

# Leyland Torque

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# Leyland Torque

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## EDITORIAL

Well, here's the second issue of our new A4 Torque (incorporating the Journal) – doesn't time fly? This time it's the planned standard size of 40 pages inside – still more page space than the old A5 sized Torque plus a quarter of the annual Journal, and this enables more text than before, also some bigger photographs. We have the third part (out of four) of Bill Pitcher's L60 articles, quite technical but an interesting insight into an area which is difficult to penetrate; a further look at Leyland fire engines thanks to Simon Ryan's further researches and a welcome return to some of Allan Condie's work – Alexander, of course!

Some readers will be aware that Peter Greaves has done some sterling work creating an index of the bus and coach photographs appearing in Torque and Journal, with over 3300 listed from the beginning and up to Torque No.79 – an invaluable exercise. However, Peter has recently been ill and is unable to continue at present, so John Bennett has kindly offered to update the index for the time being so that it doesn't fall behind

and become a major job. If any reader would like to receive a copy by email, please let me know (it is too big really to print out).

As we go to print, we are aware that the British Commercial Vehicle Museum will be re-opening in mid December, a little later than originally planned, and we are all eager to see the result of the refurbishment. We have agreed a date for the 21st Leyland Society Gathering as you will see from the Society Pages and an entry form will accompany this issue of Torque. This could be your first chance to visit the 'new' museum so please get your entry forms in as soon as possible as we may be limited for space.

We will soon be ordering binders for the new A4 sized Torque and, having run out of the red Journal binders, we'll see if it's possible to have a short run to obtain some more. Please let me know if you would want any for the Journal.

Happy Christmas!

Editor

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**Leyland Torque** (incorporating the Journal) is a newsletter and magazine dealing primarily with the activities of Leyland Motors Ltd and operators of their vehicles, published by The Leyland Society Ltd, which aims to promote the study and preservation of Leyland vehicles.

[www.leylandsociety.co.uk](http://www.leylandsociety.co.uk)

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## SOCIETY MATTERS

We reported in the last issue of Leyland Society Torque the sad news that our Chairman, David Berry passed away unexpectedly in August after a short illness. David had contributed to the running of the Society over many years and occupied many different positions during that time, taking over the position of Chairman in 2014. David also took the Society stall to a number of rallies during the summer and many of you would have met him at the Annual Gathering.

At the last Committee Meeting we discussed the activities that David carried out for the Society and whether they could be redistributed amongst the Committee members. Compared with other societies we are a relatively small Committee and it was clear that our combined resource could not absorb all of David's activities in addition to our existing duties. Gary Dwyer was elected as Chairman of the Society, which will be added to his existing roles of Treasurer and Gathering Organiser. Mike Sutcliffe is fully committed with his dual roles of Secretary and editor of Leyland Society Torque so was not able to undertake further duties. David also handled the Society sales, mainly generated

through the website but also taking the Society stand to rallies and other events. We are grateful that Richard Lukey has kindly agreed to take over the Society Sales in addition to his existing position of Social Media Manager so we ask that members direct all future enquiries about merchandise to Richard at the address on the inside of the front cover or via the Society website or Facebook page. John Ormiston has now fully taken over the responsibilities of Membership Secretary and many of you will already have had contact with him relating to renewals for 2019. John Howie and Don Hilton retain their existing responsibilities of Publicity and Production Records respectively. It may take some time for these changes to settle down as we all adjust to our new responsibilities so please bear with us during this time of change.

As you will have realised, the Society activities have become resource-limited as a result of David's sad passing. Regrettably we have been forced to make the decision that we no longer have the capability to take the Society stand to rallies other than our own event in July. As Mike stated in the previous issue of Leyland Society Torque we would welcome a volunteer to undertake this role for the Society. To honour an existing commitment, Gary, Mike and Don attended the Transportfest event at the Brooklands Museum in October as the event this year was specially dedicated to Leyland. There were a good number of Leylands at the event and we welcomed some new members to the Society.

To continue the past work in developing the Society and take our activities forward, we urgently need additional members to help. If you are willing to contribute some of your time please get in contact to offer your services to Mike. We have many different tasks that need attention and we should be able to find a task that matches your skills!



Our stall at the Leyland event at Brooklands in October. There was a good selection of Leyland-built Trojans at the event.

## 21st LEYLAND SOCIETY GATHERING, 2019

As you will be aware, the British Commercial Vehicle Museum in Leyland has undergone a major refurbishment in 2018, with assistance from a Heritage Lottery Grant, and we therefore had to relocate our Gathering to the Crich Tramway Museum. By the time you read this issue of Torque, the Museum will have reopened to the public once again and we have therefore decided that for 2019 we should return to our spiritual home of Leyland, holding our Gathering at the Museum.

The date for the event has been confirmed as Sunday 7th July and we are grateful that the Museum have included our event in their planned events for 2019. An entry form is included with this issue of Leyland Society Torque should you wish to send your entry early in the New Year. Last year we welcomed vehicles from all Leyland Group manufacturers (eg AEC, Albion, BMC, Bristol, Guy, Scammell) and we would be happy to accept any of these marques again in 2019, although preference will be given to Leyland

manufactured or designed models. We assume that most vehicles will travel there on the day but for those travelling longer distances the Museum have offered overnight parking in their courtyard on Saturday. The parking will be at the owner's risk but if you wish to take advantage of this offer please complete the section on your entry form so we can advise the Museum of your requirement. To allow Society members to experience the new British Commercial Vehicle Museum we have negotiated a 10% discount on the normal (£8) entry price to the museum on the day and we will publish details of how to obtain the special price in Torque nearer the time.

We hope as many members as possible will bring their Leylands to the event. If you wish to enter more than one vehicle, please copy the form

or download another copy from the Society website, [www.leylandsociety.co.uk](http://www.leylandsociety.co.uk). We realise that you are reading this at the end of 2018 and it is early to decide on which events you may wish to attend in 2019 but if you can return your form as soon as possible it would be appreciated so we have an idea of the number of vehicles to expect. If you are not a vehicle owner but know someone who owns a Leyland Group vehicle, then please encourage them to attend by giving them the form included with this issue of Torque. Please include up to date contact details on your entry form so that we are able to contact you in the event of any last-minute changes. If you have an e-mail address, please include that on your entry form. We guarantee that e-mail addresses provided will only be used in relation to the Gathering and not for any other purpose.

## LEYLAND ROADTRAIN - TV ADVERT

Do you remember the advert on ITV for the Leyland Roadtrain, soon after it was introduced? It was a really up-beat advert with an artic in the demonstration livery (with 'flying plughole'). It drove up a really dangerous mountain pass, stopping on a bend, dangerously near the edge with a massive drop and with boulders rolling off the edge. The closing

wording was ".....had you no faith" – implying that "here is the ultimate lorry that you've been waiting for from Leyland", despite all the rubbish quality of the car divisions. Watching it brought a real lump to the throat, thinking that this will save Leyland Motors. Does any reader know where we could find a copy of the advert? (*Emotionally! – Ed.*)

## ASCOUGH & TAYLOR PHOTOGRAPHS

In the late 1950s/early '60s, postcard sized photographs of Leyland buses and coaches were regularly advertised in Buses Illustrated and sold by Ascough & Taylor of Leeds. Lists were produced (*I still have these – Ed.*) and the vast majority were pictures of post WW2 Leylands. The photos were of a high quality and included a great number of PS1 and PS2 Tigers with their original owners (and original bodies) despite the fact that many were sold at an early stage in their lives – they were therefore a magnificent record. They took a few for Leyland Motors and these are in the BCVM Archive.

Dr Michael A Taylor moved to Leicester (he was very interested in the Great Northern Railway (Ireland) and his Triumph Herald was registered GNR1!) and your editor printed many of his negatives, some of which passed to the BCVM after he died. The preserved Weardale PD2/1 that he was involved with went to the BCVM, but later to the Science Museum at Wroughton where it has been seriously neglected along with many other preserved vehicles which have got into a disgraceful state!

Ascough went to Ireland and was involved in the supply of PSVs, notably the Ascough Clubman, and I believe new Bristol LH coaches for several operators. Does any reader know of the whereabouts of Mr Ascough, or if he is no longer with us or what happened to his photograph collection? He had some magnificent photos and it would be good to know if these still exist. (*Ed.*)



The ex-Weardale Motor Services Leyland-bodied PD2/1 in its early days of preservation prior to it being given to the BCVM (*Dr MA Taylor*)

# WHAT LEYLAND'S DOING

(The title of a weekly publicity publication once produced by Leyland Motors Ltd)

By Steve Whelan

## LONG SERVICE AWARDS

### Leyland Trucks honours 42 employees with Long Service Awards

- 2018 awards recipients have 1,640 years of service with Leyland between them
- Manufacturing Engineering Manager, Barry Hodgson celebrates 50 years with Leyland Trucks

A recent event has seen Leyland Trucks pay tribute to staff excellence at a special ceremony celebrating the long-term service of a number of its employees. Each recipient of a Long-Service Award has marked a significant milestone in their time at the company, with 2018 for some marking their 25,40 or 50 year anniversary.

It is not unusual for generations of families to work at Leyland Trucks, and there are many cases of this throughout its 122-year history. The average working life of an employee at the company currently stands at approximately 18 years and this means that Leyland

can rely on the experience and skill of its employees to build quality trucks, also to pass on that expertise to generations to come. This ensures that Leyland Trucks can continue to live up to its motto of 'Quality Trucks built by Quality People'.

Paying tribute to the commitment of Leyland's team, Leyland Trucks' Managing Director, Bryan Sitko said: "It is always a great pleasure to be able to thank our long-serving staff for all their hard work and commitment. The Leyland Trucks Long-Service Awards are designed to publicly show employees how much they are valued in the business. Leyland Trucks employs over 1,000 people, who together have a staggering amount of expertise, and it is the skill and dedication of each of these people that helps us produce such outstanding vehicles in the UK."

This year celebrating 50 years of service is Manufacturing Engineering Manager, Barry Hodgson, who said – "I started my working life as a young lad at Leyland Motors. It was a very different company in those days as we manufactured a lot of the components that went into the trucks and buses we built. Factories were spread through the heart of the town of Leyland and further beyond, and the business offered me many opportunities. Through the years much has changed; there's been highs and lows and I have worked in several areas of the business, meeting lots of people along the way. Fifty years seem to have passed by very quickly, but they have given me some fond memories, and of course I am still adding to them".



On the right is Barry Hodgson, with Bryan Sitko

## DAF TRUCKS AT THE INTERNATIONAL MOTOR SHOW, GERMANY

### A Joint Report by Robin Easton & Steve Whelan

#### Proud of our Heritage, Leading Today, Ready for the Future

This was the overall DAF theme at the IAA 2018 Show, held in Hanover, one of the world's largest Commercial Vehicle shows, from 20 to 27 September. DAF Trucks proudly showcased its innovation capabilities throughout its ninety-year history, including the classic DAF, A1600 from 1967 through to the future DAF LF Electric Innovation truck. A prominent position was taken by DAF's latest LF, CF and XF ranges, setting the industry benchmark

in quality, reliability and fuel efficiency.

DAF has grown into the premier truck manufacturer in Europe, with a 16% share of the heavy-duty market share and a 10% share of the medium duty market. DAF Trucks is the market leader in the United Kingdom, the Netherlands, Belgium, Poland, Romania, the Czech Republic and Hungary, and is Europe's market leader in the tractor sector. DAF is the number one import brand in Germany, Europe's



A 'Ghost View' of the DAF LF Electric

largest truck market. The DAF vehicles on display at the IAA included the LF for distribution transport, the versatile CF for a wide variety of applications and the flagship XF for heavy and on-highway transport.

#### Well positioned for the future

"DAF has always provided and always will provide a complete range of excellent trucks that offer the industry's lowest operating costs, best transport efficiency and highest driver comfort," said Richard Zink, Director Marketing & Sales and member of

a range of up to 220 kilometers, depending on the vehicle's duty cycle. As the battery pack is modular, capacity can be scaled to the range required by customers.

the Board of Management of DAF Trucks. "We are building on a rich, 90-year heritage that has resulted in our market leading position. Our strong capabilities will enable us to create trucks and power trains which lead us into the future."

#### On display at the DAF stand, Hall 17 (stand B20) were:

On Highway trucks  
Vocational trucks  
XF 530 - 4x2 tractor with Super Space Cab  
LF 290 Construction - 4x2 rigid with Day Cab

XF 530 - 6x2 tractor with Super Space Cab  
CF 450 - 8x2 rigid with VDL Hook lift system  
XF 480 - 6x2 rigid with ex-factory BDF frame  
CF 450 - 8x4 rigid with Liebherr mixer



DAF LF Electric



DAF CF Hybrid

The LF distribution truck has been awarded 'Fleet Truck of the Year 2018' in the United Kingdom. The new CF and XF were voted 'International Truck of the Year 2018', thanks to a number of technical innovations, resulting in 7% fuel efficiency improvement, setting the benchmark in the industry.

The DAF LF Electric is a 19 Tonne GVW fully electric truck for zero emissions city distribution. It uses a 266hp electric traction motor and is powered by a battery pack of up to 222 kWh, providing



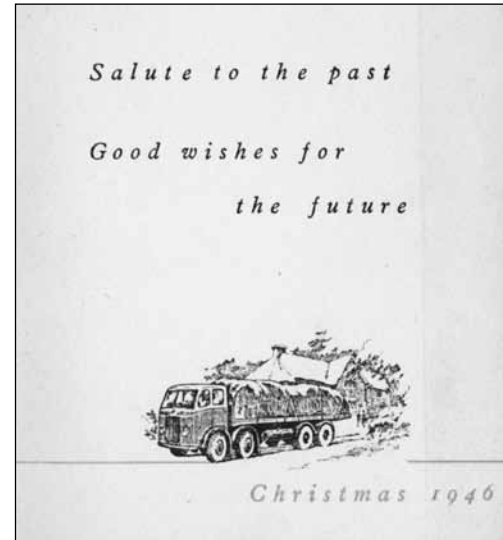
# LEYLAND'S CHRISTMAS PUDDINGS

By David Corns

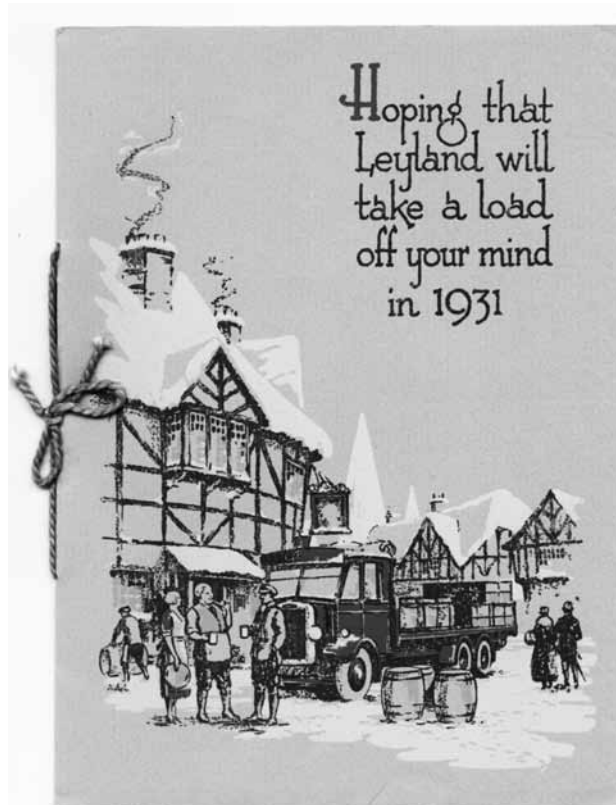
Last Christmas I had to smile at Michael Plunkett's article in Torque No.78 on the Queensland Hamper; I was very impressed with the size of the Hamper. Clearly, it was intended to give Christmas cheer to a very important customer. As a member of the UK sales team in the 1980s we distributed our Christmas cheer to key customers by giving bottles of wine, whisky and port/stilton. It was always accompanied by a Christmas card which was humorous; it usually showed a Leyland, Father Christmas and plenty of snow. It gave us the opportunity to visit customers in the run-up to Christmas, hand over the gift and discuss possible purchases in the new year. Nothing is for nothing! But, if Leyland was giving bottles then don't be surprised to learn that our competitors, Volvo, Scania, Mercedes etc, were doing the same.

