US Army Stryker Interim Armored Vehicle:
Issues & Questions
October 17 2002

Introduction:

The first issue here is not whether a Stryker can fit into a C-130. Clearly, by a very small margin, it can. The issue instead is whether it can be transported a reasonable distance in full combat mode and whether it can then be delivered by way of an assault landing with the purpose of dissuading or defeating an enemy.

The second issue concerns the effectiveness, survivability and costs of the vehicle itself. The evidence is that they are suspect.

The brief regarding these questions has been to draft the background, question, the likely reply by the Army per relevant issue, and then the follow-on question or questions. I won't be able to write the Army's reply in most cases, because the Army's story is a moving target and changes in the light of incoming criticism, and, regrettably, time is limited, but I hope I have put together an approach which will be of use and which will generate sufficient information for further inquiries to be justified. Frankly, I do not believe that there will be sufficient time to get comprehensive answers on the day of the demonstration itself; also, it is quite likely that the assembled Army team either will not know all the answers or will want to check back before committing themselves.

I strongly recommend that the Army's answers be recorded verbatim and, in addition, that they be asked to confirm all their replies in writing – under oath, if possible. I am stressing this because the Army has a habit of dissembling over details in such a manner that it is very difficult to pin down the absolute truth. That might not matter over minor points but the reality is that their habit of confusing the issue relates to matters of substance including the fundamental issue of American lives. They also have a habit of changing their own mandatory ground rules so that what they considered essential today is changed, quite arbitrarily, tomorrow. Here, the only solution is common sense, plus the expertise of Congress in dealing with these issues.

Regarding the order of the questions, I have split them into questions in rough order of importance. Accordingly, since the demonstration at McGuire Air Force base concerns, first and foremost, deployability by air, I have started with that issue first. However, I have dealt with other issues subsequently. The main issues are:

Deployability with particular emphasis on weight and size.
The effectiveness of the Stryker's armor including the appliqué armor issue.
The conditions for the 11 troops and all their associated equipment inside
Performance in urban and off-road environments.
The limitations of the Mobile Gun System
The limitations of the 120mm Mortar carrier

The overall lack of capability compared with the upgraded M113A3
The unwillingness to test the Stryker
The cost of the Stryker program

I would issue one caveat regarding my remarks re the Stryker. Although I am quite satisfied that they are substantially accurate – because I am using multiple sources who are in a position to know – there may be some errors of fact where I have been unable to check data. However I do not believe they will affect either the general thrust of the questions or the veracity of my conclusions.

Background to the Stryker purchase decision:

In the fall of 1999, General Shinseki, the new Army Chief of Staff (COS) announced his vision. He had formed the view that the US Army needed to be "Transformed." The Light Divisions, such as the 82nd Airborne and 10th Mountain Division, could get to the fight quickly but had inadequate firepower to deal with armor etc. The Heavy Divisions, equipped with 70 ton Abram tanks and 32 ton Bradley Fighting Vehicles were, he argued, too slow to deploy.

The COS announced a new type of unit to bridge the gap which would be equipped with a new light vehicle, the IAV – Infantry Armored Vehicle (actually a range of vehicles). The unit was called the IBCT – the Interim Brigade Combat Team (now known as a Stryker Brigade). This would bridge the gap until a completely new range of advanced technology vehicles and equipment, the FCS – the Future Combat System could take over. The FCS was to evolve from developments emanating from DARPA. It was a conceptual program based, in the main, upon aspirations - not functioning reality. However, some very promising technological progress underpinned those aspirations though many of the timelines for fruition were unknown.

The existing force was christened the Legacy Force. The emphasis was on the Interim /Brigade Combat Teams and the Future Combat System *despite the fact that the Legacy Force had defeated, with scant effort, every enemy of the US it was faced with – and could be made air-mobile too, if required.* But General Shinseki wanted something different. He wanted to shake up the status quo. He had been heavily influenced by peacekeeping in the Balkans where wheels proved ideal against no opposition, *and where most military traffic was road bound*. He wanted wheels. They would symbolize change. They were new. They were different.

Fundamental to the mission of the IBCT was that it should be air deployable by air, by C-130, and be in position to defeat any enemy anywhere within 96 hours. The C-130 standard was chosen because they were, and are, the transport aircraft available in greatest quantity despite being, in essence, a 40 year old design whose time, in the context of the need for Global Expeditionary Warfare, is over. (C-130s can certainly play a supporting role but fundamentally they are too slow and the aircraft body is too small to carry what is required).
The IAV was planned to be able to be flown to the fight speedily and to roll of the C-130, fully crewed and manned, and *ready for immediate action.* The target distance was never fully clarified – the implication was global – but the distance given to this writer was of the order of 1,000 miles plus. Very short distances of 1-200 miles were never considered because it would be faster to drive under those circumstances.

