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Cranfield UNIVERSITY

Defence College of Management and Technology

INVESTIGATION INTO THE CRASH OF DASSAULT FALCON 50 REGISTRATION NUMBER 9XR-NN ON 6 APRIL 1994 CARRYING FORMER PRESIDENT JUVENAL HABYARIMANA

CONTRACT REPORT
by

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1.0 INTRODUCTION

Cranfield University were tasked by The Independent Committee of Experts to Investigate the crash on 6th April 1994 of the Falcon 50 Registration 9XR-NN (see Fig 1). Two experts from Cranfield University and the Defence Academy of the United Kingdom – Mr M Warden assisted by Mr Alan McClue - visited Rwanda between 17th February 2009 and 24th February 2009 in order to carry out an investigation in accordance with a scope of work that had been agreed following meetings with Members of the Committee in London and by exchange of emails and correspondence. The detailed scope of work is included at Annex A.

The authors we were invited to examine the crash scene and the wreckage as it currently exists in 2009 some 15 years after the incident and to compare the wreckage with photographs of the scene and wreckage taken in 1994 (two sets Annex I and Annex J), and 2007 (one set Annex K). In doing so members of the Committee of Experts acknowledged that:

- Major elements of the wreckage were missing principally the cockpit and fuselage.
- That the wreckage currently present in 2009 had been moved including major elements from the garden of the residency to positions outside the boundary wall of the residency.
- That elements of the wreckage had been vandalized or removed by members of the local population.
- That following the crash military activity including the discharge of weapons of various calibres had taken place in the area of the crash site and therefore it is possible that this may have impacted on the wreckage and crash site.
- We were informed by The Committee that the air traffic /control tower recordings which may have provided the authors with evidence and which are mentioned in Judge Jean Loiuis Bruguieres's indictment are believed to be in possession of the French Court. The Committee informed the authors that as soon as these tapes and any other electronic evidence are released by the court in Paris to Rose Kabuye's lawyers they will be made available to authors for analysis.

Fig. 1: Dassault Falcon 50 9XR-NN photographed in 1991

The authors were authorized to take small section samples of the wreckage where possible forensic evidence of a missile strike was found and remove these for analysis in the UK at Cranfield/UK Defence Academy. A number of samples worth further investigation were found and analysis of these was carried out and the results reported on – See Annex P and Section 4.

The authors were able to manipulate the wreckage to examine all relevant surfaces.
The authors undertook the coordinate plotting of all relevant key locations utilizing Global Positioning Systems. (GPS)
No physical ballistics evidence used or suspected of being used in the downing the aircraft was made available to us.
In accordance with the agreed scope of work we carried out an examination and analysis of witness statements supplied by The Committee that contain references to:
a) The flight path of the subject aircraft as it approached Kigali.
b) The suggested launch location of surface to air missiles.
c) The impact or explosion whether sound or visual.
d) The crash site.
Following examination of the witness statements and making site visits it was not thought necessary by the authors for them to interview witnesses.
We visited all physical locations described in the witness statements including but not exclusively, the airfield, control tower, crash site, Camp Kanombe, possible surface to air missile launch sites, and observation positions cited in witness statements.

Following the investigation in accordance with the agreed scope of work the authors undertook to produce a report for the Committee.

The authors acknowledge that we were given unrestricted access to all locations that we requested access to.

2.0 EXAMINATION OF THE CRASH SITE

The authors spent a total of 29 man hours at the crash site. The site has changed considerably in the 15 years since the crash. Cultivation and weathering of the site, theft and possible vandalisation of parts of the wreckage and restoration to sections of the President's Residence have all combined to reduce the worth of the available forensic and visual evidence.

A sketch map at Annex G of the current site was produced using laser range finding equipment and this map should be compared with the 1994 map produced by the Belgian military authorities and given to us by the Committee and included as Annex F.

The spread of wreckage and evidence at the crash site has been reduced from 150m in 1994 to approximately 45m in 2009. It was noted that a large proportion of the aircraft wreckage including the fuselage, cockpit and front portion of the left wing was not present. It should further be noted that a number of these elements are clearly seen in the series of photographs from 1994 (see Annex J). It was confirmed by the custodian and workers from the President's Residence through a member of the Committee that the missing elements had been removed by local scrap hunters.

The information supplied at Annex F is consistent with that observed by the authors. The impact crater marked A on Annex F is shallow and is consistent with the aircraft descent angle being at a maximum of 20 degrees to the horizontal as stated in Annex F. In the sketch in Annex F no aircraft wreckage is marked as present in the crater. Aircraft debris would be expected to be found in the crater if the aircraft had adopted a more vertical descent into soft earth. At the time of this report the centre engine of the aircraft was found in the impact crater as marked on Annex G. All items of wreckage from the confines of the President's Residence had been removed or relocated.

3.0 EXAMINATION OF THE AIRCRAFT WRECKAGE

Every element of available aircraft wreckage was subjected to a thorough visual field examination and was photographed in situ (see Annex L). All elements were moved to examine the underside and then returned to their original positions in order to maintain the historical reference integrity of the site as requested by the Member of the Committee in attendance.

Detailed photographs of the overview of the crash site, individual elements and close up images of possible forensic evidence are shown in Annex L.

The following items of wreckage were examined primarily for any signs of damage consistent with an attack by a surface to air missile or any other external cause such as small arms fire or on board improvised explosive device (IED). The damage pattern expected from the above would be entirely different from that expected with the aircraft having impacted with the ground and broken up.

- Centre Engine
- Tail exhaust cone
- Nose wheel
- Tail section
- Rear section of left wing
- Right wing
- Tail left wing
- Wing landing gear section
- Pylon engine (1)
- Pylon engine (2)
- Lower tail/fuselage section

The majority of the rear and right wing of the aircraft was accounted for as large individual elements but all of the forward section; fuselage, cockpit and the forward section of the left wing were missing from the crash site. After 15 years of unprotected exposure nearly all of the smaller items of wreckage from the aircraft were not present. Given the timescale available for the investigation and the previous cultivation of the site no sub surface search for items of wreckage was carried out.

There was no conclusive evidence on the remaining elements to identify anything but damage caused to the aircraft as it impacted the ground.

Small areas of possible fragmentation damage were apparent on various elements and these were investigated and examined as described below. Without further detailed analysis it has not been possible at this stage to confirm whether the damage was caused at the time of the incident or subsequently.

4.0 EXAMINATION OF FORENSIC EVIDENCE FROM THE AIRCRAFT WRECKAGE

Detailed photographs of possible forensic evidence are shown in Annex L. A portion of the rear section of the left wing exhibited possible fragmentation damage including an area believed to have been exposed to fire damage and subsequent corrosion. Unfortunately the fragments had either fully penetrated through both outer skins of the wing or where they had only penetrated a single skin these had been lost to ground through the nature of the wing construction and the forward section being open to ground. No residual fragmentation was found and no ground search was carried out.

A box panel on the lower tail/fuselage section exhibited some possible fragmentation damage and some surface fragmentation capture. The box panel was compartmentalised into three sections separated by internal support struts to which the outer skins of the aircraft were riveted. By careful cutting to open the upper section and by popping the rivets each compartment

was exposed in turn. Following peeling back the outer skin on the top side to assist in the preservation of any possible forensic evidence samples were collected. This procedure was repeated for each compartment.

After fifteen years the majority of the contents of each compartment comprised possible organic matter. The matter was carefully sifted to expose any metallic material that may have been the cause of the fragmentation present on the box panel outer skin. A small quantity of possible metallic residue was collected for analysis by Cranfield University on the authors return to the UK. A section of the box panel outer skin approximately 210mm x 150mm exhibiting some surface fragmentation capture was removed by the authors for subsequent analysis in the UK. The embedded material exhibited possible oxidization characteristics indicating unlike materials to the outer skin of the box panel. The results of the analyse carried out are included at Annex P and commented upon in Section 8 – Conclusions.

All other elements where possible fragmentation damage had occurred were thoroughly investigated and examined but no residual materials of apparent forensic significance were found**.**

5.0 EXAMINATION OF FORENSIC EVIDENCE HELD BY THE AUTHORITIES OF RWANDA.

The authors requested access to any ballistics evidence both physical or narrative in possession of the authorities of Rwanda in order that any such evidence could be examined by the authors. Other than the written witness statements analysed below and the sketch map at Annex F no additional material was provided by The Committee which has confirmed to the authors that to the best of its knowledge no other material evidence is held by Rwandan authorities except that visited at the site of the crash..

6.0 VISITS TO RELEVENT LOCATIONS.

6.1 **Crash Site** S01* 58.534’ E030 10.434’ Elevation 1430m

Photographs of crash site both general and detailed are included in Annex L for the purpose of comparison with photographs taken by other in 1994 Annexes I and J and 2007 Annex K

6.2 Additional locations mapped for overview purposes

Karama Hill S01* 59.627 E030 09.749’ Elevation 1430m

Fig. 2: View from Karama Hill towards Eastern end of Runway

Rusororo Hill S01* 58.633’ E030 11.968’ Elevation 1466m

Fig. 3: View flight path approach to the East of Rusororo Hill

Fig. 4: View from Rusororo Hill showing Crash Site and Airport

Fig. 5: View from Rusororo Hill showing Crash Site and Airport

Fig. 6: View from Rusororo showing Flight Path to Airport

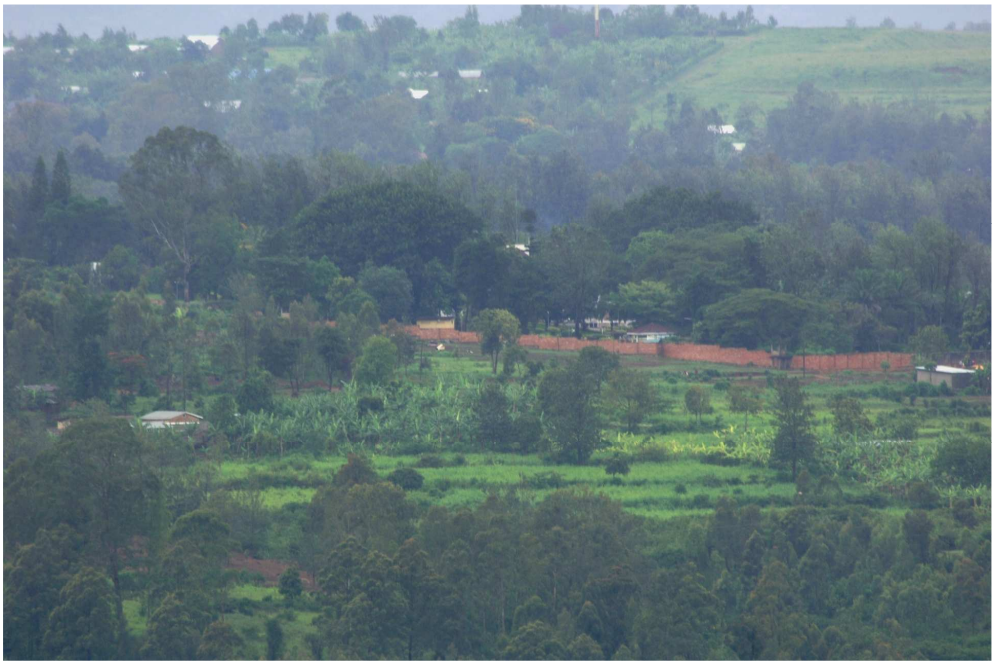


Fig. 7: View of Crash Site from Rusororo Hill. Showing Wreckage.

CEBOL (Musaka) S01* 59.303 E030 11.735’ Elevation 1356m

Fig. 8: View of Flight Path from CEBOL Masaka

Musaka Junction S01* 59.123 E030 11.487’ Elevation 1359m

No photograph taken**.**

6.3 Airport including Old Control Tower

Control Tower (viewing platform) S01* 58.206’ E030 08.276’ elevation 1505m (See photographs in Section 7.0)

Control Tower (ground level) S01* 58.216' E030 08.271 Elevation 1498m (See photographs in Section 7.0)

New Terminal Building (car park – not airside) S01 57.780' E030 08.083' Elevation 1481m

No photograph taken

6.4 Camp Kanombe

Dr PM Villa S01* 58.842' E030 10.254 Elevation 1449m

No photograph taken

N s Th In front paediatric building hospital S01* 58.755' E030 10.164' Elevation 1451m (See photographs in Section 7.0)

BS In front of Pavillion 7 hospital S01* 58.706' E030 10.122' Elevation 1451m (See photographs in Section 7.0)

TS Courtyard – Centre S01* 58.743' E030* 09.941' Elevation 1451m (See photographs in Section 7.0)

HG Courtyard NE Corner S01* 58.778' E30* 09.948' Elevation 1455m (See photographs in Section 7.0)

6.5 Additional Observation Positions of Witnesses

Rutongo Hill (Convent Site) S01* 49.571' E030 03.397 Elevation 1862m (See photographs in Section 7.0)

6.6 Possible Surface to Air Missile Launch Sites See Annex N

7.0 ANALYSIS OF AND COMMENTARY ON WITNESS STATEMENTS

The witness statements were provided to the authors of this report by The Committee supplied in French (see Annex D) and the following witness statements in English (see Annex E) were translated for the Authors for use in this report..

These statements had been grouped by The Committee into three categories:

- **a)** Witnesses placing the launch of the shots at/in the Kanombe Military Camp.
- **b)** Witnesses placing the launch of the shots in the immediate area of the Kanombe Military Camp.
- **c)** Witnesses placing the launch of the shots at the fence of the President's Residence.

The authors visited all locations referenced in each witness statement and in each case, where possible, established GPS references for the location in order to give

The Committee an opinion as to whether the statement was in whole, or in part, credible. In certain cases it was not possible to establish exact locations. In some cases a best estimate of a location has been given.

The approach taken below by the Authors has been to extract each witness's statement from Annex E and include it in the text below followed by an assessment of the credibility of the factual content specific to the destruction of the President's aircraft.

Witnesses placing the launch of the shots at the Kanombe military camp

1) Gerlache Mathieu (G.M)

Gerlache Mathieu was part of Belgian contingent of UNAMIR and found himself in the former control tower during the attack on the presidential plane. On the evening of 6 April 1994 he was in the radio room in the control tower. He declares the following:

I have already been the subject of interrogation by the judicial detachment in Rwanda on 13 April 1994.

I wish to clarify the following points :

The Rwandan armed forces camp in Kanombe was situated more or less 1.5km as the crow flies from the airport. Being installed in the former airport control tower at 5 to 6m high, our PC company as well as the radios were on the last floor of the tower. This last floor was a platform surrounded by glass. From the view that we had, we could see all the runways but not the Rwandan armed forces camp – this was found below.

On 6 April 1994 towards 20.30 while I was on duty in the radio room, I noticed that the lights on the runway had just lit up. I clarify that, indeed the lighting was always lit up. The runway was only lit up during the landing manouverers of the plane. I therefore left the control tower and leant on the guardrail of the platform to watch the plane come in, to land. I am definite that the lighting at the airport is never switched off during the approach of a plane. The lighting was indeed switched off but after the accident of the plane, I would not know how long after.

At the moment where the plane approached the airport, we did not know which plane it was. I saw a luminous point leave the ground. The direction of the start of this point was the Kanombe camp. I think that the colour of this point was white. One could have thought that it was a shooting star by virtue of its configuration. It is while I saw that the point took the direction of the plane that I realised that it must be missile fire. At that moment, the lights of the plane went out but the plane did not explode following the first shooting. The lights of the plane no longer came back on. The theory of the missile fire is reinforced while I saw a second luminous point, the same as the first coming from the same place, taking the direction of the plane. The plane exploded at that moment and fell more or less 500m from the President's residence, which was in line with the landing runway.

Directly after the moment the plane exploded, gunfire rang out. I could perceive on each side of the runway, and probably on both sides of the president's house, a number of firearms' shots, some of which were with tracer bullets.
I would no longer estimate the duration of the shooting. At the moment the plane exploded, I saw no servicemen from the Rwandan armed forces on the airport runways.

Following these events I informed by radio, the commander of the company, the S3 (CPT CHOFFRAY.) I pointed out to him that a plane had just exploded following a shooting of two missiles. The S3 did not take the information seriously, it was more or less an hour after the events that he announced, on the radio network, that it was a munitions depot that had exploded at Kanombe.

My commander of the company (CPT VANDRIESSCHE) went to the civil airport and learnt that it was the president's plane that had just exploded. When he returned, the CPT VANDRIESSCHE immediately informed a superior level of the exact events by radio. After some time, which I cannot estimate, but it could have been an hour, I saw from my control tower, the Mortier platoon arrive and make a stand-by on both sides of the runway. At that moment I left my position to go and speak with them »

Fig. 9: Old Control Tower showing Viewing Platform

Fig. 10: View of Runway from Old Control Tower looking East

Assessment.

