

Birmingham City Transport Guy Arab IV No 2548
Restoration Report 2009
By Robert Handford

After the tremendous progress on the mechanical and chassis overhaul last year, 2009 started off with work towards completion of the underside of 2548. Mick Evans brought his welder to the museum and did a number of small welding jobs, including fixing original brackets to a new trough that carries the speedo cable from the back of the gearbox to the cab. The old trough was so rotten that it literally fell apart when removed, but there was enough of the original section left for Barry Whitelaw to get a new channel made up to pattern. Other welding jobs involved fixing a patch to the bottom of the body pillar behind the off-side rear wheel and, inside the bus, attaching stainless steel piping to the edge of the staircase side panel.

Mechanical repairs and reassembly continued during January and included refitting of the exhaust system which was mostly made up of the components removed in 2008, except for a new flex and the intermediate pipe which was a second-hand spare that we had 'in stock'. Apart from the new flex, everything had been cleaned up and sprayed with high temperature black paint prior to assembly. All linkages for brakes, gear selection and bus-bar operation were refitted with new spacer bushes turned to pattern by Mick on his lathe and new hoses for conveying lubrication oil were fitted to the spring shackle pins on front and rear axles. The handbrake ribbon which stretches from the lever in the cab to the rear axle was refitted with fresh felts in the guide brackets and the outside of the fuel tank was cleaned up, de-rusted and given fresh coats of undercoat and gloss black.

The chassis mounted fuel filter bowl was removed, cleaned and externally painted before refitting with a new filter and the engine-mounted one was also cleaned out and had a new filter fitted. The engine-mounted fuel lift pump was taken off for a leaking union to be tightened up, the pump being re-sealed in place without further leaks being evident. The engine sump was removed and vast amounts of sludge cleaned out before painting in Dark Admiralty Grey (in best Gardner tradition) and re-fitting, an operation requiring unbolting of the front engine mountings and lifting of the engine. Internal inspection of the engine whilst the sump was off revealed everything in pristine condition with no ill effects resulting from only sporadic use in the 37 years since it was overhauled. Once the engine oil was replaced and the fuel system bled, despite four months inactivity, the 8.4 litre machine burst into life at the first touch of the starter button, as we have come to expect!

Unfortunately, this start up revealed four problems which would set back progress and result in work having to be redone. First was a severe vibration at certain revs which appeared to be down to mis-alignment of the coupling from the flywheel which drives the front prop-shaft. The prop-shaft was removed again and the engine run without it. The flywheel coupling was still running slightly concentrically but was much less bad and the vibration was reduced. Our former BCT fitter Des Kerrigan advised that the amount it runs out of true is within normal tolerance for these buses so the prop-shaft was re-fitted at 180 degrees to its previous position and the engine run again, this time with an acceptable level of vibration. The true test will come once the bus is back on the road and the transmission is under load.

The next problem found was a vacuum leak on the off-side front brake servo. This unit had been stripped down in 2008 and re-assembled with its existing piston seal (made of compressed leather) as it seemed in perfect condition. However, evidently this was not the case, so dismantling and replacement was required. Third on the list was a blow in the exhaust downpipe, just below the manifold (this part had not been removed for overhaul with the rest of the exhaust system). A tiny hole had appeared which needed welding up. These latter two faults were eventually rectified in April.

The most testing problem involved the newly refitted sump. An oil leak from the back end was thought to be due to failed gasket material, so the sump was removed, cleaned up again and resealed in place, a most laborious task. The gasket material was left for a week to cure before oil was once again poured in and the engine started, but the leak was there again! This time, very close inspection revealed a three inch hair-line crack below the flange holding the

sump to the crank case. It was then necessary to remove the sump once again for welding to take place. This was not a success and the engineering company that carried out the 'repair' made a mess that required considerable cleaning up by Tony Niblett and Mick before further examination revealed a crack right down the middle of the weld! This was partly due to the company doing the repair incorrectly assuming the sump is pure aluminium whereas in fact it is an alloy. The sump then had to be taken to a more competent welder who eradicated the crack, but in the process caused a severe warp in the flange that faces with the crankcase! After many more hours of painstaking work, Mick tidied the weld and built up the flange to the correct level using chemical metal before coating the inside of the sump with fibreglass matting where the crack had been, just as a precaution. After I had once again painted the sump with undercoat and gloss grey, it was, at long last, ready to refit, a task carried out at the end of April, this time with complete success.

