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GS/4/7/4/7 (DCI(A))

23 Jul 07

THE FUTURE RAPID EFFECT SYSTEM (FRES) - INFORMATION NOTE

WHAT IS FRES?

1. **Heart of the Future Army.** FRES is an incremental equipment programme delivering a fleet of some 3,721 wheeled and tracked medium weight armoured vehicles (between 20-40 tonnes). It will replace the Army's obsolescent Saxon, CVR(T)[1] and FV 430 vehicles from around 2012 onwards, making a substantial and essential contribution to the delivery of the Army's Balanced Force: over 55% of all the armoured vehicles in the armoured brigades and over 75% in the mechanised brigades will be FRES. A small number of FRES vehicles are attributed to the light or specialist brigades and more could be used to support these where necessary. Therefore FRES will:

a. Enable the armoured and mechanised brigades to conduct operations across the spectrum – from Peacekeeping to Major Combat Operations.

b. Form the backbone of our medium forces. Based on FRES, our medium forces will have better firepower and protection than light forces, but without the logistic footprint and strategic/operational mobility constraints of a heavy force.

c. Provide a Very High Readiness medium weight battlegroup able to deploy by air for Rapid Intervention operations.

d. NOT replace all existing armoured vehicles. For example, Challenger 2[2] main battle tanks and Warrior infantry fighting vehicles, which are principally part of the Heavy Force, will be replaced by separate programmes[3].

FRES is the Army's highest priority equipment programme, after support to current operations.

WHAT IS WRONG WITH OUR EXISTING SAXON, CVR(T) AND AFV 430 FLEETS?

2. The Saxon, CVR(T) and FV 430 fleets have been in service for 23, 35 and 43 years respectively and, even on our most optimistic plans, some will have to remain in service for at least another 15 years. These vehicles lack adequate protection, tactical and operational mobility, lethality and growth potential; most are obsolescent, increasingly expensive to maintain and fall short of meeting some legislative requirements[4]. None of the legacy fleets are fitted with an electronic architecture, which further limits their stretch potential in the fitting of evolving systems[5]. Details by platform can be found at Annex A.

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[1] Combat Vehicle Reconnaissance (Tracked) is a family of vehicles which includes, for example, Scimitar (the principal reconnaissance vehicle), but also Spartan (a small APC), Samaritan (ambulance), and Samson (Repair and Recovery).

[2] However, the Challenger 2s will be withdrawn from the mechanised brigades when the FRES DF variant (a medium tank) enters service.

[3] Future Ground Manoeuvre Capability will replace Warrior and Challenger 2 in around 2035. Challenger 2 and Warrior are also currently part of the mechanised brigades but in lower numbers.

[4] Vibration, noise, brakes and emissions.

[5] eg the fitting of Health, Usage and Monitoring systems which increase availability and reduce logistic footprint.

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WHAT CONSTITUTES THE FRES FLEET?

3. **Five Families in the FRES Fleet.** The requirement is for a fleet of 3,721[6] vehicles, split into 5 families:

a. **Utility.** The Utility family will consist of 2,012 wheeled armoured vehicles, weighing 25-30 tonnes, to replace the majority of the Saxon and FV 430 fleets with several variants of a modern Armoured Personnel Carrier (APC). As such the Utility family is principally aimed at providing protected mobility.

c. **Basic Capability Utility (BCU).** Some Saxon and FV 430 do not need to be replaced by vehicles that have the same capacity, protection, or mobility as that provided by the FRES Utility family; they will be replaced by much cheaper vehicles, known as BCUs[7] (approximately 259 vehicles).

b. **Recce**. The Recce family will consist of around 1163 tracked vehicles, weighing 20-25 tonnes, to replace the majority of the CVR(T) fleet with several variants of a modern manned reconnaissance vehicle.

d. **Medium Armour.** The Medium Armour fleet will represent a new capability, providing a tracked medium weight tank ('FRES Direct Fire (DF)') with the lethality of a main battle tank but, at a weight of only 40 tonnes, its logistic footprint and strategic, operational and tactical mobility will be much improved compared with a main battle tank. These 210 tanks will replace the Challenger 2 main battle tanks in the mechanised brigades.

e. **Manoeuvre Support.** The Manoeuvre Support family will consist of 77 tracked vehicles to enable gap crossing, mine breaching and general armoured engineering tasks (40 tonnes).

