the increase from 4,100 to 7,774 vehicles in the matter of four to five months. In addition, since the contract vehicle for MRAP is moving at light speed in Pentagon terms, there is no money in the Future Years Defense Plan (FYDP), and the February 2007 supplemental requests did not take into account potential demand.

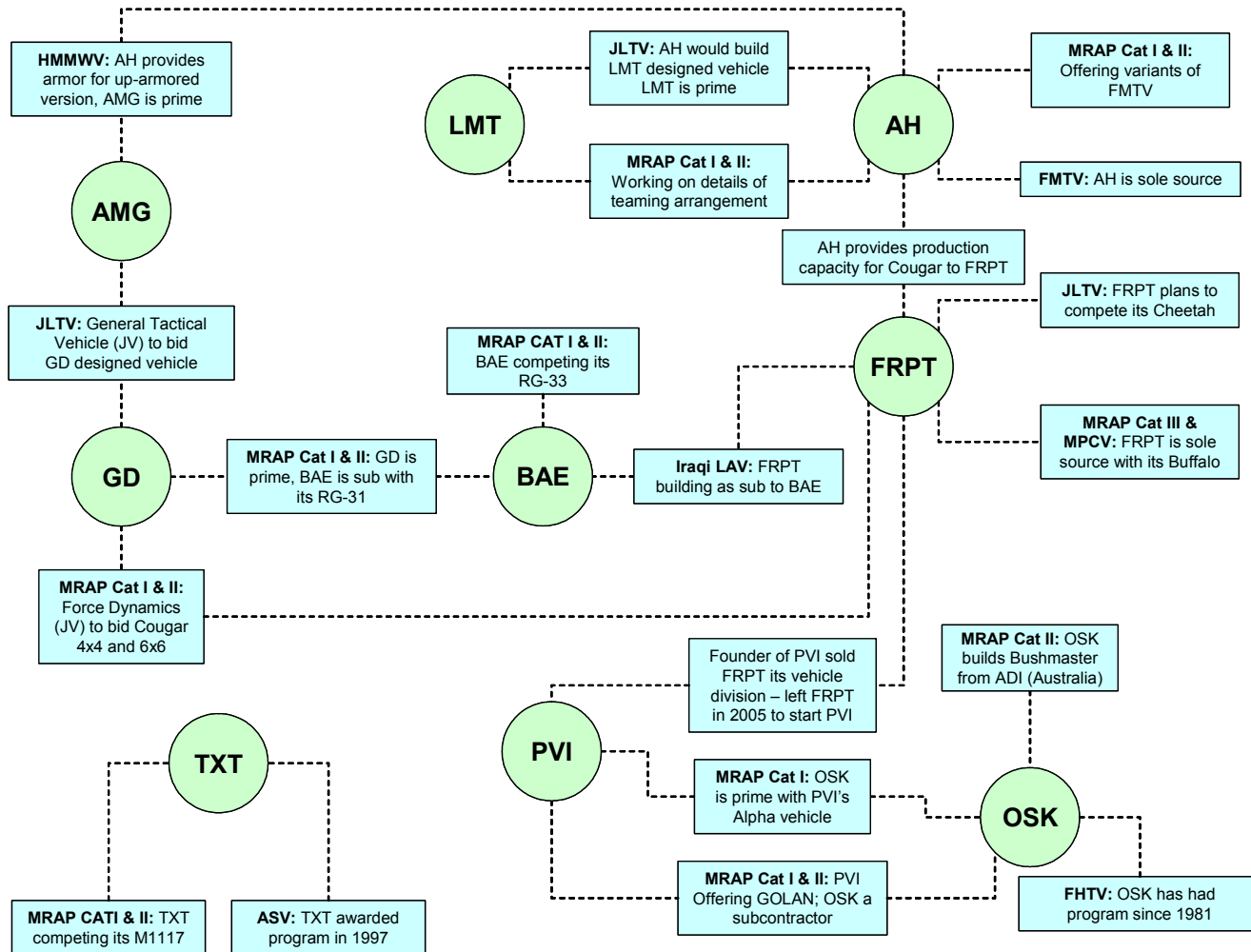
Congress bridging the funding gap: Because the demand for vehicles is growing faster than the budgeting process can support, Congress has been stepping in to fill the funding shortfall. The Marines were originally planning on approximately 1,000 MRAPs, and as such, funded 805 vehicles in its baseline FY07 budget request (\$570 million), then added 244 vehicles in the FY07 supplemental request and 255 for the FY08 supplemental request. As the FY07 supplemental request has worked its way through Congress, the FY08 budget will be debated this summer, the two houses have added to the FY07 request, bringing the full FY07 funding level to \$2.0-2.5 billion and supporting the procurement of 2,500 vehicles through FY07 (September 2007).

Does MRAP Demand Go Away When the Troops Come Home?

We view the mine-resistant vehicle platform as a game changer within the tactical vehicle market, and we do not see it going away once troop levels begin to draw down. While the production rate will most likely drop off from the 4,000-plus per year that the Pentagon wants today, we see strong demand for this type of design with not only JLTV, but also with Foreign Military Sales (FMS)—Iraq in particular. We also believe that there is a strong likelihood that a number of MRAP variants will be left in Iraq (to both help the Iraqi government and to cut down on the number of vehicle types the United States will need to support), and the Pentagon will need to restock its vehicle fleet.

MARKET PLAYERS

Current Company Relationships



AMG: AM General
PVI: Protected Vehicles, Incorporated
Source: Company reports and Thomas Weisel Partners LLC estimates

AM General (Private)

Background: AM General is the sole-source supplier of the HMMWV. Demand has been strong since the start of operations in Iraq and Afghanistan as vehicle operations in those harsh climates shorten vehicle life to 3-5 years from the design expectation of 14 years.

Current Offerings

- **HMMWV:** The standard light tactical vehicle for the Army and Marine Corps.

Industry relationships: Although demand for the HMMWV is expected to remain strong for years to come, once JLTV production ramps up it is very difficult to predict the speed at which the fleet will transition. Given that AM General does not currently have an MRAP vehicle in development, the company is targeting JLTV, which would also balance out its production capacity as it is working at almost full bore to meet current HMMWV demand.

- **General Dynamics:** AM General and General Dynamics have formed a joint venture, *General Tactical Vehicles*, to compete for the JLTV. AM General will provide secondary production capacity for a General Dynamics designed vehicle.
- **Armor Holdings:** AH is the major sub-contractor supplying armor to AM General for the up-armored versions of the HMMWV.

Armor Holdings (AH: Not Covered)

Background: Armor Holdings moved beyond its historical role as a provider of vehicle armor systems with its acquisition of Stewart & Stevenson in 2006. In the deal, Armor Holdings picked up the Family of Medium Tactical Vehicles (FMTV) and Pinzgauer vehicles.

Current Offerings

- **FMTV:** Armor Holdings is the prime contractor on the Family of Medium Tactical Vehicles (FMTV). Armor Holdings plans on offering a variant of the FMTV in a bid for MRAP.
- **Pinzgauer:** A light utility vehicle that comes in 4x4 and 6x6 configurations, it is mostly sold in international markets.
- **Armor Systems:** Armor Holdings provides armor kits for the HMMWV, FMTV and FHTV.

Industry Relationships

- **AM General:** AH provides the armor for up-armored HMMWVs.
- **Force Protection:** In late 2006, AH agreed to provide spare production capacity for Force Protection's Cougar vehicle.
- **Lockheed Martin:** Armor Holdings has joined the Lockheed Martin team competing for the JLTV. AH would provide production capacity for a LMT-designed vehicle. The two companies are also currently discussing the details of a teaming relationship for the MRAP program, which we expect would be based on AH's FMTV variant.

BAE Systems (BA.L: Not Covered)

Background: BAE Systems was already a major player in the global vehicle market when it acquired United Defense in June 2005 to become a major player in the U.S. market. Its expanded U.S. presence, together with the South African mine-resistant expertise it picked up when it acquired Alvis, make it a significant competitor for the emerging mine-resistant vehicle market in the United States. We view BAE Systems as one of the key global consolidators in the combat and tactical vehicle markets.

Current Offerings

- **AAV:** The role of the Amphibious Assault Vehicle (AAV) has been broadened to include supporting in-land patrol operations in Iraq. Unlike other programs that are experiencing

heavy use in theater, there are no major plans for upgrading the AAV as it is due to start being replaced by the Expeditionary Fighting Vehicle (EFV) within the next few years.

