

Leyland Torque

INCLUDING JOURNAL



VOLUME 11

NUMBER 83

SPRING 2019



Hon. PRESIDENT

Brennan G Gourdie
Managing Director, Leyland Trucks

Hon. VICE PRESIDENT

Peter G. Jukes
Operations Director, Leyland Trucks

Hon. CHAIRMAN,
TREASURER and
EVENT CO-ORDINATOR

Gary Dwyer, 8 St Mary's Close, West St.
Sompting, Lancing, W. Sussex, BN15 0AF

SECRETARY and
MAGAZINES EDITOR

Mike A. Sutcliffe, MBE, FCA, 'Valley Forge'
213 Castle Hill Road, Totternhoe, Dunstable,
Beds. LU6 2DA

PUBLICITY OFFICER

John Howie, 37 Balcombe Gardens, Horley,
Surrey, RH6 9BY

MEMBERSHIP SECRETARY
(ormiston92@btinternet.com)

John Ormiston, Appletree Cottage, Lower Chase
Road, Swanmore, Southampton, SO32 2PB

CHASSIS RECORDS,
TECHNICAL & SPARES

Don Hilton, 79 Waterdell, Leighton Buzzard,
Beds. LU7 3PL

WEBMASTER

Gerry Tormey, Contact via Richard Lukey

SOCIAL MEDIA MANAGER,
WEBSITE CO-ORDINATOR
& SALES

Richard Lukey, Marrick, Thorpe Bassett, Malton,
North Yorkshire, YO17 8LU



@TheLeylandSoc



@TheLeylandSoc

MEMBERSHIP

Subscription levels are £27 per annum, £33 for EEC members, £38 (in Sterling) for membership outside the EEC. Anyone joining after 1st April and before 31st July will have their membership carried over to the next 31st July, ie up to 16 months. This is good value for money and new members are welcomed. Application forms are available from the Membership Secretary or via the Website www.leylandsociety.co.uk

Overseas subscriptions and sales using PAYPAL

Please note that our PayPal address is now theleylandsocietyltd@gmail.com.

Leyland Torque

Published four times per year by the Leyland Society Ltd.
213 Castle Hill Road, Totternhoe, Dunstable, Beds LU6 2DA

Editor : Mike A. Sutcliffe, MBE

email: sutcliffes@leylandman.co.uk

EDITORIAL

This is now the third issue of our A4 Leyland Torque (including the Journal) and the positive comments from readers have been absolutely brilliant, thank you. Leyland Motors were into so many diverse products that we have a huge number of different topics to cover and I try to keep a balance so as satisfy as many Leyland enthusiasts as possible. It you think I've left out any topics please do let me know – better still, write something about the topic for inclusion in Torque. Your comments, ideally by email if you can, are always very welcome; my continued objective is to attain the highest possible standards, so as to put Leyland Torque among the best of any magazines produced by any one-marque society (including the bigger car clubs!)

Michael Plunkett rightly reminded me that we've not covered the roadside Leyland Clocks in Torque or the Journal. They were pretty-well described in a booklet produced by Roslyn Thistlewood when she was the Curator at the BCVM in 1996 but that's a long time ago and the booklets have been out of print for some time. Twenty three years ago, the photographic reproduction

wasn't all that good so we decided to update the situation – to give a summary of all the known Leyland Clocks with their whereabouts and to ask for reports and information on their current locations and condition. If you know anything about any of them – where they are, do they work, an up-to-date photograph, your inputs would be welcome.

We still struggle to find new topics for Food for Thought and would welcome more queries please. Having said that, a few of the recent ones have grown substantially and lead to larger articles in Torque, which is very good news. Odd Bodies continues to be very popular and there are plenty of oddities yet to come.

Leyland PSV Photo Index – Following Peter Greaves' illness John Bennett has kindly offered to update the photo index on a temporary basis – thank you John. The index currently covers 82 issues of Torque and all 20 of the Journal – a massive 3521 PSV photos. This is in Excel format and anyone wanting a copy should contact me.

Mike

Editor

CONTENTS

1 Editorial & Index	28 Leyland Clocks For All Time
2 Society Matters	32 Chase Van
4 BCVM Update	34 Groningen Tiger Cub
4 What Leyland's Doing	35 Another Face, 13
5 DAF Trucks	36 Long Term ex-Employee – Rodney Wright
6 Food for Thought	38 Letters
10 L60 Multi-Fuel Opposed-Piston Engine, Part 4	39 Cover Captions
20 Centre Spread – Greenall Whitley	40 Tailpiece
22 Odd Bodies	

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

Registered Charity No. 1137856

21st LEYLAND SOCIETY GATHERING, 7th JULY 2019

As we announced in the last issue of Leyland Society Torque, the date for our 2019 Gathering has been confirmed as Sunday 7th July. The event will be held at the British Commercial Vehicle Museum in Leyland which has completed a major refurbishment with assistance from a Heritage Lottery Grant.

We have already received a number of vehicle entries and we thank the owners for their early commitment to our event. Another entry form is included with this issue of Torque and we would appreciate vehicle entries as soon as possible so we have a good idea of the number of vehicles to expect. We are again welcoming vehicles from all Leyland Group manufacturers (eg AEC, Albion, BMC, Bristol, Guy, Scammell) although preference will be given to Leyland manufactured or designed models. For those travelling longer distances the Museum have offered overnight parking in their courtyard on Saturday and Sunday. Overnight 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. As an additional attraction, we have negotiated a discount on the normal entry price to the Museum on the day and we will publish details of how to obtain the special price in the next issue of Torque.

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 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. Please include up to date contact details and e-mail address on your entry form so that we are able to contact you in the event of any last-minute changes. We guarantee that e-mail addresses provided will only be used in relation to the Gathering and not for any other purpose.

AN ELDERLY LION IS FOUND

A surprising recent find has been this Leyland bodied Lion LT5, chassis no.346, dating from 1931. Richard Clegg has kindly sent us this photo of **VH 4000** which was new to County Motors (Lepton) Ltd in December 1931, becoming no.41 in their fleet. It was one of four Lions purchased in 1931, all of which were requisitioned by the War Department in September 1939. Three were returned in Oct/Nov 1941 and

possibly re-entered service for a short time. No.41 was withdrawn in 1942 and by 8/48 was owned by CS Flint, Carr Vale, being withdrawn in 6/50. It then went to H Blackburn, Leeds and became a static caravan.

It is hoped that the Lion can be rescued and restored, but an engine, gearbox and controls will be needed. It is not known at this stage whether the back axle is complete with diff.



The Lion in its recent resting place, still with air in the tyres



Here's a picture of one of the four LT5 Lions when new. Note the 'Barker Double-dipping' headlamps, no doubt influenced by Yorkshire Traction (BCVMT L010573)

BINDERS FOR TORQUE & JOURNAL

We are pleased to announce that we now have a supply of new A4 size binders for Leyland Torque from No.81 onwards (blue, 8 in each binder), also for Journals 1-20 (red, 8 in each binder, as before) as we

were out of stock of the latter. They are £10 each incl. P&P and can be obtained from Richard Lukey (address on the inside front cover).

We still have a small stock of the smaller

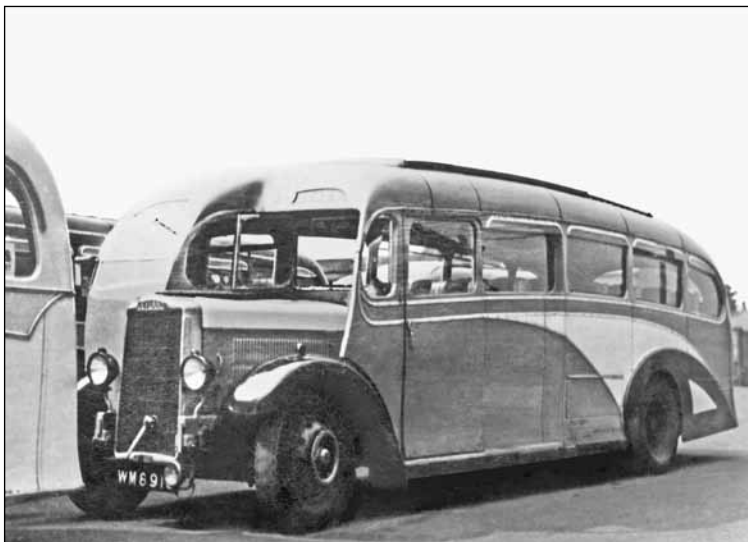
A5 Torque binders (blue, and holding 8 issues), at £8 each, so if you want to tidy up your collection while they're still available...! We have all issues going back to No.1 though some are down to single numbers. If you would like to complete your set,

please contact Mike Sutcliffe and he'll arrange a 'good deal' for you. For larger quantities, as they are so heavy due the good quality of paper, issues could be brought to Leyland on 7th July – so, here is your opportunity to stock up!

GORE'S COACHES, SOUTHPORT

On the back cover of Torque No.82 was a picture of one of the Leyland Tiger TS4 coaches, WM 8918, operated by the Southport & Birkdale Motor & Carriage Co (t/a Gore's Coaches), Southport. It was parked outside the Leyland canteen building in Thurston Road, Leyland (the road leading to the BCVM), the building then also used by the Service Department.

Gore's early 1930s Tigers had locally built bodies by Spicers and had long lives, lasting into the mid-1950s, several being rebodied by Santus around 1948. They continued to be Leyland customers, latterly with Burlingham bodies, until they succumbed to the cheaper Bedford SBs, as so many other operators did during the 1950s.



WM 8918 after having been rebodied by Santus (The Bus Archive)



The first Tiger operated by Gore's was this attractive TS1, chassis 61472, with Spicer 30 seat body, new in April 1931 (BCVMT L009246)

THE 'NEW' BCVM

The re-vitalised British Commercial Vehicle Museum, with its new roof and changed layout is now open and we're able to give you a glimpse of what it looks like inside, together with its new red white and blue

logo. The first chance that many of us will get to see it will be on the occasion of our Leyland Society Gathering on Sunday 7th July – something for all of us to look forward to.



WHAT LEYLAND'S DOING

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

A RECORD YEAR FOR LEYLAND TRUCKS

by Steve Whelan

2018 was a very busy year for the factory. We produced the highest number of trucks – 18,229 – since the global recession ten years ago, and production levels reached a new high at 88 trucks a day, or 440 per week to meet current demand from our customers. The UK and European truck markets have been fairly strong and DAF's market share in various sectors remains high, so not only have we at Leyland had a record year, but our colleagues in the Netherlands are similarly placed. 60% of all products from our factory made their way into the UK market and 40% were exported to more than 50 worldwide destinations. As well as more than 18,000 built-up units, our CKD (Complete Knock Down) department kitted, packed and shipped more than 1100 units for markets such as Taiwan and North America. So clearly everyone has been extremely busy.

But there is more to this world class manufacturing

facility than just building trucks. We go to great lengths to support our local and wider community. In 2018 we hosted 233 visits that totalled more than 3000 visitors. The largest proportion of this number were DAF customers, as we try to engage with our customers at every opportunity, and for their part our customers are fascinated with the passion and enthusiasm that our employees show when producing their trucks, and they are equally fascinated by the processes we employ.

When visiting our factory visitors get really close to the production lines, and an increasing request these days is for customers to visit while their trucks are being built. Of course we are happy to oblige (see example below). It is not only customers who visit though; we have really strong links with the education sector and schools/colleges/universities love to visit us to give their students a real life manufacturing and

engineering experience and a view as to what their futures could look like.

So, 2018 was full and exhilarating for all of us here. I wonder what I will be saying about 2019 this time next year!

Robin Easton of DAF Trucks adds:

2018 — A record year for DAF

DAF Trucks broke all records in 2018. Thanks to a historically high market share of 16.6%, DAF has grown to be Europe's second largest brand in the heavy truck (16+ tonnes) segment. DAF is the European market leader in the important tractor-unit segment, with a market share of no less than 19.8%.

The European market for trucks of 16+ tonnes amounted to almost 319,000 trucks in 2018 compared to 306,000 in 2017. "The European economy has been very strong over the past year. This resulted in a high demand for transportation with a corresponding requirement for trucks", says Harry Wolters, President DAF Trucks.

Market leader in seven European countries

As in previous years, DAF was the market leader in the heavy segment in 2018 in the Netherlands (32.0%), the United Kingdom (26.5%), Poland (23.2%) and Hungary (32.6%). The Dutch truck manufacturer was also the market leader in Belgium (22.1%), Bulgaria (19.9%) and the Czech Republic (19.5%). In Germany—Europe's largest truck market—DAF was once again the largest imported brand, with a market share of 12.3%.

Stable market share in the 6–16-tonnes segment

The total European market for light trucks (6–16 tonnes) decreased slightly from 52,500 units in 2017 to just under 52,000 in 2018. DAF held a 9.0% market share in this segment. DAF is the market leader in the light trucks class in both the United Kingdom (32.0%) and in Ireland (18.2%).

Further growth outside the European Union

DAF sold 8,700 trucks outside the European Union. Their market leadership continued in Taiwan with the launch of the new generation of DAF Euro 6 trucks. Market share grew in Israel, Belarus and South Africa and DAF achieved record sales in Indonesia. The DAF CF vehicle began local assembly at the PACCAR Australia factory. DAF sold over 3,500 PACCAR engines to leading manufacturers of coaches, buses and special vehicles as well as expanding engine sales into Singapore and Myanmar.



Customer Daniel C Lote and family with their first ever DAF Truck – XF530, also with Liam Smith of Greenhous DAF and James Stewart of DAF Trucks UK

“DAF wants to continue to grow”

“2018 has seen us lay a fantastic foundation for future growth in conjunction with our professional dealers”, says Richard Zink, member of the Board of Management with responsibility for Marketing and Sales. “The market places great value on the reliability, low operating costs and high levels of driver comfort of our trucks. This means that we have been able to bring a lot of new customers on board over the last year—from small businesses to large international fleets—thereby increasing our market share from 15.3% to 16.6%. We are extremely proud of the fact that DAF is the European market leader in tractor units, a position which we are also aspiring to achieve with our comprehensive range of rigids and vocational trucks, as we believe that we have the perfect solution for every transport requirement.”

Record production

To meet the high demand for its trucks, DAF produced a record number of more than 67,000 light, medium and heavy trucks in 2018, an increase of 10.1% compared to the previous year. DAF estimates that the market for heavy trucks will be strong again in 2019, at a volume of between 290,000 and 320,000 units.

The UK Sales Offices have Moved

Please note that the UK Sales Offices of DAF have moved from Thame, to a brand-new facility in Haddenham (3 miles from Thame). The new address is:

DAF Trucks Ltd
Haddenham Business Park
Pegasus Way
Haddenham
HP17 8LJ

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.)