The FRES family tree is at Annex B and a representation of its distribution across the Army is at Annex C.

WHAT ARE THE MAIN CHARACTERISTICS OF FRES VEHICLES?

4. **Protection.** FRES needs to be able to counter the increasing sophistication of specific weapon systems across the spectrum of operations. Although protection levels will vary across the families, recent operational experience has proved that protection will remain a core requirement for the FRES programme.

5. **The Need for Growth[8].** It is essential that FRES has the requisite growth potential to enable it to remain effective throughout its 30 year life. This includes the need for growth in weight and power; and it must have an open systems electronic architecture.

6. **Speed of Deployment and Mobility.** As it is essential to the Land element of the Joint Medium Weight Capability (JtMWCap), FRES has to be transportable by strategic

[6] The provisional FRES Total Fleet Reqirement was endorsed by APRC (and noted by ECAB) in April 2007.
[7] BCUs will be a military off the shelf purchase with minimum modifications (and preferably a vehicle which is either in service or due to enter service). It may be met by a variety of small, medium and large platforms.
[8] Growth refers to technology insertion, through life improvements to capability, and the potential for weight increase during a long life in service.

airlift (A400M and C17). Once deployed, FRES requires a high degree of operational and tactical mobility. It will have less impact on local infrastructure than the Heavy Force.

7. **Reduced Logistic Footprint.** FRES must require less support than those tracked vehicles it is replacing in order to reduce the logistic footprint and hence increase operational agility.

8. **Reduced Whole Life Costs (WLCs).** FRES WLC will be less than those of the vehicles it replaces as a result of improved reliability, system commonality, use of prognostics and the application of innovative support arrangements.

IS THE REQUIREMENT REASONABLE?

9. The requirement is derived from Defence's experiences of operations over the last 5 years and the needs of operating within the future expeditionary environment[9]. It has been endorsed by ECAB. However, the Army has conducted a number of reviews of the URD and continues to do so, in order to ensure that it is not asking for anything that is not necessary or unachievable. Capability trades have already been conducted at all levels up to and including ECAB[10] and the Army will remain fully engaged and committed to further performance trades in order to meet time and cost constraints.

WHEN DO WE NEED FRES AND WHEN IS IT DUE TO BE DELIVERED?

10. The Army needs the capability now, but it is essential that FRES has sufficient stretch potential to enable it to remain effective through life. The FRES Initial Assessment Phase has shown that these two requirements are in tension. Hence the Army is content to accept vehicles that do not meet the requirement fully at each family ISD, providing that they are more capable than the armoured vehicles they are replacing and that they have a realistic and funded growth path to meet the requirement more fully over time.
The estimated ISD for the Utility family is 2012, followed by the Recce family ISD in 2014 and then the other families. However, owing to financial and industrial constraints, the delivery of the entire FRES fleet is unlikely before 2025.

WHY CAN'T THE FRES REQUIREMENT BE MET BY OTHER IN-SERVICE ARMOURED VEHICLES OR PPVs?

ARMOURED VEHICLES

11. **Armoured Vehicles - Background.** Whilst armoured vehicles potentially have utility in all operations, they are optimised for use in high intensity combat against opposing medium and heavy forces. To do this they have to be able to take punishment and move quickly over cross country whilst remaining operational. The overall operational effect can only be achieved by using a combination of different types of armoured vehicles, each optimised for a different role[11].

