

**STATEMENT TO THE COMMISSION OF INQUIRY INTO ALLEGATIONS
OF FRAUD, CORRUPTION, IMPROPRIETY OR IRREGULARITY IN THE
STRATEGIC DEFENCE PROCUREMENT PACKAGE**

BY BAE SYSTEMS PLC


EDWARD NATHAN SONNENBERGS INC

Per: Theo Buchler and Heinrich Meiring
South African attorneys of record for BAE Systems Plc
Physical address: 150 West Street, Sandown, Sandton
Postal address: P.O. Box 783347, Sandton, 2146
Email: tbuchler@ens.co.za and hmeiring@ens.co.za
Tel: 011 269 7600
Fax: 011 269 7899
Ref: T Buchler / H Meiring / 0325439

TO: THE CHAIRPERSON: ARMS PROCUREMENT COMMISSION

House A
Nzasm Court
3rd Street
Salvokop
Pretoria
Private Bag X02
The Tramshed
0127
Email: admin@armscomm.org.za

I, _____
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Signed: _____
For: the Secretary of the Arms
Procurement Commission

SERVICE BY HAND AND EMAIL

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EXECUTIVE SUMMARY

The submission begins by giving background on BAE Systems Plc ("BAES"), including its business activities and its ethics policies and processes. Also discussed are the reports issued by the Woolf Commission and Deloitte LLP regarding BAES' adherence to, and implementation of, ethical policies and practices.

The negotiations and contracts between BAES, Saab AB, the South African Government (and its relevant Organs) are addressed. In addition, an overview is given of the subject matter of the aforementioned negotiations and contracts, including to what extent delivery has already been made.

The submission also gives a comparison between the Hawk aircraft and the Aermacchi MB-339C aircraft, demonstrating that the Hawk is superior and overall more cost-effective.

The criticism against BAES relating to offsets is addressed and it is demonstrated that BAES' obligations in this regard were fulfilled on, or ahead of, time and even exceeded what was required.

The submission further addresses the use of advisers (both in South Africa and globally) by companies in general and BAES in particular, including the commercial justification for, and remuneration of, advisers.

The UK Serious Fraud Office and US Department of Justice investigations into BAES, launched in 2004 and 2007 respectively, are discussed. The submission indicates that, where BAES agreed to plead guilty in relation to those investigations, none of the charges against BAES related to its activities in South Africa and BAES did not plead guilty to any offences of bribery or corruption. It is also noted that, in 2001, the South African Joint Investigation Team reported that it had found no evidence of improper or unlawful conduct by the Government.

BAES hopes that the Commission finds this submission useful and is able to bring its investigation to a satisfactory conclusion.

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BY BAE SYSTEMS PLC

1. INTRODUCTION

BAE Systems plc (BAES) welcomes the appointment, by the President of the Republic of South Africa, of the Commission of Inquiry into Allegations of Fraud, Corruption, Impropriety or Irregularity in the Strategic Defence Procurement Package (the **Commission**) to investigate issues arising from South Africa's Strategic Defence Procurement Package (the **SDPP**). BAES very much hopes that the Commission will be able to bring this long-running affair to an appropriate conclusion.

As the Commission knows, the history of the SDPP is long and complex. BAES' documentation surrounding both that history and the subsequent investigations into what happened is voluminous and already in the hands of a number of investigatory authorities, including the South African authorities. BAES understands that the Commission has approached the United Kingdom's Serious Fraud Office (the **SFO**) concerning documents collected from BAES and others in the course of the SFO's investigation of BAES. Over 12 years have passed since the contracts comprising the SDPP were concluded. Over 20 years have passed since BAES' predecessor, British Aerospace, began marketing its civil aircraft in South Africa. There is now no member of senior management within BAES with any direct knowledge of those events. For this reason BAES is not able to provide a sworn statement but hopes that instead it may assist the Commission to give a concise overview of the SDPP, in so far as it involved BAES, and of BAES' activities in relation to the SDPP.

2. BAE SYSTEMS PLC

BAES is a global defence, aerospace and security company. It delivers a full range of products and services for air, land and naval forces, as well as advanced electronics, security, information technology solutions and support services. In 2011, it was the fifth largest aerospace and defence

company in the world.¹ BAES is committed to behaving ethically in all aspects of its business, recognising that its success depends, among other matters, on maintaining and enhancing its corporate reputation.