Gerlache Mathieu appears to be a credible witness to the incident. His view of the approach of the President's aircraft from the Old Control Tower was verified by the authors and would have been unrestricted. His position was approximately 3.4 km from the crash site. As intimated in his statement Kanombe Camp is not visible from the vantage point occupied by GM but the camps general direction was known to him. His statement that two missiles were launched towards the President's aircraft from the general direction of "Kanombe Camp" is plausible.

Gerlache Mathieu's statement that he saw a "luminous point leave the ground" from the direction of Kanombe Camp and that he thought "the colour of this point was white" and "at that moment the lights of the plane went out" whilst not exploding may be consistent with the first missile strike.

He comments that the lights of the plane no longer came back on. He noted a second luminous point similar to the first coming from the same place, towards the plane following which he states the plane exploded. This could be consistent with a second missile strike.

Note: For comment relating to missiles that could meet the characteristics described above see Section 8.0. The following paragraph is specific to a SAM 16.

Gerlache Mathieu could not have observed the burn of the launch motor if the missile was a SAM 16 since the propellant of the launch motor is all burnt before the missile leaves the launch tube. However Gerlache Mathieu could have observed the exhaust of the flight motor as this burns for approx. 2

seconds to accelerate the missile to approximately 570m per second. The exhaust from the missile flight motor would therefore have been visible for a flight distance of approximately 1000m. (See Technical Specification at Annex H).

2) Sindano Cyprien (C.S) - Duty Commander at the Airport

Sindano Cyprien was on duty on the night of 6 April 1994. He was a direct witness of the attack. In his hearing he indicated that the presidential plane was announced at 20.30 and when the hour approached, he asked the control tower if it was in direct contact with the plane. The tower responded that the plane was visible. Sindano Cyprien therefore left his office to better observe and follow the plane's descent. He declared : *« All of a sudden I see something like a flame rise and overtake the path of the plane. Immediately after, a second was launched and hit the plane in full flight ».* When asked the question from where the shooting had left from, Sindano Cyprien responded without flinching : « *There was no other possible place, it was well and truly in the immediate area of the military camp ».* Then, in relation to the path of the missiles, Sindano Cyprien clarified that « *the two missiles would leave the ground and head towards the plane and their direction was from the right towards the left.*

Assessment.

Sindano Cyprien would appear to be a credible witness with an unrestricted view of the approach of the Presidents aircraft being located approximately 4.5km from the crash site. From his vantage point near the new terminal building at the airport his view of the flight of the missiles would be as he stated from the right towards the left. Hence by implication from the immediate area of the military camp i.e. Kanombe Camp.
Sindano Cyprien could not have observed the burn of the launch motor since the propellant of the launch motor is all burnt before the missile leaves the launch tube. However Sindano Cyprien could have observed the exhaust of the flight motor. (See comments made by the Authors in Assessment of (GM) above).

3) Cpl Rwamakuba Faustin (R.F.) - AIRPORT PRESIDENTIAL GUARD

Cpl Rwamakuba Faustin was present at the airport, waiting for the President on the night of 6 April 1994 and is witness to the attack. He declared : « *Two successful missile strikes were fired against the plane. It came below from the airport and went in the direction from where the plane came from to join the plane in the direction where it went ».*

Assessment.

The exact position from where Cpl Rwamakuba Faustin observed the incident could not be ascertained but his statement confirms the statements of GM and CS in the launch of two missiles and that these were from below the airport, and by implication the direction of Kanombe Camp. However his claim that two missile strikes were successful cannot be verified. Additionally he offers no description of seeing the missile flight path.

4) Sgt. Nsengiyumva Theogene (Ns.T.) - AIRPORT PRESIDENTIAL GUARD

Sgt. Nsengiyumva Theogene. found himself at the airport waiting for the Head of State. He was positioned at the end of the airport in the direction where the Kanombe military camp was situated. I heard three shots which left a place which was not from his position: « *I heard three shots which were fired near to the place where I was. I locate the launch of these shots as being in the proximity of the Kanombe millitary camp, more precisely between the camp and the airport, not far from the coffee plantations which were over there at this time. These shots would come from a distance close to the place where I was postioned. I clarify that I was considerate as a soldier who assured the security of the airport ; I therefore clearly heard the origin of the shots. From the place where I found myself, one could not and cannot hear a shot fired from Masaka ».*

Assessment.

The exact location of Sgt. Nsengiyumva Theogene cannot be confirmed but from his statement he intimated that he was at the end of the airport in the direction where the Kanombe Military Camp was situated. He states that the shots were in close proximity to his location “precisely between the camp and the airport, not far from the coffee plantations” but he does not mention the flight path of the missiles nor the President’s aircraft and its subsequent destruction and crash.
He is alone in mentioning three shots. We are unable to attribute an interpretation to this element of his statement.

II. WITNESSES PLACING THE LAUNCH OF THE SHOTS IN THE IMMEDIATE AREA OF THE KANOMBE MILITARY CAMP

1. Dr. Pasuck Massimo (Dr P.M.) - CAMP KANOMBE

Dr. Pasuck Massimo (Lt Colonel) is a Belgian serviceman who worked as a doctor at the Kanombe military hospital and lived in the villas allocated to officials of the Kanombe camp, 300m from the president’s residence. He heard the blast followed by two detonations and saw the plane crash into the

fence and gardens of the residence. He also expresses his surprise in the face of the rapid reaction of the Rwandan armed forces.

« I was one of the direct witnesses of this attack. In the evening of 6 April 1994 at one hour passed the half hour, that is 19.00 or 20.00 and one more of a half hour. I was in my living room. I heard therefore the first time a 'blast' sound and saw an 'orange' light. I asked myself who could celebrate an event. The 'blast' was followed by two detonations. At that moment then I could no longer hear the noise of the plane (jet engine)

My first reaction was to think that that blast had brought down the C130 (B) which should arrive that evening. I left my house and there I saw a fire ball which crashed on the President's plot…at 350-400m from my house. Between the detonations and our exit, the sky was lit in 'yellow orange' as if it had been lit up by flares but in the 'yellow-orange' tones (burning fuel)

By radio 'Kenwood' I immediately warned the CTM-adjudant Daubie, the Lt Col Duvivier and the ADC Lechat who was already stuck at the airport. This to show the unusual rapidity of the reaction of the Rwandan armed forces. Less than a quarter of an hour since we warned the UNAMIR by a radio jeep, the shots directly started, coming from, in my opinion the end of the runway and shooting in the direction of Kabuga.

According to the information that I had at the Kanombe camp and around the camp by the bys (?) and the nuns, the Tutsis were liquidated from the first night, the opponents and the suspects of the regime were mistreated, pillaged and some were killed from the second night and one quasi-systematic massacre of all the potential eyewitnesses from the third night. It is necessary to know here that an attempt was made to pretend that firing came from the CND (FPR)

On Saturday morning, the spouse of the principal adjudant (F.R), para-cdo Jeanne Jean Michel arrived in tears at our house, saying that the servant boy could escape the massacres from the neighbouring area, that he declared that at that moment they killed everyone, that they explained that it was the Belgians fault and that it was absolutely necessary that we left at the earliest opportunity.

Our exit from Kanmobe was carried out and facilitated by Cdt Para – Cdo the French De Saint Quentin and Mjr Rwandais (Comd Bn Pararwandais Ntabakuze.) Note that from the explosion of the presidential plane I contacted the Cdt De Saint Quentin to organise a coordination – I predicted the worst and his wife declaring to me that the French military had already left the place of the accident. The French Cdt declared to me afterwards that they were probably the only to be authorised to approach the plane but it would be necessary to wait for the day to recuperate the black box. The people in the area, taking refuge in the maternity hospital in Kanombe declared to the sisters (nuns) that the massacres on the third night (systematic) have been ordained in any case by the company of the Regiment Para – Cdo de Kanombe.

I can add that the former French friends of Kigali with whom we were always in telephone contact, seemed to affirm that Brigitte Minaberi, the wife of the co-pilot of the presidential plane, listened to the approach of the plane with her personal radio. She would have heard on several occasions (5 X ?) the control tower of Kigali asking if the Burundi President was on board. One would have heard Prrine, the mechanic on board, say: 'Why, they cut the lights' (at the airport)

To my knowledge, the staff on board the presidential plane consisted of:
- Herault : pilot
- Minaberi : co-pilot
- Perrine : called 'Pépé', on board mechanic. I (Je fréentais – perhaps typo?probably from verb 'frequenter') regularly associated with these people and we maintained good relations (…) the rumours coming from the attack would have been backed by the hard power faction (CDR)
- in laws of the President, Col. Bagosora, Sagatwa, 'hardcore' group to which Baranslitse and Srubuga were also party (…) I totally ignore if the Rwandan armed forces had missiles or not.

Assessment.

Dr. Pasuck Massimo appears to be a credible witness to the incident and from his location approximately 500m from the crash site which was verified by the authors would have had a good view of the final events. Since he states he was in his living room at the time he could not have witnessed the actual launch of the missiles. It is unclear from his statement whether the blast, light, and detonations were from the missiles mentioned by other witnesses or from the destruction of the President's aircraft. If the blast sound and orange light witnessed by Dr. Pasuck Massimo whilst in his living room are correct and are by implication the launch of a missile it can be concluded that the firing point was in close proximity to his residence. (See comments made by the Authors in the Assessment of GM above).

2) Moreau Nicolas (M.N.)

Moreau Nicolas and the corporal C.,Belgian servicemen from the UNAMIR found themselves on the 6 April 1994, with their section, in the convent at Rutongo on one of the hills overhanging the town of Kigali in the north-west more than 20km from Kigali as the crow flies, in the region of Masaka, where they kept watch. Moreau Nicolas declared that he had seen in the sky two flames which left the same place, one after the other, then one large fireball following one detonation:

The evening of 6 April 1994, I found myself with my section in a convent (I no longer know the place), we kept watch there for two hours. We finished our shift when I saw in the sky (I did not know at that moment that it was in the direction of the end of the airport) first of all a single bright orange flame. This first bright flame made a bell and started to come back down while I saw a second (which seemed to leave from the same place) leave the sky. This

second flame stopped. I then saw a cascade of flames (without hearing the explosion), and when this cascade arrived on the ground, I saw a large fire ball followed by a detonation. I deduced that it concerned a plane which had been shot down. I never saw the plane as it was night, it was about 20.00. The Cpl C. who was next to me, saw the same thing as me. The other guys who were there, were behind the UNIMOG (four wheel drive truck) and I believe that they only heard the last detonation with the big glow on the ground. I no longer know how to describe more precisely what I noticed, because we were very far from these two trains of fire in the sky, and it was already night. I am keen on clarifying that from the place where I found myself, the origin of the two missiles came from the left to head towards the sky towards the right. The angle of the shot was more or less 70 degrees.

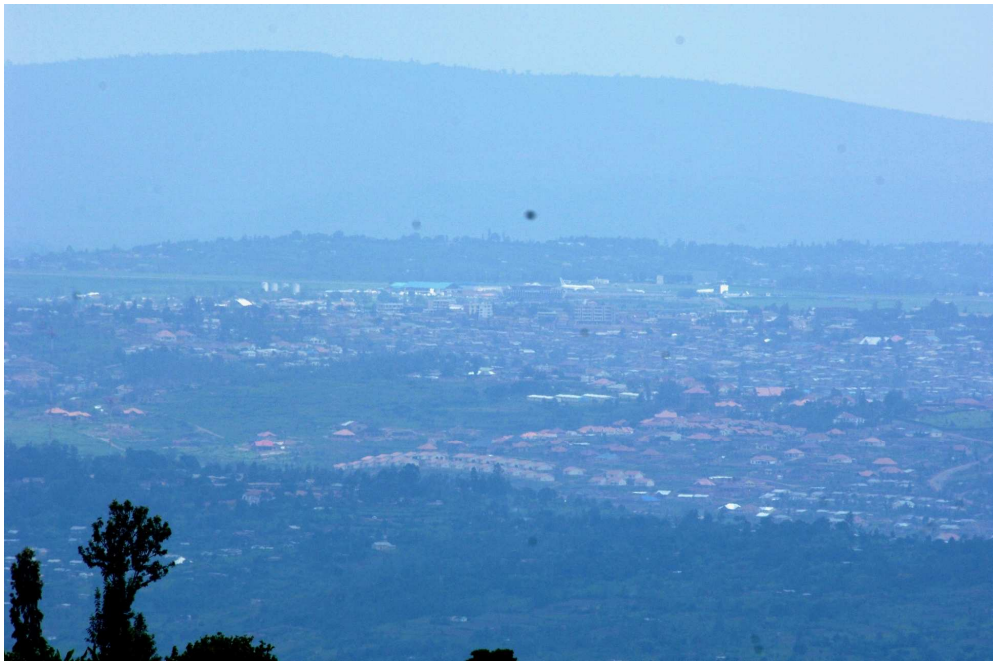


Fig. 11: View of Airport from Rutongo Hill (Through 400mm lens).

Fig. 12: View of Rutongo Hill from Old Control Tower

Assessment.

The exact location of Moreau Nicolas in the convent area at Rutongo could not be ascertained. This is some 20km from the site of the incident but his statement that he could see the area of the incident was verified by the authors. Kigali airport and runway can be seen at a distance from various south facing areas at this location. A line extending the runway generally eastwards would afford a clear view of the incident with no obstruction from the intervening hills. However should the shooting have originated from the location referred to as “The Farm” or from the location “CEBOL” as marked on the map at Annex M which is in the Masaka Valley it is not credible that the witness Moreau Nicolas could have seen the incident in the way he states since Rusororo hill obstructs the view of CEBOL from Rutongo. Moreau Nicolas confirms with other witnesses the firing of two missiles. His statement that he had a view of the missile’s exhausts must be questioned. It is accepted that he could have seen the destruction of the plane in the air and the burning of the wreckage on the ground. This element of his statement is credible. From his presumed vantage point at Rutongo, however, Moreau Nicolas statement on the flight path of the missiles from the left to the right is inconsistent with other witnesses. This however could be a matter of either translation or visual perspective.

3) Cpl. Siborurema Silas (S.S) - Kanombe Military Camp

Cpl. Siborurema Silas lived in the medical company in the Kanombe camp. He described that the shots which affected the plane « *fell vertically from the left side ».* They reached the plane while he found himself *« above the Nyarugunga valley, if they aimed from the flank side. The plane was brought*

down by shots coming from near the military camp after having gone past the valley. According to what I observed, these shots were not opposite or behind the plane, but earlier on its left side.

Assessment.

From his statement the exact location of Cpl. Siborurema Silas could not be verified and although he states the plane was brought down by shots coming from near the military camp little credence can be given to this statement.

Witnesses placing the launch of the shots at the fence of the President's residence

1. Cpl. Nsengiyumva Tharcisse (N.s Th.) - Kanombe Military Camp

On the night of 6 April 1994, Cpl. Nsengiyumva Tharcisse was in the Kanombe camp and describes how he saw the launch of the shots:

" I myself was witness to the attack of 6 April 1994 against the plane of President Habyarimana. I saw the shots leave the ground towards the target. I found myself in the Kanombe camp in front of the paediatric buildings of the hospital, situated at a place towards the EFOTEK college. I saw the plane coming, the place where I found myself, was clear and unblocked. The plane came from the direction of Masaka, it had started its landing manoeuvres. As a result I saw a flare go up very quickly towards the plane, then the first missile followed and hit the motor; the plane turned over. In a few seconds, the second missile followed and the plane definitively exploded. From the view I had in the place I was, the shots came from the fence of the President Habyarimana's residency, at the second entrance on the south side of the residency, near the buildings where the President brought up porcines. I saw clearly the launch of the shots: they left from this place. The first shot hit the plane, after this one came to cross the Nyarugunga valley. The shots went up from the bottom towards the plane, whereas this one had dealt a blow to the landing."

Fig. 13: View from Paediatric Building towards President's Residence.

Assessment.

Cpl. Nsengiyumva Tharcisse appears to be a credible witness to the incident. His view of the approach of the Presidents aircraft from his location in front of the paediatric buildings of the hospital at approximately 700m from the crash site was verified by the authors and would have provided him with a clear view of the early stages of the incident including the missiles flight paths, the destruction of the aircraft but not the crash site. This witness confirms with other witnesses the firing of two missiles towards the President's aircraft and the aircrafts subsequent destruction. He is quite specific in his statement as to the location of the firing point for the launching of the missiles and this general area concurs with the statements of other witnesses.

2. Bicamumpaka Sylvestre (B.S) - Kanombe Military Camp

On the night of 6 April 1994, Bicamumpaka Sylvestre was in front pavilion 7 of Kanombe military hospital and saw the launch of the shots, without knowing that it concerned a plane that had been shot down:

"I was in front of the entrance to the hospital at pavilion 7. All of a sudden I saw something like a missile which went up in the sky, followed immediately by a second, aimed in the same direction. From the place where I was, I saw clearly what happened. The two shots about which I speak to you, came from the position of the servicemen from the presidential guard who were at the residence, there where President Habyarimana lived. Then I saw that one object, which had just been hit by two shots, caught fire and fell into the fence of President Habyarimana's residency, but I did not know at that moment that his plane had been destroyed. Immediately, several shots were sent into the

sky by the servicemen of the presidential guard who were in the same place as the residency of President Habyarimana.

