

# Mississippi Thunder.

There's a storm brewing down in Mississippi with 'Lightning' a definite possibility. The Lightning being 14 Tons of English Electric T5 that arrived at Stennis International Airport Hancock county Mississippi back in late 1997. The aircraft is none other than Lightning TMk5 XS422, the former RAF Boscombe Down Empire Test Pilots School (ETPS) aircraft that featured in the BBC documentary "Test Pilot". Flown by many RAF, Commonwealth and USAF pilots the Lightning Experience became the highlight of their Test Pilots course. John Thorpe of the EPTS and a former pilot of XS422 wrote *"I remember now that when I returned to join the ETPS staff in spring-'80 we had a borrowed T5 while 422 was undergoing some servicing, which is why I didn't fly her until Feb 81. While the aircraft was on ETPS it was used for a variety of test pilot training tasks, mostly concerning supersonic handling and performance. My favourite exercise involved a reheat take-off and climb to 40,000ft (very quick!) heading south-west from Boscombe, cruising at about 0.9 Mach until out to sea over the English Channel, just west of the Isle of Wight, and then a supersonic dash east down the channel up to about 1.4 Mach carrying out some test pilot training stuff en-route. Then a decelerating turn back towards Boscombe and a rapid descent and landing before the fuel ran out - during the max reheat acceleration to high speed you could actually see the fuel gauges unwinding! The whole exercise only lasted half an hour, but it was a pretty exciting half hour I can tell you, particularly if you're flying it with a French test pilot student who doesn't completely understand quite what he's trying to do or how little fuel/time he has to do it in - happy days!!"*

The aircraft was built on the 23<sup>rd</sup> March 1965 and had its first flight on the 24<sup>th</sup> March 1965. She joined 226 Operational Conversion Unit (OCU) 1<sup>st</sup> June 1965 and was code 422. In March 1969 XS422 conducted the first air-to-air Lightning T5 refuelling by the OCU. In September of 1969 XS422 was transferred to 29 Sqn and coded 'O'. By January 1970 XS422 was at RAF Leaconfield number 60 Maintenance Unit (MU) for overhaul and in August was transferred to RAF Wattisham 111 Sqn and coded 'T'. Here she was considered to be a somewhat rogue aircraft and on 20<sup>th</sup> May 1971 was returned to 60 MU. On the 15<sup>th</sup> March 1972 XS422 returned to 29 Sqn and coded 'Z', but this was only to be a short stay as in December 1972 XS422 was transferred to Wattisham's other resident Squadron number 56 Sqn. Here she stayed until 1 January 1976 when XS422 was transferred to EPTS, Boscombe Down (replacing Lightning T4 second prototype XL629, which was withdrawn from EPTS service and is now the Boscombe Gate Guardian). In the August of 1976 XS422 acquired a red fin, spine and wing décor, which she retained for her time as the EPTS aircraft. However due to paint stripping off the fin during high speed flight the fin eventually reverted back to polish metal. In mid 1986 XS422 was withdrawn from flying duties and was officially 'struck-off charge' on 28<sup>th</sup> October 1987. Thereafter she remained as a static airframe until being purchased by Entrepreneur Mr Wensly Haydon-Bayllie when she was dismantled and eventually stored with a cache of 16 ex - Saudi Lightning's that he had also purchased.

## Mississippi USA

Nothing much was heard of the collection until Classic Citroen car restorer Mr Andrew Brodie heard that the Lightning collection was for sale. Andrew talked to a very good friend of his into becoming involved with the project, a Mr Jon Roth who ran the Vintage Aircraft Restoration Company. Based at Stennis International Airport, Mississippi USA, Jon restored Stearman Biplanes to concourse condition for US customers and had won prizes for his restorations at the Experimental Aircraft Association (EAA) annual show Sun and Fun. He really was not quite sure what a Lightning was! Boy did he get a surprise!

The location of Stennis Int. Airport was an ideal location as it less than 5 miles from the Gulf of Mexico, it has a massive runway designed to handle Boeing 747's and is a reserve landing ground for the space shuttle, an ideal home for the Lightning.

## 17 Airframes

Andrew then set about the task of purchasing a suitable airframe. However armed with loads of enthusiasm and not much technical expertise on an aircraft of such complexity, Andrew needed a Lightning expert to ensure he got the best airframe possible and the basis of a viable project. Andrew was given the name of Phil Wallis, a stalwart in the Lightning preservation movement. Phil had nearly 26 years worth of experience on the aircraft in Royal Air Force service and in various preservation

projects. Phil took the trip down to Portsmouth with Andrew to view the 17 airframes, and after crawling around the storage containers selected two airframes, XS422 as the primary airframe and ex Royal Saudi Air Force ZF597 (55-711) as a secondary airframe and spares source for 422.

## **Anglo American Lightning Organisation**

Once selected, a deal was finalised to purchase the two airframes plus engines and they were made ready for shipment to the USA and the *Anglo American Lightning Organisation (AALO)* was born. Andrew now had another problem. Who was going to head up a team to restore XS422 to flight condition? Although he had the facilities in the USA, the technical know how was lacking. Phil was asked if he would take on the task of project manager and this he did. However Phil needed a deputy to help push the project forward, he approached a colleague and very good friend of his whom had 11 years in the Lightning Aircraft preservation world and 15 years fast jet experience and so Max Waldron duly joined the team.