24th January saw the resumption of external painting. Dave Hird began by flattening down the roof which had been given three coats of paint back in 2005 and over the next few weeks he applied further coats of matt khaki green.

As we moved into February work was underway on bringing the autolube back into operation. A new seal had to be fitted to the drive cable where it enters the pump and as one could not be found of the correct outside diameter, Mick turned out the inside of the housing on his lathe to allow a slightly larger one to be fitted. This was re-assembled and an electric drill was then rigged up at the gearbox end of the drive cable to operate the pump. Over the next few visits, the drill was left running to charge the system with SAE30 oil, thinner than the usual heavy 140 grade. This was to help speed the passage of oil to the extremities of the system through the many new pipes, which was proving difficult in the extremely cold weather being experienced at the time. Eventually, after assisting oil through a couple of troublesome pipes with compressed air and a syringe, the entire system was charged and fully operational, supplying 140 grade lubrication to all spring shackles, the king pins and brake servos.

February 4th saw the start of the long-awaited re-boarding of the lower saloon floor. This was substantially completed in just over two weeks enabling us to walk safely throughout the lower saloon for the first time since 1993. What a relief! The specially machined new boards were neatly tied in with the remaining originals at the front end of the saloon and bedded onto the steel bearers using a very sticky weatherproof tape, the whole new section being held in place by No 10 self tapper screws. The final small sections of board needing replacement were slotted in either side of the flywheel inspection hatch in April following welding of the support framework which had been loosened by years of vibration.

Whilst this was going on, I filled and prepared the staircase side panel and bottom stair riser and applied undercoat blue.

Work then resumed on the rear wheel arches and luggage rack with filling and priming of bare steel with two-pack epoxy paint to enhance adhesion where leathercloth was then glued in place. The vertical galvanised plates on the inner sides of the wheel arches, facing the gangway, were filled, flattened and then covered in ribbed sheet rubber (the sort used on vintage car running boards) which was the material used by BCT to substitute for the original leathercloth that wore out too quickly in such a vulnerable position. The beading that overlaps the top edge of this rubber sheet was fitted on each wheel arch, a new joggled aluminium one being manufactured for the off-side. A wooden moulding was made by Keith Ball to replace the extremely battered and rotten original that fitted along the rear end of the luggage rack and he also formed new aluminium beading for the off-side of the rack, again using dilapidated originals as patterns. A new steel plate covering the join in the lino on the luggage rack was formed and all these new fittings were drilled before painting up to top coat brown prior to installation. The cappings that fit over the gangway side of the luggage rack were covered in leathercloth and fitted, along with the stainless steel rail which had previously had a visit to the polishers. This meant that by the end of March both rear wheel arches were complete, above and below, apart from some final coat gloss brown to be applied after laying of the floor lino.

On 27th March we were joined by my brother, Michael, a new and valuable recruit to the restoration team. He arrived with son Graeme, a stalwart of previous work sessions on 2548, and spent time in the inspection pit trimming off the ends of self-tapper screws holding down the floor boards which were protruding through the framework below. Graeme began degreasing the top side of the old floor boards in the forward section of the lower saloon which had been saturated with oil from the flywheel and engine, accumulated over many years in service. You wouldn't believe how much oil had soaked into that wood! The two of them also started to make up a paper template of the entire lower saloon floor so that we would be able to tell where all the screws and redundant holes were once the boards had been covered in lino. This would avoid problems when the many holes had to be drilled for the new floor treads. Michael completed belt sanding and degreasing the floor on a subsequent visit in April which enabled underlay for the lino to be glued down, a job completed by mid-May, allowing the lino to be laid by the beginning of June. The latter job involved making paper templates to the exact shape required for each section and then using these to mark out the lino before cutting. After applying contact adhesive to floor and lino, up to four people were required to position each section, some extremely awkward manoeuvres being required to ensure it all went down straight and smooth. The finished job looks extremely satisfactory.

With floor covering complete, refitting of the near-side battery boxes, body mounting bolts and all seat mounting blocks could be carried out. These had all been renovated many years ago and, along with numerous other components fitted in the last year or so, had been stored away awaiting completion of more fundamental repairs, such as replacing the floor! To position the seat blocks, it was necessary to fit the seat frames temporarily, complete with the squabs previously fitted in them by the upholsterer in 2008. This gave us a brief taste of how the lower saloon would look with all its glorious moquette, once completed.