Fig. 14: View from Pavillion 7 towards President's Residence

Assessment.

Bicamumpaka Sylvestre confirms much of the statement of N.s Th above in that two missiles were fired at the President's aircraft and that the firing point for the launch of the missiles was from the direction of the President's residence. His statement is judged to be credible. His view of the initial incident from his location at Pavilion 7 in the hospital approximately 800 meters from the crash site was verified by the authors and would have provided Bicamumpaka Sylvestre with a clear line of sight of the missiles flight path and the destruction of the aircraft on its approach.

3. Cpl. Turatsinze Samson (T.S) Kanombe Military Camp

Cpl. Turatsinze Samson was in Kanombe military camp on the evening of 6 April 1994 and was also a direct witness to the attacks. He declared:

"*On the evening of 6 April 1994, a little before the plane exploded, I was in the courtyard at the Kanombe camp in the middle of eating with two of my comrades called Barihuta Nathanael and Tuyishimire Dismas. It was visible, I could observe the plane which came, it had lights that flashed. In a short while I saw the first missile in a red colour, go up towards the plane. It hit it and the plane moved. In a few seconds a second missile from the same place hit the plane again the plane definitively caught fire. The plane had just past Masaka in the approach to landing. The shots left below the fence of President Habyarimana's residency. There, where I found myself in the Kanombe military camp, I saw perfectly their origin. Then, I found myself in the place*

where I could see the plane clearly. I certify that these shots which made the plane explode left from Habyarimana's house. We saw that they left from the position of the presidential guard. The shots which reached the plane left from this place. It was really near to us: it is not at Masaka, don't insist it. I am an eyewitness, I say what I saw.

Fig. 15: View of from the Centre of the Kanombe Camp Courtyard

Assessment.

The exact location of Cpl. Turatsinze Samson in the courtyard of Kanombe Camp could not be verified by the authors. The surrounding buildings of the courtyard would provide a restricted view of the ground locations towards the President's Residence but not of the flight path of the President's aircraft. The statement of Cpl. Turatsinze Samson confirms with other witnesses the firing of two missiles and the destruction of the aircraft on its final approach. Although TS Cpl. Turatsinze Samson states that the shots were fired from President Habyarimana's house he is not specific about the exact location within or near the residency compound. His statement is consistent with those of other witnesses.

4) Capt. Bwanakweri Isidore – Serviceman - Resident in the Kanombe Camp Area)

Capt. Bwanakweri Isidore worked at the Ministry of Defence and was a direct witness to the events of the attack:

"*I lived at Kanombe in the Kajagari area, not far from Nyandungu.*

On 6 April 1994 I returned to Kanombe about 16.00 and I passed by the tarmac road which overhangs the airport, the one from Nyandungu was bad. When I arrived in the Kanombe area, I saw a few soldiers from the presidential guard, some of them were dressed in civilian clothes, but armed. I know nearly all of them. They patrolled in a large number, they entered the houses and cafés of Kanombe and identified some people they found there. It was not often that they did this tight control. I spoke to one of them, the adjudant Kinyakura, and asked him what they did over there in such a large number. He responded to me under the form of another question, by saying: "I thought that you, who works at the MINADEF, you were powerful to be informed of everything that happens!" Then, he added: "The President is outside the country." I didn't remember that the President had already left for Dar-es-Salaam. I stayed over there in the area, in the process of talking with people, waiting for the time to go to bed. The evening, I continued to see servicemen of the presidential guard who moved around, but when night fell, those who were in civilian clothes were, this time joined by those in military clothes. A little after 20.00 I went down to return to my house. Arriving outside I heard two enormous blasts, within a few seconds of each other: POOO! POOO! Then I saw an explosion in the sky. People started to run back home. These blasts were shot from the side of the residency of President Habyarimana, it is over there towards the direction looking at Masaka-Kabuga. It was really near to the place where I found myself. I say to you that I had not heard the sound of the plane and all the same I have heard these shots. There were not shot from far away, it was right near me, not far from the President's residency. I am not obliged to say it to you, but it is in this manner that things happened.

Assessment.

The exact location of Capt. Bwanakweri Isidore at the time of the incident could not be verified by the authors. In his statement Capt. Bwanakweri Isidore mentions that he heard two enormous blasts within a few seconds of each other and saw an explosion in the sky. He does not state that he saw the flight path of any missiles and as his location could not be verified his statement that these blasts were shot from the side of the residency of President Habyarimana cannot be accepted as fact however it is consistent with reference to the other witness statements from the area immediately surrounding Kanombe camp.

5) Sgt Ntwarante Anastase - Presidential Guard at the Airport

Sgt Ntwarante Anastase was part of the GP section who waited for President Habyarimana on the evening of 6 April 1994 and was witness to the attack. He declared the following: "*I saw the plane on the approach to landing in the sky of Masaka around 20.00. It was visible and had flashing lights. While it started the descent, finding itself over the Kanombe hill, the first missile with a red colour went up and did not completely reach the plane, then at the end of about 5 seconds, a second missile followed and the plane exploded. The launch point of the two missiles is Kanombe, behind the residency of*

President Habyarimana, towards that zone there. The shots left towards the plane coming from the front.

Assessment.

The exact location of Sgt Ntwarante Anastase a the airport could not be verified by the authors. He confirms as do other witnesses the flight of two missiles towards the Presidents aircraft on its final approach, the destruction of the aircraft in the air and the possible firing point for the launch of the missiles as being behind the residency of President Habyarimana. The statement of Sgt Ntwarante Anastase is plausible.

6) Cpl Habimana Gonzague - Kanombe Military Camp

Cpl Habimana Gonzague was in the courtyard of Kanombe military camp and saw the shots which reached the Falcon 50. He places them below the presidential residency: "*I was in the courtyard of the military camp with a comrade, corporal Munyankindi. I heard the noise of the plane and I watched to observe its movements. I then saw the first shot, then the second after a few seconds. It is this second shot which made the plane explode and we saw some fire in the sky which immediately spread over the sky. In seeing these shots, they all came from the residency, in the Nyarugunga. My first view is that the launch point for the shots was situated below the presidential residency.*

Assessment.

The exact location of Cpl Habimana Gonzague in the courtyard of the military camp could not be verified by the authors but the same restrictions in line of sight to the incidents would apply as those stated in the assessment of TS. Cpl Habimana Gonzague statement of events confirms those of other witnesses and is considered plausible. He confirms the firing point for the launch of the missiles as being in the area of the President's Residence.

CONCLUSIONS

At the time of writing this report there is as yet no conclusive evidence as to why Falcon 50 Registration No 9XR-NN crashed apart from the evidence contained in various witness statements. Not withstanding a number of inconsistencies most of the statements provided, and analysed state that the aircraft was destroyed by possibly two surface to air missiles whilst on its final approach see Annex O to Kigali International Airport. A member of The Committee has supplied the Authors with an estimate that a the time the aircraft was hit by the first or the second missile it was at or around an altitude of 6000ft and travelling at a speed of approximately 150 knots on a normal approach path. This information cannot be verified by the Authors and is not documented. On this assumption the aircraft would have been approximately 4 nautical miles short of the runway.

Fig. 16: **View of Approaching Aircraft on Flight Path Taken from Crash Site**

Analysis of the possible metal fragments both free standing and embedded recovered from the wreckage and detailed above has been carried out in the UK and the results are detailed in Annex P. The conclusion of the analysis is that the embedded fragements are not consistent with having come from a SAM16 warhead of Russian manufacture. The embedded material may have originated from a missile manufactured by an other source or may have been generated as a result of the explosion of the aircraft.

On the basis of the evidence both provided by way of witness statements and as a result of the authors examination of possible missile launch locations contained within these statements it may be concluded that the aircraft was destroyed by one or more surface to air missiles fired from a position within the envelope marked by the authors on the attached map at Annex G.

The remaining wreckage present in 2009 is from the aircraft rear and right wing which would imply that a catastrophic event occurred to the forward left area of the fuselage and wing area. On the basis of the evidence provided the subject missile or missiles would appear to have hit the aircraft with an impact point in the area of the forward left wing and fuselage. The physical evidence that could have confirmed this presumptive conclusion and which is seen as being present in the photographs at Annex J taken in 1994 is no longer present for examination.

The elements of the witness statements accepted by the authors as credible and well founded indicate that the firing point for the surface to air missile/s launch would be bordered by an area incorporating the eastern end of the runway, the President’s Residence, and the northern extremities of Kanombe Camp. This would necessitate a surface to air missile with a capability to engage an approaching aircraft head on or flank/head on. Although various other missile types have this capability the SAM 16 IGLA-1 is documented in un verified open source material in relation to this incident and is therefore used as an example of that capability. A number of locations within the area indicated in Annex G give a line of sight to an aircraft on the final approach to the airport at a height and altitude of those stated in Annex O. The missile operator can lock on to the target aircraft at approximately 10 km distance and track the aircraft until it enters the 5 km engagement envelope. The SAM16 is designed to home on to the aircraft and has a terminal manoeuvre to strike the fuselage to cause maximum damage.

9. 0 AUTHORS OPINION.

From the available evidence and information from open source historical material it is the author’s opinion that The Committee may wish consider that the movement of the 14.5mm anti aircraft gun mentioned in Rwanda Governments Reaction to Judge Brugeires Indictment Saga paras 5 and 10 may have been part of a coordinated fall back plan to ensure that had the

missile strike not been successful the subject weapons shown below may have been employed to down the President's Aircraft.

Fig. 17: View of 14.5mm Anti Aircraft Gun (Quad Mount).

10.0 ACKNOWLEDGEMENTS

The authors of this Report Mike C Warden Research fellow Ammunition Systems and Explosives Technology Group Centre for Ordnance Sciemnce and Technology DASSR. Cranfield University and Defence Academy of the United Kingdom and Mr Alan McClue, Fellow of The Cranfield University Forensic Institute – Defence Academy of the United Kingdom - would like to thank the Members of The Independent Committee of Experts appointed to investigate the crash of the Falcon 50 on 6th April 1994 and in particular its President Justice Mutsinzi Jean, Bizimana Jean Damascene, and Commission Members Mr Augustine Mukama and Mr Peter Mugenzi for their assistance both logistical evidentiary.
We are indebted to Brig. Gen Steven Kalyango and his officers for assistance during our visit to Camp Kanombe.

ANNEX A: Agreed Scope of Work

Cranfield UNIVERSITY

W. Alan McClue M.Sc. B.A. (Econ)
Visiting Fellow Cranfield Forensic Institute

Department of Applied Sciences,
Security and Resilience,
Cranfield University, DCMT,
Shrivenham, Swindon SN6 8LA, UK
Direct Line +44 (0) 1425 482941
e-mail: w.a.mcclue@btinternet.com

For the attention of Mr Augustine Mukama – Commission Member.

Dear Mr Mukama,

Further to our meetings in London and our subsequent phone conversations I have pleasure in confirming the scope of work and the approach we propose taking in assisting The Commission in its investigation into the crash on 6th April 1994 of the Falcon 50, registration N° 9XR-NN and the death of former President Juvenal Habyarimana.

As discussed the expert who will carry out the agreed scope of work will be M Walden whose CV we have supplied and whose expertise I have discussed with you. Mr Walden is a Research Fellow – at Cranfield University and the Defence Academy of the United Kingdom. As discussed I will accompany Mr Walden.

Proposed Scope:

1. Examine the crash site. Photograph and incorporate into report.
2. Examine the wreckage of the aircraft. Photograph wreckage in general and specifically any ballistics evidence. Compare photographs taken with photographs taken in 1994 (See note 1 below).
3. If appropriate take small section samples of the wreckage, paint scrapings etc for analysis in the UK at Cranfield/UK Defence Academy. (See note 2 below).
4. If necessary lift the aircraft wreckage to examine underneath of the wreckage and the ground under the wreckage. (See note 3 below).
5. Examine any ballistics evidence in your possession, physical or narrative, including launchers used or suspected of being used in the downing the aircraft.
6. Examine and analyze witness statements in your possession (See note 4 below) that contain references to:
   a) The flight path of the subject aircraft as it approached Kigali.
   b) The suggested launch location of surface to air missiles.
   c) The impact or explosion whether sound or visual.
   d) The crash site.
   e) References to the aircraft “black box”, cockpit voice recorder, air traffic control tower

recordings
(See note 5 below.)

7. Where agreed, possible, and thought appropriate, interview the witnesses referred to in 3 above. (See note 6 below).
8. Visit all physical locations described in the witness statements including but not exclusively, the airfield, control tower, crash site, Camp Kanombe, possible surface to air missile launch sites, and observation positions cited in witness statements.
9. Utilizing GPR equipment establish coordinates of all relevant key locations and from that information map lines of sight for incorporation into final report. (See Note 7 below.)
10. Following 1-9 write and submit a report within one week of returning to the UK. (See note below.)

Notes:

1. We have available to us a number of photographs of the wreckage and crash site taken in 1994. We would appreciate photographs in your possession/available to you taken in 1994 and any photographs taken at any time subsequently when/if the wreckage was moved.
2. In the event that small samples of paint or structure are taken we would appreciate these being sent, by you, via diplomatic channels to London since we do not believe these should be transported by us since they maybe subject to confiscation as we pass through other jurisdictions.
3. In the event that it is felt appropriate to lift the wreckage it would be necessary for appropriate lifting equipment and an operator to be made available.
4. In respect of witness statements it would assist us considerably if prior to our visit you could: a) supply us with a list witness statements The Commission considers relevant b) could supply copies in English c) it will speed up our work if copies of these could be emailed to us prior to our visit which will allow us to extract information from the statements that we would need to validate by making site visits.
5. We discussed during your visit to London the relevance to your investigation of the aircraft "black box", the air traffic control recording, the cockpit voice recorder and we discussed that should these become available to you the type and scope of assistance we may be able to offer.
6. In the event that it is agreed that we should interview a witness then the interview will be conducted in English and we would require you to provide a competent interpreter.
7. I will email you with the specification of the GPS equipment we will bring but since we do not have, Kigali area, map software for this equipment I suggest that you confirm that you can make available GPS equipment locally with map software pre loaded for the subject area. We will down load copies of the data we collect prior to leaving territory and leave you with the equipment and a copy of the data. **Additionally, please confirm what maps and to what scale you can make available.** We will require three copies of maps covering the area of the investigation.

Comments:

As discussed, in order that our visit is as effective as possible it would be appreciated if a letter could be supplied from either Justice Muzenzi or yourself that confirms:

1. The Commission guarantees all diplomatic and other government facilities being made available during the visit.
2. Access is guaranteed to all relevant locations and personnel.
3. Rwanda will supply and meet the cost of the required air tickets for 2 people.

4. Rwanda will arrange and meet the cost of accommodation and subsistence for two people whilst in Rwanda.
5. Rwanda will supply a driver and vehicle for the duration of the visit.
6. We will be met on arrival to assist with immigration and customs procedures.

Costs:

Rwanda will arrange ticketing and meet the cost of flights, accommodation and subsistence for two people whilst in territory. Our charges for the expert, Mr Walden, will be on the basis of a day rate at the rate of £864 per day. There will be no day rate charges for my involvement. We believe that the required work will take no more than 7-10 days in territory and approximately 2-3 days in writing a report on return to the UK. The invoice for the subject work to be settled in Sterling and payment to be made within 30 days of the submission of our report.

Timing:

In order to allow for time for preparation including the taking of anti malaria medication the earliest date that we would be able to leave for Rwanda would be 15th or 16th February 2009 with the report being submitted no later than 27th February 2009.

Acceptance:

If the scope of work, conditions and commercial terms are acceptable to you please confirm your acceptance by signing a copy of this letter on page 3 and initialling each page. Please fax the signed copy to +44 1424 482941.

If you have any questions or wish to make any changes to the scope please phone me in order that we can discuss these.

Yours sincerely,

W. Alan McClue

W. Alan McClue

ANNEX B – Quotation Accepted by The Committee

CEIFALC 50,
Kigali.
23rd. Jan. 2009.

Mr. W. Alan McClue,
Department Of Applied Sciences,
Security and Resilience,
Cranfield University, DCMT,
Shrivernham, Swindon,
SN6 8LA,
UNITED KINGDOM.

Dear Mr. Alan,

Re: **CONFIRMATION OF YOUR VISIT REQUIREMENTS.**

Following our continued correspondences with you through Mr. Mukama, and the recent official visit made by Mr. Mukama Augustin and Mr. Mugenzi Peter ; I am happy to confirm that :

1. Our Commission guarantees all necessary Diplomatic and Government facilities Shall be made available during your visit.
2. Access to all relevant locations and personnel are guaranteed.
3. The Commission will supply and meet the cost of the required Air tickets for 2 people.
4. The Commission will arrange and meet the cost of accommodation and subsistence for 2 people whilst in Rwanda.
5. The Commission will provide a Vehicle and Driver for the duration of your visit.
6. The Commission will meet you on arrival at Kigali International Airport to assist you with immigration and Custom procedures.