Phil and Max are unique in the project, as they are both current serving RAF Aircraft Technicians who happen to have Lightning Preservation as their main hobby! They work on the project in their own time and work for free and are wholly committed to seeing the project through to a successful conclusion.

## **War Reserve**

Shipping the 2 airframes was just the start to this mammoth undertaking. It was soon realised that a more substantive spares back up would be required to keep the project resourced with the amount of equipment and spares to not only restore XS422, but also sustain her once in operation. The team started to scour the UK for ground equipment and suitable spares. Keith Smith of marine salvage came to the rescue and sold the team the former RAF war reserve of Lightning spares, that thankfully was never required and comprised over a 20,000 piece part spares. A number of near zero timed RR Avon 302R Turbojets capable of giving the jet 16,360 lbs. of thrust with reheat. Also Keith supplied AALO with a number of low houred reheat pipes, starter units and also the fwd fuse of ZF595 and the rear fuse of ZF 596 plus 2 sets of wings giving the composite assets of a whole airframe. The team now had a comprehensive spares package with which to support the project.

## **Sun & Fun**

A small team was formed in the USA headed by Jon Roth and his chief engineer Mike Shallbetter. Mike, better known for his concourse restoration of Stearman's met the challenge of fast jet technology head on. Mike had been in the aviation business for many years, as had his family, and had very close ties to the Experimental Aircraft Association (EAA). He was also a regular volunteer at the EAA showcase Airshow "Sun & Fun" held in Florida every year.

## **Check 4 Servicing**

Phil decided to mirror the RAF paperwork system to record the restoration and maintenance of XS422, as it is a tried and tested system which allows all work to be fully accountable right down to the last nut and bolt. This would ensure the highest standards were adhered to and the system would more than satisfy any FAA inspector's scrutiny. He also decided that if we were going to do the job then there would be no half measures, "If we are going to restore this aircraft only the highest standards will do". A philosophy the group works to at all times. The first trip the British contingent did was to extract the airframes from their 45-ft containers that had been used to deliver them to the USA. This was not as straight forward a job as one might think. To accommodate the cargo into the containers the roofs were removed to get the airframes in. So the first day's work was to make an opening, which made it possible to free the components. Once out, the major components were placed onto specially built transportation dollies, which Mike had designed and built prior to delivery of the airframes. Due to the time the airframes had spent in storage in shipping containers the team decided to carry out a "penalty" Major Servicing on the XS422 airframe. Known as a 'Check 4' this is the most in depth servicing she can possibly have, all carried out in accordance with RAF Maintenance Schedules. This phase would ensure the airframe was inspected from top to toe, thus highlighting any serious defects prior to assembly of the aircraft. It would also flag up the majority of the minor defects and give the team an idea of how much work would be involved in the restoration and indeed confirm its viability as a potential flyer.

## Experimental Aircraft

XS422 will be flown in the USA as an Experimental Aircraft; this category means she can be displayed at Airshows and fly freely over non-populated areas – in our case the Gulf of Mexico! It was decided that the inspection phase of the ‘Check 4’ servicing would be carried out prior to the start of any restoration. This was for a number of reasons, firstly to check and treat any corrosion, secondary to identify missing or unserviceable components and give the airframe a thorough inspection. Once everything was out of the containers the steam cleaner was sparked up and everything was given a thorough clean. XS422 had been coated in a very heavy coating of waxoil that had been applied prior to containerisation; it had done a superb job of protecting the aircraft. This proved very stubborn to remove, but after a few days-hard work it had all been removed. One fortunate aspect of being in Mississippi is things dry very quickly and within a few hours the whole thing was dry and pushed back into the project hanger. The inspection phase started and the pile of “job cards” steadily grew. On this trip only a fraction of the inspections were completed, but the American crew were left with a long list of tasks to be carried out before the Brits returned. One of the problems that arose was that the

American team was not 100% familiar with the British jet and its many peculiarities – for example bolt sizes “BSF what’s that”, so a digital camera was acquired and via the Internet the 2 teams kept in constant touch with each other. The British team were also kept busy, as the huge spares collection required sorting, a gargantuan task in its own right. Sorting out the 20,000 piece part spares collection was a project in itself and the group with the expert help and guidance from Geoff Cummings entered them all onto a database. Volunteers please form an orderly queue!

## Hurricane

The next trip to the USA by the Brits was in February 99, it was to have been in October 98 however a Hurricane put paid to that. Fortunately the project hanger, which is home to 422, is built to withstand 150-mph winds, which is a big bonus as the Mexican Gulf is famous for the odd Hurricane or two. On the second trip the forward cockpit was given a thorough inspection and although was found structurally sound it had been heavily “souvenir hunted” prior to being sold. Another problem was it had suffered some water damage, which although repairable it was at the time considered to be a costly and time-consuming task.

## New nose job

It was at this point Phil decided to do a feasibility study into seeing if the forward fuselage of ZF595 could be mated instead. Mechanically it was considered possible with no major problems. Infact ZF595 being ex Saudi it had a better Environmental Control System (ECS) for the aircrew, which would be ideally suited to the conditions in the Southern USA. The other thing in its favour at the time was ZF595’s cockpit was still in the UK enabling the British team to do a potential full servicing and restoration back at home. This would have enabled the team to have a two pronged attack and aid a swifter restoration. Another major headache was the aircraft electrical looms as 100’s of wires had been cut to get the aircraft apart. The identification tags on these cables were either missing or perished. Fortunately both Phil and Max knew an ideal candidate to tackle the problem and John Sherry joined the team. John had spent many years working various Squadrons within the RAF and was at this time an instructor in the Tornado Maintenance School at RAF Marham teaching electrics to future Tornado technicians. John carried out the feasibility study into the viability of mating a T55 cockpit onto a T5 rear fuselage from an electrical point of view, after many hours John reported that it was indeed possible.