How the Stryker was chosen:

In early 2000, the Army held a 'demonstration' of prospective IAVs at Fort Knox. The word 'demonstration' is important because it meant that each vehicle merely showed off its capabilities (in a limited sense) and the vehicles (a limited selection) were not tested rigorously, one against the other. There was no true competition. This lack was to prove important in a legal sense.

At the end of the demonstration, the Army chose the LAV III, a derivation of a wheeled armored vehicle that the US Marines had bought nearly two decades earlier. The prime contractor was a General Dynamics / General Motors subsidiary which, for convenience, will be referred to as GM GD.
The main opposition came from United Defense who make the Bradley Infantry Fighting Vehicle, the M112/3 range of armored personnel carriers and the AGS – Armored Gun System (which had been developed for the Army but then cancelled for reasons which were far from clear). UD argued that a mix of *significantly upgraded* M113 armored personnel carriers and AGS vehicles would do everything, and more, that General Shinseki required. Nonetheless, the General Dynamics IAV proposal was the one accepted. Its main advantage, as explained by the Army, was that it was wheeled, and therefore would be faster on roads, and simpler to maintain. Wheeled technology, it was stated though not proved by the Army in any way (and which was contradicted by available data), had now progressed so much that it was now virtually as good as tracked technology off road and, it was definitely superior on roads. On good roads, it was claimed, wheeled vehicles could cruise at 60 mph whereas a tracked convoy would be hard pressed to maintain half that speed (mainly thanks to the Army's own rules; also virtually all tracked vehicles are governed to keep down their speed).

This finding by the Army, *which was not supported by any evidence*, did not conform to the findings of a joint US/British program to develop a Future Scout Vehicle. After extensive research, the US/UK program decided that tracks gave the most operational flexibility. General Shinseki cancelled that collaborative effort in 2000 and the UK continued alone. Also, General Shinseki did not consider tracked vehicles equipped with 'Band Tracks' – a new rubber/composite/steel track technology which made tracked vehicles significantly faster, quieter and more soldier friendly to ride in. Tracked vehicles equipped with band tracks could cruise at 50 mph plus – only ten miles an hour less than the theoretical cruising speed of wheeled armored vehicles. In practice, the Stryker has been limited to around 40 mph, or less, on many occasions and *they lose their speed advantage completely when up-armored.*

The conclusion of informed insiders was that decision to purchase the Stryker had very little to do with factual data but was inspired by General Shinseki's perception that the Army would be focusing primarily on peace-keeping in the

future and that a grand gesture, symbolic of change in itself, was needed to symbolize his vision of Transformation.

Although the strategic circumstances chanced radically on September 11, 2001, and although Secretary Rumseld issued clear direction that the focus in the future was would be much more on Homeland Defense and Global Expeditionary War, General Shinseki made no changes to his Army Transformation plans.

An explanation of what the Stryker is for:

The word 'Stryker' actually covers up to 10 variants, from personnel carrier to command vehicle, all based on the same chassis with about an 85% commonality of parts, but for the purpose of this exercise, I shall focus on 3 (because the others are not significantly different to the Personnel Carrier). They are:

The Stryker Interim Armored Vehicle or IAV (Personnel Carrier)
The Stryker Mobile Gun System
The Stryker 120mm Mortar Vehicle

The Stryker IAV (Personnel Carrier):
The Stryker IAV is, in essence, an armored box on 8 heavy rubber air-filled wheels designed to do the following:

- Transport a standard infantry squad of 9 soldiers, a vehicle commander and a driver – a total of 11 soldiers *plus their weapons, supplies and equipment* in relative safety against the threats most likely to be commonly available on the modern battlefield (which could be just about anywhere on the global land mass).
- Achieve speeds of up to 60 mph on improved roads plus have an off-road capability broadly equivalent to that of tracked vehicles under all conditions in all weathers.
- Mount an infantry support weapon, typically a .50 caliber heavy machine gun or a 40mm grenade launcher, which would be fired from an RWS (Remote Weapon System) from inside the vehicle.
- Be suitable, in terms of moderate noise and lack of vibration etc., as a housing for the type of electronic equipment that will be used in the Transformed Army.
- Be air-transportable via C-130 in such a manner that it would arrive combat ready (a phase which was widely understood at the time as being ready to drive and shoot). Combat ready clearly also means *that the entire 11 soldier crew and all their supplies should also travel on the same C-130 so that the entire vehicle be offloaded as an integrated fighting unit.*

The Stryker was not envisaged as an Infantry Fighting Vehicle which would fight aggressively like the Bradley with its own firepower. Instead it was seen as a battle taxi which would disgorge its infantry near the point of contact and from then on do no more than, at best, maintain over-watch and provide some covering fire.

A Stryker Brigade, although described by the Army as being a dramatic innovation, is, in fact, little more than am infantry heavy motorized rifle unit of the type fielded by the Soviets over the last decades. True, there is a difference in

the surveillance equipment and combat electronics used, but when it comes to offensive weaponry and strength of protective armor, the comparison is apt.

