Engine Forum

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Gardner Engine Forum Philosophy

"The aims of the Forum are to promote and foster interest in all Gardner engines"

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Cover Picture

Gardner Engine Rally 2007
Park Head Locks, Dudley
View from the disused railway

Chairman's Jottings

Reflections on the past year can of course give us mixed memories of the good and sad times that life throws at us.

The rally which was held at Park Head Locks in Dudley this June was a huge success. It was well attended by all types of engines and as usual we had an excellent following from the boats. We were very fortunate that the forum was able to fund the whole event and each year we learn more and more as to what is required to organise a good rally. The weather was exceedingly kind to us, the only hot and dry weekend we appeared to have the whole Summer. The location was also very good but it was highlighted that our publicity is sorely lacking, something we need to sort out for the next rally in 2009. Any thoughts or suggestions would be most welcome. Plans are already being drawn up for the 2009 rally with locations in North London and Milton Keynes being looked at closely - though we acknowledge that a Southern location is very much needed for future rallies.

Moving our boat "Sharpness" around the system this year has been very interesting with a lot of interest being shown in the Gardner with folks wanting to stand and chat more than ever.

And now for the sad news.... both Mike and Lucy Short (Treasurer and Editor/ Secretary respectively) have announced that they wish to stand down from the Committee with effect from the 2008 AGM and therefore do not wish to be put up for re-election. Mike and Lucy have managed to bring the Gardner Engine Forum and the newsletter into the 21st Century. They have been very keen and conscientious supporters to both myself and the forum. Unfortunately I have been unable to persuade them to stay and they will be sadly missed. A very big thank you goes to them both for all they have done, and we wish them well in whatever other interests life moves them to.

There are now therefore two key roles on the committee that will need to be filled by next March and we would very much like you to join us. If you have any interest and would like to know more, please feel free to contact me by phone or email.

The forthcoming AGM will be held at 2.00pm on 15th March 2008 at the Anson Engine Museum, Anson Road, Poynton, Nr. Stockport, Cheshire and we look forward to welcoming as many of you as are able to attend. A reminder will be sent nearer the time and I look forward to seeing you there.

And finally a warm welcome to our latest recruits:

Mike Griffin	Garry Bowler	Tony Bowman	Paul Bailey	Tony Hodges
Edgar Waine	Terry Olds	Christopher Taggart		Neil Ecclestone

Colin Paillin
Chairman - Gardner Engine Forum

Continuing our transcript of:
Diesel Maintenance
T. H. Parkinson, AMIAE

SPARE PARTS

Selection of Service Spare; Small Fleets; Injection Equipment and its Storage; Unit Replacement; Method of Stores Control; Salvage and Material Reconditioning

Advice in spare part selection and storage can only be offered in general terms. In the case of the small user, it could, in many cases be termed good advice to carry as few spares as possible. On the other hand, if the nearest service depot is some distance away, a reserve of essential material is necessary if maximum vehicle use is to be achieved.

In estimating requirements for a fleet of say six vehicles, the relation of the maintenance programme to the spares supply is obvious. If regular inspection is undertaken followed by repair and adjustment intervals on a time or mileage basis, the owner should have little difficulty in estimating his needs. For instance, a fleet of this size is unlikely to require injector changes on more than one vehicle at a time and assuming that all the vehicles are of a similar type, one set of spare sprayers would suffice. This principle can be applied to other components when the time or mileage intervals have been established. Spare heater plugs (if fitted) and fuel and oil filters should form part of the normal stock. In considering engine parts the position is more complicated. Repair periods calling for engine part renewals occur at much longer intervals. The stocking of valves and springs could with advantage be undertaken but it will be appreciated that the routine attention calling for valve and spring replacement would not require supplies under periods of three monthly intervals at least.

Items such as these are governed by a number of factors; availability of spare, the class of repair personnel employed, and by no means least, the views of the owner in tying up capital for which there is apparently no immediate return.

The foregoing remarks relate to normal conditions, but the position today is more a question of knowing what spares are required and getting them. It will be obvious, therefore, that planned maintenance is vital if any attempt at forecasting supplies is to be accurate.

In emphasising this point it is accepted that the finest maintenance system cannot be immune fro unforeseen mechanical failure, but it may be agreed that regular maintenance procedure, based on actual study of running conditions, limits these failures or permits an intelligent anticipation of their incidence, so that a sound basis of assessing spares required is provided. Under normal conditions, the smaller user has nothing to gain in stocking fuel pump parts and items such as pistons and bearings; these, as a rule, are associated with specialist repairers. It is assumed, however, that the fitting of a single big-end bearing lies within the capacity of the repair personnel employed, but an attempt to carry complete bearing sets has little to commend it, and a little thought on the part of the operator will indicate the advantage of putting out work of this description to specialists. Time will undoubtedly be saved and the mechanic more usefully employed on other chassis rectifications during the period of major repairs. It is not suggested that the average fleet mechanic is unable to carry out such work, but rather that the amount of specialist work arising in a small fleet maintenance is insufficient to keep a mechanic skilled in that particular field fully employed.

As these considerations narrow the field, the storage of essential spares presents little difficulty. At the same time it is desirable to stress the importance of careful handling of such items as filters, sprayers, valves and springs. Filters for instance, will not function any better if choked with dust, therefore some form of container is essential. Sprayers should be stored in racks, likewise being protected from dust and damp. Valves and springs require the same treatment and possibly no better methods can be found than shelved cupboards or drawer with suitable wooden trays or stands. Incidentally this method is an ideal one for metal parts and cleaning is simplified if penetrating oil is applied periodically by spraying.

The foregoing can to some extent be applied to the larger fleets although spares requirements will be greater and since many of the larger operators carry out specialist operations the range is increased.