It is well known that BAES was investigated for many years by the UK and United States authorities about allegations of bribery and corruption relating to its global defence business. As explained in section 7, these investigations ended in 2010. In 2007, while the investigations were continuing, the board of BAES appointed an independent committee, chaired by the Rt Hon The Lord Woolf of Barnes (former Lord Chief Justice of England and Wales), to report publicly on the company's ethical policies and processes (the **Woolf Committee**). The Woolf Committee sought to identify the high standards to which a global company is expected to adhere, the extent to which BAES currently met those standards and to make a series of recommendations about actions that BAES should take to achieve them. Before the Woolf review commenced, BAES' board of directors (the **Board**) committed itself to accepting and implementing the Woolf Committee's recommendations in full. This was an unprecedented step for a major international company. In presenting his Committee's report to the Board on 6 May 2008 (the **Woolf Report**), Lord Woolf stated that its 23 recommendations "*provide a route map for the Company to establish a global reputation for ethical business conduct that matches its reputation for outstanding technical competence*".²

The Woolf Report noted the importance of appointing an independent external auditor to provide assurance to the Board about the progress of the Woolf implementation programme. BAES appointed Deloitte LLP (**Deloitte**) for this purpose. In May 2011, BAES completed the implementation of the Woolf Committee's recommendations. This implementation was assured by Deloitte. In 2010, the Ethical Leadership Group³ independently reviewed BAES' progress and concluded that it has a solid business conduct programme that includes many best practice elements. It identified some

¹ Based on global revenues in 2011. Source: PWC publication, "*Aerospace & Defence 2011 year in review and 2012 forecast*": http://www.pwc.com/en_GX/gx/aerospace-defence/assets/aerospace-and-defence.pdf

² http://ir.baesystems.com/investors/storage/woolf_report_2008.pdf

³ The Ethical Leadership Group is a global provider of business ethics and compliance services. It provides consulting services in the areas of governance and risk management assessment, training and strategy: www.globalcompliance.com/Expert-Advice/Overview.aspx

opportunities for improvement. These have been incorporated into BAES' continuing business conduct programme consistent with BAES' objective to be in the vanguard of ethical best practice.

3. OVERVIEW OF NEGOTIATIONS

From 1991 BAES' predecessor, British Aerospace, was in discussions with South African companies about the sale of civil aircraft and with the South African Government about the Government's possible purchase of Hawk aircraft. In 1995, after British Aerospace formed a joint venture with the Swedish company, Saab AB (**Saab**), those discussions relating to military aircraft also included a possible purchase of Gripen aircraft. The discussions about military aircraft did not, however, result in any concluded agreements.

In January 1998, the South African Air Force (**SAAF**) launched the Advanced Light Fighter Aircraft (**ALFA**) and the Lead In Fighter Trainer (**LIFT**) procurement programmes as part of the SDPP. In response to requests for offers, BAES (jointly with Saab) submitted: (i) in May 1998, a proposal to sell 38 Gripen aircraft for the ALFA programme for US\$1.877 billion; and (ii) in June 1998, a proposal to sell 24 Hawk aircraft for the LIFT programme for US\$599.761 million.

In November 1998, the South African Government selected BAES and Saab as its preferred suppliers on the basis of the proposals submitted, but reduced the number of Gripen aircraft to be purchased from 38 to 28. In February 1999, BAES submitted a revised joint proposal to sell 28 Gripen and 24 Hawk aircraft for US\$1,682.7 billion. In July 1999, following further discussions about price with ARMSCOR, the procurement agency for the South African Department of Defence, BAES proposed two alternative joint packages for delivery in tranches of a total of 28 Gripen and 24 Hawk aircraft for US\$2.23 billion.

In September 1999, the South African Government announced its decision to procure 28 Gripen and 24 Hawk aircraft. In December 1999, the purchase contract was signed by the South African Government and BAES with a back-to-back contract between BAES and Saab in relation to the Gripen aircraft.

The contract was to be executed in three tranches with 9 Gripen and 12 Hawk aircraft to be supplied for "Tranche 1". ARMSCOR had an option without penalty until 31 March 2002 to cancel "Tranche 2", consisting principally of the remaining 12 Hawk aircraft. Similarly, ARMSCOR had an option expiring on 31 March 2004 to cancel "Tranche 3" consisting principally of the remaining 19 Gripen aircraft. In the event, ARMSCOR did not exercise its cancellation rights but proceeded with the full order.