We needed to be different and make it memorable, even get the customer thinking about Leyland over the Christmas period. For several years, Christmas puddings were added to our selection of festive gifts and these were made in the kitchens of Farington Lodge under the supervision of Giovanni the House Manager. The puddings were supplied in a basin, superbly gift wrapped in Christmassy paper with a compliments slip

and cooking instructions. The customers liked them. The gift was different, unique, and could be shared with the family. Christmas lunch was never the same. The puddings were of exceptional quality, using the best ingredients and made in Leyland, not at Spurrier or Farington Works but just down the road. No warranty claims or product complaints here, only smiling faces. The Leyland Christmas pudding may not have been as grand as the Queensland Hamper but it certainly gave customer satisfaction. Happy times!



A Christmas card of the early 1950s, with Henry Spurrier at the wheel, 'Gaucho' must be Donald Stokes, top deck right looks like AB Chadwick (Publicity) and third from right must be Basil Nixon. Who can recognise any of the others?



The 1931 card displayed here and on the next page included some poetry which readers may find humorous



"YOU are old, Father Leyland," the young van said,  
 "And your paint is no longer so bright;  
 Though built for four tons, you take seven instead,  
 Do you think at your age it is right?"

"In my youth," the old Leyland replied to his son,  
 "I was built to withstand any strain,  
 So now I don't mind the extra odd ton—  
 Why, I do it again and again."



"YOU are old," said the van, "as I mentioned before,  
 And your body's a tumbled-down flat,  
 Yet your second-hand value's as high as of yore;  
 Pray, what is the reason for that?"

Said the old Leyland lorry, "Now let me explain;  
 The fact which does most to preserve this  
 Is that, old though I am, I can always obtain  
 Spare parts and reliable service."



"YOU'RE so old," said the van, "that you're almost antique;  
 One would say at your age you go through it,  
 For hundreds of miles you still cover each week;  
 Pray, how do you manage to do it?"

This time the old Leyland replied with less tact,  
 As his throttle with sentiment trembled:  
 "The work I can do is just due to the fact  
 I was built—and not merely assembled."



"YOU are old," said the van, "one would hardly suppose  
 That your upkeep's as little as ever,  
 Yet never an increase your maintenance shows;  
 What makes you so awfully clever?"

"I have answered three questions and that is enough,"  
 Said the old 'un, "don't give yourself airs.  
 Do you think I can listen all day to such stuff?  
 Be off, or you'll need repairs."



# FOOD FOR THOUGHT

Compiled by John Howie  
All correspondence to Mike Sutcliffe

*We are still very short of new items to include in Food for Thought so please put your thinking caps on and come up with some more problems and queries to be solved. Thank you – Ed.)*

## 299. New Zealand Leyland Leopard car transporters

By a remarkable coincidence, **Ron Thomas** was looking through some old copies of Leyland Journal, the inhouse magazine of Leyland Motors, and he came across an article on these two unusual Leopards. It is repeated here:

**Kiwi Carrier** – Two 36ft long Leyland Leopards have been put into service in New Zealand by Car Haul-ways Ltd as car carriers. Each has a special low cab mounted ahead of the front axle and cabs and bodies as well as trailers were built by Seabrook Fowlds of Auckland. To join the two Leopards are four Leyland Comets which will be used in conjunction with existing trailers. They will make car deliveries throughout the North Island.

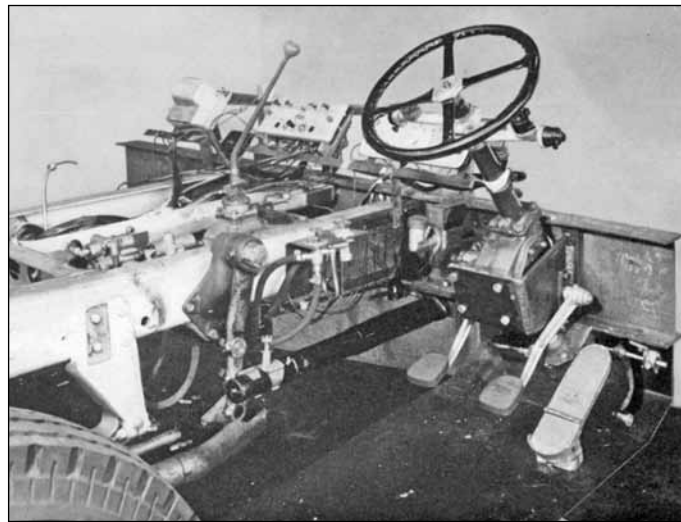
The basic idea of the conversion of the Leopard chassis was to enable two extra cars to be carried over the cab. One of the Leopards is a PSU3/2R with pneumocyclic gear box and two-speed axle. The conversion was fairly simple as it was easy to reposition the gear change. Less easy was the other Leopard, which was a PSU3/1R.

On both the wheelbase was shortened to 16ft 6in. This was done by moving the rear axle forward, the front axle remaining in its original position. The original front crossmember was discarded, and replaced with a rolled steel joist section measuring 10in x 4in x 8ft: this was the foundation of the conversion. The steering box was positioned on a bracket mounted on the front cross-member, the column being reduced in length by 18 inches. Power steering was fitted by using a Hoburn Eaton ram, the linkage being relayed through an Octopus relay arm. The power steering pump was driven from the front of the crankshaft through twin V belts and these were fitted with guards.

The gear selection box was repositioned from the cross-member to a position 2 feet to the rear and inside the chassis to maintain the line of the gear rod. The gear lever was shortened by 18 inches, and this presented a slight problem due to the lack of leverage. To overcome this the change rod was given (fore and aft) movement of

½in and this movement was straddled with a hand brake assistance valve for forward movement and clutch assistance valve for rear movement. The actual assistance was provided through two 9in air cylinders mounted on brackets to the chassis and pushing directly to the gear change rods. The control pedals were mounted downwards from the front cross-member. The hand brake was discarded and Maxibrakes fitted incorporating the emergency tank and hand brake valve. When finished the height of the cab from floor to the ground with cars loaded was only 14in.

It is thought that these two Leopards were rebodied as buses but we have no details of these as yet – *come on you bus enthusiasts down under?*



*The redesigned front of the chassis showing the shortened steering column, power steering, new layout of pedals and the change speed lever*



## 308. Leyland Atlantean PDR1/1, 7001 WW

**John Burton** thinks that the Atlantean was maybe being inspected as it was fitted with interior fluorescent lights, 'modern plastic refinements' and fluorescent advertisement panels. It may have been of

interest to the trade, not just for these features, but also as it was Mexborough & Swinton's first double-decker. The people could also include representatives of the BET. (I like the new A4 format of Torque).

## 309. Mystery Australian Double-Decker

**John Shearman** has sent this photograph of a centre entrance Leyland double-decker in Australia which was published in an Australian magazine in November 1940 and the bus has always been described as a Leyland Titan TD5 – no record can be found of its chassis number or its existence.

Looking at the picture it is clearly not a TD5 – the wheelbase is too long and it has the shorter dumb-irons associated with TD7 and TS11. As it has a particularly long wheelbase it must therefore be a Tiger TS11 but fitted with a double-decker body, possibly it also had its springs strengthened.

The bus was new to Rover Motors Pty Ltd of Cessnock, New South Wales and it went into service between Cessnock and West Maitland. The centre entrance body seated 61 people and was built by Syd Wood Pty Ltd, Bankstown, NSW. The entrance was double width and led to a double-width staircase which had steps up to a landing and then split into two staircases, one going forward and one towards the rear; it was claimed that by having the central entrance it made the bus warmer in the winter as it was less draughty.

Records show that the bus was first registered m/o.699 when new but it was re-registered m/o 493 in 1952 and in 1954 it was sold to Linsley Bros, Wallsend and re-registered m/o.215. In 1956 it was sold again to Chapelman's Bus Service, Hamilton being re-registered m/o.951. It was scrapped in 1960 after a 25 year life in the Newcastle-Cessnock area.

Its seating capacity of 61 confirms the long length of the bus which would have had a wheelbase length of 17ft 6in as opposed to the 16ft 6in of the Titan and an overall chassis frame length of 27ft. Is any reader

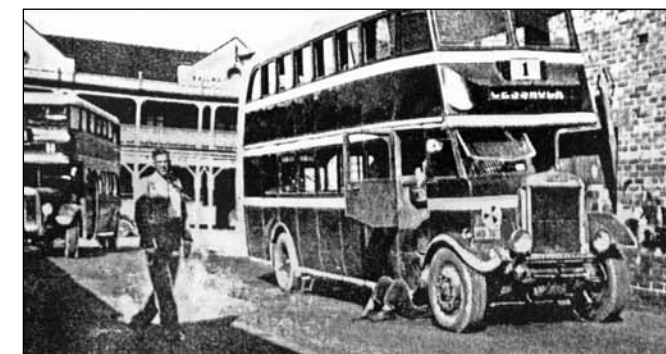


able to identify any potential TS11 chassis supplied to Australia which would have been delivered sometime earlier in 1940? Was there just one of these or possibly two?

In another issue, dated May 1943, there is a fleet summary of Rover Motors listing Leylands – possibly some Titan TD1s bought second hand, but from where? NSW Government Department of Road Transport & Tramways appear to have kept their second hand TD1s until 1946/47 (see page 27 of Torque No.68). Here is the fleet summary at 5/43 – can any reader please help to identify the Leylands, also to throw light on the identity of this rebodied TD1 with Rover (note it carries the early type radiator!)

Details of Fleet.	
THE roster of equipment shows:	
Reo (Petrol) Forward Control .....	5
Reo (Petrol) Standard .....	4
Reo (Mercedes Benz diesel engine) .....	2
Leyland (Petrol) .....	6
Leyland (Leyland diesel) .....	2
Leyland (Hercules diesel) .....	1
M.A.N. (diesel) .....	2
A.E.C. (diesel) .....	1
Mack (petrol) .....	1
Ford (Hercules diesel) .....	4
Federal (Hercules diesel) .....	1
Retired for scrapping after smash .....	1
Total .....	30

Notes:—  
Some of the petrol-engine buses have gas producers.  
Bodies have yet to be built on 4 Fords.  
Federal, chassis only.







(BCVMT L012644)

## ANOTHER FACE OF LEYLAND, No.12

By Michael Plunkett

Export was a face of Leyland seen only by a specialist team of the workforce; those in the factory preparing vehicles and parts as crated units (see Torque No.77) or complete, ready to be loaded by experienced dockers and giant floating cranes, as in this atmospheric photograph.

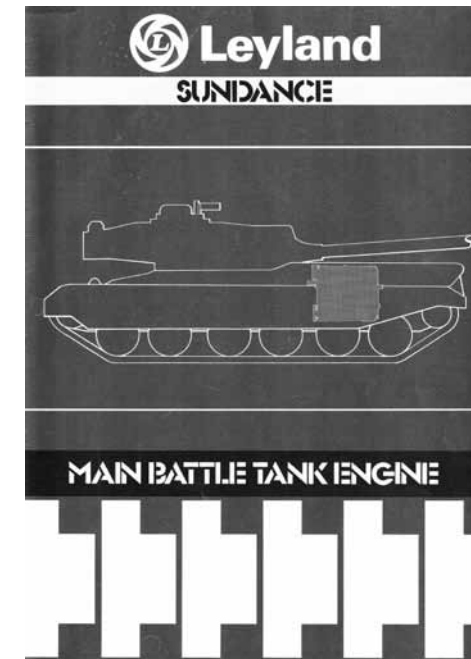
The Leyland works were close to rail sidings and major docks at Liverpool, Manchester, Preston and Fleetwood, were selected according to the overseas destination and shipping line involved. Canada, Australia, New Zealand and India as well as South Africa and South America offered potential markets, Leyland's Agents in these countries actively soliciting orders to report back to HQ by letter or telegraph; that is how it was done in 1933 – and Leyland prospered!

In March 1933, Mr N Toutourine, of Cairo, commenced to operate a 600-mile cross-desert service between Damascus and Baghdad, employing a Leyland Terrier oil-engined six-wheeler and trailer. The loads carried were seldom less than seven tons on the vehicle and four tons on the trailer. In the first nine months of this service, the vehicle covered no fewer than 50,000 miles, travelling through territories which

were practically roadless. In view of the difficulty of obtaining clean fuel, an important point with oil engines, the fact that the Terrier performed so well on this work is high praise for the efficiency of the Leyland 8-litre oil engine. By reason of the success of this vehicle, Mr. Toutourine placed an order for a further Terrier oil-engined six-wheeler. *(From a contemporary report sent to Leyland Motors)*



*This Leyland Terrier TE6 was loaded onto a ship bound for Cairo at the end of February 1933 and was clearly a successful purchase for Mr N Toutourine. Note the Leyland Coat of Arms Terrier badge, unusually fixed on the firewall.* (BCVMT L012643)



## THE LEYLAND L60 - Part 3

### EXERCISE SUNDANCE

By Bill Pitcher

*In Parts 1 & 2, Bill set the scene with the recent history of engines for British tanks prior to the L60, he included the thinking behind the introduction of the multi-fuel L60 opposed-piston engine, and then described the development of the two-stroke opposed-piston multi-fuel engine.*

Sundance was the name given to an exercise carried out in the mid to late 1970s, aimed at overcoming some of the reliability problems of the Leyland L60 engine when fitted in the Chieftain Main Battle Tank. This would improve the poor availability rates that the Chieftain was suffering in service with the British Army (during an exercise in Germany in the mid 1970s it was stated that for every 100 miles covered, 10% of Chieftains would break down).