Stores control in normal times in the larger undertakings is regarded as part of the routine organisation and efficient store-checking systems are looked upon as an essential. Various methods of control are exercised such as consumption analysis over a time period or estimating on a given output; the relation to maintenance methods will be seen. As mentioned previously, many operators carry out specialist repairs such as cylinder reboring and sleeving and bearing replacement. In the latter case even if crankshaft grinding is not undertaken on the premises adequate stocks of bearings are necessary. Large fleet maintenance particularly where specialist work is undertaken, lends itself to accurate assessment of material requirements; in such cases spare part supply resolves itself into an assessment of the number of unit overhauls. The intervals, usually mileage, are known factors and spares requirements become numbers required to produce a given output over three, six or even twelve monthly intervals. It is outside the scope of this chapter to attempt any detailed description of stores organisation, but it is appropriate to emphasis once again the importance of the careful storage of injection equipment.

Large fleet users invariably carry out repairs to injection equipment and maintain the necessary skilled personnel for pump adjustment and overhaul. In the case of injectors, nozzle re-conditioning after the limit of normal adjustment is reached, is usually undertaken by manufacturers. Spare and reconditioned nozzles are delicate and must be stored and handled with care. Fuel pump governor springs are fairly regular replacements in the larger fleets and their storage and subsequent re-issue also demands care in handling. Experience does not confirm the need for large stocks of pump elements, quandrants and control rods, but some cover in these items is necessary where injection equipment repairs are carried out. The control of material of this type presents problems that vary somewhat on ordinary spare part control.

So far as storage is concerned these parts should be classified on a similar basis to fine tools. Nozzles are most satisfactorily dealt with if accommodated in wooden trays preferably in drawers. A distinction between new and re-conditioned injectors must be established and in the latter case some identification by etching is necessary. As a rule complete injectors used as service units are only handled by stores in transferring to garages or running depots, although where spare vehicles are laid up, injector removal and storage is necessary. Mention has been made in the chapter on injection equipment of the necessity of adopting a colour scheme for identifying varied types. This practice should be followed by stores when storing injectors. As simple wooden stands are capable of accommodating these components, storage is not difficult and this method allows easy spraying to prevent rust. A colour scheme is vital in the storage of springs and each spring should be identified so that pairs can be matched with ease. Regarding pump elements and control rods, the ideal method utilises glass covered show-cases. A considerable amount of equipment can be accommodated in a single case and as the construction is usually dust proof the cleaning problem is simplified. This detail may create the impression that storage of injection equipment is being overstressed, but it will be recognised that the workmanship limits are extremely fine and damage due to careless handling is easy to inflict and difficult to rectify. It is pertinent to ask if any maintenance organisation would keep micrometers in the average store bin; the parallel is obvious.

The regular flow of unit reconditioning associated with the larger fleets adds additional responsibility to the stores organisation. Standards of oversizing and undersizing in such components as cylinder blocks, pistons and crankshafts involve checking, whether work is done on the premises or not. Under the conditions obtaining in the repair works of large output dealing with a standardised fleet it is probable that the engine unit, recorded as a number, only retains its crankcase on re-assembly. The issue of a reconditioned block with pistons, therefore, and possibly the former having received welding or other repairs, must be controlled by some form of record if unit life information is required. Further accurate costs must be to some extent governed by material issued, consequently the importance of stores control in this matter will be seen. It is vital in an efficient organisation that more than a passing knowledge of wear tolerances and repair standards is possessed by some member of the stores personnel. This standard of knowledge it is admitted is not usually available in the average stores staff. The need for providing for it will be obvious particularly if successful material salvage is to be carried out. Prior to the war, the importance of salvage was recognised by the majority of the larger fleet users, but present day material shortage make a successful salvage section almost a necessity if continued operation is to be maintained. The reconditioning and reclaiming of material cannot be successful if the check of working life is left to chance. A simple illustration will demonstrate this.

In the case of ball and roller bearing reconditioning, which is a specialist operation, the percentage of reclaiming is fairly high. This may be to some extent governed by the encouragement to remove races for reconditioning at shorter intervals. It will be obvious therefore that some means of identification readily recognised must be practised if accurate estimates of life are required. Etching, giving the date, is a simple matter but unless machinery is in operation to estimate the actual life of the part when a failure occurs, the value or otherwise of reconditioning is unknown. It is accepted that as a principle, the issue of a part, reconditioned or new, shall be against the return of the replaced part either as scrap or possible salvage and that the decision as to which it shall be is a function of the stores. The provision of suitable personnel with the necessary qualifications has in some cases been solved by selecting a suitable fitter with general qualifications (including some machine shop knowledge) and after a short period of training on stores routine, giving him charge of the stores side of reconditioning and salvage. Briefly he is responsible for assessing wear, issuing stores orders for repair to recognised standards, and where any work is put out, for checking dimensions before acceptance for re-issue. Salvage of material passes through the same channel. All scrap, for which suitable containers are supplied in each section of the works, is regularly collected, sorted and graded. The growing possibilities of material salvage are conveyed by the following which being confined to engine units, does not represent a complete summary of salvage possibilities.

It will be appreciated that material salvage schemes of this type are confined to the larger operators. The small owner is unlikely to have the supplies of material for reclamation or the facilities for handling. At the same time he should not allow any reclaimable material to lie out of use. A number of leading chassis manufacturers have comprehensive salvage schemes in operation and anything that can be reclaimed today, might mean some vehicle in use instead of being held up for parts.