230. Leyland bus body designation.

Bruce MacPhee correctly points out that the bodies we now call ‘final design’ wouldn’t have been known as that at the time (unless someone had a crystal ball!). The only references found so far in GM’s reports are to ‘27ft. double-deckers’. **Mike Sutcliffe** adds – It was members of The Leyland Society who came up with this casual description to avoid more people falling into the trap of erroneously calling them ‘Farington’! From the early 1930s, Leyland called

all of the highbridge bodies, the ‘Hybridge’. The lowbridge bodies from the TD1 to early TD3s were called the ‘Titan’ body, thereafter just being referred to as lowbridge, with no name as such. We casually refer to the ‘V-front’ metal-framed bodies, which were replaced by the ‘Bailey’ bodies, so as to distinguish between them and the only other official Leyland name which was the ‘Farington’, for those few bodies which were just that.

299. New Zealand Leyland Leopard car transporters



Robin Barnes confirms that the two Leopards were indeed subsequently rebodied as buses. This photograph was given to him by the late Dudley Kirker, a renowned and very generous NZ enthusiast. The caption on the rear reads “**HM 4303 (its registration)** – 1966 Leyland Leopard/Hawke, Leopard Coachlines No.32, taken at their Darfield depot after re-power with MAN engine. Originally a car transporter, 01.06.85.”

With apologies for the quality of the scan, which we’re lucky to find (D Kirker)

302. Leyland Titan PD1/1.

Bruce MacPhee offers the following comments, after reading the relevant General Manager’s reports: in November 1945, design work commenced on a torsion bar stabiliser but it was not until June 1947 that a prototype was fitted to the demonstration PD2, then in service with Lancashire United; the first fitting of a stabiliser to a production chassis was in February 1948; City Coach Co’s PD1s pre-date this, so it is clear that they had their stabilisers retro-fitted and, therefore, **Alan Townsin’s** assertion that there probably never was a type PD1/1 remains unchallenged.

Although the stabiliser eventually replaced rear shock absorbers, it did a different job. Actually, the term ‘shock absorber’ is a bit of a misnomer; springs absorb the shocks and shock absorbers damp the oscillations of the springs. The stabiliser does what it says; it stabilises the chassis frame in relation to the back axle, preventing body-roll. Early PD1s, particularly those with non-Leyland bodies, had difficulty passing the tilt-test, and the stabiliser helped overcome this. Initially, the stabiliser was fitted in addition to shock absorbers but it was later found that it made them superfluous.

309. Mystery Australian Double-Decker.

Allan Condie states that most Australian double-deckers had a 17ft 6in wheelbase and that the centre entrance double decker may have been one of three Titan TD7 chassis numbers 304455 -57, all of which were operated by New South Wales. He also

makes some general points about supplies of UK manufactured chassis to the Australian market and these are shown in the Food for Thought appendix.

In the book ‘The Australian Double-decker’ by GJ Travers, it mentions the Rover centre entrance bus



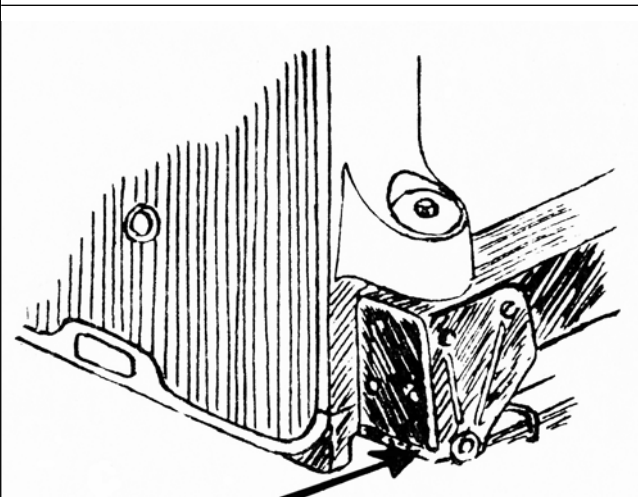
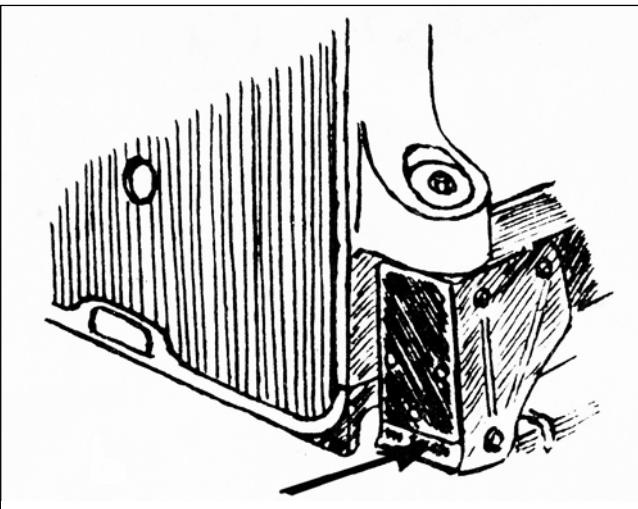
m/o 951, the mystery central entrance double-decker, nearing the end of its life and looking rather 'down at heel', with Chapleman, Hamilton, now named 'Matilda' and no doubt still giving good service (Allan Condie collection)

as having a composite construction and it was initially inspected by DRTT engineers, the photograph in Torque No.82 being taken opposite the Ministry of Transport in Sydney outside the Conservatorium of Music.

Bob Kell responds that he has had a copy of this picture for over 30 years and passes on the information received at that time from a correspondent associated with the Hunter Transport Museum in New South Wales, Australia. This largely agrees with **John Shearman's** information and states "This is the only example of an 'MSD' (mid-stair decker) in Australia and was based on a Leyland TD5 with Syd Wood body from Sydney. It was offered to the DGT (identity unknown) who, after using it for a short time, opted for another design. Hence it was then sold to Rover Motors at Cessnock (which is about one hour from Newcastle). After many years of good service, old 'Hector', as it was then apparently called, was sold to Linsleys of Wallsend. There it worked the Wallsend to Port Waratah service for over ten years. Decay eventually took over and it was scrapped about mid-1959."

He agrees that it looks long for a TD5 but wonders whether the words 'based on' has a particular relevance? However, **Mike Sutcliffe** remains adamant that it is not a TD5, but is either a long wheelbase TD7 or a TS11 as it has the shorter dumbirons, characteristic of these models. It has a plain bonnet side (no louvres) and the autovac and fuel filter beneath the bonnet (not on the bulkhead). The true identity of this bus still remains unresolved!

The differences between the TD5/TS8 and the TD7/TS11 (also TD6c) dumb-irons were described by Alan Townsin in Buses Illustrated nos.20 & 21 (in 1954/55!). Paul Williams, Manchester Museum, produced a very detailed and excellent 'Guide to Leyland TD Development and Identification' and it seems that we need to re-publicise these guides to model identification – this will follow in a forthcoming issue of Torque. In the meantime, these are scans of Alan's original drawings:



(Alan Townsin)

Upper – Models TS8 & TD5 (and LPTB's STD class TD4s) had a deeper, flat dumb-iron, almost to the bottom of the radiator.

Lower – Models TS11 & TD7 (and Birmingham TD6c), similar flat dumb-iron but much shallower, with a narrower band for the chassis number (see arrows).

Rover Motors of Cessnock

Additional information has been gleaned from the magazine mentioned in Torque No.82, including a route map of Rover services (reproduced here) operated from their Cessnock base and a picture of the operator.



Map showing routes operated by Rover Motors buses on regular and mine-shift-change schedules.

Map, showing the routes operated by Rover Motors on regular and mine-shift-change schedules in 1943



LIVE-WIRE DIRECTOR of Rover Motors Pty. Ltd. is Mr. "Rab." Lewis, who knows his extensive coal-mine bus territory almost to the last square foot.

May, 1943.

In May 1943, "Live-wire" Director of Rover Motors Pty Ltd was Mr 'Rab' Lewis, who "knew his extensive coal mine bus territory almost to the last square foot". You can just imagine his broad Australian accent!



'Frontal Attack' - Rover 18, registered m/o 701, Leyland Titan TD1 (chassis 71176) being subjected to 'emergency repairs'

John Burton expands on our information in Torque No.68, page 27, to say that Rover acquired three TD1s from DRTT Sydney in 1940 - these were the three that DRTT had acquired from South Sydney Bus Co, Mascot in 1933. They were: 71176, was m/o 1004 with DRTT no.4, new 12/29, to

Rover 11/40? reg'd m/o 701, fleet no.18; 70325 m/o 1005 DRTT 5, new 8/29, to Rover 4/40, reg'd m/o ??? fleet no,11, scrapped; 71177 m/o 1006 DRTT 6, new 12/29, to Rover 4/40? reg'd m/o 702, burnt out at depot 1941 and rebodied with a 1935 Waddington H30/26R body acquired in damaged condition formerly carried by DRTT AEC Regent 189 regd m/o 1189, re-numbered fleet no.11

(Note m/o was used for vehicles operating in the Sydney Metropolitan Area. Outside this area vehicles carried MO)

The picture at the bottom of page 9, in Torque No.82 shows 71177, after the fire and having been re-bodied with a 1935 Waddington H30/26R body, formerly carried by DRTT AEC Regent 189. By some amazing feat it has the early type radiator originally fitted to



It is thought that this is the Waddington body of DRTT AEC Regent no.189, which was damaged and sold to Rover Bus Co, being fitted to the Leyland Titan TD1, m/o 702. Note the front doorway with canvas 'door' similar to that cut into the side of Rover TD1 no.11, seen on the extreme left of the picture on page 9 of Torque No.82 (NSW PTC Archive)

the first Australian Titan, with its channel section side standards. This was originally on **m/o 402** (chassis 70584) and was later fitted to DRTT 2, **m/o 1002**. We know this because the first TD1 (70584) was the only one to have the early type 'Titan' body, with sidelights

on the corners of the canopy waist band! On the left of the same picture is Rover No.11, **m/o ???**, 70325, clearly not scrapped before 1943 and with its original Leyland body, now with a front canvas covered doorway cut into the body.

309. Appendix (Submitted by Allan Condie)

Australian legislation was more liberal than that which bus operators had to suffer in the UK pre-war and this was taken into account when Albion, Leyland and AEC provided 'export' specification chassis for this export market. The main difference was in the chassis wheelbase, for double-deckers the UK norm was 16ft 3in, but Albion supplied their SpCX19 chassis to a 17ft 6in wheelbase which allowed for a 27ft 6in long vehicle, as opposed to the 26ft limit in the UK. It would appear that AEC and Leyland followed suit and all DRTT double-deckers after No.192, apart from 467-9 and 471-3, appear to have been built to the export long wheelbase which, incidentally, was the same as that for single-deckers in the UK. I wonder if 467-9 and 471-3 were a mistake or was there another reason for the 'shorties'? Adelaide of course always used UK wheelbase chassis.

Supplies of chassis from the UK obviously dried up in 1940 and no new chassis were supplied until 1946 when the OPD1 Titans came on stream. These were not UK cast-offs as the then current UK model was the PD1 (7ft 6in wide) which had a 16ft 3in wheelbase and the 7.4 litre E.181 engine. This had been developed from that fitted to tanks during the war. PD2 production didn't start until the same time as the OPD2! The OPD1 (8ft wide) retained the pre-war 8.6 litre engine, though in its final pre-war form as fitted to the TD7 with heavy flywheel and ponderous gearchange; this was now built purely for export. The reason for using the pre-war engine was that the O.600 engine intended for the PD2 and OPD2 models was not quite ready at that stage and some operators didn't want to have to carry spares for an engine which would only be used for a short time. Albion continued to supply their SpCX19 chassis but now to 8ft width and designated SpCX19W, the post-

war ones having Albion engines. AEC came back post-war with the Regent II of which none were exported; just as well as they had the 7.7 litre engine and crash gearbox. Then came the Regent III which had the superior AEC 9.6 litre engine and pre-selector gearbox. Albion ceased passenger chassis manufacture in 1950 and therefore fell out of the game. The provision of pre-selector gearboxes in the later Leylands followed UK trends in that London Transport went for this specification on the RTW & RTL, so Leyland were forced to provide the same option on UK provincial and export chassis. Pressure from the trades unions often influenced such changes as the adoption of pre-selector and semi-automatic gearboxes.

The Daimler company made some serious mistakes in early post-war years and there were a number of rejected orders due to the wrong specification chassis being supplied (eg. CVD6 single deckers for Western SMT which should have been CVG6). Clearly what the DRTT wanted was a 17ft 6in wheelbase and they got a 16ft 3in one instead; it was no use for the standard Comeng body so it was sold on to Adelaide. There was an odd one which went to Rowles of Wollongong but that is a mystery.

It would appear from the records in the UK that Guy Motors did try and get in on the act with the Arab III which they could have supplied to the DRTT specification but no orders were placed. It was to be 1950 before UK operators could have 27ft long double-deckers.

(Our records of Leyland double-deckers [and single-deckers] going to Australia and New Zealand are far from complete and could do with a study of its own. If readers could please send details of what records they have, or could find, to the Editor, we'll see what we can put together – Ed.)

310. Titan PD2 & PD3 Synchromesh Gearboxes

Paul Banbury was talking with one of the Leicester THT members about Leyland synchromesh gearboxes and the subject came up about when Leyland removed synchromesh from second gear. He'd always understood this happened because drivers complained of difficulty engaging second gear from a standstill because the baulk-ring synchromesh responded to the slightest clutch-drag, blocking the engagement – which of course was what it was supposed to do. Somewhere, he thinks he heard that the removal of 2nd gear synchro was carried out early in the production of the PD3. Does anyone know anything definite about

this? He knows for a certainty that all Leicester's PD2s had synchromesh on second, third and fourth, having worked on these gearboxes but he'd left LCT by the time any work was required on their PD3 gearboxes.

The Leyland synchromesh was very good in operation with massive synchronizer cones which did allow unsympathetic drivers to abuse gearchanges. LCT had a number of PD2s rip prop-shafts in half with the danger of them coming through the lower deck floor and they made guards to fit round them to prevent this danger. Can anyone (Bruce?) throw some light on this subject?

THE LEYLAND L60 - PART 4

L60 Miscellany

By Bill Pitcher

Over the last three issues of the Leyland Torque and the last Journal I have attempted to tell the story of the Leyland L60 Two-Stroke Opposed Piston Multi-Fuel Engine through the use of photographs, material from 'top secret' reports, minutes from meetings, workshop manuals, technical articles and first hand information from people involved with the development of the engine. The Chieftain Tank remained in front-line service with the British Army until 1996 and served for a short time alongside its replacement the Challenger. This was a full thirty years after it first entered service, so whatever the critics might say about the Chieftain, and in particular the L60 engine, it did fulfil the rôle of Britain's main battle tank for three decades seeing service with the British Army on the Rhine (BAOR) as well as active service in the Middle East.