- **Bradley:** The Bradley is a mainstay of the Army and Marine Corps' combat vehicle fleet. Although production of new vehicles ended years ago, the production facilities have been kept busy on upgrade, reset and refurbishment work on vehicles returning from combat. We expect work to continue for years past any troop drawdown in Iraq. Although eventually to be replaced by an FCS vehicle, the Bradley will remain in the fleet for decades.
- **RG-33:** This is a larger and updated version of BAE OMC's RG-31, which is sold in the United States by General Dynamics. The RG-33 was first unveiled in November 2006, and the Marine Corps placed an initial order for 90 vehicles (75 Category II and 15 Category I) under the MRAP program.

Industry Relationships

- **Force Protection:** BAE Systems is the prime contractor for the Iraqi Light Armored Vehicle (ILAV), which is a variant of Force Protection's Cougar vehicle. Force Protection is the primary sub-contractor for vehicle assembly.
- **General Dynamics:** BAE Systems OMC division in South Africa is the main subcontractor (and builder) of General Dynamics' independent offering in the mine-resistant vehicle market, the RG-31 Mk-5. This relationship pre-dates both General Dynamics' acquisition of General Motors Defense and BAE Systems' acquisition of Alvis.

Force Protection (FRPT: Overweight)

Background: Force Protection first got into the armored vehicle market when it purchased Technical Solutions Group in 2002. Technical Solutions Group was founded in 1997 by Garth Barrett, who leveraged off his military experience in South Africa. Mr. Barrett remained with the company until 2005, when he left to start Protected Vehicles.

Current Offerings

- **Buffalo:** The largest of FRPT's offerings, this 22-ton vehicle has an extender arm that is used for ordnance disposal. The vehicle first came to the market after beating the South African **Casspir**, the then global standard for mine-clearance vehicles, in 2003 for the U.S. Army's Mine-Protected Clearance Vehicle (**MPCV**) as part of the Ground Standoff Minefield Detection System (**GSTAMDIS**). Given that this was the only official contract vehicle in place, this was the first Force Protection Vehicle to see a step up in orders from the Army starting in June 2004. Since then, it has also received orders from the Marine Corps and has become the sole source for the Mine-Resistant Ambush Protected Category III vehicle (**MRAP Cat III**).
- **Cougar:** This 15-ton vehicle got its start on a small production run for the United Kingdom in 2001, and it now comes in 4x4 and 6x6 variants. This vehicle was first delivered to the Marine Corps in late 2004, with the Marine Corps providing the initial funding. Since then it has become mostly a joint effort, with many of the dollars coming from the Joint IED Task Force budget, and the name transitioning to the Joint Explosive Ordnance Disposal Rapid Response Vehicle (**JERRV**). In late 2006, the funding underwent another transition with the establishment of the **MRAP** program, which is a joint services procurement effort overseen

by the Marine Corps. The Cougar is being offered for both **MRAP Category I** (4x4) and **MRAP Category II** (6x6) competitions, with pre-decision orders already placed for 325 vehicles to meet the urgent need on the battlefield.

- **Cheetah:** A lighter and more nimble version of the Cougar, Force Protection plans to offer this vehicle on the international market and for lighter U.S. tactical vehicle applications, possibly including the **JLTV** competition and on the international market as an urban patrol vehicle.

Industry Relationships

- **General Dynamics:** General Dynamics first signed a production agreement with Force Protection to provide manufacturing capacity for Cougar. Just over a month later (December 22, 2006), a second agreement was reached in which the two companies formed **Force Dynamics**, a joint venture to jointly market the Cougar 4x4 and 6x6 for the MRAP Cat I and Cat II competitions.
- **Armor Holdings:** In November 2006, Armor Holdings signed on as a sub-contractor to provide overflow production facilities for the Cougar vehicle.
- **BAE Systems:** Force Protection has signed on as a sub-contractor with BAE Systems to build the wheeled **Iraqi Light Armored Vehicle (ILAV)**, a derivative of the Cougar. The initial June 2006 contract was for 379 vehicles, with options for up to 1,050. Another 20 vehicles were ordered in October 2006.
- **Mechem (Division of DENEL in South Africa):** Mechem has been working in landmine detection, de-mining and unexploded ordnance disposal equipment for 30 years. Mechem has extended its agreement through 2011 to allow Force Protection exclusive rights to projects exploiting this technology.

General Dynamics (GD: Overweight)

Background: General Dynamics has long been a leader in the global combat and armored vehicle markets. As the tactical vehicle market evolves to include greater armor and take on more characteristics of a combat vehicle, General Dynamics has begun to seek out teammates to leverage its expertise to enter this growing market segment.

Current domestic offerings: GD has a long history and strong position in Europe, but here we are focusing on its U.S. vehicle business.

- **Stryker:** The Stryker is at the heart of the Army's Brigade Combat Team (BCT) concept. The Stryker comes in many variants including infantry carrying vehicle, reconnaissance, command vehicle, engineering support and medical evacuation to help support the modularity concept of the BCT. The vehicle is a derivative of the widely used Piranha light armored vehicle that is built under license around the world.
- **Abrams:** This is the main battle tank of the U.S. Army and Marine Corps. Even as the tanks age, produced from 1980 to the mid-1990s, there is no fixed replacement date. Vehicle resets and upgrades are currently under way as units return from Iraq, with these updated vehicles expected to remain in service until a future vehicle based on FCS development work is fielded.

- **Expeditionary Fighting Vehicle (EFV):** The EFV is the intended replacement for the AAV-7A1. Its improved capabilities offer the Marines the opportunity to launch from further offshore, allowing protection for the Naval vessels, and has improved armor and electronics systems.
- **Teamed offerings**
 - **RG-31 Mk5:** GD is the prime contractor on this vehicle, which is designed and built by BAE OMC (South Africa). Already deployed with the U.S. Army (265 Mk5 variants), the RG-31 Mk5 has also received a pre-production order of 10 vehicles for both MRAP Category I and II.
 - **Cougar:** This vehicle is being offered for the MRAP Cat I and Cat II programs as part of the Force Dynamics joint venture with Force Protection. It is independent from GD's RG-31 offering.

Industry relationships: Well established in its own right as a military vehicle manufacturer, GD also brings its established expertise with production and logistic to smaller companies competing for the light-to-medium vehicles.

- **AM General:** The two companies have entered into a joint venture agreement, **General Tactical Vehicle**, to pursue the JLTV competition. General Dynamics will supply the design and system integration while AM General will provide its vehicle expertise and production capacity.
- **BAE Systems:** BAE Systems OMC division in South Africa is the main subcontractor (and builder) of General Dynamics' independent offering in the mine-resistant vehicle market, the RG-31 Mk-5. This relationship pre-dates both General Dynamics' acquisition of General Motors Defense and BAE Systems' acquisition of Alvis.
- **Force Protection:** The two companies entered into the **Force Dynamics** joint venture to market Force Protection's Cougar vehicle for the MRAP Cat I and Cat II competitions.

General Purpose Vehicle (Private)

Background: A smaller vehicle maker based out of Michigan, General Purpose Vehicles has done various work including manufacturing technology development for the Army, fire trucks for Istanbul, Turkey and protected law enforcement vehicles.

Current offerings: The company offers a range of vehicles from 4x4 to 10x10 configurations in support of military, homeland security, law enforcement and first responder needs.

Industry relationships: There are no publicly disclosed relationships with any other military vehicle makers.

International Military and Government (NAVZ: Not Covered)

Background: International Military and Government is a wholly owned subsidiary of Navistar that specializes in the military vehicle market. The company specializes in mass producing military vehicles on commercial chassis.

Current Offerings

- **MXT-MVA:** This vehicle was introduced in the summer of 2006 and provides ballistic and blast protection on top of a commercial frame. International Military and Government teamed with engineers within the Army and armor producer Plasan Sasa (Israel) to develop this vehicle. We believe this is the primary entrant for the MRAP competition as it is too heavy (more than 14,000 pounds) for JLTV.
- **JLTV technology demonstrator:** International Military and Government was one of two (Lockheed was the other) that provided technology demonstration platforms to the Army to help develop requirements for the JLTV. These vehicles are undergoing testing in 1H07.

Industry relationships: International Military and Government has not announced any ties to other players in the military vehicle market.

Lockheed Martin (LMT: Overweight)

Background: Aside from helping Stewart & Stevenson (which was acquired by AH) set up its FMTV assembly line, Lockheed had almost no ground vehicle capabilities until its acquisition of HMT of the United Kingdom. Using HMT's platform, Lockheed has already won a small program with the Marine Corps (the Light Weight Prime Mover, LWPM) and is offering up a variant for the JLTV program.

