

ARCHIVED REPORT

For data and forecasts on current programs please visit

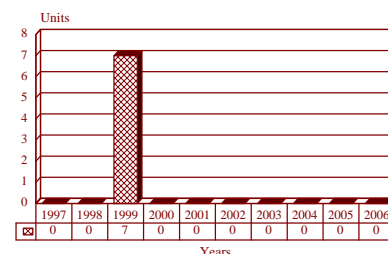
www.forecastinternational.com or call +1 203.426.0800

Timoney/BDX/Valkyr - Archived 8/98

Outlook

- Production of the Timoney will be very limited for a domestic follow-on order
- Production of the BDX is complete, with 130 manufactured
- Production of the Valkyr has terminated and is no longer available

10 Year Unit Production Forecast
1997-2006



Orientation

Description. Wheeled vehicles

Sponsor. The development of all three of these vehicles has been based on the Timoney vehicle originally developed on a private basis and manufactured by Timoney Technology Limited; the vehicle has been further developed on a private basis by the respective licensees. Further development of the Timoney is on a private basis by Timoney Technology.

Contractors. The Timoney was developed and manufactured by Timoney Technology Limited; Trim, Republic of Ireland. Major subcontractors include Detroit Diesel Corporation, Chrysler Corporation, Cummins, the Allison Transmission Division of General Motors Corporation, Kidd-Graviner, Perkins Engines and Zahnradfabrik Friedrichshafen.

Licensees. Beherman Demoen of Mechelan, Belgium, manufactured the modified Timoney under license as the BDX, while Vickers Defence Systems of

Newcastle-upon-Tyne, England, United Kingdom, has further developed the BDX and manufactured the vehicle under the name Valkyr.

Status. The production of the BDX and Valkyr are complete. Production of the Timoney is dormant but available for additional production orders.

Total Produced. As of January 1, 1997, a total of 16 Timoney 4x4 and two 6x6 vehicles, 130 BDX and 15 Valkyr vehicles (including prototype and developmental vehicles) had been manufactured.

Application. An armored personnel carrier vehicle for carriage of personnel, reconnaissance, anti-guerrilla, or riot control with flexibility for support roles as an ambulance or as a command and control vehicle.

Price Range. In equivalent 1997 United States dollars, if production were resumed at this time, the unit price of the 4x4 Timoney would be \$244,700, while the unit price of the 6x6 version is projected at \$302,500.

Technical Data

Timoney 4x4 and BDX

Crew. Three: commander, gunner and driver, plus nine infantrymen. The BDX is configured for two, the commander and driver, plus ten infantrymen.

Configuration. 4x4

Armor. Both the Timoney and BDX are fabricated from steel alloy armor which is proof from 7.62 millimeter Armor Piercing projectiles and ballistic fragments. On the Timoney, the maximum thickness of

this armor is 14 millimeters on the hull while on the BDX it is 12.7 millimeters with a resulting slight reduction in the level of protection.

Design Features. The Timoney was designed as a rugged, easily maintained multi-purpose vehicle optimized for use by Ireland's United Nations' commitment. The BDX represents a refinement of the Timoney optimized for the armored personnel carrier role. The vehicles are amphibious.

Dimensions. The data below are for the Mark 6 version of the 4x4 Timoney with the BDX (the Mark 5 Timoney) in parentheses where different.

	<u>SI units</u>	<u>US units</u>
Length	4.95 (5.05) meters	16.24 (16.56) feet
Width	2.50 meters	8.20 feet
Height	2.75 (2.84) meters	9.02 (9.31) feet
Combat weight	9.98 (10.7) tonnes	11.0 (11.79) tons
Fuel capacity	300 (248) liters	79.8 (65.6) gallons

Performance. The maximum speed and range figures are on a metalled road.

