GARDNER

Engine Forum

Autumn 2014

www.gardnerengineforum.co.uk

No. 26

GARDNER Engine Forum

Membership Application

Title	Mr / Mrs / Miss / Dr / Other		
Forename(s)			
Surname			
Address			
	Post Code		
Telephone Number		Ex Directory	Yes / No
Mobile			
Email Address			
Engine Model			
Engine Serial Number			
Engine Application	Stationary	Road	Marine
Year of Manufacture			
Name Vehicle /Vessel			
Signed		Dated	
Any Other Info			

This information will be held on a computer database

Membership fee £10.00 per annum (UK) £18.00 per Annum (Overseas)
Renewable on the anniversary of joining,
Payable by cheque electronic funds transfer or standing order.
Standing order mandate is available at www.gardnerengineforum.co.uk/subscribe

Please complete the above and send to
Mr J McCool
Membership Secretary G.E.F
Artasooley,
Benburb
Dungannon
N Ireland
BTB71 7LN

Tele 07802 57441
Email:-tangent.gardner@gmail.com

Gardner Engine Forum Philosophy

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

Forum Officers

Chairman: Mike Johnson
5 The Green, Wrenbury
Nantwich. Cheshire
CW5 8EY Tele 01270 780093

Secretary. Yvonne Crane
7 The Green Wrenbury
Nantwich, Cheshire
CW5 8EY

Treasurer: Judith Gray 29 Verity Walk
Wordsley Stourbridge West Midlands DY8 4XS
Tele 01384 827745

Membership Secretary: Joe McCool, Artasooley, Bendurb, Co Tyrone, Northern Ireland BT1 7LN
Tele 07802 572441

Editor-Webmaster:Steven Gray 29 Verity Walk, Wordsley, Stourbridge, West Midlands. DY8 4XS
Tele 01384 827745

Andrew & Linda Kemp
Korna Cottage
Notts
NG13 9JJ

Contents **Page**

Advertising Rates:
Free for Members Personnel Ads
Trade ½ page
£25 per 2 editions

Cover Picture

Scammell Pioneer

Photo by S Gray

Chairman's Notes

Sadly as we go to press Mike has been unable to compile his normal contribution to this spot in the newsletter.

On Tuesday 7th October Mike was once again hospitalised as his illness got the better of his resilience. Two weeks later he is still there undergoing further treatment.

We had visited Mike and Yvonne the previous day, to collect the Gardner merchandise that he had stored after the rally at Wrenbury, ready for the Bugsworth rally next year.

During our visit Mike made us aware that he would be standing down as Chairman at the next AGM in June, due to his ongoing illness and the likelihood that he will not see any great improvement in his overall condition.

We are sure that you will join with us in sending Mike and Yvonne our heartfelt best wishes as he continues to fight his illness.

Judith & Steven Gray

2015 Rally

The venue for the next Gardner Engine Rally is

Bugsworth Basin in the Peak District

On the weekend of 6th-7th June

Entry Forms will be included in the next newsletter

Or

On the website from early January

We look forward to meeting up with old friends and also

welcoming new exhibitors

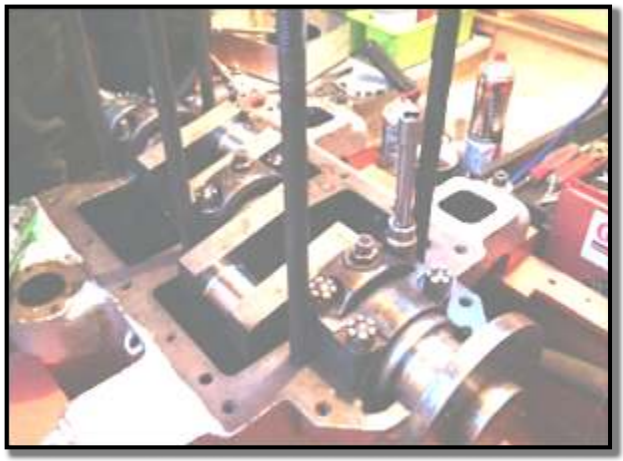
Our Enery 1938 2L2
Step by Step rebuild by Grumps

This is the story of our Enery, that's the nickname I've given to my 1938 Gardner 2L2. Enery started life in the Gardner factory in Patricroft and was then shipped to London, to be on a trade stand at Earls court marine exhibition, after which he was returned to Manchester to be commissioned and sold to R.A.Balfour -Thorne marine, after service with them for a few years, he was sold on to a showman, and used as a generator for I don't know how many years.

Eventually he was abandoned in a barn and obviously forgotten about. Years later again he was found by a guy who obviously saw the potential in him and got an engine builder to renovate him, and fit him in a narrowboat in 1998/9 which he used for a couple of years, then put it up for sale, which is where I came on the scene, as soon as I heard that thump-thump- thump noise I was smitten, hell and high water had no chance whatsoever, I just had to have it!

So anyway l got my way. and the boat was mine we used it for about 10 years' and it gradually- started to develop little oil and diesel leaks, which I could not cure, then one day we went out for a chug, and there was a definite knocking noise. Which went away once the oil pressure had built up, which gave me a feeling of impending doom.