Current Offerings

- **LM4x4:** This vehicle was made possible by the HMT acquisition and was used to win the Light Weight Prime Mover (LWPM) program. The LWPM will be used by the Marine Corps to tow its new M777 155mm howitzer.
- **JLTV:** Lockheed Martin is working to develop a prototype to compete for the JLTV program. Lockheed was one of two contractors chosen to supply vehicle prototypes to the Army in order to help determine JLTV requirements (Navistar was the other).

Industry Relationships

- **Armor Holdings:** Armor Holdings signed on as a subcontractor for JLTV and is currently discussing teaming with Lockheed Martin for the MRAP program.

Oshkosh (OSK: Not Covered)

Background: Oshkosh is a major supplier of larger tactical vehicles to both the Army and the Marine Corps, as well the producer of medium tactical vehicles for the Marine Corps. The company has recently expanded into the lighter tactical vehicle market with the licensing of Australia's Bushmaster armored vehicle.

Current Offerings

- **Bushmaster:** Based on an Australian design, the Bushmaster is a large capacity, armor protected vehicle that got its start in the Australian Army. The vehicle provides the capacity to carry a large number of soldiers a relatively long distance with enough supplies to last three days.

- **Family of Heavy Tactical Vehicles (FHTV):** Oshkosh is the Army's supplier of heavy tactical vehicles, which includes the Heavy Expanded Mobility Tactical Truck (HEMTT), Heavy Equipment Transport (HET) and Palletized Load System (PLS).
- **Protected Vehicles Alpha:** Oshkosh is the prime contractor for Protected Vehicles Alpha, which is competing for MRAP Category I. Oshkosh is also providing production capacity as a subcontractor to Protected Vehicles for its Golan Vehicle, which is being competed for both Category I and II.

Industry Relationships

- **Protected Vehicles:** Oshkosh is the prime contractor for the Alpha's competition for MRAP Category I. Alpha is a Protected Vehicles design and has already won an order for 100 MRAP Category I vehicles.
- **ADI (Australia):** Oshkosh has a licensing agreement with ADI (Thales) to sell and manufacture ADI's Bushmaster vehicle for North American customers as well as those eligible for Foreign Military Sales (FMS).

Protected Vehicles (Private)

Background: Protected Vehicles, Incorporated (PVI) was founded in 2005 by Garth Barrett, who had also founded, sold and subsequently left the vehicle company that is the basis for Force Protection (FRPT). Despite the company's recent beginning, it has established strong industry relationships for armor technology (Battelle and Rafael) and production and logistics support (Oshkosh, OSK).

Current and planned offerings: The PVI-designed vehicles offer reactive lightweight armor designed by Battelle, have done extensive development work with Rafael in Israel and incorporate armor into the structure of the vehicle, thereby, enabling approximately half the vehicle weight to be dedicated to soldier protection.

- **PVI-Alpha:** The Alpha is an 8-12 ton 4x4 light protected vehicle (LPV) and is targeted toward the replacement market for the up-armored HMMWV. PVI is offering this vehicle in conjunction with Oshkosh (OSK), which is acting as prime contractor, for the MRAP Category I vehicle. Aside from the initial contract for two prototypes, the team has also received a low-rate initial production contract for \$30.6 million to produce 100 Alphas by June 2007.
- **Golan:** Designed and built in partnership with Rafael, the Golan is a 4x4 medium protected vehicle (MPV) weighing in at 15 tons and capable of carrying up to 10 troops. In addition to the contract for two prototype vehicles, the team has received a \$37.4 million contract for 60 Golan vehicles (MRAP Cat II) to be delivered by June 2007.
- **Beast:** The largest of Protected Vehicle's offerings, this 20-35 ton 6x6 is made for ordnance disposal and mine clearance, and is of a similar size and use to the Buffalo from Force Protection.

Industry Relationships

- **Oshkosh:** Oshkosh is the prime contractor for Protected Vehicles Alpha, which is competing for MRAP Category I. Oshkosh is also providing production capacity as a subcontractor to Protected Vehicles for its Golan Vehicle, which is being competed for both Category I and II.
- **Rafael:** Protected Vehicles jointly developed the Golan with Rafael, and will also be sharing production of the vehicle.
- **Battelle:** Protected Vehicles has an exclusive license with Battelle for its ShieldAll armor, a composite ceramic armor system that is approximately one-third lighter than steel armor.

Textron (TXT: Not Covered)

Background: Textron's military vehicle business has overcome some challenges to prove its worth as a solid armored mine-resistant vehicle company. First there was a lower order rate prior to the Iraqi conflict and then production facilities were affected by Hurricane Katrina. Today more than 650 ASVs have been deployed.

Current Offerings

- **ASV:** Chosen for a military police role in the late 1990s, this vehicle had a very limited order book prior to the Iraqi conflict. As the benefits of mine-resistant vehicles became apparent, the Army used the existing contract vehicle to expand the role of the ASV. Today the ASV and its variants are being used for the M707 Armored Knight vehicle and are being considered for the MRAP Category I and II competitions. More than 600 vehicles have already been delivered and are in service in Iraq and Afghanistan.
- **Dingo 2:** A lighter vehicle than the ASV, the Dingo 2 is transportable by rotorcraft, putting it in the size range of the JLTV. Textron is under license from Krauss Maffei-Wegmann (Germany) to produce the DINGO 2 for the United States and Foreign Military Sales (FMS).

Industry Relationships

- **Krauss Maffei-Wegmann (Germany):** Textron has the exclusive license for the Dingo 2 for the U.S. market and FMS.

SELECT MATURE PROGRAMS

Abrams Main Battle Tank

The primary tank of the U.S. armed forces, the M1 Abrams variants were first delivered in 1980 and production ran through the mid-1990s. Only a small number of M1A2 tanks were produced from the ground up, with most of the M1A2 and M1A2 SEP variants upgrades of prior M1 versions. There is no replacement due until the next decade, with the current effort focused on resetting and upgrading existing tanks to the latest version.

- **Prime Contractor:** General Dynamics
- **Unit cost:** \$3.0-4.6 million for upgrade/reset work
- **Vehicle type:** Tracked combat vehicle
- **Estimated fleet size:** 8,350 tanks produced for the Army and Marine Corps
- **Current upgrade work:** Planned to run through current FYDP to FY13
- **Planned replacement:** The Mounted Combat System (MCS) as part of FCS

DoD Budget Procurement Plan for the Abrams (Reset and Upgrades)

	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	Remaining	Total
Quantity	60	311	244	77	94	77	85	30	0	1,389
Budget Authority (\$mn)	894	1,792	1,945	547	609	537	598	227	0	7,193

Note: Includes FY07 Title IX and FY07 and FY08 GWOT supplemental requests

Source: DoD

Amphibious Assault Vehicle (AAV-7A1)

The mainstay of the Marine Corps' amphibious transport fleet, the AAV-7A1 has been in service since 1979 (the original AAV-7 started service in 1971). The AAV-7 and its variants were mainly designed to take Marines from amphibious assault ships onto the shore, but some are now pressed into service as patrol vehicles far inland. This has posed a serious safety issue as the vehicles are lightly armored (to enable buoyancy) and not designed to deal with mines or heavy caliber fire. The vehicle is due to be replaced in the near future.

- **Prime contractor:** BAE Systems (through UDI acquisition)
- **Unit cost:** \$3.5 million
- **Vehicle type:** Tracked combat vehicle
- **Estimated fleet size:** 1,322 vehicles
- **Current work:** Minor upgrade work, mostly electronics and weapons, continues at a low grade pace
- **Planned replacement:** Expeditionary Fighting Vehicle (EFV)

Armored Security Vehicle (ASV)

Although this program was almost cancelled in the late 1990s, with only 94 vehicles ordered, the realities of the Iraq war quickly revived this program. Originally intended as a military police patrol vehicle, the ASV is now being used for convoy escort duty and urban patrols.

- **Prime contractor:** Textron
- **Unit cost:** \$570-730K depending on variant
- **Vehicle type:** Armored wheeled vehicle
- **Estimated fleet size:** 1,121 vehicles under contract as of early 2007, 2,730 planned
- **Current production run:** Planned through 2013
- **Planned replacement:** Versions of the ASV are currently being considered for the MRAP Category I and II vehicles

DoD Budget Procurement Plan for the ASV

	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	Remaining	Total
Quantity	23	53	781	124	555	551	172	149	149	44	44	0	2,730
Budget Authority (\$mn)	17.0	41.5	612.8	115.5	461.9	457.0	155.0	136.3	136.2	53.7	53.0	0	2,283

Note: Includes FY07 Title IX and FY07 and FY08 GWOT supplemental requests

Source: DoD

Bradley Fighting Vehicle

Built to replace the Vietnam era M113, which was used to carry troops to the combat zone, the Bradley tracked combat vehicle is designed to also offer the soldier cover fire for dismounting operations once it arrives at the battlefield and also to defeat any enemy vehicles or tanks that may pose a threat. The Bradley entered service in 1981, had its first real combat use in the first Iraq war and production wound down in 1994 with 6,720 produced. In the late 1990s, the Army began to refurbish, remanufacture and reset equipment, with this work picking up steam as vehicles are brought back from the current Iraq conflict.