Maximum speed	97 kilometers per hour	60.24 miles per hour
Maximum range	1,000 (710) kilometers	621.0 (440.9) statute miles
Step	40 centimeters	1.31 feet
Trench	53 centimeters	1.74 feet
Slope	45%	45%
Gradient	65%	65%
Fording	amphibious	amphibious

Engine. The 4x4 version of the Timoney (except the two armored reconnaissance vehicle prototypes) uses the Detroit Diesel Corporation 4-53T liquid-cooled diesel engine rated at 134.28 kilowatts (180 horsepower) at 46.67 revolutions per second (2,800 revolutions per minute). The power-to-weight ratio is 13.45 kilowatts per tonne (16.36 horsepower per ton). The BDX uses a Chrysler V-8 spark ignition engine rated at 134.28 kilowatts (180 horsepower) at 66.67 revolutions per second (4,000 revolutions per minute). The power-to-weight ratio is 12.55 kilowatts per tonne (15.27 horsepower per ton). For both vehicles, a 24 volt electrical system is fitted with two 12 volt 100 ampere-hour batteries.

Gearbox. Both the 4x4 Timoney and BDX use the Allison Transmission Division of General Motors

Corporation AT-540 automatic unit with four forward and one reverse gear ratios. A two speed transfer box is standard. Power assisted rack and pinion steering is standard equipment.

Suspension and Running Gear. Both vehicles use an independent double wishbone type suspension with a helical spring and hydropneumatic shock damper at each wheel station. The 14.00x20 (14.00x20 optional) tires have run flat inserts.

Armament. Both the Timoney and BDX have several armament options, including 7.62 millimeter machine guns, single or twin turret-mounted machine guns/cannon, electrically operated smoke grenade launchers, an 81 millimeter mortar, and various anti-tank missile launchers.

Timoney 6x6

Crew. Two: commander and driver, plus ten infantrymen

Configuration. 6x6

Armor. The Timoney is fabricated from steel alloy armor which is proof from 7.62 millimeter Armor Piercing projectiles and ballistic fragments. The

maximum thickness of this armor is 14 millimeters on the hull front, sides and rear.

Design Features. The Timoney was designed as a rugged, easily maintained multi-purpose vehicle optimized for use by Ireland's United Nations' commitment. The 6x6 version of the vehicle represents

a refinement of the original Timoney. The vehicle is amphibious.

Dimensions. The data below are for the latest prototype of the 6x6 version of the Timoney armored personnel carrier.

	<u>SI units</u>	<u>US units</u>
Length	6.45 meters	21.16 feet
Width	2.70 meters	8.86 feet
Height	2.04 meters	6.69 feet
Combat weight	15.04 tonnes	16.58 tons
Fuel capacity	365 liters	97.07 gallons

Performance. The maximum speed and range figures are on a metalled road.

Maximum speed	100 kilometers per hour	62.10 miles per hour
Maximum range	700 kilometers	434.7 statute miles
Step	40 centimeters	1.31 feet
Trench	40 centimeters	1.31 feet
Slope	30%	30%
Gradient	60%	60%
Fording	amphibious	amphibious

Engine. The 6x6 version of the Timoney uses the Cummins 6 TCA 8.3 liquid cooled six cylinder diesel engine rated at 261.1 kilowatts (350 horsepower) at 41.67 revolutions per second (2,500 revolutions per minute). The power-to-weight ratio is 17.36 kilowatts per tonne (21.11 horsepower per ton). Alternatively, a Perkins Phaser 300 Ti six cylinder diesel engine rated at 223.8 kilowatts (300 horsepower) can be fitted. A 24 volt electrical system is fitted with two 12 volt 100 amperehour batteries.

Gearbox. The 6x6 version of the Timoney uses the Zahnradfabrik Friedrichshafen 6 HP 500 automatic unit with six forward and one reverse gear ratios. An A10002/4D single-speed transfer box is standard. Power assisted rack and pinion steering is used on the first axle.

Suspension and Running Gear. An independent double-wishbone type suspension with two helical springs and hydropneumatic shock damper at each wheel station. The 14.00x20 tires are the run-flat type and a central tire inflation system is fitted.

Armament. A number of armament options are available for the 6x6 version of the Timoney. These include a 105 millimeter turret-mounted cannon, 7.62 and/or 12.7 millimeter machine guns in various pintle or shield type mountings, single or twin turret-mounted machine guns and/or cannon, smoke dispensers, an 81 millimeter mortar, and various anti-tank missile launchers.