In these articles, readers will have noted that I've mentioned the name John Farnworth several times. I worked with John in Test Operations at Spurrier Works from 1975 to 1993 when Leyland DAF entered receivership. Fortunately we both then rose out of the ashes when a new company, Powertrain Services was formed as a result of a management buy-out, and we continued to work together until Powertrain itself was eventually taken over by the owners of the Leyland Technical Centre; that had also been the subject of a management buy-out. Eventually the engine test facilities migrated from Spurrier Works to the Technical Centre and, while I remained involved in engine testing, John went on to specialise in environmental testing. We both retired in 2018 after giving almost 100 years of service between us to 'Leyland Motors'.

I spent nearly all of my working life testing commercial engines, but John worked on the L60 engine supporting research and development activities including the Sundance Exercise. Even after production of the L60 came to an end, he continued to work on the engine providing support to the MoD before becoming responsible for overseeing the refurbishment of L60 engines for the Sultan of Oman's Armed Forces. With John's help I was able to access the archived records still held at the old Leyland Technical Centre, including the original design drawings for the engine (Leyland Motors was the Design Parent for the engine).

The previous articles have each had a specific theme but this, the last in the series, is as the title suggests, a bit of a Lancashire Hotpot and provides me with an opportunity to publish more of the photos that I discovered plus some anecdotes provided by John. I've

also included some sales and in-service information on the L60 engine, as fitted to the Chieftain used by the British Army and several overseas countries.

John visited India on five occasions in the role of trials engineer working on the Mk 11 engine (the Mk 11 engine incorporated many of the modifications resulting from the Sundance Exercise). Based at Suratgarh and working with representatives of the Indian MoD, he was involved in the trial of four engines in the Thar Desert. On one occasion whilst camping in the desert one of the Indian engineers dug a "snake pit" round John's tent for protection, to this day John doesn't know if this was a genuine precaution or a 'wind up'! Another visit coincided with his wedding anniversary and camp was set up next to a lock-keepers cottage on the Indira Ghandi Canal; the lock keeper had made a garden that was known locally as 'Little England'. To make up for John missing his wedding anniversary the engineers laid on a 'few' drinks and next morning John woke up outside with a sore head after spending the night in the garden under the stars!

On another occasion John remembers two engineers from India visiting Leyland to witness an engine rebuild. They paid particular attention to the cylinder liners and within a very short time after their return, the Indians had copied them and had begun to make their own.

L60s in service

As would be expected the biggest operator of the Chieftain tank and therefore the L60 engine was the British Army and if prototypes are included, approximately 940 main battle tanks were produced for them. In addition, there were a number of variants produced, ie. AVLB (Armoured Vehicle Launched Bridge layers), ARV (Armoured Recovery Vehicles) and CHAVRE (Chieftain Armoured Vehicle Royal Engineers). The CHAVRE was equipped with a winch, a crane and could carry several fascines (fascines are large bundles of pipes used to bridge ditches).

The Chieftain was designed, developed and built in answer to the perceived threat from the Soviet Union at the end of the Second World War and it was the British Army's main battle tank for much of the Cold War period. When not based in the UK the Chieftain saw service with various regiments serving with the BAOR in West Germany. Less well known is that the British Army also has a facility in Canada where the Chieftain regularly took part in large scale training exercises, this



A powerpack change underway, the two radiators are in the upright position to assist with removal. The lobes inside the scavenge blower can clearly be seen, in the vehicle these would be covered by the air cleaner. The powerpack is being lifted by an FV434 Armoured Recovery Vehicle, this was capable of lifting the Centurion and Chieftain engines but not the Perkins engine fitted to the Challenger. This image is from the Richard Rose collection provided courtesy of the 14th/20th King's Hussars Regiment Club website

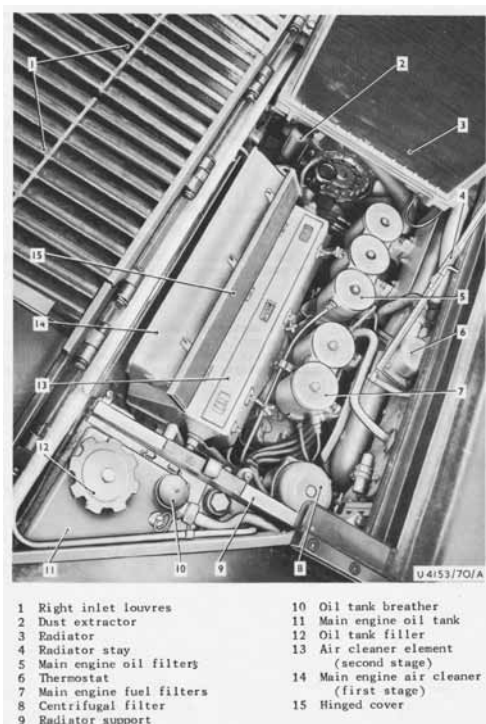
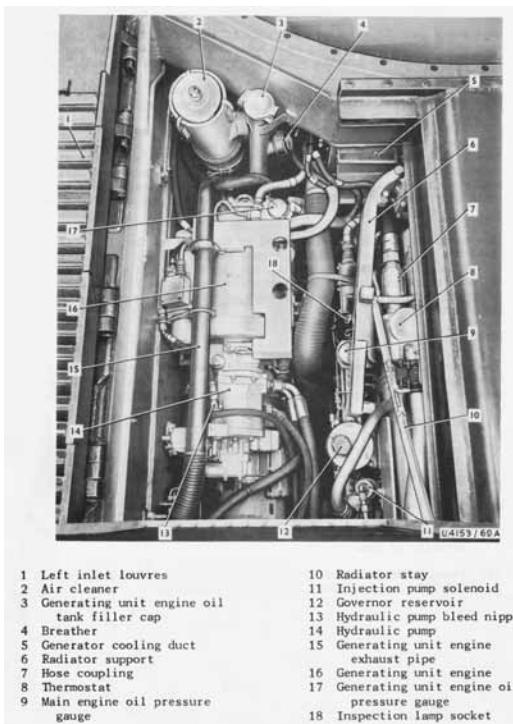
cold starting (I cannot imagine the white smoke this would have produced); the Chieftain was a notoriously cold vehicle.

Despite the Cold War lasting for forty-five years, the Chieftain, while in service with the British Army, never saw active combat in mainland Europe. However, it did see action during the first Gulf War in 1991 albeit in the guise of AVREs and AVLBs alongside the newly introduced Challenger 1 Main Battle Tank. Ironically in this role it was stated that availability rates

facility is called BATUS (British Army Training Unit Suffield) and covers approximately 670,000 acres! Although exercises are generally held between May to October, the Chieftain would at times have been subject to extreme climatic conditions which would have been a test for both the L60 and the crews, especially when

of the L60 powered support vehicles were as high as the Rolls Royce/Perkins powered Challengers.

In service the performance of the L60 engine is well documented: poor availability rates; frequent breakdowns; persistent smoke problems etc. and the REME were well versed in effecting repairs and



Two photographs taken from a Chieftain maintenance manual; they show how tight a fit in the Chieftain hull the L60 engine was. Scope for carrying out repairs with the engine in-situ were obviously limited hence the need to be able to carry out quick powerpack changes. In reality, repairs would not be practical under battle conditions anyway!

carrying out powerpack changes (powerpack changes could be carried out in a matter of a few hours). On one military forum there is a story about a Chieftain that had five powerpack changes in two weeks while on exercise. So bad did things get that after the first couple of replacements the REME stopped waiting for the radio call for assistance and began to follow the tank around!

From very early on in the Chieftain's life, the MoD and British Government saw the potential of export sales for the Chieftain. This would not only bring in revenue from the sale of vehicles but also from the very lucrative market for spares including those for the L60. Unlike previous British tanks, the Chieftain was not adopted by any Commonwealth countries; in contrast the Chieftain's predecessor the Centurion was purchased by Australia, Canada, India and South Africa amongst others. However, the Chieftain was exported in big numbers to Middle-Eastern countries.

Kuwait – Kuwait purchased over 160 Mk 5/2k Chieftains, the first being delivered in 1976 and the last of the batch in 1980. Kuwait also operated 70 Vickers Mk 1 Main Battle Tanks thus increasing the number of L60 powered vehicles to approximately 235. Later in the life of the Chieftains, the Kuwaitis considered a re-engining programme and proposed fitting a 1000 b.h.p. diesel engine manufactured by Motoren-und Turbinen-Union GmbH (MTU) however, apart from one prototype, the programme never reached fruition. The Chieftains saw active combat when Iraq invaded Kuwait in 1990 and although they were reported to have performed well a large number were captured along with some of the Vickers MBTs.

Oman – Oman leased 12 Mk 7 Chieftains from the British in 1981 before purchasing them in 1984, and these were engined with a mixture of Mk 11A and Mk 13A L60s incorporating modifications resulting from the Sundance exercise. They then bought 15 newly built Mk 15s in 1984/1985 fitted with Mk 14 L60 engines. These Chieftains were designated 'Qayd Al Ardh' after a famed desert warrior. These sales were made against a background of competition from the United States of America who tried to persuade Oman to purchase M60 tanks. Despite its close proximity to both Iraq and Iran and its support for UN forces in the Gulf War, none of its Chieftains saw active service. Later in this article there is some information on the refurbishment of L60 engines by Leyland for the Sultan of Oman's Armed Forces.

Iran – By far the biggest export customer for the Chieftain was Iran. An initial order for just over 700 tanks was placed in 1971 with final deliveries taking

place in 1978. The vast majority of these tanks were Mk 5s the balance being made up of Mk 3/3s. The Mk 3s and Mk 5s were fitted with Mk 7A L60 engines rated at 720bhp. In addition a mixture of AVLBs and ARVs totalling 55 vehicles were also delivered. Despite the problems encountered in operation the Iranians placed another order for just over 190 Chieftains for delivery in 1979. The Chieftains were in active combat during the prolonged Iran-Iraq War during the 1980s and the L60 engine continued to give problems in part due to the arduous conditions but also through the lack of availability of spare parts and trained personnel. Originally support for the Chieftain was provided by the REME but this was withdrawn when the political situation in Iran worsened.

Although Iraq never purchased any Chieftain MBTs they did build up a sizeable fleet made up of vehicles captured during the Iraq-Iran war and those taken during the invasion of Kuwait. Various estimates put the numbers at between 200 and 300. Note: Iraq did purchase a small number of L60 powered Armoured Recovery and Repair Vehicles (ARRV).

Other countries – A number of other countries also expressed an interest in purchasing the Chieftain including Israel, Libya, Pakistan, India, Canada and Denmark. However, for various reasons including political considerations, the Chieftain's reliability problems and its perceived complexity no orders were placed.

Total sales – Including variants, the total number of L60 engined Chieftains manufactured (British and export sales) was approximately 2,250. If you then factor in the L60s fitted to the Vickers MBT and the Indian Vijayanta and consider the number of spare engines that would have been needed, the production run of the L60 was considerable for what was a relatively niche engine.

L60s for the Sultan of Oman's Armed Forces

The Chieftain tank was actively marketed for export sales; unfortunately no other NATO countries purchased the tank, instead preferring to either develop their own or buy from elsewhere (France developed the AMX-30 and Germany the Leopard tank). However, as previously mentioned, the Chieftain did prove to be attractive to Middle Eastern countries and sales were made to Iran, Jordan, Kuwait and Oman. Note: The Chieftains sold to Jordan were designated FV4030 and were originally destined for Iran but the order was cancelled following the Islamic Revolution. These tanks were fitted with a Rolls Royce/Perkins CV12 1200 bhp engine and given the name 'Khalid' (Sword).

An eventual spin off for Leyland from these sales

was a contract to carry out engine refurbishment work on behalf of the Sultan of Oman's Armed Forces. To this end a facility was set up in the Test Operations building at Leyland's Spurrier Works where engines could be stripped, examined, rebuilt and tested. The Oman Army had 27 Chieftain tanks (a mixture of 12 refurbished ex British Army Mk 7 vehicles and 15 new Mk 15 tanks designated as 'Qayd al Ardh').

The contract was already in place prior to the collapse of Leyland DAF and following a management buyout of the engine test business from the appointed receivers' it gave the fledging new venture a solid base on which to build. I was lucky enough to be retained as part of the new workforce and can remember the new owners hiding some of the stock of L60 spare parts under a canopy at the bottom end of No 8 Shop from the receivers when they came to value the business! The work provided regular full-time employment for four people and kept the company ticking over while new customers could be found.

The engines were received in large packing cases and were first stripped and examined to verify the condition of components and determine what parts would need to be changed. These engines had operated in desert conditions and one of the main problems encountered was the ingress of sand through the air inlet system. So severe was this on occasions that the sand mixed with the engine lubricant and formed a very effective grinding paste which was so effective that, as well as wearing away some of the metal, the

resultant finish on the worn components was mirror like! It was apparent on strip down of some engines that the maintenance regime practised by the Omani Army workshops left a lot to be desired and suggested that poorly fitted or missing air cleaner elements were a contributory factor to the damage observed. Following rebuild the engines were fitted to a test bench, run-in and performance tested before being prepared ready for despatch back to Oman.

Here are two photographs showing the engine strip and rebuild area in Test Operations. The quality of the photos isn't brilliant as they were scanned from an old brochure and the originals were only 2 inches square!

Show engines

Leyland had a history of producing engines for shows and as an apprentice I can recall working on some of them for the annual Commercial Vehicle Show then held at Earls Court in London. These engines were works of art, sectioned where appropriate to show off particular aspects of the design, castings were smoothed off and components chromed and painted to add an extra bit of 'bling'. In this respect the L60 engine was no different and an engine was produced for display at military shows. Below are some photos of this engine.