So on mooring up drained the oil and removed the mesh out of the filter found bits of white metal, whoops! Not good news. So what to do, a pal mine spent his working life fitting cranks into blocks, so I thought just the fella I'm looking for, so we removed the inspection panel to have a poke about. What we found in there was not good news at all, there was a lot of movement in the bearing on number one cylinder, by a lot I mean 1/4 inch of play, and you could see where the bearing had broken up. So I thanked Clive for his help, and had to ring another mate to tow me back to the mooring at Welford, where I could relax a bit. Thank the lord I never gave up my mooring as It was going to do the year before .at least id got the landline ,water and car park, so not too bad, as it meant I could get the engine sorted at my own pace. Being a member of the Gardner forum I started to ring around to find the best place to go and get my baby sorted, anyway the same name came kept coming up,Charles Mills of cmd at Higher Poynton. So I got in touch with him for a chat, and the upshot was he said he could do it but (there is always a but) he couldn't get round to do it, for at least a couple of months because he was up to his eyes in work, so didn't want to take any more on until he had cleared the backlog fair enough, so just sit on the mooring and wait, it's a hard life! Because there isn't a hatch to lift the engine out in one, it had to be dismantled and passed through the side door, one part at a time, and there seemed to be more than one engine, going by the growing pile of bits outside.



The cover is an old photo of the engine, as it was found, after being stored in a barn for years!!

When Charles rang me a few days later he said the builder who did the engine last time, had fitted a right hand crank

in a left hand engine, so that's why I could not cure the oil leak on the end of the crank! The cranks have a scroll to wind any stray oil back into the sump! of course mine was trying to do exactly the opposite! Also when we removed the flywheel it was fitted with the wrong sort of bolts, Charles said it it was actually dangerous with all that weight spinning at 1000 revs, if it had come adrift, well it don't bear thinking about really, he also found a few other things that weren't right, so the guy who did the last rebuild, bodged quite a bit,and he was a well-respected builder, no names, because he may start shouting! Also when we pulled it to bits, the drive for the water pump was in two pieces it was only the fact that it was bolted to the block that it was holding together, that little item was perhaps the hardest to put right, could not find one anywhere, because it was backwards. So Charles fabricated one out of two 1/2 of mine and 1/2 from a 61-2, I have to say he made a beautiful job of it, I didn't think there were any of these sort of chaps around anymore, I was beginning to see why he was always busy. Anyone out there looking for a good Gardner man I would recommend him to anybody, no hesitation. So anyway back to the rebuild, the crank was away for regrind, new bearings fitted, starter motor was away for overhaul, and the rest was under way I had already told Charles that anything needed doing do it because there wasn't much point in doing half measures We might as well do it right while it was out of the boat .so whilst all this was going on I took advantage of an empty engine room, and gave it a couple of coats of paint, and a good clean up, very posh!

So back to the rebuild, Charles arrived armed

with crank / bearings/ block, conrods etc, and so started the rebuild of Enery, to my knowledge for the 3rd time in 76 years

I have to say at this stage that my mechanical knowledge is very limited, in spite of 33 years lorry driving, including Leyland, Cummins, and Gardner engines, and ending up with a Volvo, I always tried to keep away from too many spanners, don't get me wrong, I could get myself out of trouble if needed, unless it was engine related, and then I surrendered.

So back to the rebuild, it was interesting to watch Charles at work, and to watch the rebuild progress. He set the crank bearings in first and it was I thought tight, but, he said don't panic it's ok,so he proceeded adjusting the nuts, in various combinations, and after 5 minutes, it actually spun round freely, amazing that such a heavy lump could spin like that!

Anyhow he fitted the conrods next and then the base, pistons and block, and it was starting to look like an engine again. He then fitted the camshaft so he could check the end float, he was not happy with it so he said he would have to measure it, and make a shim to bring it right, which was on the next visit. The problem was, any little jobs that needed a trip to the workshop, was 2/3 hours driving each way, so it was a bit slow going at times. One odd thing was that 2 of the cam tappets would not fall of their own accord once clamped in place, they were fine in the housings, until tightened down, so Charles said ,next some different ones to try as he he'd never come across

It before, so that's what he did, and cured it. So now had come the Job of fitting the timing gear, Which was all rebuilt with a new bearing in the tensioner, new chain ,and the sprockets were aligned to +/- 0.005" Charles had already modified the timing cover to accept a bespoke housing to accept a crank seal as he had to machine the scrolls from the crank. So on went new copper head gaskets and all new "O" rings, and on went the heads, which had been completely refurbished with new valve guides and seats, modified LW inlet valves to L2 spec and new exhaust valves. All new springs collets etc., he also fitted all new head nuts.

So now came the job of timing all the bits together, it quite surprised me how far the flywheel turned in relation to the small movement on the valves.

At this point I was completely out of my depth, it's a good job Charles knew what he was doing Because to be honest I hadn't got a clue, I was quite happy to make a cup of tea, and let him do his thing, anyway, after he had timed it all to his satisfaction, it was time to start bolting on various parts such as timing cover, which he had modified to take a custom built seal on the end of the crankshaft,

I have to say that not a single drop of oil has leaked past this mod, whereas before it was leaking enough to keep a bowl under there, so that was a good job sorted out once and for all.