The Stryker Mobile 105mm Gun System – MGS:

Experience has shown that infantry need a heavy caliber direct fire weapon to support them. Typical tasks would include destroying bunkers and other enemy emplacements, dealing with a limited amount of enemy armor and otherwise generally providing fire support to the infantry.

The Stryker is not designed to slug it out with enemy armor or deal with heavy weapons because it is not that heavily armored itself. The theory is that such threats will be detected well in advance by the RSTA Squadron (the reconnaissance unit of a Stryker Brigade) and destroyed by longer distance indirect fires. This theory, in the context of both today's technology, and that foreseeable over the next couple of decades, is suspect. For the foreseeable future, despite the best technology, to be tactically surprised is inevitable.

Current information is that the MGS is in some trouble. It is too tall and too heavy for a C-130, won't fire standard 105mm US Army ammunition because its chassis cannot handle the recoil, and cannot fire on the move.

The odd thing is that the US Army already has an approved Armored Gun System – the AGS – which is superior in just about every way to the MGS and which can also be air-dropped – but whose only crime is that it runs on tracks and has a different chassis.

The Stryker 120mm Mortar Vehicle:

The 120mm mortar was originally envisaged as being mounted inside the Stryker so that mortars could accompany the infantry, be brought into action near instantly, and then move fast after shooting to avoid counter battery fire. Tests showed that the Stryker's suspension could not deal with the recoil so the current plans, still in a state of flux, appear to be to mount only the smaller mortars and tow the 120mm versions. That, of course, runs flatly against the high speed deployment thinking of the Stryker Brigades and exposes the mortar crew to enemy fire.

Ironically, the Army already has a perfectly good 120mm mortar mounted in its upgraded M113 vehicles. The combination is well proven and works perfectly.

Observations on the Stryker Brigade concept:

Informed observers have serious doubts about the core thinking behind the Stryker Brigades because not only do they have the most serious weaknesses but just about every capability they are supposed to have – plus a great deal more – could easily have been supplied by using mainly existing equipment (albeit

upgraded in some cases) plus fairly modest purchases of type approved items such as the AGS.

The issue is not wheels versus tracks but the more fundamental matter of comparing capabilities. Simply put, a typical Stryker Brigade will be significantly less capable than a Brigade based on proven tracked equivalents – or even a mix of wheels and tracks - and has already cost years in time and billions more in funding.

Let me illustrate the point by listing just some examples:

Unlike the Stryker, an upgraded M113 has no problems being airlifted by a C-130, can swim, can be air-dropped or moved by helicopter, has superior off-road performance, can virtually match the speed of a Stryker when using band tracks, and fits 4 to a C-17 instead of 2/3 (as is the case with the Stryker). Also, because of its design, it is vastly easy to up-armor to make it RPG proof. Its tracked design makes it less likely to set off mines and a better weapons platform because it can handle recoil. And it has more internal space for the crew while remaining shorter than the Stryker. Add in an engine upgrade to hybrid-electric and the vehicle will be superior in fuel economy, have silent running capability and can replace a generator thus facilitating the switch to a digitized force.

The mortar version of the M113 has already been discussed but it should also be noted that in addition to the above capabilities and those described previously, the mortar M113 holds more ammunition in a ready mode – because it is more spacious.

Unlike the Stryker, the AGS is C-130 approved, fits 4 to a C-17, can use standard 105mm ammunition, can carry more ammunition, can be up-armored to withstand a high threat environment, can fire on the move, can be air-dropped and has excellent off road capability. And it can also be fitted with a hybrid electric engine.

The irony of a Stryker brigade, as planned, is that it is absolutely *not* the fast easy to deploy unit it was intended to be. Instead, like the vehicle itself, the brigade is heavy, *has very limited combat power and survivability,* costs a staggering amount of money and absolutely is not full spectrum (of war) capable. That is not to say it would be useless – it would probably be fine in a peace-keeping situation but it is just a very inferior, and significantly less secure option to cheaper and more readily available alternatives.

The airlift issue is only part of the Stryker problem. Two other issues are worth mentioning.

The first issue concerns survivability - making the Stryker, as a minimum, fully resistant to heavy machine gun fire and the ubiquitous RPG 7 (a weapon which will almost certainly be encountered). The current story is that the Stryker can be up-armored with appliqué armor if conditions require it. However, apart from the fact that appliqué armor further increases the weight problem and degrades both road speed and off road capability, the core problem remains that there is no way of applying appliqué armor to the wheel well area. So quite simply, the Stryker remains vulnerable to calibers as small as armor piercing 7.62mm in the wheel wells – a sector that experience has shown that every hostile will seek out if only to shoot at the vulnerable tires and which comes naturally if you are firing from a hole in the ground.