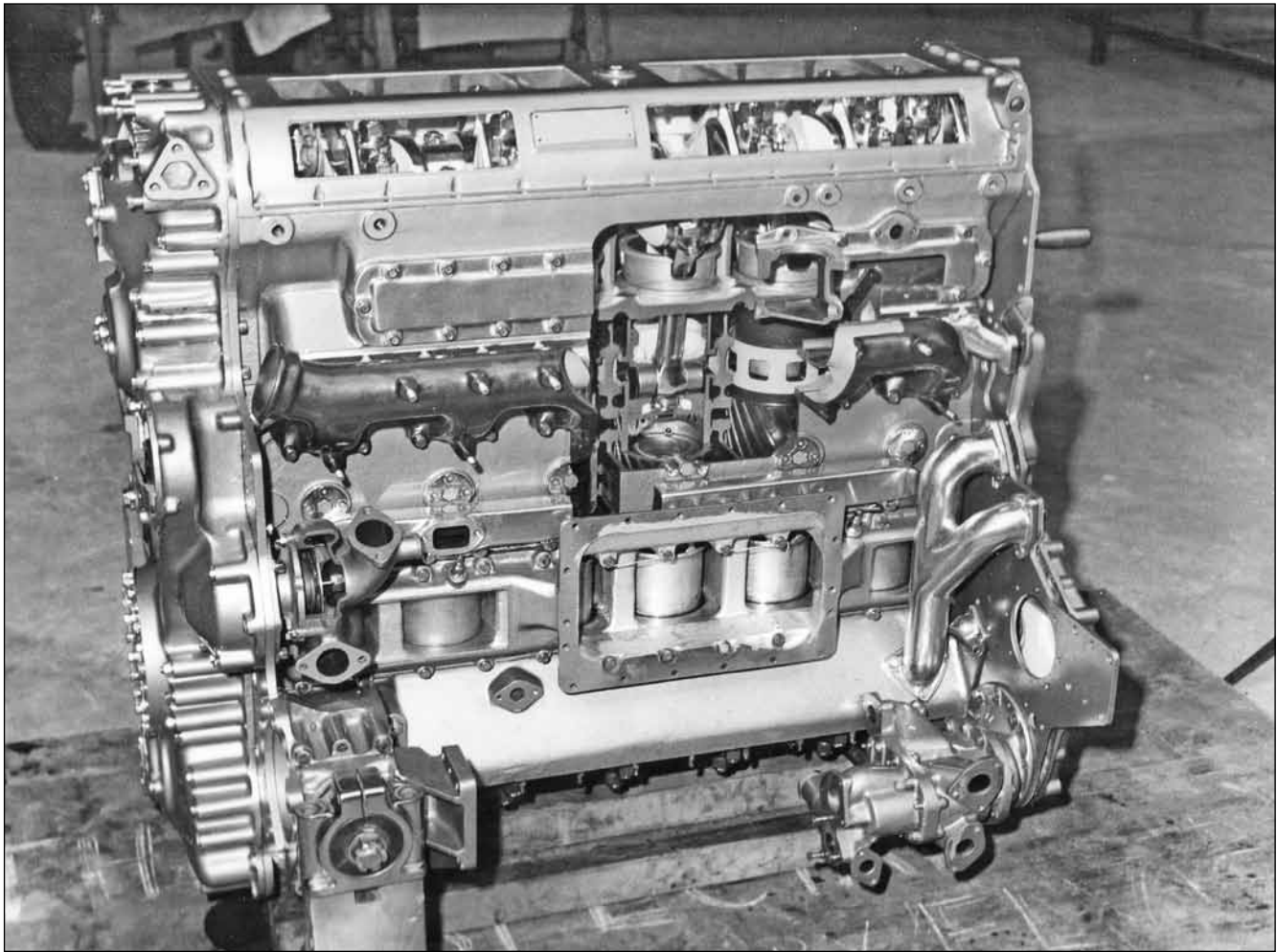
Whilst researching for this series of articles on the L60 engine I inevitably turned to the internet for inspiration, but I soon realised that amongst all the



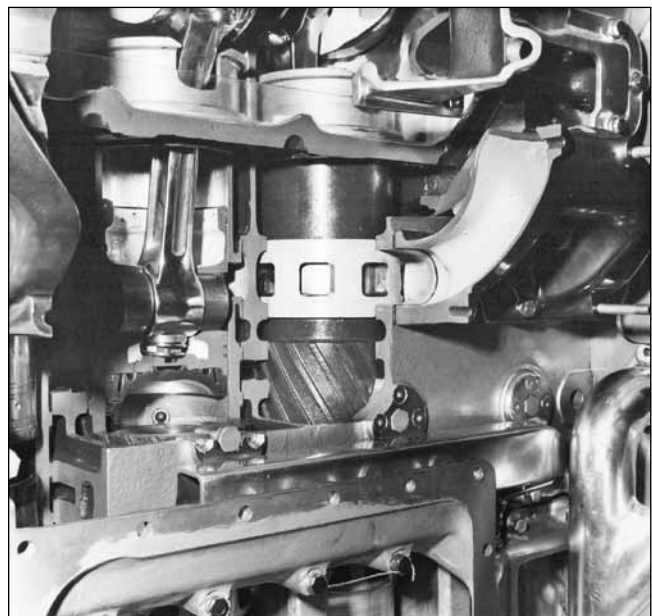
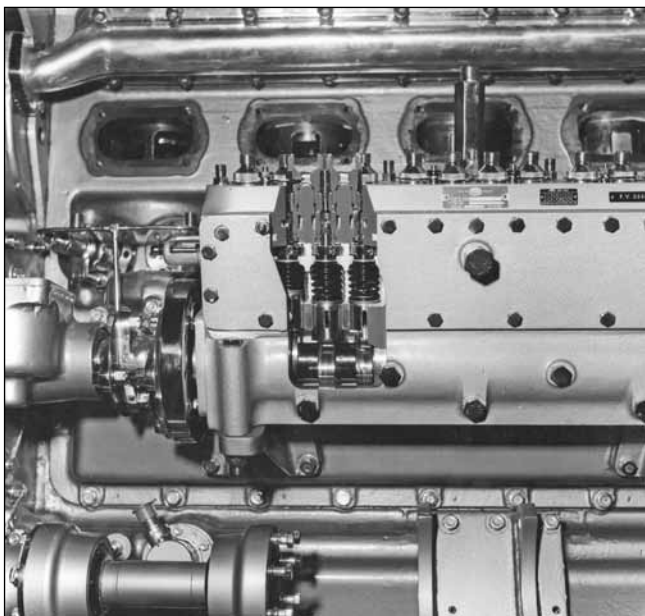
Left – Oman L60 components laid out for inspection in the Test Operations building at Spurrier Works. This posed photo was taken in 1993 shortly after formation of the new company and was used in the marketing brochure. The three engineers in the photo are left to right Terry Higgins (sadly deceased), Mick Boardman and Terry Blackhurst. The large piece of equipment in the background was “my friend” for many years. Its technical name was Gaseous Invisible Emissions Cart used to measure pollutants in exhaust gas, not something they ever bothered about on the L60!



Right – A wider view of the rebuild area showing work on two L60 engines in progress. The row of doors in the background are the front doors to some of the test cells. In its heyday the engine research and development facility in Test Operations boasted nearly forty test cells. Note: The follically challenged engineer in the left foreground is the author!

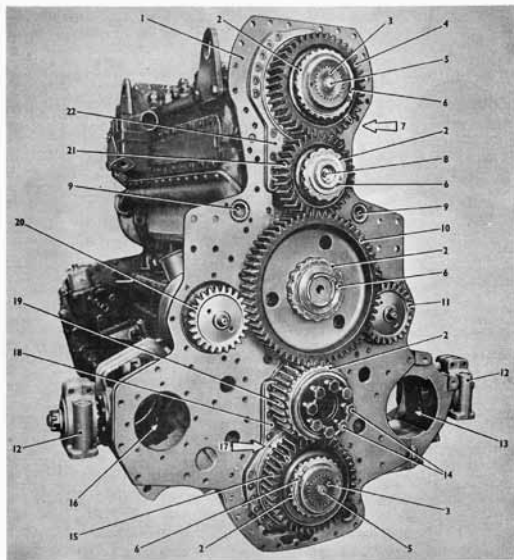


View of the right-hand side of the display engine. Through the cut-outs in the top cover can be seen the exhaust crankshaft. Also of interest is the alignment of the exhaust manifold with the exhaust ports in the cylinder liners. It's possible that this engine block formed the basis of the cutaway horizontal engine featured in the Sundance article.

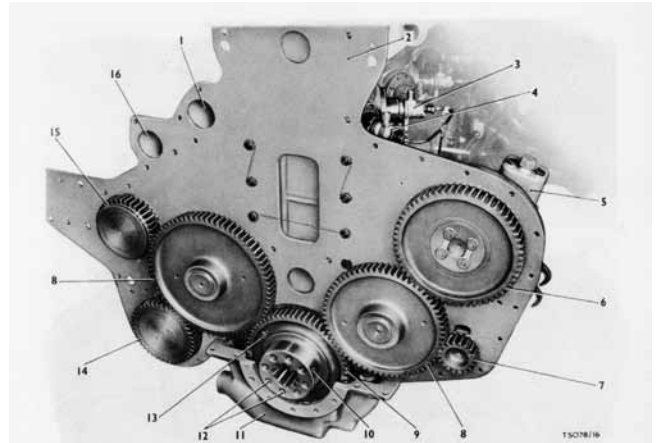


Left hand side of engine showing sections through the fuel pump. As with all Leyland show engines the surfaces of the castings have been smoothed off and some components have been chromed. The section through the fuel pump body shows the camshaft, plungers and delivery valves.

Section through cylinder block showing pistons and liners. The machined spiral on the outside of the liners was to promote the flow of water to improve cooling. Note the cut-out in the top of the cylinder liner to give clearance for the connecting rod.

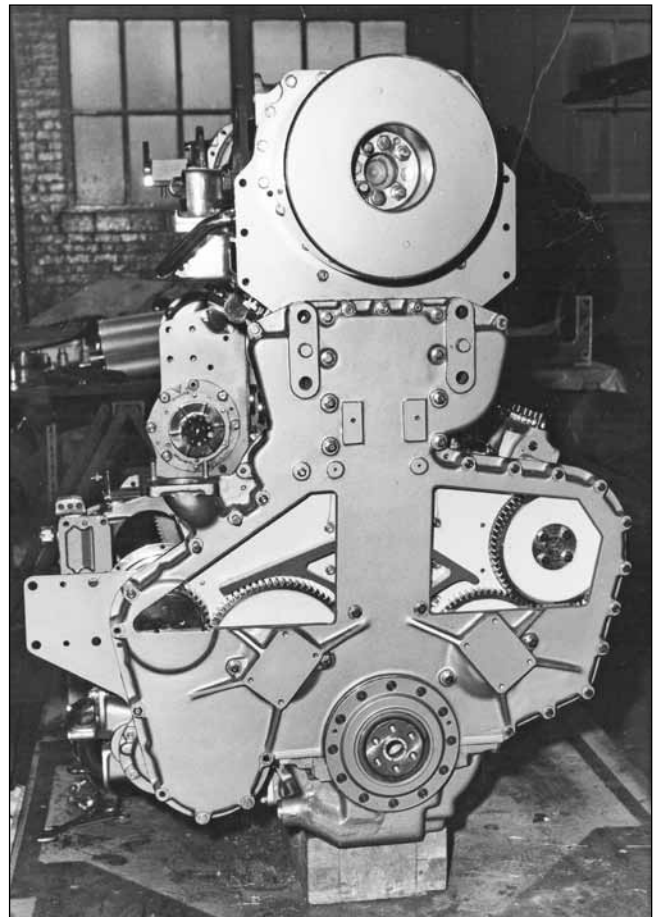
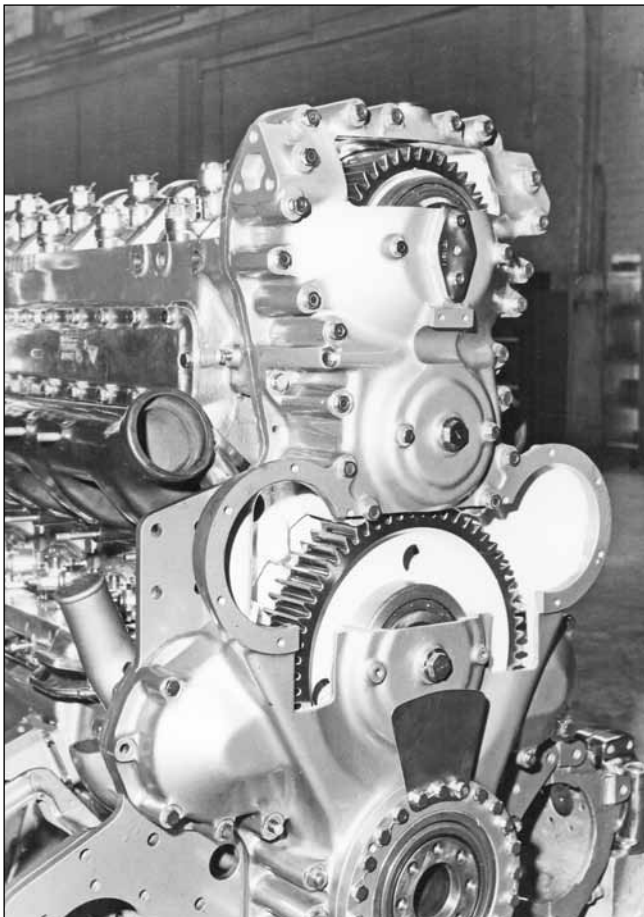


- | | |
|--|---|
| 1 Backplate | 12 Engine mountings |
| 2 Roller bearing | 13 Aperture for electric starter motor |
| 3 Quill shafts | 14 Driving flange securing bolts |
| 4 Exhaust crankshaft gear | 15 Air crankshaft gear |
| 5 Thrust button face | 16 Aperture for hydraulic starter motor |
| 6 Circlips | 17 Air crankshaft timing mark |
| 7 Driving socket for hydraulic pump (steering) | 18 Lower bearing housing |
| 9 Oil drain galleries and feed to gears | 19 Main output gear |
| 10 Large idler gear | 20 L.H. coolant pump driving gear |
| 11 R.H. coolant pump driving gear | 21 Small idler gear |
| | 22 Upper bearing housing |



- | | |
|--|--|
| 1 Oil drain to sump from top oil galleries | 9 Air crankshaft gear (driving) |
| 2 Backplate | 10 Oil seal seating |
| 3 No. 2 injector No. 1 cylinder | 11 Sump |
| 4 No. 1 injector No. 1 cylinder | 12 Damper bolt holes |
| 5 Service recorder | 13 Crankshaft phasing mark |
| 6 Injector pump, service recorder and tachometer driving gear (driven) | 14 Oil pump driving gear (driven) |
| 7 Generator driving gear (driven) | 15 Scavenge blower driving gear (driven) |
| 8 Idler gear | 16 Oil drain to sump from centrifugal filter |

The left hand image shows the complexity of the rear geartrain and how the drive from the two crankshafts is taken to a single output. The right hand photo identifies the front geartrain components, note that the fuel pump, generator, oil pump and scavenge blower are all driven by the air crankshaft. Both the front and rear geartrains utilise straight cut gears, although inherently noisy, straight cut gears do not create axial loads, are more efficient than helical gears and simpler to assemble.



Views of the sectioned engine showing cutaways of the rear and front geartrains.

information available there was also quite a lot of misinformation that only served to add to the myths surrounding the engine, copied below is a thread from a discussion group that illustrates this:

Question – I've heard some stories regarding the supposed unreliability of the Leyland L60 engine. Do these stories have any truth? If so, what were the specific problems of this engine?

Reply – Completely true, although the reliability did improve over the life of the Chieftain, due to both a series of modifications and also the ability of the REME and the crews to do the right preventative maintenance. Like so many poor tank engines, it was not a dedicated design but an adapted commercial engine, and not well suited to the battering it took as a tank power-plant – constant changing of revolutions, air filtration issues, poor internal oil flow etc. I hated being a Chieftain driver, heavy maintenance and constantly filthy! (Which is why I went into the gunnery world!)

Reply – I was an A Mech in the REME and have to agree that during my time in the BAOR working on these things (from '1975-84 when Challenger was being phased in), they were hopeless!