Here are a couple of picture of the water pump drive that Charles made out of two halves, my old two cylinder one and an old six cylinder one chopped and made into one good one.

Then came the job of all those little bits that seem to take up a lot of time, all the external pipes

Oil and diesel some of which were a real pain in the butt to fit, the exhaust and inlet manifold were next on and then the top water rail, it really was starting to look like it should do now ,on went both alternators complete with new belts, I also fitted a new set of belts with cable ties to the gearbox mounting plate so that in future I can change the belts once without removing the gearbox, and in truth these can't even be seen when the belt guard is fitted. So now came the job of lining up/ fining of the gearbox and prop shaft, l must mention here that Charles

had rebuilt the drive plate with new Cush plates he had also fitted what he termed a soft start kit, on a PRM 500

Gearbox, it runs at something like 350 pounds pressure all the time, including when changing from forward to reverse, which used to result in a loud clunk, not anymore it don't! Apparently what he did releases the pressure by dumping the oil through a channel as it comes to neutral, and as it comes back into gear the pressure immediately climbs back to normal, whatever it has since proved to work a treat. As it was getting late, and I could not run the engine at that time of day don't think my neighbour would have been pleased, we decided to wait for the next visit to start up for the first time. When Charles arrived a couple of days, Iater, he spent some time, double checking it all over, bled the diesel through, filled it with oil and he said it was ready to go.

We spun the engine over, on decompression to bring the oil pressure up, dropped the levers, and it fired straight away and settled to a nice tickover.

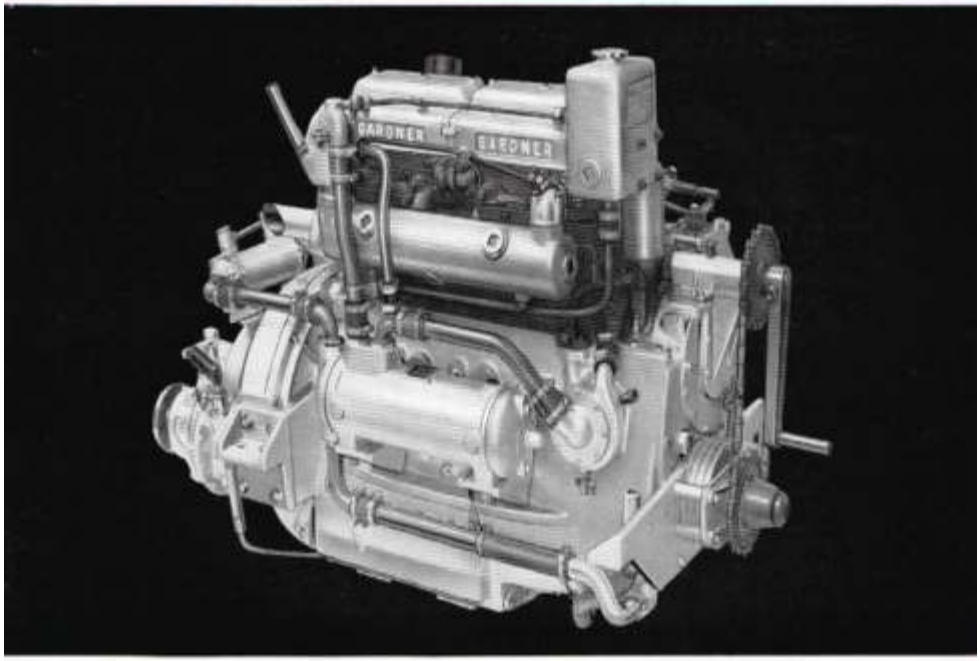
It was only when I heard it ticking over, that I realised how bad it was before, it was quiet and even with none of the usual knocks and rattles, completely different altogether. We ran it up to temperature, and Charles sat there listening to it run with a stethoscope to see if there were any strange noises coming from anywhere, I think i could have answered that for him, it sounded glorious I He put it into gear, not so much a clunk, as a snick, to say I was delighted would be an understatement, to say the least. So Charles went off home, saying he would be back for the first service at 50 hours. now fast forward a couple of months, Charles was back to Welford for the service, he checked the timing chain, tappets, the exhaust valves had opened slightly, he also checked the new flywheel bolts he had fitted ,and he removed the side plate to get the filter out of the sump, he was pleased to note that there were no metal bits in there ,just bits of sealant, fibres from rags etc, which surprised meas he was almost surgical when building it. He did say that sometimes, when bearings are bedding