The agreed contractual price for 24 Hawk aircraft was US\$624 million (US\$24.1 million more than the original proposal) and for 28 Gripen aircraft US\$1,514 million (US\$169.1 million less than the original revised proposal). The contract for the Hawk aircraft included the provision of spares and a ground support equipment package, training, training devices, facility data packs, technical publications and field service representatives support. The transaction also imposed obligations on BAES and Saab to provide very significant countertrade (or "offset") to South Africa, as explained in section 5 below.

The contract for the Hawk was for 24 Mk120 aircraft with one of these aircraft (the SAO1) to be fully assembled in the UK and sent to South Africa and the remaining 23 aircraft to be assembled from kit parts by Denel SOC in South Africa. The first deliveries of these aircraft were due in 2005 with the exception of the SAO1, which was to be used for flight development at the Test Flight and Development Centre near Cape Town. The Hawk aircraft were to be operated exclusively by 85 Combat Flying School based at Air Force Base Makhado in the Limpopo Province.

All the Hawk aircraft have been delivered. There are a number of continuing connected activities.⁴ Delivery of these activities is not due to be completed until at least 2013.

In 2007, BAES was awarded a contract to provide technical assistance, the supply of spares and a repair service. This contract had a value of approximately £20 million (including £15 million of spares and repairs of items).

⁴ Current programmes consist of two maintenance capabilities (Hydraulic Air and Fuel and Auxiliary Power Unit) and an upgrade to the Operational Flight Trainer

A support contract for technical assistance (which included an enabling element for on-demand spares and repairs), which had a value of approximately £6.3 million, was awarded in 2011. The support contract expires in March 2016 (with final completion likely to occur at a later date as any outstanding commitments are delivered).

BAES understands that all of the Gripen aircraft have been delivered. We respectfully refer the Commission to the manufacturer, Saab, for further information about these aircraft.

4. THE AIRCRAFT

There have been allegations that the Hawk was inferior to, and more expensive than, other aircraft in the bidding process for South Africa's LIFT programme, which included the Aermacchi MB-339C (the **Aermacchi**), the Aero L-159, MiG-AT and Yak-130. BAES considers that a comparison of the Hawk with its principal rival for the SDPP, the Aermacchi, demonstrates that the Hawk is the superior, and overall more cost-effective, aircraft.

(i) The Hawk

The version of the Hawk aircraft purchased by the SAAF represents a new generation of aircraft. It features a new wing, forward and centre fuselage, fin and tail plane, and has only ten percent commonality with the existing first-generation Hawk aircraft. The SAAF Hawk is equipped with a powerful Rolls Royce engine and has high-level technology navigation and weapon delivery systems.

The Hawk aircraft has had strong export success throughout the world. It has been consistently selected in competitive tenders and is used in Australia, Bahrain, Canada, Finland, India, Indonesia, Kenya, Kuwait, Malaysia, Oman, Saudi Arabia, South Korea, the UK, Zimbabwe and Switzerland. It has operated successfully in a wide range of conditions, including the Arctic Circle, the Middle East and the Tropics.

The Hawk introduces the student pilot to operational front-line fighter aircraft performance in a training environment, reducing the time needed on expensive-to-operate, front-line aircraft, and is the training aircraft of choice for many countries. With its advanced avionics and equipment, reliable

airframe and 3,000kg payload, the Hawk provides advanced flying and weapons training, which addresses the skills a student pilot needs to master to become a front-line pilot. With proven low maintenance requirements and low life cycle costs, the Hawk provides a cost-effective, realistic training environment for future front-line combat aircrew.

The Hawk programme in South Africa provides a training system which is ideally suited to young inexperienced pilots through to more experienced pilots. The new aircraft replaced the SAAF's Impala aircraft which had started to be produced in South Africa in the 1960s. As a result South Africa's new young pilots benefit from far more effective fighter pilot training that facilitates a smoother transition from basic training to more advanced roles. It also means that South African pilots enjoy the benefits of a new jet trainer programme comparable to programmes being offered by the Royal Air Force, the US Navy, the Royal Australian Air Force, the Canadian-based NATO Flying Training programme and the air forces of Kenya and Zimbabwe.

There has been a continuing development programme for the Hawk which has enhanced its capabilities and embodies many product improvements, derived from the experience of over one million flying hours in-service worldwide.