The second issue concerns the much hyped capability of Stryker Brigades in urban situations. The justification for this is the fact that a Stryker Brigade is infantry heavy, but that is where the advantages end, because the Stryker vehicles, as has just been shown, are decidedly vulnerable to the very weapons that are most likely to be encountered. Further, unlike tracked vehicles, Strykers are no good at either climbing or pushing aside obstacles such as barricades. The argument then put forward is that the Stryker's speed is its best defense. Well, firstly, an intelligent enemy will put up barricades to nullify the speed advantage (as was the case in Mogadishu), secondly there remains the heavy machine gun/RPG issue and thirdly, it is an extraordinary fact that not only does the Remote Weapon System have to be reloaded *from the outside* but also, *it is not stabilized, so cannot be fired with any accuracy on the move.* And it may be worth mentioning that rubber tires burn and, even with run flat features and central inflation, are inherently more vulnerable to hostile action than tracks. Then there is the issue of the turning circle of the Stryker. It is more than 100 feet whereas a tracked M113 can pivot in its own length. The wide Stryker literally cannot turn in the average Third World alley – if, indeed, it can get in.

One could argue that the Stryker's one saving grace is that it is a more ergonomically pleasing vehicle than an upgraded M113A3 to ride in, and there would be some truth to that on an improved road under ideal circumstances (providing the M113 has not been upgraded to band tracks and was half empty). However, the Stryker is proving decidedly cramped for its 9 plus 2 manifest because the wheel wells take up so much space. And the Stryker has no air-conditioning. Temperatures during the recent 2002 Millennium Challenge in the Mojave reached 120F and crew reported they were so cramped they had trouble reaching their water bottles.

The Stryker and the issue of testing:

A vehicle of this type would normally have been subject to extensive comparative testing prior to being ordered in quantity. In this case, there was no more than a demonstration followed by an unusually hasty decision. The argument was that *since the Stryker was an interim vehicle designed to fill a capabilities gap*, testing – which would take time – should be waived; and, anyway, the Stryker was based on the well proven LAV chassis so was an off-the – shelf rather than development purchase.
That was always a suspect premise and became even more so when a problem with the armor was detected in the spring of this year.
Independent survivability testing has to be regarded as essential before fielding let alone deployment. At this stage one might have expected an extensive program of live fire and other testing to be carried out but, as best as can be ascertained, that has not happened and, instead the Secretary of the Army sought a waiver to field the initial couple of brigades without the Office of Testing and Evaluation fulfilling its mandate. Since OT&E was set up by Congress after the Bradley fiasco to prevent equipment slipping through without extensive testing, one cannot but be disturbed. One also has to ask why is the Army so reluctant to have the Stryker independently evaluated.
Congress did manage to have a limited test against the M113 mandated as a condition to be fulfilled prior to funds being passed for 3 more Stryker brigades. That test, which was set up to favor the Stryker, has reportedly just been won by the M113A3s.

As matters stand in October 2002, the supposedly off-the-shelf Stryker vehicle has absorbed extensive development funds (reportedly hundreds of millions) and has 41 significant defects according to the Army's own figures. Some of these can certainly be put right but the weight problem, the off road performance limitations, the armor issue and the size issues (it is too large externally- which makes it a bigger target - and too small internally) cannot be remedied to any significant effect short of completely re-designing the vehicle. One has to ask, therefore, why the Army are paying$1.7 billion for such a limited and inadequately protected product. If 6 Stryker brigades are fielded as planned that will equate to an investment of over $10 billion in up-front costs alone for a deployment solution, which apart from its many other problems, is too heavy to deploy as planned and to bulky to deploy economically even in a C-17. The bulk issue is also a negative factor in sea lift.

The Army's attitude towards the Stryker program:

The Army's attitude towards the deficiencies of the Stryker is disturbing because, in essence, despite a plethora of evidence about the problems, the policy seems to deny everything except minor deficiencies ("teething problems") and charge on regardless. In short, facts, including every spiraling costs, seem to have

no impact on the Army Leadership at all; and this writer has encountered clear evidence of negative factual data being deliberately suppressed.

Further strategies are to ramp up political support in the areas where the Stryker is made and will be stationed, and to lower the standards and other requirements for the vehicles use. The latest here is to advance the idea that although C-130 deployment was an aspiration, it was never an absolute requirement and in fact the Stryker will now most probably be deployed mostly by fast sea lift and C-17s (both currently in extremely short supply).

Those familiar with the Stryker, including serving soldiers who have witnessed the Stryker's operational performance, argue that soldiers will die unnecessarily because of the inadequacies of the Stryker.

Questions re deployability with particular emphasis on weight and size.

Getting to grips with the weight issue is not easy because the Army has a habit of lightening the demonstration Stryker by way of a series of techniques including leaving off the RWS and external fuel tanks, excluding ammunition, not including the 11 man crew etc. The fact is that all these elements must be included if a meaningful weight is to be arrived at.