in they can shed bits of white metal, but no in this case. So all that remains is to thank Charles very sincerely for the job he had done, he made a cracking engine out of a sows ear! And as I said earlier I would heartily recommend him to anybody, a nice bloke who without a doubt knows his trade inside out. Below is a list of all the work carried out by Charles ,I think you must admit, he didn't cut corners. Crank pins reground to 2.590 (0.035 u/ size, main journals-polished (2.625 standard) oil scrolls on crank filled in and dressed,scrolls were r/ h engine is left hand build. Crank nose ground to dia 2.250 to accept new oil seal mod, new big end bearings cast and bored to 2.592 dia (0.002 clrr on Pin) nip on brings 0.003 conrod bores checked for out of round, new small end bushes fitted and reamed to size, re sleeve block ,bore and hone to 4.250, machine 0.015 oft block face to clean up and provide correct piston height, machine coolant o ring bores 0.015 to restore depth, flush block and make/ fit new inspection doors and fastenings ,modify right hand LW pistons to suit left L2 engine! New rings and pins, machine off number one piston crown to correct and match piston heights. Piston to head clearance, number 1 cyl. 0.039" number 2 cyl 0.038".Machine cyl head flame face 0.010 install all new valve guides and valve seats, modify new LW inlet valves to L2 spec, new exhaust valves, install new copper head packing's ,coolant seals and head nuts, replace corroded conrods, supply and install replacement fuel pump / water pump drive gear assembly, machine lock screw location in camshaft to align with hole in gear hub ,install new bearing in chain idler, install new timing chain all sprockets aligned + - 0.005,fit 2 new cam tappets, replace water pump drive assembly, bore out damaged pump drive square, press and pin new drive insert, modify shaft housing to match with engine and shim housing to crankcase, fit new bearings and face seal in water pump, Machine timing cover plate to accept crank seal mod, make bespoke housing for radial lip seal at crank forend, strip cam box! governor assy and fit new bearings replace weight pins, service fuel pump and sprayers, reset phasing on ram tappets , strip and clean oil pump, flush out all oil pipes supply new bolts for bearers, machine new correct bolts for flywheel strip and clean starter motor, install new brush kit and main contactor set, fit new gearbox drive plate and fit soft start kit to gearbox, fit new gaskets where needed And here is the cause of the problem in the 1st place!

One very broken bearing
Mick Beck

GARDNER 4LK

Marine Propulsion Diesel Units
with Oil Operated Reversing and Reducing Gears



FOR COMMERCIAL CRAFT, FISHING VESSELS, YACHTS, CRUISERS, LAUNCHES, HIGH SPEED CRAFT, ETC.

GARDNER ENGINES (SALES) LTD.
BARTON HALL ENGINE WORKS, PATRICROFT, ECCLES
MANCHESTER
Telegrams: "Gardworks, Eccles, Manchester" Telephones: ECCles 2201 (8 lines)
London Office: ABFORD HOUSE, WILTON ROAD, S.W.1
Telegrams: "Gardiesel, Sowest, London" Telephones: TATe Gallery 3313-6
Glasgow Office: 134 ST. VINCENT STREET, C.2
Telegrams: "Glangard, Glasgow" Telephones: CENtral 0887/8

The GARDNER 4LK

MARINE PROPULSION DIESEL ENGINE

INTRODUCTION

In response to requirements for a small marine engine possessing characteristics offered by the larger and more powerful Gardner Units, the well known 4LK 3·8 litre Diesel engine has been fully developed for marine propulsion duties.

This engine at one time powered the British Navy Midget Submarine and embodies certain design features developed for that period of historic service. It achieves a high power-to-weight and power-to-space ratio at moderate revolutions per minute together with all traditional Gardner standards of efficiency, durability and refinement.

The minimum specific fuel consumption rate of the engine when directly coupled to the dynamometer, is less than the low value of ·360 lb./BHP/hr. which represents an overall thermal efficiency of 36·4%.

Engine cooling is effected by a fresh water closed circuit system with integrally mounted heat exchanger and header tank or alternatively a keel cooler. Coolant is circulated at high rate by centrifugal pump and temperature is automatically controlled at all loads and speeds from idle to maximum output. Controlled temperature is approximately 142° F.

Standard lubricating oil cooling arrangements provide adequate control in high ambient temperature.

The engine is constructed as a unit with a compact oil operated reversing gear and reversing-reducing gear, manufactured by The Self-Changing Gear Co. Ltd. Control of Ahead and Astern Clutches and engine speed may be effected by a Single Lever or by separate speed and gear levers.

It is available with direct drive or with reducing gear having either hand of rotation. A propeller thrust bearing is incorporated in the unit.

This unit has been accepted by Lloyds and is entered on the Register in the 100A1 Classification.

DESCRIPTION

The four cylinder 4LK engine is of direct injection 4 cycle type, having one inlet and one exhaust valve per cylinder located vertically in the cylinder heads, one each side of the fuel sprayer. The cylinder heads are mounted in pairs and the valves are operated by levers, push rods and tappets from a camshaft located in the crankcase.

The camshaft and auxiliaries are driven by a triplex roller chain running in a constant stream of oil which, together with carefully spaced sprockets, ensures a smooth drive, perfect reliability, long life and silent operation.

The combined fuel injection pump and governor unit is rigidly mounted in permanent alignment on the side of the crankcase and is driven by helical gears from the valve camshaft. Precise optimum injection timing control for all loads and speeds is secured automatically by this combination of helical gears, one of which is moved axially on its helically splined shaft by interconnection with the governor.

The engine is under governor control at all speeds.

The cast aluminium water-jacketed exhaust manifold, centrifugal pump, heat exchanger and thermostat unit are all mounted on one side of the engine whilst on the opposite side are mounted the fuel pump and governor assembly, dynamo and electric starter motor. The inlet manifold is neatly incorporated in the cylinder head design by the simple addition of two cast aluminium covers.