(ii) Aermacchi MB-339C

The Aermacchi was the Hawk's principal competitor in the competition to supply the SAAF. It is a modified and updated version of the Aermacchi MB-326 basic jet trainer which first flew in 1957. Improvements consist of an up-rated engine, new front fuselage for improved view from the rear cockpit and a re-profiled wing leading edge. The design of the airframe and its Rolls Royce Viper 680 engine, however, remain those of the original MB-326 aircraft. The Aermacchi is used in Dubai, Eritrea, Ghana, Italy, Malaysia, Nigeria, Peru, Singapore and the United Arab Emirates.

The overall performance of the Aermacchi falls between that of a turboprop and a proven advanced jet trainer. As a basic trainer the aircraft performs both competently and safely. In comparison to the Hawk, however, the Aermacchi does not offer a wide range of performance skills training.

The initial unit cost of the Aermacchi is lower than the initial unit cost for the Hawk, but this figure is misleading when calculating costs of ownership. When the real cost of maintenance and support for the Aermacchi over its lifetime is added to that of acquisition, the cost of ownership of the Aermacchi compares unfavourably with the Hawk. The average cost for the Aermacchi is US\$1,609 per flying hour, compared to US\$1,060 per flying hour for the Hawk (i.e. US\$549 per hour cheaper) demonstrating that the Hawk provides better value for money.

The Aermacchi is also inferior to the Hawk in a number of other areas, including the Hawk's abilities to give the student pilot a realistic experience of front-line aircraft, to carry a greater payload and full fuel (which enables a much greater range) and to fly night-time missions (whereas the Aermacchi aircraft is limited to short range daylight missions only).

(iii) Comparison of the Hawk and Aermacchi aircraft

There are a number of comparable features of the Hawk and the Aermacchi. The Hawk is widely regarded as superior when assessed against those features.

The Hawk is widely acknowledged as having broader operational performance than the Aermacchi. The Hawk can be used for both training and operational purposes (meaning that an air force could deploy Hawks during times of crisis and redeploy for training purposes during peacetime). Further, the Hawk offers Forward Looking Infrared which enables it to carry out missions both during the day and at night and in a range of conditions, unlike the Aermacchi which is limited to short range and daylight ground attack missions. BAES provides a proven operational flight trainer and simulator with the Hawk which is more advanced and realistic than the fixed-base cockpit simulator provided with the Aermacchi.

With respect to operational capabilities, the Hawk has a higher maximum payload and is the most capable trainer aircraft in delivering heavy ordinance over the furthest distance. Unlike the Aermacchi, the Hawk does not require a choice between reduced payload or reduced fuel load (which limits the capability of the aircraft in operational missions). The Hawk is also equipped with various

defence aids, such as Chaff⁵ and Flare⁶ and a RWR system,⁷ which provide a high level of protection for the aircraft when flying.

The Hawk has an advantage over the Aermacchi in relation to life cycle and maintenance requirements. It has a longer aircraft lifespan and a lower average cost per flying hour than the Aermacchi. The Hawk requires a shorter time on the ground for maintenance during the life cycle of the aircraft, meaning that it is available for more time during the course of a year for operational missions and training. The Hawk uses a more advanced engine than the Aermacchi: the Rolls Royce Adour Mk 951 engine fitted on the Hawk offers better fuel consumption, greater thrust and has generally had fewer problems reported than the Rolls Royce Viper turbojet engine fitted on the Aermacchi.

A technical comparison of the two aircraft is given at Appendix 1.

5. OFFSET

The requirement for a supplier to provide industrial, commercial or other economic benefits to the purchasing country as compensation for the main contract (**Offset**) is "*a characteristic of virtually all defence contracts*"⁸ and is frequently a major determining factor in the award of contracts. It is common practice for the government of the recipient nation to use credit multipliers to encourage investment in key areas which it wishes to target. The value and number of Offset agreements and transactions related to defence contracts is high.⁹ They are used by over 130 countries¹⁰ and are particularly favoured where development of its defence industry is considered by the local government to be important. A suggestion that there was anything unusual or improper in the use of Offset as an important criterion in awarding the ALFA and LIFT contracts to BAES and Saab is unwarranted.