- **Prime contractor:** BAE Systems (through United Defense acquisition)
- **Unit cost:** \$2.8 million per vehicle to recapitalize
- **Vehicle type:** Tracked combat vehicle
- **Estimated fleet size:** 6,720 vehicles produced
- **Current upgrade work:** Upgrades, resets and refurbishments planned through 2012
- **Planned replacement:** The Infantry Combat Vehicle (ICV) and Reconnaissance and Surveillance Vehicle (RSV) as part of FCS

DoD Budget Procurement Plan for the Bradley (Base Sustainment)

	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	Remaining	Total
Quantity	57	738	481	87	107	121	118	0	0	3,998
Budget Authority (\$mn)	268	2,129	1,543	740	745	779	758	355	0	11,743

Note: Includes FY07 Title IX and FY07 and FY08 GWOT supplemental requests

Source: DoD

Family of Heavy Tactical Vehicles (FHTV)

The Family of Heavy Tactical Vehicles (FHTV) is used in line haul, local haul, unit resupply and other missions throughout the tactical environment to support modern and highly mobile combat units. FHTV was first created in early 2001 as a common contract vehicle for a number of existing heavy support vehicles including Heavy Expanded Mobility Tactical Truck (HEMTT), Palletized Load System (PLS) and Heavy Equipment Transport System (HETS).

- **Prime contractor:** Oshkosh
- **Unit cost:** \$300-450K depending on variant
- **Vehicle type:** Wheeled tactical vehicle
- **Current production run:** Beyond current planning period

DoD Budget Procurement Plan for the FHTV

	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	Remaining	Total
Total Quantity	3,276	13,039	3,181	3,186	3,563	3,772	3,816	3,503	20,437	83,993
Budget Authority (\$mn)	675	3,095	1,014	834	982	1,009	1,116	1,012	7,078	22,080

Note: Includes FY07 Title IX and FY07 and FY08 GWOT supplemental requests
Source: DoD

Family of Medium Tactical Vehicles (FMTV)

FMTV performs more than half of the Army's supply missions to combat-related units. The vehicles are also used as a platform for mobile weapons systems such as Theater High Altitude Area Defense (THAAD), High Mobility Artillery Rocket System (HIMARS), Medium Extended Air Defense System (MEADS) and Joint Network Node (JNN). The FMTV family is broken down into two sub-groups, Light Medium Tactical Vehicle (LMTV) and Medium Tactical Vehicle (MTV).

- **Prime contractor:** Armor Holdings (Stewart & Stevenson)
- **Unit cost:** \$130-150K
- **Vehicle type:** Wheeled tactical vehicle
- **Current production run:** Beyond current planning period

DoD Budget Procurement Plan for the FMTV

	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	Remaining	Total
Total Quantity	3,276	13,039	3,181	3,186	3,563	3,772	3,816	3,503	20,437	83,993
Budget Authority (\$mn)	675	3,095	1,014	834	982	1,009	1,116	1,012	7,078	22,080

Note: Includes FY07 Title IX and FY07 and FY08 GWOT supplemental requests
Source: DoD

HMMWV (Humvee)

The HMMWV was never intended to be used on an asymmetric battlefield and subject to land mines and other improvised explosive devices, it was designed as a transport vehicle to replace the venerable ¼ ton Jeep. First deployed in 1985, the HMMWV serves multiple roles including troop and cargo carrier, weapons platform, scout vehicle for long-range reconnaissance and ambulance. Recent procurement emphasis has shifted from an up-armored version of the standard M1114 vehicle to more updated M1115 and M1116 armored versions. Current procurement plans are somewhat fluid and easily could be extended if Iraqi operations continue as the vehicles are only lasting 2-5 years in the harsh climate versus their expected life span of 13-15 years.

- **Prime contractor:** AM General (Armor - Armor Holdings)
- **Unit cost:** \$140-150K for up-armored version
- **Vehicle type:** Wheeled tactical vehicle
- **Estimated fleet size:** 140,000-150,000 vehicles
- **Current production run:** Planned to run at least through current FYDP period (FY13)
- **Planned replacement:** Joint Light Tactical Vehicle (JLTV)

DoD Budget Procurement Plan for the HMMWV

	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	Remaining	Total
Total Quantity	7,224	14,440	10,057	3,886	4,194	3,730	4,172	1663	0	160,728
Budget Authority (\$mn)	1,302	2,531	1,929	669	722	645	722	291	0	14,913

Note: Includes FY07 Title IX and FY07 and FY08 GWOT supplemental requests
Source: DoD

Stryker

The Stryker is a key part of the Army's transformational efforts and is at the heart of the Brigade Combat Team (BCT) concept. The Stryker comes in many variants including infantry carrying vehicle, reconnaissance, command vehicle, engineering support and medical evacuation to help support the modularity concept of the BCT.

- **Prime contractor:** General Dynamics
- **Unit cost:** \$1.3-5.2 million
- **Vehicle type:** Wheeled combat vehicle
- **Estimated fleet size:** 2,800 vehicles
- **Current production run:** Planned to run through 2013-2014

DoD Budget Procurement Plan for the Stryker

	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	Remaining	Total
Quantity	494	211	227	15	39	46	24	0	0	2,887
Budget Authority (\$mn)	1,319	1,760	1,442	447	666	663	320	60	0	11,099

Note: Includes FY07 Title IX and FY07 and FY08 GWOT supplemental requests
Source: DoD

NEW AND EMERGING PROGRAMS

Expeditionary Fighting Vehicle (EFV)

The EFV is being developed to replace the aging amphibious assault vehicle AAV-7A1 fleet. It is designed to carry a full squad to shore from beyond the horizon, allowing the fleet to remain safely out of firing range, and then maintain pace with the M1 Abrams tank. System design and development (SDD) on the EFV, formerly called the Advanced Amphibious Assault Vehicle (AAAV), was started in 2001.

- **Current work**

- **System Design and Development (SDD):** A mid-March 2007 contract award to address reliability issues will extend SDD work through September 2008.
- **Timeline:** Initial operating capability (IOC) had been planned for 2010 and full rate production for 2011-2012, but delays are expected as SDD stretches out.
- **Estimated fleet size:** 573 (cut 50% following Quadrennial Defense Review)
- **Total potential value:** \$8.4 billion
- **Prime contractor:** General Dynamics
- **Production start:** Current discussions focus on 2011 LRIP (from FY10 funding for 15 vehicles), expected to slide out on extended SDD phase.
- **Replaces:** The AAV-7A1

DoD Budget Procurement Plan for the EFV

	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	Remaining	Total
Quantity	0	0	0	0	15	36	48	51	422	573
Budget Authority (\$mn)	0	0	0	0	384	646	756	690	5,780	8,441

Note: Includes FY07 Title IX and FY07 and FY08 GWOT supplemental requests
Source: DoD

Future Combat System (FCS)

The FCS program was intended to provide a clean sheet opportunity for the Army to shape an integrated fighting force, but the reality of ongoing operations has resulted in a reshuffling of priorities with some technologies pulled forward and other systems delayed. In addition, the resetting of combat vehicles, the acquisition of armored vehicles (e.g., MRAP, etc.) and the evolution of separate programs such as JLTV have pushed out the immediacy of developing next-generation combat vehicles. We believe that technology developed for the FCS program will eventually evolve into replacement vehicles for heavy armor and will be integrated into such new programs as Stryker and JLTV.

Ground Standoff Mine Detection Systems (GSTAMIDS – MPCV and MMPV)

The GSTAMIDS program was an Army program of record in place before 9/11 and is intended to support the Future Engineer Force (FEF) with explosive ordnance disposal, including route and area clearance. While Force protection won the initial competition for the larger vehicle in

the summer of 2001, orders did not start flowing in any significant amount until 2004 as it offered a good contract vehicle for the Army to procure vehicles for troops in Iraq and Afghanistan.