The construction of the engine embodies a rigid, deep section, magnesium alloy crankcase to which is bolted a one-piece cast iron cylinder block by means of high tensile "through" bolts which also form the studs for the main bearing caps.

This method of construction secures great strength and relieves the crankcase of much load and consequent distortion due to cylinder gas pressure, etc.

The extreme rigidity created, gives adequate support to the main bearings and avoids crankshaft deflection, ensuring smooth and quiet engine operation at all speeds and loads together with long bearing life.

A gear type pump delivers oil under pressure directly to all main bearings, big and small end bearings and to the valve gear, whilst surplus oil, by-passed by the pressure regulator, is fed to the governor, fuel pump camshaft, tappets and timing gear drive.

Cooling of the engine lubricating oil is effected by a cast aluminium water-jacketed oil sump through which sea water is circulated by a separately mounted engine driven centrifugal pump.

A 12 volt or 24 volt electric starter motor may be fitted on all engines in addition to the single handle provided for hand starting and for general servicing and maintenance adjustments.

The Self Change epicyclic reverse gear, Type MRF 11/2B, is bolted directly to the end plate in unit with the engine, ensuring true and permanent alignment of engine and gear.

Ahead and Astern clutch engagement is controlled entirely by oil pressure through the medium of a lever-operated selector valve, fed by the combined lubricating and oil pressure systems contained within the gear box.

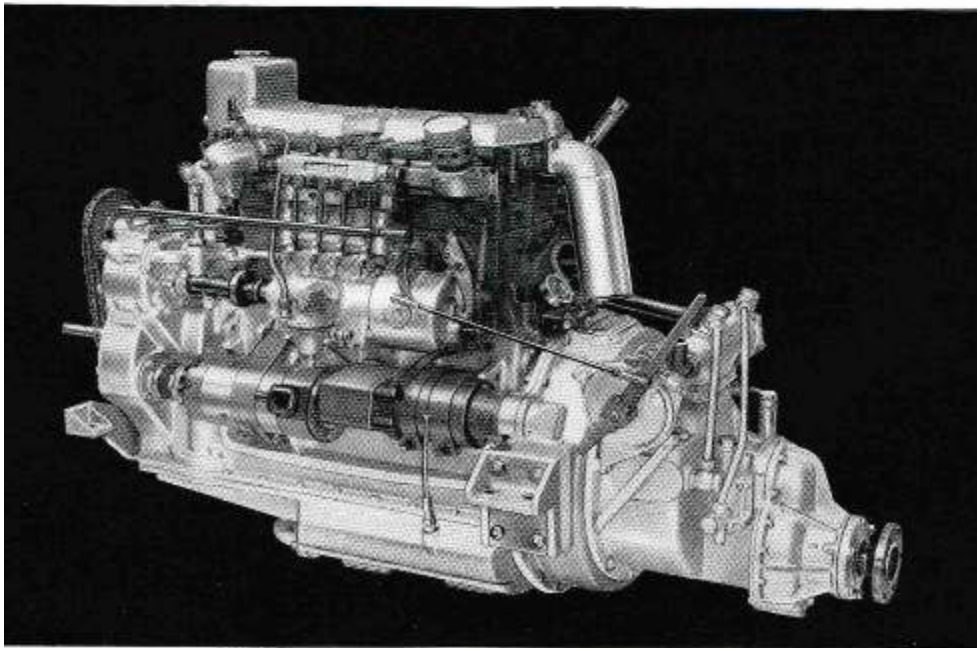
In addition, the selector valve may be made to control engine speed by inter-communication with a Sequent Control directly coupled to the engine speed control lever.

This system of Single Lever Control ensures that engine speed is reduced to idling during the period of clutch engagement and disengagement, thus safeguarding engine and transmission against sudden loading and stress.

The reducing gear is available as a two-gear reduction unit for driving a right hand propeller or as a three-gear reduction unit for left hand propeller and is lubricated from the reverse gear lubrication system.

Cooling of the reverse gear lubricating oil is effected by a separate water cooled oil cooler mounted on the reverse gear casing.

Every engine complete with reverse gear and, if specified, its reducing gear, is fully tested when coupled to a dynamometer, and no unit is passed off test until all aspects of its performance complies meticulously with requirements in respect of power and fuel consumption, etc., indicated in the published performance curves.



GENERAL DATA AND POWER OUTPUT

These units comprising engine reverse gear and reducing gear are of LIGHT ALLOY construction for ALL purposes.

They are suitably protected from corrosion to specification accepted by the Royal National Life-boat Institution.