⁵ A radar countermeasure

⁶ An aerial countermeasure against heat-seeking missiles

⁷ A radar warning receiver system

⁸ Woolf Report page 27 at 3.43

⁹ As an example, according to the US Department of Commerce's Bureau of Industry and Security, between 1993-2009, 49 US firms reported entering into 736 offset-related defence export sales contracts worth US\$108.22 billion with 46 countries. The associated offset agreements were valued at US\$75.90 billion. (*Offsets in Defense Trade Fifteenth Study, December 2010*)

BAES and Saab had Defence Industrial Participation (DIP) and National Industrial Participation (NIP) obligations to South Africa under the SDPP, each of which was fulfilled on, or ahead of, time. The criticism which has been levelled at BAES and Saab about the delivery of their Offset obligations is therefore without foundation. The total Industrial Participation (IP) package of around US\$8.7 billion amounted to almost 400% of the contract value and represented an offer which substantially exceeded the stated requirements for both DIP and NIP and recognised South Africa's aims to stimulate significant broad-based, export-related economic development through defence procurement.

(i) DIP

The DIP obligation was US\$1.488 billion comprising a Hawk obligation of US\$680 million and a Gripen obligation of US\$808 million. The DIP objectives set down by the South African Government were:

- the retention, and where possible, creation of jobs, abilities and capabilities;
- the establishment of a sustainable defence, industrial and economic base, with strategic logistical support capabilities;
- the promotion of defence exports of value-added goods;
- the promotion of like-for-like (comparable levels) technology transfers and joint ventures;
- the maintenance of skilled indigenous manufacturing capabilities; and
- the provision of a sustainable local defence industry capacity.

The DIP programme achieved these objectives by focusing primarily on long-term roles for the South African aerospace and defence industry, both directly in the supply of aircraft to South Africa and also

¹⁰ Transparency International Defence Offsets, "Addressing the Risks of Corruption and Raising Transparency", at page 9: http://archive.transparency.org/publications/publications/other/defence_offsets

as an industrial partner on aircraft export and Swedish programmes. The obligations were met by a combination of technologies, investments, orders and Offset trades.

Both the Hawk and the Gripen portions of the DIP obligation have been fulfilled, equating to US\$680,341,667 and US\$808,049,501 respectively, as confirmed by ARMSCOR in February 2012.

(ii) NIP

The NIP obligations amounted to US\$7.2 billion and were required to be discharged over an 11 year period, ending in 2011. The NIP objectives set down by the South African Government were:

- sustainable economic growth;
- the establishment of new trading partners;
- foreign investment into South Africa;
- the export of South African value-added goods and services;
- black economic empowerment;
- research and development collaboration in South Africa;
- the export of at least 70% (seventy percent) of goods and services produced by NIP activities;
- employment creation and retention;
- human resource development;
- technology transfer;
- economic advantages for previously disadvantaged communities; and
- the promotion of small, micro and medium-sized enterprises.

The NIP programme achieved these objectives via a package of major industrial activities spanning many industrial sectors. It sought to focus on the technological and industrial areas that had been

identified by the Department of Trade and Industry as priority areas and which, through the nature of the projects and the companies involved, would help the South African manufacturing market develop across borders.

In October 2011, the Industrial Participation Control Committee informed BAES that it had successfully met its entire NIP obligation of US\$7.2 billion. This was confirmed by the South African Department of Trade and Industry in March 2012.

6. ADVISERS

BAES engaged advisers in relation to BAES and Saab. BAES paid approximately £115 million to advisers in connection with the sale of civil and military aircraft (including Hawk and Gripen) in South Africa and in fulfilling Offset obligations.

Some campaigners have suggested that the payment of these commissions is evidence in itself that there was corruption in the procurement process. The Institute for Accountability¹¹ has suggested to the Commission that an admission of bribery was made in the UK's House of Commons in 2003. In fact, the statement made by the then Secretary of State for Trade and Industry, Patricia Hewitt MP, on 9 June 2003 in relation to BAES' sale of Hawk aircraft to South Africa, was *"ECGD's application process requires certain details of agents' commission to be disclosed to ECGD in order that it can follow its due diligence procedures. In this case such due diligence procedures were followed and no irregularities were detected. For reasons of commercial confidentiality specific details of the commission paid cannot be revealed."*¹² The Institute for Accountability's letter to the then Evidence Leader of the Commission dated 14 November 2011 submitted that the word *"commissions"* meant *"bribes"*. These assertions do not accurately characterise the statement made by the Secretary of State. They also reflect a misunderstanding of the nature of the procurement process.