Valkyr

Crew. Two: commander and driver, plus ten infantrymen

Configuration. 4x4

Armor. The Valkyr is fabricated from steel alloy armor which is proof from 7.62 millimeter Armor

Piercing projectiles and ballistic fragments. The maximum thickness of this armor is 14 millimeters on the hull front, sides and rear.

Design Features. The amphibious Valkyr represents a major refinement of the original Timoney and BDX.

Dimensions. The data below are for the armored personnel carrier version of the Valkyr.

	<u>SI units</u>	<u>US units</u>
Length	5.59 meters	18.33 feet
Width	2.50 meters	8.20 feet
Height	2.27 meters	7.48 feet
Combat weight	11.5 tonnes	12.13 tons
Fuel capacity	200 liters	53.19 gallons

Performance. The maximum speed and range figures are on a metalled road.

	<u>SI units</u>	<u>US units</u>
Maximum speed	100 kilometers per hour	62.10 miles per hour
Maximum range	700 kilometers	434.7 statute miles
Step	40 centimeters	1.31 feet
Trench	40 centimeters	1.31 feet
Slope	30%	30%
Gradient	60%	60%
Fording	amphibious	amphibious

Engine. The Valkyr is fitted with the Detroit Diesel Corporation 4-53T liquid-cooled diesel engine rated at 134.28 kilowatts (180 horsepower) at 46.67 revolutions per second (2,800 revolutions per minute). The power to weight ratio is 11.67 kilowatts per tonne (14.84 horsepower per ton). A 24 volt electrical system is fitted with two 12 volt 100 ampere-hour batteries.

Gearbox. The Valkyr uses the Allison Transmission Division of General Motors Corporation AT-545 automatic gearbox with four forward and one reverse gear ratios. A two speed transfer box is standard.

Power-assisted rack-and-pinion steering is standard equipment.

Suspension and Running Gear. The Valkyr has an independent double wishbone type suspension with a helical spring and hydropneumatic shock damper at each wheel station. The 14.00x20 tires are the run-flat type.

Armament. There are several armament options for the Valkyr including 7.62 or 12.7 millimeter machine guns, single or twin turret-mounted machine guns/cannon, smoke grenade launchers, an 81 millimeter mortar, and various anti-tank missile launchers.

Variants/Upgrades

Variants. The Timoney and BDX were manufactured in one basic version. Timoney Technology Limited developed the Timoney in a number of somewhat confusing marks which break out as follows:

Mark 1 - initial prototype completed in July of 1973.

Mark 2 - paper design only.

Mark 3 - second prototype.

Mark 4 - manufactured in pre-production quantities for the Irish Army.

Mark 5 - developed to be manufactured under license as the BDX.

Mark 6 - a developed version of the Mark 5 manufactured in pre-production quantities for the Irish Army.

Mark 6 Fire Support Vehicle - a redesigned and improved Mark 5 or BDX designated the Mark 6 Fire Support Vehicle with a Hispano-Suiza Lynx 90 turret. This model, unveiled in March of 1982, carries the three man crew plus nine infantrymen. This vehicle has been proposed in several versions including an armored personnel carrier that can carry 17 troops, an amphibious load carrier, and an amphibious reconnaissance vehicle. This latter program has been developed to prototype status with a Mark 1 and a Mark 2 4x4

Armored Reconnaissance Vehicle. As of mid-1997, this avenue of development has not been proceeded with.

The Mark 7 was a paper design which has not been developed.

The Mark 8 is the new 6x6 vehicle described above.

The variants and other upgrades developed and proposed for the BDX by Beherman Demoen were subsequently transferred to the Valkyr program. In order to enhance the marketability of the Valkyr, Vickers has developed a family of combat vehicles with the armored personnel carrier and a fire support vehicle being the basis of this family. The armored personnel carrier is slightly higher (19.3 centimeters - 7.59 inches) than the fire support vehicle which is offered with numerous armament options:

1. An Electronique Serge Dassault twin turret with two 20 millimeter cannon.
2. A Cockerill CM90 turret with 90 millimeter Mark III cannon.
3. The FIROS 6 multiple rocket launcher.
4. An 81 millimeter breech-loading mortar.