- **Mine Protected Clearance Vehicle (MPCV):** The larger of the two vehicles, the MPCV seats six and has a moveable claw that enables the handling of explosive ordnance from within the safety of the vehicle. Force Protection (Technical Services Group at the time) won this competition in June 2001 and received an initial order for 10 Buffalo vehicles to be delivered through 2007. The reality of asymmetric warfare changed that, with additional orders and quicker delivery times, starting in the summer of 2004. Although these additional vehicles are being used outside the original scope of the contract vehicle to meet immediate war fighter needs, we believe the Army will ultimately fill its goal of fielding the MPCV with the MPF as part of the FEF as these new units are activated over the next few years, starting in FY08.
 - **Prime contractor:** Sole source contract for Force Protection’s Buffalo vehicle
 - **Potential value:** \$150 million
- **Medium Mine Protected Vehicle (MMPV):** The MMPV will be a mission support vehicle to the MPCV during explosive ordnance clearance operations. Although the MMPV is similar in size to the MRAP, its mission is more specific in terms of ordnance clearance, it will only have one variant, and it will be fielded with specific FEF units, as opposed to the MRAP, which will be used in multiple roles, come in multiple configurations (10 alone for the Army) and be fielded with the Army, Marine Corps and Navy.

Comparison of MMPV and MRAP

MMPV	MRAP
Key Similarities	
Technical Requirements (survivability, mobility)	
Key Differences	
Joint Capabilities Integration and Development System	Urgent Needs Statements/Operational Needs Statements
Full Material Release	Urgent Material Release
Organic Logistics Support	Contractor Logistics Support
Fielded CONUS	Initially Fielded OCONUS (Southwest Asia)
First Fielding 3Q FY08	First Fielding CY07
One vehicle/variant/configuration	Three Categories of vehicles/configurations
Single production contract award	Multiple contract awards

Source: TACOM

- **Request for proposal (RFP):** Expected April 20, 2007
- **Contract award:** Expected July 31, 2007
- **Competitors:** Due to similarities with MRAP, we expect that the field will be just as large.
- **Number of contractors:** Down select to a single supplier in July 2007
- **Fleet requirements:** Although the FY08 FYDP currently contains funding for 243 MMPVs, the current Authorized Army Acquisition Objective (AAO) is 1,014 vehicles. The RFP leaves open the option for the procurement of up to 2,500 vehicles. Like the MRAP, MMPV requirements are moving so rapidly that the FY08 budget plan is already well out of date.

- **Potential value:** \$2.0-2.5 billion if all options exercised
- **Deployment:** Fielding slated to begin in F3Q08.

RFP Estimated MMPV Delivery Schedule for Contact Evaluation

	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14
Quantity	18	107	112	236	225	190	189	172

Source: TACOM

DoD Budget Procurement Plan for the GSTAMIDS

MMPV	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
Quantity	0	0	159	82	79	0	0	0
Budget Authority (\$mn)	0	0	125	66	66	0	0	0

MPCV	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
Quantity	0	0	84	44	42	0	0	0
Budget Authority (\$mn)	0	0	89	48	48	0	0	0

Note: Includes FY07 Title IX and FY07 and FY08 GWOT supplemental requests

Source: DoD

Joint Light Tactical Vehicle (JLTV)

The JLTV program has the potential to be a multi-decade, multi-billion dollar program. Initial estimates put the potential fleet size at more than 50,000, similar to initial estimates for HMMWV production, which has since grown to more than 185,000 including international deliveries. Plans call for five variants: (1) Combat Tactical Vehicle (CTV), (2) Utility Vehicle (UV), (3) Command and Control on-the-move Vehicle (C2OTM), (4) Long Range Surveillance Vehicle (LRS) and (5) Ground Maneuver Vehicle.

- **Moving up the schedule:** Recently approved changes (December 2006) enable the Army and Marine Corps to move the JLTV schedule up two years. The plan calls for a prototype in 2008, LRIP and deployment in 2010 and full deployment by 2012. The RFP is expected in April 2007, with a decision on which two or three models to develop during System Design and Development (SDD) between October 2007 and March 2008. SDD would then take 24 months, with a single vehicle system chosen for production.
- **JLTV versus MRAP:** The MRAP program offers an immediate gap-filler solution to help protect soldiers in Iraq and Afghanistan, but falls short of offering a permanent replacement to the HMMWV. The following are some important factors that preclude the MRAP program from displacing the JLTV.
 - **Cost:** The JLTV is targeted to be \$100-150K less expensive per vehicle than the smallest MRAP (Cat I, MRUV), which is not a big concern when soldiers' lives are in immediate danger but an avoidable cost when the industry has the time to bring the cost down to a more manageable range for a fleet that is expected to exceed 50,000 vehicles. Most MRAPs under consideration are based off of commercial truck chassis, making production and

design easy but adding to cost. The JLTV will be such a large fleet that a clean design from the ground up is worth the up-front costs.

- **Weight:** Mobility was not a concern in the development of mine-resistant vehicles, as the numbers required were small so moving them around would not create an undue burden. The JLTV will meet the weight requirement (under 14,000 lbs) for rotorcraft and tilt-rotor transport.
- **Networkability:** The JLTV will have the latest in satellite and UAV communications equipment integrated into its design, as well as the modularity to allow for quick upgrades.
- **Current work**
 - **Technology demonstrators:** Lockheed Martin and Navistar built prototypes used by the DoD to determine a final set of requirements for JLTV.
 - **Modeling and simulation aid:** The Office of Naval Research (ONR) has contracted for assistance from AM General, BAE Systems, General Dynamics, Oshkosh and Textron (Cadillac Gage).
- **Competitors:** Given the potential size of the program and the similarities to MRAP, we expect the competitive field will consist of many of the same players. This includes already known participants General Dynamics (*General Tactical Vehicle* joint venture with AM General), Lockheed Martin (teamed with Armor Holdings), BAE Systems, Oshkosh (we believe potentially with a lighter variant of Protected Vehicles Alpha), Force Protection (we expect a teaming with a major contractor to compete its Cheetah), Navistar and Textron.
- **Contract timeline:** The request for proposal (RFP) is expected in April, with a down-select to two or three bidders in 4Q07 or 1Q08. At this point, each company would produce 40-50 vehicles for 24 months of test and evaluation. The final down-select to a single supplier is expected in time to support initial fielding in 2010.
- **Estimated cost per vehicle:** \$200-250K
- **Estimated fleet size:** 5,500 for initial contract planning purposes; could grow to over 50,000 (38,421 Army, 14,150 Marine Corps).
- **Total potential value:** \$10-20 billion
- **Production start:** The plan had called for LRIP to begin in 2010-2011 (from FY09 funding for 61 vehicles), but there is a growing discussion and expectation that this could be moved up two years.
- **Replaces:** The HMMWV

DoD Budget Procurement Plan for the JLTV

	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	Remaining	Total
Quantity	0	0	0	61	465	789	1,030	1032	2,173	5,550
Budget Authority (\$mn)	0.0	0.0	0.0	49.1	139.5	136.8	309.1	309.5	1,956	2,997

Note: Includes FY07 Title IX and FY07 and FY08 GWOT supplemental requests
Source: DoD

Light Weight Prime Mover (LWPM)

The LWPM will be used to tow the new M777 155mm howitzer for the Marine Corps. This vehicle, the LM4x4, is air transportable via the C-130 and can be airlifted by the CH-53E and MV-22. While this is not a major program by any measure, it is important in that it is Lockheed Martin's first tactical vehicle win as prime contract and solid performance on this program could provide LMT a reputational boost among the Marine Corps, one of the major decision makers for the JLTV program.

- **Current work**

- **Production qualification testing:** Lockheed Martin delivered four vehicles at the end of February 2007 to under production qualification testing at the Nevada Automotive Test Center.

- **Timeline:** A potential 2Q07 decision on production.

- **Cost per vehicle:** \$250K

- **Estimated fleet size:** 120 vehicles

- **Total potential value:** \$30 million

- **Prime contractor:** Lockheed Martin

- **Production start:** TBD

- **Replaces:** N/A - new vehicle program

Marine Personnel Carrier (MPC)

The need for the Marine Personnel Carrier was the result of the study conducted at the request of the last Quadrennial Defense Review (QDR), which asked the Marine Corps to examine its mix of planned amphibious assault vehicles and light tactical vehicles. Many current generation amphibious assault vehicles were pressed into inland service (for lack of other available patrol vehicles) in Iraq, a role for which they were not designed. The impact of the study was a shifting of resources from the Expeditionary Fighting Vehicle (EFV) to the MPC to form a triad of vehicle capabilities: EFV – MPC – JLTV.

The role of the MPC has only been minimally defined and could be viewed as very similar to MRAP. This adds to the general confusion of what direction the Pentagon is taking on its long-term fleet, as we believe an extended MRAP production run for the Marine Corps could supplant the MPC requirement.