Component	Treatment
Alloy cylinder heads	Corrosion and local damage built up welding
Cylinder blocks (cracks)	Metal cut away and steel plate low temperature welded (Alda bronze)
Pistons	Ring grooves built up or turned to oversize; Gudgeon pinholes reamered oversize
Valve inserts	Stellited
Rockers	Built up Stellite
Flywheel	Starter ring teeth built up
Fuel pump couplings	Metal thrust faces built up
Water pumps	Impellors built up
Camshaft bearings	Bored out and white metalled
Gudgeon pins	Oversizes ground to standard
Fuel pump brackets	Welded and machined
Fuel pump bodies	Machined and tipped
Steel backed main bearing shells	Re-metalled
Pump shafts, etc.	Built up (Sif or Alda bronze)
Ball and roller bearings	Reconditioned.

It is difficult to foresee the effect salvage will have on post-war maintenance, but it will be obvious that accurate knowledge cannot be acquired without careful check on part life. If this knowledge is not available the economics of material salvage will be influenced by uncertainty and doubt.

GARAGE AND WORKSHOP LAYOUT

Notes on Repair Equipment; Fuel and Lubricating Oil Storage Installations; Lubricating Oil Reclamation

The design and layout of the garage and workshop is a subject on which any advice given can only be in the nature of tentative suggestions. The whole subject is influenced by individual opinion, and when the combination of fleet sizes and different ideas on maintenance are considered, the number of, and the variation in the schemes possible, would fill a volume; however, experience indicates certain general lines that are worth following. Any scheme of layout for small fleets is unlikely to have much in common with those applicable to the larger user. Space in the former case will be at a premium and garage and workshop will probably be combined. Some operators in this class, however, have installed ramps or hoists for lubrication purposes and this eliminates the need for pits. In the past, even in big establishments, repair pits may have left a good deal to be desired but the modern interpretation of repair pit construction offers many advantages to the small fleet owner. A joint inspection and repair pit with lubrication facilities, constructed on modern lines coupled with the now accepted practice of adjoining axle pits could be of great value to small fleets with limited repair personnel.

A good deal of controversy in vehicle maintenance centres around the merits and demerits of low level work-benches. This method has disadvantages when frequent engine unit changes are undertaken. When considered in relation to small fleet maintenance the disadvantages are not so obvious. Equipment requirements, owing to the nature of the work undertaken are obviously limited while the employment of specialised tools will be dictated by the type of fleet operated.

In the chapter on fuel injection equipment the importance of light and cleanliness was stressed and this should not be overlooked when planning the section of the shop in which injector maintenance is to be carried out.

There appears little point in elaborating on large fleet layouts as, generally speaking, garages carrying out light docks have designed pit layouts and in the majority of cases unit overhauls are dealt with in specialist grouped workshops. In these cases, equipment ranges from shop-constructed adaptations to elaborate machine tool layouts. As an illustration of accepted practice in this sphere and confiding it to engine unit overhaul, it is unusual to sub-divide the unit into separate and self contained sections: dismantling - cylinder heads and manifolds - cylinder block and piston group - bearings (main and connecting rods) – auxiliaries - erection.

In considering equipment under these headings, the close association of cleaning facilities to dismantling will be apparent. Oil engine unit overhaul has been responsible for steady progress in the improvement of cleaning facilities for there is a demand for something more efficient than the old type paraffin bath formerly associated with repair shops. Self-contained plants using a boiling solution of water, silicate and caustic or the alternative chemical degreasing again trichloroethylene, are now in general service. In the latter case the chemical is vaporised by gentle heat, the vapour acting as a solvent on the dirty parts of the container. Condensation of the vapour is effected by cooling tube coils in the upper part of the plant and the liquid further helps the cleaning process on its descent to the vaporising tank. The parts are dry on and the degreased dirt can be brushed off. The caustic, silicate and water method the solution is circulated under pressure and impinges on the dirty parts through jets in the plant cleaning chamber. Although free from oil and dirt the parts are not dry and if wanted quickly a warm air blast is necessary. Yet another method, particularly useful in the small repair shop is the use of the proprietary oil emulsifying agent "Gunk". When this is dabbed or brushed over oily parts they can be washed clear of oil and oily dirt with a low pressure cold water hose.

The situation and general layout of cleaning sections, particularly where the flow of work is constant; is worthy of some time and thought. Isolation of dirt and easy access to dismantling and assembly departments are two essentials. The provision of a small bay for cold water pressure cleaning and a stand for rough cleaning of exceptionally dirty components with paraffin, all speed up an unpleasant but highly important operation. Elaborate commercially-produced engine stands either for dismantling or erection have not been favoured more than the shop-designed stands which are a feature of many modern layouts.

Cylinder head and manifold sections, as a rule, maintain an output of components to meet dock requirements in addition to unit overhaul output. Their equipment, therefore, includes valve reconditioning plant, valve insert cutters and a surface grinder for cylinder head and manifold facing. The cylinder group, which is also responsible for pistons, gudgeon pin and ring fitting and with the final checking of connecting rods, requires to be provided with dial gauges, micrometers, reamers and connecting rod alignment equipment. Bearing sections, organised in the modern conception of bearing fitting, are equipped with line boring plan for main bearings and equipment for boring connecting rod bearings. Auxiliary component repairs such as exhausters and the present day adoption of carbon seal water pumps, require motive power for the necessary running in. Erection, on the other hand, apart from special alignment jigs for certain auxiliaries, does not call for special equipment. It will, or course, be recognised that the justification for plant outlay of the varieties specified is governed by output, while sub-division of engine repairs as outlined is hardly justified on , say, two units per week. At the same time bearing equipment on even a single overhaul per week is a sound investment if only from the point of view of the class of work produced. Machine shop relation to repair shop output in normal times is a debatable issue. Local buying facilities as regards machined parts were in many cases such that every inducement was present to use them. Thus, specialised equipment such as brake drum grinders and cylinder reconditioning plant, etc., gradually absorbed machine shop labour. Today however, salvage and spare part reconditioning allows little surplus time in the average machine shops.