Finally may I take this opportunity to assure you of the Commission's any other necessary assistance that you may require during your visit.

Kind Regards.

Dr. Bizimana Jean Damascene.
Vice President.
CEIFALC 50.

Dr. BIZIMANA Jean Damascène
V/Président
CEIFALC 50

ANNEX C- CV. of Cranfield Expert – M C Warden

TECHNICAL CURRICULUM VITAE

Michael Connor Warden MIExpE, MIABTI

Telephone: Work: 01793 785597
Mobile: 07802 969989

E-mail: m.c.warden@cranfield.ac.uk
mwarden.cu@da.mod.uk

1998 to date **Ammunition Systems and Explosives Technology Group**

Cranfield University
The Defence Academy of the United Kingdom

Research Fellow

- Contract Manager, Instructor, Trainer and Assessor for HM Revenue and Customs Firearms Make Safe and Training for Trainers courses.
- Instructor in Improvised Explosive Devices (IED), Explosives Technology and Ammunition Systems.
- Research, exploitation and technical reporting on commercial and foreign ammunition systems.
- Project management on the development of the Dragon anti-personnel mine clearance torch.
- Supervision of student projects on various ammunition and explosives trials.
- Authorised Range/Trials Conducting Officer at the Defence Academy and Salisbury Plain Training Area for firearms and explosives.
- Conducting explosives demonstrations.
- Course administration for weapons, ammunition and range bookings.
- Ammunition and explosives accountant.
- Mechanical Handling Equipment (MHE) instructor and national examiner.

1994 – 2007 **HM Army**
Royal Logistic Corps (Volunteers)

Senior Ammunition Technician (SAT) Class 1

- 2004-2005 operational tour in Iraq with HQ UK (National Support Element) where the duties reflected those in the Regular Army from 1971 to 1993.

- Allocating and planning workload of EOD teams and Ammunition Technical Support troops in locations throughout the UK.
- Supervising and operating shift systems including the manning of Operations Centres.
- Responsible for the technical control, efficiency and motivation of EOD teams.
- Planning and implementing IEDD licensing and training exercises.
- Supervising and mentoring staff under training and selecting personnel for advancement courses.
- Implementing and conducting training in Counter-terrorist and EOD procedures.
- Providing instruction and demonstrations.
- Range clearance.

1994 – 1998 **Akzo Nobel Coatings Limited**
Milton Park
Abingdon

Distribution Centre Supervisor

- Management applications in Health and Safety, logistics, warehousing, distribution, transport, human resources and workshop operations.
- Responsible for day to day resourcing to achieve deadlines.
- MHE and Manual Handling instructor and national examiner.

1971 – 1993 **HM Regular Army**
Royal Army Ordnance Corps

Senior Ammunition Technician (SAT) Class 1

- Allocating and planning workload of EOD teams in 3 geographically diverse locations.
- Supervising and operating shift systems including the manning of Operations Centres.
- Responsible for the control, efficiency and motivation of EOD teams.
- 3 EOD operational tours in Northern Ireland, rural and urban and IEDD/EOD duties throughout UK.
- IEDD/EOD commitments in Kuwait, Belize, Canada, Norway and the Falkland Islands.
- Falklands War operational tour responsible for ammunition management and calculating liabilities to ensure supply to forward gun positions and units.
- Range trials on conventional ammunition and guided weapons.
- Investigating and producing reports on ammunition accidents, performance failures and defects.

- Planning and implementing military/police IEDD licensing and SOCO training exercises for 300+ personnel.
- Supervising and mentoring staff under training and selecting personnel for advancement courses.
- Implementing and conducting training in Counter-terrorist and EOD procedures.
- Providing instruction and demonstrations.
- Implementing Health and Safety procedures
- Requisitioning, managing, controlling and provisioning ammunition holdings with an inventory value of £650m.
- Exercising executive action affecting ammunition and associated packaging and implementing management policy.
- Analysing ammunition shelf life data to identify logistic implications and cost savings.
- Responsible for the control and functioning of ammunition depots in Canada and Belize.
- Providing technical advice to Director General level on all aspects of ammunition safety, storage, handling, movement and procedures.
- Analysing and evaluating ammunition reports and technical data, initiating and progressing matters arising with MoD and outside agencies.
- Writing and reviewing technical publications.

Qualifications and Specialist Training

Ammunition Technician Class 1.
Improvised Explosive Device Disposal (IEDD) Operator.
Advanced IED and Terrorist Activities.
Biological and Chemical Weapons Disposal.
Fireworks Supervisor.
Post Bomb Scene Management.
Chemical, Biological, Radiological and Nuclear (CBRN) Instructor.
Advanced Guided Weapon Systems.
Commando Trained.
Small Arms Range Management (SA(B) 90).
Small Arms Trainer Supervisor.
Small Arms Combat Marksmanship Coach.
Safety Officer.
Radiation Protection Supervisor.
COSHH Assessment.
Risk Assessment.
Supervisory Management.
Civilian Personnel Management for Military Supervisors.
First Aid at Work (including ballistic trauma treatments).
Manual Handling Instructor.
GCE A Level (1 Subject) O Level (5 Subjects).
Education for Promotion Certificate (Advanced) (5 Subjects).

NVQ Level 3 in Direct Training and Support.
Methods of Instruction.
Colloquial Arabic.
City and Guilds Basic Construction Industry Skills and Building Maintenance.
Mechanical Handling Equipment Instructor and Examiner.
Expedition Leader.
Intermediate Skiing.

Professional Memberships

Member of the Institute of Explosives Engineers (MIExpE).
Member of the International Association of Bomb Technicians and Investigators (MIABTI).
Member of the Association of Ammunition Technicians.

Applying for Membership of the City and Guilds of London Institute in Leadership and Management.

ANNEX D – Witness Statements in French as Supplied by The Committee

I - Témoins situant le départ des tirs au camp militaire de Kanombe

1) G.M

G.M. faisait partie du contingent belge de la MINUAR et se trouvait à l'ancienne tour de contrôle lors de l'attentat sur l'avion présidentiel. Le soir du 06 Avril 1994, il était de service à la permanence radio, à la tour de contrôle. Il a déclaré ce qui suit, :

« J'ai déjà fait l'objet d'un interrogatoire par le DETACHEMENT JUDICIAIRE au Rwanda en date du 13 avril 1994.

Je désire cependant éclaircir les points suivants :

Le camp FAR de Kanombe était situé à plus ou moins 1,5 kilomètres à vol d'oiseau de l'aéroport. Etant installés dans l'ancienne tour de contrôle de l'aéroport haute de 5 à 6 mètres, notre PC compagnie ainsi que les radios se trouvaient au dernier étage de la tour. Ce dernier étage était une plate-forme entourée de verres. De la vue que l'on avait de cet endroit, on pouvait)apercevoir toutes les pistes mais pas le camp des FAR, ce dernier se trouvant en contre bas.

Le 6 avril 1994 vers 20.30 hrs alors que j'étais de service à la permanence radio, j'ai constaté que l'éclairage de la piste venait de s'illuminer. Je précise, en effet que l'éclairage était toujours éteint. La piste n'était éclairée que lors des manœuvres d'atterrissage d'un avion. Je suis alors sorti de la tour de contrôle et je me suis appuyé sur la rambarde de la plate-forme pour regarder l'avion qui approchait, atterrir. Je suis formel pour dire que l'éclairage de l'aéroport ne s'est jamais éteint pendant les manœuvres d'approche de l'avion. L'éclairage s'est effectivement éteint mais après l'accident de l'avion, je ne saurais plus vous dire combien de temps après.

Au moment où l'avion approchait de l'aéroport, nous ne savions pas de quel avion il s'agissait. ***J'ai aperçu alors un point lumineux partir du sol. La direction du départ de ce point était le camp de Kanombe****. Concernant la couleur de ce point je pense qu'il était blanc. On aurait pu penser qu'il s'agissait d'une étoile filante de par sa configuration. C'est lorsque j'ai aperçu que ce point prenait la direction de l'avion que je me suis rendu compte que cela devait être un tir de missile. A ce moment, les lumières de l'avion se sont éteintes mais l'avion n'a pas explosé suite à ce premier tir.*
Les lumières de l'avion ne se sont plus jamais rallumées. La thèse de tir de missile s'est confortée lorsque j'ai aperçu un deuxième point lumineux, le même que le premier venant du même endroit, prendre la direction de l'avion. L'avion a à ce moment explosé et est tombé à plus ou moins 500 mètres de la résidence de président, cette dernière se trouvant dans l'alignement de la piste d'atterrissage.

Au moment où l'avion a explosé directement après une fusillade générale a éclaté. Je pouvais apercevoir de chaque côté de la piste, et vraisemblablement de part et d'autre de la maison du président de nombreux tirs d'armes à feux dont certains avec balles traçantes.
Je ne serais plus évaluer le temps que ces tirs ont durés. Au moment de l'explosion de l'avion, je n'ai aperçu sur les pistes de l'aéroport aucun militaire du FAR.

Suite à ces événements, j'ai informé par radio, le commandant de compagnie se trouvant à mes côtés, le S3 (CPT CHOFFRAY), je lui ai signalé qu'un avion venait d'exploser suite à un tir de deux missiles. Le S3 n'a pas pris cette information au sérieux, il annonçait d'ailleurs plus ou moins une heure après les faits sur le réseau radio que c'était un dépôt de munitions qui venait d'exploser à Kanombe.

Mon commandant de compagnie (CPT VANDRIESSCHE) s'est alors rendu à l'aéroport civil et a appris que c'était l'avion du président qui venait d'exploser. En revenant, le Cpt VANDRIESSCHE a immédiatement signalé les faits exacts par radio à l'échelon supérieur. Après un certain temps que je ne saurais évaluer, mais qui pourrait être une heure, j'ai aperçu de ma tour de contrôle le peloton Mortier arriver et effectuer un stand by de part et d'autre de la piste. A ce moment j'ai quitté ma position pour aller parler avec eux »

2) C.S. (Commandant de permanence de l'aéroport)

C.S. était de permanence le soir du 06 avril 1994. Il a était un témoin direct de l'attentat. Dans son audition, il a indiqué que l'avion présidentiel était annoncé à 20h30, et quand l'heure a approché, il a demandé à la tour de contrôle si elle était en contact direct avec l'avion. La tour lui a répondu que l'avion était visible. C.S. est alors sorti de son bureau pour bien observer et suivre sa descente. Il a déclaré : « *Tout d'un coup je vis quelque chose comme une flamme monter et dépasser la trajectoire de l'avion. Tout de suite après, une deuxième fut lancée et atteignit l'avion en plein vol* ». A la question de savoir d'où étaient partis ces tirs, C.S. a répondu sans broncher : « *Il n'y a pas d'autre endroit possible, c'était bel et bien aux environs immédiat du camp militaire, si ce n'est pas dans le camp même. De toutes les façons ce n'était pas très lion du camp militaire*». Puis, à propos de la trajectoire des projectiles, C.S. a précisé que « *les deux projectiles partaient du sol et se dirigeaient à l'encontre de l'avion et leur direction était de droite vers la gauche».*

3) R.F. « GARDE PRESIDENTIELLE AEROPORT »

R.F. était présent à l'aéroport en attendant le Président le soir du 06 avril 1994 et est témoins de l'attentat. Il a déclaré : « *Deux coup successifs de missiles ont été tirés contre l'avion. Il provenaient en contre bas de l'aéroport et allaient en direction d'où provenaient l'avion pour le rejoindre dans le sens où il allait* ».

4) Ns. T. (GARGE PRESIDENTIELLE AEROPORT)

Ns.T. se trouvait à l'aéroport dans l'attente du chef de l'Etat. Il était positionné aux extrémités de l'aéroport vers le coté donnant au camp militaire Kanombe. Il a entendu trois coup de tirs qui sont partis à un endroit qui n'était pas lion de sa position : *« J'ai entendu trois coup qui ont été tirés près de l'endroit où je me trouvais. Je situe le départ de ces coups dans la proximité du camp militaire de Kanombe, plus précisément entr le camp et l'aéroport, non loin des plantations de caféiers qui se trouvaient là – bas à cette époque. Ces tirs provenaient d'une distance bien proche de l'endroit où j'étais positionné. Je précise que j'étais bien attentionné en tant que soldat qui assurait la sécurité de l'aéroport ; j'ai donc très bien entendu l'origine des tirs. De l'endroit où je me trouvais, on ne pouvais, on ne pouvait pas entendre un tir envoyé à partir de Masaka ».*

II. TEMOINS SITUANT LE DEPART DES TIRS DANS LES ENVIRONS IMMEDIATS DU CAMP MILITAIRE DE KANOMBE

1. **Dr P. M. (CAMP KANOMBE**)

Le Dr P. M. (Lt Colonel) est un **militaire belge** qui travaillait comme médecin à l'hôpital militaire de Kanombe et résidait dans les villas allouées aux officiers au camp Kanombe, à 300 mètres de la résidence présidentielle. Il a entendu le souffle suivi de deux détonations et a vu l'avion en s'écraser dans la clôture et les jardins de la résidence. Il exprime aussi son étonnement face à la rapide réaction des FAR :

« J'ai été l'un des témoins directs de cet attentat. Dans la soirée du 06 avril 1994 à une heure passé la ½ heure soit 19Hr ou 20Hr et un plus d'une demie - heure. Je me trouvais dans mon living. J'ai alors entendu dans un premier temps un bruit de ''souffle'' et aperçu un éclairage filant ''orange''. Je me demandais qui pouvait bien fêter un événement. Le ''souffle''a été suivi de deux détonations. A ce moment-là je n'ai plus entendu le bruit de l'avion(réacteur)

Ma première réaction a été de penser qu'il avaient descendu le C 130 (B) qui devait arriver ce soir-là. Je suis sorti de chez moi et là j'ai vu une boule de feu qui s'écrasait sur la parcelle du Président,… à 350-400 mètres de chez moi. Entre les détonations et notre sortie, le ciel était éclairé en ''jaune orange'' comme si cela avait été éclairé par des fusées éclairantes mais dans les tons jaunes-orangé(fuel en combustion).

Par radio '' Kenwood'' j'ai immédiatement pévenu la CTM-adjudant Daubie, le Lt Col Duvivier et l'ADC Lechat qui, lui,était déjà coincé à l'aéroport. Ceci pour dire la rapidité inhabituelle de réaction des FAR. Amoins d'un quart d'heure que nous avertissions la MINUAR par une radio jeep MINUAR, les tirs ont directement commencé, provenant à mon avis du bout de piste et tirant en direction de Kabuga.

Selon les renseignements que j'ai eu au camp de Kanombe et autour du camp par les bys et les religieuses, les Tutsis ont été liquidés dès la 1ere nuit, les opposants et les suspects au régime malmenés, pillés et certains tués à partir de la 2ème nuit et un massacre quasi systématique de tous les témoins oculaires potentiels dès la 3ème nuit. Il faut savoir ici qu'une tentative a été faite pour faire croire à un tir à partir du CND (FPR). Comme cela n'était pas crédible, les témoins oculaires devaient semble-t-il disparaitre.

Le samedi matin l'épouse de l'adjudant principal(F.R.) para-cdo Jeanne Jean Michel est arrivée en pleurs chez nous, disant que son boy a pu s'échapper des massacres des quartiers avoisinants, qu'il déclarait qu'on tuait à ce moment – là tout le monde, qu'on expliquait que c'était la faute des belges et qu'il fallait absolument que nous partions le plus tôt possible.

(…) Notre sortie de Kanombe a été réalisée et facilitée par le Cdt Para – Cdo français De Saint Quentin et le Mjr Rwandais (Comd Bn Para rwandais Ntabakuze. Anoter que dès l'explosion de l'avion présidentiel j'ai contacté le Cdt De Saint Quentin pour organiser une coordination – prévoyant le pire et sa femme me déclarant que les militaires français étaient déjà partis sur le lieu de l'accident. Le Cdt français me déclara par la suite qu'ils étaient probablement les seuls à être autorisés à approcher l'avion mais qu'il fallait attendre le jour pour essayer de récupérer la boîte noire. Les gens des environs, réfugiés à la maternité de l'hôpital de Kanombe ont déclaré aus sœurs que les massacres de la 3eme nuit (systématiques) ont en tout cas été ordonnés par compagnie du Régiment Para - Cdo de Kanombe.

