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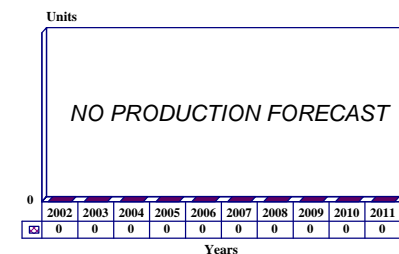
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Tactical Reconnaissance Armored Combat Equipment Requirement and Future Scout and Cavalry System - Archived 2/2003

Outlook

- Program terminated in 2001
- British portion of program was designed to replace FV101
- United States portion of program was to replace M3 Bradley and M1114
- Several variants (including logistics vehicles) were proposed

10 Year Unit Production Forecast
2002 - 2011



Orientation

Description. Tracked vehicles.

Sponsor. The development and projected British Army procurement of the vehicle to meet the Tactical Reconnaissance Armored Combat Equipment Requirement program has been sponsored by the United Kingdom Ministry of Defence through the Ministry of Defence Procurement Executive and Ministry of Defence Army Department, and by the British Army. For the three initial developmental contracts for the Tactical Reconnaissance Armored Combat Equipment Requirement program, most of the funding has been provided by the contracting teams listed below.

The development of the vehicle to meet the Future Scout and Cavalry System program was sponsored by the United States Department of Defense through the United States Army Tank-Automotive and Armaments Command, Warren, Michigan.

Contractors. The three initial developmental contracts for the Tactical Reconnaissance Armored Combat Equipment Requirement program were awarded to the following contract teams; they are named as they then existed:

- British Aerospace Defence/Systems and Services along with Royal Ordnance (team leader), with Alvis Vehicles Limited, and Computing Devices (Canada).
- GEC-Marconi (team leader) with GKN Defence (subsequently acquired by Alvis).
- Vickers Defence Systems (team leader) with Short Brothers, Siemens-Plessey, General Dynamics (formerly Teledyne Continental Motors), Teledyne Brown Engineering, Pilkington Optronics, Teledyne Systems Company, and Texas Instruments UK.

As a result of company changes plus the unification of the United Kingdom's Tactical Reconnaissance Armored Combat Equipment Requirement program and the United States Army's Future Scout and Cavalry System program for a new scout vehicle, the teaming arrangements were changed as follows:

- SIKA International, a consortium consisting of BAE Systems (formerly GEC-Marconi) with GKN Defence (now Alvis), Raytheon Systems and United Defense.

- Lancer, a consortium consisting of British Aerospace Defence/Systems and Services along with RO Defence (Royal Ordnance), General Dynamics, Lockheed Martin, and Vickers Defence Systems.

Licensees. None

Status. The initial feasibility studies on the Tactical Reconnaissance Armored Combat Equipment Requirement program were completed in 1994 and underwent further evaluation. In 1995, six-month extensions were awarded to each of the original British contracting teams described above. At least two follow-on contracts for the project definition phase had been expected to be awarded before the British and United States' programs were merged.

In October 1996, the United States signed an agreement for the study of the feasibility of combining of the United States Army's new Future Scout and Cavalry System requirement with the British Army's Tactical Reconnaissance Armored Combat Equipment requirement. This action delayed the British aspect of the program by about six months. A year later, a conditional Memorandum of Understanding was signed, with the definitive version signed in 1998.

On October 8, 1998, both Lancer (then-GKN Defence - now Alvis, Marconi Electronic Systems, United Defense and Raytheon Systems) and Sika International (Vickers Defence Systems, British Aerospace Defence Systems, General Dynamics Land Systems and Lockheed Martin) officially submitted their proposals for a new scout/reconnaissance vehicle to meet the joint requirement.