## Wing preparation

The British team returned to Stennis for their third stint in February 2000 the final major inspections were carried out and work began on sealing the wing centre sections. It had been decided that this would be our only chance of getting the wings and fuel tanks sealed. All the old and dried PRC sealant was removed from the outside of the wings and the tank sealing plates removed so as to gain access to the inside of the wing. Once in, the whole area was cleaned to the highest standards. Phil was very fussy about the cleanliness to the point that he suffered quite a few jokes. However the team did a fantastic job. All of the internal areas had been completely resealed before the Brits returned home. This had been a hard trip as the wings had been put on individual trestles and the undercarriage lowered wheels

and brake units removed and the main legs raised. In the fourteen days the team had worked 10 –12 hour days without a break and as a result ended up sleeping all the way back to the UK. Nonetheless with a very satisfying feeling knowing how much had been achieved.

## **More time and people**

Whilst back in the UK ploughing through the spares the Brits reflected on the previous trip and how much was achieved and how much more could have been achieved if we had had more time or lightning experienced people. As the main problem was a lack of ex-Lightning qualified people. Ideally we wanted ex-Lightning personnel or people with good fast jet knowledge. Andrew was asked if funding was available for a bigger team. He was given one of Phil's by now famous Gantt charts of what could be achieved. After many phone calls, Emails and meetings it was decided to take three extra British engineers with us. One was to be John Sherry who would take on the cable identification on the rear fuselage, and the other was Dave "Lenny" Henry. Dave was yet another instructor in the Tornado Maintenance School at RAF Marham and has Lightning (Aircraft Servicing Flight Binbrook), Buccaneer (16 Sqn Laarbruch) as well as Tornado experience. Finally ex- Chief Tech Dave Blisset was recruited to tackle the propulsion system. Unfortunately due to circumstances beyond his control, Dave Blisset was unable to make this trip. The date was set and plans made for a return to Stennis in October 2000. However we ended up with an 'extra' in the form of Dave's (Lenny's) wife Eileen, who had paid for herself to go and help. Eileen was normally one of British Telecom's finest operators, proved to be a real asset, especially in the nut, bolt cleaning and identifying department. Another unexpected helper came in the form of Richard Herrando a French engineer who was a friend of Jon's and keen to help the project. He also had paid his own airfare out to Stennis to help aid the project.

## **Documentary**

Another thing that made this trip somewhat different was that Nick Holeman a cameraman had followed the team out to the USA. Nick had been listening to Radio 2 and the Johnny Walker show a number of weeks previous, when he heard Chief technician Phil Wallis being interviewed on a project to rebuild a Lightning to flight condition in the USA. Nick only remembered that the guy's name was Phil and he worked at RAF Marham. So Nick wrote a letter to the Station Commander at Marham asking if he knew of the individual and if he could be contacted. Strange thing, but the letter found its way to Phil. Nick was duly contacted and a meeting set up with the British element of the team. Nick explained his interest and asked if we minded him making a documentary on the project. We were extremely pleased and more than happy for this to happen and so Nick found himself on a plane going to Stennis, a place he was still trying to find on the map! He was also about to find out those cameramen when not filming, could end up doing an awful amount of humping and dumping of various aircraft bits.

## **Progress towards rebuild**

On arrival at Stennis the team set about their tasks. John started on the wiring and to his credit and a lot of sweat and tears, completed the areas of the wiring identification he planned to do. This meant working solid with very little time even for dinner. Phil orchestrated the other tasks whilst Max and Lenny set about completing the tank and wing sealing. This job relied heavily on the preparation being correct and many hours were spent on getting it right and also neat and tidy. At one point an individual visiting the project was heard to say 'why are you doing it like that no one is going to see it' to the reply 'we would know' other jobs that were carried out were the identification of many of the bolts and pipe work. Once identified photocopies of the relevant Air Publication (AP) highlighted and boxed up with the items. A painstaking job, but one that was vitally important as for anybody to have a fighting chance of rebuilding the aircraft they would need to know where and how it all fitted together. Another job that was carried out was the strip of the spare cockpit. All the instruments were removed cleaned and categorised.

## **Escape System**

It has been decided that the Aircraft Assisted Escape System (AAES) be made live and operable. This would allow the Aircrew an excellent chance of survival in any situation and give them piece of mind when strapping them selves in. Max, the resident expert on the escape system realised that the restoration of the system would require the seats and sub-assemblies to be serviced by a recognised agent. Fortunately, a very good friend of Max's, a Sergeant Glen Turner (Armaments Technician) of the

Royal New Zealand Air Force. Had been on a recent four-month exchange visit to the UK, Glen enthusiastically offered AALO his help. He had been involved with ejection seat equipped Warbird aircraft in New Zealand for many years. He had recently fitted a live seat system, after four years work, to a privately owned Hawker Hunter Mk 74B (ex- Singaporean Air Force). This is the first live escape system in a civilian aircraft in New Zealand. Glen has helped to draft the rules for the Civil Aviation Authority of New Zealand with regard to live escape systems. He also holds a current certification from, the Civil Aviation Authority of NZ. Glen has a keen interest in Warbird aviation and ejection seats worldwide and is a recognised authority in his area of expertise. So the seats and canopy jettison components from XS422 were removed and shipped to Glen's facility Warbird Escape Systems NZ. So the organisation now really did have a truly International feel.