(…) Je peux ajouter que les anciens amis Français de Kigali, avec lesquels nous sommes toujours en relations téléphonique, semblent affirmer que Brigitte Minaberi, la femme du co-pilote de l'avion présidentiel écoutait avec une radio personnelle l'approche de l'avion. Elle aurait entendu à plusieurs reprises (5X ?) la tour de contrôle de Kigali demander si le Président Burundais était à bord. (…) On aurait entendu Prrine, le mécanicien de bord dire : '' Tiens, ils ont coupé les lumières'' (de l'aéroport).

A ma connaissance le personnel de bord de l'avion présidentiel était composé de :
- Herault : pilote
- Minaberi : co-pilote
- Perrine : dit 'Pépé', mécanicien de bord. Je fréentais régulièrement ces personnes et nous entretenions des relations d'amitié. (…) les bruits courent que l'attentat aurait été commandité par la faction dure du pouvoir (CDR), belle-famille du Président, Col. Bagosora, Sagatwa, clique des 'durs' de laquelle faisait aussi partie Baranslitse et Srubuga. (…) J'ignore totalement si les FAR avaient ou non des missiles».

2. M. N.

N. M. et le caporal C., militaires belges de la MINUAR se trouvaient le soir du 06 avril 1994, avec leur section dans un couvent des religieuses à Rutongo sur une des collines surplombant la ville de Kigali dans la partie Nord-Ouest à plus de 20 km de Kigali à vol d'oiseau de la région de Masaka où ils montaient la garde. Moreau a déclaré avoir vu dans le ciel deux flammes qui partaient du même endroit, l'une après l'autre, puis une grosse boule de feu suivie d'une détonation :

« *Le soir du 06 avril 1994, je me trouvais avec ma section dans un couvent (je ne saurais plus situer l'endroit), nous y montions la garde en rôle de deux heures. Nous terminions notre rôle lorsque j'ai vu dans le ciel (je ne savais pas à ce moment que c'était dans la direction du bout de l' aéroport) d'abord d'une seule flamme vive de couleur orange. Cette première flamme vive a fait une cloche et commencer à redescendre lorsque j'ai vu une seconde (qui partait du même endroit semble-t-il) partir dans le ciel. Cette seconde flamme a été arrêtée. J'ai alors vu une cascade de flammes (sans entendre l'explosion), et quand cette cascade est arrivée au sol, j'ai vu une grande boule de feu suivi d'une détonation. J'en ai déduit qu'il s'agissait d'un avion qui avait été abattu. Je n'ai jamais vu d'avion car il faisait noir dans le ciel, il était aux alentours de 20.00heurs. Le Cpl C. qui se trouvait à côté de moi, a vu la même chose que moi. Les autres types qui se trouvaient là étaient derrière l'UNIMOG, et je crois qu'ils n'ont entendu que la dernière détonation avec la grosse lueur au sol. Je ne saurais décrire plus précisement ce que j'ai constaté, car nous étions très loin de ces deux trainés de feu dans le ciel, et il faisait déjà nuit. Je tiens à préciser que de l'endroit où je me trouvais, l'origine de ces deux missiles provenaient de la gauche pour se diriger dans le ciel vers la droite. L'angle de tir était de plus ou moins 70 degrés ».*

3.) S.S. (Militaire camp Kanombe)

S.S. vivait dans la compagnie médicale au camp Kanombe. Il a relaté que les tirs qui ont touché l'avion « *montaient verticalement du côté gauche* ». Ils ont atteint l'avion lorsqu'il se trouvait « *au dessus de la vallée de Nyarugunga, s'ils visaient du côté des ailes. L'avion a été abattu par des tirs partis tout près*

du camp (militaire) après avoir dépassé la vallée. D'après ce que j'ai observé, ces coups ne sont pas montés en face ou derrière l'avion, mais plu tôt de son côté gauche ».

ANNEX E - Witness Statements in English as Translated for Cranfield

I – Witnesses placing the launch of the shots at the Kanombe military camp

1) G.M

GM was part of Belgian contingent of UNAMIR and found himself in the former control tower during the attack on the presidential plane. On the evening of 6 April 1994 he was in the radio room in the control tower. He declares the following :

I have already been the subject of interrogation by the judicial detachment in Rwanda on 13 April 1994.

I wish to clarify the following points :

The Rwandan armed forces camp in Kanombe was situated more or less 1.5km as the crow flies from the airport. Being installed in the former airport control tower at 5 to 6m high, our PC company as well as the radios were on the last floor of the tower. This last floor was a platform surrounded by glass. From the view that we had, we could see all the runways but not the Rwandan armed forces camp – this was found below.

On 6 April 1994 towards 20.30 while I was on duty in the radio room, I noticed that the lights on the runway had just lit up. I clarify that, indeed the lighting was always lit up. The runway was only lit up during the landing manœuvres of the plane. I therefore left the control tower and leant on the guardrail of the platform to watch the plane come in, to land. I am definite that the lighting at the airport is never switched off during the approach of a plane. The lighting was indeed switched off but after the accident of the plane, I would not know how long after.

At the moment where the plane approached the airport, we did not know which plane it was. ***I saw a luminous point leave the ground. The direction of the start of this point was the Kanombe camp.*** *I think that the colour of this point was white. One could have thought that it was a shooting star by virtue of its configuration. It is while I saw that the point took the direction of the plane that I realised that it must be missile fire. At that moment, the lights of the plane went out but the plane did not explode following the first shooting.*
The lights of the plane no longer came back on. The theory of the missile fire is reinforced while I saw a second luminous point, the same as the first coming from the same place, taking the direction of the plane. The plane exploded at that moment and fell more or less 500m from the President's residence, which was in line with the landing runway.

Directly after the moment the plane exploded, gunfire rang out. I could perceive on each side of the runway, and probably on both sides of the president's house, a number of firearms' shots, some of which were with tracer bullets.

Témoins situant le départ des tirs à la clôture de la résidence présidentielle

1) Ns. Th. (Militaire camp Kanombe)

Ns. Th. se trouvait le soir du 06 avril 1994 dans le camp Kanombe et décrit comment il a vu le départ des tirs :

« J'ai moi-même été témoin de l'attentat du 06 avril 1994 contre l'avion du président Habyarimana. J'ai vu les tirs partir du sol vers la cible. Je me trouvais au camp Kanombe, devant les bâtiments du service de pédiatrie de l'hôpital, situé à un endroit donnant vers les locaux du collège EFOTEK. Je voyais l'avion venir, l'endroit où je me trouvais était clair et dégagé. L'avion venait de la direction de Masaka, il avait commencé ses manœuvres d'atterrissage. Du coup, j'ai vu une fusée éclairante monter très vite vers l'avion, puis un premier missile a suivi et a touché le moteur ; l'avion a basculé. Dans quelques secondes, le deuxième missile a suivi et l'avion a définitivement explosé. Au vu de l'endroit où je me trouvais, les tirs sont partis de la clôture de la résidence du président Habyarimana, à l'entrée secondaire du côté sud de la résidence, près des bâtiments où le Président faisait l'élevage des porcins. J'ai bien vu le départ des tirs ; ils sont partis de cet endroit-là. Le premier tir a touché l'avion après que celui-ci venait de traverser la vallée de Nyarugunga. Les tirs montaient du bas vers l'avion, alors que celui-ci avait entamé son atterrissage ».

2) B.S. (Militaire camp Kanombe)

Le soir du 06 avril 1994, B.S. se trouvait devant le pavillon 7 de l'hôpital militaire de Kanombe et a vu le départ des tirs sans savoir qu'il s'agissait d'un avion qu'on abattait :

> *« J'étais devant l'entrée de l'hôpital au pavillon sept (7). Tout d'un coup, j'ai vu quelque chose de la nature d'un missile qui est monté vers le ciel, suivie immédiatement d'un deuxième dirigé vers la même direction. De l'endroit où je me trouvais, je voyais clairement ce qui se passait. Les deux tirs dont je viens de vous parler sont partis de la position des militaires de la garde présidentielle qui se trouvaient à la résidence, là où habitait le président Habyarimana. Puis, j'ai vu qu'un objet qui venait d'être touché par ces deux tirs s'est enflammé et est tombée à la clôture de la résidence du président Habyarimana, mais je ne savais pas à ce moment-là que c'était son avion qui était détruit. Immédiatement, plusieurs tirs ont été envoyés dans le ciel par les militaires de la garde présidentielle qui se trouvaient au même endroit de la résidence du président Habyarimana ».*

3) **T.S. (Militaire camp Kanombe)**

T.S se trouvait au camp Kanombe le soir du 06 avril 1994 et a été également témoin direct de l'attentat. Il a déclaré :

« Le soir du 06 avril 1994, peu avant que l'avion n'explose, je me trouvais à la cour du camp Kanombe, en train de manger avec deux de mes camarades nommés Barihuta Nathanaël et Tuyishimire Dismas. C'était visible, j'ai pu observer l'avion qui venait, il avait les phares qui clignotaient. Dans un court instant, j'ai vu le premier projectile de couleur rouge monter vers l'avion. Il l'a touché et l'avion a bougé. Dans quelques secondes, un second projectile est monté venant du même endroit et a touché encore une fois l'avion qui a définitivement pris feu. L'avion venait de dépasser Masaka en approche d'atterrissage. Les tirs sont partis en dessous de la clôture de la résidence du président Habyarimana. Là où je me trouvais, au camp militaire de Kanombe, je voyais parfaitement leur origine. Puis, je me trouvais aussi dans un endroit où je voyais bien l'avion. Je certifie que ces tirs qui ont fait exploser l'avion sont partis de chez Habyarimana. On voyait qu'ils partaient de la position de la garde présidentielle. Les tirs qui ont atteint l'avion sont partis de cet endroit-là. C'était vraiment très près de nous ; ce n'est pas du tout à Masaka, n'insistez pas. Je suis témoin oculaire, je dis ce que j'ai vu ».

4) **B. Is. (Militaire résidant dans les environs du camp Kanombe)**

B. Is. Travaillait au Ministère de la Défense et a été émoin direct des faits de l'attentat :

« J'habitais à Kanombe dans le quartier de Kajagari, non loin de Nyandungu. Le 06 avril 1994, je suis rentré à Kanombe vers 16h et j'ai passé par la route goudronnée qui surplombe l'aéroport, celle de Nyandungu était mauvaise. Lorsque je suis arrivé dans le quartier de Kanombe, j'ai vu plusieurs soldats de la garde présidentielle, dont certains étaient habillés en tenue civile, mais armés. Je les connaissais presque tous. Ils patrouillaient en grand nombre ; ils entraient aussi dans des maisons et des bistrots de Kanombe, et identifiaient des personnes qui s'y trouvaient. Ce n'était pas fréquent qu'ils fassent ce contrôle serré. Je me suis alors adressé à l'un d'eux, l'adjudant Kinyakura, en lui demandant ce qu'ils faisaient là-bas en nombre aussi important. Il m'a répondu sous forme d'une autre question en me disant : 'Je croyais que toi qui travailles au MINADEF, tu étais tout puissant pour être informé de tout ce qui se passe' ! Puis, il a ajouté : 'Le Président est en dehors du pays'. Je ne me souvenais même pas que le Président était parti à Dar-es-Salaam. Je suis resté là-bas dans le quartier en train de causer avec des gens en attendant l'heure d'aller me coucher. Le soir, j'ai continué à voir des militaires de la garde présidentielle qui circulaient, mais à la tombée de la nuit, ceux qui étaient en habits civils avaient été cette fois-ci rejoints par d'autres en tenue militaire. Peu après 20h, je suis descendu pour rentrer chez-moi. Arrivé dehors, j'ai entendu deux énormes coups, espacés de quelques secondes : POOO ! POOO ! Puis, j'ai vu une explosion dans le ciel. Les gens ont commencé à courir pour rentrer chez-eux. Ces coups ont été tirés du côté de la résidence du Président Habyarimana, c'est là-bas, vers le côté donnant à Masaka-Kabuga. C'était vraiment tout près du lieu où je me trouvais. Je

vous dis que je n'avais même pas entendu le bruit de l'avion, et j'ai quand même entendu ces coups. Ils n'étaient pas tirés de loin, c'était tout près de moi, non loin de la résidence du Président. Je ne suis pas obligé de vous le dire, mais c'est de cette manière-là que les choses se sont déroulées ».

5) Nt. A. (Garde présidentielle Aéroport)

Nt. A. faisait partie de la section de la GP qui attendait le président Habyarimana, le soir du 06 avril 1994 et a été témoin de l'attentat. Il a déclaré ce qui suit : *« J'ai vu l'avion en approche d'atterrissage dans le ciel de Masaka aux alentours de 20h. Il était visible et avait des phares clignotants. Lorsque il a entamé la descente, se trouvant au-dessus de la colline de Kanombe, le premier projectile de couleur rouge est monté et n'a pas complètement atteint l'avion ; puis au bout de cinq secondes environ, un second projectile a suivi et a explosé l'avion. Le point de départ de ces deux projectiles est Kanombe derrière l'habitation du président Habyarimana. Vers cette zone-là. Les tirs partaient vers l'avion en venant de devant ».*

6) H. G. (Militaire camp Kanombe)

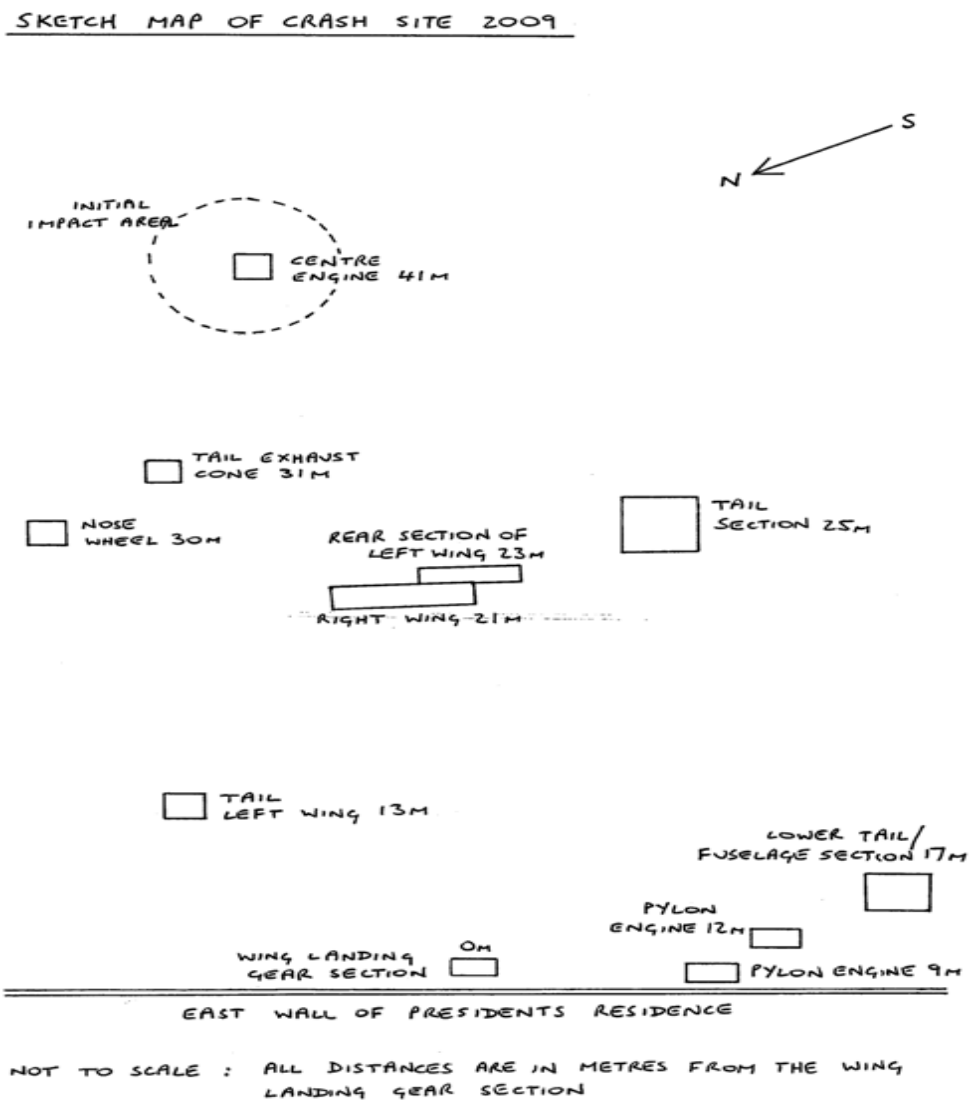
H.G. se trouvait dans la cour du camp militaire de Kanombe et a vu les tirs qui ont atteint le Falcon 50. Il les situe en dessous de la résidence présidentielle : *« Je me trouvais dans la cour du camp militaire avec un camarade, le caporal Munyankindi. J'ai entendu le bruit de l'avion et j'ai regardé pour observer ses mouvements. J'ai alors vu le premier tir, puis le deuxième espacé de quelques secondes. C'est ce deuxième coup qui a fait exploser l'avion et nous avons vu du feu qui s'est tout de suite répandu dans le ciel. En voyant ces tirs, ils provenaient de tout près de la résidence, dans la zone de Nyarugunga. Ma première vue est que le point de départ de ces deux tirs était situé en dessous de la résidence présidentielle ».*