The use of advisers by international companies exporting to countries where they have no material in-country capability or staff was, and is, commonplace across many industries. This approach offers a

¹¹ The Institute for Accountability in Southern Africa is a not-for-profit organisation aimed at upholding constitutionalism in Southern Africa

lower cost base for long lead time programmes compared to basing staff in-country, ultimately leading to a lower cost of sales to the customer. It is widely accepted that Offset obligations require contractors to employ advisers to perform roles which include providing local knowledge of market-specific procurement processes and practices.¹³

In the 1990s, BAES' sales strategy worldwide was to incur no cost in-country itself but rather to engage local advisers upon whom the costs fell. Further, the advisers assumed all the financial risk of the procurement process, saving BAES a fixed overhead which, in the case of South Africa, BAES estimates (based on the costs of other overseas offices) to have been in the order of approximately £4.2 million annually.

BAES' work in South Africa began in 1991 and has run for more than 20 years. The SDPP contracts were worth in excess of £2 billion and incorporated very significant Offset obligations. The actual spend on advisers in relation to BAES and Saab was well within what any company bidding for contracts of this sort would have expected to incur.

This is not to say that BAES would adopt exactly the same approach for a similar procurement process today. BAES undertook a comprehensive review of its relationships with advisers in 2007 as a result of which BAES terminated its contractual relationships with its advisers globally including those acting in relation to the SDPP. In its report, the Woolf Committee considered that BAES' revised process for the appointment, selection and management of advisers was "*leading-edge practice*".

The conduct of advisers relating to BAES and Saab products in the course of the SDPP has been subject to a number of detailed investigations over many years. None of these investigations has demonstrated unlawful conduct on their part.

¹² <http://www.publications.parliament.uk/pa/cm200203/cmhansrd/vo030603/text/30603w84.htm>

¹³ Transparency International, "*Due diligence and corruption risk in defence industry offset programmes*", section 2

7. INVESTIGATION AND SETTLEMENT

As is well known, in July 2004 the SFO began investigating allegations against the BAES group. That investigation included an investigation of the sale of Hawk and Gripen aircraft to South Africa. In the course of the five years of that investigation, BAES disclosed hundreds of thousands of documents to, and made relevant employees available for interview by, the SFO, at a cost to BAES of tens of millions of pounds. BAES believes that the SFO obtained documents from others in the UK, South Africa and elsewhere, and interviewed many individuals. In 2007, the US Department of Justice (the **DOJ**) also began an investigation of BAES' business.

In February 2010, BAES agreed with the SFO and the DOJ the basis upon which the investigations should be concluded. In the UK, BAES agreed to plead guilty to one charge of failing to ensure that the books and records of one of its subsidiaries were reasonably accurate in relation to a transaction in Tanzania and to make a payment for the benefit of the people of Tanzania. In the US, BAES agreed to plead guilty to making false statements to the US Government and certain export control violations. None of the charges against BAES related to its activities in South Africa. BAES did not plead guilty to any offences of bribery or corruption.

BAES understands that the South African authorities have also investigated allegations concerning the sale of Hawk and Gripen aircraft to South Africa. In 2001, the Joint Investigation Team reported that it had found no evidence of improper or unlawful conduct by the Government. It appears that the matter has also been investigated by the Scorpions but BAES has not been informed that that investigation made any adverse findings.


8. CONCLUSION

In the 1990s BAES, in partnership with Saab, responded to the South African Government's request for a replacement for the SAAF's Impala aircraft. In so doing, BAES offered and sold to South Africa Hawk aircraft, which have been successfully exported to countries throughout the world.

BAES and its predecessor companies are proud of their partnership with South Africa over the past two decades. They have met their obligations both in the delivery of the aircraft themselves and in relation to Offset, each to the evident satisfaction of the South African authorities.

BAES hopes that the Commission finds this overview useful and is able to bring its investigation to a satisfactory conclusion.

Dated at Sandton on this the 26th day of July 2012.