Industry Day: April 2007

Prototype development and production: 2009-2012

Estimated fleet size: 600 vehicles

Initial operating capability: 2014

Final operating capability: 2019

Mine-Resistant Ambush-Protected (MRAP) Vehicle

The MRAP program is an effort to get an effective tool to the war fighter as quickly as possible. Funding for this type of mine-resistant vehicle for wider use first started to trickle in late 2004 and early 2005 through small orders, and as the numbers requested started to grow, the procurement system was slightly more formalized under the Joint IED Defeat Organization (JIEDDO) in mid-2005. Under JIEDDO, the Cougar was provided under the Joint EOD Rapid Response Vehicles (JERRV) program. The vehicles' survivability against IEDs has resulted in even greater demand, and the JERRV program has evolved into the MRAP procurement effort, with the JERRV now classified as MRAP Category II.

The program is broken up into three variants: (1) **Category I Mine-Resistant Utility Vehicle (MRUV)**: Six passenger utility vehicle, the RFP listed a requirement for 1,500 vehicles; (2) **Category II Joint Explosive Ordnance Disposal Rapid Response Vehicle (JERRV)**: 2,600 vehicles (per the RFP) carrying 10-plus passengers for ordnance disposal and (3) **Category III**: This is a sole source contract for up to 200 Force Protection Buffalo vehicles.

• Current work

- **Prototype Contracts:** Of the nine companies contracted to deliver prototypes (two each for Category I and Category II), one is running five months late and is expected to drop out and 3-4 others missed the March 27th delivery deadline but are expected to deliver their vehicles by the end of April.
- **Initial production:** The Marines have also placed orders for 595 Category I and II vehicles.

MRAP Orders

Company	Prototype Order	Production Orders		Comment on Production Contracts
		Cat I	Cat II	
Armor Holdings	4	--	--	
BAE Systems	4	15	75	From RG-33 family of vehicles
Force Protection	--	--	200*	Awarded prior to joint venture with General Dynamics
Force Dynamics	4	65	60	JV between Force Protection and General Dynamics
General Dynamics	4	10	10	From RG-31 family of vehicles, BAE sub-contractor
General Purpose Vehicle	4	--	--	
International Military and Government (Navistar)	4	--	--	
Oshkosh	4	100	--	Oshkosh is prime with Protected Vehicles Alpha vehicle
Protected Vehicles	4	--	60	Goloan vehicle, Oshkosh a sub-contractor for production
Textron	4	--	--	

Note: * Awarded simultaneously with MRAP Category III - sole-source award for Buffalo, done under JERRV contract terms

Source: DoD and company reports

- **Timeline:** Testing is expected to finish in April or May at which time the Marine Corps is expected to narrow down the field of suppliers (final number to be determined) and issue large scale production orders.
- **Estimated cost per vehicle:** \$350-400K (Cat I), \$450-620K (Cat II), \$850-950K (Cat III)

- **Estimated fleet size:** Initially 4,100 Cat I and Cat II vehicles were discussed out in the RFP, but since then the services have increased that number to 7,774.

MRAP Fleet Requests, by Service

	Nov-06	Feb-07	Mar-07
Marine Corps	1,022	3,700	3,700
Army	2,500	2,500	2,500
Navy	538	538	544
Air Force	0	0	697
Special Forces	0	0	333
Total	4,060	6,738	7,774

Source: Company reports and DoD

- **Total potential value:** \$6-8 billion with potential to increase even further. The FY08 baseline and supplemental budgets did not fully fund the 4,100 vehicles the RFP requested by the end of 2008, but the Army and Marine Corps unfunded requirements lists include a combined total of \$5 billion for 5,000 vehicles, which would support most of the new target of 7,700 vehicles.
- **Competitors:** All major military truck manufacturers, as well as new entrants to the market (see “MRAP Orders” table above).

MRAP Competitive Landscape

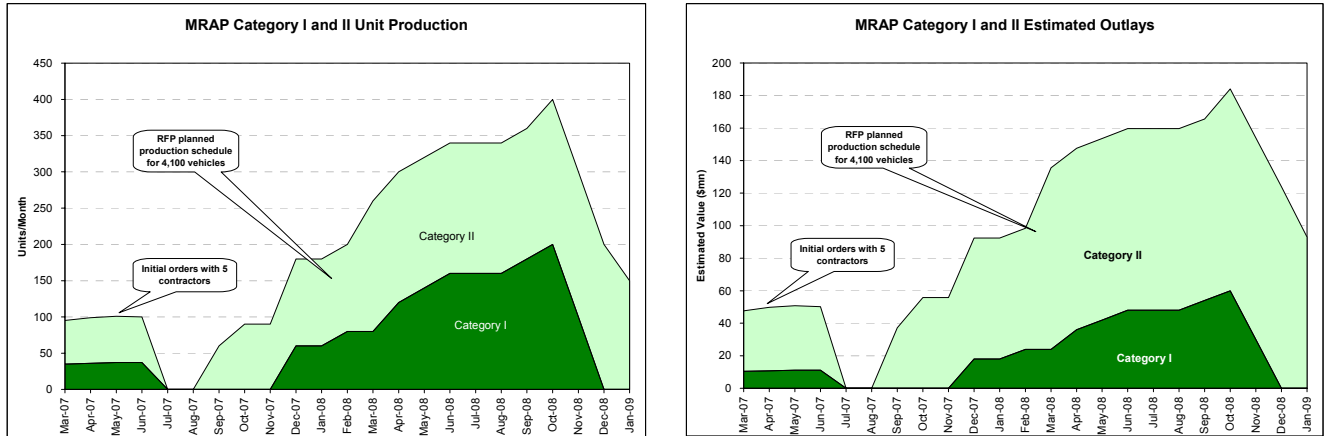
MRAP Categories	Vehicles (companies)	
Category I	Alpha (OSK, PVI) * Cougar (FRPT/GD JV) * FMTV (AH, LMT) Golan (PVI, OSK) ASV (TXT)	RG-31 (GD, BA.L) * RG-33 (BA.L) * TBA (NAVZ) TBA (GPV)
Category II	Bushmaster (OSK) Cougar (FRPT/GD JV) * FMTV (AH, LMT) Golan (PVI, OSK) * ASV (TXT)	RG-31 (GD, BA.L)* RG-33 (BA.L)* TBA (NAVZ) TBA (GPV)
Category III	Buffalo (FRPT)	

Note: * Denotes award of MRAP production contract prior to completion of prototype testing

Source: Company reports and DoD

- **Production start:** Limited production already under way, we expect full production to ramp up in 3Q07. The RFP requested 4,100 by the end of 2008, but we see production being increased and extended as demand remains strong.

MRAP Category I and II Initial Production Plans



Source: DoD and Thomas Weisel Partners estimates

- Replaces: N/A - new vehicle program

VALUATION

TWP Defense & Security Coverage (Priced as of April 13, 2007)