A certain amount of information has at various times been published on fuel installation and storage. As this is a particularly important aspect of, and closely related to successful maintenance, a review of certain recommendations is desirable. It cannot be too strongly emphasised that satisfactory oil engine operation is not likely to be achieved unless the methods of storage and handling of fuel are right.

Some difficulty has been experienced in layouts converted from petrol installations. It will be obvious that wherever possible, operators preferred to adapt existing equipment when changeovers took place. Essential requirements however, can be summarised very simply:-

1. Initial cleanliness of tanks.
2. Ease of sludge removal
3. Periodical analysis of fuel samples.

It will be seen therefore, that certain difficulties arise in converting initial underground installations. Experience has however indicated that improvement can be obtained on this type of installation by carrying out various modifications. Alterations to the tank pit to allow the drawing off of settled deposits and modifying existing layouts to incorporate methods of cleaning the fuel prior to issue are justified in the light of experience. In the latter case the introduction of a centrifuge in series between input and output tanks is now general practice. This method embodies the use of reception tanks for acceptance of the bulk fuel delivered. A centrifuge is then connected between these tanks and the issue tanks, to which the delivery columns are coupled. Many of the modern installations favour overhead or above ground tanks with gravity supply to the delivery columns. This latter arrangement in single tanks is popular practice in small fleet installations. At the same time, difficulties of space above ground in the large installations have compelled the adoption of underground fuel storage. There are some excellent examples of this method to be seen in certain of the large undertakings. Manchester Corporation Transport have an example of an ideal underground installation. The tanks are mounted on ramps or bolsters in what might be termed an underground room. They are positioned for easy access and set at a slight angle to facilitate deposit collection. It is thus a simple matter for an attendant to draw off through appropriate cocks and test for sludge. In this particular case, the receiver tanks are connected to a common lead and with the centrifuge in series the filtered fuel is passed to the clean fuel tanks situated in the same chamber. An additional refinement is that the cleaned fuel is then pumped to an overhead tank which supplies the delivery columns by gravity. A useful feature of overhead installation is thus retained, i.e., by having an adequate supply available and feeding by gravity the aeration of frothing associated with rapidly pumped fuel is avoided.

Overhead installations for lubricating oil are in general use. As compared with fuel installation they do not present the same space difficulties, although there are, of course, a number of underground installations. Certain modern installations have been developed to enable oil sumps to be topped up during the fuel filling period. Either type of installation can be used with this method - the final choice of equipment will be governed by garage layout and local conditions.

Lubricating oil reclamation has been the rule for some years in most of the large fleets. The methods of using reclaimed oil vary but a common system was to use new oil for sump filling after repairs or for routine oil changes to and reserve the reclaimed oil for topping up between these intervals. Present-day conditions have made reclaiming absolutely necessary and any feeling of doubt as to its advisability must be over-ruled, but there appears some divergence of opinion as to whether the scheme adopted should be the use of self contained units or whether there should be a centralised reclaiming organisation equipped either with a battery of small plants or with a large scale single unit. The governing factor naturally is the location and number of used oil supply points. At the same time if garages are situated within a reasonable distance of the central works there is something to be said for the collection of used oil, reclaiming it at a centralised plant and subsequently redelivering it to the operating units.

If the latter scheme is adopted and the weekly output is in the region of 400 to 500 gallons this justifies the use of a full time attendant. Based on a scheme of this type employing semi-skilled labour the cost, including plant maintenance and capital charges works our at 1s. per gallon on an annual output of 25,000 gallons. In garages using self-contained units there are certain advantages in handling and re-issue. The installation can be designed to include sump draining direct to permanent tanks and the transfer there from to the reclaiming plant and ultimate return to the issuing installation without the use of barrels or containers.

There is one factor in connection with oil reclamation that may influence the adoption of the process and the plant associated with it. It is what may be termed continuous reclamation on the vehicle itself. Or if that description appears to have an exaggerated tone then super-filtration by the use of by-pass filters in the pressure side of the engine lubrication system. On the earlier oil engines it was not usual for pressure filters to be arranged to deal with the entire flow of oil, although the Gardner engine always had a full-flow filter in the delivery line from the lubricating oil pump. Subsequently most maker incorporated combined filters and oil coolers through which the whole of the oil was passed. But the new types of by-pass filter here more particularly referred to are proprietary devices coupled into the pressure system in parallel with the branches leading to the bearings and other points. The effect of this arrangement is that while the entire volume of oil does not flow through the special filter, a proportion deflected from the high pressure circuit is continuously passing, so that in the course of time all the oil goes through.

Diesel Maintenance continues on Page 16.........

GARDNER ENGINE RALLY – JUNE 2007

And the winners are......................