The weight a C-130 can carry depends on many variables including the range (because it has to carry fuel for itself), whether it can refuel at its point of destination, whether it is going to have to do a combat landing, whether it needs to be fitted with its own armor (as is normal in a threat zone), the altitude, the air temperature, the model of C-130 and so on. However, the bottom line is that under field conditions, a C-130 typically carries no more than 12-14 tons – as is the case in Afghanistan right now. True, it can go a few tons higher for very short journeys – if a combat landing is not required - but it cannot go up to the 19-24 tons plus that seems to be required as a minimum even if appliqué armor is left off. Remember that a combat ready Stryker requires not only itself but also fuel, ammunition, spares, a crew of 11 and all their associated combat equipment including AT4s, Javelins and other essential supplies such as food, water, spare ammunition, personal equipment and so on.

Why did the Army not know this when they ordered the Stryker?

Q. What was the weight of the Stryker, as originally ordered by the Army, in 2000?
Note: At that time it was not called the Stryker. It was called the IAV and was, in effect, the LAV III, a direct evolution of the USMC LAV.

Q. Given that the Chief's vision specifies deploying a Stryker Brigade to an unspecified trouble spot in 96 hours, what were the parameters to which the Army was working to fulfill this mandate? Specifically, what was the target weight of the Stryker to be after modification and what distance were the C-130s transporting this Stryker brigade to be?

Q. Was any protocol agreed with the Air Force to transport the Stryker Brigades and, if so, what does it specify?

Q. What changes were made to the vehicle originally selected and what was the resultant weight increase?

Q. Who authorized these changes?

Q. How was the Stryker project managed? Who was in overall charge? Who is in overall charge now?

Q. What target weight is the Army working towards achieving for the Stryker now – and has that target weight been agreed with the Air Force?

Q. What is the actual weight of a Stryker now including its RWS, fuel and fuel tanks and all other ammunition, supplies and accessories required to have it ready for combat?

Q. What is the actual weight of a Stryker's 11 man crew including personal weapons, supplies and equipment, normal unit weapons such as machine guns, AT4s, Javelins etc.

Q. What is the actual combined weight of a single fully equipped Stryker vehicle and its crew and ALL their associated weapons, equipment and other supplies?

Q. How far can a C-130 fly when carrying a single fully equipped Stryker, and its crew and ALL their associated weapons, equipment and other supplies?

Q. What is the effect on the above when flying to a airfield that is at altitude, such as in Afghanistan?

Q. How far can a C-130 fly when carrying a single fully equipped Stryker, its crew and ALL their associated weapons, equipment and other supplies if the C-130 I flying into a threat environment which would mean the Air force lightly armoring the C-130, making an assault landing and then refueling back at its original point of departure?

Q. Can a C-130 make an assault landing at all when carrying a single fully equipped Stryker and its crew and ALL their associated equipment and other supplies?

Q. What is the current weight of a single Stryker Brigade and how many C-130-sorties would be required to transport it?

Q. What do you hope to achieve from the current Stryker weight reduction program and what, specifically, will these changes be?

Q. Given that the Stryker is not protected against RPG 7s, what is the weight of the appliqué armor that will have to be fitted to achieve RPG 7 protection?

Q. What will the total weight of a Stryker be after being fitted with a full suite of appliqué armor assuming full equipment and the Stryker crew and ALL their associated equipment and other supplies?

There are many different types of appliqué armor so it is impossible at this time for me to determine the weight. However, appliqué alone is likely to weigh several tons. Assuming a baseline vehicle weight of 19 tons, a crew, fuel and ammunition weight of 4-5 tons, the combined weight to be combat ready could easily be 26 tons plus including appliqué – or 24 tons without appliqué protection. Either way, the C130 can scarcely be considered a suitable deployment aircraft, a fact which should have been known at the time the Strykers were ordered. Strykers were sold to Congress on the basis that they were light, superior to tracked vehicles, off the shelf and C-130 deployable. They are none of these things.

There has been a recent trend to say that the Stryker can arrive stripped down, and without its crew, and the whole be consolidated in minutes upon arrival. That approach clearly admits the need for more than one C-130 per Stryker but otherwise sounds credible. In fact it gives up the very significant strategic capability of taking an airfield and then rolling off Strykers ready to shoot or otherwise completing the assault (as the Soviets did when the seized Kabul in 1979). Consolidating upon arrival is a peacetime approach and goes flatly against the current thrust towards an agile, responsive military. Obviously, it also allows time for an enemy to respond and for the normal confusion of darkness to influence matters. Finally, speed of unloading (which makes roll-on/roll-off very desirable) is a critical element during a combat assault because there is normally limited ramp space on Third World airfields. There is nowhere to park more than few aircraft so they have to unload and take off again in minutes; which also means they have to carry fuel for the return journey. Aircraft fuel weight means even less weight available for the Stryker.