The L60 engine went through several improvement programs during its production life including Fleetfoot, Dark Morn, High Noon and Sundance (it seems that someone at the MoD had a penchant for code names!), but I've chosen the Sundance program because I was fortunate enough to find a considerable amount of information about it in the archives still stored at the old Leyland Technical Centre. The Sundance exercise was also the last major development of the engine and it went some way to finally giving the otherwise excellent Chieftain MBT the engine it deserved.

The following extract from a meeting of the Defence and External Affairs Sub-Committee of the House of Commons illustrates how serious a problem the reliability of the engine had become:

"The performance of the Chieftain's gun and range finding equipment is first class. It is therefore all the more unsatisfactory that the tank should be let down by its engine in the past. It is difficult to feel confident about future performance of the engine in light of the subsequently unfulfilled assurances given by the Ministry of Defence. We wish to assure the House that the present program of engine modifications, as it has been explained to us, appears to be meeting with success so far. Nevertheless, despite these welcome improvements, we cannot avoid observing

in conclusion that the saga of the Chieftain tank is not one which reflects well on the Ministry of Defence, even allowing for an element of sheer bad luck in the problems that have dogged the engine. It is only right to point out that, assuming the present program of modifications represents the final instalment, it will be well over halfway through the Chieftain's active life before it has an engine to match its other undoubted assets" *(Extract from "The Chieftain Tank Engine HMSO London 23<sup>rd</sup> May 1978).* As can be seen, the committee was damning in its summing up of the L60 engine and even though improvements were already being put in place it remained sceptical about their effectiveness.

Amongst the documents I've unearthed relating to the Sundance exercise are some detailed notes made by the then British Leyland team of engineers tasked with developing solutions to the known problems of the engine, extracts from these notes are shown below in bold:

### **L60 ENGINES – SUNDANCE MODIFICATIONS**

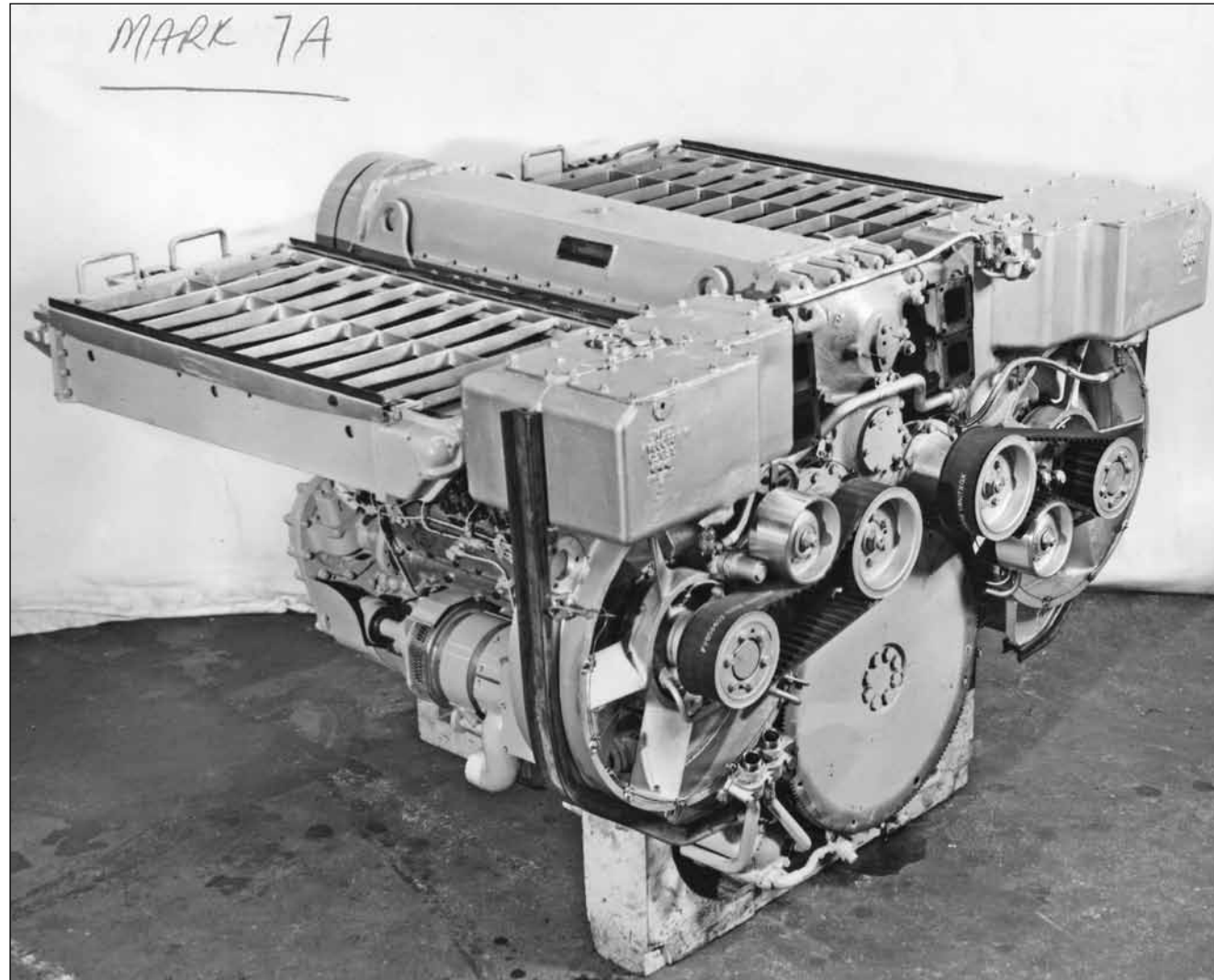
#### **Purpose**

**The object of the Sundance modification was to improve the reliability and service life of the L60 engine at the current M.O.D. rating of 750 bhp (gross) at 2250 rpm.**

**The major areas of failure on the Mk. 7A engines were the piston rings and cylinder liners, ranging from:**

- Molybdenum flaking from fire and compression rings**
- Collapse of fire rings**
- Breakage of fire rings**
- Piston crown cracking and burning**
- Piston seizure**
- Liner cracking across injector holes**
- Liner leakage past seal lips, liner scuffing and heavy bore wear**

**Other problem areas concern the fuel injection equipment and its timing, the belt drives to the fans, the cooling system and other auxiliary components.**



*Photo of a Mark 7A engine; this engine Mk. was used as a baseline comparator for the Sundance Program. It is shown in power-pack form. One point to note is the use of toothed belts to drive the fans, one of several different belt designs trialled on the engine during its life. This area of the engine was the subject of extensive development to try and alleviate the problem of belt, sprag clutch and rear gear case failures.*

Note: As one can see the list of problems was quite extensive, especially considering that by this time it was a mature engine and the problems related to more than one aspect of the engine's operation. The document addresses each concern in turn some of which I've expanded on below.

#### Cylinder Block and Liners

The outside of the liner has been re-designed in the five supporting land areas, and the machined lips have been replaced by solid lands. In the case of the Sundance build, a single groove is machined in each land to carry a Viton rubber O-ring. In the NRTL (No O-Ring Tight Fit Liner) build, the groove is omitted.

The O-ring liner (Sundance build) in which the liner is an interference fit in the block, and the O-rings are merely there to seal. The NRTL liner is identical to the O-ring design except that it is machined without grooves.

To take the Sundance Liner, the cylinder block lands are bored oversize, and the top edge of each land is accurately chamfered and de-burred to provide a smooth lead-in for the O-rings. In the case of the NRTL Liner, the accurate chamfering of the block is no longer necessary.

Note: A twin O-ring design (two O-rings per land) was trialled during the Sundance program. This liner was a clearance fit in the block and relied upon the rubber rings both for sealing and support. Although successful during bench tests, it was a failure on vehicle trials due to cavitation erosion of the O-rings.

The liner material has been changed from CI4 iron to CI16, in order to increase the liner strength to prevent cracking in the central area, between the injector and locating plug holes. CI16 iron is a poor material with regard to ring and piston scuffing. In order to achieve the desired compatibility, the liner bores are silicon carbide treated in their free state. This process, carried out by Laystall Engineering Ltd, consists of a honing and polishing process using a silicon carbide grit mixed in lapping oil.

The finished liners are fitted with their rubber O-rings using Hellerine (a static lubricant) and after the block lands have been greased they are pressed into the block. Special locating jigs ensure the liner is centralised as it enters the block lands, thereby preventing damage to the O-rings. In the case of the NRTL build, the liners and block lands are merely coated with Permabond A150 sealant before being fitted. The high interference fit of these types of liners produces a certain



*View of a post Sundance exercise engine for comparison. The drive belts are now ribbed rather than toothed and only the left-hand fan assembly contains a sprag clutch, the right hand fan now being a solid drive.*

amount of distortion and ovality in the bore, particularly in the supporting land areas and near the outer ends. However, these effects have not resulted in excessive oil consumption during the Sundance trials, and satisfactory figures of 1 to 1.5% (oil/fuel ratio) have been achieved consistently.

#### Pistons and Rings

The Sundance piston is generally similar to the Mark 7A design except that the oil cooling cavity in the crown has been increased slightly by machining the top platform of the body. This gives a slight reduction in weight. The piston skirt diameters have also been reduced to give extra clearance. Furthermore, the oil feed slipper spring has been stiffened to ensure full contact with the con rod surface at maximum speeds.

The main area of improvement in the Sundance pistons is the re-design of the fire ring assembly. Whilst retaining the composite ring design and molybdenum inlay on the ring faces, the changes are:

- Ring material changed from CI4 to CI16 iron for increased strength
- The sealing ring is of the in-springing design, compared with conventional outward springing type of piston ring
- The back clearance between the obturator and sealing rings has been reduced to zero. This, in conjunction with the in-springing characteristic, prevents gas pressure getting behind the sealing ring and forcing heavily onto the bore.
- The locating lug has changed from axial 180 degrees to radial 90 degrees
- The bullnozing of the fire ring horns was found to be unnecessary to prevent ring fouling on the ports, and the design has changed to a straight cut gap with a tapering chamfer on the top and bottom edges of both rings

The compression ring material has been changed from CI3 iron

to the stronger CI4 whilst retaining the molybdenum inlay. In order to prevent the problem of molybdenum flaking on the fire and compression rings, Wellworthy have introduced into production an improved method of wire spraying, together with cleanliness and quality control improvements.

#### Fuel Filter

Having dealt with the cylinder liner, block and piston area, the next important area is the fuel injection system. Starting with the filter, although the Coopers filter unit is of sturdy construction, it had certain inherent disadvantages:

- The element will not filter fuel sufficiently for the satisfactory long term operation of the injection pump
- The element is spring loaded and, as it becomes choked up, it can lift and allow unfiltered fuel to pass through the pump
- The sludge bowl design inherently allows dirt to pass directly through the clean side of the filter during operation of changing the element

The CAV paper element commercial type of filter was therefore tried, this overcame the previous disadvantages. However, it was not entirely satisfactory due to its extremely short life due to choking under the adverse fuel conditions experienced in the Chieftain tank.

A star type element, with slightly inferior filtration characteristics to the CAV commercial design, but with increased life, has been approved for production following successful service trials. The element change period however is to remain at 50 SCR for the time being.

Note: SCR was the abbreviation for Service Counter Unit. A drive was taken from the front gear train to a counter and a count of one on the SCR was equivalent to 10 miles, however this was based on



tarmac running and desert conditions could reduce this to approximately 7 miles/SCR count. 400 SCR (or 4000 miles) was often used as the trials target for the British Army.

Fuel Injection Pump

On the fuel injection pump, the main problems have been:

- a. Seizure of elements after a short mileage
b. Heavy wear of pump elements and delivery valves due to dirt ingress past the filters. (This problem has been catered for in the re-designed elements)
c. Erratic governing
d. Cross shaft seal leakage
e. Failure of the bellows seal on the control rod, resulting in governor oil loss or contamination of the governor oil by engine oil

The changes made to overcome these problems are:

- a. Improved manufacture of the elements by CAV, comprising - torque lapping; nylon brushing to remove burrs; modified heat treatment
b. Increased diameter lubricating oil drain pipe to prevent the accumulation of excessive quantities of lubricating oil in the pump cam box
c. Introduction of a re-designed spring in the hydraulic governor to prevent erratic governing and excessive run out
d. The rubber material of the two bellows seals to isolate the governor oil from the lubricating oil within the injection pump assembly has been changed to Viton. This material is stronger and less susceptible to handling, assembling into the pump or operational damage
e. The fuel pump cross shaft has been re-designed and shortened so that it only passes through the front side of the pump casing. This has eliminated the rear seal leakage problem, whilst the front seal design has been improved
f. The accuracy of injection timing is of the utmost importance in achieving the desired reliability from the engine components, particularly the pistons and rings. Therefore, in order to ensure the pump is correctly timed by the Capillary Method, the timing pointer and the mark on the fuel pump have been deleted

Fan Drive

The cog belt fan drive and sprag clutch have been responsible for a large number of rear gear case failures, and the following design changes to the drive have been made:

- a. Improved sprag clutch, with five drag clips and three drag clips, to control the position of the sprag cage relative to the inner and outer hubs
b. Controlled end clearance of the sprags by fitting shouldered distance pieces
c. Closer tolerances of machining on the inner and outer hubs, to control the space for the sprags to operate
d. Closer tolerance bearings in the fan hubs
e. Deletion of the sprag clutch in the right fan, making this a solid drive
f. Improved lubrication by increasing the well of oil in the fan hubs. This was achieved by rotating the hub assemblies and re-piping

Other Minor Features

- a. Rear gear-case bolts of improved stretch to prevent breaking

- b. The front idler gear bush is reamed after fitting to prevent seizure
c. Air cleaner - Second stage clamp adjusting nuts are pinned in position to prevent tampering mal-adjustment. Drainage of the first stage has been introduced by means of plastic ball valve
d. Perforated plate screens have been fitted to both ends of the sump, at the lower end of the Y-pipe from the Glacier filter and at the breather aperture on the top cover. These prevent major damage from small objects falling into the engine during service

The list of modifications above isn't exhaustive, changes were also made to the fuel injectors to reduce fuel flow variations and improve life plus changes to the design of the engine mounts to reduce vibration. An outsider looking in might wonder how the Chieftain ever made it to the end of the road!