BEST MARINE

David Dowler – 4LK

BEST ROAD

Edwin Fasham – 4LK

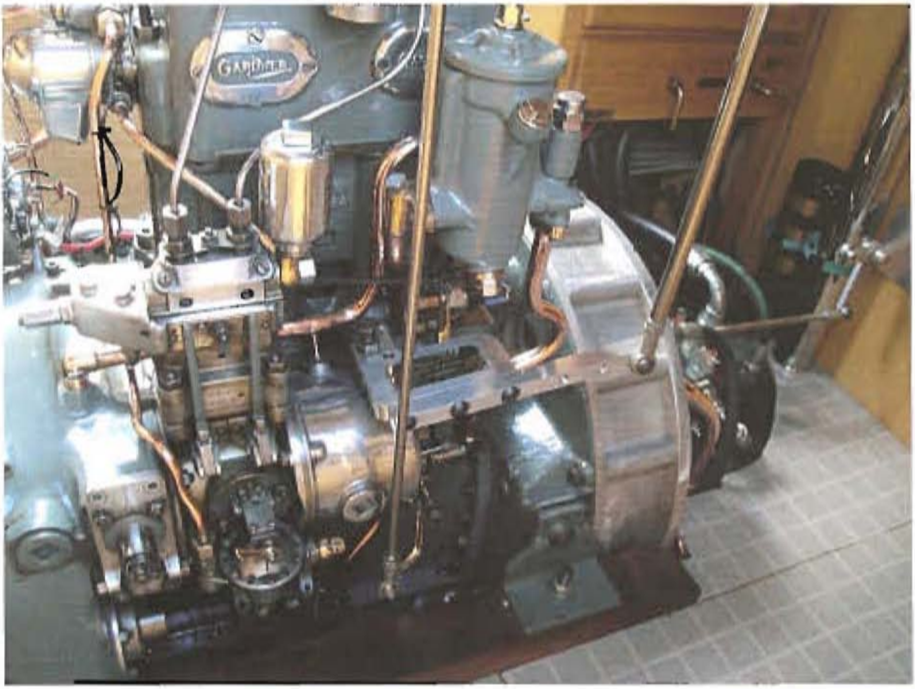
BEST STATIONARY

Cliff Noble – 1L2

BEST OVERALL IN SHOW

Alan Bagshaw – 2L2



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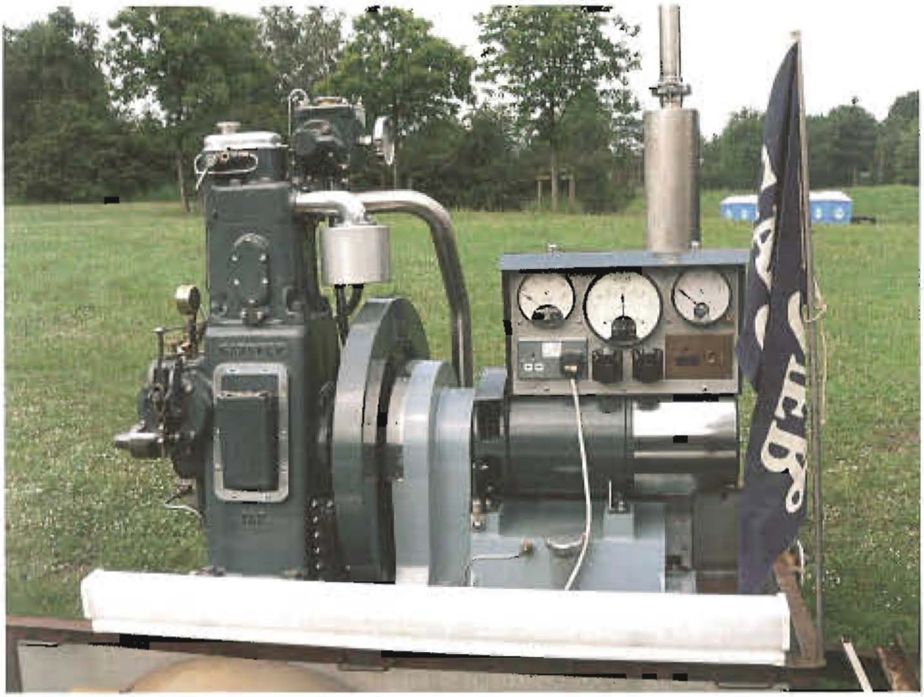


Rally Entries 2007	Engine Model	Engine Serial No	Date of Manufacture	Engine Application
Colin & Rita Paillin	4L2	29560	1931	Marine
Mike & Lucy Short	2LW	118752	1958	Marine
Steven & Judith Gray	3LW	91628	1953	Marine
Donald & Beryl Gray	3LW		1954	Marine
Andrew and Linda Kemp	2LW	155109	1966	Marine
Jeffrey Barley	4LK	86301		Marine
Graham & Susan Russell	2LW	1935		Marine
David & Pat Talbot	2LW	115500		Marine
Roger Maylam	3LW	136654	1962	Marine
Michael Zair	4L2	49095	1940	Marine
Ian Ashcroft	3LW	126516	1960	Marine
Ian Gilbody	2LW			Marine
Bernard & Janet Hales	5L2	29245/29748	1932	Marine
Edwin Fasham	3LW	109505	1956	Marine
Mike Johnson	2LW		1963	Marine
Paul Bailey & Karen Kendal	2L2		1932	Marine
Dave & Janet Dowler	4LK		1954	Marine
Peter Boyce	2LW		1945	Marine
Terry Olds	3LW			Marine
Alan Moore	3LW		1964	Marine
Alan & Pamela Bagshaw	2L2	60016		Marine
Peter & Mary Freakley	4LK		1952	Road
Edwin Fasham	4LK	138681	1963	Road
Robert Cotterill	8LXDT			Road
Ron Morgan West Midlands MCW Bus Group	6LX			Road
John Ramm	8LXB	198743		Road
Henry Wilson Tuer	4LK	106394	1955	Road
Henry Wilson Tuer	4LK	143587	1964	Road
David Reed	6LW	179555	1971	Road
Cliff Noble	6LXCT	23309	1982	Road
John Waynham	6LW	54393	1940	Road
Paul Smith	4LK		1939	Road
Bill Geldeard	4LK	91744	1952	Road
Edwin Fasham	1L2		1968	Stationary
Jeff Ramsay	1L2	34625	1935	Stationary
Raymond R Kings	1HV	5322	1903	Stationary
Cliff Noble	13HF	51758	1941	Stationary
Cliff Noble	1L2	33022	1935	Stationary

Diesel Mainentance (Cont/d...) The filtering medium is a chemical-impregnated felt or fabric cartridge and its effect is to remove all physical impurities and to correct certain chemical changes in the used oil and it is a fact that even after very long runs extending over some thousands of miles, with necessary topping up but without sump draining, a standard grade of oil retains its original clarity of appearance and colour. At about 10,000 miles the filter cartridge must be renewed, but no special maintenance procedure is otherwise required.
Pressure filtration on the vehicle is becoming increasingly adopted by the automobile world, and though it is as yet by no means common on oil engined vehicles it must be considered in relation to any plan for the installation of oil reclaiming equipment.