Questions re the effectiveness of the Stryker's armor including the appliqué armor issue.

This is another complex issue because the level of protection varies with different locations and matters such as the vulnerability in the wheel wells – and of the rubber wheels themselves – are substantially ignored. Also, the armor was changed in Spring 2002 because the existing armor was substandard (an odd finding given that this was supposed to be a proven vehicle).

The classic answer to questions re the armor seems to be that appliqué armor will be added as necessary. That is a dubious statement because it assumes that appliqué armor would not only be readily available but that there would be time to apply it – which is rarely the case under fire. However, the most critical problem with appliqué and the Stryker is that and appliqué is almost impossible to add in the wheel well if the tires are allowed to turn. It is also heavy with a resultant negative impact on performance, particularly off-road.

The Soviets had a very similar vehicle to the Stryker in Afghanistan and it proved an absolute death trap because of the vulnerability of its wheels and light armor combined with the ubiquity of RGP 7s.

The Marines are very conscious of the vulnerability of their LAV but compensate by using it in a limited reconnaissance mode in the main, always using it with combined arms cover and by mounting a 25mm automatic cannon on it so that it can level the playing field if necessary. The Army does not seem to appreciate such caution and the Remote Weapons System they are fitting does not come close to the firepower of a 25mm and is not stabilized so cannot even be fired on the move.

Q. What is the level of protection given by the basic Stryker? Can you describe it by external area in relation to likely threat including 7.62mm, .50, 14.5mm, RPG 7, artillery fire, mines etc. Also factor in armor piercing rounds.

Q. Has a complete fully loaded, and fueled Stryker every been subjected to live fire testing against all the above threats? If so, can we see the results in tabular and visual form?

Q. Why is there no spall lining inside the Stryker and what alternatives have been installed?

Q. Have OT&E independently tested the Stryker against live fire?

Q. What protection do the rubber tires have if perforated?

Q. What happens if the wheels are set on fire with Molotov Cocktails or similar?

Q. We are advised that the wheel wells are a major point of vulnerability and can be penetrated by armor piercing 7.62 rounds let alone anything heavier. Is this true?

Q. Has the Stryker been tested against mines and are there any special anti-mine features?

Q. Given the ubiquity of the RPG 7, how do you propose to protect against it?

Q. Does appliqué armor currently exist for the Stryker?

Q. How much does the appliqué armor suite weigh?

Q. How long will appliqué armor take to apply?

Q. Can appliqué armor be applied over the entire vehicle or will areas of vulnerability remain?

Q. Will the appliqué armor degrade the performance of the Stryker in any way – such as in terms of on road top speed, maneuverability, off road performance etc?

Q. Given that the Stryker also defends itself with its .50 or 40mm in a RWS, why is the weapons not stabilized and thus able to fire on the move?

Q. Can any other firing positions be set up on the Stryker? For instance, in Vietnam, M113s mounted up to 4 machine guns and could thus cover every direction.

Q. Given its limited protection, how will the Stryker stand up to Full Spectrum warfare?

Questions re the conditions for the 11 troops and all their associated equipment inside?

The Stryker was made the size and weight it is because it was designed to hold a standard army squad of 9 plus driver and vehicle commander. Feedback from the field suggests that the Stryker is seriously cramped for this number of soldiers which is no minor problem given that infantry are likely to be in the vehicle for many hours at a stretch. It may well also mean that the unit, because of space restrictions, will carry less equipment than it really needs. Here it should be remembered that infantry need AT4s, Javelins, 7.62mm machine guns and a host of other bulky items to do their job properly; so space is crucial.

Spall is the debris that gets dislodged at high speed when a projectile hits externally. Spall is frequently lethal so a spall liner, a sort of Kevlar curtain, is normally fitted to minimize this problem. Such is the case in M113s but this good practice does not seem to have been followed in the case of the Stryker – probably because of space.

Q. What is the full manifest for a combat ready Stryker including all associated weapons, ammunitions, supplies and other equipment?

Q. Is there in fact adequate room inside a Stryker for a full combat equipped nine man squad plus the full manifest and the driver and vehicle commander?

Q. Do the troops have space for all their personal belongings.

Q. Is the Stryker air-conditioned and heated?

Q. What is the maximum sound level in decibels under both on road and off road conditions – and has this been formally tested?

Q. Is the lack of external situational awareness a problem?

Questions re performance in urban and off-road environments.

The Stryker has been heavily touted as being ideal in an urban environment because of its speed. However, apart from the fact that upgraded tracked M113s can now go nearly as fast, the actual track record of light armored vehicles in an urban environment is very poor because they are so vulnerable to mines, Molotov cocktails, roadblocks, heavy machine gun fire and RPG 7s. Both the Israelis and the Russians, who have extensive recent experience in urban combat, use heavy armor as a spearhead backed up by up-armored tracked vehicles.