In addition to the document identifying all the problems and the measures put in place to alleviate them I also came across a detailed report covering the measurement of various components prior to an engine being fitted into a Chieftain for test and this may also be of interest. The preamble for the report was as follows:

PROJECT "SUNDANCE" - ASSEMBLY REPORT FOR ENGINE SD1

The main objective of the "Sundance" project was to carry out a proving exercise on nine L60 units assembled to an agreed specification. The exercise was to consist of vehicle running of power packs and bench testing of engines.

The initial inspection of components and the assembly procedure were kept under close surveillance by the Control Team, comprising:

MVEE (Military Vehicles and Engineering Establishment), British Leyland, REME (Royal Electrical and Mechanical Engineers), QAD FVE (Quality Assurance Division Fighting Vehicle Establishment) representatives and it is the inspection and measurement data for Engine SD1 which forms the subject of this report. Engine SD1 was assembled as a rework power pack by British Leyland Production Department using components from Engine No.2347. On completion as a power pack it was despatched to ATDU (Armoured Trials and Development Unit) Bovington on 12th May 1976 for vehicle trials.

Note: Nine engines were used for this project, numbered SD1 to SD9. Engines SD1, 2, 4, 5, 6, 7 and 8 were identified as Mk.7 engines, SD3 a Mk.7 ATP engine and SD9 a Mk.8A engine. All the Mk.7 variants were rated at 720 bhp (gross) and the Mk.8A engine at 750 bhp (gross), the Mk.8A engine being fitted with a two lobed Roots blower. (Even numbered Mk's were as a rule sales or export engines).

As with many stories about the history of Leyland Motors, the names of the personnel involved are often of as much interest as the technical details. A meeting was held at British Leyland on 16th February 1976 to discuss inspection and quality assurance aspects of Project Sundance. Those present were:

- G Frier, Chairman PP/D MVEE
A Pulin QAD (FVE)
A R Gordon QAD (FVE)
Maj R Pearce Veh Br REME Support Group
J W Hammersley 38 Cent Wksp REME
J Smallbones Wellworthy Ltd
D T Nineham Wellworthy Ltd
J M Smith British Leyland
J C Watson British Leyland
M C Thompson British Leyland
R Robinson British Leyland
R Miller British Leyland
T Barber British Leyland
H Stopford British Leyland
R Manchester British Leyland
H P Mason SS/PP/D MVEE Secretary

When I first began work in the Research and Development Department at Spurrier Works in 1975 several test beds were still allocated to the test and development of the L60 engine and I had the pleasure of meeting two of the people from the above list; Mr Ralph Robinson and Mr Bob Miller, who were frequent visitors to the department.

The report goes on to detail what components

should be measured, how many samples should be measured and the documentation to be used to record the measurements. The bulk of the folder is made up of measurement record sheets (forty-six in total) all signed and dated for components such as the cylinder block, cylinder liners, pistons, injectors and fan hub assembly. The last few pages of the folder are the sign-off sheets for the engine prior to despatch to ATDU Bovington including the final test certificate for the engine.

As stated earlier this exercise covered the assembly of nine units and the reworking of these engines was split between Leyland and REME and in the report there are differing stipulations for the inspection requirements for engines reworked at Leyland and by REME

As well as carrying out development work for and with the British Army, Leyland also worked with the Indian Army and subjected Sundance specification engines to trials in desert conditions. According to my friend John Farnworth, who was personally involved with these trials, Leyland supplied two new de-rated engines (Vijayanta tank specification). India supplied

TEST CERTIFICATE FOR L60 ENGINE. BRITISH LEYLAND UK LIMITED TRUCK AND BUS DIVISION. CONTRACT NO. FL 18063. TYPE 11607 SUNDANCE (SPECIAL BUILD) No. SD1. DYNAMOMETER B.H.P. = WN SD1. Includes technical specifications and test data tables.

Copy of final pass off certificate for engine SD1 dated 13.04.76. The certificate includes some information on the build specification of the engine plus power output and fuel consumption data obtained at various points through the speed range. At the rated speed of 2800rpm the engine was producing 695 bhp and using 285lbs/hr of fuel (roughly equivalent to 33.5 gallons/hr!). Note: The rated speed quoted is at the output shaft not the crankshaft. The output shaft rotated at crankshaft speed x 1.25, therefore crankshaft speed would have been 2240rpm (although marketing specifications state 2250rpm).

two more engines that were reworked to the same specification as the two new engines replacing parts as required. All four engines were prepared at Leyland in the Test Operations Department at Spurrier Works. On delivery to India the engines were converted to power packs and fitted into Vijayanta tanks for the trials.

Amongst the technical reports I had access to was one covering the strip and examination of one of these engines. As previously, extracts from the report are shown in bold italics.

#### History

Engine 1867 was originally a Mk.7B power pack (ex-HVF) and was reworked at Leyland Vehicles, UK to the Sundance build standard (Mk.14B), its initial running being 16 SCR.

Note: HVF was the abbreviation for the Heavy Vehicles Factory, a facility located in Avadi in the Indian state of Tamil Nadu. The factory was set up by the Indian Government for the manufacture of heavy battlefield equipment including the Vijayanta and T-72 main battle tanks.

#### Vehicle Trials

The power pack was installed in Vehicle 80X1477Y in 505 Army Base Workshop under Leyland supervision. It then ran in vehicle trials under desert conditions at Suratgarh, until it was withdrawn with the complaint of water and oil in the engine compartment (the sump was cracked and holed) after completing 2026Km (1259 miles) 137 SCR. The vehicle was returned to 505 Army Workshop for removal of engine, strip and examination. The trial was stopped on 23/10/81 and the examination started 5 months later, on 20/3/82.

Note: 505 Base Workshop is situated in New Dehli and is still in use today. Suratgarh is a city and a municipality in Ganganagar District in the Indian State of Rajasthan and lies within the fringes of the Thar Desert. The report goes on to detail the findings resulting from the strip-down:

#### Engine Examination

The servicing on the air cleaner involved the element being removed for cleaning or changing thirteen times. The average distance covered per cleaner service was 145Km. The air cleaner was previously examined in detail by the Microflow and Leyland representatives, both in the vehicle and after removal.

On removal of the power pack, both the polyvee belts were in good condition and tight. There was no evidence of oil leakage from the fan hub seals, and the bearings and sprag clutch appeared to be satisfactory. There were heavy deposits of sand over the exterior of the engine, but it was not oily and both crankshaft seals and output shaft seal were quite dry.

Although the generator had remained operational, the bearings in the drive assembly and the front one of the generators had failed. (These were not examined in detail). The generator vent gauze was damaged).

The exhaust pipes were oily, and on the right hand pipes the short bellows (top and bottom) connections were broken

and some were missing on the L. pipes.

There was a deep score on the blower rotors, which were heavily caked with a deposit of sand, slightly oily. The rotors were jammed and would only move ¼ turn. With the blower removed, the engine would rotate, in spite of there being holes in the LH side of the sump opposite Nos.2 and 3 cylinders. As the engine stripping proceeded, (except for removing cylinder liners), the following points were noted:

#### Pistons and Rings

Severe ring wear and breakage had occurred due to the abrasive action of sand ingress, and subsequent running had led to the seizure of A3 piston (air piston number 3) crown in its cylinder, between the ports and IDC. The crown bolts had sheared and the body pulled down the bore and completely broken into pieces, leaving the gudgeon pin in the connecting rod to thrash around and burst through the liner wall, breaking 4 air port bars and pushing a large piece of liner outwards into the air chest.

Note: If I'd been asked to describe this failure in one of my technical reports I would have called it catastrophic!

#### Cylinder Liners

The exhaust portion of the liners between the outer end and the ports, were in fairly satisfactory condition, with the carbided surface visible and showing minimal wear, but with a few light scratches. Between the ports and the IDC position of the exhaust fire rings, abrasive wear had scoured the carbide surface and resulted in heavy wear.

On the air side (excluding No.3 liner) the silicon carbide surface over the full piston travel had been worn away by abrasion, with Nos.1, 4 and 6 liners also showing heavy scoring from ring debris. The carbon formed at IDC, indicated that prolonged running had taken place after the fire rings had broken.

Similarly, this section also goes on to report more areas of damage in the liners. Further sections relate to the crankshaft and bearings (in good condition with little or no wear), front and rear gear trains and fuel injection equipment.

#### Conclusions

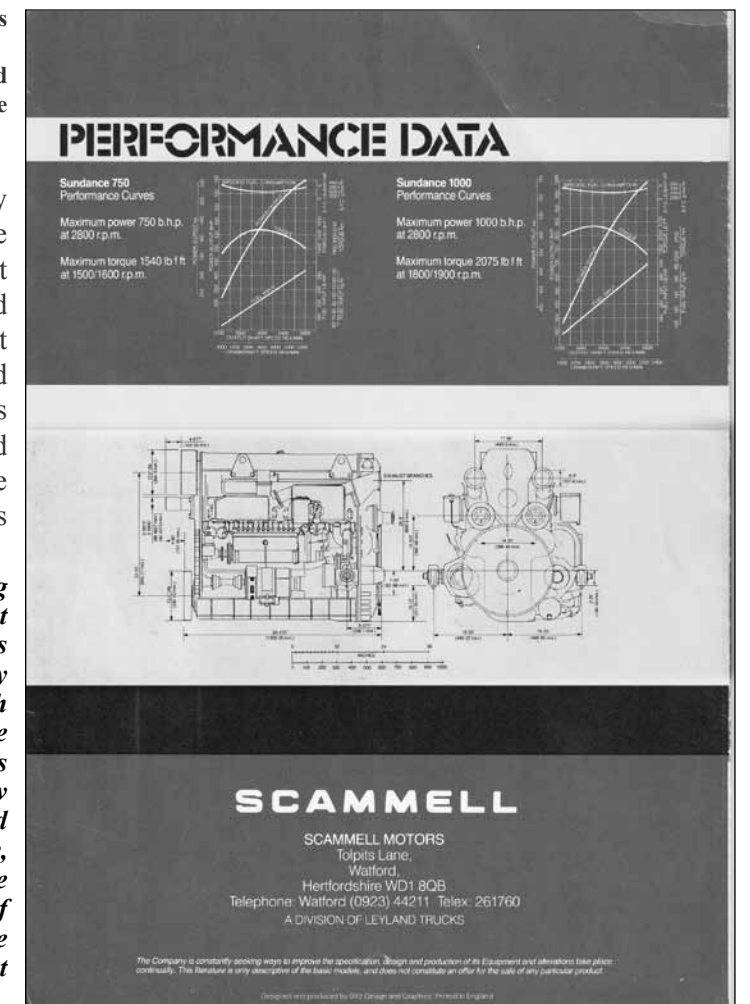
1. The failure of L60 engine No.1867 after completing only 2067Km was due to the entry of large quantities of sand and dust through the air intake system. This had caused severe wear of the piston rings (particularly on the air side) to the extent that all the air piston fire rings and top compression rings (except one) had broken. Further running had resulted in damage to the piston crowns, overheating of the piston skirts and the ultimate seizure of A3 piston.
2. The engine exhibited no sign of overheating, except as a result of piston ring breakage.
3. The abrasive action of sand had scoured or removed the silicon carbide surface of the cylinder liners, No.3 liner was broken around the air ports due to piston seizure and No. 4 liner was broken due to piston ring damage.
4. In spite of the amount of sand which had passed into the lubrication system via the engine sump, the damage to the crankshafts and shell bearings was minimal.
5. The fuel injection pump was in good condition. Although the injector condition appeared. unsatisfactory by the

rigorous standards of the test machine, the injectors had performed satisfactorily during the trials

6. The polyvee belts and fan drive system performed exceedingly well throughout the trial, as did the front and rear gear trains.

From the contents of the report it is very apparent how important cleanliness in the air intake system was. Although the trials were carried out in desert conditions, where the presence of sand and dust was inevitable, I have also read that Chieftains serving with the BAOR also suffered from dust ingress (often thrown up by the tanks own tracks) and that tank crews regularly carried out a process known as "knocking out" to remove accumulated dust from the filter elements. John's

*Right – The page from the advertising brochure giving details of the performance of the Sundance engine at 750 bhp and 1000 bhp ratings. The brochure states "Development to the higher rating is in progress, by means of turbocharging and inter-cooling, which may permit the use of a smaller Roots type scavenge blower, with reduced power absorption. Other systems designed to supply charged air for starting and low speed running are being investigated. These would then obviate the requirement for a scavenge blower, and thereby improve the overall effectiveness of the power unit". I've not been able to find any evidence of an engine running at 1000 bhp so I can only surmise that these were aspirational figures. Also note that Scammell's rather than Leyland's address appears.*



*A Vijayanta tank in service with the Indian Army. This photograph shows the extremely dusty conditions that the vehicle was expected to operate in and clearly demonstrates the need for good air filtration to prevent damage to the engine (Image reproduced with the permission of 21st Century Asian Arms Race)*



final recollections of this exercise are that one engine failed due to a broken conrod causing excessive damage and another suffered oil contamination in the cooling system causing overheating. With minimal repair options available all the units eventually failed one by one.

The last piece of information I uncovered relating to the Sundance project was a brochure intended for use at military shows titled "SUNDANCE MAIN BATTLE TANK ENGINE". Interestingly, although the front-piece carries the Leyland name and infamous plughole logo, the rear of the brochure displays the Scammell name with the well known Tolpits Lane address. Maybe this was just a clever piece of marketing to try and disassociate the engine from its less than illustrious past as Scammell had a long history of producing military vehicles.

There is another example of this inside the brochure where the engine is referred to as "The Sundance is a new MBT engine currently offered in vertical form at 750 bhp, with a maximum power envelope up to 1000 bhp. Recent performance in Chieftain hulls has shown it to be the most reliable MBT unit currently in service". This statement is interesting as the engine is described as 'new' rather than updated seemingly another attempt to distance the product from its predecessor.

Surprisingly the engine was still being marketed as having multi-fuel capability, despite this requirement being relaxed in the 1960s, combined with the fact that the British Army had never run the engine on anything other than diesel.