5. An 81 millimeter muzzle loading mortar.
6. A Euromissile MKT 02 turret with MILAN anti-tank missiles.
7. A Peak Engineering twin 7.62 millimeter machine gun turret designated P-1.
8. A Peak engineering single 7.62 millimeter machine gun turret designated P-2.
9. A Vickers one-man turret with a single or twin 7.62 millimeter machine gun.
10. A Vickers one-man turret with a 12.7 millimeter machine gun.
11. A Vickers one-man turret with a 20 millimeter cannon and a single 7.62 millimeter machine gun.
12. A Swingfire anti-tank guided missile installation.

13. A MILAN anti-tank guided missile installation.

Other variants include an ambulance with a higher roof and a capacity of four stretchers, a workshop, a command post with extensive communications equipment, a VIP vehicle for the secure transportation of government officials and an internal security vehicle available with such options as a barricade removal device, tear gas launchers, searchlights, water cannon and a public address system.

Modernization and Retrofit Overview. As of mid-1997, there have been no major modernization or retrofit programs developed for these vehicles. There is a potential to re-engine the BDX vehicles with a more fuel-efficient diesel engine. In 1980, Beherman Demoen Engineering test fitted the 4-53T diesel engine as used in the Timoney and Valkyr, but as of this writing, no retrofit program had yet taken place.

Program Review

Background. In January of 1972, the then Technology Investments Limited of the Republic of Ireland began the development of a new 4x4 armored personnel carrier that could be capable of worldwide use with Irish troops operating under United Nations control. The first prototype was completed in 1973. In 1976, the Engineering Division of Beherman Demoen in Belgium negotiated a licensee agreement with Technology Investments to undertake production of a modified form of the original Timoney (the Mark 5) vehicle under the nomenclature of BDX. In late 1981, Vickers Limited negotiated a contract to develop and produce the Mark 11 version of the BDX in the United Kingdom under the name of Valkyr. In 1990, Technology Investments changed its name to Timoney Technology Limited.

Timoney. Timoney Technology continues with the somewhat confusing development of the original Timoney. The basic vehicle is of all-welded steel construction which provides protection against 5.56 and 7.62 millimeter Armor Piercing projectiles at all ranges and protection from a 105 millimeter round exploding ten meters from the vehicle. Three doors are provided for the crew and passengers. The driver is at the front with the engine at his immediate rear. The vehicle is fully amphibious and smoke dischargers, nuclear, biological and chemical defense equipment, air conditioning, heaters and a dozer blade are offered as options. The armament is described above in the pertinent section.

Following the fabrication of two prototype/developmental vehicles, the initial Irish order for ten vehicles (in two different Marks as described above) was

completed some years ago. For a long period, further orders from the Irish Government were expected as there has existed a requirement for a hundred vehicles of this type; however, this procurement has been repeatedly delayed due to financial considerations and is not now expected to take place. While a 6x6 version of the Timoney was developed in order to enhance the appeal of the vehicle, the market interest never materialized and the program went dormant in the mid-eighties.

BDX. Production of the BDX was completed some years ago with two prototype and 128 vehicles serially produced. There were reports that Belgium wanted to procure additional vehicles but the licensing agreement with Vickers apparently means that the Valkyr, which can also be manufactured by Beherman Demoen, will have to be the vehicle procured in lieu of the original BDX. However, due to the major geopolitical changes in Europe, any further procurement by Belgium is unlikely.

The BDX is the Timoney Mark 5, differing from the Marks 4 and 6 only in detail design features and the engine, a Chrysler V-8 spark ignition engine rated at 132.48 kilowatts (180 horsepower). Various optional armament configurations were offered. There is evidence that Beherman Demoen provided some assistance in developing the vehicle in the Valkyr form in conjunction with Vickers.