Reply – The problem seemed to stem from the fact that the L60 was originally used as a generator engine on ships, running at constant speed in a relatively controlled environment. However put it in a tank, give it a hard life, up and down the rev range, and pretty soon the cylinder liners would leak coolant into the cylinders, throwing out plumes of white smoke. The other problem was with the fan drives – one of my first jobs on being posted to 13/18H was to remove the fan belts on all our squadrons tanks, drill holes in the belts to weaken them and refit the belts – this was so the belt would break before it pulled the fan drive housing off.

I can remember that in my early days, 1975-77, when with 13/18H, sometimes an L60 might only last around 100km before needing replacement.....which was a 3 hour job as a minimum, longer at night in a forest (which is when I lost the ends of my fingers under the rear mounting block!)

Reply – While the L60 was undoubtedly a poor engine it has generated many urban myths around it. I have seen its parentage linked to the Deltic diesel engine as used on the UK's railways, German bombers, and many more myths. The design came from Junkers at the end of the war, and by various political means it (the new tank engine design) was given to British Leyland, partly because the need for a new engine for the then new tank was urgent. Rolls Royce were developing a new V12 engine but it would be two more years before it was ready. The European nations came up with a wonderful idea (as they do) that all new engines must be multi-fuel. Every other country said

OK then ignored it, except for the UK; this made the engine slightly bigger with a knock on effect on hull design. Our REME were sent to do a conversion course on how to convert to petrol, their words on return were not printable.

There were four main areas of failure, cracking of cylinder liners, failure of cylinder lip seals, piston ring breakages and cracking of rear gear case. Some of these faults were blamed on the crew for a while but in the end it was accepted that BL had to rectify the faults. Various programs were put in place to rectify the faults and gradually the L60 became more reliable. I had one fitted in the field and for three years it was perfect with no leaks and plenty of power. Overall it affected sales to an extent; it should never have been accepted and marred the Chieftain's reputation. As a foot note it worked well in the Eagle and Vickers Vijayanta. I also have documentation with the IDF (Israel Defence Forces) praising it and opening negotiations to buy it for fleet.

Reply – It depends. I had one in a Chieftain AVLB (Armoured Vehicle-Launched Bridge) and I hammered it for 1000 miles before anything went wrong, but that was nearly non-stop driving as I just went on exercise from one battle group to another. I believe towards the end of its life when it was fitted to AVLBs and CHAVREs (Chieftain Armoured Vehicle Engineers) in the first Gulf War, its availability rate was as high as Chilly 's (Challenger 1) which was high. But as a tank it was good for its time, just the engine could be unpredictable at times.

Comment – Thanks guys for the comments, most helpful! The reason why I asked about the L60 is that I'm trying to find out whether the problems had anything to do with the opposed piston design per se, or were they more of a nature resulting from poor design/manufacturing in this particular case. There are some generic complaints over the reliability of the Junkers aircraft diesels of opposed piston design, but on the other hand, the Fairbanks-Morse diesels of similar design as fitted to many US submarines were the longest TBO engines of them all.

I found this exchange of views very interesting, particularly as it contains comments from people that had first hand knowledge of working with Chieftains and the L60 engine. It also highlights some of the half truths surrounding the engine in particular relating to its parentage.

Full Circle

This series of articles has sought to show the thought processes behind the selection of the Leyland L60 engine to power the Chieftain Main Battle Tank, the problems encountered in development/service and the work carried out to rectify these problems. By

common consent and for a variety of reasons the engine never quite lived up to expectations although towards the end of its life reliability had been improved. Part of the problem was the relatively unorthodox design of the engine, ie. compression ignition two stroke opposed piston combined with the need to provide multi-fuel capability and cope with the ever increasing weight of the Chieftain that put additional stresses on the engine. It was no surprise therefore that for the next generation of Main Battle Tank the MoD returned to more conventional methods of propulsion, the Challenger Tank (the replacement for the Chieftain) being fitted with a Rolls Royce/Perkins Condor CV12.

Other reasons for the general demise of this type of engine, when compared to four-strokes, were that they could be more maintenance intensive and the combustion process wasn't as clean, so engines would have struggled to meet more and more stringent emission regulations being introduced around the world.

However, a company based in America called Achates Power has, since 2004, been taking a new approach to the design of the opposed piston engine and in conjunction with some leading engine manufacturers has been working towards bringing new engines to the market. I contacted the company and was given permission by Andrew Schreck (Marketing Director) to reproduce the information below which makes an interesting comparison to the original marketing material for the L60 engine published in 1966.

Information from Leyland L60 brochure:

Design and Utilisation:

Conforming to the specification laid down by the British War Office (F.V.R.D.E.), the Leyland L60 engine is designed to run satisfactorily on a wide range of fuels and consumes a higher proportion of the hydrocarbons available in crude oil than is possible with current designs of piston engine.

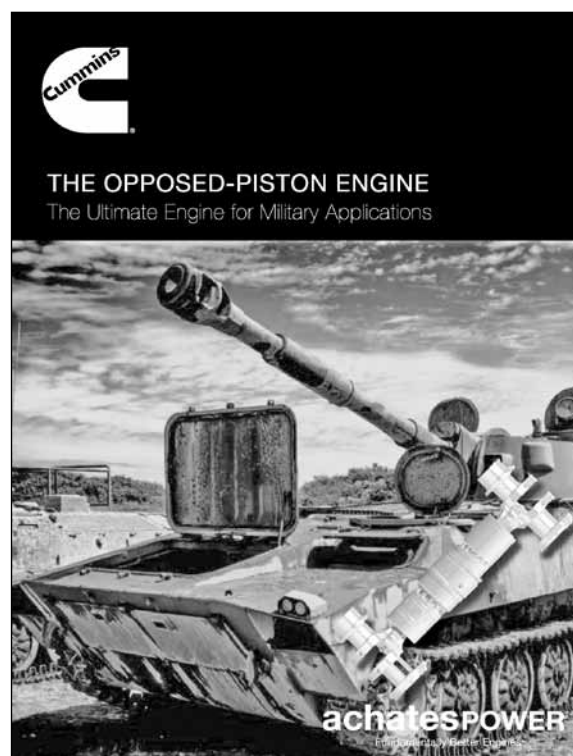
Even when running on lower grade petroleum fuels, the Leyland L60 engine is comparatively quiet and has a high power output. Research and development work on the L60 engine was initially undertaken by Leyland Motors Ltd to produce a reliable power unit to meet the increasing demands for an engine suitable for use in various spheres of military operation. The L60 engine meets these demands in no small measure.

It has the advantage also of limited industrial application, especially in those territories where, for economic or geographical reasons, it is essential to have a power unit which can be run on the type of fuel that is in plentiful supply at any one moment.

The opposed piston two-stroke layout was chosen for the L60 as the most efficient type for operation on a variety of fuels mainly because of the following factors: the design enabled an extremely compact combustion chamber to be used; it also prevented high heat losses during the combustion stroke, and at the same time made starting an easy operation coupled with less noise during running.

By exploiting this design to the full, Leyland Motors Ltd has been able to develop, manufacture and market this extremely compact vertical engine for multi-fuel operation with a power rating as high as 700 b.h.p. for certain duties.

Despite the compact envelope dimensions of the engine, sufficient drives and power take-off points



Contrasting brochures, the Leyland L60 engine brochure published in 1966 and the Achates Power brochure 52 years later.

have been provided to enable a range of auxiliaries to be fitted which make the unit suitable for use in varied applications.

Backed by the full resources of Leyland research facilities, which have been devoted for many years to the continuous development of compact high power transport diesels, the L60 has been brought to a high degree of refinement and reliability. The engine has been accepted by the British Ministry of Supply for use in military vehicles and powers the battle tank 'Chieftain'. During extensive trials in the 'Chieftain' tank a Leyland L60 engine has completed over 6,000 miles, 3,600 miles of which consisted of road operation and 2,400 miles over extremely severe cross-country courses.

Information from Achates Power brochure:

A Fit for All Fuels. The Opposed-Piston Engine is a compression ignition engine capable of using gasoline, diesel, natural gas, JP8, and biofuels/renewable fuels. Its technology leverages existing fuelling standards and infrastructure currently being used by consumers.

A Fundamentally Better Architecture. Lower cost. Lower mass. Less complexity. The Achates Power Opposed-Piston Engine is engineered to achieve superior thermal

efficiency by virtue of its lower heat losses, improved combustion and reduced pumping losses. The engine design eliminates the cylinder head for an improved surface-area-to-volume ratio of the combustion chamber for reduced heat transfer and rejection. It takes advantage of the inherent power density of a two-cycle engine by reducing both displacement (reducing the size, mass, and cost of the engine) and brake mean effective pressure (BMEP). Reduced BMEP results in: + Lower nitrogen oxides operation and enables more rapid combustion to improve efficiency. + Leaner and more efficient combustion at the same boost level, which has the additional benefit of generating less particulate matter. The Opposed-Piston Engine has efficient, uniflow scavenging that decouples the pumping work from the engine speed.

At low loads, the engine can have increased internal exhaust residuals and reduce the supercharger work at the same time, improving efficiency while reducing nitrogen oxides (NOx). This operation also enables increased exhaust gas temperatures to achieve rapid catalyst light-off during cold starts to maximize after-treatment system efficiency.

A Fundamentally Cost-Effective Engine. The cost of an engine consists of three main parts: materials,



TAILPIECE

When I retired from Leyland Motors in 2018, my wife and son bought me a tank driving experience, allowing me to fulfil a lifelong ambition. Included in the experience was the opportunity to look round a military vehicle museum and for the first time I was able to get up close to a Chieftain and see at first-hand how impressive they were. If you want to see (and more importantly hear this tank running at full throttle) the following link will take you to a YouTube video: <https://binged.it/2LxFELX>

fuel systems/controls and after-treatment systems. The Opposed-Piston Engine architecture helps reduce the cost of two of these areas: + Materials – Material costs can be reduced 15% through the elimination of the cylinder head, valve-train, and other conventional engine components. Compared to a supercharged V6, the 2.7L Opposed-Piston Engine has 60% fewer parts, providing an approximate 10% cost reduction. + After-treatment Systems – The Opposed-Piston Engine architecture offers a reduction in the after-treatment system size, generating a potential 30% cost reduction. Finally, the cost to manufacture an Opposed-Piston Engine is similar to any engine. It can be built in existing OEM factories.

Despite there being just over 50 years between the two publications some of the similarities are quite striking:

1. Both stress the multi-fuel capability of the engine. Despite the fact that many people consider the multi-fuel requirement 'imposed' on the L60 contributed to its reliability issues, Achates Power are keen to stress this as a positive characteristic of their engine.
2. The importance of low heat losses during combustion.
3. Compactness.

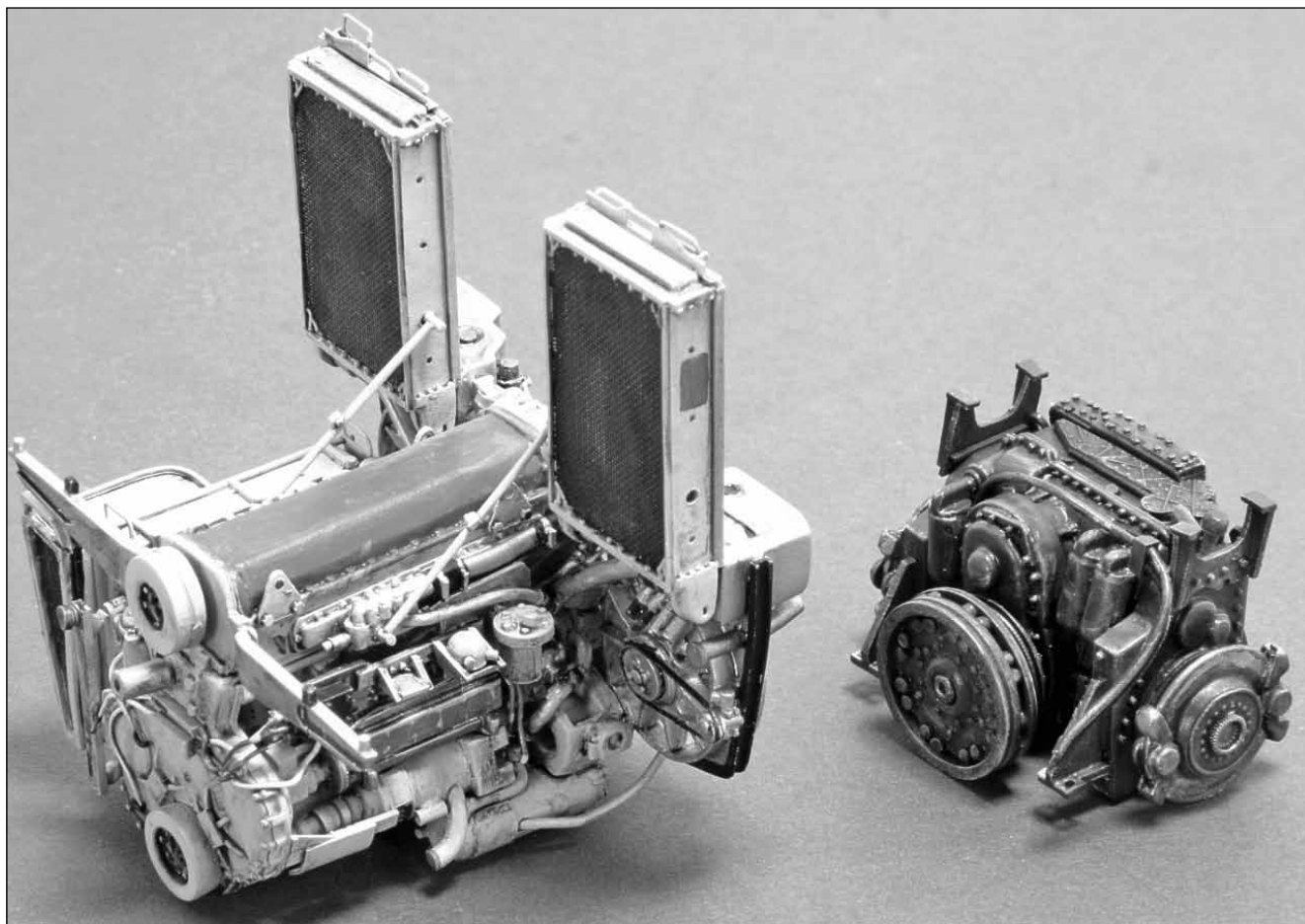
Of particular interest is that Achates (in partnership

with Cummins Engines) is developing an engine for military use.

Amendment

In the second of this series of articles titled 'Development of the Leyland L60 Two Stroke Opposed Piston Multi-Fuel Engine' I gave details of all the different engine marks. For marks 11, 12, 13 and 14 (post Sundance Exercise) a power output of 840bhp was quoted. Following further research and after discussions with my friend John Farnworth I'd like to clarify this. The maximum rated horsepower released for production was 750bhp but plans were in place to increase this and according to information contained in the Sundance launch brochure an ambitious target of 1000bhp was mooted. From a technical point of view the fitment of a high powered L60 into the Chieftain would have been problematical as it would have required an upgraded transmission to cope with the additional power.