EDWARD NATHAN SONNENBERGS INC

Per: Theo Buchler and Heinrich Meiring

Attorneys of record

Physical address: 150 West Street, Sandown, Sandton

Postal Address: P.O. Box 783347, Sandton, 2146

Email: tbuchler@ens.co.za and hmeiring@ens.co.za

Tel: 011 269 7600

Fax: 011 269 7899

Ref: T Buchler/ H Meiring / 0325439

APPENDIX 1

Technical comparison of the Hawk and Aermacchi aircraft¹⁴

Area	Aermacchi MB-339C	BAE SYSTEMS Hawk 100 Series Aircraft
Average lifecycle costs	[Commentary] The average cost per flying hour is US\$1,609.	[Commentary] The average cost per flying hour of the Hawk aircraft is lower than the Aermacchi aircraft at US\$1,060 per flying hour.
Operational Performance	<p>Max level speed at S/L: 496 kt</p> <p>Max rate of climb at S/L: 6,890 ft/min</p> <p>Service ceiling: 46,000 ft</p> <p>Ferry range:¹⁵ 1,100 nm</p> <p>The Aermacchi is a two-seat fighter lead-in trainer and attack aircraft. It does not have FLIR¹⁶ installed as standard. It offers conventional flying controls with power-assisted ailerons, manual elevators and</p>	<p>Max level speed at S/L: 540 kt</p> <p>Max rate of climb at S/L: 11,800 ft/min</p> <p>Service ceiling: 44,500 ft</p> <p>Ferry range: 1,360 nm</p> <p>The Hawk 100 series¹⁷ offers a two-seat weapons system (with option for pilot only on combat missions), advanced Smiths Industries HUDWAC¹⁸ and a new air data sensor package with optional laser ranging and FLIR in extended nose. It also offers an improved weapons</p>

¹⁴ Unless otherwise stated, all technical data is sourced from Jane's All the World's Aircraft 1999-2000. Jane's "has served as an unparalleled reference to aircraft under development or in production for more than 100 years. This trusted resource provides the intelligence you need to adapt to a shifting landscape, evaluate competitors and identify market potential for new programs and products"

¹⁵ With two underwing drop tanks and 10% reserves

¹⁶ Forward Looking Infrared System. FLIR uses imaging technology which senses infrared radiation, thereby helping pilots to steer their planes at night

¹⁷ The Hawk 120 used in South Africa is a variant of the Hawk 100 series

¹⁸ Head-Up-Display Weapon Aiming Computer

Area	Aermacchi MB-339C	BAE SYSTEMS Hawk 100 Series Aircraft
	<p>rudder. Its mission systems comprise of a Kaiser Sabre head-up display and weapon aiming computer, logic stores management system, and an optional laser range finder. The Aermacchi does not have FLIR or ECM pods installed as standard.</p>	<p>management system over the Hawk 60 series aircraft, allowing pre-selection in flight and display of weapon status, manual or automatic weapon release, passive radar warning, HOTAS¹⁹ controls, full colour multipurpose CRT²⁰ display in each cockpit and provision for ECM²¹ pods.</p> <p>The model selected by the South African Government was the lead-in fighter trainer, which offered additional features including the combat wing, new three MFD²² glass cockpit with NVG²³ compatibility, a MIL-STD-1553B digital databus, revised mission planning system and data transfer unit, and capability for aerial refuelling. The built-in FLIR system and NVG capability means that the Hawk is capable of carrying out missions in both daylight and darkness and in various conditions.</p>

¹⁹ Hands On Throttle And Stick

²⁰ Cathode Ray Tube

²¹ Electronic Counter Measures

²² Multi Function Display

²³ Night Vision Goggle

Area	Aermacchi MB-339C	BAE SYSTEMS Hawk 100 Series Aircraft
		The Hawk 100 series is not solely a training aircraft and can be used for both training and operational purposes.
Operational Capabilities	<p>Max weapon payload: 1,814 kg</p> <p>Max takeoff weight (clean): 5,030kg</p> <p>The Aermacchi can be equipped with a variety of aids including a radar warning receiver, chaff and flares dispensing system and electronic counter measures.²⁴</p> <p>[Commentary] However, given the lower maximum payload of the Aermacchi, it is likely that carrying all of these aids will restrict weight capacity in other areas.</p>	<p>Max weapon payload: 3,000 kg</p> <p>Max takeoff weight (clean): 9,100 kg</p> <p>The Hawk aircraft is equipped with various defence aids including radar warning systems, chaff and flare which combine to give a high level of protection. These can also be operated manually or put on 'automatic self-protection' mode to operate on their own which leaves the crew free to deal with combat operations.²⁵</p> <p>[Commentary] The Hawk's capability to carry the maximum weapon payload is not reduced by fuel load. Both the maximum payload and the fuel load can be carried simultaneously with no reduction in the radius of activity.</p>
Engine	Engine: Rolls Royce Viper 680	Engine: Rolls Royce Adour Mk 861A