In late 1999, the joint requirement became confused as a result of the establishment of the US Army's new medium brigades. By March 2000, the British were concerned over the perceived lack of commitment by

the United States. In mid-2000, as the program was in the advanced technology development phase, the United States cut off all further developmental funding, effectively terminating it. While the contractors continued their developmental work and indeed subsequently submitted their preprototype vehicles, no further production is anticipated. The British Army is evaluating several options to address its Tactical Reconnaissance Armored Combat Equipment requirement.

Total Produced. As of January 2001, no vehicles to meet the joint Tactical Reconnaissance Armored Combat Equipment Requirement and Future Scout and Cavalry System requirement had yet been manufactured. However, the contractors did submit preprototype vehicles in 2002.

Application. As it was originally conceived by the British Army, the Tactical Reconnaissance Armored Combat Equipment Requirement program was to develop two vehicles based on a common chassis. One vehicle was to be a light reconnaissance vehicle designed to replace the FV101 Scorpion (especially the FV107 Scimitar member of the FV101 family). The other was to be an armored utility or logistics vehicle. Later on, additional armored utility or logistics vehicles were expected to be developed.

Under the joint program, the United States Army's requirement was for a new light tracked vehicle to replace the M3 Bradley and the M1114 wheeled vehicle.

Price Range. In equivalent 2002 United States dollars, the vehicle to meet the armed reconnaissance portion of the joint Tactical Reconnaissance Armored Combat Equipment requirement and Future Scout and Cavalry requirement had a projected \$2.882 million unit price. The unit price of the armored utility or logistics vehicle would have been somewhat less.

Technical Data

The following data were projected for the vehicle that would meet the armed reconnaissance portion of the joint Tactical Reconnaissance Armored Combat Equipment requirement and Future Scout and Cavalry System requirement.

Crew. Three: commander, driver and gunner.

Dimensions and Performance. As this program was effectively terminated before a design was accepted, no realistic technical data are available. In general terms, the tracked armored vehicle would have been broadly similar in dimensions to the FV107 Scimitar member of

the FV101 Scorpion family of vehicles. The speed was expected to be somewhat higher. One proposal put forth by the Alvis team involves a smaller version of the FV510 Warrior, a program covered separately in this tab.

Engine. The vehicle that would have been selected for the joint Tactical Reconnaissance Armored Combat Equipment requirement and Future Scout and Cavalry System requirement would probably have been fitted with an advanced-design diesel engine. In the Lancer proposal, this engine would have been used in the hybrid electric drive system.

Gearbox. If a conventional drive system were to be selected, the vehicle was expected to be fitted with an advanced-design, automatically operated gearbox.

Suspension and Running Gear. The selected tracked vehicle was to be fitted with an advanced-design suspension system. Several alternative technologies were investigated.

Armament. The armament options for the selected vehicle were still being investigated as the program was terminated. The operational vehicle was to have an armament sufficiently potent to defeat any equivalent

vehicle and possibly heavier vehicles, including tanks. Heavy cannon of 30 to 40 millimeters caliber, anti-tank guided missiles or a combination of the two may well have been mounted on this vehicle.

Fire Control. The heavily electronics-based fire control components on the selected vehicle was expected to account for at least 60 percent of the unit price. These components were expected to allow for day/night operations in any weather. An automatic target detection/threat prioritization/target queuing system was not out of the question.

Variants/Upgrades

Variants. At least three versions of the British Army's Tactical Reconnaissance Armored Combat Equipment requirement were planned. One vehicle was called the Formation Reconnaissance Scout, another was the Formation Reconnaissance Guided Weapon, and the

third was the Close Reconnaissance Scout. Later on, an armored utility or logistics vehicle was expected to be developed.

Modernization and Retrofit Overview. This is not applicable, as the program has been terminated.