12. **Infantry Fighting Vehicles.** Infantry Fighting Vehicles (IFVs) (eg Warrior) are principally designed to deliver an infantry section onto an enemy held objective and then to

[9] As described in Jt HLOC and FLOC.
[10] For example, ECAB agreed to remove the requirement for FRES to fly within a C130 and APRC agreed to meet part of the FRES requirement with BCUs.
[11] For example, Challenger 2 tanks, infantry fighting vehicles (eg Warrior), armoured personnel carriers (eg AFV 430), manned reconnaissance vehicles eg CVR(T), manoeuvre support vehicles (eg TITAN and TROJAN) and self propelled artillery (eg AS 90).

assist that section, once dismounted, to destroy the enemy and/or take the position. To do this they must be well protected and be equipped with a cannon (to destroy enemy IFVs and strongholds) and machine guns. They have great utility on PSO since they can provide good protection to troops that need to move around the area and can neutralise the majority of enemy weapon systems. IFVs have a different primary role to FRES and any IFV would over achieve against some key FRES requirements (eg fire power for most families) and would fail to meet others (eg operational mobility and logistic footprint/WLCs, since they are heavy tracked vehicles). In addition, IFVs are much more expensive to procure and support than the majority of the FRES variants and we would need to buy thousands more if we were to use them in lieu of FRES.

13. **Bulldog and Viking Armoured Personnel Carriers (APCs).** APCs provide protected mobility for sections of infantry and combat support troops within a Deliberate Intervention environment. The AFV 430 MK II is the principal in-service armoured personnel carrier (APC) and is due to be replaced by the FRES Utility family. Most of the AFV 430 fleet is due to be upgraded to MK III standard ('Bulldog'). After being upgraded further with a number of UORs, Bulldog has some utility in Iraq, but it still lacks protection in certain areas; suffers from poor tactical and operational mobility; and it has no stretch potential. VIKING was designed as an armoured personnel carrier to transport a section of infantry in the light role. It has certainly proved its worth on Op HERRICK, but it falls well short of meeting the FRES protection requirement and has little or no stretch potential.

PROTECTED PATROL VEHICLES

14. **PPVs.** Whilst armoured vehicles have considerable utility on PSO operations, they are too large, too provocative and too cumbersome to conduct all tasks on such operations, especially in areas of complex terrain and urban areas[12]. In addition, *all* personnel moving in military vehicles on operations now need to have a degree of protection and we could not afford to buy and maintain sufficient armoured vehicles to meet this need. Hence armoured vehicles need to be supplemented by Protected Patrol Vehicles (PPVs). These are designed to be simple and to provide some[13] protection for up to 7[14] personnel in the vehicle, equipped to patrol scales. They can take less punishment than armoured vehicles; cannot move as quickly cross country; and, in order to remain small, they cannot carry an infantry section. We have a requirement for light PPVs (eg Vector) and medium PPVs - which have better protection and are correspondingly larger - to give commanders the flexibility to use vehicles with the right combination of size, agility and protection to meet different circumstances. PPVs do have some utility on DI operations, but not in areas where they are likely to have to operate within the range of enemy medium or heavy forces. PPVs do not meet the protection, capacity, or tactical mobility requirements of FRES as a whole, although it is possible that they could meet part of the requirement in the FRES BCU family. Annex D provides further details and, for completeness, describes the WMIK capability which is used by light forces.

ARMOURED VEHICLES AND PPVs - COMPLEMENTARY CAPABILITIES

15. Current operations show that we need to use a combination of armoured vehicles (Challenger 2, Warrior, Bulldog, Viking) and PPVs (Snatch, Vector and Mastiff) to operate in different roles, in different areas, to meet different circumstances. However, PPVs are

[12] Armoured vehicles cannot get access to all urban areas; often cause damage to local infrastructure; and their lack of agility makes them vulnerable to ambush.
[13] Light PPV – fragments and Small Arms. Medium PPV – fragments, Small Arms, IED, EFP and RPG.
[14] Driver, Commander, a Fire team and a specialist, such as an interpreter.

particularly important at the moment because, in many cases, we have to use them where we would use FRES if it were available. Therefore, if FRES was in service now we would need to deploy fewer PPVs. Annex E illustrates how armoured vehicles and PPVs will be distributed across the Balanced Force in the FRES era.