Valkyr. This was a dual project of Beherman Demoen of Belgium (initial design) and Vickers Defence Systems of the United Kingdom (research and development, fabrication and marketing). In 1980,

Beherman Demoen began the testing of a modified BDX with a Detroit Diesel 4-53T diesel engine, along with new components and construction techniques to extend the service life as well as to enhance crew comfort. A more streamlined shape and a strengthened suspension were incorporated into the modified vehicle. Testing of the pre-prototype by Beherman Demoen was completed in November of 1980. Shortly thereafter, Vickers Defence Systems took over the project, designating the new vehicle Valkyr. In September of 1981, Vickers announced that a ten year agreement had been reached with Beherman Demoen under which Vickers would develop, market and produce the BDX vehicle under the name of Valkyr. In mid-1982, a second prototype Valkyr was unveiled at the British Army Equipment Exhibition and since then, three additional prototypes have been fabricated. In 1988, the Valkyr entered serial production for Kuwait, but the order was truncated and only two vehicles were delivered before the Iraqi invasion.

The Valkyr can seat ten fully equipped troops plus the two man crew. The driver and power plant are

positioned as in the basic Timoney. Protection and survivability are improved over the basic Timoney; armor protection on the Valkyr ranges from eight to 13 millimeters in thickness. Seeing that the vehicle had further potential, the third prototype, which was developed and displayed at the 1984 British Army Equipment Exhibition was significantly improved. The internal layout is so improved that the latest Valkyr is essentially a new vehicle; in fact only about four percent of the original BDX interior design remains. Crew survivability and habitability have been greatly enhanced. Two large doors, one on each side of the vehicle, are provided, with an additional door at the rear. Optional equipment includes air conditioning, night vision equipment, nuclear, biological and chemical defense apparatus, water jets, anti-Molotov cocktail defenses and a winch. Run-flat tires are standard.

However, despite the order for Kuwait (of which only two were delivered), interest in the Valkyr never really caught on and the program went dormant in the mid-nineties.

Funding

The funding for the Timoney is provided by Timoney Technology while the further developmental funding for the BDX was supplied by Beherman Demoen. The Valkyr built upon these two programs with developmental funding provided by Vickers Defence Systems.

Recent Contracts

Not available as contractual information is not released by the three contractors involved.

Timetable

The following timetable is for the Timoney, BDX and Valkyr only and for no other vehicle programs of Timoney Technology, Beherman Demoen or Vickers Defence Systems.

Jan	1972	Technology Investments began work on Timoney
Jul	1973	First prototype completed
	1976	Beherman Demoen obtained license to develop Timoney
	1977	Belgian Government awarded contract for BDX
Oct	1978	First BDX vehicles completed in Belgium
Feb	1981	Belgian order completed
Sep	1981	Beherman Demoen/Vickers signed contract
Late	1981	Valkyr prototype fabricated
Mar	1982	Timoney Mark 6 Fire Support Vehicle unveiled
Jul	1982	Valkyr shown at British Army Equipment Exhibition
	1983	Valkyr ready for production
May	1984	Definitive Valkyr prototype displayed
Feb	1988	Kuwait placed order for Valkyr
	1989	Development of 6x6 version of Timoney began
Mid	1990s	6x6 version of Timoney and Valkyr programs went dormant

Mid 1997 BDX and Valkyr programs complete, Timoney available for further production orders; development of Timoney continues

Worldwide Distribution

Export Potential. The Timoney is competing in a very hotly contested market, with an increasing number of countries, including the formidable French, having viable entrants. While the Timoney appears to be a highly effective answer to the need for a vehicle for internal security, its effectiveness, as well as that of many similar vehicles in actual combat, is questionable at best.

Following the 1984 British Army Equipment Exhibition, interest in the Valkyr was expressed by several countries, including Algeria, Brunei (the internal security variant was demonstrated in early 1985), Malaysia and Oman. In early 1988, Kuwait placed the first export order for the vehicle. However, only two were completed and delivered before the Iraqi invasion. The program subsequently went dormant.

Countries. Ten Timoney vehicles (5 each Mark 4 and 6) are in service with **Ireland**. The BDX is in service in **Belgium** (43 in the Air Force and 77 for the police), **Mexico** (3) and **Argentina** (five with the Army). Two Valkyr vehicles were ordered by **Kuwait** and delivered in late 1988, but their present status is not known.