BORE		STROKE		No. of Cylinders	SWEPT VOLUME	
Inches	m.m.	Inches	m.m.		Cu. In.	Litres
3¾	95·250	5¼	133·350	4	232	3·80

FOR HEAVY DUTY COMMERCIAL CRAFT

B.H.P.	R.P.M.	Approximate Weight (lb.) and lb. per B.H.P.			Drawing No.
		Direct Drive	With Two-Gear Reduction Unit (1·5 : 1, 2 : 1 and 3 : 1 ratios)	With Three-Gear Reduction Unit (1·5 : 1, 2 : 1 and 3 : 1 ratios)	
42	1,500	1,239 29·5	1,270 30·2	1,287 30·6	14494

FOR YACHTS, CRUISERS, AUXILIARY VESSELS and other MARINE use as distinct from commercial craft which may operate at maximum hours per annum

B.H.P.	R.P.M.	Approximate Weight (lb.) and lb. per B.H.P.			Drawing No.
		Direct Drive	With Two-Gear Reduction Unit (1·5 : 1, 2 : 1 and 3 : 1 ratios)	With Three-Gear Reduction Unit (1·5 : 1, 2 : 1 and 3 : 1 ratios)	
51	1,800	1,239 24·3	1,270 24·9	1,287 25·2	14494

HIGH SPEED CRAFT

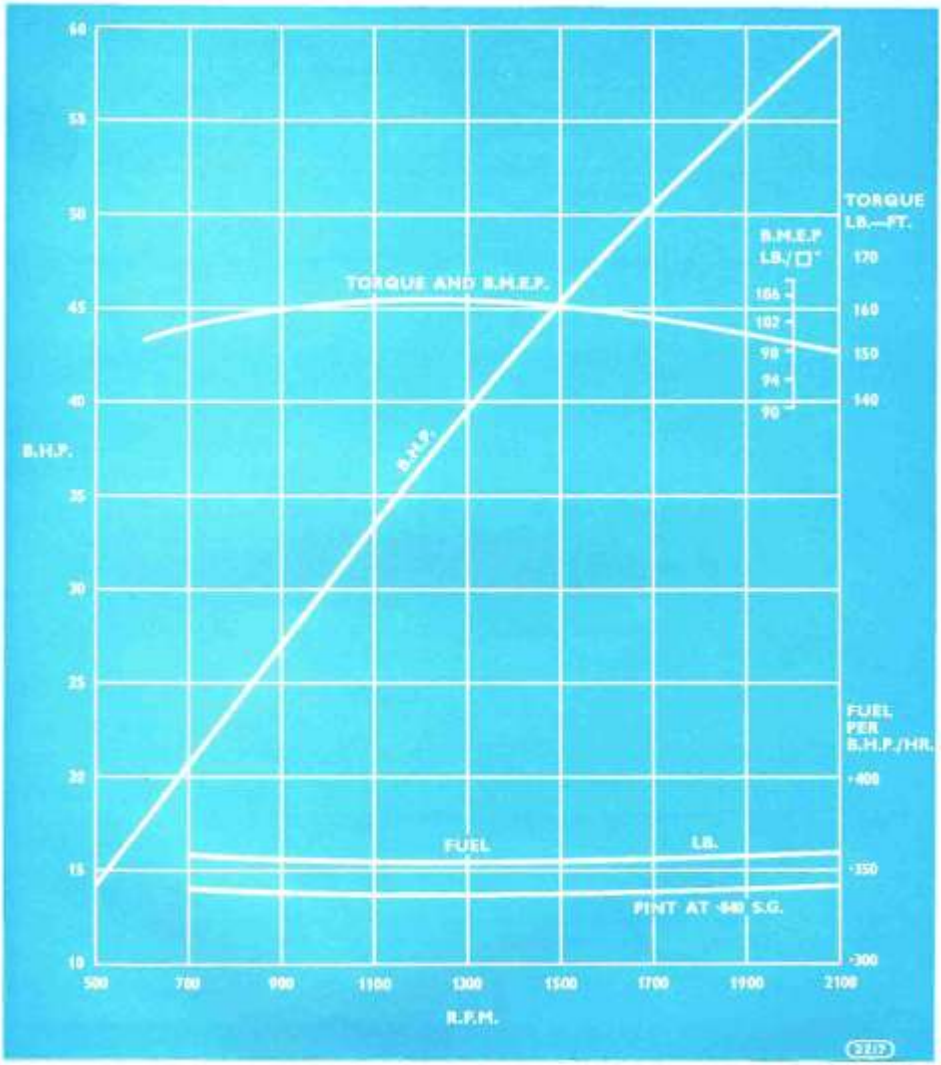
B.H.P.	R.P.M	Approximate Weight (lb.) and lb. per B.H.P.			Drawing No.
		Direct Drive	With Two-Gear Reduction Unit (1·5 : 1, 2 : 1 and 3 : 1 ratios)	With Three-Gear Reduction Unit (1·5 : 1, 2 : 1 and 3 : 1 ratios)	
60	2,100	1,176 19·6	1,207 20·1	1,224 20·4	14494

The above tables give the powers developed at **normal atmospheric temperature and pressure.** They are net values and represent installed performance except for deductions on account of transmission gear loss, any auxiliaries, or inadequate induction or exhaust systems.

For adverse climatic conditions engines are de-rated in accordance with Engine Instruction Manual.

The weights quoted include :—
1,500 and 1,800 r.p.m. units : Hand Starting equipment only and heavy design flywheel.
2,100 r.p.m. units : Electric Starting equipment only and light design flywheel.