WHAT IF FRES IS NOT DELIVERED?

19. If FRES was not delivered, the relative capability of Saxon, FV 430 and CVR(T) would continue to decline since their growth potential is negligible. Having already withdrawn Saxon[15] from service, we are now some 400 armoured vehicles short of the number required to meet Large + Small concurrency. FV 430 and CVR(T) would become undeployable on anything other than the most benign operations; and they could well become unusable owing to legislative issues. Since FRES is key to both the Heavy Force and the Medium Force, the Army's ability to prosecute PE, PP and DI operations would effectively cease and neither the Balanced Force nor the JtMWCap would be delivered.

Annexes:

A. The Inadequacies of the Saxon, CVR(T) and AFV 430 Fleets.
B. The FRES Family Tree.
C. Outline FRES Holdings Across the Arms and Services of the Army.
D. Related Vehicle Fleets (PPVs and WMIKs).
E. Distribution of Armoured Vehicles and PPVs Across the Balanced Force in the FRES Era.

The Inquiry has decided not to publish Annex B

[15] The General War Role variant has been withdrawn, but the more capable Saxon Patrol is currently still in service.

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ANNEX A TO
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THE INADEQUACIES OF THE SAXON, CVR(T) AND FV430 FLEETS

Problems with our Saxon, CVR(T) and FV430 include:

a. **Saxon.** Used as the armoured personnel carrier for our Mechanised Infantry, the Saxon General War Role variant's protection, capacity and cross country performance is so poor that it is considered not to be deployable on operations and has subsequently been withdrawn from service; the Patrol variant is marginally more capable and, in the absence of any other wheeled APC, it still has some limited utility in certain roles on Peace Support Operations, but it has no stretch potential.

b. **FV 430.** Much of the FV 430 fleet is being upgraded to Mk III standard[1] ('Bulldog'); without this upgrade the fleet would become obsolete from around 2010. With a number of UOR improvements (eg additional armour and an overhead weapon station) these 'Bulldog Uparmoured' vehicles are more reliable and better protected than the Mk IIs. However, they remain vulnerable to attack in some areas; continue to lack tactical and operational mobility and adequate capacity; have little or no further stretch potential: and still fail to meet modern legislative standards in some areas[2]. They provide a means of filling what would otherwise be an APC capability gap until FRES enters service and enable us to run on elements of the fleet until it is finally replaced by FRES in around 2025. By then, some vehicles will be 60 years old.

c. **CVR(T).** Those elements of the CVR(T) fleet deployed on operations have been uparmoured in order to improve their survivability, but they are now operating on the very edge of their weight limit. Consequently, we have to expend huge effort to keep availability high and they are logistically demanding and less agile than we would want. Having been modified in a somewhat piecemeal manner over the years they are now 'difficult to fight' and the Scimitar variant needs a more capable gun: they have no further weight stretch potential and yet the fleet will need to be run on beyond its OSD of 2014 until completely replaced by FRES in around 2025 (by which time some vehicles will be 50 years old).

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[1] Some 900 of the 1492 AFV 430 fleet are being upgraded to the Mk3 standard.
[2] Eg Noise and vibration.