Throughout the whole of that visit Jon Roth and Mike Shalbetter worked very closely with the UK team and a real dent in the work required on XS422 was achieved. This work format for the British element of the team worked very well indeed and will be the standard format for all visits.

## **Phase one completed**

Phase one of the restoration was complete in that she had been inspected fully and prepared for re-assembly. We found that the aircraft was in superb condition, and although having been in storage for several years and not flown for 14 years there had been very little degradation of the airframe and its systems. Some minor corrosion has been found, but nothing that would prevent this valuable airframe from flying again. All that was required was more money and resources to aid the project and help it progress further.

## **Phase two begins**

In October 2000 Bob Simms who works for Lockheed Martin Space Systems at the NASA Michoud Assembly Facility joined the team as the US project manager. We were very pleased to welcome Bob aboard as he brought a host of qualities that the project would only benefit from. Bob worked for English Electric from 1961 until 79 when he moved to the USA and had first hand experience of the production of the Lightning. Infact he helped build XS422 so it was a fantastic reunion. Bob is a real workaholic and has propelled the project into another dimension. Refurbishment tasks were laid out and Michael Shalbetter and the US volunteers set about working off the various deficiencies found during the Cat 4 inspection. Major accomplishments during this time were the removal of corrosion under the standard cable tray covers and the repair of the damaged port wing trailing edge. Sky Powers, a young aircraft fanatic was recruited to refurbish the ailerons and spent many hours removing old paint and getting them ready for a new coat of red paint. Bob Newton, a recently retired aerospace veteran, volunteered to provide technical oversight and has helped refurbish many items. To spread the word on this exciting project, Bob persuaded John Turpin, a friend of his son, to become the teams' Webmaster.

John is a graphics expert and quickly got a very professional looking web page (<http://www.lightningusa.org>) up and running and this has raised the profile of AALO quite considerably. Bob together with the other members of the executive committee started to put together the basis of the master plan on returning XS422 to flight. Bob felt that to keep our volunteers interested and to demonstrate that what we were doing was not impossible suggested that the team adopt a "Get XS422 on its wheels" plan where the airframe would be reassembled by September. All agreed and this became our focus for 2001 but the team realised that addition funding would have to be acquired if this was to become a reality.

## **Cash injection for the project**

Jon Roth and Andrew Brodie had been working very hard to sealed a deal that would hopefully see two Lightning's in the skies of the USA. The original intention of AALO was to restore XS422 to flight and once achieved, then work would begin on Mk T55, ZF597 (55-711). This would have meant that it would have taken approximately 8 years before ZF597 was in the air again if at all. Jon had been in negotiations with Brian Reynolds of the Olympic Flight Museum, Port of Olympia Airport, South of Seattle off the US interstate 5 for some considerable time. The end result was that Brian Reynolds joined in the now exclusive club of owning a Lightning having purchased ZF597 from AALO. Jon Roth explained this could have only benefits for the Lightning movement in the USA. Brian Reynolds has a huge reputation for restoring war birds to exacting standards and would do a fantastic job on ZF597. We will enjoy the benefits of having another operator to work alongside and so it was a win win situation for both Brian Reynolds and AALO. Many of the problems we had encounter on the rebuild of

XS422 would be passed on to Brian also AALO made available items of equipment required to facilitate the rebuild of ZF597 that were surplus to XS422's rebuild. Bob Simms and Michael Shallbetter together with Brian Reynolds Engineer, Mark Calderwood, readied and loaded ZF597 for her journey north to Seattle and she arrived there by 10 April 2001. So ZF597 started a bright new chapter in her life and by April 2002 She was rebuilt for static display. In due course Brian intends to follow 422's lead and 597 will be rebuilt to flight condition.

The composite assets of ZF595/596 now become the spare aircraft for AALO and parts and major sub-assemblies would be despatched to the USA as required. Graham Tagg who had been instrumental in the rebuilding of the South African Lightning's offered to help with the airframe re-assembly and systems rebuild. The main problem for the Brits was that both Phil and Max had been selected to go on out of area operations with the Royal Air Force during 2001 and so could not be available to get XS422 ready in time for September. During March prior to Phil's detachment, he and Graham visited Stennis to assess XS422. Graham assessed the viability of getting the airframe into one piece by the September deadline and concluded that he was very happy with the condition of the airframe and saw no problems with the rebuild.

## Shipping spares

Now the Brits had a real job on their hands to provide the missing equipment and parts required to get the aircraft on her wheels. Phil was now in theatre and so Max and Andrew were left to orchestrate the gathering of equipment and loading. On the 5<sup>th</sup> May the container was in place and the loading began. The team consisted of Max Waldron, Andrew Brodie, Nick Woodhouse, Dave Thomas and Nick Holeman. The largest item loaded was the cockpit of ZF595 that would be used as either the main cockpit or a spares source as the Brits had been unable to make a full appraisal of it prior to leaving the shores of the UK. Unfortunately we were short of one or two items and so Tony Hulls of T5 Lightning projects (XS458) was contacted to see if he could help. Thankfully Tony had the items we required and was only too happy to help. The Brits had worked very hard to get this task done on time and had been smiled upon as the weather was very kind indeed. The container arrived at Stennis on the 18<sup>th</sup> of June and the US team comprising Bob Simms, Michael Shallbetter, Sky Powers, and Tom Bordelon had the whole thing unloaded in less than 4 hours and were left wondering what to do with this mountain of spares.