Annex F – Hand Drawn Map of Crash Site Produced in 1994 by Belgian Military Authorities

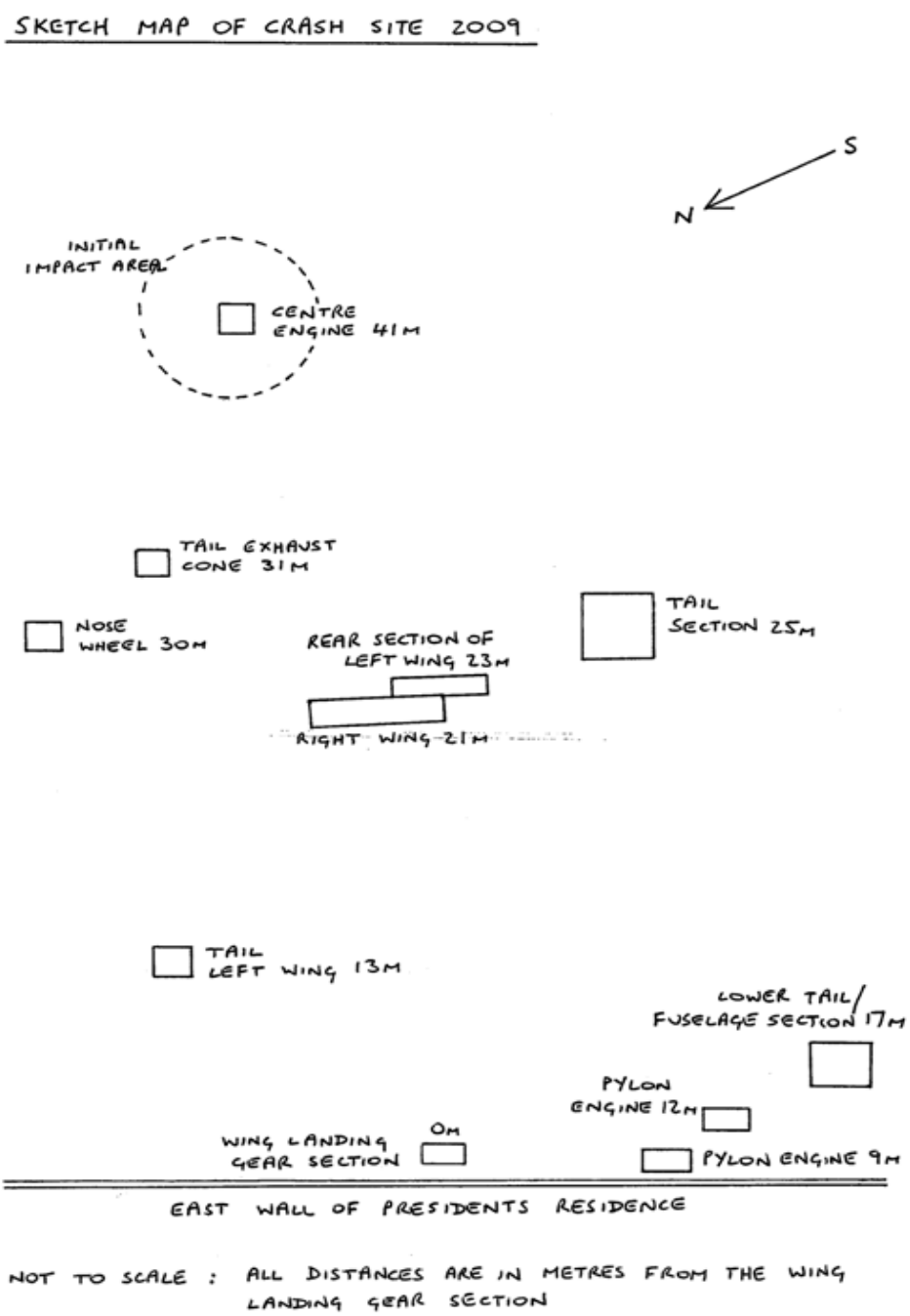
DESCRIPTION DES LIEUX DU SINISTRE

1. L'avion s'est écrasé dans une bananeraie sur un cap ouest. L'angle de descente devait être relativement faible (Max 20°) vu la faible profondeur du cratère (Rep A) dans ce terrain meuble. L'avion devait avoir de l'inclinaison à gauche (aile droite et plan horizontal droit entiers, aile gauche et plan horizontal gauche très endommagés).

2. Nous estimons que les débris se sont éparpillés sur environ 150 m dans la bananeraie et dans une propriété qui serait la résidence présidentielle.



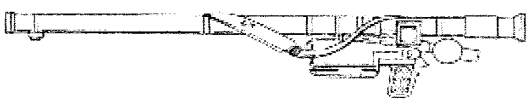
Annex G - Hand Drawn Sketch Map Produced by The Authors of this Report of Crash Site as existing in February 2009



Annex H – Technical Specifications of SAM 16

The **9K38 *Igla*** (Russian: **Игла́**, needle) is a Russian/Soviet man-portable infrared homing surface-to-air missile (SAM). "9K38" is the Russian GRAU designation of the system. Its US DoD designation is **SA-18** and its NATO reporting name is **Grouse**; a simplified, earlier version is known as the **9K310 Igla-1**, or **SA-16 Gimlet**.

Igla



Type	Man-portable air-defense systems (MANPADS)
Place of origin	Soviet Union
	Service history
In service	1983- present
	Production history
Manufacturer	KBM
Unit cost	USD 60,000–80,000 (as of 2003)
	Specifications
Weight	10.8 kg (24 lb)
Length	1.574 m (5.16 ft)
Diameter	72 mm
Warhead	1.17 kg (2.6 lb) with 390 g (14 oz) explosive
Detonation mechanism	contact and grazing fuzes
Engine	solid fuel rocket motor
Operational range	5.2 km (3.2 mi)
Flight ceiling	3.5 km (11,000 ft)
Speed	700 m/s, about Mach 2
Guidance system	two color infrared

Contents

History

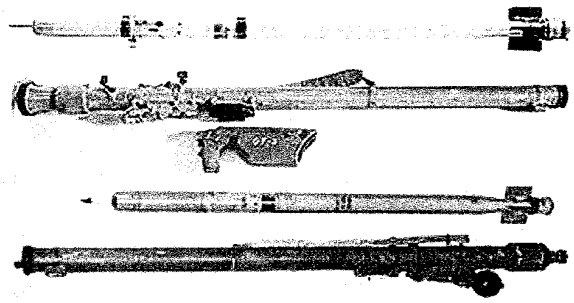
The development of the Igla short-range man-portable air defense missile (MANPADS) began in the Kolomna OKB in 1971. Contrary to what is commonly reported, the Igla is not an improved version of the earlier Strela family (Strela-2/SA-7 and Strela-3/SA-14), but an all new project. The main goals were to create a missile with better resistance to countermeasures and wider engagement envelope than the earlier Strela series MANPADS systems.

Technical difficulties in the development quickly made it obvious that the development would take far longer than anticipated however, and in 1978 the program split in two: while the development of the full-capability Igla would continue, a simplified version (Igla-1) with a simpler IR seeker based on that of the earlier Strela-3/SA-14 would be developed to enter service earlier than the full-capability version could be finished.

Igla-1

The 9K310 Igla-1 system and its 9M313 missile were accepted into service in the Soviet army on 11 March 1981. The main differences from the Strela-3 included an optional Identification Friend or Foe system to prevent firing on friendly aircraft, an automatic lead and super elevation to simplify shooting and reduce minimum firing range, a slightly larger rocket, reduced drag and better guidance

system extend maximum range and improve performance against fast and maneuverable targets, an improved lethality on target achieved by a combination of delayed impact fuzing, terminal maneuver to hit the fuselage rather than jet nozzle, an additional charge to set off the remaining rocket fuel (if any) on impact, an improved resistance to infrared countermeasures (both decoy flares and ALQ-144 series jamming emitters), and slightly improved seeker sensitivity.



On the top a SA-18 (Igla) missile, launch tube and grip stick. Below is a SA-16 (Igla-1) missile and launch tube.

According to the manufacturer, South African tests have shown the Igla's superiority over the contemporary (1982 service entry) but smaller and lighter American FIM-92A Stinger missile. However, other tests in Croatia did not support any clear superiority, but effectively equal seeker performance and only marginally shorter time of flight and longer range for the Igla.

According to Kolomna OKB, the Igla-1 has a P_k (probability of kill) of 0.30 to 0.48 against unprotected targets which is reduced to 0.24 in the presence of decoy flares and jamming. In another report the manufacturer claimed a P_k of 0.59 against an approaching and 0.44 against receding F-4 Phantom II fighter not employing infrared countermeasures or evasive manoeuvers.

Igla

The full-capability 9K38 Igla with its 9M39 missile was finally accepted into service in the Soviet Army in 1983. The main improvements over the Igla-1 included much improved resistance against flares and jamming, a more sensitive seeker, expanding forward-hemisphere engagement capability to include straight-approaching fighters (all-aspect capability) under favourable circumstances, a slightly longer range, a higher-impulse, shorter-burning rocket with higher peak velocity (but approximately same time of flight to maximum range), and a propellant that performs as high explosive when detonated by the warhead's secondary charge on impact.

A soldier with an Igla-1 launcher

Tests in Finland have shown that in comparison with the French Mistral, the 9K38 Igla has inferior range and seeker sensitivity and smaller warhead, but it has a superior resistance to countermeasures.

The naval variant of 9K38 Igla has the NATO reporting name SA-N-10 Grouse.

Igla-type shoulder-launched missiles were used in 29 attacks on civilian aircraft between 1978 and 1998, killing more than 400 people – mostly in Africa, according to the Pentagon's Defense Intelligence Agency.[1]

Other variants

Several variants of the Igla were developed for specific applications:

Igla-1E
: Export version.

Igla-1M
: Improved version of 9K38 Igla. Entered service in Soviet Military during late 1980s.

Igla-1D
: A version for paratroopers and special forces with separate launch tube and missile.

Igla-1V
: Air-launched version, mainly for combat helicopters.

Igla-1N
: A version with heavier warhead at the cost of a slight reduction in range and speed.

Igla-1A
: Export version?

Igla-1S
: The newest variant, which is a substantially improved variant with longer range, more sensitive seeker, improved resistance to latest countermeasures, and a heavier warhead.

Comparison chart to other MANPADS

	9K34 Strela-3	9K38 Igla	9K310 Igla-1	FIM-92A Stinger
Service entry	1974	1983	1981	1982
Weight, full system, ready to shoot	16.0 kg (35 lb)	17.9 kg (39 lb)	17.9 kg (39 lb)	14.3 kg (32 lb)
Weight, missile	10.3 kg (23 lb)	10.8 kg (24 lb)	10.8 kg (24 lb)	10.1 kg (22 lb)
Weight, warhead	1.17 kg (2.6 lb), 390 g (14 oz) HMX	1.17 kg (2.6 lb), 390 g (14 oz) HMX	1.17 kg (2.6 lb), 390 g (14 oz) HMX	2–3 kg (4.4–6.6 lb), 450 grams (16 oz) HE
Warhead type	Directed-energy blast fragmentation	Directed-energy blast fragmentation	Directed-energy blast fragmentation	Annular blast fragmentation
Fuze type	Impact and grazing fuze.	Delayed impact, magnetic and grazing.	Delayed impact, magnetic and grazing.	Delayed impact.
Flight speed, average / peak	470 m/s (1,100 mph) sustained	600 m/s (1,300 mph) / 800 m/s (1,800 mph)	570 m/s (1,300 mph) sustained (in +15°C temperature)	700 m/s (1,600 mph) / 750 m/s (1,700 mph)
Maximum range	4,100 m (13,000 ft)	5,200 m (17,000 ft)	5,000 m (16,000 ft)	4,500–4,800 m (15,000–16,000 ft)
Maximum target speed, receding	260 m/s (580 mph)	360 m/s (810 mph)	360 m/s (810 mph)	?

Maximum target speed, approaching	310 m/s (690 mph)	320 m/s (720 mph)	320 m/s (720 mph)	?
Seeker head type	Nitrogen-cooled, lead sulfide (PbS)	Nitrogen-cooled, Indium antimonide (InSb) and uncooled lead sulfide (PbS)	Nitrogen-cooled, Indium antimonide (InSb)	Argon-cooled, Indium antimonide (InSb)
Seeker scanning	FM-modulated	FM-modulated	FM-modulated	FM-modulated
Seeker notes		Aerospike to reduce supersonic wave drag	Tripod-mounted nosecone to reduce supersonic wave drag	

Annex I – Photographs of Crash Wreckage – By Insurance Company Sonarwa– unverified date believed taken on or around 24th May 1994. (The following photographs received untitled from The Committee)

Annex J – Photographs of Crash Wreckage – believed to have been taken in 1994 by Non Attributable Source


F

Annex K – Photographs of Crash Wreckage Taken 2007 Non Attributable Source

Annex L – Photographs taken 2009 by The Authors of this Report.

General Views of Crash Site and Layout of Wreckage at February 2009

Fig. 1: View from the SE corner (1).

Fig. View from the NE corner (1).

Fig. 3: View from the SE Corner (2)

Fig. 4: View from the SE Corner (3).

Fig. 5: View from the SE Corner (4).

Fig. 6: View from the SE Corner (5).

Fig. 7: View from the E (1).

Fig. 8: View from the SE Corner (6).

Fig. 9: View from the SE Corner (7).

Photographs of Individual Elements.

Fig.10: Right Wing and Rear Section of Left Wing (1).

Fig. 11: Right Wing and Rear Section of Left Wing (2).

Fig. 12: Right Wing and Rear Section of Left Wing (3).

Fig. 13: Right Wing and Rear Section of Left Wing (4).

Fig. 14: Tail Section (1).

Fig. 15: Tail Section (2).

Fig. 16: Tail Section (3).

Fig. 17: Pylon Engine (9m).

Fig. 18: Pylon Engine (12 m).

Fig. 19: Tail Left Wing

Fig. 20: Tail Exhaust Cone.

Fig. 21: Centre Engine (1).

Detailed photographs of Possible Fragmentation damage.

Fig. 22: Rear Section of Left Wing (1).

Fig. 23: Rear Section of Left Wing (2).

Fig. 24: Rear Section of Left Wing (3)

Fig. 25: **Rear Section of Left Wing (4)**

Fig.26: **Rear Section of Left Wing (5)**

Fig. 27: Rear Section Left Wing – Sectioned (1)

Fig. 28: Rear Section of Left Wing – Sectioned (2).

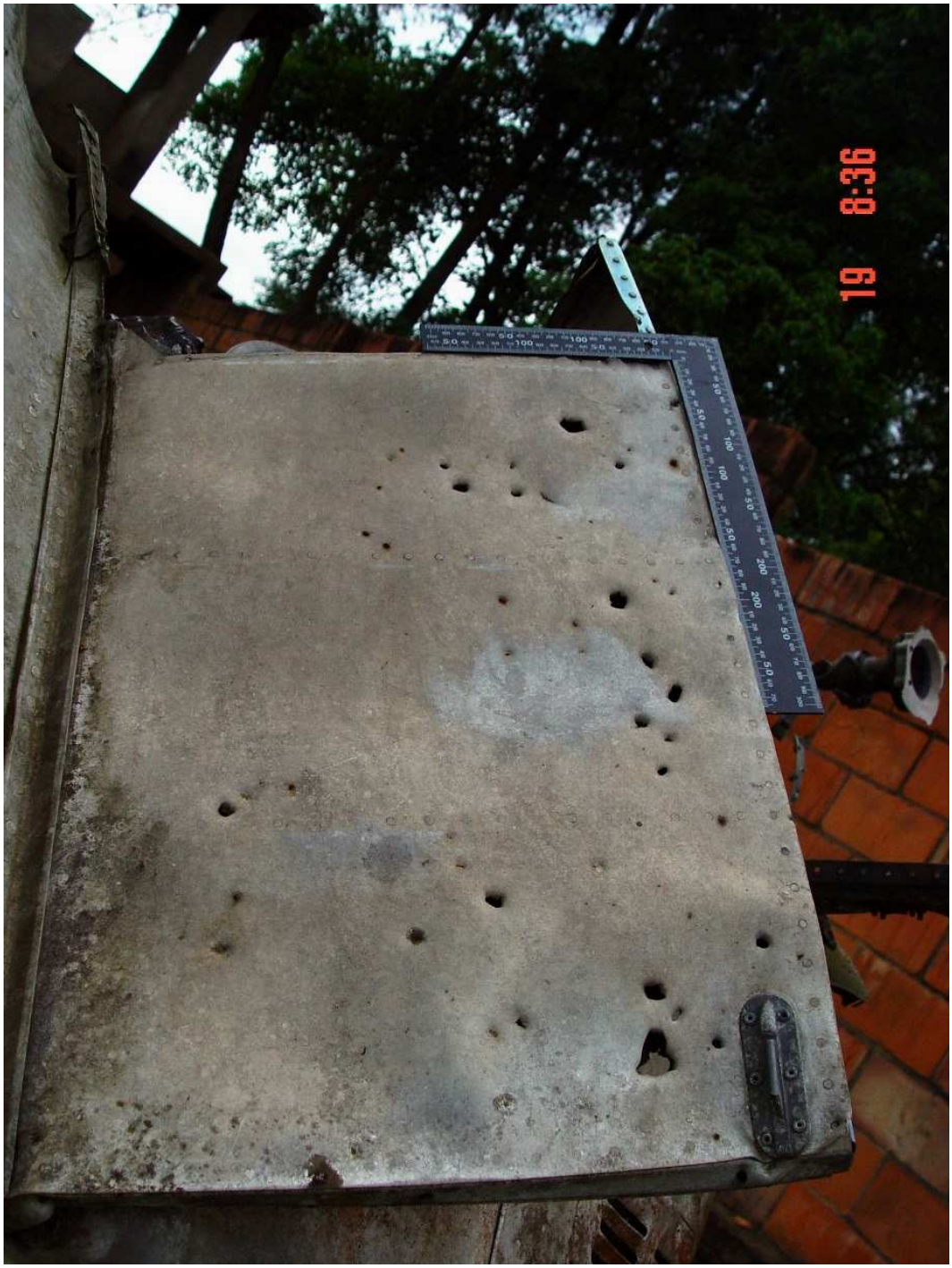


Fig. 29: Box panel (1).