Next stage in the lower saloon re-fit involved the repetitive and laborious task of cutting, drilling and countersinking over 100 sections of steel grip-tread for the floor. This took much of July and August and included welding sections together to make up surrounds for the various inspection traps. Everything had to be trial fitted over the previously mentioned paper template, avoiding old screw holes and fittings hidden below the lino. Once complete, all the treads were taken up again and sent for powder coating in cinnamon brown, a process that failed at the first attempt due to a previous application of zinc oxide paint, so the treads then had to go for chemical stripping prior to return to the powder coaters. With floor treads now successfully coated, we were able to fit all the treads by mid-September, followed by the painstaking task of painting the 900 or so screw heads with one coat of red oxide and one coat of gloss brown to blend in nicely with the treads.

Alongside all this work, I spent many long hours at home renovating the radiator tubes. We had spent some time back in 2006 straightening the cooling fins, a job that now required completing. Once done, superglue was used to re-secure the many loose fins that had once been soldered to the tubes. A couple of the radiator elements were of a later design incorporating looped copper wire coiled around the central tube and these took around four hours each to straighten out and re-secure. With a total of forty tubes, most of which were in a pretty dilapidated state, I was glad to see the end of this task! However, although we had hoped to fit these directly into the newly re-assembled radiator framework once they were painted, it was found that during assembly, some of the threads had been stripped in the aluminium top and bottom tanks. We then had to take it all apart again to drill out the holes, re-tap and fit helicoil inserts, a job completed by Tony Niblett and Mick in October.

19th August was visibly a notable milestone with the first application of moquette to the side panels in the lower saloon. This process was completed before the end of the month, including cladding of the original plywood panelling for the front bulkhead. Following on from this was the re-fitting of all remaining decorative varnished wood fascias prior to final coating with clear gloss varnish.

Mid-September found us looking at further jobs that had not been expected. The terminals on the ends of the battery cables required changing to allow fitting of modern and more durable

batteries and the old terminals were sweated off. The rubber hoses through which the cables run, between under-floor conduit and the battery boxes, were in a very poor state, probably due to never having been replaced in the 59 years since the bus was built. These were removed and it was then found that the insulation on the cables was also breaking up badly. Therefore, the decision was made to replace all the battery and starter motor cabling, which necessitated removal of the vacuum reservoir tank and part of the cab floor to gain access. Before all the cables were removed, I disconnected a lead from a battery and placed the loose end on the floor alongside the battery box. A shower of sparks shot out as it touched one of the newly fitted floor treads, obviously resulting from a dead short through the body. This problem was traced to a short circuit through the dynamo which would require removal for rectification.

Most of the hefty battery cables were surprisingly easy to remove from their conduit pipes, but the one running under the floor between the two front battery boxes required much brute force and bad language to persuade it to leave its resting place of nearly six decades. Unfortunately, whilst the copper core eventually parted company with the steel pipe, it left much of the crumbling cloth and rubber insulation jammed inside. Despite many attempts to extricate it using methods as diverse as high pressure air and a piece of barbed wire rotating in the chuck of an electric drill(!) it was realised that the length of conduit bunged up with remnants of the old cable covering was too great to deal with from one end or the other, so it was reluctantly decided to cut the pipe into two sections to remove the blocked part from the bus. Extraction of the complete pipe would have been impossible due to it being surrounded by other chassis mounted equipment and body-side panels at each end.

Once off the vehicle, the blockage was easily removed and the conduit cleaned up and painted before being put back in position, joined to its other half using a piece of radiator hose held with jubilee clips. This was achieved during a seven day work stint from 8th – 14th October which also enabled us to prepare the replacement cable, most of which had been salvaged back in the early 80's when we purchased former Huddersfield Fleetline 4488 (KVH 488E) to break up for spares. My brother John, joining the team for the first time, cleaned up and prepared this cable and also assisted in feeding it into position. He then removed and cleaned up the terminal ends from the old cables that had been connected to the control unit under the cab floor. Mick Evans soldered and crimped these to the replacement cables and crimped all the new terminals in the battery boxes and installed a battery isolation switch in the front off-side box. This is a feature never previously found on this type of bus, but is required for insurance purposes and will add to vehicle security and safety when 2548 is left unattended. Completion of this work now means that, apart from a few short sections to be connected to the front destination box lights, the bus has been totally rewired.