## The jigsaw gets put together

Graham Tagg and Michael Shallbetter together with part time help from Bob Simms, Sky Powers, Bob Newton, and Carey Mavor worked solid on the rebuild of XS422. Before starting the rebuild effort, Michael completely rebuilt the various dollies that supported the airframe. The dollies were made fully adjustable to facilitate the various angles of movement required during the assembly process. Airframe re-assembly started on July 2<sup>nd</sup> and within less than two weeks the wings were mated and the "dogbone" installed with copious amounts of PRC. Michael and Carey safety wired the numerous bolts at the upper centre section splice and Graham completed subsystem installation on the centre section. The tricky task of mating the rear fuselage to the wings then began. Graham requested, as many sets of eyes as we could muster were present as we pushed the rear fuselage over the centre wing section. Bob rounded up several additional volunteers and the fuselage was slowly moved into place. Constant adjustment of both the wing and fuselage angles and elevations were necessary as slowly it was inched into position. Once in-place Graham and Michael installed the various bolts and fittings.

The ZF595 cockpit section had arrived at Stennis a few days before airframe re-assembly started so the team had not had time to reach a consensus on which cockpit section to use on XS422. An inspection of 595 was quickly completed and areas of concern noted. Bob put together a plus and minus point brief on the cockpits and via email and phone calls a collective decision was made to go with the original cockpit of XS422. The job of mating this to the rear fuselage was accomplished on July 17<sup>th</sup> with minimal problems. Once this was done the undercarriage was lowered and XS422 stood on her wheels again on the 20 July 2001. This is a major milestone for the project and one the team felt very proud as a major amount of time and effort by all the team on both sides of the Atlantic had achieved this fantastic goal. Remaining items to be re-installed included the ailerons, flaps, fin, and tailplanes. The ailerons were completely overhauled and given a coat of fresh paint and then re-installed. The flaps were also given the same treatment and were re-installed at the same time. The tailplanes were readied and painted however the port bearing was found to be in an unsatisfactory condition. The British team was contacted and was soon on the trail for a replacement once again Tony Hulls came to the rescue

and the bearing was dispatched to the USA. Sky Powers had now got the polisher up and running and has made a terrific job of restoring the highly polished finish of XS422. All the panels have been thoroughly cleaned and repainted. Graham had now started to attack the number one engine bay rebuild which became a difficult task as some of the pipework was missing or required replacing. Once again the British team members trawled the spares pack and the spares airframe to come up with the missing or damaged components. This was a time consuming task as the distances travelled by the British team to come up with the goods was quite considerable, however the items were found and UPS'ed to the team in America. Once the number one engine bay was completed Graham moved up to the number two engine bay and work started in Ernest here. The goal being that the hydraulic system would be up and running by the time the British team visited in November 2001 so as functional testing could be carried out.

## The Roll Out

On Sunday the 16<sup>th</sup> September XS422 was rolled out of the Hanger for the first time to let all inspect her at close quarters. It had been the first time 422 had been out side as a whole aircraft for over 10 years. The local TV stations interviewed Bob Simms and all in all XS422 was a hit. Unfortunately due to the recent events in the USA (9/11) the crowd was not as large as one would have liked, but this was quite understandable under the circumstances. However the team had a great day showing the aircraft off.

## Brits return to finish the cable idents

On the 27<sup>th</sup> October 2001 Andrew Brodie, Phil Wallis, Max Waldron and Derek "Bo" Brocklesby flew to Stennis to complete the cable and wire idents on XS422. The UK team had got 2 weeks to complete this task prior to going back to the UK and were ready for the task at hand. This would also be a good time for the executive committee to do some more planning on the project, as this was the first time all the committee would be together. Although the right hand side was identified the cables actually need to be marked up and also a 100% check carried to ensure nothing had been missed. Also a few anomalies had been found and so a hard wiring identifying was required where the wire was followed all the way down to the component to find its true ident. This was a very long and hard job, but essential if this was to be done correctly. Whilst the team were carrying out the wiring job Michael Shallbetter set about the task of stripping the cockpit ready for restoration. The team decided to modernise the cockpit as far as is realistic and practicable as the main problem is getting and keeping the original components tested and serviceable. New modern items would relieve this problem and make the aircraft far more maintainer friendly. The team draw up some realistic goals of how the project should carry on and set the target of having the engines fitted by Dec 2002. A lot of work, but a goal worth going for so as to maintain realistic progress. One item that the team wished to strongly explain is that they are not in completion with the South African "Thunder City" team. We intend to fly XS422 as an Air show experimental aircraft and will not be selling rides. The aircraft will be available for all types of air show work from static to display routines. We will of course give rides to our patrons as a way of saying thank you for help etc, but we do not intend to mimic the Thunder City experience in anyway as we could not even come close to that type of operation. We think Mike Beachyhead has done a fantastic job in South Africa and we really admire the job he and his team has done and we do not intend to touch on his side of the fence in anyway whatsoever. ***Following the airframe reassembly and wiring identification and connections the team will focus on cockpit refurbishment, subsystem re-connection, and engine installation.***

On the 12<sup>th</sup> November 2001 the cable and wiring identification was finished the American and British team members were very pleased with the task being completed and realise that this is a truly Anglo American team with all members holding equal status to each other. We are very proud of our achievements and of the team members all whom have been significant in getting XS422 to this stag in such a short time. It was at this point that Simon Johnson who was ex RAF and an ex Lightning electrician joined the team. Simon had read about the project and was on a business trip in New Orleans and so drove out to visit. This was very fortunate as the UK team were over and so Simon managed to get his hands dirty on his first visit. Simon lives in Chicago and joined the team as lead electrician. We were all very please to welcome him aboard.