THE FUTURE OF THE OIL ENGINE

Present Development; Effect of Special Materials on Maintenance; Weight Factors; War Conditions in Relation to the Trend of Design

Some indication of the trend of design in the development of oil engine power units has already been given. Direct injection units have undoubtedly taken the lead in the road vehicle field, and in the heavier class capacities of 7.5 to 9 litres, delivering 90 to 110bhp are in general use. Consumption in the region of 0.35pts per bhp-hour is a fairly generally accepted standard of fuel consumption efficiency. Engine layouts in production up to 1940 followed orthodox lines and in the majority of cases the general design closely followed accepted petrol engine practice although there was some diversity in the choice of crankcase material, and magnesium alloy, aluminium and cast iron have each had their adherents. But cylinders with dry liners are universal and hardened crankshafts with lead-bronze and alloy big-end bearings and white metal main bearings are standard practice. Cast iron is practically universal in cylinder heads, while inserted valve seats have been generally adopted.

Early experience of special materials, particularly where use in crankcase construction, did not encourage operators to welcome this material in later designs. At the same time it is recognised that most of the troubles invariably associated with early stages of design are eventually overcome. Nevertheless, the considerable improvement in the associated components that followed changes from light alloy to case iron crankcases make it unlikely that any reduction in the popularity of this material can be expected while the present supply position, of course, suggests that its use will be increased in any case. In considering weight factors, the heavy vehicle industry has suffered to a considerable extent from the difficulties imposed by an arbitrary system of legislation, in which taxation is based on unladen weight. Meanwhile wartime experience of multi-wheel and tractor vehicles may ultimately play a great part in revolutionising the design of civilian transport vehicles. It is possible too, that the condition of road surfaces may for some years be such as to retard the return to what has hitherto been accepted as normal practice.

When future development possibilities are considered, the "ifs" likely to arise as a result of wartime service are innumerable. Oil engines are being increasingly used in military mechanised vehicles, passenger and goods, while the claims for under-floor engines are by no means to be ignored. Technical development, however, may not be the deciding factor. It is doubtful if any reasonable estimate of post-war conditions can be made; it is generally recognised that some time will elapse before production of vehicles for civil duties can commence after the war. And in any case it is likely that first releases will be based on tried designs rather than that they will incorporate any considerable breakaway from present orthodox practice. In considering future possibilities it is impossible to ignore factors such as the release of military vehicles, which might under certain circumstances mean the adoption of load capacities less than those at present generally accepted; certainly flooding of the market with War Department surplus, as happened immediately after the last war, will be opposed by trade and manufacturing interests. The last war was largely responsible for extensive development in transport vehicles, and generally speaking the class of machine available as surplus was not entirely suitable for civil requirements. A different position arises today. The transport vehicle prior to this war was a highly efficient machine and the type will survive some years of post-war activity. One can thus appreciate the distinct possibility of vehicle manufacturers rebuilding war disposal chassis; further unit reconditioning with modern manufacturing facilities has undoubtedly proved its worth in the car world. Will post war conditions encourage this development in the transport and passenger vehicle industries? This might for some time retard the development of new designs. The whole subject bristles with interesting possibilities.

One factor does emerge as likely to affect the future of the oil engine. The considerable increase in knowledge of mechanisation gained by army personnel will be reflected in the class of driver available and in the wider knowledge of many garage hands, and oil engines will no longer be something of a mystery, as they have been to many people associated with transport whose experience was largely confined to petrol vehicles.

Technical development will go on, it cannot stand still, and investigations into combustion phenomena and the knowledge and experience gained in the use of modern alloys in the aeronautical sphere might even produce a competitor to the oil engine. Economic conditions, and possible shortage of good quality fuel may give encouragement to designs embodying improved combustion changes and petrol injection principles that will bring to the spark ignited engine a thermal efficiency comparable with the diesel. But in spite of such possibilities there can be no doubt that the place of the oil engine in road transport is assured for a long time ahead.

Editor's Note – This extract has been taken directly from the book printed in 1942 and the written word, grammar and punctuation has changed quite significantly over the past 60 years.

And this concludes the transcript of the book

The Gardner Bug
By Jeff Ramsay – Membership No. 226

In 1998 I was offered a small diesel engine to buy from a fellow enthusiast Dave Trenchard. Arrangements were made to go and view the engine at Dave's house in Chalgrove, Oxfordshire, but I took my trailer with me as I was almost sure I would have the engine for the asking price, as Dave's engines always seemed to be in a very nice condition. Dave explained that he could never get this Ruston Hornsby 1YB, to run at a slow steady rate, it had a tendency to race away, and judging by the size of the flywheel, it was designed to be driving a generator, so the governor was probably set up for 1500 revs per minute.


Ruston Hornsby 1YB

I bought the engine with a view to working on the governor to cure the problem. While in negotiations with Dave, we chatted about a large engine that had caught my eye, a very tall single cylinder diesel with a very large flywheel that he was restoring. Dave explained that the engine was a Gardner 1L2 laboratory engine that used to belong to his employers, Esso Research Laboratories in Abingdon.

When I later experimented with the 1YB diesel, I found that the addition of an external spring on the governor linkage to the injector rack was enough to calm down the engine's enthusiasm, allowing it to run steadily at speeds more suitable for display at a rally.