					Div. Yld.	Revenue (CY)			GAAP EPS (CY)			Mkt. Cap. (\$mn)	Ent. Value (\$mn)	CY 2008E					FCFLO Yield
Company	Ticker	Price	52 Week Low	High		2007E	2008E	% Chg	2007E	2008E	% Chg			EV/ Rev.	EV/ EBITDA(P)	GAAP P/E	Relative	Economic P/E	
Defense primes:																			
Boeing* - M	BA	91.03	72	- 92	1.3%	64,973	72,029	11%	4.80	6.15	28%	71,231	64,578	0.9x	7.1x	14.8x	1.00x	13.4x	7.7%
General Dynamics* - O	GD	76.72	62	- 81	1.5%	26,486	28,154	6%	4.72	5.25	11%	31,355	32,532	1.2x	9.0x	14.6x	0.99x	14.0x	7.5%
Lockheed Martin* - O	LMT	96.24	70	- 104	1.5%	41,325	42,187	2%	6.10	6.50	7%	41,653	43,799	1.0x	8.2x	14.8x	1.00x	14.2x	7.1%
Northrop Grumman* - M	NOC	74.75	62	- 76	2.0%	31,855	33,376	5%	4.98	5.29	6%	26,805	29,952	0.9x	8.1x	14.1x	0.96x	14.1x	6.6%
Raytheon* - M	RTN	54.37	43	- 56	1.9%	21,665	22,984	6%	3.00	3.55	18%	24,592	26,097	1.1x	8.5x	15.3x	1.04x	13.4x	7.1%
<i>Averages/Totals</i>						\$186,303	\$198,730	7%			14%	\$195,636	\$196,958	1.0x	8.2x	14.7x	1.00x	13.8x	7.2%
Defense suppliers:																			
Alliant Techsystems* - O	ATK	90.15	74	- 91	0.0%	3,756	4,081	9%	6.13	7.09	16%	3,025	4,409	1.1x	8.6x	12.7x	0.86x	12.5x	8.9%
DRS Technologies* - O	DRS	51.08	36	- 60	0.2%	3,007	3,263	9%	3.48	3.92	13%	2,079	3,889	1.2x	8.7x	13.0x	0.88x	11.7x	7.5%
EDO* - M	EDO	26.88	21	- 30	0.4%	1,025	1,280	25%	1.47	2.39	62%	666	843	0.7x	6.2x	11.2x	0.76x	9.6x	9.8%
Force Protection* - O	FRPT	20.85	1	- 24	0.0%	650	1,303	101%	0.70	1.30	86%	1,428	1,272	1.0x	9.1x	16.1x	1.09x	16.1x	0.1%
Herley Industries* - M	HRLY	16.00	9	- 21	0.0%	174	183	5%	0.91	0.88	-3%	230	214	1.2x	8.5x	18.2x	1.23x	16.4x	4.3%
L-3 Communications* - O	LLL	89.92	67	- 91	1.1%	13,350	13,975	5%	5.70	6.25	10%	11,366	15,553	1.1x	8.9x	14.4x	0.97x	13.8x	9.3%
Rockwell Collins* - O	COL	65.67	49	- 70	1.0%	4,434	4,797	8%	3.40	3.88	14%	11,170	11,199	2.3x	10.2x	16.9x	1.15x	16.6x	6.2%
<i>Averages/Totals</i>						\$26,397	\$28,881	9%			28%	\$29,965	\$37,380	1.2x	8.6x	14.6x	0.99x	13.8x	6.6%
Security technology																			
Applied Signal Tech* - M	APSG	18.57	13	- 19	2.7%	164	172	5%	0.53	0.58	9%	226	208	1.2x	11.6x	32.3x	2.18x	32.3x	3.9%
Argon ST* - O	STST	28.05	19	- 35	0.0%	330	372	13%	1.13	1.34	18%	637	607	1.6x	11.4x	20.9x	1.41x	20.9x	3.9%
AeroVironment* - M	AVAV	22.50	21	- 26	0.0%	185	221	19%	0.84	0.99	17%	473	364	1.7x	9.9x	22.8x	1.54x	22.8x	3.6%
FLIR Systems* - O	FLIR	38.30	21	- 38	0.0%	680	770	13%	1.55	1.75	13%	2,973	2,880	3.7x	13.4x	21.9x	1.48x	21.9x	3.8%
L-1 Identity Solutions* - M	ID	18.86	12	- 19	0.0%	350	405	16%	0.13	0.23	72%	1,373	1,448	3.6x	23.1x	NM	NM	NM	3.8%
Verint* - M	VRNT	31.80	25	- 37	0.0%	560	778	39%	0.20	0.40	97%	1,049	1,814	2.3x	13.1x	NM	NM	23.4x	6.9%
<i>Averages/Totals</i>						\$2,389	\$2,857	20%			36%	\$8,017	\$8,193	2.9x	14.1x	25.4x	1.72x	25.1x	4.4%
Major Indices:																			
NASDAQ Composite	COMP	2,492	2,013	- 2,531															
S&P 500	SPX	1,453	1,219	- 1,462					\$92.33	\$98.22	6%					14.8x	1.00x		

Rating: O = Overweight, M = Market Weight, U = Underweight, SR = Suspended Rating
 Note: EBITDA(P) - Large-cap defense adjusted to exclude non-cash FAS/CAS pension income/(expense)
 Source: Bridge, Baseline, company reports and (*) Thomas Weisel Partners LLC estimates

FRPT trades at 16.1x our CY08 EPS estimate and 9.1x our CY08 EV/EBITDA estimate, a discount to defense suppliers at 18.1x and 9.3x. We believe the company deserves a premium multiple, given its strong market position and strong growth expectations for the market segment as a whole. We expect FRPT's team to garner at least 50% of the upcoming \$8 billion in expected MRAP orders, providing FRPT's Cougar vehicle with a solid base in this nascent market space. We believe the shares are attractively valued.

GD trades at 14.0x 2008E economic EPS and 9.0x 2007E EBITDAP, a premium to large-cap peers at 13.9x and 8.4x. We believe a premium multiple is warranted, given the company's execution track record, above-peer organic Defense growth boosted by supplemental funds, and the fact that 20-25% of EBIT is derived from the faster-growing business jet market. Potential sources of upside to our numbers include faster GAC margin improvement, improved shipbuilding performance, additional reset spending, accretive acquisitions and share repurchases. We believe the shares are attractively valued.

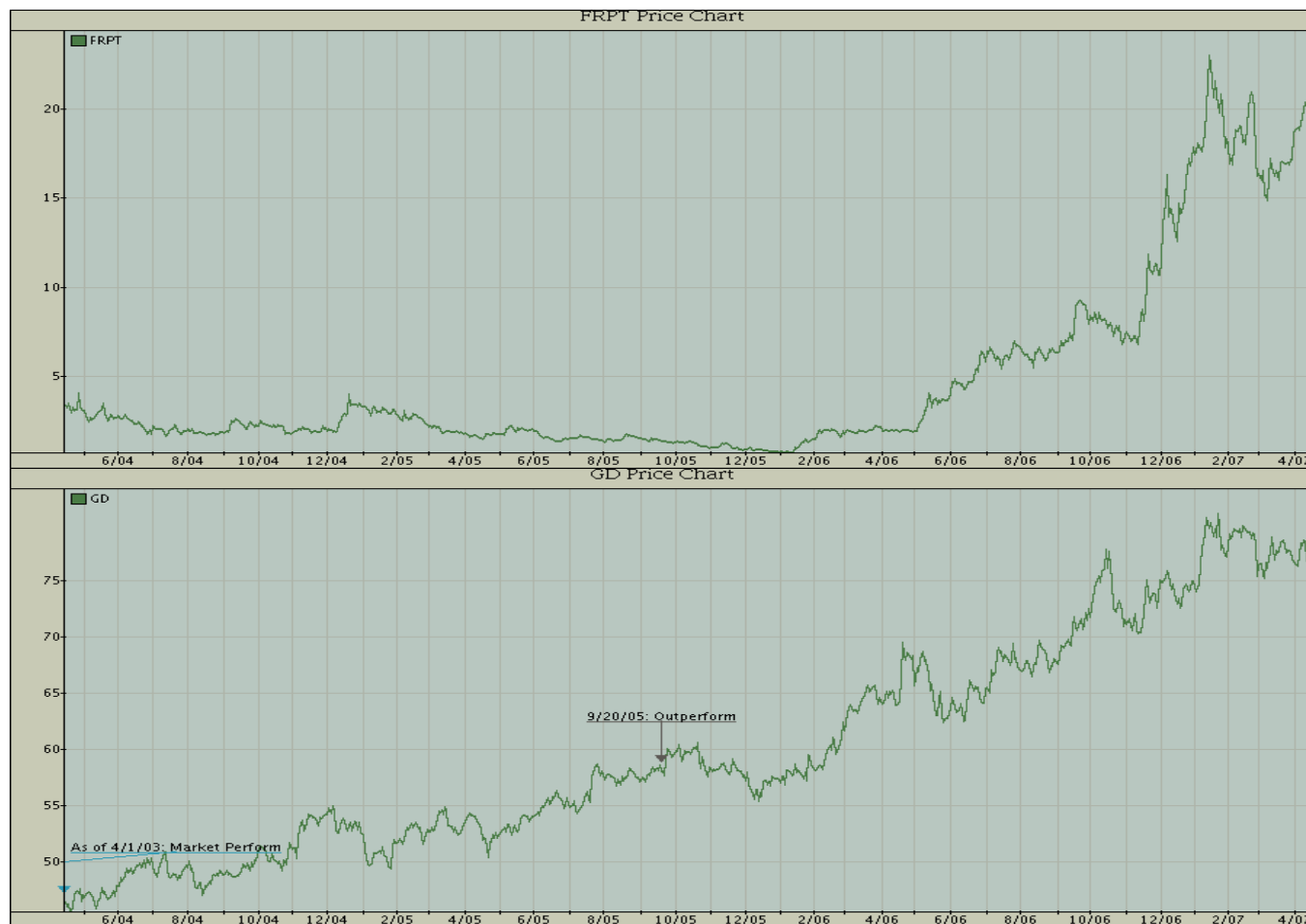
LMT trades at 14.2x 2008E economic EPS and 8.2x 2008E EBITDA, a premium to large-cap peers at 13.7x and 8.3x. We expect Lockheed Martin to outperform the peer group over the next 12 months on the basis of consistent execution and margin expansion opportunities (favorable F-16 mix shift, F/A-22 production of higher margin lots and F-35 improvement). Potential upside could come from the further share buybacks and accretive acquisitions. The balance sheet is arguably underleveraged with net debt/capital of only 24%. We anticipate continued share repurchases and disciplined M&A. Catalysts could include decisions on GPS III (\$8 billion versus BA), Justice Dept. IWN (\$10 billion versus GD) and JTRS AMF (\$1 billion versus BA), as well as a number of international F-16 opportunities.