(Thank you Bill for this very detailed and well-prepared set of articles. This is a subject where it would be difficult if not impossible to research and, to have all this first-hand knowledge and experience, it has been brilliant! Thank you again – Ed.)



If the story of the Leyland L60 engine has piqued your interest and you fancy owning one there are plenty for sale on the internet plus a few Chieftains! If however you don't have the room (or the finances) then this 1/35th resin and etched brass kit available from ACCURATE ARMOUR Ltd could be the answer. It's a faithful reproduction of the engine complete with its TN12 gearbox. Image courtesy of Derek Hansen of ACCURATE ARMOUR Ltd.



Greenall Whitley of St Helens were loyal Leyland customers, going back to the days of their Leyland steam wagons. This Leyland GH6 (4-tonner) was one of two, chassis nos.13919/20, bought in July 1928 and on 4 x 8 pneumatics (24in wheel centres). It is easily recognisable as a late GH, with the Ricardo headed E.36/2 engine, due to the blanked-off centre hole on the front crossmember, also the wide front axle beam with extra wide spring saddles (with 2½in flat outside the springs) to enable the same axle to be fitted to the wider framed SQ2. The 5 and 6-ton models PH and QH would look similar, but would have the deeper radiator going below the top of the frame. Their little Z Type is parked behind, possibly needing repairs, a troublesome model! (BCVMT L005183F)

ODD BODIES !

Compiled by Gordon Brooke

All correspondence to Mike Sutcliffe

Thanks to John Bennett, Colin Brazier, John Burton, Maurice Doggett, Mike Fenton, Richard Gadsby, Michael Hampton, Paul Jefford, Alan Lambert, Graham Martin-Bates, Martin Weyell, Mike Sutcliffe, Ron Thomas and the PSV Circle.

Tye's, Mendlesham, Leyland Lion LT2, WE 8115 (Torque Nos.80-2)

Mike Fenton and John Bennett point out that the correct spelling of the suggested bodybuilder of **WE 8115** is Waveney, not Waveny as given previously. I'm afraid that I am not old enough to have spotted this.

They both point out that the list of East Anglian bodybuilders produced about 25 years ago although reasonably accurate, was simply draft compilations of what had been published and what was known then and should *not* be taken as gospel. Mike Fenton suggested that Maurice Doggett should not discount the idea that **WE 8115** had a Waveney body because it did not appear in that list. Whether **WE 8115** had or had not a Waveney body will be very difficult to decide.

John Bennett adds that The Waveney Co. Ltd, Victoria Works, Stanley Street, Oulton Broad was registered by Thomas George Betts in June 1924, although it is believed that the business existed before this date. The threat of invasion caused the closure of the works in 1940 and Mr Betts went on to work for Commer Cars Ltd, Luton and then, in the post-war period, Myers & Bowman Limited of Distington, Cumberland. Unfortunately, there are no official records of the production of Waveney bodies.

Smith, Wigan, Leyland Tiger TS4, AG 8280 (Torque Nos.81 & 82)

Ron Thomas points out that the Bellhouse Higson re-bodied Tiger TS4, depicted on page 28 of Torque No.81 shows the legal lettering as James Smith & Co Ltd, 33 Mesnes Street, Wigan, General Manager (F?) Webster, and not Smith's Tours, J Smith & Sons or even James Smith & Co (Wigan) Ltd as given elsewhere!

Leyland Tiger TS2, WH 1922 (Torque Nos.81 & 82)

A very interesting answer to the question 'When does a rebuild become a rebody?' comes from John Burton – that it could be down to accountancy. A rebody is usually funded from the Capital account (and so requires approved funding) whereas a rebuild would usually be charged to the Current account under repairs and renewals, although some form of approval must have been obtained. Generally, a rebuild is to alter an existing body in some way but at times this has been taken to extremes. For example, it has been suggested that Brighton Hove & District rebuilt AEC Regents only contained light fittings from the original body!

Bevan Bros (Soudley Valley), Leyland Tiger TS1, VA 8792 (Torque No.82)

There was a large response for this one, with the result that we have a very complete history for it. Everyone says that it was a Tiger TS1 ordered by John O'Hara & Sons, t/a Southern, Barrhead and the chassis was released by Leyland's Glasgow depot in 3/29 for fitting with a Kelly B30F body (29 and 31 seats were also mentioned). It was delivered to O'Hara in 5/29 as fleet no.99, chassis no.60588 though O'Hara had been taken over by the SMT Group in 3/29. The business was kept as a separate entity until 10/29 when it was absorbed into the fleet of J C Sword, t/a Midland Bus Services. Some of this batch of Kelly bodied TS1s went to O'Hara then to Midland and others went direct to Midland.

Afterwards **VA 8792** had a series of owners, passing to Western SMT in 7/32, to TA Holland, t/a Feltham & District, Hanworth, via Milburn Garage (dealer), in 1937 and to Grindle (Forest Greyhound), Cinderford in 10/38, where it is recorded as being fitted with a second-hand Leyland B32R body c1941, from an unknown source (could it have already been fitted with a Leyland body from a later Tiger whilst still with the SMT Group, as there were several early Tigers fitted with later second-hand Leyland bodies?) It passed to F C Cottrell, Mitcheldean by 2/43 and then on to F O J & RJ Bevan, t/a Soudley Valley, Cinderford in 10/46. In 1948 it was rebodied by Santus as a 33 seat coach but in 7/56 it was in the ownership of R I Davies & Son, Tredegar after which no more has been heard of it. Here is a photograph of similar **VA 8790** with its original Kelly body, one of the same batch but delivered direct to Midland.

O'Hara operated charabancs from 1921. A Glasgow-Newton Mearns service started in 1924, continuing the service previously operated by Caledonian Automobile Services of Glasgow. By 1925 there were 10 vehicles required to operate this service. O'Hara originally operated from Barrhead and c1929 relocated to Newton Mearns.



Sister bus, VA 8790, with Kelly body when with Midland, Airdrie

(Leyland Society Archive)

The livery was originally blue and white, but this was later changed to brown. The fleet name 'Southern' was used. The business was sold to SMT in March 1929, supposedly for £36,000. The O'Hara family then established a new company, J.O'Hara & Co, Barrhead in 1930, but this was sold in 1933 to McGill, Barrhead, which became a well-known and loved operator.

J.H.Kelly was a Glasgow body builder. Originally in the 1800s this was for farm carts and later horse-drawn vans and wagons. The business continued to grow and eventually passenger-carrying bodies were built. Kelly had a reputation for good quality bodies. Three 20-seat bodies were built on Studebaker chassis in 1927. Also, in 1928, two Albions received bodies with unusual observation lounges at the rear. O'Hara was one of Kelly's most important customers. As Beardmore formed a separate commercial vehicle department to manage their own works, the Kelly operation faded away. The last known bodies were on two Commer Invaders in 7/30 for McConnachie, Campbeltown.

Grey Coaches (Banfield), Leyland Tiger TS7, DUF 176 (Torque No.82)

Another good response to this one also, with no disagreement about its history, I guess, partly because much of it comes from the work of the Southdown Enthusiasts Club. We did actually feature this bus in Odd Bodies in Torque Nos.13 & 14, but at that time we had no idea where the Beadle body came from. Fortunately, Mike Fenton has now come up with the probable answer.

DUF 176 was new as Southdown 1176 in January 1937, but not registered until March. It was a Leyland Tiger TS7 with chassis no.11970 and Harrington C32R body. In March 1940, the coach was requisitioned by the War Dept. and allocated to the Royal Army Service Corps, but it was re-acquired by Southdown in 11/46. It was sold to Samuelson New Transport in 2/47 who sold it again to Grey Coaches, Peckham; that



Sister bus, DUF 173, with Southdown and identical to DUF 176 when with them
(Alan Lambert collection)



One of the Royal Arsenal Co-op Society AEC Regals with its Beadle body when quite new (AD Packer)

These two photographs show similar **DUF 173** with its very attractive original Harrington body, with canvas roof, and AEC Regal, **HXX 537**, with a Beadle body, looking rather like a Duple A, of the type transferred to **DUF 176** as seen in Torque No.82.

United Services Transport, Leyland Lion LSC1, YP 7117 or 7118 (Torque No.82)

Just two responses for these two Lions. John Bennett says that they had chassis nos.45158/9 new to United Service Transport in 7/26; they were converted to lorries in 12/33. Mike Sutcliffe has added - there can't have been many forward-control charabancs, probably as well as the seats in this one look most uncomfortable – seven rows crammed into a short Lion, there must have been hardly any leg room! Although the coachbuilder of the 1926 LSC1 Lions of United Service Transport is unknown, the probability is that it was Beadle – are there any Beadle records in existence?

This picture of one of what is thought to be one of the next batch of LSC1 Lions delivered to UST in the following year and which had a rather ungainly All-Weather body, by Beadle.

UST went on to have an enormous fleet of 73 LSC Lion coaches, which can be accounted for as follows:

1926	–	2	Charabancs,	chassis nos.45158/59,	?	Ch32
1927	–	16	All-weather coaches	45500-15,	Beadle	AW29D and AW32D
1928	–	16	“	“	46863-78,	Beadle AW32D
1929	–	39	“	“	47637-44/68-76, 47756/85-88, 47918-34,	(Beadle ?) AW32D and AW29D



An unidentified LSC1 Lion from the 1927 batch (Mike Sutcliffe collection)

(The 1926-27 ones were LSC1 Lions and 1928/29 batches was all 'Long Lions' LSC3). These all took UST fleet numbers in the series 200-56/61-75 in a rather haphazard way (which is 72 vehicles, so there must be another number). There are only three where we don't know the fleet numbers, **YP 7117/18** which could have been 237/38, and **YE 9635**, the 73rd Lion. Does any reader have records that could help us please?

Lowland, Leyland Tiger TS2, GE 6001 (Torque No.82)

This was a Tiger TS2, not a TS1 as originally thought (note the long wheelbase but short rear overhang). It had chassis no.60534 and was one of four ordered by JR Tognorelli, Bolton (oddly enough, see page 23 of Torque No.82!). The chassis were delivered to Tognorelli in April/May 1929 and three were bodied by Burlingham (**WH 1920-22**), but the fourth chassis was sold to Lowland Motorways, Glasgow. It received a Pickering C26D body, being delivered to Lowland in July 1929. It was rebodied by Burlingham C32R in 1938 and this is how it is seen in Torque No.82. It passed to W Laurie, Liverpool in 12/52 and was withdrawn in 8/55.

The two photographs opposite show it with its original body. Note that the fleet name in the style of the 'Leyland' scroll of the time with just two of the letters changed!



GE 6001, the Lowland Tiger TS2 when new, with 'Lowland scroll' on its sides

(Leyland Society Archive)



A series of pictures was taken by Leyland showing express services which started beside Christy's terminal in Bolton

NEW ITEMS

J Docherty, Auchterarder, Leyland Tiger TS7, ATE 808

This does not look like the original body to me with it not quite fitting the chassis at the front at least; it is not a pretty sight! It possibly wasn't built very well and appears to be literally falling apart judging by the doors hanging off it.



(The Bus Archive – Roy Marshall)

Chard & District, Leyland Tiger TS2, CK 4339

Obviously this has been rebodied complete with CovRad radiator and uglified front mudguards. Does anyone know its history?



(J Sealey collection)

CIE TP42, Leyland Tiger TS7, ZA 7183

This must have been CIE's attempt to produce the strangest looking coach ever built. Were they trying to kill-off their private hire trade?



(Cyril McIntyre collection)

Greenock Motor Services, Daimler CVA6, VS 4364

Not a Leyland for a change but it is carrying a Leyland 'V' front body. Where did this originate?



(Mike Sutcliffe collection)



FOR ALL TIME

By Michael Plunkett

Contributions to the Journal and Leyland Torque have covered so many aspects of Leyland's activities past and present, yet there has been no reference to one of the most iconic and effective advertising campaigns produced by the Sales and Publicity department – the Leyland Clocks. In 1996 a booklet was published by the British Commercial Vehicle Museum Trust Archive, compiled by Roslyn M Thistlewood, giving a detailed account of the 'Clock Saga' from inception to eventual demise. There was also a short article by Gordon Barron and Lenore Knowles based on the Shap Clock, its local history and personalities involved. Both accounts are illustrated and informative but sadly seem to be no longer available, so this article is an attempt to provide at least a précis of the story contained in those publications and to include additional photographs which have not seen the light of day.

A well-known picture of RN 7754, a 1936 Duple bodied Leyland Tiger TS7 coach of Ribble Motor Services at the top of Shap, passing what was probably the most famous of the Leyland Motors' clocks (BCVMT L033444)

Leyland Motors, like many other motor manufacturers, had experienced financial stress due to low sales orders at the start of the 1920s, though the situation was rapidly improving by 1930. However, promotion of its products still needed to reach a greater number of potential customers, so Mr A Whalesby-Windsor, the then General Sales Manager, conceived the idea of siting large, working clocks bearing advertising slogans at strategic points beside major trunk roads, thereby reaching not only readers of the Transport press but all who drove past. The idea was approved, a prototype was constructed and placed on the Leyland to Preston road where its performance could be assessed. It proved a failure due to vulnerability to weather, but the many reports of its unreliability showed that it was indeed fulfilling its purpose of attracting attention!

An approach was then made to clockmakers for a mechanism able to withstand the harshest weather experienced around the country. At the same time, Franco Reflex Signs of London were commissioned to design a suitable tower to support clock faces and advertising panel. The resulting structure comprised a

tapering tower some 14 feet high built of steel angle sections joined by a lattice of steel bars, the lower part sheathed by panels protecting the eight-day clockwork, weights and winding gear. Twin 28-inch diameter clock faces were connected but angled separately towards on-coming traffic, they were cantilevered from the tower below a panel about 3 feet square bearing the legend "Leyland Motors for All Time", some being topped by the Royal 'by appointment' badge. Lettering and clock hands were painted silver picked out with glass studs to reflect vehicle headlights at night, as found at the time on many road signs and subsequently in rubber-mounted 'cats eyes' road markers. The towers were painted mid-Brunswick green.