Forecast Rationale

For an as yet (mid-1997) undetermined reason and despite a continued lack of sales (even to the Irish Government), Timoney Technology perseveres with the Timoney program. For a while, the firm had hopes that its development of a 6x6 version of the vehicle would breathe some life into the program but interest never materialized and it went dormant in the mid-nineties.

Despite the fact that the Republic of Ireland has had a long-standing requirement for a hundred Timoney-class vehicles, the extremely limited financial resources of this poor country have consistently precluded any major procurement. This lack of a domestic sale, plus the fact that the contractor and vehicle are essentially unknown on the international market, has also precluded any

sales on the export market. We therefore forecast that only a few additional Timoney vehicles will be sold and those to Ireland. The procurement will most likely be the 4x4 version as the 6x6 version is moribund.

The Valkyr program never went anywhere beyond the initial ten unit sale to Kuwait (only two of which were delivered). Despite the well known Vickers name and reputation, the Valkyr suffered under the glutted market conditions which eventually prompted the firm to throw in the towel - no additional production is forecast for this now dead program.

The BDX program is dead and no additional production is forecast.

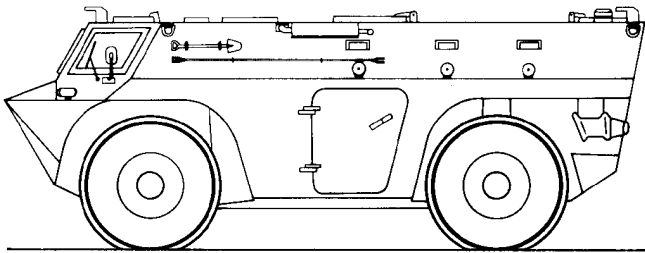
Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

Vehicle	(Engine)	through 96	High Confidence Level				Good Confidence Level			Speculative			Total 97-06	
			97	98	99	00	01	02	03	04	05	06		
TIMONEY TECHNOLOGY LIMITED														
TIMONEY 4X4(a)	4-53T	16	0	0	7	0	0	0	0	0	0	0	7	
TIMONEY 6X6(b)	6 CTA 8.3	2	0	0	0	0	0	0	0	0	0	0	0	
Subtotal - TIMONEY TECHNOLOGY LIMITED		18	0	0	7	0	0	0	0	0	0	0	7	
BEHERMAN DEMOEN (Licensee)														
BDX(c)	CHRYSLER V8	130	0	0	0	0	0	0	0	0	0	0	0	
Subtotal - BEHERMAN DEMOEN (Licensee)		130	0	0	0	0	0	0	0	0	0	0	0	

			<u>High Confidence</u>				<u>Good Confidence</u>			<u>Speculative</u>			
			<u>Level</u>				<u>Level</u>						Total
Vehicle	(Engine)	through 96	97	98	99	00	01	02	03	04	05	06	97-06
VICKERS DEFENCE SYSTEMS LIMITED (Licensee)													
VALKYR(d)	4-53T	15	0	0	0	0	0	0	0	0	0	0	0
Subtotal - VICKERS DEFENCE SYSTEMS LIMITED (Licensee)		15	0	0	0	0	0	0	0	0	0	0	0
Total Production		163	0	0	7	0	0	0	0	0	0	0	7

- (a)The historical production figure includes four prototype/developmental vehicles. This breaks out to one Mark 1, two Mark 3 and one Mark 6. The Mark 2 was a paper design, while the Mark 5 is the version manufactured under license as the BDX. Five each of the Mark 4 and 6 were manufactured for the Irish Army. The historical production also includes two Timoney Armored Reconnaissance Vehicles, a Mark 1 and a Mark 2.
- (b)The through 1996 production is for the initial prototype and developmental vehicles.
- (c)The production shown includes two prototype vehicles.
- (d)The historical production includes five prototypes and the ten production vehicles for service deliveries, of which two were delivered.



Valkyr

Source: Forecast International