Other jobs tackled during our early October stint included construction of new wooden trays to accommodate the four 6v batteries, which are much smaller than the originals and would otherwise fall between the support hoops. The trays, along with the interiors of the battery boxes, were painted in acid-resistant black rubberised paint. My other brother Michael did some final preparations on the radiator tubes prior to spraying with high temperature black paint and he cleaned up and silver painted the vacuum reservoir tank, which had last been de-rusted, patched and painted when the bus was kept at Pensnett back in 1984. A fault which kept causing the wiper motor to stop working was tackled and following a strip down and test of the windings, cleaning of the commutator seems to have resolved the problem. After re-assembling the motor, Michael gave it coats of black undercoat and gloss prior to refitting. He spent a good chunk of time preparing the support blocks for the upper saloon seats for painting. This involved removal of the very rusty locking plates which locate in the underside of the blocks and the seat frame securing studs which are held in position by those plates. All thirty were de-rusted in the shot-blaster or with a wire brush attachment fitted to the drill and the fifteen wooden blocks had pits and hollows filled and splits were glued up. John spent time on the lathe polishing up some stainless steel dome nuts which we had had made to pattern for the lower deck stanchion poles and I refitted the bye-law notice plate to the panel under the stairs (this notice was salvaged from 2958, JOJ 958) along with the blind for the near-side front bulkhead window in the lower saloon (previously fitted to 3005, MOF 5). This I had fettled up after thorough cleaning by another new recruit, Lucy Grice, who also spent time polishing the stanchion poles and other handrails for the lower deck using Autosol

metal polish. She came along with Justin Price who flatted down all the gloss brown in the lower saloon in preparation for its final coat. To complete the list of jobs tackled during our seven day stint, I concluded varnishing of the wood cappings in the lower saloon, much of them having received around seven to ten coats. However, it has been worth all the effort and I am very satisfied with the finish.

As we moved into the second half of October, work continued on re-assembly of the lower saloon. Completion of work on the battery boxes and installation of the new smaller batteries made it possible to fit a charger in one of the boxes, permanently connected, so that all that is needed to keep the batteries in good order during periods of inactivity is to plug into the mains using a kettle lead! We have made concessions to authenticity in the electrical system where they are not normally visible or on the grounds of safety (eg, use of cable with modern insulation).

Elsewhere in the lower deck, all the cinnamon brown surfaces other than the previously completed window frames were given their final coat of gloss and the seats were then permanently fixed in place along with the stanchion poles and the breather for the main servo which is fitted under an off-side seat. Apart from a few relatively minor jobs still outstanding, the lower saloon was now more or less complete, and what a wonderful feeling that was after many hundred hours of painstaking effort by all involved.

Following our discovery of the electrical short, my brother John and I undertook the awkward task of removing the dynamo without the aid of the inspection pit, although we did drive the bus onto timbers to raise it a little higher. Once off the bus, John was able to dismantle the unit to discover the cause of the fault. This was found to be due to insulation missing from the wires between brushes and windings and after coating with self-amalgamating tape, successful re-assembly and refitting followed.

Our regular discovery of degraded insulation throughout the electrical system of the bus makes one wonder how safe many other preserved vehicles of a similar vintage really are when the vast majority have never benefited from the attention and repairs received by 2548 and many are not fitted with isolation switches.

After spraying of all its components in high temperature black paint, final re-assembly of the radiator was carried out over a number weeks, incorporating a complete set of eighty newly manufactured rubber seals for the tubes where they locate in the tube plates. Mick provided a new copper overflow pipe to replace the very battered original, using salvaged pipe, to the correct imperial dimensions, found in a scrap yard. This culminated in fitting of the unit in mid-November following a final coat of paint over the entire radiator. Once the system was filled with seven gallons of water, apart from a quickly rectified leak where the overflow pipe is bolted to the filler neck, the radiator was completely water-tight. A number of minor leaks were found on the engine and these were easily stopped by tightening pipe clips and joints. The engine was then run up for an hour or so until the top tank of the radiator was hot, the bottom tank remaining cold. I am sure that as this component is now as good as new, it will be extremely efficient. In fact it may be too efficient as it was designed to cope with stopping and starting and crawling in slow traffic. However, Gardner engines are renowned for running cool and we can always fit blanking plates or even the radiator muff if required to keep the engine temperature up.