Fig. 30: Box Panel (2).

Fig. 31: Box Panel (3).

Fig. 32: Box Panel (4).

Fig. 33: Box Panel (5).

Fig. 34: Box Panel Fragment Capture (1)

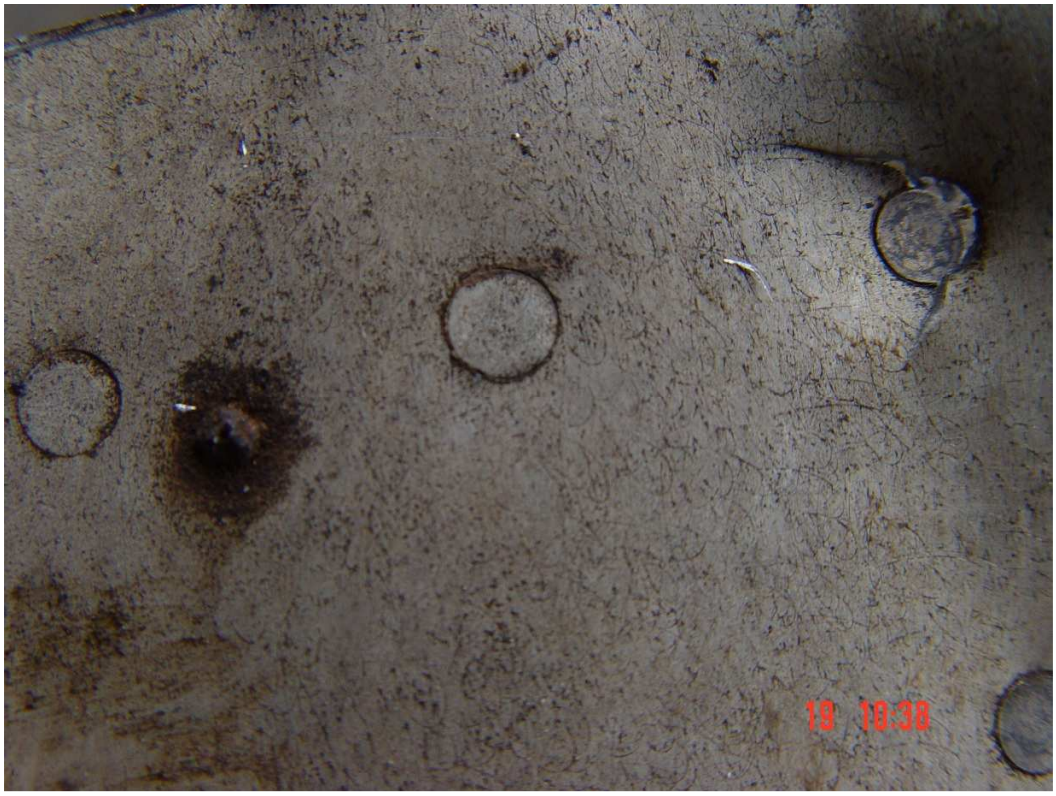


Fig. 35: Box Panel Fragment Capture (2)

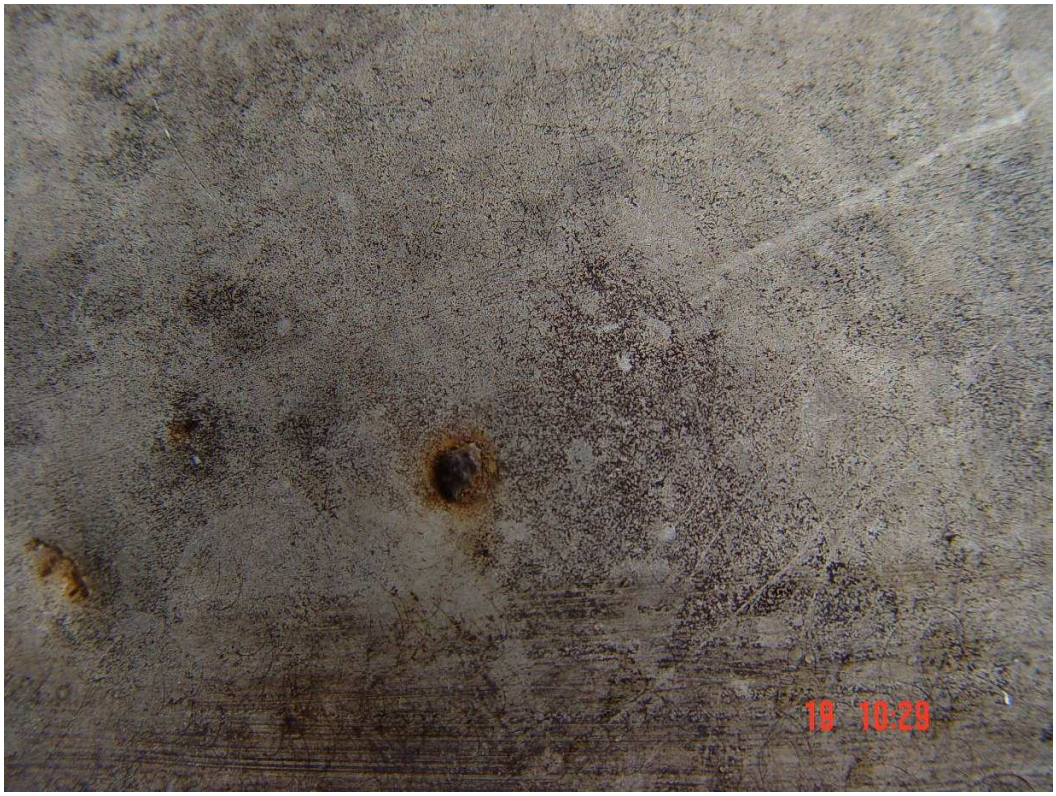


Fig. 36: Box Panel Fragment Capture (3)

Fig. 37: Box Panel Fragment Capture (4)

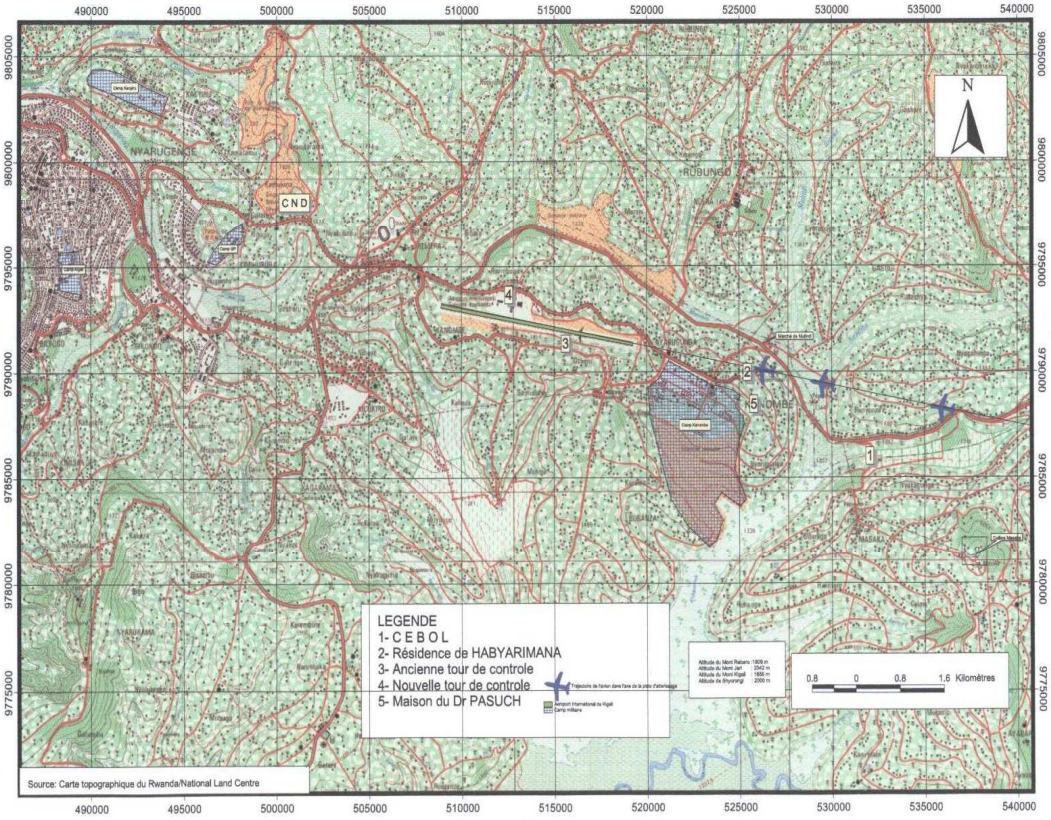
Fig. 38: Box Panel Fragment Capture (5)

Fig. 39: Lower Tail/Fuselage Section (1)

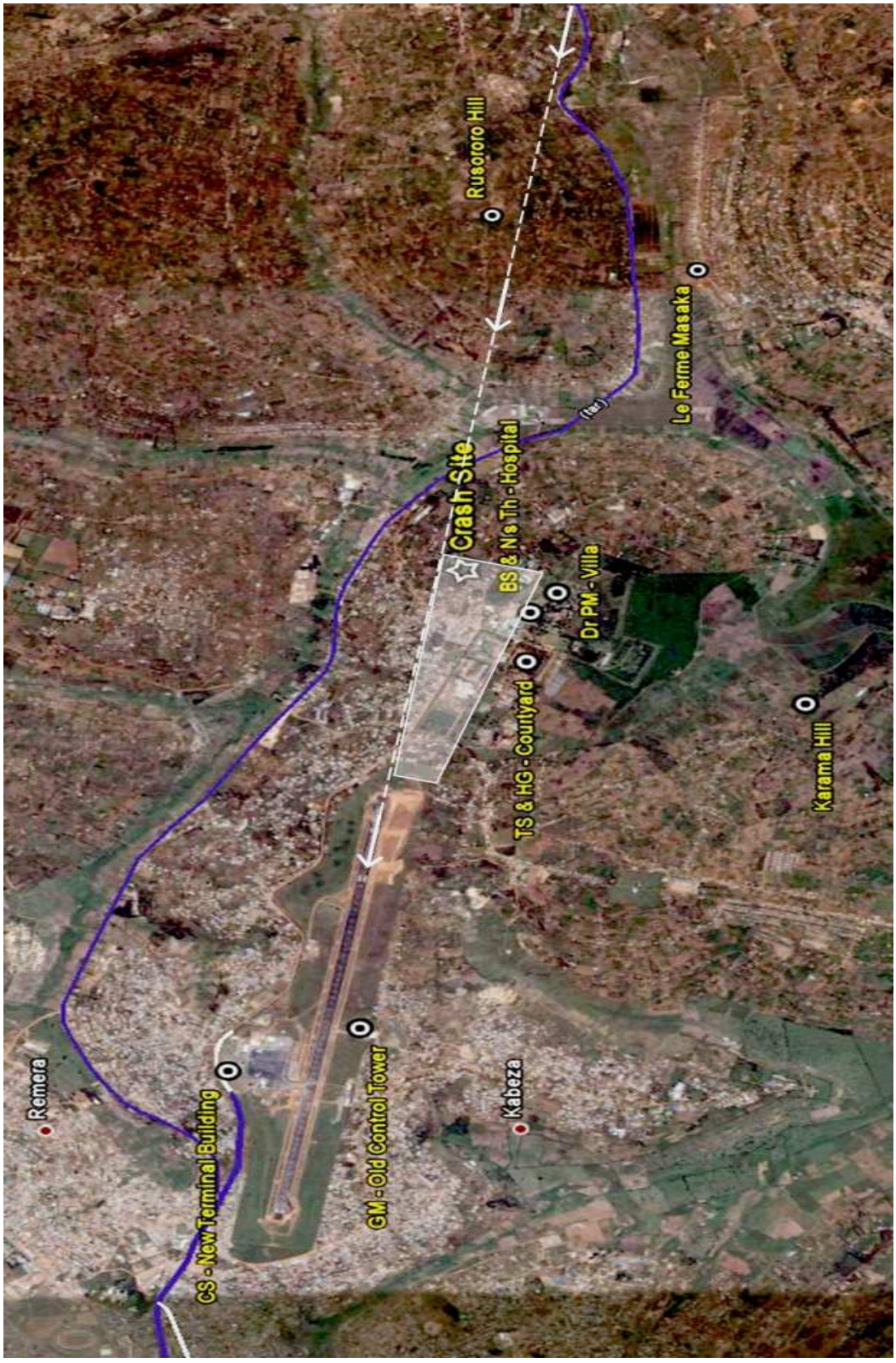
Fig. 40: Lower Tail/Fuselage Section (2).

Fig. 41: Lower Tail/Fuselage Section (3)

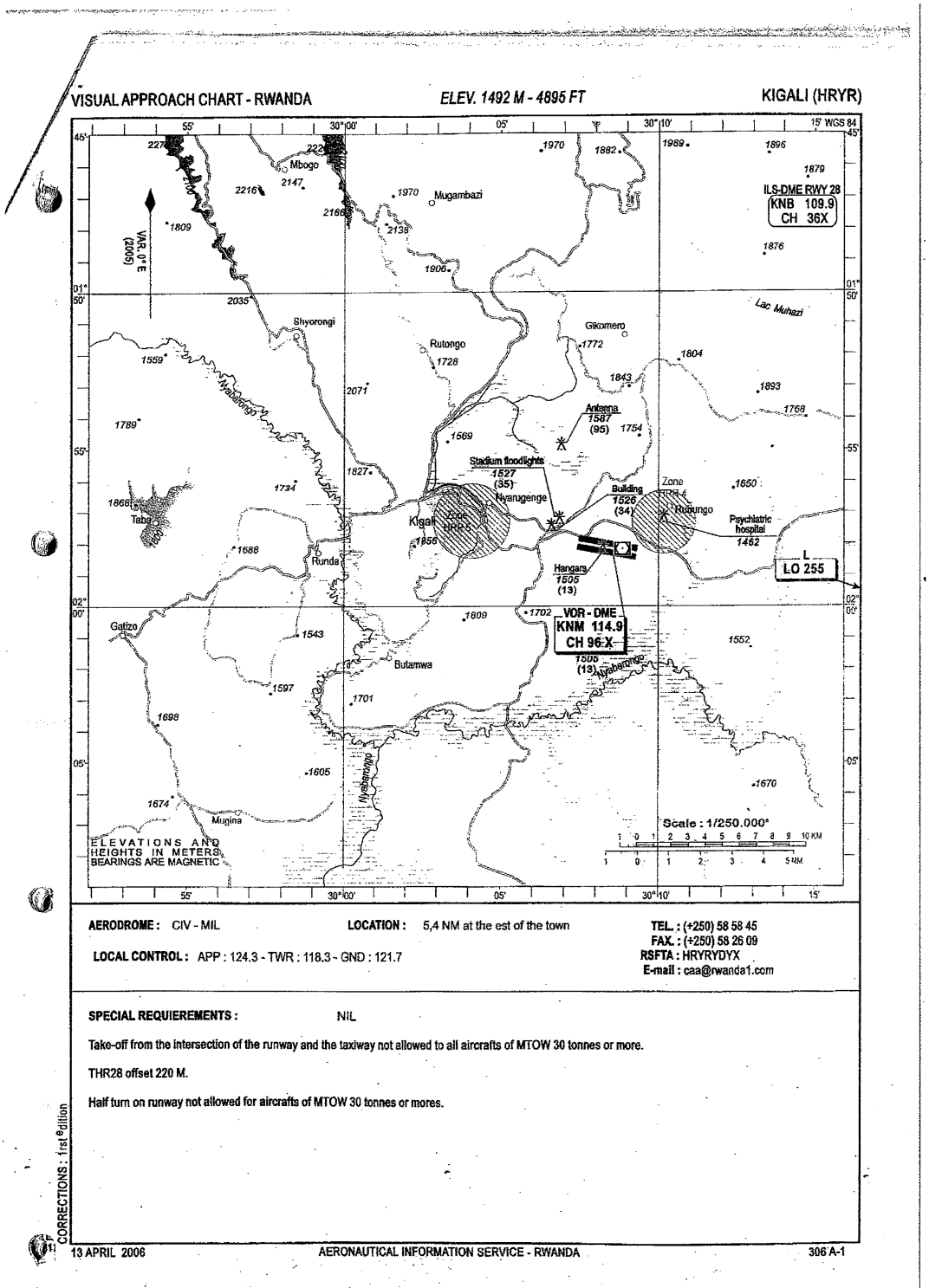
Annex M – Internet based map supplied by The Committee