## 2002 Progress

Once the Brits returned home both teams were kept busy on both sides of the Atlantic. So as to keep to the rigorous timetable set by the team. Michael Shallbetter spent many hours in the cockpit gently persuading the various components to leave their home. As this task has gone on Bob and the other USA team members had been restoring the various items and emailing wish lists to the UK team to source and dig out from the substantial spares cache. During January the Federal Aviation Authority (FAA) granted AALO the registration number for XS422 and so enter N422XS. The team were very pleased this phase had been completed and applied the new number on 422. So as to start getting more components over to the USA it was decided that another container of goodies should be shipped. High on the wish list was the engines that would power 422. These were duly packed with great care and sent on their way. The container arrived at Stennis in April 2002 and the American team members had a huge smile on their faces as they got the jets. The British team members did not let the grass grow under their feet either and sourced 4 hydraulic rigs, a Fuelraulic rig, and various other items essential in the rebuilding process. In fact the team were ready again to ship another container.

## Hydraulics come on line

As was normal the UK and USA teams planned another big push towards flight status. The main area of work was to be the regeneration of the hydraulic system. The UK had gathered a team of 10 AALO members who could work within a 3-week period. So as to ensure that the work plan went smoothly with the comings and goings of the UK workforce over this period then certain members would have to be present for the total 3-week stint. Therefore Max Waldron, Andrew Brodie, Nick Woodhouse and Nic Holman volunteered to cover this period and flew out on the 18<sup>th</sup> November. Also flying out for the first half of the work program Charles Scott from the UK flew out and from Chicago USA Ex-pat Simon Johnson (Ex Binbrook Lightning Electrician) arrived.

This first week involved a great deal of preparation to ensure a successful second week. All the ground equipment was serviced and the aircraft jacks and trestles were completely stripped and repainted in AALO house colours of red. Nick Woodhouse and Charles Scott spent many hours on this job and did a fantastic job. Max Waldron and Andrew Brodie concentrated on getting the Hydraulic rigs up and running. This was no mean feat as the MK3 rig needed a complete service and once running it was also realised that an exhaust evacuation system would need making as the rig soon filled the hanger with fumes. Michael Shallbetter and Bob Simms together with various pipes and welder manufactured a very professional answer to the problem and within 2 days had this problem sorted. Whilst all this activity was going on Simon Johnson set about the wiring in the spine. There had been a lot of missing and unidentified wires in this area. Max had prior to this trip been to Bruntingthorpe and carefully stripped this area out from the spare rear fuselage to aid this rebuild. Simon set about the rebuild of this area and together with the manuals and the aid of some excellent photos from Tony Hull of T5 Projects this area was 95% completed during the first week. Additionally during this first week the rebuild of the starter system was begun. With many spare items brought across from the UK this area was 90% completed during the first week, however due to a few missing items the starter system could not be finished during this trip. The missing parts were identified and fortuitously found to be in the AALO spares holding. These were in the UK and would be readied and shipped in the next container. Michael spent nearly all of his time buried in the cockpit. Michael had spent so much time in here it was beginning to become his second home and it is doubtful that anybody knows the inside workings of a Lightning cockpit as well as he. Merrill carried on with the refurbishment of the many removed components and has done an amazing job on transforming the various components into like new condition. During this first week Nic Holman gathered more footage for the forthcoming documentary of the project of 422 to flight status.

The second week started with the arrival of Phil Wallis, Jon Roth, Geoff Commins and Roger Winkworth arriving on the 23<sup>rd</sup> November. Heading back home on the 25<sup>th</sup> November were Charles Scott and Simon Johnson who had done a great job and we were sorry to see them go. Now that Phil and Charles were on site the job of getting the hydraulics could begin in earnest. Nick Woodhouse now moved into the number 2-engine bay and started to seal this area off. The Viton sealer required to do this job was very kindly donated by Bostick UK and the group are very appreciative of this donation. Nick did a very professional and diligent job in this area and when tested no leaks were found. This was a very time consuming job and not a pleasant task at all and AALO were very pleased with Nick's efforts. Meanwhile Phil, Max, Michael and Andrew started to on the rejuvenation of the hydraulic system. The first task was to flush out the old and replenish with new. This took a little longer than at first thought, but the team worked well into the evening to ensure the task was completed. The next task was to start moving the oil around the system and operating the air brakes, flaps, rudder, ailerons and the under carriage. The undercarriage was the last thing to be operated and it was fantastic to see the

aircraft functioning again. Whilst the hydraulics were being worked the opportunity was taken to de-iriate the hydraulic system. 422 was now a fully hydraulic live aircraft and only 2 minor leaks were found, which is testament to the quality of workmanship that has gone into the rebuild and restoration.