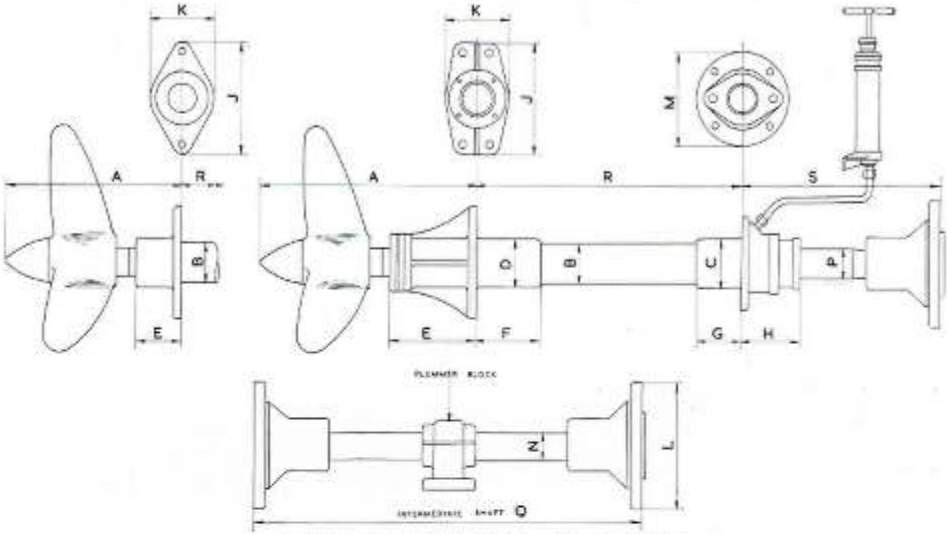
PERFORMANCE CURVES



The above are the performance curves of the 4LK engine as set for High Speed Craft.

They indicate Maintained Efficiency and Torque over a wide Speed Range.

APPROXIMATE DIMENSIONS OF STERNGEAR FOR 4LK ENGINE



PROPELLER AND STERNGEAR SIZES

Approximate dimensions of Bronze Sterngear with Whitemetal Bearings for Wooden Vessels.

DESCRIPTION		A	B	C	D	E	F	G	H	J	K	L	M	N	P TAIL SHAFT
DIRECT DRIVE		9"	2⅝"	2½"	/	2¼"	/	2¼"	3"	5⅝"	3"	5¾"	4½"	1¼"	1⅞" DIA.
REDUCTION GEAR	1·5 : 1	9⅝"	2⅞"	2⅝"	/	2⅞"	/	2⅝"	3⅝"	5⅛"	3¼"	5⅞"	5"	1⅜"	1⅞" DIA.
	2 : 1	14½"	2⅞"	3¼"	3¼"	5¼"	4¼"	3⅛"	3⅝"	7⅞"	5"	5⅞"	6¼"	1⅜"	2" DIA.
	3 : 1	14½"	3"	3½"	3½"	5½"	5½"	3¼"	4⅛"	7½"	4⅝"	5¼"	7"	1¼"	2⅛" DIA.

Dimensions R & S must be supplied by clients when ordering Sterngear, also dimension Q if Intermediate Shaft is required.

Shaft lengths exceeding 6 feet should be supported by a plummer block.

Reduction Gears referred to as 1·5 : 1, 2 : 1 and 3 : 1 are actually 1·577 : 1, 2·045 : 1 and 2·941 : 1 respectively.

ENGINE	3 BLADE PROPELLER DIAM.				4 BLADE PROPELLER DIAM.			
SPEED	DIRECT	1·5 : 1	2 : 1	3 : 1	DIRECT	1·5 : 1	2 : 1	3 : 1
1500 R.P.M.	17½"	23½"	27"	33"	—	—	—	30½"
1800 R.P.M.	16½"	22"	25½"	31"	—	—	—	29"
2100 R.P.M.	15"	19"	22"	—	—	—	—	—

Propeller sizes are approximate and may vary according to the lines of the vessel.

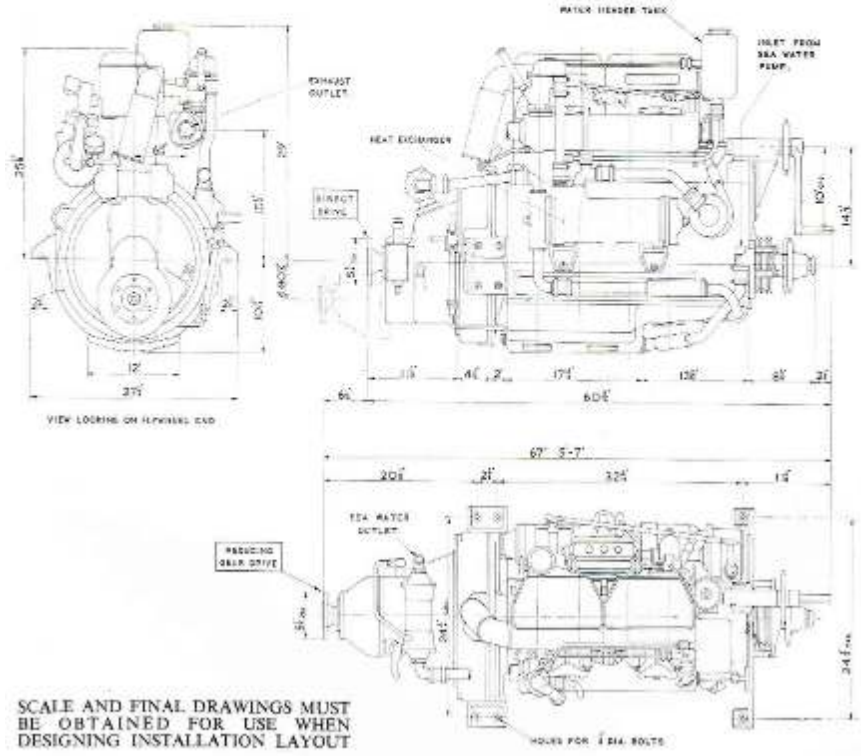
Four Blade Propellers are not recommended for shaft speeds above 700/800 R.P.M.