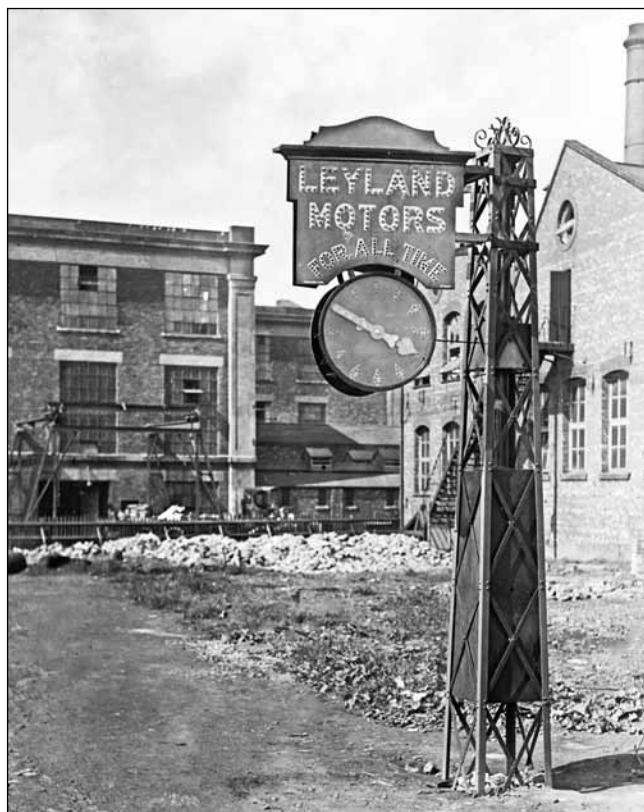
Suggested sites for five clocks were listed in the Leyland House magazine 'Once-A-Month' in 1930, with a sixth location undecided. However, the list (dating from the 1950s/60s) published in Roslyn Thistlewoods' booklet in 1996 differs, listing nine clocks (not six as recently suggested) together with their status at that time. Some of the information is known to require amendment and it is therefore hoped that an up-to-date list of survivors and their condition can now be compiled with help from Society Members' observations.

The Thistlewood list is as follows, with the then current whereabouts and condition: -

1. The prototype clock from Lostock Hall, Lancs. was removed, inoperative, in the 1960s. The clock was then displayed in the British Commercial Vehicle Museum, its tower being stored in private hands elsewhere.
2. The 'Lea Clock' was sited on A583 Preston to Blackpool road. It was the first of those designed by William Potts and Sons and for the first six months was erected near LML's South Works for evaluation before its move to Lea in 1931. The tower and clock faces are privately stored with the 'Lostock Hall' tower.
3. The 'Shap Clock' was sited just south of Shap summit. It was removed in 1970 and later refurbished and erected in the Kendal Brewery Arts Centre in 1977. In 1988 Leyland-DAF commissioned an overhaul by William Potts and Sons to restore the clock to working order (in 1996 it was used as a model for the 'Centenary Clock' qv).
4. The 'Cherhill Clock' was on the A4 near Calne in Wiltshire close to a White Horse cut into the chalk downland and adjacent to a pub and café which no doubt provided a pull-in for drivers. It was displaced by widening of the A4 in 1965. Collected by LML it was probably stored in North Works, eventually providing the clock face and mechanism to join a newly built tower for erection in the centre



The Lostock Hall Clock in February 1930, complete with picture of a Leyland QH6 lorry. The lorry was removed after a short time when that model became outdated



The Lea Clock was installed outside the South Works to test the Potts design in August 1930. Its position would now be the entrance to the BCVM compound, the BCVM building being erected to the left of the picture some seven years later



A Leyland SQ2 6/7 Ton lorry, CW 9883, passes the Lea Clock on the Blackpool road in March 1931. Note the pneumatics (40 x 8s) on the front and solids at the rear

of a traffic roundabout in Leyland town to mark the firm's centenary in 1996. (It is reported to be no longer there).

5. The 'Healam Bridge' clock was sited on the A1 near Leeming, halfway between Boroughbridge and Scotch Corner. In 1955 it was removed and re-sited on the A167 at Plawsworth, north of Durham.

Finally, it was dismantled, overhauled by Leyland and shipped to the main agents in Sydney, Australia. (Where is it now?)

6. 'The Hook Clock' was in the grounds of a café near Hook, Hampshire on the A30. It was eventually removed in the late 1950s or early '60s and displayed at the Cobham Bus Museum. (Now on display at Cobham Hall, Brooklands and keeping good time)

7. 'The Alconbury Clock' was in the grounds of a private house sited on Vinegar Hill near Alconbury, Cambridgeshire on the A1. It is now in the National Motor Museum at Beaulieu.

8. 'The Daventry Bypass Clock' was at the junction of the A45 and A425 near the Maple Leaf Garage in Warwickshire. It was removed in 1966 to a garage in Salford, Manchester where it was thought to be still in store. (Is there any up to date news of this one please?)

9. 'The Capetown, South Africa Clock' sent to Leyland's Service Centre in Capetown in 1934, this clock was electrically operated and was supported on a taller tower (locally built?). Nothing further is known of its history, but is it possible that there were plans to send similar clocks to



The Cherhill clock and White Horse



The Capetown clock

Leyland's Service Centres in Canada or Australia? In fact, LML was fully occupied by the mid-1930s producing lorries and buses in quantity – perhaps the clocks had proved their worth!

10. 'The Centenary clock' – In 1996 Leyland Motors Ltd would celebrate their centenary. It was suggested that a replica clock should be constructed and sited within the town. The idea was approved and using the Kendal Brewery Arts Centre clock as a pattern, a new tower was created by the local firm Albion Automotive and Mr John P Potter. A clock was found in the BCVM (thought to be from Cherhill) adapted for electrical operation by Mr Philip N Irvine of Southport and united with the new tower. A site was prepared by the local Council at a major roundabout at the intersection of Hough Lane and four other roads and on 30th May 1996 with due ceremony, the Mayor of South Ribble Borough Council, Mrs Betty Greenland re-started the clock. However, it is now reported that the clock has gone. Surely its recent fate must be known and with help from the Leyland Society it should be re-erected in a safe but appropriate site in Leyland – if one can be found?

Maintenance of the clocks required both frequent and periodic attention. The weekly winding and checking was carried out by a local resident; perhaps a farmer or publican who received a small annual 'retainer' – say £2. Servicing of the clock mechanism was the responsibility of the original manufacturers Potts and Sons who would also be alerted by the local 'winder' if a fault occurred. Repairs and painting of the tower structure remained a task for Leyland itself, possibly through the area Service depots.

The Leyland clocks had soon become landmarks and points of reference, well known to those using the trunk roads, particularly the long-distance transport drivers, whose numbers were increasing during the period before the second world war as road haulage



The 1996 Centenary Clock

took over much of the goods previously carried by the railways.

Maintenance during the war became increasingly neglected and by the 1950s the demise of the clocks was inevitable – few showing a true time other than twice a day! But for several years, a lorry ploughing through the sleet on a winter night (at its licensed 20mph!) might still pick out with its headlights points of light ahead spelling out the message "Leyland Motors for All Time"; the driver would consult his own watch and know that he would soon be home! *(Photographs from the BCVMT, not all negative numbers known, and Mike Sutcliffe collection)*



Maintaining a clock



LEYLAND'S AMERICAN VAN

By Chris Green

This photograph was taken from another of the large glass plate negatives at the BCVM, referred to in Torque No.80, this one being *neg.no.42 (now LA0042)*. The gate at the left extremity shows a part-address which was traced to Great Ducie Street, Strangeways, Manchester. Local trade directories identified a car dealer in the early 1900s at this location named Joseph Cockshoot & Co. This company, with origins in 1724, was traditionally a coachbuilder and started manufacturing bespoke car bodies in 1904 continuing until 1939. It accumulated numerous car dealerships including Stanley Steam Cars. The showroom window advertises Renault and Crossley (which were made in Manchester) at the time of the photograph. Cockshoot was purchased by Lex in 1968.

The small van displays the Leyland trade-plates **B3K** and the use of these Leyland plates would imply more than a demonstration by Cockshoot. Enquiries with the Crossley Motors car enthusiast organisation determined that the car in the showroom is a Delage, rather than a Crossley, and was manufactured c1906-7.

It is thought to be second-hand in the photograph.

The van was an American Chase 10cwt delivery van, of a type known as a 'high-wheeler', developed to cope with poor road conditions. It had fully elliptical road springs and a chain drive to each rear wheel. It was right-hand drive and had a three-cylinder, 15hp air-cooled two-stroke engine and a two-speed gearbox. The wheels were fitted with steel spokes and solid tyres. This model was manufactured and bodied in Syracuse, New York, from 1907 until at least 1912. The company ceased trading in 1938.

It was discovered that some Cockshoot papers had been lodged with the Museum of Science and Industry, Manchester in the 1970s. The main item in this collection is a listing and description of all the car bodies manufactured by Cockshoot. More importantly, from the Leyland point of view, there is a subject index of Cockshoot external correspondence. No date information for this index is shown and none of the letters have been found.

However, there were extensive correspondence

subjects and addresses listed between Cockshoot and Leyland. These included LM Cartmell; Ceylon Rapid Transport (should be Ceylon Rapid Transit according to the Leyland photographs); 'Grass Cutter Steam', Herbert St; Water St (Towngate, Leyland from the early 1930s) and Forge St Leyland; George and Henry Spurrier; Steam wagons and James, Elias, John and Richard Sumner.

There was also a heading 'Leyland Van'. It is possible that Cockshoot supplied a Chase van to Leyland, who might have been interested in importing and retailing a light van which would have been a good fit into the early Leyland range of steam and petrol-engined trucks. It would be interesting to know of any other Leyland-connected reference to a light van around this time and what happened to this van?

If a Leyland representative was collecting the vehicle for delivery to Leyland, did the Company photographer accompany him and why? What was the nature of the relationship between Cockshoot and Leyland on the steam grass cutter and steam wagon and Ceylon projects mentioned above?

Mike Sutcliffe adds – This is all very interesting, thank you Chris! Of the names mentioned above, we know who the Spurrier brothers were, also some of the Sumners, but I wasn't aware that LM Cartmell was around as early as 1910 (see below). His photograph appeared in 'Once-A-Month' with other members of the sales team in 1926 and Cartmell looked quite young there, so can't have been older than about 20 in 1910. He had risen by the 1920s to the position of North East Sales Superintendent in charge of the Leeds Sales Office at 22 Boar Lane, Leeds.



At the Show, the Chase van with bonnet removed showing the air-cooled cylinders (Mike Sutcliffe collection)

Reverting to the Chase 10cwt van, it was exhibited on the Leyland Stand at the Manchester Motor Show in February 1910, the photograph was probably taken just prior to or just after the show. There was an excellent

report in 'Motor Traction' giving a lot of technical information on the van and that is reproduced here:

The Chase 10 Cwt Motor Van

15hp engine, with 3 separate air cooled cylinders
3¾in. bore x 4in. stroke, working on the two-cycle principal (two-stroke)

No magneto, but had an Atwerter-Kent ignition system
No clutch, with power direct to a two speed epicyclic gearbox

Bevel driven back axle

Imported by Leyland and sold at £230

For historical reference, Chase made a Model F Surrey or Pleasure Car, probably using the same basic design and this had a 4-seat body with no doors at the front or rear, the rear seats were removable to form a light truck. Cars were dropped in 1912 and much larger 4-cylinder lorries were made up to about 1918. Not a lot seems to be known about them but the Models A and C (1 ton and 1½ ton) had Waukesha engines and the Models B and O (2½ ton and 3½ ton) had Buda engines.

With a shortage of heavy chassis in WW1 a handful of the larger ones were imported in 1915/16, in the same way as the Romar and the Signal chassis, some of these going to BET fleets and taking Brush built bodies from Leylands that had been requisitioned in 1914. Shown here is a Leyland S4.36.T3 of 1914 of Worcestershire Electric Traction Co, soon to be requisitioned, and a 1915 Chase of Northampton Motor Omnibus Co, fitted with a Brush body which may have been built for one of the later Leyland chassis which didn't get as far as receiving its body.



FK 539, Leyland S4.36.T3 with Brush body (Brush)



NH 1694, Chase Model O with Brush body (Brush)



THE FIRST UNDER-FLOOR ENGINED LEYLAND IN GRONINGEN (NL)

By Jan Emmelkamp

The Groningen municipal undertaking (Gemeente Tram Groningen or City Tramway Groningen) ordered a Leyland Tiger Cub chassis in the spring of 1953. This chassis (no.524409), type LOPSUC 1/1, was delivered to the bodybuilder, Medema in Appingedam, in the autumn of that year. The complete bus was delivered in early March 1954 with fleet number 41 after being exhibited at the bi-annual commercial motor show (the RAI) in Amsterdam. Its body was luxurious, almost a coach instead of a citybus. Bodies made by Medema were heavyweight. This was not helpful because it was equipped with a Leyland O.350 engine and a manual gearbox.



The interior of the bus

The bus was rarely used on city services and was mainly used on short trips in the northern part of the Netherlands. Only in the winter of 1955/56, whilst the Grote Markt (Big Market) was being re-established and

the new bus station was constructed on the northern part of it, was no.41 used on the temporarily transformed trolleyroute 1 (Grote Markt-Esserweg). After that, it was used on the short bus route 8, which connected the Halte (Station North) with the Selwerderhof cemetery. On weekdays it made its journeys on an unnumbered service between the Halte (North Station) and a special school in Appélbergen near Haren.



At the depot in the Akkerstraat in Groningen

It was also used as a driver-trainer bus for new bus drivers but it was sold in October 1967 for scrap. However, that was not the end of the story; its upper bodywork was removed and placed on a house boat. Unfortunately I never took pictures of this combination (a young schoolboy doesn't have so much money for that). Half-way through the 1970s the houseboat with bus bodywork was sold for scrap.



(BCVMT L009154)

ANOTHER FACE OF LEYLAND, No.13

By Michael Plunkett

The 1920s and '30s were the decades when physical fitness became a universal preoccupation: Swedish drill, Women's League of Health and Beauty, mass exercise displays by Hitler Youth and even pre-breakfast PT at a Holiday Camp. Hiking, camping and the unprecedented exposure of sun-starved flesh would all contribute to a healthier nation – and of course to greater fitness to work!

Leyland, like most large firms, saw the potential in encouraging sporting activities among its workforce and set about providing playing fields and pitches for all forms of sport, backed up by special health facilities including ultra violet ray treatment – all the rage in the 1930s!

Sports Leagues and inter-works competition flourished, so the Leyland photographer was now called from his usual depiction of vehicles, Directors and workshop scenes, to portray ranks of PT exercisers, high jumpers airborne or victorious rugger teams. Cricket matches too – above we see an important

confrontation between the 'The Leyland Tigers' v 'The AEC Mammoths' on 1st June 1931. Right in the centre of the picture we see Aylmer A Liardet (the General Manager, whose monthly reports we rely upon so much) and, to his left is Chief Designer, John Rackham from 'The AEC' as Leyland called them. Just which team had he cheered on? We can never know!



(BCVMT L018109)

A LONG-TIME EX-EMPLOYEE OF LEYLAND

By Rodney Wright

I received the latest copy of the Leyland Torque magazine and, as was the Journal, it is absolutely wonderful and with grand photo reproduction, also the editorial content. The level of detail and information is excellent and a credit to all contributors, also the format of compilation! (*Thank you! – Ed.*)

As a long-time ex-employee of Leyland Motors, an apprentice from 1961-67 and following through to 1973, I look to the past with affection. My father and grandfather, my brother and friends also worked at Leyland, my grandfather from 1920s and my father from 1950s-70s. We have much history of the shop floor with changes in work practises and production.