²⁴ <http://www.airforce-technology.com/projects/mb339/>

²⁵ <http://www.airvectors.net/avhawk.html>

Area	Aermacchi MB-339C	BAE SYSTEMS Hawk 100 Series Aircraft
	<p>First available: 1950s</p> <p>Max thrust: 4,400 lb</p> <p>Fuel consumption (dry): 1.09 lb/hr/lb</p> <p>[Commentary] Owing to its design, if one part of the Viper engine needs to be replaced, that part cannot simply be removed and substituted with a new part. The whole engine must be replaced.</p>	<p>First available: 2000</p> <p>Max thrust: 6,000 lb</p> <p>Fuel consumption (dry):²⁶ 0.81 lb/hr/lb</p> <p>[Commentary] The Adour is designed so that if part of the engine fails, this section can be removed, rather than requiring a removal of the whole engine or a complete replacement engine. Over 2,800 of these engines have been sold to date acquiring over 7 million flying hours for over 20 different armed forces as of 2009.²⁷</p>
Availability of aircraft	<p>The Aermacchi requires scheduled maintenance at 150 and 300 hour intervals. It therefore spends more days on the ground for maintenance within the overall life cycle of the aircraft.</p>	<p>The Hawk LIFT is not subject to scheduled maintenance like the Aermacchi therefore it spends a shorter amount of time on the ground.</p>
Aircraft fatigue	<p>The Aermacchi is designed to MIL-A-8860A²⁸ for 10,000 hours service life.</p>	<p>The new variants of the Hawk aircraft (including the Hawk 100 series) have a fatigue life of 24,000 hours.²⁹</p>

²⁶ www.rolls-royce.com/defence/products/combat_jets/adour.jsp

²⁷ www.rolls-royce.com/defence/products/combat_jets/adour.jsp

²⁸ The airplane strength and rigidity general specification of the Aermacchi

²⁹ The original Hawk had a 6,000 hour fatigue life, but the new variants are said to have four times the fatigue life of the original series: <http://www.fighter-planes.com/info/hawk.htm>; www.defenseindustrydaily.com/britain-orders-29-hawk-lift-advanced-fighter-trainers-02734

Area	Aermacchi MB-339C	BAE SYSTEMS Hawk 100 Series Aircraft
Training capabilities	<p>The Aermacchi has a lower maximum speed and shallower maximum rate of climb than the Hawk.</p> <p>Although it offers Lead-In Fighter Training facilities, it does not include many of the extra features found on the Hawk such as the colour displays and night vision capability. The straight wing shape of the Aermacchi prevents the development of the requisite skills needed to fly in front-line combat situations.</p> <p>The Aermacchi's limited payload also means that the aircraft is less suited to advanced weapons and tactical training. As a result, an additional aircraft is required to allow students to progress safely on to front line aircraft which is a drain on time and funds.</p>	<p>As noted above, the Hawk has a higher maximum level speed and steeper rate of climb than the Aermacchi. It reaches an equivalent of Mach 0.87 in level flight and Mach 1.2 in a dive, thus allowing trainees to experience trans-sonic flight before advancing to a supersonic trainer.³⁰</p> <p>[Commentary] The Hawk LIFT features Lead-In Fighter Training facilities and is equipped with modern cockpit technology. It is designed to be closer to flying front-line fighter jets due to its combat wing with wing pylons that are capable of carrying substantial amounts of stores and ammunition.³¹ Moreover the LIFT series has an improved wing shape to enhance combat efficiency. In training, this saves time and resources as it allows the student pilot to develop his or her flight skills to a higher level of expertise and often produces a smoother transition between required training</p>

³⁰ David Donald, "British Aerospace (HS) Hawk", The Complete Encyclopedia of World Aircraft, 1997

³¹ <http://www.airvectors.net/avhawk.html>

Area	Aermacchi MB-339C	BAE SYSTEMS Hawk 100 Series Aircraft
		systems.
Training support systems	The Aermacchi comes with a static simulator to enhance the training experience. This aircraft simulator can be used to familiarise pilots with the control and operation of the Aermacchi systems for general handling alongside normal and emergency procedures training.	The Hawk aircraft comes with a full flight trainer and simulator. The simulators can be used throughout the training process from the beginning stages to the more advanced areas of training. The enhanced visuals contribute to the realism of the simulations. ³²

³² www.raf.mod.uk/rafvalley/stationfacilities/simulator.cfm