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OUTLINE FRES HOLDINGS ACROSS THE ARMS AND SERVICES OF THE ARMY

	Major Units Equipped	Utility	BCU	Recce	Medium Armour	Manoeuvre Support
MECH INF	An Inf Bn in each Mech bde	• APCs for Inf Coys • C2 for BG HQ • Support vehs in A1 Echelon • Unit Ambulances	• A1 Ech • LAD	• Close Recce		
ARMD INF	An Inf Bn in each Armd Bde	• C2 for BG HQ • A1 Echelon	• Bn LAD HQ	• Close Recce		
HEAVY ARMOUR REGT	CR 2 Regts	• BG HQ • Echelon CP	• SSM • LO at Large Scale • A1 Echelon CP	• Close Recce • Fitter Section • Ambulances		
MEDIUM ARMOUR REGT	MA Regts	• BG HQ • Echelon CP • Fitter Sections	• SSM • LAD CP • LO at Large Scale	• Close Recce • Fitter Section • Ambulances	• MA Sqns • ES variant in Fitter Sections	
RECCE	FR Recce Regts	• Main Log Officer • Alt Log Officer • LAD CP	• LO	• Recce Tps • Recovery veh • Ambulances • UAP		
ARTILLERY	CS regts	• CPs and Recce	• Arty Bde HQ			
General Support ENGINEERS	GS Regts	• CO's Tac HQ • Rebro	• GS Regt LAD HQ			
Close Support ENGINEERS	CS Regt per Bde (Mech and Armd)	• Counter Mobility • Mech Engr Sqns • Armd Engr Regt Rebros • Amphib Sqns		• Engineer Recce Tps in Armd & Mech Sqns		AVRE AVLB AET (TERRIER)
SIGNALS	• Bde HQs • Div HQ and Sig Regt • 22 Sig Regt	• Div Fwd HQ Staff Vehs • REACHER • Some FALCON • SOOTHSAYER	• Some FALCON			
REME	REME Bn per Bde	• Intimate Support Teams • Fwd Platoon CPs • Fitter Sections • FRTs	• Coy and Bn CPs			
RAMC (MedicaMEDIC	Bde Medical Regt per Bde	• Ambulances & UAPs	• SQMS & Tp Comds	• Sqns that Support FR		

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ANNEX D TO
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RELATED VEHICLE FLEETS

1. **Protected Patrol Vehicles (PPV).** A PPV is a wheeled vehicle, which provides some degree of protection, usually only for the occupants (not, for example, the engine). It is designed to carry around 6 personnel, to enable a combination of limited duration foot and vehicle-mounted patrols to be mounted on operations[1]. PPVs are expected to be able to operate on roads and tracks and need to be as small, unobtrusive and agile as possible. PPVs do not need to have the same capacity, mobility, protection, firepower, or robustness required of armoured vehicles and they cost considerably less. Our current in-service 'Light PPV' is Snatch, but this was designed for the relatively benign environment of Northern Ireland. It does not meet the levels of capacity, mobility, or protection required for light PPVs on expeditionary operations in Iraq and Afghanistan. Vector is just coming into service and whilst this will represent a significant improvement over Snatch, its protection is still lower than is required in some circumstances. The Mastiff PPV was bought as a UOR and is well protected, but it is much larger and more cumbersome than we would want[2]. Hence we have a requirement for a 'Medium PPV' that has better protection than Vector, but is smaller than Mastiff. The Future Medium PPV programme is funded for a concept capability demonstrator but not for actual capability procurement at this stage.

2. **WMIKs.** In some operations there is a requirement to conduct vehicle patrols (without carrying half a section of infantry) in difficult terrain, where the threat to vehicles from IEDs, buried mines, or hand held anti tank weapons is low and the threat is principally from small arms at range. In such cases there is operational advantage in using soft skinned, open topped vehicles, which have little or no physical protection, but which rely upon high agility, small size, good visibility and fire support weapons for survivability. These are known as WMIKs; they should not be confused with PPVs, but are often required in an area of operations, as well as PPVs and armoured vehicles: they are complementary capabilities.

[1] They are also used to conduct administrative and command support tasks.
[2] It is as long and as high as Warrior and almost as wide.