Program Review

Background. In June 1992, the British Ministry of Defence initiated the development of a new light armored vehicle to meet its future requirement for an armed reconnaissance vehicle. Since 1972, this mission area has been filled by the Alvis FV101 Scorpion family of vehicles, particularly the FV107 Scimitar. Following the initial government work, the Ministry of Defence held an industry briefing in September 1992. In November of that year, the Invitations to Tender for Land Staff Requirement 4061 were sent out, with three contracting teams responding. In April 1993, these contracting teams (listed at the beginning of this report) were awarded feasibility contracts for what was designated the Tactical Reconnaissance Armored Combat Equipment Requirement program. These contracts were to run for one year, but in 1995, the contracts were extended six months. Due to the possible full-scale integration with the United States Army's Future Scout and Cavalry System requirement, this schedule was further extended in a de facto manner. Following an evaluation of the feasibility studies, contracts related to the project definition phase were to be awarded to at least two of the three contracting teams.

Electronics Vehicle Research Defence Initiative. In 1987, the British Ministry of Defence initiated a program to develop and integrate electronics-related advances with armored vehicles. Called the Vehicle Electronics Research Defence Initiative (VERDI), this effort was a one-off technology demonstration vehicle

based on the FV510 Warrior. This vehicle integrated a variety of advanced vehicle electronics including databus/multiplexing technology, various sensor and fire control technologies, data fusion technologies, navigation and position technologies, and advanced engine monitoring and control technologies. A major feature of the first Vehicle Electronics Research Defence Initiative test vehicle was a mast-mounted sensor package. The standard crew of three was retained in the heavily modified FV510 Warrior mechanized infantry combat vehicle. The initial phase of the Vehicle Electronics Research Defence Initiative program ran three years and cost the equivalent of US\$15 million. At least 35 different firms were involved in the development program.

In 1993, a second phase of the Vehicle Electronics Research Defence Initiative program was initiated in response to the advent of the British Army's new Tactical Reconnaissance Armored Combat Equipment Requirement program. Two vehicles were in the second phase of the Vehicle Electronics Research Defence Initiative program. The first vehicle was based on the FV510 Warrior; however, this version had a crew of two. The new vehicle testbed had a redesigned turret with the ability to be fitted with different armament suites. The mast-mounted sensor package of the first vehicle was retained, but three electro-optical viewing systems were integrated in the front of the vehicle to enable it to be operated when closed up. The second vehicle was based on the Alvis Stormer, a

vehicle heavily based on the FV101 Scorpion technology. It was developed as a troop leader's vehicle. Its missions were radio and electro-optical datalink and other command and control missions. The associated advanced electronics components were fitted to this vehicle. The developmental testing of the two Vehicle Electronics Research Defence Initiative vehicles was completed, and the results integrated with several other developmental programs.

The United States Army's Requirement. In the early 1990s, the US Army began studies of a new scout and reconnaissance vehicle to replace the M3 Bradley. By the mid-1990s, an up-armored version of the M998 light wheeled vehicle, the M1114, had been developed for the scout and reconnaissance mission. The M1114 was considered an interim capability vehicle and was to be replaced by the Future Scout and Cavalry System. Once the requirements for this new vehicle had been defined, it became apparent that the vehicle desired for the Future Scout and Cavalry System was quite similar to the vehicle being developed for the British Army under its Tactical Reconnaissance Armored Combat Equipment Requirement program. On October 14, 1996, an agreement between the two nations to study the development of joint requirements and the potential integration of the two programs was signed.

In May 1997, the US Army decided to remain committed to the joint program, which industry on both sides of the Atlantic was teaming up to pursue. In July 1997, even before the programs were fully and officially integrated, the United Kingdom issued a draft Invitation to Tender. In October 1997, the two nations signed a conditional Memorandum of Understanding, with the final Memorandum of Understanding integrating the two programs signed in early 1998. The total program costs were expected to total around \$4.8 billion over 15 years. The two nations' requirements had changed over the lives of their respective programs, but as of April 1999, the British Army required 335 vehicles and the United States Army 1,095 vehicles.