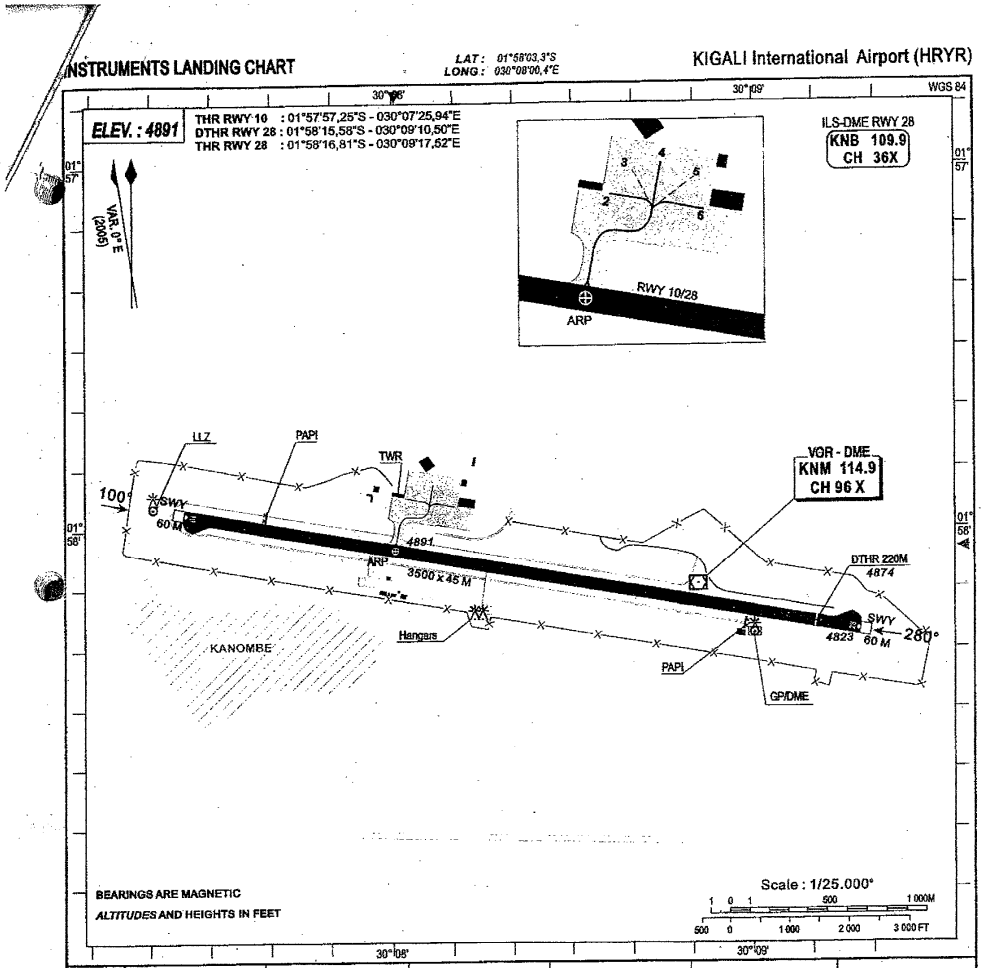


Annex N – Internet Based Map produced by the Authors from GPS plots



Annex O – Aircraft Instruments Approach and Landing Charts for Kigali Airport





RWY	Approach	PAPI	Threshold lights	Runway edge lights	Runway end lights	Stopway end lights
10	NIL	Slope : 3,00°	Green	White unidirectional	Red LL unidirectional	Red and white bidirectional
28	420 M	Slope : 3,00°	Green	White unidirectional	Red LL unidirectional	Red and white bidirectional

Turning pads QFU 10 and 28, taxiway : Blue omnidirectional lights.
Landing RWY 28 : Displaced threshold = 220 M

SPECIAL REQUIEREMENTS :

Half turn on runway not allowed to all aircraft whose MTOW exceed 30 tonnes. Half turn must be done on the turn around area at the far end of the runway.

Take-off from the runway and the taxiway intersection not allowed.

Landing not allowed on runway 10.

CORRECTIONS : 1st edition

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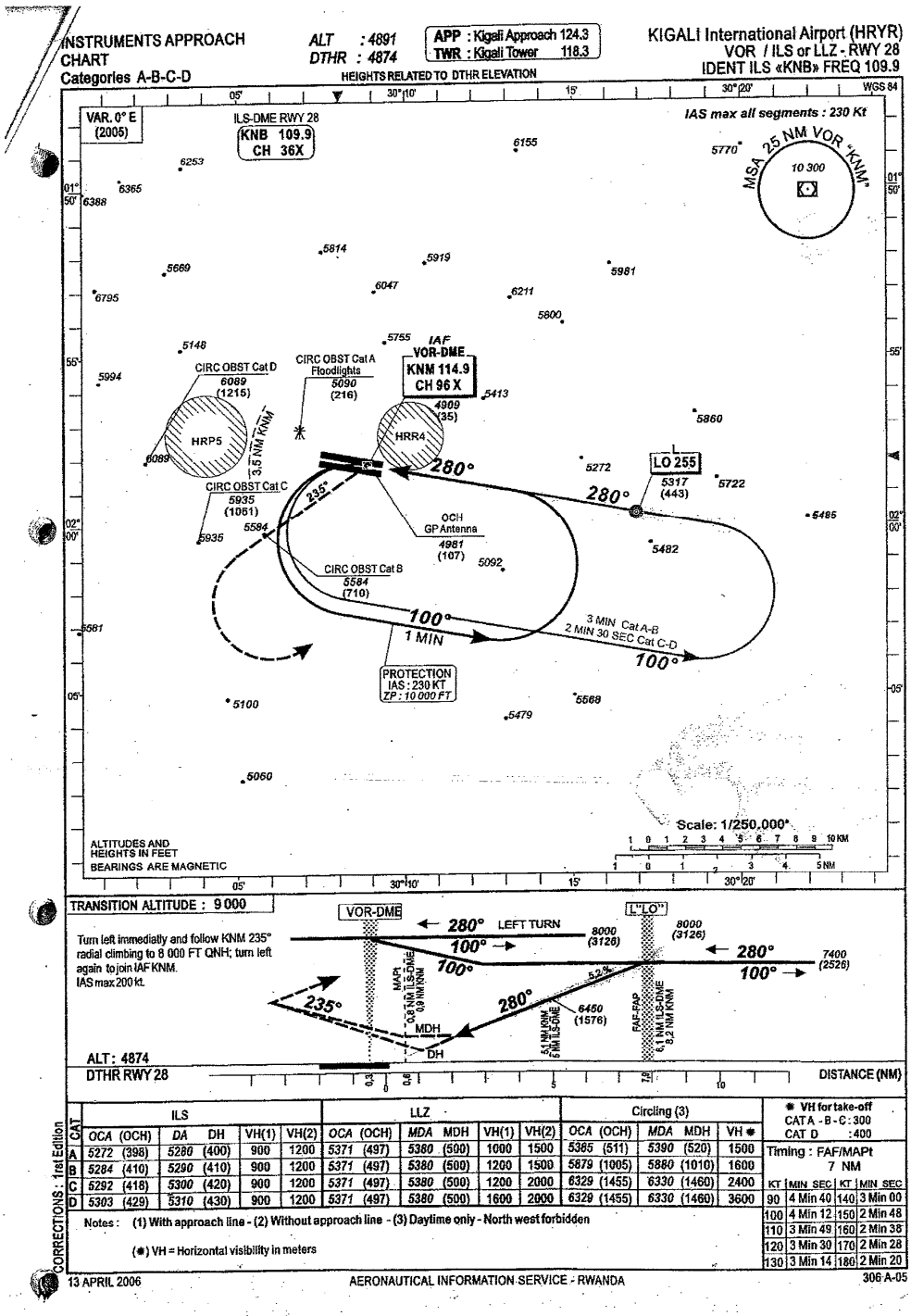


CAT	ILS OCA (OCH)	ILS DA DH	ILS VH(1)	ILS VH(2)	LLZ OCA (OCH)	LLZ MDA MDH	LLZ VH(1)	LLZ VH(2)	Circling (3) OCA (OCH)	Circling (3) MDA MDH	Circling (3) VH *
A	5272 (398)	5280 (400)	900	1200	5371 (497)	5380 (500)	1000	1500	5385 (511)	5390 (520)	1500
B	5284 (410)	5290 (410)	900	1200	5371 (497)	5380 (500)	1200	1500	5879 (1005)	5880 (1010)	1600
C	5292 (418)	5300 (420)	900	1200	5371 (497)	5380 (500)	1200	2000	6329 (1455)	6330 (1460)	2400
D	5303 (429)	5310 (430)	900	1200	5371 (497)	5380 (500)	1600	2000	6329 (1455)	6330 (1460)	3600

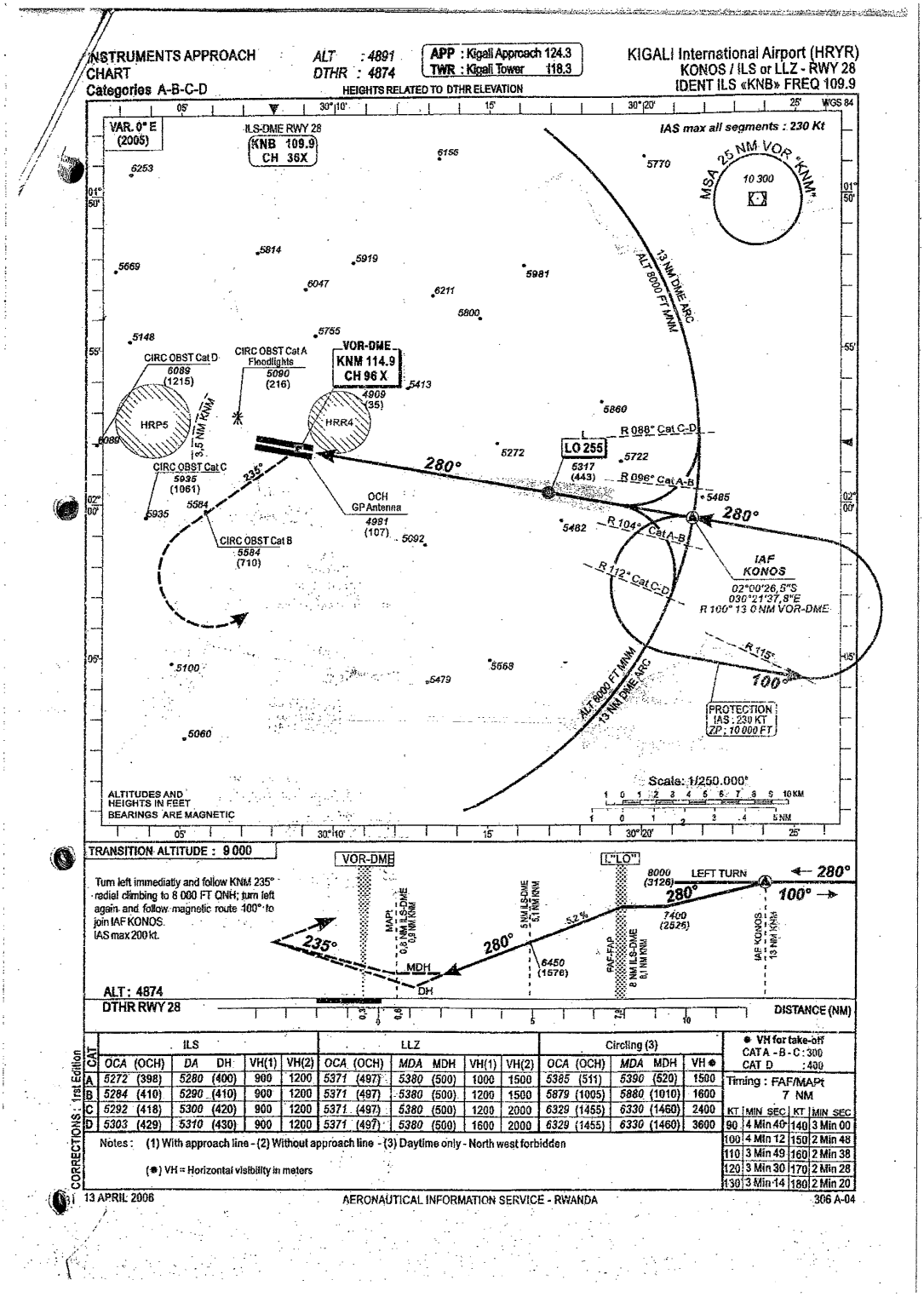
Notes : (1) With approach line - (2) Without approach line - (3) Daytime only - North west forbidden

(*) VH = Horizontal visibility in meters

* VH for take-off
CAT A - B - C : 300
CAT D : 400

Timing : FAF/MAPt
7 NM

KT	MIN SEC	KT	MIN SEC
90	4 Min 40	140	3 Min 00
100	4 Min 12	150	2 Min 48
110	3 Min 49	160	2 Min 38
120	3 Min 30	170	2 Min 28
130	3 Min 14	180	2 Min 20



CAT	ILS OCA (OCH)	ILS DA DH	ILS VH(1)	ILS VH(2)	LLZ OCA (OCH)	LLZ MDA MDH	LLZ VH(1)	LLZ VH(2)	Circling (3) OCA (OCH)	Circling (3) MDA MDH	Circling (3) VH *
A	5272 (398)	5280 (400)	900	1200	5371 (497)	5380 (500)	1000	1500	5385 (511)	5390 (520)	1500
B	5284 (410)	5290 (410)	900	1200	5371 (497)	5380 (500)	1200	1500	5879 (1005)	5880 (1010)	1600
C	5292 (418)	5300 (420)	900	1200	5371 (497)	5380 (500)	1200	2000	6329 (1455)	6330 (1460)	2400
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Timing : FAF/MAPt
7 NM

KT	MIN SEC	KT	MIN SEC
90	4 Min 40	140	3 Min 00
100	4 Min 12	150	2 Min 48
110	3 Min 49	160	2 Min 38
120	3 Min 30	170	2 Min 28
130	3 Min 14	180	2 Min 20

CORRECTIONS : 1rst Edition

13 APRIL 2006 AERONAUTICAL INFORMATION SERVICE - RWANDA 306 A-04

Annex P - Elemental Comparison of Aircraft Debris Recovered from The Crash Wreckage and Warhead Metal.

Introduction

Eight metallic fragments found embedded in the aircraft were received for elemental analysis. For comparison, sections of a disassembled warhead were also received for analysis.

The analysis was conducted using energy dispersive X-ray spectrocopy (EDS). The equipment was a JEOL 840A scanning electron microscope (SEM) with an attached EDAX Genesis EDS system.

Results

Of the eight debris fragments retrieved from the plane, five were aluminium alloys (and so were ignored as they may be from the plane itself) and three were iron based. All three debris samples have a very similar composition to each other:

- Fe, Si, C with a trace of Cr and Mn

Three different areas of the warhead were analysed and their composition was

- Fe, Cr, Si, C with a trace of Mn, Ni, W and (possibly) Mo

Therefore, the elemental composition of the sections of warhead and the debris fragments are different.

Conclusions

The composition of the warhead metal is different from that of the debris. This is in terms of both minor and trace components of the metals. This suggests the warhead material analysed is not a match with the source of the debris.

Analysis by
Dr Jonathan Painter
Cranfield University
9th March, 2009

List of Elements

Element	Symbol
Iron	Fe
Silicon	Si
Chromium	Cr
Manganese	Mn
Nickel	Ni
Tungsten	W
Molybdenum	Mo
Carbon	C