My grandfather, Mr Thomas Birks, worked for Leyland being himself an 'immigrant' from east Lancashire, not as we understand the term today, but nonetheless applicable. He married a local lass, one Jane Robinson (who's relatives worked at Leyland also). He commenced his employment with the company in the 1920s until his retirement from North Works, where he was a much respected tool grinder, especially very small intricate cutting tools.

My father, Denys Wright, came to be employed by Leyland in the early 1950s, having graduated from a position as a Mill Engineer with a local cotton mill, and with some reluctant acceptance from the trade union (AEU) he successfully began employment in the Comet factory as an engineering inspector, a position he held with distinction until a transfer to Farington tool room, where he again held a position of respect for his ability in the job.

Of course, his offsprings, namely my brother Alan and myself, became apprenticed to the company from leaving school at the age of 15 to the termination of our 'indenture' after six years, including some three years of one day a week day schooling, learning the technology of engineering from a practical angle at Leyland Motors Day Continuation School. In my case the chosen career from the training school (The Pen), was to be a turner, one of the few skills accepted as 'proper', along with fitter, also the skills attached to foundry/blacksmith work. The training was excellent for those inclined to learn and befitted most with the basics of understanding of most technical problems likely to be encountered.

Progression through the apprenticeship at Leyland was intense encompassing most departments needed to develop skill in the apprentice. Fitting in the apprentice training in a volume production environment sometimes did not develop skills as intended by the planned curriculum, more like we were used as spare

hands or 'dogsodies', but nonetheless, for those that wanted to learn, it was all there, including the understanding of etiquette on the shop floor.

My factory experiences began with movement to the 100 Shop at North Works, assisting the operator of a large Turret Lathe on the then pay structure of 'Piece Work' which meant pay by produced volume. This was a regime leading to much malpractice and devious means of increasing the pay level of the operator! The apprentice was of course used to further this aim.

Following on, I continued to work in the North Works factory sites until a move to Farington and the Comet Factory, where I continued my experiences in relative wonderment of the whole massive undertaking I was surrounded with – at that time approximately 13000 people were engaged by the Leyland factory producing the best heavy vehicles money could buy (after a long wait, of course!)

Various experiences in the Comet factory included Cyanide fumes from the heat treatment and metal plating processes, adjacent and sealed only by constantly opening rubber doors. The factory, with its low roof, was not originally meant for the purpose to which it was finally put. I became a fitter on the assembly line in the 'BX' factory at Farington; from this location, and still an apprentice, was a move to yet another of the Leyland sites, the former MoD factory, named Spurrier Works. My apprenticeship was completed at the age of 21 whilst in the No.8 Shop on L60 work. Machining the timing gear intermediate sandwich plate needing accurately bored holes to fine tolerances, a job needing a large jig borer and a heavy cumbersome jig, the jig being a temporary fixture to enable mass production efficiently.

But the job became undemanding and the problems of devious piecework systems caused much frustration! The production in No.8 Shop was enthralling for me, however, with the various amazing products, camshafts, finished cylinder blocks, connecting rods for engines and various other vital parts, all produced with seeming speed and quality assured. Working on some of these operations enhanced my memories, also the engine assembly lines for 400, 600, 680 and the L60 test bays to the side of the main factory. Chassis frames were assembled in the 'Fab Shop' at the end of the factory and the Running Shop No.9, by the test track, was once used for the Centurion tank testing, including gun firing!

The development and building of the facility to produce the 500 engine was amazing in its technology, with CNC machines (computer controlled), compared



Spurrier Works, formerly called the MoS Factory, with the new 500 Shop top left. It would be helpful if someone could tell us what went on in each of these buildings?
(Mike Sutcliffe collection)

to much older production equipment still in use in the other Leyland sites. A primary problem with the derided 500cu in engine was its capacity/size, with management unable to foresee the need for 40tonne 500hp vehicles within a relatively short time frame. My later employments proved to me the general concept of the 500 engine (the 'headless wonder') was good and experiences with running these engines in Leyland National buses enabled massive mileages without any serious mechanical failures, turbo-charges notwithstanding. Starting on cold mornings presented problems on occasions, but that could be overcome.

The major problem with the existing 600/680 engine was the demand to extract power outputs for which it was not really designed and of course cylinder head gaskets failed regularly. Producing an engine of the type without a detachable cylinder head possess many difficult engineering challenges, to machine the necessary intricate and accurately finished features; that this was achieved is a victory itself.

My history at Leyland included two experiences of working for the export division, both in Istanbul and Zaire, the latter difficult in 1973, but the former produced excellent results and a commendation from recipient and Leyland.

My further involvements with Leyland products changed to a service/repair role when I changed employment to Ribble Motor Services; a major use of Leyland products. My experiences and previous history helped me to be successful as a mechanical fitter and it was very rewarding too. Unfortunately, Ribble (as Leyland) changed in response to politics and the market place.

The old factory sites at Leyland are now long gone, being subject to re-development, and heritage is hard to find in sites and buildings, but the BCVM in King St, Leyland exudes some history of the past, situated as it is adjacent to the erstwhile South Works Canteen and Publicity Departments in Thurston Road. Centurion Way. The ex MoD factories are virtually non-existent now and the Farington Leyland site has also gone All very sad!

However, the times change, and I remember when Swedish Trucks took engines from Leyland (usually on Friday mornings as I exited the factory from my night shift machining L60 parts). My brother Alan rebuilt a Leyland Steer from the 1950s and is also engaged in an Octopus rebuild; awesome tasks and nearly all done in house thanks to an excellent Leyland upbringing.

Both machines represent a time past as does your excellent publication – Long may we all continue!



The Leyland Steer at the Crich Gathering last year
(Gary Dwyer)

LETTERS ETC.

LMS Leyland Railcar – from John Fallon

I have attached some pictures which may be of interest for readers of Torque. I'm a member of the Edinburgh Society of Model Engineers and we are building a miniature ride-on railway on our 14 acre site. Recently, a visitor from England turned up and ran his battery railcar model. It turns out he has made a model of one of the three LMS railcars that Leyland Motors built in 1933. I recognised it immediately as being based on the top deck of a 'V' front Leyland Titan TD3. His model runs on 7¼ in gauge track.



Meccano Leyland Super Beaver – from David Thorp

Earlier this year I contacted you to advise that I was making a Meccano model of a Super Beaver with export cab. I have just finished the model – with radio controlled forward, reverse and steering. It is built at a scale of 1:6 – the model being 1350mm long compared with the Leyland being 8048mm long. This matched the 'ash-tray' tyres which I



used. The model weighs a hefty 14kg and has been road tested on a local car park at 1.7mph – a scale speed of 10.2mph, very underpowered, like the

original! Here are a couple of photos – one showing the radiator with a Leyland Society Badge which was a perfect fit.

Unusual Leyland Scroll Badge – from Chris Green

I attach a photo of a Leyland scroll, vehicle size, with two bars added. Have you any idea what this was on? We have at least one in the British Commercial Vehicle Museum. It has a (largely indecipherable) part number on the back of the casting in the 2xx,xxx series.





Two magnificent Leyland 22.01 Octopuses of The Sutherland Transport & Trading Co dating from 1952/53. The NS series of registrations for Sutherland CC only reached NS 5685 by 1964 when the registration system changed and year suffixes were introduced (BCVMT L049544)

COVER PICTURES

Front Cover

What a magnificent photograph this is! It was taken when this Leyland Titan TD5 was brand new – well, nearly new judging by the front types (which could have been on contract and transferred from another bus). It was taken by Geoff Atkins on a sunny day in 1939 and demonstrates not only the excellent quality of Geoff's photography, but also the wonderful livery of the Lincolnshire Road Car Co in the 1930s. Elaborate liveries like this mainly disappeared during World War 2, rarely to return, due to wartime economies, nationalisation and spray painting. LT567, **AFU 844**, had chassis no.300823 and carried a 'Bailey-designed' Leyland 'Hybridge' all-metal body seating 56, and was fitted with standard LRCC Clayton destination indicators. Note the deeper front dumb-irons of the TD5 when compared with a TD7 and louvres in the bonnet side, also the autovac.

(Geoff Atkins – Simon Butler)

Back Cover – upper

'Leylands, Luxurious as Limousines' was one of Leyland's regular slogans using alliteration in the 1920s. This followed 'The Lion of Olympia,' the Leyland Eight luxury car which caused such a sensation at the 1920 Motor Show and which Leyland Motors capitalised upon by naming the LSC1 the

'Lion' in 1925. The bonneted version, the 'Lioness' was deliberately designed to look like a large luxury car and even the radiator bore a close resemblance to the Leyland Eight. **HD 3539** was a Leyland Lioness LC1 owned by E Box & Sons, Dewsbury, who were connected with the well-known heavy haulage firm Norman E Box Ltd, Manchester. It carried chassis no.46559 and the builder of the 26 seat All-weather body is unknown. It was delivered in March 1928, just after the Box stage carriage services had been sold to Yorkshire (Woollen District) Electric Tramways. Box carried on with their coaching operations until March 1936, but these were sold to Yorkshire Woollen in March 1936 with this Lioness becoming no.378 in the YWD fleet. It was then sold to Rowe, Cudworth, Yorks for further use

(Geoff Atkins – Simon Butler)

Back Cover – lower

Still on the theme of limousines, **RN 8850** was a Leyland model FT4A Limousine fire engine, chassis no.100156. It was delivered to the County Borough of Preston, no.6, in March 1939 and the bodywork followed two similar Limousine fire engines delivered to Edinburgh, in 1937 and 1938. It had the smooth-running Leyland E.105, 6-cyl, petrol engine, probably the best petrol engine Leyland Motors ever made

(BCVMT L0233753)

TAILPIECE

BOLTON'S MAROON & RED LIVERY



In 1932 Bolton Corporation modified its livery from maroon with three white bands and roof to maroon with three red bands, maroon domes and retaining an off-white centre portion of the roof (possible to retain white lead paint on most of the roof, used regularly in those days). The red bands were profusely lined out in typical Lancashire fashion and the usual tram-style ornate fleet numbers were carried. No upper deck advertisements, just another Corporation coat of arms; municipal pride in Lancashire wouldn't entertain adverts at that time, describing London's buses as mobile advertising hoardings!

This is a Leyland Titan TD4c, the first of a batch of five being numbered 25-29, **WH 7801-05**, with

chassis nos.10621-25, in order, delivered in June 1936. They had Leyland 'Hybridge' bodies, a comfortable H28/24R. These, together with the following batch of 15 Massey bodied TD4cs have frequently been recorded as having lowbridge bodies in error.

This all-metal Bailey-designed body was the first version of the body, with a fairly 'angular' rear end compared with later versions. The corners of the windows were square until window pans were introduced with radiused lower corners in 1938, an improvement which would considerably improve the prevention of water ingress at the bottom corners. Note the oval plinth at the bottom of the rear panel, ready to take the PSV licence plate. *(BCVMT L017925)*

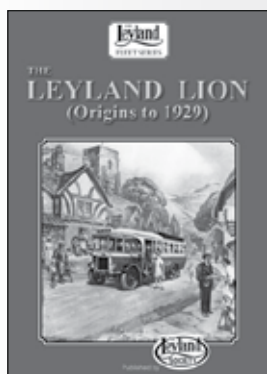
LEYLAND TORQUE

Opinions and views expressed in this publication are not necessarily those of the Society, its officers or the Editor. The Editor would be pleased if members could bring to his attention any errors. Every effort is made to give due credit for all photographs and material used. Should there be any unintended breach of copyright, then the Editor must be informed to enable acknowledgement to be made. Under the Data Protection Act 1984, the Society gives notice that membership records, Leyland Vehicle Register details and Leyland Torque dispatch information are held in a database. The Society undertakes that this information is not divulged to any outside agency or individual.

This issue of Leyland Torque has been produced by Mike Sutcliffe, with proof reading by Gordon Brooke. It was printed by AB Print Group, Leeds. Distribution by RnB Mailing, Leeds. **Items for inclusion in the Summer 2019 issue should be sent to the Editor by 30th April 2019, please.**



SOCIETY SALES

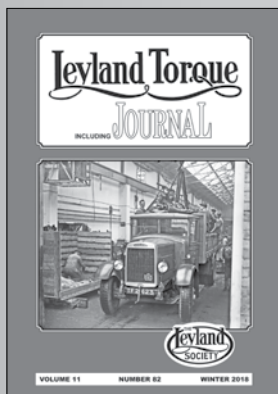


Leyland Fleet Series

Books recording the operators and fleets of important Leyland customers

- Wigan Corporation £7.95
- Southport Corporation £7.95
- Leigh Corporation £8.95
- Leyland Fire Engines 1930-1942 £8.95
- Buses of Burnley, Colne & Nelson £8.95
- Plymouth City Corporation £8.95
- The History of Halton Borough Transport £8.95
- Ribble Double Deck Coaches £8.95
- Edinburgh Corporation & Lothian £9.95
- The Leyland Lion (Origins to 1929) £14.95

Prices including P&P



Leyland Torque and Journal

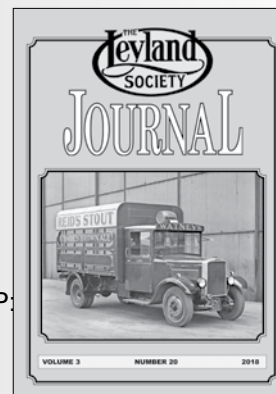
Nearly all back numbers of Torque and Journal are still available:

- £6.00 for Torque 1-80
- £9.00 for Torque 81 onwards
- £9.00 for Journal 1-20

(Prices above are for each, incl. P&P, but special deals available for quantities)

Binders (for 8 issues) are also available, incl. P&P:

- £8.00 for Torque 1-80
- £10.00 for Journal 1-20 (now in stock)
- £10.00 for Torque 81 onwards (now in stock)



Society Clothing

Placket Sweatshirt

Available in Navy Blue, and Burgundy

Sizes S, M, L, XL, XXL

£25.84 inc P&P

Polo Shirts, Body Warmers and High Visibility

Waistcoats are also available, more details

can be obtained at www.leylandsociety.co.uk



Baseball Cap £11.99
inc P&P



Rally Mementos

Available for most Leyland Gatherings see website or brochure for other Badges available.

The Badges shown here are from the most recent Rallies.

Price £7.00 each including P&P



See our website for special offers - www.leylandsociety.co.uk

Please send your order to the address below

All prices include P&P for UK orders only (non-UK by arrangement)

Payments should be made to "The Leyland Society"

The Leyland Society, Richard Lukey, Marrick, Thorpe Bassett, Malton, North Yorkshire, YO17 8LU



“LEYLANDS – LUXURIOUS AS LIMOUSINES”