*A Mk.11 Chieftain fitted with a Mk.13A L60 Sundance engine. This engine was rated at 720 bhp @ 2250 rpm. There was a more powerful version available for overseas sales but differences in engine specification ie. a three lobed Roots blower instead of two lobed would have increased the British Army's spares holdings (Peter Trimming from Croydon, England)*

Chieftains fitted with Sundance engines took part in an exercise and this was reported on in Engineering Today, dated October 1980, as follows: **Exercise Spearpoint, a NATO exercise last month, was a crucial test for the 11A, the latest L-60 engine. Initial results showed that the 11A held up well. 23 Base Workshop, as well as making its own jigs and tools, has made modifications to the L-60 that represent a significant jump in reliability.**

**But the men closer to the field operation of equipment are gloomier than the people back at base. It is depressing to see the same piece of equipment coming back for repair time and time again. The L-60, or at least the 7A version of it, which is starting to be taken out of service, caused a minor collapse of morale among the army's engineers. "You can make a Chieftain more reliable by putting a lot of work into it" says one of them. This means, for example, cleaning the filter regularly. The tank crew are expected to do this themselves and also to change the 100 litres of oil - another messy job.**

**Colonel Hugh Sanders, Commanding Officer of the Queens Own Hussars, says the secret of the army's man management is getting the right people in the right jobs. To serve in the REME you must certainly have a taste for discomfort. Other officers point out that cuts in civilian staff as a result of government spending curbs just mean more overtime for the soldiers. And soldiers do not get paid for overtime!**

Note: 23 Base Workshop was located in the town of Wetter in Western Germany. It used buildings that previously housed one of Germany's oldest iron and steel works. During the Second World War the works was flooded as a result of the Dambuster Raid on the Möhne Dam.

Eventually, as a result of the Sundance modifications, availability rates for the Chieftain greatly improved. Chieftains numbering several

hundreds, in service with the BAOR, were fitted with a mixture of Mk.11A (interference fit liner with O-rings) and Mk.13A (interference fit liner no O-rings) engines.

As well as containing the normal technical information one would expect to see in a sales brochure there is also an image of a horizontal version of the L60 engine and the brochure states "In its horizontal form, the Sundance 1000 engine's overall height can be reduced to 37 inches, the corresponding width and length dimensions being 54 inches and 46 inches respectively. This represents a power to bulk ratio of 18.8 bhp/cuft

By referring to a horizontal version it was clear that Leyland were trying to market the engine for use in vehicles other than the Chieftain, perhaps to try and recoup some of what must have been substantial costs incurred during the Sundance program. However, I have spoken to John Farnworth at length on this and, although he recalls seeing the engine in "show form", ie. as shown in the brochure with cutaways, to his knowledge a running version was never produced or tested. On reflection it seems ambitious if not surprising that Leyland were offering a horizontal version of the L60, bearing in mind that the Sundance project had only

just got the engine to the stage where its reliability was considered acceptable in vertical form. From my own experience of engine development and testing trying to get an engine to run "on its side" brings with it its own problems.

I hope that this article has proved interesting; it is difficult sometimes to strike a balance between including sufficient technical detail to illustrate how much work went into a particular project while at the same time not overloading readers with too much information. The Leyland engineers at the time certainly had their backs against the wall but with the help of the various parts of the British Army's technical teams they managed to overcome a great number of complex engineering challenges.

The fourth and final article on the Leyland L60 Two Stroke Opposed Piston Engine will include some anecdotes from people who worked on the engine plus photos I've not been able to utilise up to now and a little about the service of the Chieftain (with references to the L60) both with the British Army and with foreign armed forces, focussing on a contract Leyland had with the Sultan of Oman's Armed Forces.

*A tantalising image of what might have been. The photograph shows a sectioned view of the Leyland L60 (Sundance) in horizontal form; sectioned engines such as this were normally produced for shows. Interestingly the engine is shown fitted with two Holset turbochargers, frustratingly however, there is no view of the underside of the engine where in vertical form the Roots blower would normally have resided, so it's not possible to say whether the turbochargers were intended to supplement the blower or replaced it (possibly for reasons of packaging). There have been examples of engines fitted with both a turbocharger and a supercharger, VW announcing one in 2005 for fitment into the Mk 5 Golf GT.*





*Oddly, the Leyland Titanic designations did not follow the sequence used for the Titans. Bury Corporation 52, EN 6051, was a model TT2, chassis 5156, with EEC coachwork – see also page 40*

*(BCVMT L018081)*



# ODD BODIES !

## Compiled by Gordon Brooke

### All correspondence to Mike Sutcliffe

Thanks to John Banfield, John Bennett, Colin Brazier, Colin Bull, John Burton, Peter Caunt, Allan Condie, Maurice Doggett, Mike Elliott, Mike Fenton, Ted Jones, Geoff Kelland, Graham Martin-Bates, Harold Peers, John Sinclair, Mike Sutcliffe, Ron Thomas, Roger Warwick and the PSV Circle.

#### East Kent Leyland TS1s with double deck bodies (Torque Nos.80 & 81)

The PSV Circle recently had a query on this matter and member Nicholas King provided the following response: "Chassis drawings have now emerged from East Kent drawing office records which confirm that these had a 3ft 7½in rear frame extension to support the platform and open staircase. Photographs confirm that there was a step up from the platform into the lower saloon. The drawings are labelled as 'Tiger Special' and show chassis dimensions as overall length 27ft 2in, wheelbase of 17ft 6in and rear overhang of 7ft 8in. The body overhang points towards an overall length of around 27ft 6in.

"The mention of a 25ft maximum length for double-deckers is misplaced at this period. Before the implementation of the Road Traffic Act 1930, licensing powers sat with local authorities rather than through national legislation. The majority of local authorities adopted the standards of London's Metropolitan Watch Committee, whose maximum length for double-deckers was indeed 25ft.

"At Thanet, double-deck trams were already 29ft or longer, so East Kent probably had little problem in persuading a precedent for 27ft 6in length. The vehicles were never intended for operation outside Thanet, so no need arose to approach other local authorities which might have been reluctant to sanction this.

"Photographs also seem to imply that 20in rim wheels (TD1) rather than 22in wheels (TS1) were fitted. FN 9094 and JG 652 were rebodied Park Royal L27/26R in 1942. In itself, this means that their 'Grandfather rights' kept them over the legal maximum for double-deckers until post war changes in legislation". (Reproduced with kind permission from the PSV Circle)

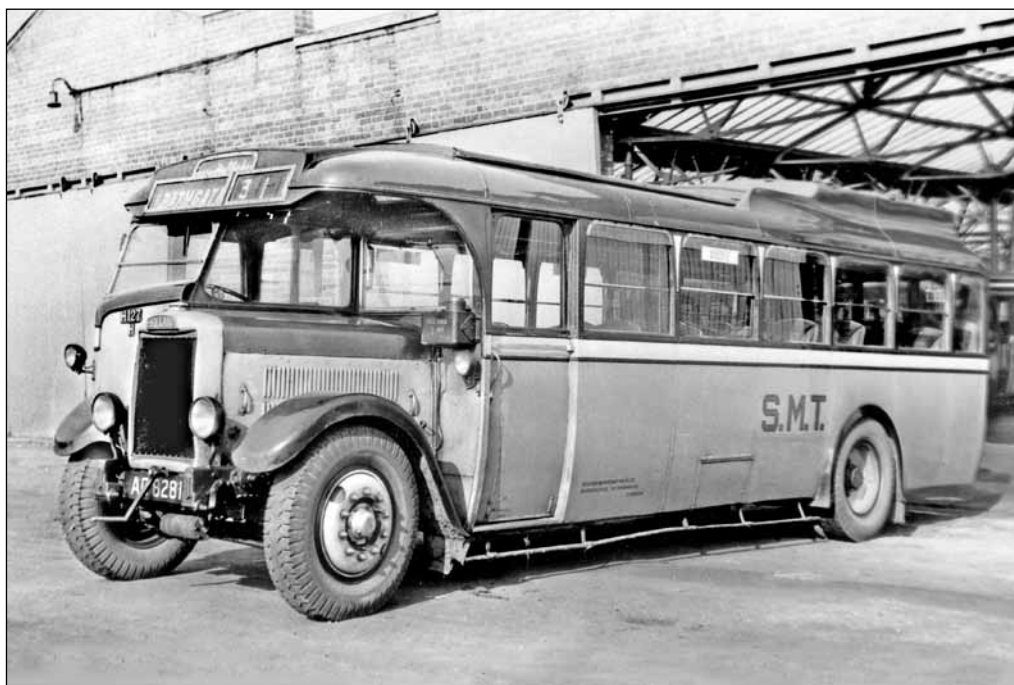
#### Tye's, Mendlesham, Leyland Lion LT2, WE 8115 (Torque No.80 & 81)

Contrary to Mike Fenton's suggestion that the body was by Waveny, Maurice Doggett can find no mention of it in the list of Waveny bodies which he has, nor does it appear in any of his lists for other East Anglian bodybuilders.

#### J. Smith and Sons, Wigan, Leyland Tiger TS4, AG 8280 (Torque No.81)

The several replies for this all agree apart from a few minor discrepancies. The model was TS4, chassis 178, new to Western SMT with a Pickering C30F body, fleet no.324, new in 6/32; one of fifteen ordered by Scottish General Transport but with SMT fleetnames. It went to SMT, Edinburgh as H126 in 5/35. Here is a photograph of sister vehicle AG 8281.

After that it either went to the War Dept in 1940 and on to J. Smith and Sons 'by 1948'



Sister coach, AG 8281 with Pickering body in the livery of SMT

(The Bus Archive)

or to Smith by 1941. The former seems the more likely to me, except that it was rebodied in early 1947 for Webster Bros, Wigan with J. Smith and Sons as legal owner. This was with a Bellhouse Higson C33F body, fleet no.32, one of four for the associated fleets of Smith/Webster. (Bellhouse Higson became Bellhouse Hartwell after these bodies were completed.) It went to W Morris, Wigan, in 5/50 and to D A Morris, Wigan, 6/54. It was last licensed 1/56. The accompanying rear offside photograph was taken at the same spot as the nearside view in the last issue. Presumably they were for use in Bellhouse Higson's publicity.



After rebodding by Bellhouse Higson, a much more 'rounded' body (BCVMT L032441)

#### Leyland Tiger TS2, WH 1922 (Torque No.81)

The nine responses for this are all in agreement except for minor details. It was Tiger TS2, 60537, with a Burlingham AW26D body new to J R Tognarelli, Bolton in 7/29. Apparently Tognarelli was a thorn in the side of several Lancashire operators and in December 1929 was bought-out jointly by Lancs United and the Corporations of Bolton, Manchester, Oldham and Salford and the fleet was shared 6, 2, 6 +1 on order, 2 and 6 correspondingly. However, it seems that the coach operation continued for some time after that. This magnificent photograph shows it behind WH1299, a Tiger TS1, 60029, delivered 11/20, with both carrying the Tognarelli name. The coachbuilder of the latter is not known but an oval transfer can be seen near the rear wheel. The transfer has a picture of a bonneted coach on it, so can anyone say who built the body? (See inset at the top of the photograph).

John Robert Tognarelli was an ice cream parlour and restaurant owner in Bolton. In 1927 he acquired the charabanc fleet of local bodybuilder Bromilow & Edwards and inter-town bus services were started in the Bolton, Manchester and Oldham area as well as a Bolton-Manchester-London service.



Two of Tognarelli's Tigers, WH 1299, a TS1, with WH 1922 behind, a TS2 with Burlingham All-weather body. Who built the body on the TS1? (BCVMT L006671)



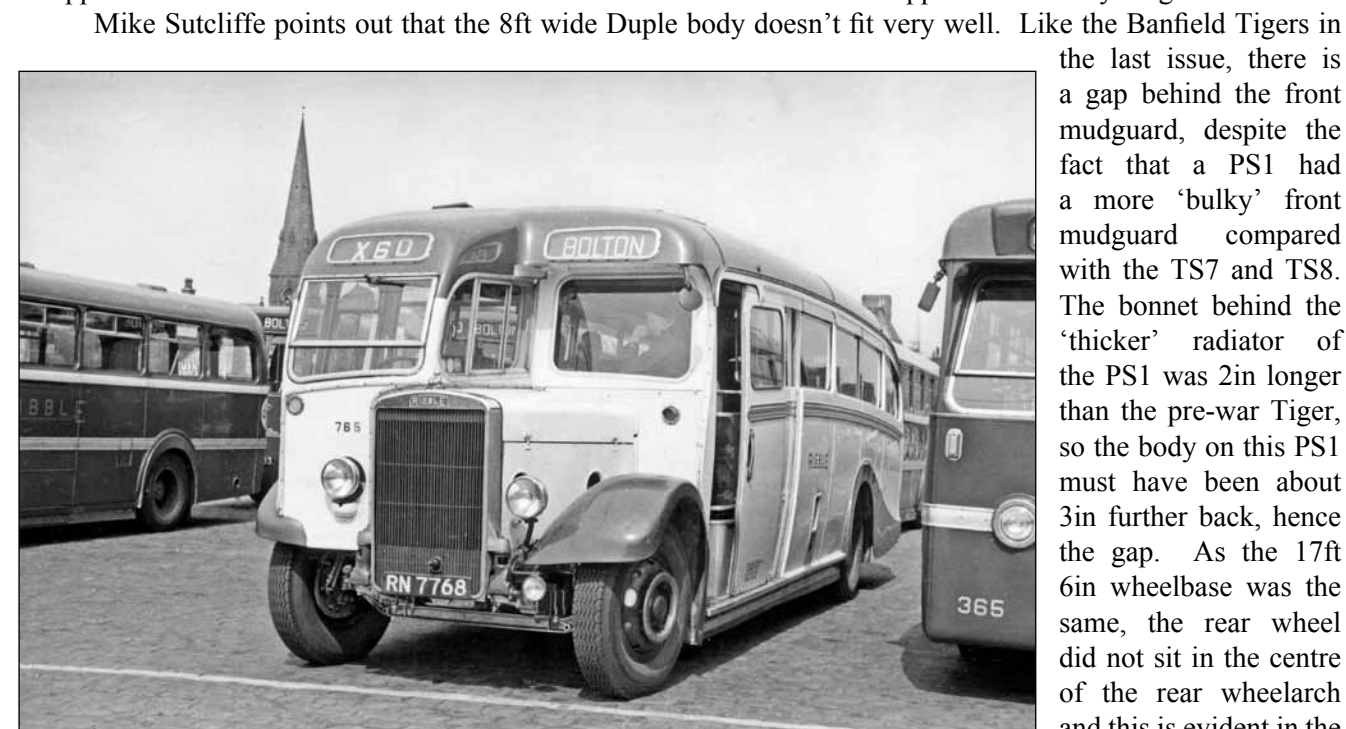
Two views of WH 1922, left is with Salford, right with Hackett

(Harold Peers & Ted Jones)

WH 1922 passed to Salford City Transport, possibly via Bolton Corporation, on 5 December 1932, and was given the fleet number 2. It was rebodied by Salford City Transport C18F in 1938, renumbered 402, for use by the Transport Committee, which explains the lack of destination equipment. It was renumbered again in 1949 to 99. It has been suggested that it was not rebodied but the original body was comprehensively rebuilt. If this was the case, there can't have been much left of the original body, particularly as there was no roof, except for the rear portion, and the pillars were longer, some being in a different position. When does a rebuild become a rebody? It was sold to H Hackett, Manchester in 9/51 and scrapped in 1959. These photographs show it shortly after its transformation into the Committee coach and in service with Hackett looking much more impressive than in the one in Torque No.81. When with Salford post-war it had a 'Salford City Transport' radiator plate but received a 'Leyland' plate with Hackett.