Jon Roth had taken the task of the 2-airframe repairs required on the forward fuselage. These 2 areas had been damaged during the time the cockpit had been in storage in its container. So as to keep the cosmetics of the aircraft an insert repair was deemed the best solution. Jon spent many hours on these areas and a very satisfactory result was obtained by Jon's work in these areas. Geoff Commins took his time and did a very thorough inspection of the engines and the engine bays. Geoff was pleased to report he was very happy with the propulsion system. Geoff also the spares guru and spent many hours sorting out the many new spares that were not on the database. Roger Winkworth worked like a Trojan and built new racking and reorganised the USA spares storage facility. Roger also sorted cleaned and prepped all the cockpit flooring that had been removed from 422.

Yet again a fantastic effort by all the team members and another huge dent in the work required getting 422 airborne. The project is infact very close indeed to the goal of flight.

## 2003 Progress

As another year passed by the Anglo American Lightning Organisation did not let the grass grow beneath their feet. With the goal of flight looming ever closer the team on both sides of the Atlantic ramped up activities. The last 24 months had been an exceedingly busy time for the AALO. Though the organisation was always short of finances as many projects like this are we managed to maintain nearly all our goals. Bob Simms and his team continued to make fantastic progress on the strip and rebuild of the cockpit and also had completed the registration of XS422 to US registration N422XS. Whilst in the UK the team have been involved in various activities. The Reheat pipes were at a location in Lincolnshire and being worked up to flight status. The spares' sorting was practically completed and work was progressing towards another shipment of vital spares to fuel the project in 2004.

During the October/November 2003 UK visit great progress was made in a number of areas. This trip like others before followed the now familiar format. However so as to direct as much activity on the project as possible the UK visit was split into two distinct phases. Firstly Geoff Commins commenced the UK activities in early October and carried on his inspections of the Avon power plants and also the throttle control runs. Geoff also did a comprehensive review of the USA spares holding and updated the spares database.

On the 2<sup>nd</sup> November the main party started to arrive with Phil Wallis, Max Waldron, Dave Cruddas, Jason and Rebecca Skinner arriving at Stennis. The team set to work quickly and also got the basic logistics in place for the next four weeks. Over the next 3 days the other members of the team arrived including Andrew Brodie, Nick Woodhouse, Roger Winkworth, John Sherry and Nic Holman. Additionally a few days later Simon Johnson our other primary electrician arrived from Chicago. The primary items that were required to be worked up were the rebuilding of the starter system. This was a ground up rebuild as no components were left whatsoever, having been robbed on 422 retirement from active duty. Therefore we had stripped the spare fuselage section (ZF596) at Bruntingthorpe prior to the visit and brought the required items over. Simon Johnson had done all the wiring identification and so electrically we had no problems. Together with the available spares in holding the starter system has been practically completed. The only omissions being the HT boxes, which we have, brand new components in the UK. These will be dispatched in the next spares shipment and so the spine is essentially finished. Obviously once we go for the first engine start we will spend time again in this area due to the temperamental nature of the Lightning starter system.

The next area requiring attention was the ventral tank and lower hatch. These had acquired a varying amount of damage during the original storage and transportation. Dave Cruddas took the helm and together with his apprentice Rebecca Skinner spent 2 hard weeks working these items up to flight status. These items were fitted to 422 prior to the team returning to the UK and all the team were very pleased with finished result.

Jason Skinner who is an Avon specialist concentrated on the power plans and spent many hours checking them over and applying new inhibitor as specified in the maintenance manuals. Jason then went through the throttle runs making a list of required spares and also checking routing and connections. AALO knew we have all the required items in stock and Jason would be working up the spares package required to be sent to the USA to finish off this vital area of the restoration.

Andrew Brodie and Nick Woodhouse finished off the number 2-engine bay with the fire resistant paint. This was a long and boring job requiring a great deal of diligence and patience. The finished result was a fantastic job and credit must be given to Nick who practically made the number 2 engine bay a second home. Nick and Andrew also stripped many spares from the T55 fwd fuse required for the rebuilding of 422's cockpit.

Phil the projects Engineering manager had spent great time orchestrating the restoration on the cockpit and its many components. It was great to see items being refitted rather than being removed. The USA team has spent hundreds of hours painstakingly removing and restoring the throttles, Rudder pedals, Control sticks etc. Without this work being carried out the significant progress in the cockpit would not have been possible. Additionally Phil applied hydraulics to 422 and stirred the controls and undercarriage.

John Sherry and Simon Johnson the project electricians really took the bull by the horns as regards the electrics. This has been a mammoth task and all parties involved have remained fully focused on what at times seemed like mission impossible. To everybody's relief the intrepid duo managed to get both the AC/DC systems completed. Once the cockpit has been finished mechanically then the latter parts of the electrics would be finished. John and Simon additionally worked up a gradual 'Power On' sequence and to this end planned the rebuild sequence for the electrics.

As regards the Aircraft Assisted Escape System (AAES) AALO shipped a further spare seat to the Warbirds Escape Systems New Zealand. This arrived in early January 2004 at Glen's workshop. Glen Turner had stripped both seats and found that there was a lot of corrosion on one of the seats. It was decided that the best option would be to work another seat up to operational standard then waste precious time and resources on the corroded seat. This seat would now become a spares source for the two seats being worked up to operational condition. Otherwise Glen Turner was happy with the seats and AALO would in the next 12 months start to work up the canopy jettison system up to flight status. The intent being to test the system with cold gas to prove it prior to final seat fit and arming.