Description. The following is a general overview of the vehicle that was being competitively developed. The vehicle was expected to weigh around 23 tonnes (25.35 tons) and to have a modern diesel engine with a power rating of around 521.99 kilowatts (700 horsepower). If a conventionally powered system were to be selected, an automatic gearbox and advanced-design hydropneumatic suspension system would most likely have been fitted. However, the Lancer team's vehicle was investigating a hybrid electric drive system. The main armament was expected to be a 35 or 40 millimeter cannon, possibly the Bushmaster III, the Cased Telescoped Weapon System or the Rh 503 dual-caliber cannon. Much of the technology

developed under the two Vehicle Electronics Research Defence Initiative programs was expected to be incorporated in the new vehicle, as well as new sensor and surveillance technology developed in the United States. All indications were that this requirement would be met by a tracked vehicle design.

Program Moves Ahead. In February 1999, the United Kingdom Ministry of Defence and the United States Department of Defense awarded contracts for project definition studies to the SIKA and LANCER consortia. This phase of development was to last for a period of 42 months. At the end of the 42 months, each consortium was to have submitted one prototype vehicle for test and evaluation. If the program had moved ahead as planned, the winning team would have been awarded a full-scale development contract in mid-2002. Initial production deliveries had been expected by 2007. The latest procurement objective had the United Kingdom procuring 335 vehicles and the United States 1,095.

Program Confusion. As a result of a now famous speech given by US Army Chief of Staff General Erik Shinseki in October 1999 redirecting the US Army to a lighter, more deployable force, the US Army began establishing a number of new medium brigades. Beginning in December 1999, several wheeled and tracked armored vehicles that could meet the designated mission areas for the new brigades were evaluated at Fort Knox and elsewhere; this culminated in the selection of the Light Armored Vehicle III version of the Piranha as the Interim Armored Vehicle for the new brigades. However, the advent of this program caused a good deal of confusion, and concern on the part of the British. Some observers believed that the US Army would not have enough funding to support both programs. Moreover, since the United States did not have an urgent need to replace the Bradley and M1114, its Future Scout and Cavalry System program could be slipped and integrated into the Interim Armored Vehicle program for the new medium brigades.

Another alternative was that the United States could cancel the Future Scout and Cavalry System program outright and again make it a part of the Interim Armored Vehicle program. The British were especially worried, as they had the more urgent requirement and indeed had spent a good deal of funding on it before it was integrated with the United States program. The British believed that if the joint effort were broken up, they would have to take the more expensive "go it alone" route to meet their requirement. The British concern was heightened in March 2000 when the Pentagon acquisition chief, Jaques Gansler, officially failed to guarantee the continued participation of the United States.

Britain's fears came to pass later that year and again in 2001 when the United States officially stated that it would not fund the combined program beyond the advanced technology development phase. However, as a partial concession to the British, efforts were made to extend the program's development phase.

The US Army hopes to get as much as possible out of the already funded portion of the program so it can use some of the technology in the new Future Combat System. This means an extension of some nine months. The British, although pleased with the extension, are still pressing for the United States Army to stay the course with the program but this was always considered as being extremely remote. Without continued funding from the United States, the British are now hard pressed to address their requirement; sources indicate that the British simply cannot wait for the scout/reconnaissance member of the Future Combat System to be fielded. So despite the continued interest in exploiting the technology developed by the two contracting teams in their initial preprototype vehicles, many officials in the United Kingdom are asking, "where do we go from here?"

Lancer Team Unveils Its Proposal. On February 11, 2002, the Lancer team rolled out its offering for the joint Tactical Reconnaissance Armored Combat Equipment requirement and Future Scout and Cavalry System requirement at United Defense's engineering center in Santa Clara, California. The rollout was of the Future Mobility Platform for the joint British-American program. The vehicle features a number of advanced

technologies to meet the program's requirements. The Future Mobility Platform features a hybrid electric drive with over half a megawatt of power delivered by a battery/diesel-generator hybrid power system. The vehicle's battery power is provided by lithium-ion batteries, which have the highest power density of any batteries in the world. The vehicle uses a new design track that is half the weight of conventional track. The Objective System (the final form of the vehicle) will feature ceramic-composite armored structures developed from the joint US Army Tank, Automotive and Armaments Command-United Defense Composite Armored Vehicle program.

