

Starcraft Boosters, Inc.

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Viewpoint: Space Transportation for America

Summary:

The recently announced plan for returning America's space program to exploration beyond Earth orbit constitutes a wonderful new opportunity for energizing, not only our space program, but the American spirit and, as a consequence, our economy. A number of important decisions have been made; but it is likely that many of the details of the plan either have not yet been decided or will be revisited in the next few years as economic and technical realities are revealed. Vested interests are sure to seize upon what they consider to be a Presidential endorsement of their plans or design solutions. Some of these speculations may be in error as regards the long-term interests of our nation.

This new course has initiated a sense of excitement that the aerospace capabilities of our nation may once again be fully challenged to achieve new success for the American people. It is of vital import, however, that unwarranted assumptions not be made as to the details of how these new goals will be achieved; that we carefully discriminate between what are permanent national policy decisions and what are the choices yet to be made as events unfold. Failure to do this could deprive us of the sustained exploration that President Bush proposes – the exploration program could end by 2008.

The Mandates:

On January 15, 2004, President Bush announced a new, grand plan for the renewal of human space exploration by the United States, in concert with the other nations who may choose to join us. By 2008, a series of robotic lunar missions will prepare for the first humans setting foot on that body since the *Apollo* program ended more than three decades ago. Humans will return to the Moon sometime between 2015 and 2020, with the intention of sending human explorers to the planet Mars at some unspecified later date. An important point is that he has directed that these exploration endeavors be sustained.

Quite appropriately, the President announced only the sketchiest of details as to what means of transportation into and within space will be used. He reaffirmed that the present *Space Shuttle* will return to flight as soon as practical to complete the

construction of the *International Space Station* before 2010. He announced that we would develop a new crew exploration vehicle. Its purpose is intentionally left vague: “to provide crew transportation beyond low orbit.” Early flight-tests are to begin before 2010 and operations by 2014. He also stated that we would acquire crew and cargo transportation to and from the *International Space Station* “as soon as practical and affordable”.

Finally, he stated that international and commercial opportunities for achieving his goals would be pursued with new vigor.

The Speculations:

Understandably, there are as many interpretations of these new policies as there are prospective participants. France would like us to use the ESA *Ariane 5* booster launched from their favorably situated Kourou launch site near the equator. The Russians have indicated an interest in renewing work on their heavy-lift *Energia* launch vehicle and are in negotiations with France on launching their large *Proton* vehicle from Kourou. Although we may not yet have heard from them, it is highly likely that China will offer use of their new human-carrying launch vehicle, *Long March*.

There are several commercial suppliers now planning flight within the next several years of small, privately funded launch vehicles that might be scaled up. At least one, Kistler Aerospace Corporation, has a somewhat larger vehicle, the *K-1*, partway through construction. The two largest U.S. defense contractors each have a new vehicle developed for the U.S. Air Force that might be grown for use in achieving these goals – the *Atlas V* and *Delta 4*, each with very significant inputs of corporate funds. Others see a renewal of interest in long-studied cargo derivatives of the present *Space Shuttle*.

Each of these has a common attribute: Funding from outside sources will be required to bring them into effective operational status. “Other people’s money” (OPM) is necessary in large quantities, sustained over a span of several years. A serious question is: who will get what part of the funds the President is asking of the American taxpayer to provide the launch services necessary for exploration?

Similarly, the in-orbit transportation and human-carrying vehicles also have many options, as do the operational schemes for employing them. New propulsion techniques are under review, including some that use nuclear power. This option is clearly limited to use in space and then only at very high altitudes so as to not endanger Earth’s inhabitants. Others attempt to use atmospheric air to aid in achieving high performance in flight, from takeoff on a runway on Earth, much like today’s aircraft.

I believe that an underlying principal in the forthcoming debates is that we must pay full attention to the President’s directive that we are beginning a sustained period of space exploration --- that each item selected for development must evolve and build progressively to support the next stage, and the next and the next. We must not jump to premature conclusions based upon the short-term needs of industry or those of

governments. As U.S. tax dollars are to be spent, first consideration must always be given to enhancing the long-term military and economic security of our nation.

Hence, we must not over-react to or unwittingly accept the assumptions people will draw from this new and exciting set of goals for NASA. Decisions are needed and will be made in due course, but they must not be made by Internet pronouncements of “insider news letters” or by the (by definition) parochial views of the many lobbyists in Washington. Congress must act in the best interests of us all and our children and our grandchildren. Remember, the President used the word “sustained”.

A similar situation exists on the important choice of the nature of our next human-carrying spacecraft, what President Bush referred to as the *Crew Exploration Vehicle*, or *CEV*. Some advocate the use of the familiar conical shape used by the *Apollo Command Module* designed more than forty years ago. Others envision vehicles with wings so that they may land on runways on Earth. Still others see an intermediate vehicle that has intermediate attributes – the “lifting body”, or “semi-ballistic” shape.

Some view the *CEV* as simply a means to get people into low Earth orbit, changing into a different vehicle to go beyond. Some see it as capable of landing on and taking off from the Moon and other bodies; others see a different mission mode with separate landing craft, much as was the case with the *Apollo Lunar Module*. Some want to plan for the day when the *CEV* will grow to fulfill the needs of public space travel; others see this as a never-to-occur market. Once again, each item selected for development must evolve and build progressively to support the next stage – and the next.

Criteria for Design Solutions:

First and foremost, we must do three things:

1. Require NASA and U.S. Air Force to work as a close-knit team, beginning now, to assure that the President’s goals are fulfilled in a manner that results in major benefits to our national security through and within space.
2. Make sure that the economic security of our nation is best served by each and every decision that is to be made.
3. Involve the American people so that political support can be gained to begin this space exploration plan and sustain it over the long period. In particular, give children the strong incentive of potential personal participation to encourage them to continue their education, many in the technical fields that will now offer good jobs and satisfying careers.

Next, we must make sure that conservative decisions are made on major outlays for the new vehicles and infrastructures that will be needed, while the more speculative, high payoff technologies are fully supported, but with quite separate, much smaller programs. As another example, we must listen to what history tells us of space vehicle inert mass growth as programs have unfolded. We must use conservative dry mass reserves – I

suggest 30% margin on estimates of the mass of all items that have not yet been placed on the scales.

Similarly, conservative choices must be made in planning our programs. For instance, history has shown that we should never enter flight test with a single flight vehicle – two and preferably three are needed to assure that a program is not lost because of a trivial mistake causing the loss of a single vehicle.

A Possible Plan:

Starcraft Boosters, Inc., a small Texas company, has a program it has developed over the past eight years that we believe complements the President’s vision. This plan is now undergoing revision and can, when it is ready, be provided under separate cover to any that request it at www.starbooster.com

Hubert P. Davis
Vice President Engineering & Development

Starcraft Boosters, Inc
Dr. Buzz Aldrin, Chairman
Dirk Jameson, President
3106 Beauchamp Street
Houston, TX 77709

Website: www.starbooster.com
Art Dula, Legal (713) 861-1960
Hu Davis, V.P. Engineering (830) 935-2743