During late summer and autumn, the upper saloon ceiling panels which had been prepared and painted up to undercoat or first coat gloss back in 2007 were brought out of storage, dusted down and further coats applied as necessary by Dave Hird. With renovation of the lower saloon and mechanical repairs largely finished, work turned in earnest to repair and re-assembly of the stripped-out upper deck, once all the items stored there had been cleared out. After a final flattening ready for final coat gloss, the ceiling panels were fitted during the first couple of weeks in November. This was followed by fitting of all the wood or aluminium beading strips and the light mounting blocks which were sealed in place with white caulk before Dave Hird applied gloss paint to the entire ceiling, though sadly this would have to be redone due to poor atmospheric conditions affecting the finish. New brass bayonet light fittings were connected to wiring that had been installed by Robert Day back in 2007,

although, to achieve this, the round bases of the fittings had to be reduced in size in the lathe as they were slightly larger than the originals and would not initially fit into the recessed centres of the mounting blocks.

Down at floor level, the corroded aluminium coving panels which support the lino where it curves up to the sides and ends of the saloon were removed to reveal the framework where the top deck is bolted to the lower deck, these buses being the last constructed for BCT in two halves. The upper framework is seated onto zinc sheet, some of which is rather corroded but thankfully does not warrant replacement because we would have to take the top deck off to do that! At the front near-side corner, the angle-iron and steel structure panel were badly rusted, the panel being non-existent at its bottom end. Michael chopped out the rot with the angle grinder and cleaned up the sound parts prior to coating with rust neutraliser and painting with red oxide. He then made up a new section of panel which was welded in place by Mick Evans. The aluminium fascia panel, which will be covered in leathercloth, was then riveted back into the corner after re-shaping to its correct profile. The previously battered appearance of this panel was due to one or more of the seven front-end collisions which put 2548 into Tyburn Road Works between 1951 and 1962, there being other evidence of repair work carried out to the framework and panelling in the near-side front corner.

At the start of December, work was carried out on the doors to the front destination blind and number box compartments which required stripping of old paint, leathercloth and the lino on the lower door which allows access to the blind. This also had splits in the woodwork which required gluing and screwing – more evidence of front-end collision damage – which had been the subject of previous repair jobs. Along with this, the banister panel had repairs carried out to the plywood skin and hollows were filled and flatted in preparation for covering in leathercloth. The steel canopy over the staircase which partly supports the banister, had been shot-blasted a couple of years ago and this was prepared and painted in epoxy paint. This also will be covered in leathercloth.

Trial fitting of the upper saloon decorative wood cappings took place in order to assess what was required to repair the damage done when the bus was converted for Travelcard promotion purposes back in 1972. Several sections had been chopped out to accommodate wiring to the film projector table and conduits for the fluorescent light fittings that replaced the bayonets and tungsten filament bulbs at that time. The original wooden conduits mounted on the first window pillar back on either side, containing the wiring to the bayonet light fittings, had had large areas hacked away. This was to allow for the fact that the seats were reversed to face the projector screen at the back of the bus and therefore clashed with these conduits. A spare conduit salvaged from scrapped sister vehicle 2607 (JOJ 607) was modified and fitted on the near-side (every bus body was hand built so transferred parts such as this will not fit without alteration). The off-side one was taken away by Mick who cut out the butchered section to allow a new section to be inserted and glued.

As we approached Christmas, work started on cleaning up the nine sliding window units in the upper saloon and the remaining brown paint was being stripped from the lower sections around the seat support rails. On leaving the museum after our final working day of the year, I transported all the smaller wood cappings from the top deck back home to my utility room where the application of many coats of varnish was started on some sections and continued on others. The longer sections will have to be prepared and varnished at the museum in due course as they are too big to fit in my car or utility room.

So ended another year of dramatic progress on 2548. We did not achieve our aim of getting the bus through an MOT because it was decided that before venturing out onto the road we wanted the interior to be structurally complete, ie with the upper deck ceiling in place, the banister and stanchions fitted and rubber treads on stairs and platform. Whilst the ceiling has been put back, the banister and stanchions cannot go in until the lino has been laid upstairs. However, overall progress has been close to expectations despite the various setbacks along the way.

All being well, 2010 will be the year that 2548 returns to the road and a new chapter in her history will begin. Now that should prove every bit as interesting as what has gone before!