Of course, Stryker-like wheeled vehicles do fine on road when there is no opposition, but then so do ordinary trucks. They also do fine in peace-keeping situations providing that conditions do not deteriorate into combat. But such changes are near impossible to forecast.

Apart from armor limitations, the Stryker's vast turning circle makes it very vulnerable in an urban environment and this weakness is exacerbated by the fact that it is vastly inferior to tracks when going either through, or over, road blocks.

In an off- road situation, the Stryker is demonstrably inferior to a tracked vehicle such as an M113 and the situation becomes critical in wet and boggy conditions such as the Australians encountered in East Timor. There, the Australians learned to keep wheels on the road and to cover other options with tracks. Such common sense should be global. It is scarcely news.

Q. Why exactly is the Stryker considered excellent for urban conditions?

Q. Has the Stryker ever been tested against tracked vehicles in urban combat?

Q. How do you turn the Stryker in a restricted urban environment?

Q. Why is the Stryker considered to be so good in off-road conditions?

Q. How does the Stryker compare with tracked vehicles in off road conditions particularly in snow or in wet and boggy ground?

Questions re the limitations of the Mobile Gun System?

It is worth remembering that according to the Chief of Staff, General Shinseki, the Stryker Brigades are no more than interim solutions designed to bridge a perceived capability gap until the Objective Force starts to be fielded in 2008. Given the interim nature of the Stryker Brigades, one cannot but wonder at the determination to give most vehicles in the Stryker Brigade a common chassis when that decision slows down the fielding of the Stryker Brigades and results in significantly decreased combat capability.

The Armored Gun System does everything the new Stryker based MGS system will do and vastly more – and is ready now. So why develop a new inferior weapon? The only argument would appear to be apparent logistic efficiency (they have the same chassis) but here the benefit is demonstrably minor while the disadvantages (including logistic) are huge. Just for starters, the MGS will not fit into a C-130. Only 2/3 will fit into a C-17. It cannot fire standard 105mm ammunition. It cannot fire on the move. It carries less ammunition than an AGS. It lacks the off road capability of tracks. It suffers all the armor vulnerabilities of the Stryker but cannot use the special appliqué kits developed for the ABS (which, by the way, drives into its extra armor so it can fitted with unusual speed).

Q. When will the MGS be fielded?

Q. Is its armor any different from that of the Stryker IAV?

Q. Can appliqué armor be fitted to the MGS?

Q. Can it fire standard 105mm ammunition?

Q. Can an MGS fit into a C-130?

Q. How many MGSs will fit into a C-17?

Q. How much does an MGS weigh with its full basic load of ammunition, crew and all ancillary ammunition?

Q. How much does its appliqué armor weigh?

Q. Why is the MGS considered superior to the already type proven AGS?

Questions re the limitations of the 120mm Mortar carrier?

Since a Stryker Brigade is too light to slug it out with the enemy, the idea is that enemy be detected from afar though advanced technology and destroyed with indirect fires. The main indirect fire weapons fielded by the brigade are towed artillery and 120mm, and other, mortars. That makes the 120mm mortar very important.

Current reports state that the Stryker chassis cannot support the recoil of a 120mm mortar so that the mortars will have to be fired from outside the vehicle. That situation may have been changed in the light of recent development work, but it is worth probing.

Let me also repeat that the Army has, right now, a perfectly acceptable vehicle mounted 120mm mortar in the M113A3 chassis so why is a new and inferior capability needed?

Q. Since the Army already has a perfectly acceptable 120mm mortar carrier mounted in an M113 chassis, why does the Army consider it necessary to develop a Stryker version?

Q. We are advised that the Stryker suspension and chassis will not take the recoil forces of the 120mm mortar so that the mortar will have to be dismounted before firing. Is this the case?

Q. What is the exact status of the Stryker 120mm mortar program?

Q. What will the cost of the Stryker 120mm mortar carrier be – including development costs - and how does it compare with the M113 version?

Q. How much 120mm ammunitions will the Stryker mortar carrier be able to transport compared to the M113?

Q. What exactly are the advantages of the Stryker 120mm mortar carrier compared to the M113 120mm mortar carrier?

Questions re the overall lack of capabilities of the Stryker compared with the upgraded M113A3:

The issue here is not that the Stryker has no capabilities – it could be useful in a peace-keeping environment where patrolling on the roads is the primary task – but that it lacks the range of capabilities of the upgraded M113. That means that it is not as well suited for the global expeditionary missions that the Stryker Brigades are designed to cope with – most of which will probably be in Third World environments from Afghanistan to Indonesia, from Africa to South America, from the Caucasus to East Timor.

The Army leadership denies this in the face of overwhelming evidence to the contrary.

The facts are that the upgraded M113 would add swim, rotary airlift, greater deployability, better crew comfort, better armor protection, superior off road performance and great maneuverability in an urban environment – to name but a few advantages.

Q. What were the key reasons which determined the decision to order the Stryker instead of utilizing upgraded M113s at a much lower cost?