In the spring of 1999 Dave explained to me that he was finding the Gardner 1L2 restoration a bit too heavy to manage, as he had some problems with his back. He said that since he had sold me the Ruston Hornsby, he had seen it running more often at rallies, than when he had owned it, so if I bought the Gardner 1L2 from him (for a very reasonable sum) he would expect to see it running at a rally in the very near future.

How could I refuse? I turned up at the pre arranged date and time to purchase the Gardner engine, but it was all of the accompanying stuff that amazed me. Included in the sale were:

- Several Gardner drawings for the engine
- Some testing notes from the laboratory
- Engineers' notes from when the engine was changed from normal to reverse rotation as necessitated by a change from a Heenan & Froud water brake dynamometer to a British Thompson Houston electric dynamometer
- A spare parts list
- An operators handbook
- A box of small lead balls for setting the bump clearance
- Several fixtures that Dave had made for servicing the engine

The agreed sum was handed to Dave and the engine loaded onto the trailer for the journey home.

Gardner 1L2 Laboratory engine as bought

The Cogges Farm Museum Threshing Weekend (that Dave organised the stationary engines entry for) was to take place on September 19th 1990. I had booked in the Ruston Hornsby engine as my exhibit, if I could sort out a cooling system for the Gardner, I might be able to surprise him with a running Gardner engine at the rally instead.

There were quite a few little jobs that needed finishing before the first test run of the engine. Dave had restored all of the internals of the engine, leaving only the external stuff to finish off. At the Ed Bolton's open day at Amersham, I purchased a radiator of suitable proportions for £1; the vendor assured me that it was a good-un, with no leaks. I fabricated a temporary water header tank and made all of the necessary pipe work to complete the cooling system. I also fitted a straight-through "cherry bomb" silencer to the engine, having had great success with the same type of exhaust on the Ruston Hornsby. The oil sump was filled, the fuel system filled and primed – now for the big moment. A couple of pulls on the manual injection lever produced audible squeaks from the injector, so I set the decompression lever, put some energy into that huge flywheel and released the decompression lever, the 1L2 started instantly and accelerated to the governor setting, settling down to a steady beat. What a wonderful sound!

It was now Saturday September 15th and the stationary engine display at Cogges Farm Museum Threshing Weekend was the next day, so I only just got it running in time. Even though when I bought the radiator I was told that it did not leak, water was pouring out of it from several places, so I had to drain it and solder the offending holes. When re-filled, it still leaked a little, but that would have to do for now.

Even though the engine was sheeted over on the trailer, as soon as I rolled through the gates at Cogges Farm, Dave recognised the bulk on the trailer and with a broad grin an his face said "she's up and running then". When unloading the engine onto the grass, which was very soft due to the previous wet weather, the first pair of wheels to leave the trailer ramps sunk in down to the axle. The engine would not move from this position, so I pulled the ramps from under the rest of the engine by towing the trailer and ramps away with my Range Rover. The engine stayed in that position for the duration of the rally and was winched out of the mud onto the trailer ramps at the end of the rally. Dave paid many visits during the rally - just to make sure I was treating her right.

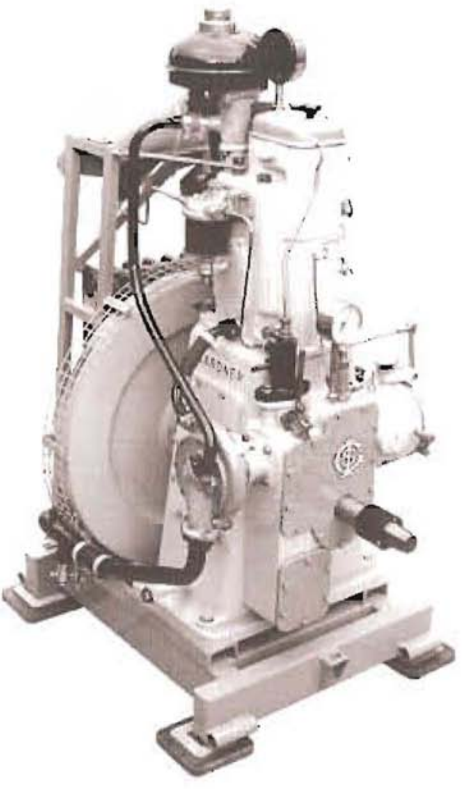
The first item I wanted to change was the trolley. I found an advert in the Stationary Engine magazine for some Dunlop industrial wheels with wide pneumatic tyres, and promptly ordered four. When they were delivered, they turned out to be ideal, with cast iron hubs fitted with one inch diameter needle roller bearings, a good hefty size for the weight of the engine. Hopefully they would not tend to sink so readily into the mud. Running the 1L2 on pneumatic tyres would be very bouncy, so I designed the trolley so that the wheels and stub axles could be removed, allowing the trolley to rest directly on the ground. The new trolley was constructed from 100mm X 50mm rolled hollow section steel with no steering, maneuvering being accomplished using a special jack that pivots on its base plate to skew the chassis round. The jack is also used to lift the chassis to fit or remove the wheels. That leaky old radiator would have to go. I visited an architectural salvage company near Aylesbury and found an old cast iron Victorian heating radiator that would do the job very nicely.

It was now December and I wanted to exhibit the 1L2 at Mervyn Bone's Frozen Frolics Rally on New Years Day. However, the weather was cold and nasty and the garage was far too damp and cold for painting the engine - nothing else for it - I will have to squeeze the 1L2 into the workshop to do the final preparation and painting in there. Trouble is that there is a six inch threshold to get over as you enter the workshop, so I rigged some scaffolding just outside the door to lift the 1L2 off the new trolley and back on to the old trolley. Luckily Dave had made the old trolley with bolt on axles and a clearance under the chassis of' about six inches, so once the 1L2 was back on the old trolley, I rolled it up to the threshold, blocked up underneath the chassis, removed the leading axle, levered the engine and chassis across the threshold until the axle could be re¬fitted to the chassis on the other side of the threshold and then removed the trailing axle. It was at this point that I found the flywheel of the 1L2 was just a quarter of an inch smaller than the doorway - phew! The engine and chassis were levered the rest of the way into the workshop and re-united with the trailing axle, then pushed to the widest part of the workshop where there is most room.