#### Mitchell, Luthermuir (not Kincardine), Leyland Tiger PS1, FDK 908 (Torque No.81)

There was a good response for this one, with much of the information coming from PSV Circle records. FDK 908 was a PS1/1, 471885, new in 8/47, to Yellowway Motor Services, Rochdale with a Trans United C33F body. It passed to F & J Mitchell about December 1956 and was rebodied by them in 1961 with the body from Ribble 1518, RN7768, Leyland Tiger TS7, which had been rebodied in 1950 by Duple with an 8ft wide body which is seen in this photograph. It had been obtained from Millburn Motors, Preston and the TS7 chassis was scrapped in 8/61. The alternative near side view does not seem to make it appear excessively long.



The donor vehicle, which gave the PS1 an extended life

(The Bus Archive) photograph on page 28

Like the Banfield Tigers in the last issue, there is a gap behind the front mudguard, despite the fact that a PS1 had a more 'bulky' front mudguard compared with the TS7 and TS8. The bonnet behind the 'thicker' radiator of the PS1 was 2in longer than the pre-war Tiger, so the body on this PS1 must have been about 3in further back, hence the gap. As the 17ft 6in wheelbase was the same, the rear wheel did not sit in the centre of the rear wheelarch and this is evident in the

of Torque No.81. It looks as though the windscreen slopes slightly more than when the body was on the TS7, with a thicker front nearside cab pillar to compensate for the 2in longer bonnet.

#### Campbell Bros, W Lothian, Leyland Titan TD5c, EWA 543 (Torque No.81)

Not a Tiger, this was part of a batch of fourteen Leyland TD5c Titans delivered to Sheffield Corporation in 1937 fitted with Cravens H31/24R bodies; they were withdrawn between 1947 and 1951. This one was Sheffield 343 and had chassis no.13811. Sheffield 335 from the same batch is seen here (below), nearing the end of its life and apparently disowned by Leyland!



Another view of FDK 908 after rebodding. We haven't found a picture of it with Yellowway yet – any offers? (Roy Marshall - The Bus Archive)

Geoff Kelland says that there is an interesting line-up in view in the photograph in Torque No.81, which was taken in Dumfries on Whitesands. This includes SW 6893, an AEC Regal (06624188) with a Harrington B34F body operating for Carruthers of New Abbey, but originally intended for Gelligaer District Council; it was in that fleet from May 1946 until 1958. Next is a Bedford OWB, one of six in the Carruthers' fleet. He believes that others include GKC 248 belonging to Gibson of Moffat, a Guy Arab I with a Weymann (LCPT) body formerly Liverpool Corporation G214 and alongside this is most probably Gibsons' MTA 747 a former Leyland PD2/1 demonstrator. As SW 6893 was with Carruthers from May 1946 until 1958 and GKC 248 was with Gibsons' from June 1954 until July 1959 this would indicate that the photo was taken during the period 1954-58.

Mike Fenton says that the new C35F body seen in the photograph was built by Campbell themselves. It was one of six coach bodies built by them on Leyland chassis – was the chassis lengthened before rebodding? John Bennett points out that an amazing number of former Sheffield Leylands were rebodied after sale; perhaps the mechanical bits were better than the bodies!



(Roy Marshall – The Bus Archive)



**NEW ITEMS**

**Stockland, Birmingham, Leyland Tiger TS8, DOX 190**

This attractive body is almost certainly the original. Does anyone know the bodybuilder?



*(From Paul Banbury)*

**Grey Coaches (Banfield), Leyland Tiger TS7, DUF 176**

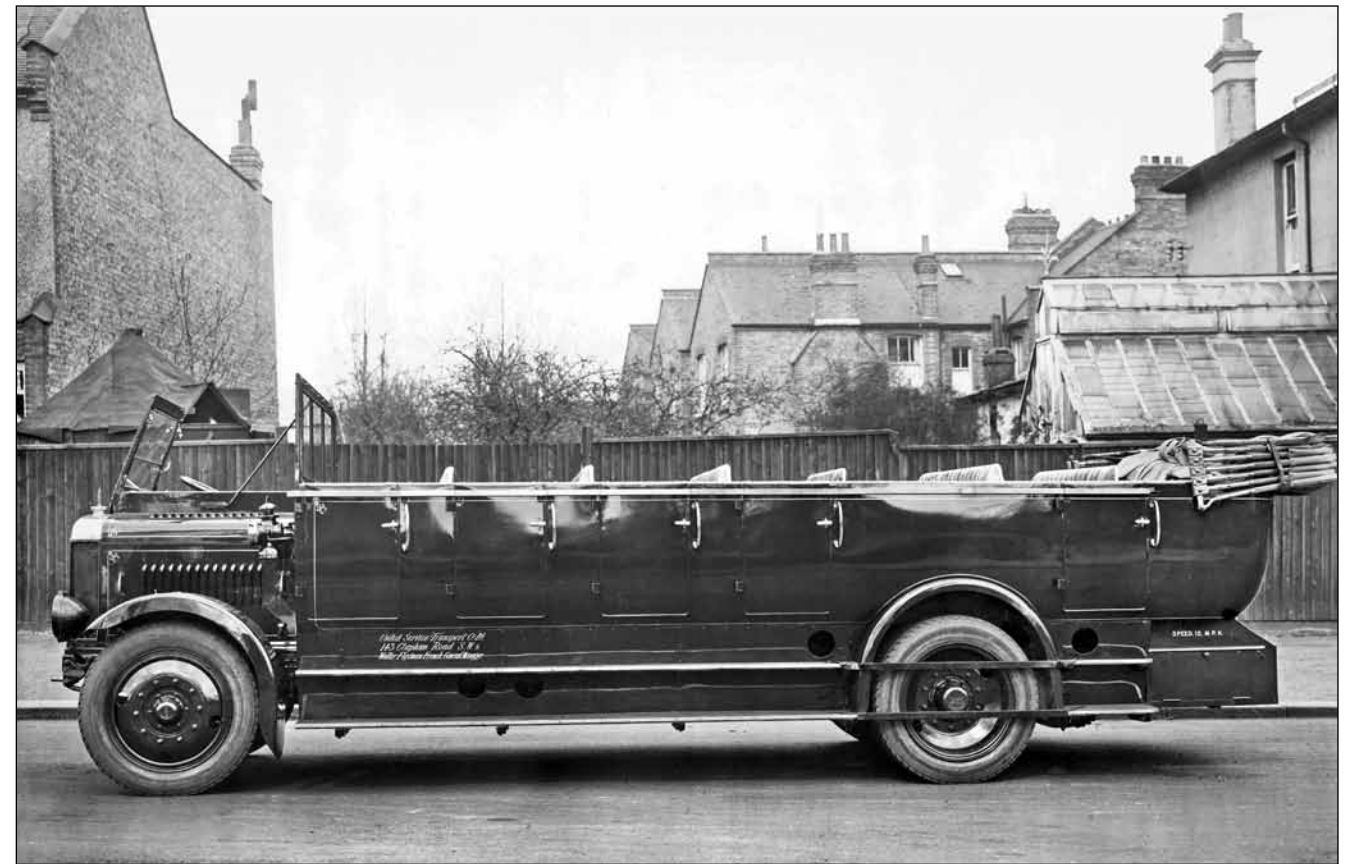
Grey Coaches was associated with CW Banfield and the body on this Tiger TS7 appears to be a post-war Duple A body with a few minor modifications near the front, but is it? The front nearside bulkhead window appears to be angled so that passengers can communicate with the driver. Where did it come from?



*(Mike Sutcliffe collection)*

**United Service Transport, Leyland Lion LSC1, YP 7117or 8**

A forward control charabanc is most unusual. It seems that there were at least two in this fleet.



*(Roger Warwick collection)*

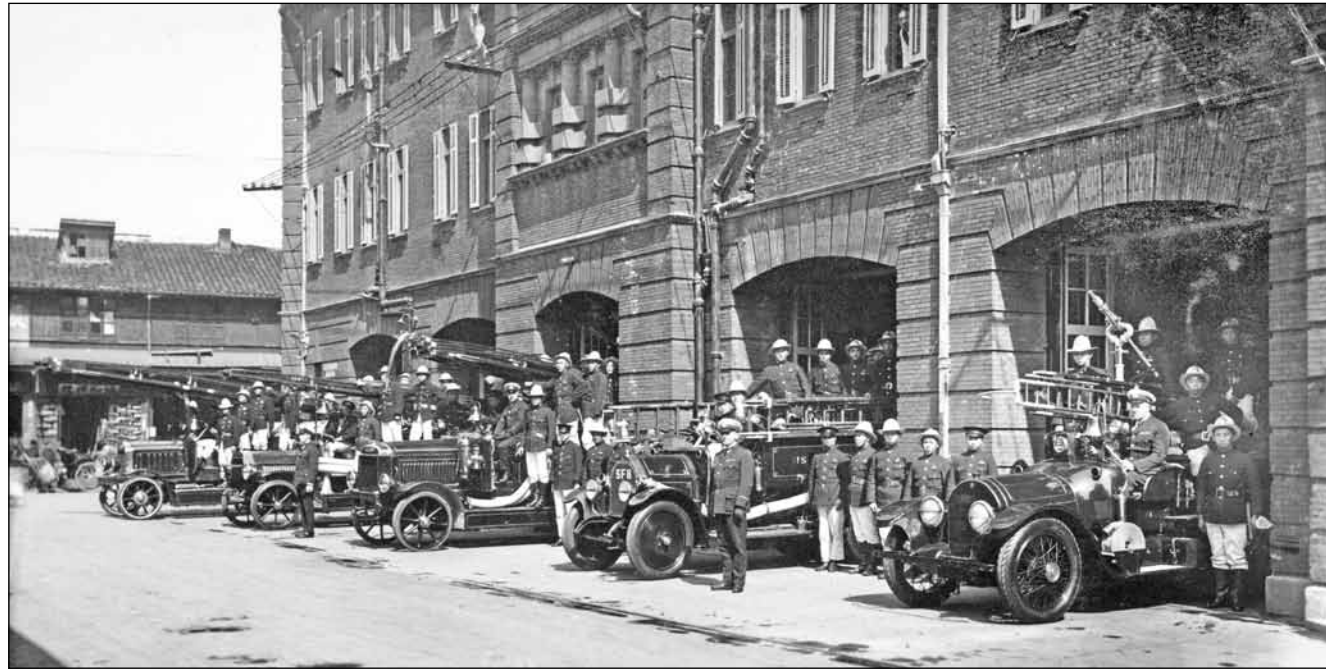
**Lowland, Leyland Tiger TS1, GE 6001**

The body style and the CovRad radiator, introduced in 1937, show that this had been rebodied – but by whom?



*(Mike Sutcliffe collection)*





## 'UPON-THE-SEA'

By Cdr Simon Ryan QVRM. RD. VR. MIFireE. RNR.

The title refers to the meaning of the characters 上海 which make-up the name Shanghai in Chinese script, the city having being founded as a small settlement during the Song dynasty in the 11<sup>th</sup> century.

With its strategic location on the Huangpoo river, Shanghai's importance increased significantly when it was chosen as one of the five Treaty Ports provided for under the terms imposed on the Imperial Chinese Government following the Sino-British First Opium War in 1842. These Treaty Ports allowed foreign traders to establish premises and businesses subject to their own laws and dues independent from the Chinese government. The very next year Shanghai's Treaty Port was established.

Shanghai thrived but it was not until 1863 that the first fire engine was imported into the International Settlement and this came from the USA, they along with the British and French having the largest concessions (there were also smaller German, Russian and Japanese concessions).

In 1866 a Volunteer Fire Department was established intended to cover the whole area with

*Sinza Fire station around 1930 with No23 (later 32) a Leyland Standard 500gal fire pump in the centre. From left to right are, what is thought to be a Morris Commercial Hosereel Tender which carried a 65ft escape, a Dennis N type pump, the Leyland, Fiat No15 and Cadillac No.4, a First Aid Tender. Sinza is a District and one of the five original stations in the International Settlement (Rewi Alley collection, NZ)*

Companies in each of the main concessions, the American one being known as the Mih-ho-oong Company (destroy the fire dragon); however, it was not until 17th May 1868 that the French Company 'La Torrent' was formed.

The Settlement's first motor appliance was delivered in 1906, a Merryweather with Aster engine, fitted with a chemical unit, it also carried a wheeled escape. By now, whilst it was still called a volunteer brigade under a Chief Engineer elected annually; there were 131 personnel of which only 55 were volunteers, mainly Europeans and Americans. Seven were foreign paid staff (being the engineers in the main) and there were 69 native staff, all paid. In 1912, following extensions to the area of the Settlements and a great increase in the number of fires, it became necessary to



*Shanghai's first Leyland, a U.55.V with a 55hp, 10 litre petrol engine, delivered in 1913. It had been exhibited at the 1913 Commercial Motor Show (BCVMT LB1310)*

abandon the voluntary system and introduce a paid and trained Chief Officer, appointed by the Municipal Council. A small number of foreigners stayed on to man the Watchtowers sited across the Settlement and later a Volunteer Corps was re-formed.

The Chief was William Montague Pett, himself the son of a fireman. He was responsible for the placing of the first order for a Leyland, a U.55.V model, having a 4-cyl 55hp petrol engine, a Leyland-built Braidwood body and a Mather & Platt centrifugal pump. This was exhibited on Leyland's stand at the third SMMT

Commercial Motor Show, held at Olympia in July 1913, prior to delivery. It was allocated Fleet No.6 and served at Hongkew fire station for many years liveried as 'Shanghai Fire Dept.' It later became No.30, then 31.