COUGARS AND CHEETAHS AND BUFFALO, OH MY!

ADDITIONAL INFORMATION IS AVAILABLE UPON REQUEST.

ANALYST CERTIFICATION AND IMPORTANT DISCLOSURES:

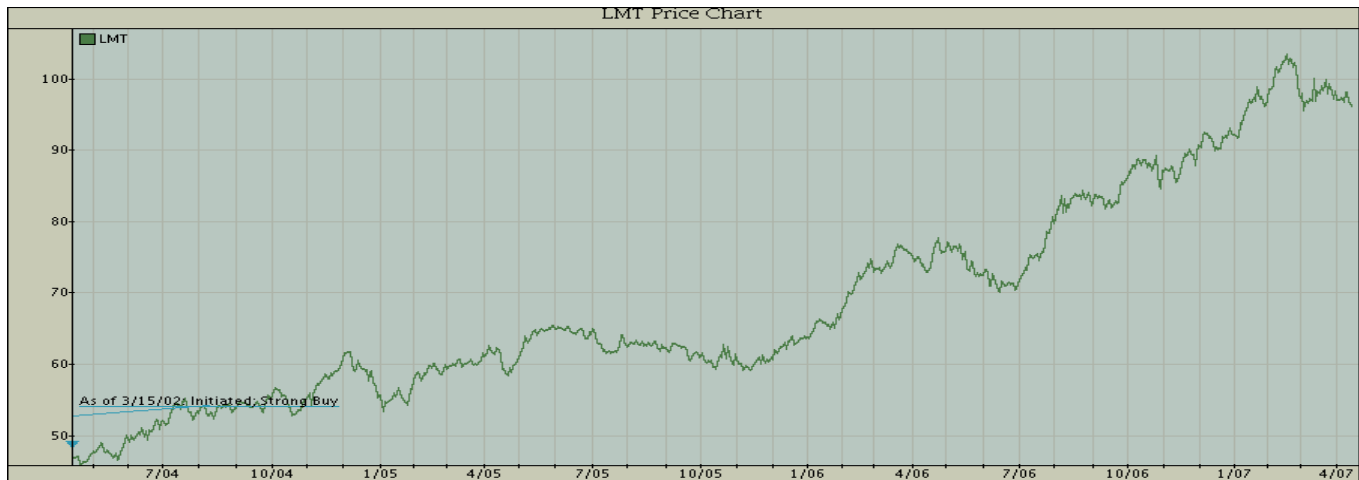
The Research Analyst(s) principally responsible for the analysis of any security or issuer included in this report certifies that the views expressed accurately reflect the personal views of the Research Analyst(s) about the subject securities or issuers and certifies that no part of his or her compensation was or is or will be, directly or indirectly, related to the specific recommendations or views expressed by the Research Analyst(s) in this report.



Notes: Price chart updated as of 4/10/2007. All price targets displayed in the chart above represent either a specific price target or the midpoint of a range. Prior to November 16, 2006, Thomas Weisel Partners LLC used a three-tier rating system with different rating names and definitions: Outperform, Peer Perform and Underperform.

Source: First Call, FactSet and Thomas Weisel Partners LLC

COUGARS AND CHEETAHS AND BUFFALO, OH MY!



Notes: Price chart updated as of 4/10/2007. All price targets displayed in the chart above represent either a specific price target or the midpoint of a range. Prior to November 16, 2006, Thomas Weisel Partners LLC used a three-tier rating system with different rating names and definitions: Outperform, Peer Perform and Underperform.

Source: First Call, FactSet and Thomas Weisel Partners LLC

Thomas Weisel Partners LLC makes a market in the securities of the following company or companies mentioned in this report and may sell any of the securities to or buy them from customers on a principal basis: Force Protection, Inc.

COUGARS AND CHEETAHS AND BUFFALO, OH MY!

The following table outlines the Thomas Weisel Partners LLC stock rating system, along with the relevant definitions, effective November 16, 2006.

STOCK RATING	STOCK RATINGS DEFINITIONS	PCT. OF SECURITIES RATED IN EACH CATEGORY	PCT. FOR WHICH IB SERVICES HAVE BEEN PROVIDED
Overweight (O)	When an analyst rates a stock Overweight, he/she is advising our clients to carry a position in the stock that is in excess of its weighting relative to the stocks either in that analyst's coverage or an index identified by the analyst that includes, but is not limited to, stocks covered by that analyst.	43.8%	33.2%
Total Buy		43.8%	33.2%
Market Weight (M)	When an analyst rates a stock Market Weight, he/she is advising our clients to carry a position in the stock that is in line with its weighting relative to the stocks either in that analyst's coverage or an index identified by the analyst that includes, but is not limited to, stocks covered by that analyst.	51.8%	10.6%
Total Hold		51.8%	10.6%
Underweight (U)	When an analyst rates a stock Underweight, he/she is advising our clients to carry a position in the stock that is below its weighting relative to the stocks either in that analyst's coverage or an index identified by the analyst that includes, but is not limited to, stocks covered by that analyst.	4.4%	9.5%
Total Sell		4.4%	9.5%
Suspended Rating (S)	The stock rating has been suspended.		
Not Rated (NR)	The stock is not rated, but it is covered by a Thomas Weisel Partners LLC analyst.		
Not Covered (NC)	The stock is not covered by a Thomas Weisel Partners LLC analyst.		

Notes: The percentage of investment banking services is calculated as of 12/31/2006. The percentage of securities rated in each category is calculated as of 4/13/2007. The new rating system is effective 11/16/2006. An analyst's coverage universe is defined as all of the stocks within the analyst's industry that reasonably are part of his/her potential coverage, not necessarily the stocks specifically covered. "Buy", "Hold" and "Sell" are not ratings categories defined by Thomas Weisel Partners LLC and should not be interpreted as investment opinions. We show these categories for illustrative purposes in accordance with NASD and NYSE regulations. The above table includes Thomas Weisel International stocks.

Source: FactSet and Thomas Weisel Partners LLC

The following grid outlines the Thomas Weisel Partners LLC industry rating system, along with the relevant definitions, effective November 16, 2006.

INDUSTRY RATINGS	INDUSTRY RATINGS DEFINITIONS
Favorable	When an analyst assigns a Favorable rating to an industry that means he/she believes that, generally, the industry's fundamentals or stock prospects are improving.
Neutral	When an analyst assigns a Neutral rating to an industry that means he/she believes that, generally, the industry's fundamentals or stock prospects are stable.
Unfavorable	When an analyst assigns an Unfavorable rating to an industry that means he/she believes that, generally, the industry's fundamentals or stock prospects are deteriorating.

Source: Thomas Weisel Partners LLC

COUGARS AND CHEETAHS AND BUFFALO, OH MY!

The following grid outlines the Thomas Weisel Partners LLC stock rating system, along with the relevant definitions, in effect from April 4, 2003, to November 16, 2006.

COMPANY RATING		RATINGS DEFINITION
Outperform (O)	The stock is expected to outperform the median performance of the Analyst's coverage universe over the next six to 12 months.	
Peer Perform (P)	The stock is expected to perform in line with the median performance of the Analyst's coverage universe over the next six to 12 months.	
Underperform (U)	The stock is expected to underperform the median performance of the Analyst's coverage universe over the next six to 12 months.	
Suspended Rating (S)	The stock rating has been suspended.	
Not Rated (NR)	The stock is not rated, but it is covered by a Thomas Weisel Partners LLC analyst.	
Not Covered (NC)	The stock is not covered by a Thomas Weisel Partners LLC analyst.	
SECTOR RATING		SECTOR RATING DEFINITION
Overweight (OW)	The Analyst's coverage universe is expected to outperform the S&P 500 over the next six to 12 months.	
Market Weight (MW)	The Analyst's coverage universe is expected to perform in line with the S&P 500 over the next six to 12 months.	
Underweight (UW)	The Analyst's coverage universe is expected to underperform the S&P 500 over the next six to 12 months.	

Source: Thomas Weisel Partners LLC

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