Q. Does the Army consider the Stryker's off road performance to be at least equal to that of the M113A3 and, if so, is this judgment based upon actual tests which we can examine?

Q. The Stryker does not have swim capability yet the M113A3 does. Why does the Army consider swim capability as being unnecessary in the context of global expeditionary warfare?

Q. The Stryker cannot either be air-dropped or lifted by rotary aircraft for redeploying for positional advantage. The M113A3 can be. Why does the Army regard the loss of these two capabilities as acceptable?

Q. The Stryker has a large turning circle which makes it hard to maneuver in any kind of restricted environment, and particularly in an urban environment. The M113A3 can pivot in its tracks. In this context, why was the Stryker chosen?

Q. The Stryker is more difficult to up-armor than the M113A3 and has an unsolvable problem in the wheel and wheel well area. Given these facts, why is the Stryker considered superior?

Q. The Stryker is larger externally in relation to its internal space than the upgraded M113A3. It is on the margin of C-130 transportability. Fewer per C-17 sortie can be fitted in. Why therefore is it considered superior to the M113A3?

Questions re the unwillingness to test the Stryker:

Common sense – and Congress – would seem to dictate that the Stryker would be tested under the kind of conditions under which it will be used. If it is planned that it be used under hostile fire in an urban environment, as in Mogadishu or Baghdad, then let us see it tested under similar conditions in advance. If off road performance is likely to be relevant, then that should be tested also. If certain types of hostile fire are to be expected – and there is little doubt about that – then it is essential, indeed fundamental – that such threats be factored in.

Worryingly – despite the precedent of the Bradley debacle – that has not happened. The record is that the Army has consistently been unwilling to either test the Stryker – or even expose it to competition.

Such behavior flies in the face of common sense and puts American lives in harm's way.

Q. Was the Stryker directly evaluated against the M113 and what were the results? Here, please include the results of the September tests at Fort Lewis.

Q. Has the Stryker ever been independently by OT&E and if not, why not?

Q. Please details all live fire tests of the Stryker and supply videos and tabular results.

Q. Pleas explain the consistent unwillingness of the Army to test the Stryker under operational conditions and against competitive products?

Questions re the cost of the Stryker program:

Here I am dependent, in the main, on press and back channel reports (some with high credibility), which may not be entirely accurate - if close - so it will be useful to ascertain the facts. I do know that each Stryker Brigade requires approximately $1.7 billion in new equipment to set up but cannot guarantee that all of that is spent on Strykers.

What I can confirm is that General Shinseki could have obtained all the deployability he wanted back in 1999 by building an Interim Brigade Combat Team around upgraded M113A3s, the Armored Gun System and stocks of existing equipment at a saving of a billion dollars or more a brigade. And in addition, he would have had vastly increased capabilities because:

- *The equipment would have been genuinely C-130 deployable and/or fewer C-17 flights would be needed.*
- *He would have had a rotary lift capability which would increase strategic options.*
- *He would have had river crossing capability.*
- *He would have had full off- road global terrain capability.*

I do have reason to believe that more money is being spent on the Stryker Brigades than is generally believed but being hidden under other headings. This is paying for the considerable development costs which are being incurred for this of- the-shelf vehicle and for various other mistakes and confusions. The tragedy is that some of this funding is coming from the sharp end of the fighting force and the shortfall is showing up in terms of maintenance problems and so on.

Perhaps the strangest aspect is why a fairly simple armored vehicle should cost so much as compared with the BV206, for example, which costs less than a third. In fact the baseline LAV III is but a fraction of the cost, as best as can be ascertained of the Stryker. Such discrepancies are worth investigating.

Q. What was the original cost of the Stryker to be as specified in the original order to GM GD?

Q. What is the cost per Stryker, including the RWS, right now?

Q. How much additional development money has been paid to GM GD?

Q. What is the entire projected cost of the Striker program for the first 6 brigades?

Q. What is the development cost of the Mobile Gun System?

Q. What will the unit cost per MGS be if development costs are included?

Q. What would an IBCT have cost if created around upgraded M113s and AGS etc.?

Q. What is the cost per flying hour of a C-130?

Q. What is the cost per flying hour of a C-17?

Conclusion:

When a demonstration takes place at McGuire or Andrews, it is tempting to regard that as definitive. That would be unfortunate.

The truth is that demonstrations at such airports, which are First World and designed for 747s, do not give a fair example of what our troops are likely to run into in the War Against Terror where Third World conditions are more likely to be encountered.

Imagine instead an assault landing of the Stryker into a recently taken airport with the danger of a counter-attack ever present. Intermittent incoming fire is the norm. The enemy is numerous, equipped with sophisticated weapons and far from defeated. It is dark; and the weather is vile.

Would delays in unloading matter then? Would the numerous deficiencies in the Stryker matter then?

They would not. It would be too late.