All of the bits were removed from the engine to enable a thorough clean and rub down prior to re-painting. The 1L2 has a lot of aluminium castings and although they are nicely cast and of generous proportions, the surface finish is a little rough for polishing, I therefore sand blasted and lacquered all of these and was very pleased with the results. I hung all of the removed components from the ceiling of the workshop so that the paint could dry, by the time they were all hung up, the workshop looked more like a cave full of stalactites and in places you needed to get down on hands and knees to pass beneath them.

During the painting the temperature in the workshop was around freezing on most nights and only slightly warmer in the daytime, so the paint took much longer than usual to dry. I considered using a heater, but that would cause a lot of condensation to form on all that cold metal, so I did not risk it. I made new gaskets for all the joints as I re-assembled the engine and wire brushed and lacquered all of the nuts, bolts and washers as they went back on the engine.

The pantomime of getting the engine into the workshop was then repeated in reverse and the 1L2, the cooling system and fuel system were then assembled on to the new trolley outside the workshop where there was a bit more elbow room.
It was now December 31, 1999, Mervyn's rally is tomorrow, I seem to have left it to the last minute again! I filled the cooling system with a one-to¬-one mixture of antifreeze and water so that internal corrosion and scaling would be kept to a minimum, that also meant I did not need to empty the engine for winter storage. The sump was filled to the correct level with diesel grade engine oil and the fuel tank filled. The fuel system bleeding was much easier than the previous time, as the new position for the fuel tank is a little higher and the filter element was already wetted. the 1L2 fired and ran at the first attempt so I put her away in the garage to await the rally in the morning. On January I, 2000, I loaded the 1L2 on to the trailer and made my way to Little Tring. The wheels of the new trolley coped easily with the soft mud. After removing the wheels and lowering the 1L2 onto the ground, she started easily and settled down to the governor setting.



The 1L2 newly restored and gleaming in January 2000

Among the paperwork that came with the engine was an application form for the 1999 Gardner Rally at the Waterway Museum in Gloucester so I wrote to Colin Paillin to request an entry form for the 2000 rally. He replied that it was a bi-annual rally and that he would send the entry form for the 2001 rally when the paperwork was ready next year. So I continued to show the Gardner 1L2 Laboratory engine at local rallies. The 1L2 attracts a lot of attention from the general public and from Gardner enthusiasts in particular. I have even had a long conversation with a retired engineer who used to run the engine in the laboratory in the Esso Research establishment. This meeting came about because a friend of his read through the information board that I always display with the engine and linked the engineer to the engine. I also let it be known around the fellow stationary engine collectors that I would be interested in any other Gardner engines that may come on the market.

In 2001 an entry form for the Gardner Rally at Walsall arrived in the post from Colin, so I sent off my entry and looked forward to my first Gardner rally. Upon arrival at the rally site I was amazed that it was right in the town centre, that was a first for me – stationary engine rallies are normally in a field somewhere. During the course of the two day rally I was really impressed by the whole concept of a single manufacturer engine rally. I also found that ALL Gardner engines sound wonderful, especially that huge 8L3 on the back of a lorry – pure music. At the end of the rally I was very surprised and delighted to be presented with the best stationary engine award.

To be continued..................

Marine Engine Workshop
By Charles of CMD Engineering

Advice and Observations on Crankshaft Assemblies.

There are 3 factors that contribute to a correctly fitted crankshaft.

a) The shaft is ground to the tolerance and finish for the main and crankpin bearings.

b) The bearings supplied are correct in their limits and their sizing matches that of the crankshaft.

c) The main bearing and conrod housings for these bearings are free from distortion/quality and the housing diameters are to "Gardner" specification.

In my experience, many problems can be attributed to distorted or worn big end housings.

The crankpin bearings, when correctly torqued down in perfectly sized housings, will result in well secured, truly round bearings and provide the correct running clearance on the crankpin. Alternatively a bearing installed in a distorted or oval conrod bore will assume this deviation. This results in an out-of-round bearing bore and incorrect clearance on the crankpin.

Local polished or black areas within the conrod parent bore indicate a problem and this should be assessed with a bore gauge. The polished and black areas indicate insecurity and movement of the bearing within its housing. The former is resultant of relative movement and the latter is caused by oil ingress between the back of the bearing and its housing, where subsequent. Carbonation of the oil occurs due to temperature.

Problems with main bearing housings are generally due to a slight collapse of the crankcase structure in this area. This manifests itself as a reduced clearance across the "horns" of the bearing and a corresponding excess of clearance at 90o to this.

Main and big end bearing caps are unique - each has a unique number and must only be installed on the housing displaying the same number.

It would not be expected that an engine that has provided a good and full life with no major problems and is being overhauled due to normal wear and tear, would have too much wrong with the main and crankpin housings.

On the other hand, on an engine being rebuilt due to oil trouble overheating for whatever reason, the chances are that a bearing has been knocked out or a piston seized. This will probably have damaged a) the crankshaft b) the bearing and c) the bearing housing.

It is evident that people will correct a) and b) but never give c) a second thought. Furthermore, if a faulty oil pump, pressure relief valve or cylinder head were the root cause of the problem, these are often re-installed to repeat the ruination of the engine.

Hardly any knocked out crankshaft is the cause of its own failure. A damaged crank or seized piston is usually consequential of other problems

All the best
Charles

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