China remained neutral until 1917 in the Great War and, other than a large influx of White Russians after the revolution, Shanghai was not significantly affected by the war. After 1918 further Leylands were available and the Settlement bought a pair of Leyland Standard 500gal fire engines to replace horse-drawn steamers. They had the U4.55hp engine Rees-Roturbo pumps and Braidwood bodies and arrived in July and August 1921. These larger machines worked alongside 15 or so Fiats



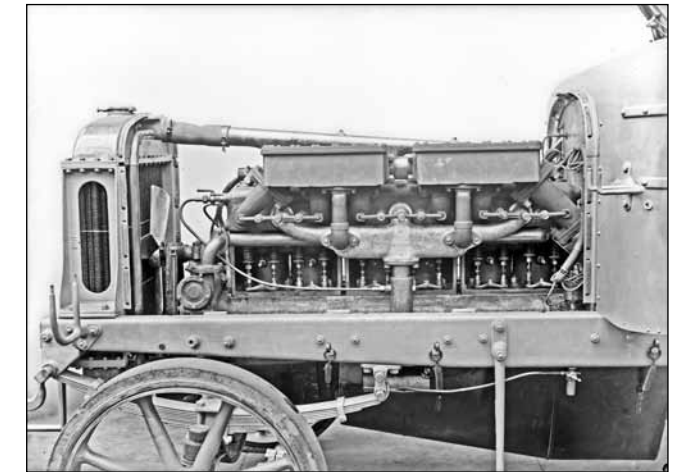
*In April 1921, Shanghai's second Leyland Standard 500gal machine stands outside the grand frontage of Leyland's Chorley Works where it was built, together with Cardiff's BO 3888 (BCVMT L001079)*

and Cadillacs fitted out as first Aid Tenders.

Thereafter Shanghai next opted for the larger capacity Leyland F.E.3 machines, fitted with the Rees-Roturbo 1,000gpm pump. Chassis no.11682 had the 6-cyl, 80hp, engine and a Braidwood body; it was also fitted with a windscreen and was delivered in June 1923, being allocated Fleet No.37. The 1923 annual report noted 'The powerful Leyland pump ordered in 1922 arrived in June this year and was placed in commission forthwith. This machine, which is fitted with an auxiliary Kerosene carburetor, came up to expectations at the test here and reached a water pump pressure of 250 lbs.'

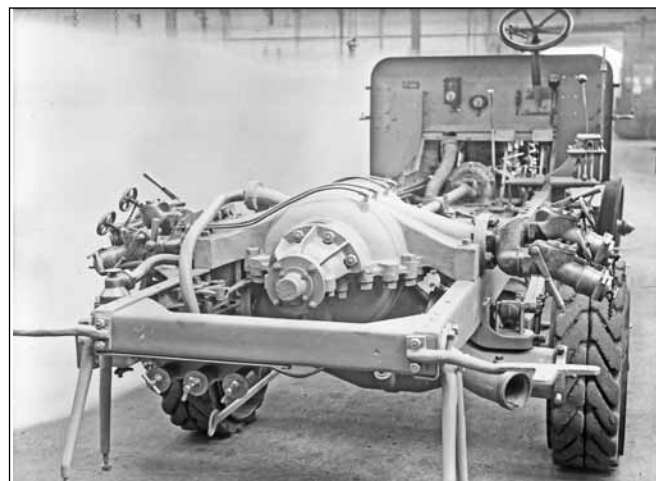


*Shanghai's second Leyland was a Standard 500gal machine, FE.U4 with V4 back axle, seen here before delivery in April 1920 and on trade plates B.1.DD (BCVMT L000617)*



*The first of two Leyland F.E.3 6-cyl, 80hp, (15.2 litre) pumps for Shanghai. Each was fitted with a 1,000gpm pump, this one being delivered in 1923. (BCVMT L002083)*

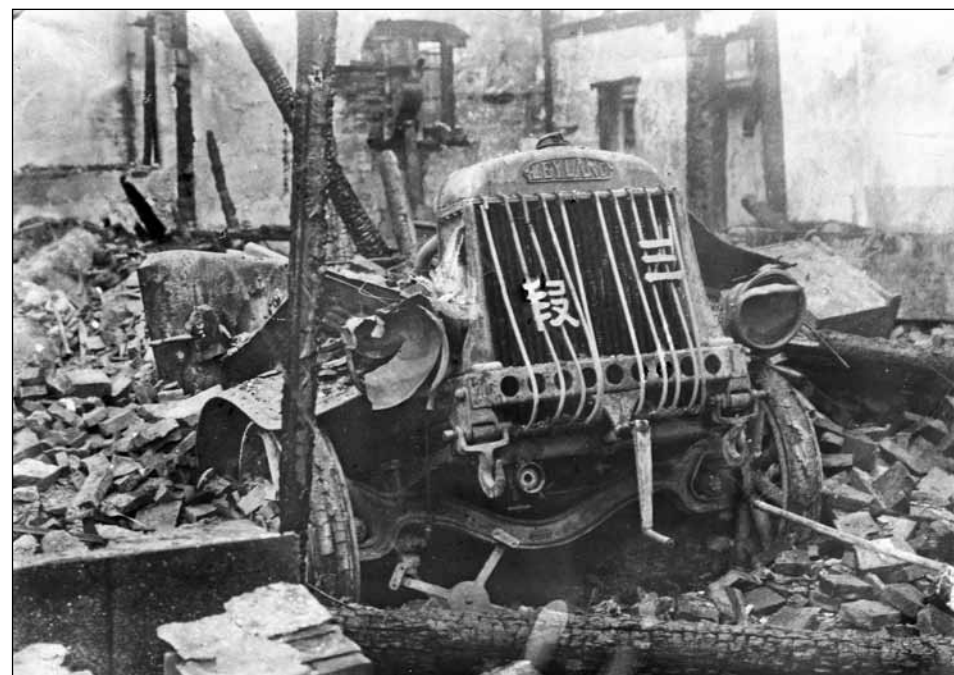




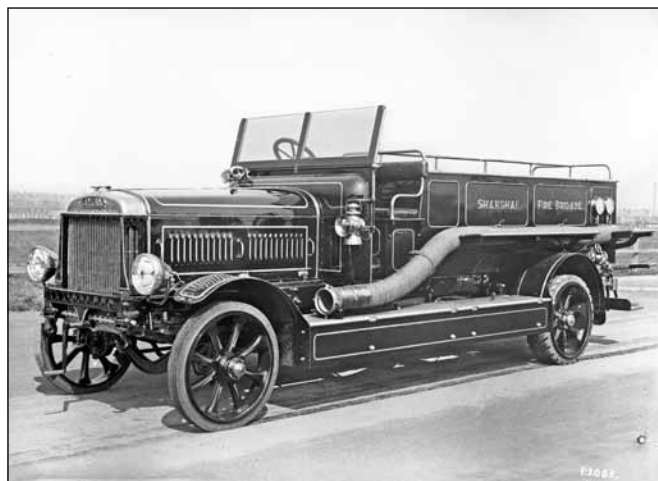
*The chassis of the F.E.3 prior to bodying. What a huge engine - with the power of 80 horses! Note the strange arrangement of the exhaust-heated inlet manifold, presumably to help to ignite the Kerosine - I'll bet it did not run very well on that fuel! Note the damaged tyres, presumably used for testing (BCVMT L002037/38)*

Brigade records show 8 Leylands as having been delivered by December 1931, six being 4-cyl and two 6-cyl types, sadly our archive records show only four of the 4-cyl along with the two 6-cyl models. Based upon my research the missing machines were probably delivered in 1923 and 1926. We do know both were fitted with a 500gpm pumps and they were probably therefore both model F.E.2. Does any reader have any further details?

The 4-cyl models received Fire Brigade Fleet numbers 30-35 and the 6-cyls 37-38. In 1932/33 however, these were then changed to 31-36 and 38-39 respectively.



*The remains of the Chapei Fire Brigade F.E.3 80hp pump destroyed during riots in May 1927 when Chang Kai Shek's forces arrived in the city from Nanking. The characters on the radiator say 'No.3 District'. There is no record of a Leyland being lost in that year or indeed in any other. The damage is so severe it would have been an impossible job for the workshops to have rebuilt this appliance - If today, perhaps a good restoration project?! (BCVMT L004325)*



The next delivery we do know was an F.E.2 model, chassis no 11727 having a 55hp U series engine with the standard Braidwood body and 500gpm Rees-Roturbo pump. This was completed in October 1924 and delivered in the following year.

The Municipal Report for 1924 records 'two Standard 500gpm Leyland pumps were fitted in workshops with 55ft escape ladders and placed on the run at Yang Zepoo on 20th May and at Bubbling Well on 9th Dec'

I would mention for the sake of completeness, that an F.E.3 Leyland Braidwood pump was also supplied new in 1923 to the Chapei Fire Brigade in Shanghai, this being a separate Chinese run local authority. A second 1,000 gpm Leyland F.E.3, the 8th Leyland to be ordered by Shanghai, had chassis no 11784 and a U6 engine of 80hp. This was built in December 1926 and delivered in February of the following year, becoming Fleet No.38. It could have been supplied as a chassis and scuttle only, as the pump unit on No.38 (later numbered 39) is recorded as a Tamini rather than the Rees-Roturbo model fitted on all the others. This was fitted in the workshops in 1929 along with a trunnion and head gear for a wheeled escape. It is also possible a Rees-Roturbo pump was supplied but damaged beyond repair.

The population of the International Settlement was

by now around 250,000 and the city continued to prosper. It was the world's fifth largest port and received over 50% of China's total foreign imports. Whilst the settlement had seen the chaos which engulfed much of China in the 1920s and 1930s, first the War Lords and then Civil War resulted in the death of millions. The Japanese annexation of Manchuria in 1931 also had set the tone for a more ominous future.

The Brigade had by now expanded to five main stations including the exotic sounding Bubbling Well Road and Yang Tsezepoo along with five sub-stations. Its fleet of pumps in addition to its Leylands consisted of 3 Dennis and 3 Merryweather machines along with 7 Cadillacs, 2 Studebakers and over a dozen Fiats fitted with Tamini pumps.

In 1932 Japan, following a report that five Japanese monks had been attacked as they were leaving the International Settlement, landed 70,000 marines and troops in the native areas of Shanghai and attacked the Chinese troops there. Chapei (now Zhubei), an area adjoining the Settlement was badly damaged and aircraft bombed refugee camps, some 600,000 people being made homeless, a taste of things to come. A Peace Treaty was concluded in May of that year.

Against the likelihood of further Japanese attacks the Municipality again expanded its Brigade acquiring a ninth Leyland appliance in 1933. This was a former Standard 500gal FE.U4 (chassis 11637) originally delivered to Lever Bros (see article on Port Sunlight Brigade's Leylands in Torque No.72). It was new in 1921, registered **CM 2142**, and was taken in part exchange for the LTB1 Lioness demonstrator, **TF 2880**. It was then re-conditioned to F.E.2 standard in 1931 and re-registered **LG 6168**, before being sold-on to Shanghai in December 1933. This was now on pneumatics. In 1935 the workshops recorded that 'wheels on five Leylands were converted from solid tyres to giant pneumatic tyres and equipment insert was fitted.'

The year 1937 would see traumatic times in Shanghai. Japanese and Chinese armies fought pitched



*Shanghai's final Leyland was the ex-Lever Brothers FE.U4 seen here in 1933, having been modified by Leyland Motors and on pneumatics (BCVMT L013700)*

battles around the Settlement, whose population increased tenfold to over 2.5m due to a massive influx of refugees. Chapei was largely destroyed after the Chinese themselves set it on-fire. Air raids caused mass casualties, the Chief Officers report details that 2,106 deaths had occurred in the year due to fires and bombing, of these on 14th August when two bombs hit Yu Ya Chi Rd in the French Concession which was crowded with refugees. The following year when there was relative calm would see just 51 deaths. Through all this the Brigade was involved in the mayhem, even having two of its stations Hongkew and Woosung Rd damaged and evacuated while Wayside and Point sub-stations were destroyed by shellfire. Insurance estimates of the damage in the settlement during 1937 were \$7.85m, compared to 1929 losses of \$590,000.

The Brigades Annual Report noted 'Leyland fire engines, with 500 gallons-per-minute capacity pumps, proved the most effective machine for dealing with fires during air raids and others in or near the 'war zone,' as these were found not only to give ample pressure and volume of water, but to be rugged in construction and capable of continuous hard usage. Pumps of smaller capacity would have been inadequate as the majority of the fires (and particularly those caused by incendiary bombs) had spread extensively by the time the Brigade reached them; they therefore called for strong jets and large volumes of water.' Despite the problems during the year the workshop records state that 'the wheels of another one of the Leylands were converted from solid to giant pneumatic tyres, also four Leylands were fitted with self-starters.'

The International Settlement Brigade did not cease to exist in December 1941 when Japan occupied the area, but thereafter the Japanese Military provided the Senior Officers for the Brigade and 6 station Officers were later drafted-in from the Tokyo Police Metropolitan Fire Brigade. The Europeans had been interned or, as the annual report states, had 'failed to return from long leave overseas', hardly surprising in the circumstances! The City was liberated in late 1945 and suffered under another civil war to become part of the new People's Republic of China. Several of the Leyland machines remained in use well into the 1960s, in fact, some Leylands were said to be still in use in 1984! It seems sadly none was preserved.

#### **Acknowledgements:**

*Merseyside Fire & Rescue Service Heritage and Education Centre archive*

*Leyland Society archive*

*'The Last Empress' by Hannah Pakula published by Phoenix*

*Annual Reports of the Municipal Council of Shanghai*





## GAIRN TERRACE - LEYLAND BODY REBUILDER

By Allan T Condie

With the rapid growth of the Alexander Empire in the 1930s operations were organised into three areas:

- Northern Area whose Workshops were at Gairn Terrace in Aberdeen,
- Fife Area with Workshops at Tiel Road and Gallatown in Kirkcaldy, and
- Southern Area with Workshops at Brown Street Camelon.

Lack of space at Brown Street meant that the Paint Shop was located at Larbert Road Depot. There was also the Coachbuilding facility at Drip Road, Stirling, those premises concentrating on building new bodies although some new bodies were also assembled at Brown Street, using components from the timber and joinery department in the old tram sheds at Causewayhead, which also supplied all the wooden components to Drip Road. With excellent overhaul facilities available, the acquisition of second-hand double-deck vehicles to increase capacity on busy routes was an economic proposition. Facilities at Gairn Terrace were expanded

*Top - Titan TD4, R121, finished its working life at Milngavie. It is seen in Buchanan Street, Glasgow. The rebuilding resulted in a body more like the early post-war Alexander design.*

in the mid-1930s and the body repair facility there was able to undertake extensive body overhauls.