The hybrid-electric power train arrangement allows optimal placement of the crew cockpit at the front of the vehicle, providing exceptional direct vision and side-by-side seating of the commander and scout for optimal crew communications. The signature reduction characteristics of the vehicle are enhanced by its so-called silent operational capability, enabling troops to travel undetected during reconnaissance or other covert operations.

After the unveiling, the Future Mobility Platform was air-shipped to the United Kingdom to complete the integration of other innovative mission equipment, such as a turreted 40 millimeter cannon from CTI International, a mast-mounted sensor suite, and advanced crew displays to form an integrated demonstrator vehicle that will undergo field trials later this year.

Funding

Funding for the initial development of the vehicle to meet the Tactical Reconnaissance Armored Combat Equipment Requirement program was provided by the United Kingdom Ministry of Defence through the Ministry of Defence Procurement Executive and Ministry of Defence Army Department, and by the British Army. Most of the funding for the three initial developmental contracts was provided by the contracting teams listed at the beginning of this report.

Funding for the United States' participation in the program was provided by Program Element number 0603005A, Project D440 - Advanced Combat Vehicle Technology.

Recent Contracts

None

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1992	First Vehicle Electronics Research Defence Initiative research program completed
June	1992	Concept formation by the British Ministry of Defence
September	1992	Industry briefing given by Ministry of Defence

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
November	1992	Invitations to Tender sent out
	1993	Second Vehicle Electronics Research Defence Initiative research program begun
April	1993	Feasibility contracts awarded to three contracting teams
June	1994	Second Vehicle Electronics Research Defence Initiative research program vehicles displayed
October	1996	Announcement of study to possibly integrate US Army requirement
May	1997	US Army commits to joint United Kingdom-United States program
October	1997	Conditional Memorandum of Understanding for joint United Kingdom-United States program signed
Early	1998	Final Memorandum of Understanding for joint United Kingdom-United States program signed
Late	1999	Establishment of new medium brigades by US Army causes program confusion
Mid	2000	United States funding beyond advanced technology development phase withdrawn
February	2002	Lancer team unveils its proposed vehicle
Mid	2002	Program funding terminated; technology developed under program being evaluated

Worldwide Distribution

Export Potential. Even before its effective termination, it was far too early in the development of the joint Tactical Reconnaissance Armored Combat Equipment requirement and Future Scout and Cavalry System requirement to forecast its impact on the export market. In general, British and American armored vehicles of this type are known for their high level of quality. However, the projected unit price of the vehicle that was being developed may well have put it out of the reach of many potential customers. Of course, if the United States with its much larger procurement had come in on the program, the unit price of the vehicle would have been much lower than if it were solely a British program. Moreover, the potential for the export of the vehicle would have been greater.

Countries. None

Forecast Rationale

This report on the joint Tactical Reconnaissance Armored Combat Equipment requirement and Future Scout and Cavalry System requirement has been maintained to provide a background to ongoing efforts to develop such a vehicle. It is now certain that the Future Scout and Cavalry System program and related

technology will be integrated into the Future Combat System program. The British are examining several options to address their portion of the requirement, but will probably not proceed with the earlier program alone.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

		<u>High Confidence Level</u>					<u>Good Confidence Level</u>			<u>Speculative</u>			Total 02-11
Vehicle	(Engine)	through 01	02	03	04	05	06	07	08	09	10	11	
MANUFACTURER NOT SELECTED (Consortium)													
TRACER/FSCS (a)	NOT SELECTED	0	2	0	0	0	0	0	0	0	0	0	2
Total Production		0	2	0	0	0	0	0	0	0	0	0	2

(a) Production through 2002 is for the competitive preprototype vehicles for evaluation. This program has been terminated and is not forecast to move beyond the initial developmental preprototype vehicles as currently funded. This line is for the combined United Kingdom and United States requirements only.