Additionally during this period Michael had to leave the project due to circumstances beyond his and AALO's control and it was with deep regret that we had to say goodbye. However Michael took up a position with another aviation business and was doing well. Michael had made a tremendous contribution towards the project and he will always be fondly remembered.

## 2004 Progress

During 2004 it was realised that all the major spares had to be in place at Stennis and to this end all effort was focused on this goal. Shipping a container may seem a simple task until one realises the cataloguing and packing and the searches required for the final piece for this massive jigsaw puzzle. Additionally each shipment costs over £5000 from the UK to USA covering customs costing and transportation to and from docks and crane hire. Additionally all this was timetabled to arrive during the annual invasion of the UK Engineering team in November.

During the beginning of November 2004 the UK sent a 20 strong contingent to aid the USA team. The team in the USA had been reduced, as Michael Shallbetter had left the project for a position at another location. Fortunately though during the early part of 2004 Andrew Brodie had been seeking the help from Bill Norman who has now joined the team as our new USA Chief mechanic. Bill has a wealth of legacy fast jet experience and cut his teeth on the likes of F101, 104 and F4 Phantom. Bill's last job was doing upgrades on C-130's and so is the ideal person to lead the team forward in the USA.

The primary goals during this recent visit was to progress as many systems as possible with the emphasis being focused within the cockpit. Having been fully stripped the rebuild has been started in earnest and great strides were made. Both engine bays received attention with the goal of first engine fit being a real possibility in the not too distant future. The final fuse to wing connections were completed and the electrical system is finally getting connect up. If a power set were now connect things would start to light up. However until we have finished this task in whole this milestone is on hold.

The three weeks intensive activities have left the USA team in great shape and what with additional storage becoming available in early 2005 things are really coming together. The project is over the hill in engineering terms and Phil Wallis the teams Engineering director said " The end of the tunnel is very much in sight and with the correct finance in place XS422 could be ripping the skies apart sooner rather than latter "

The trips seem to be highly valued by the participants, both from a social standpoint as individuals have had little difficulty settling in with the existing team, and from a point of view of learning and broadening their own experience.

Flt Lt Paul Oughton, based at Waddington was on his first visit to Stennis with the team in November 2004. His reaction to the trip was typical.

*“Working on the Lightning could be considered as putting all your accumulated skills to the test and more – the ultimate challenge so to speak. Lack of space, awkwardness, lack of tools and spares are all minute-by-minute challenges to each and every task undertaken. Ingenuity, resourcefulness, resolve and sheer single mindedness are what gets the job done – plus of course technical expertise and an enormous sense of humour. The old adage “If you can’t take a laugh, you shouldn’t have joined” should be our mission statement. Anyone who works on the aircraft will, in my opinion, come away richer in terms of their contribution to both the aircraft’s progression through team effort, and their own personal development”.*

On a very sad note AALO in December 2004 Brian Carroll sadly passed away after his long battle with cancer. Brian faced this as he had all things in life with a smile and a bright outlook. Brian was a member of the AALO pilots group and was a huge personality within the Lightning community. He always had time for all and was a real pleasure to know. I feel very privileged to have known him and strapped him in XS904 on his last reheat run during September 2005. His loss has left a massive void within the Lightning world and he will be missed greatly. AALO salute Brian and will remember him with great affection.

## Help wanted

So what can you do to help? Well basically the only thing slowing this project down is money. We still require help especially on the financial front. We would urge anybody that wishes to help please lend a hand and all donations whatever size go directly to the coalface and help get the air under 422's wings once more. Please direct all correspondences to Andrew Brodie, AALO Project champion, 51, The Grove, London, N3 1QT or visit [www.lightningusa.org](http://www.lightningusa.org).

AALO has now formed a supporters group. By joining the supporters group all profits will go straight to the coalface and help push this project on at a realistic time scale. You will get an Anglo American Lightning CDROM free with hundreds of images of XS422 during the rebuild and restoration. A quarterly news letter giving you up to date progress on XS422 and an insight into the personalities that are pushing this project forward. All group members who are visiting the USA and come to the restoration facility will be given full access to see at close quarters this fascinating restoration project. Once we start getting the merchandise up and running all group members will get discounted prices on all merchandise on offer.

Membership is £20 (\$30) ordinary or £150 (\$225) for life membership.

Interested then please write to the Anglo American Lightning Supporters Group Membership secretary, Charles Scott, Greenways, Vicarage Lane, Hordle, Lymington, Hants, SO41 0HS together with a cheque payable to the Anglo American Lightning Organisation. Please become a part of the team that will put this classic and charismatic British Jet back to her rightful place the sky for the pleasure of all to see and hear.

AALO would like to thank the Supporters group ([www.lightning422supporters.co.uk](http://www.lightning422supporters.co.uk)) as without their assistance not only would we have lacked the finance for shipping the container, but also the manpower they have provided on both sides of the Atlantic. AALO would additionally like to thank the many personalities and companies who have helped past and present, as their help has been vital and very much appreciated. So far the Anglo American Lightning Organisation would like to thank the following Risbridger Ltd, Didsbury, Dunlop, Cooper Tools, Villager Inn's for discounted accommodation, Memphis Aviation for the kind loan of airframe tooling, Vapor Tek Ltd of Bolton who kindly donated 25 litres of PX-24 engine preservative and C Walton Ltd whom without their help and assistance the project would not have got to its present position.