The first evidence of this activity came with the acquisition by Alexanders of a number of ex-Wallasey Corporation Titan TD1s with open staircases in 1936 and 1937. These were sent to Gairn Terrace and given full body overhauls which included conversion to enclosed staircase. The result was a distinctive rear end style that marked the vehicles dealt with in Aberdeen from other conversions. *(See also Torque No.55, pages14-17)*



*A poor photo of R67 at Gairn Terrace. The rebuilds enclosing the open staircase utilised the original rear dome.*



*R46, WG 3380, in Dundee showing the initial rebuilding evident with the wide pillar behind the cab door.*



*R48 after rebuilding and transfer from Perth to Alloa Depot. Again, the wide pillar behind the driver's door can be seen and the application of sliding vents.*

From then to the post-war period Gairn Terrace had been involved mainly with normal body overhauls which made no major changes to the appearance of the vehicles, but to tell the full story we have to go back in time. In 1935, Alexander received six Leyland Titan TD4 double deckers with the 'vee front' design of metal framed body (R44-49, **WG 3378-83**). As is well known, these bodies gave considerable trouble and had either to be rebuilt or in some cases Leyland provided new bodies to the Bailey design. This design superseded the 'vee front' after Colin Bailey joined Leyland from MCCW and produced a most successful product. The bodies on the six Alexander examples had to be rectified, which in the initial stages involved the rebuilding of the front bulkhead and stiffening the frame in other locations unseen to the naked eye. Most noticeable was a wider pillar just behind the driver's door on the offside and on the outside of the front bulkhead on the nearside.

Further rectification was found to be necessary bearing in mind that under normal circumstances the six would have required renewal of their Certificates of Fitness in 1940 and again in 1945. The suspension of this requirement in wartime meant that by 1946, when CoFs were reintroduced, the vehicles would require further work.

All three Alexander body repair facilities had access to Drip Road and Causewayhead for components and, when it came to dealing with heavy overhauls, items like roof domes, window pans, and sliding vents could be sourced. What appeared to be the first major rebuild by Gairn Terrace was that of the body on R29, a Titan TD2 dating from 1932. This vehicle had been involved in an overturning accident on the Deeside Road in the 1930s when the body was badly damaged, but repaired in its original style. An exact date for this is not known but it had to deal with again sometime after 1946. How much of the original body was retained is again not clear but six-bay construction was evident. The rebuilding may have been done as an



*Leyland Titan TD2, R29, WG 772, lies on its side on the Deeside Road*



*R29 with its 'new' body outside Gairn Terrace.*

exercise to ascertain if it was worth extending the lives of these vehicles particularly as they had already been fitted with oil engines in the mid 1930s.

Further evidence of activity at Gairn Terrace in the late 1940s arrived when three of the 1935 TD4s appeared, taking on the appearance of later bodies. Gone was the 'vee front' and, apart from the six-bay construction, the bodies took on the shape of post-war Alexander double-deck bodies which of course were very much Leyland in design.





R47 outside the City Churches in Dundee. The rebuild was a strange mixture of Leyland and Alexander body details.

Not content with those rebuilds, attention was then focussed on the 1936 TD4s which had a hard life on the Culter-Dyce service. R119-121, WG 4473/44, 4923, were stripped to the bare frames and rebuilt with new Simplastic window pans, new front and rear domes, and new cab fronts. The result was a strange amalgam of pre-war Leyland and post-war Alexander styles. Two ex-Sutherland TD5s, R663/64, AV 9962/63, with platform doors were also rebuilt with Simplastic pans (see page 35).

The Northern area received two ex-Plymouth Corporation Weymann bodied TD4s, R549/50 in 1945. R549 was withdrawn in 1955 without major rebuilding but R550 was subjected to the Gairn Terrace treatment and came out looking like a Weymann shaped Leyland body!

The use of Simplastic window pans and glazing was not confined to Gairn Terrace, as both Brown Street and Gallatown rebuilt TD4 Leyland bodies with these to a greater and lesser degree. Alexander's fleet was the largest provincial one in the United Kingdom vying with Midland Red of course, but in Alexander's case one could almost say that every vehicle was slightly different!

*(All photographs from Allan Condie's collection except where stated otherwise. Some of these are not high quality but are very necessary to tell the story.)*



R147 outside Market Street Garage in Dunfermline has a half-and-half body overhaul. The top deck has sliding vents and windows set in Simplastic pans whilst the lower deck retains half drops and original glazing. This work was carried out at the Fife area body shop based at the old Kirkcaldy Corporation Tram Depot at Gallatown.



R550 at Stonehaven as it first entered service with Alexander. The initial preparation for service with its new owner involved some bodywork repairs, a new destination layout, and fitting of sliding vents.



R550, JY 6737, spent most of its life at Stonehaven and is seen here in its rebuilt state.



AV 9963 when new. The oval window by the offside emergency exit can just be seen.

(BCVMT L021000)



Ex-James Sutherland R663, after receiving the Gairn Terrace Treatment.



*'Bisonomics' – This Leyland Bison 6x4 24 tonne chassis was probably a Motor Show exhibit as it carries the colour scheme used for one of the shows in the 1970s. It would have been powered by a 500 Series engine and has been fitted with Edbro RLT Series hook loader equipment. After each Motor Show, exhibits often joined the official demonstration fleet and many retained their show livery.*

## LEYLAND & EDBRO SKIP & HOOK LOADERS Working in the UK Waste Disposal Industry in the 1970s

**Timothy Byrne**, of Timothy Byrne Waste Management Consultancy, has kindly sent us these four photographs. He tells us that Edbro and Leyland Trucks were at the forefront of supplying skip and hook loaders for the transport of dry waste across the UK in the 1970s period.



*A 1970s Leyland Clydesdale 4x2 16 tonne gross weight chassis fitted with Edbro BLB Series skip loading equipment. The Clydesdale was derived from the original BMC commercial vehicle range which was integrated into the Leyland model line-up following the merger between the Leyland Motor Corporation and BMC in 1968. Using the G-Cab, it was powered by the Leyland 400 engine and assembled at the Bathgate factory.*



*A 500 engined Leyland Octopus 8x4 30 tonne chassis fitted with an Edbro 40 cubic yard enclosed roll-on-off waste compaction container. The Octopus was a popular model with waste disposal companies due to their strong chassis design and relatively light weight, giving maximum payload within axle weight limits. It has both Leyland and Edbro lettering on the cab door so is clearly a demonstration chassis.*



*Another Leyland Octopus chassis but this one is demonstrating the capability of the Edbro RLT Series hook loader equipment. This chassis was another Motor Show Exhibit but a different year from the Bison. A metal flake paint was applied to the front panel and the cab stripes also had a metallic finish. Judging by the cleanliness of the wheels on the hook loader, this picture could have been taken just after painting and prior to the final show preparation.*



## LETTERS ETC.

### Post War Leyland DD Bodies – from Mike Fenton

One brief comment on the very interesting and informative Leyland dd bodies piece in Torque No.81 by John Howie. The date of registration of the new Samlesbury Engineering Ltd business was 16th May 1947 - formed to take over the bodybuilding activities (only) of Lancashire Aircraft. Although no legal eagle, my understanding is that all of Lancashire Aircraft's in-build bodies would then have become the property of Samlesbury - and probably invoiced as such from that date.

**John Jones** adds - many thanks for Torque No.81 – Superb! Can I just offer up a couple of comments on the Postwar Double Deck Body article. A splendid picture of West Mon 11, **LWO 323**, but that was chassis 531525 and new in 8/53 and therefore not in contention for last lowbridge to enter service. The contenders are (as stated in the article);

– 541228, West Mon 12, **MWO 389**, which, according to the West Mon GM's report dated 14/10/54, was 'licensed 1/10/54 and now in service'. For some reason the article records it as not entering service until December 1954.

– 541310, Caerphilly UDC 26, **OTG 526**, which the PSV Circle's PG9 history simply records as new 10/54 (the article states September). It would appear that the two buses entered service within days of each other and I suspect we will never know which took the honours! Finally, in that momentous month, Merthyr Tydfil also acquired the ex-demonstrator 'Hybridge' **TTC 170** in October 1954 (not December).

### Some afterthoughts on Leyland Post-War double-deck bodies from Allan T Condie

**CVA 430** – The ventilation system for the upper deck fitted to this body was based on that used by Alexander on its wartime double deck bodies used in the single to double-deck conversion programme.

**Pre-war to Post-war** – The basic post-war body was structurally similar to the pre-war one, such alterations that were made were to suit the post-war PD1 chassis. To accommodate the longer bonnet of the PD chassis the front bulkhead was moved back

2 inches and the bulkhead inset by the same amount – a double pillar being employed at the front of the lower saloon, resulting in the front side windows being shorter. The adoption of a narrow rear window on the lower deck was standardisation of window pan size. Alexander had applied the same practice, often when reconditioning pre-war bodies.

**Ventilators on the front bulkhead** – The round vents were called Anemostats and were another



(Roy Marshall – The Bus Archive)



Apparently this demonstrator, built in May 1954, carried an all-red livery. Does any reader have a photograph of TTC 170 in this red livery?

(Mike Sutcliffe collection)

Sadly, I was not quite two at the time and missed all the fun!

feature that originated with Alexander, who used them initially on their single deck bodies as outlets from the Clayton Canopy Heater fitted to the TS8 Special bodies. The system proved inefficient and the heater outlet was altered into a trunking down the centre pillar of the front bulkhead. Post-war Alexander bodies also had them, in fact apart from certain obvious details, what came out of Drip Road was very much a Leyland body.

**Opening Windows** – Alexander pioneered the use of sliding vents in Leyland bodies that were supplied in 1941/42 as shells and finished off at Drip Road. The lack of opening windows on the offside upper deck of lowbridge bodies was a feature dating back to the 1930s, the Scottish Companies pursuing this practice.

**Platform Doors** – The two leaf manual pattern was supplied by Redro of Beverley (part of Deans & Lightalloys), and the four leaf power operated pattern by G. D. Peters. A number of bodies were built without doors and converted later – examples were the PD2/12s for Stratford Blue. Redro also provided kits

### London Brick Leyland Cubs – from John Burton

On the back cover of Torque No.81 was a picture of three London Brick Co Leyland Cubs. The method of brick manufacture by the company involved pressing and repressing a brick. The machines used were known colloquially as 'four press' machines and the company adopted a slightly classical trade name of PHORPRES BRICKS (PHOR PRES). The Cubs

to convert existing open platform bodies.

**Saloon lights** – The fitting of these in the roof rather than in the cove panels is difficult to explain, however one notes that Dublin United Transport/CIE followed the same practice on the Leyland derived bodies built at Spa Road. Now, one George Bissett, who left Alexanders in 1936 to become Rolling Stock Engineer with DUT, and returned to Alexanders during WWII, may have had some influence on this. He was responsible for the wartime double from single deck conversions, the 1945 single deck service bus bodies built using up Leyland style parts, and other details. He does not seem to feature in the Alexander Coachbuilding operation after it was sold off to Walter Junior in 1948. The appointment of William Taggart as Manager also saw the end of the Leyland 'look-alike' double-deckers and the resultant four bay design had certain affinity to what Northern Counties were also producing from whence Taggart had come.

were permitted to run at 30mph due to the light load and their role was restricted to deliveries within a 30 mile radius from their base (delivering to builders' merchants). Many were fitted with diesel engines within two years of purchase and lasted to the 1950s. Those retaining petrol engines were disposed of by the end of the 1930s.

## COVER PICTURES

### Front Cover

The Leyland Buffalo TQ1 was a short-lived model in the early 1930s, built as a normal control version of the forward control Leyland Bull TSQ (the 'S' standing for side-type). The 'Q' stood for 6-ton range, this letter having been in use since 1919. The reason for the Buffalo's demise was that the Beaver TC range ('C' originally meaning 3-ton), was progressively up-graded, first-of-all ousting the 4 Ton Bison TG, then the Buffalo, to become Leyland's Heavy Duty Two-axle Goods Chassis for the second half of the 1930s. **TF 2623** was originally built as a demonstrator, chassis 66363, being registered around August 1930. However, by September 1931 when it was photographed here, it had been sold to HW Ward & Co Ltd, Selly Oak, Birmingham. (BCVMT L010070)

### Back Cover – upper

Ainscough of Burscough was a loyal Leyland customer and purchased this Leyland Hippo TSW8T, chassis 7742, in August 1935. The final 'T' in the designation stood for Trailing rear axle (as opposed to

a 'D' for Driven axle). It was shod with Triple Stud tyres on the front with single 'balloons' on the back and stands outside The Leyland Garage Co's premises.

(BCVMT L016325)

### Back Cover – lower

Parked in Thurston Road outside the Canteen building (by now including the Spares & Service Departments), with the entrance to the North Works in the distance, is a two year old Tiger TS4 coach. It had chassis 3127, with Spicer's C30R body, and belonged to the Southport & Birkdale Motor & Carriage Co Ltd (Gore's), Southport, registered **WM 8918**. The coach ran with its 'Duple influenced' Spicer body until c1948, when this was replaced by a new Santus C33F body, still with its original owner. It continued with Gore's until being last licensed in October 1954. The occasion for this picture was a visit to the works by the Commercial Motor Users' Association, in September 1935. Is any reader able to find a photograph of this Tiger TS4 with its Santus body? - or any other photos of Gore's coaches. (BCVMT L016513)



# TAILPIECE

## SIX WHEELS ON MY WAGGON !



At the beginning of 1935, Bury Corporation took delivery of five English Electric bodied Leyland TT2 Titans. They were purchased to replace trams on the Bury to Jericho route, this being converted to motor bus operation on 2<sup>nd</sup> January. Bury kept them for twelve years, the usual life expectancy for a Bury bus at the time. Here are interior views of the lower saloon showing the seating arrangement. (BCVMT L018091)



### LEYLAND TORQUE

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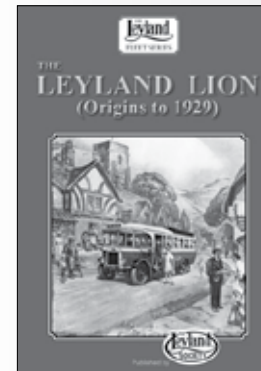
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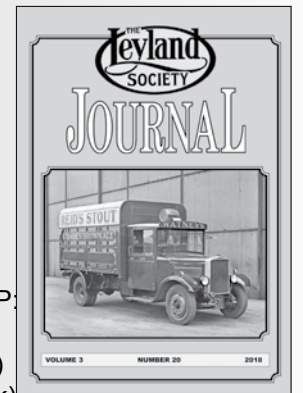
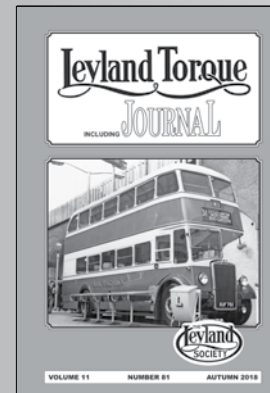
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PHOTOGRAPHED IN LEYLAND IN 1935