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ANNEX E TO
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ARMOURED VEHICLES AND PPV IN THE FRES ERA BALANCED FORCE

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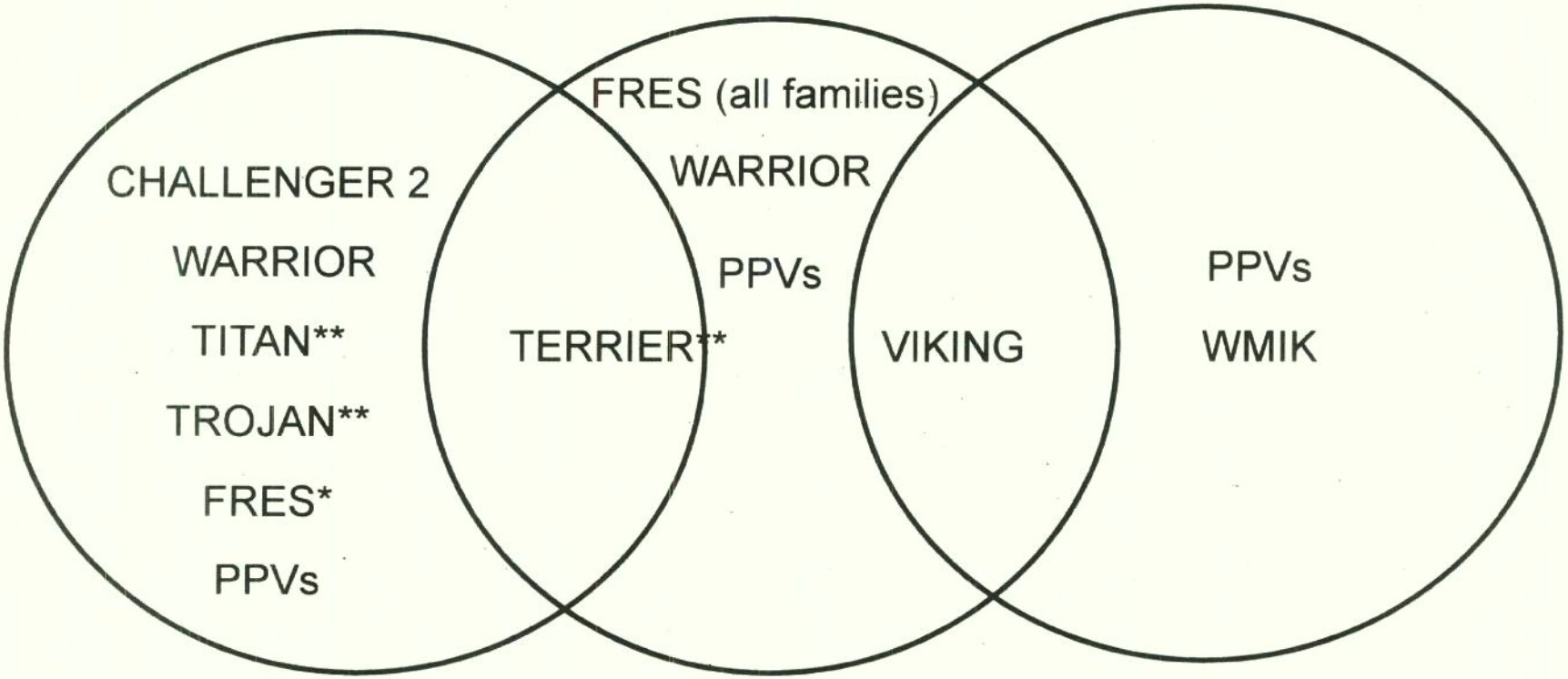

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Heavy Brigade x 2	Medium Brigade x 3	Light Brigade x 3
(optimised for DI)	(optimised for PP/FI/PE)	(optimised for FI/PK)

*NOT FRES Medium Armour or Manoeuvre Support Families

** Manoeuvre Support engineering vehicles. It has been agreed that TERRIER, which was designed to support the Heavy Force, will be good enough to meet the FRES requirement.