Direct drive engines require L.H. Propellers, reducing gears R.H. Propellers.

No liability can be accepted for alterations to Propellers after trials.

2219

4LK TYPE ENGINE AND TYPE MRF 11/2B REVERSE GEAR WITH DIRECT DRIVE TO PROPELLER SHAFT OR WITH 1·577 : 1, 2·045 : 1 or 2·941 : 1 RATIO REDUCING GEARS



SCALE AND FINAL DRAWINGS MUST BE OBTAINED FOR USE WHEN DESIGNING INSTALLATION LAYOUT

Normal maximum static inclination aft. 7° for greater inclination consult manufacturers.

2218

STANDARD MARINE ENGINE EQUIPMENT

Standard Equipment for the 4LK Marine Propulsion Diesel Unit comprises engine with integrally constructed Self-Changing Gear Co's. Direct Drive Reversing Gear, light alloy engine crankcase, raised hand starting gear with starting handle, centrifugal type water circulating pump, engine mounted water header tank, thermostatically operated temperature control, water cooled sump, integrally mounted tropical heat exchanger with pipework, bronze sea-water heat exchanger circulating pump and drive, bronze single sea-water strainer and sea-cock assembly, engine sump oil emptying pump, engine support feet, engine mounted water and oil thermometers, engine mounted oil pressure gauge, engine mounted fuel filter, additional Duplex change-over type fuel filter unit, friction disc speed control assembly, additional vee groove on sea-water pump driving pulley fitted to engine crankshaft, jacking screws, stopping lever, decompression levers, raw water inlet and outlet connections, exhaust outlet companion flanges, air intake silencer tube, engine lifting eye nuts, box of tools and spares, Instruction Manual and Spare Parts Catalogue.

Alternative Equipment : Temperate keel cooler arrangement in lieu of heat exchanger.

Gardner Engines (Sales) Ltd., reserve the right to modify specifications at any time without notice.

ADDITIONAL EQUIPMENT SUPPLIED WHEN SPECIFIED

1. 1·5 : 1 (actually 1·577 : 1), 2 : 1 (actually 2·045 : 1), or 3 : 1 (actually 2·941 : 1) ratio propeller shaft reducing gears for standard R.H. propeller rotation.
2. 1·5 : 1 (actually 1·577 : 1), 2 : 1 (actually 2·045 : 1), or 3 : 1 (actually 2·941 : 1) ratio propeller shaft reducing gears but 3 gear design for L.H. propeller rotation.
3. Electric starting equipment with lead acid battery, dynamo and regulator, ammeter, starter and starter switch with 9 ft. of starter cable.
   12 volt equipment :—100 ampere/hour battery, 420 watt lamp load dynamo.
   24 volt equipment :—100 ampere/hour battery, 622 watt lamp load dynamo.
   Larger dynamos can be supplied if specified.
4. Sub-tropical or tropical keel cooler equipment.
5. Remote reading tachometer, mechanical type with 12 ft. drive.
   Remote reading tachometer, mechanical type with hour meter and 12 ft. drive.
6. Separate oil pressure operated hour meter with switch, etc.
7. Remote reading water thermometer and 15 ft. tubing.
8. Remote reading oil thermometer and 15 ft. tubing.
9. Remote reading oil pressure gauge and 12 ft. pipe.
10. Switch only for low oil pressure warning.
11. Switch only for high water temperature warning.
12. Push rod linkage for remote control of engine speed only.
    Push rod linkage for remote control of reverse gear only.
    Self Changing Gear Co. sequent control (single lever) for gear and speed with 20 ft. cable to wheelhouse control unit.
13. Two station control for gearbox and engine speed.
14. Remote engine stopping control.
15. Vertical bend on manifold and 3 ft. of flexible metallic exhaust pipe.
16. Exhaust silencer—dry absorption type.
17. Exhaust silencer—dry type, mounted in Gardner ventilating funnel.
18. Exhaust silencer—water jacketed type, with water injection bend.
19. Engine mounted fuel lift pump arrangement.
20. Average set of installation pipes and fittings.
21. Alignment shims for engine feet.
22. Half coupling for tailshaft, rough bored.
23. Electric motor driven ventilating fans for the supply of and extraction of air from engine room; with or without weatherproof cowls.
24. 'Pic-a-bac' heat exchanger sea-water pump and bilge pump assembly, with Giljector unit.
25. Lloyd's (or M.O.T.) survey and test on engine for yachts or commercial craft.
    Lloyd's (or M.O.T.) survey and test on sterngear, including calculations.
    Clients inspection and tests at Works.
26. Sterngear and propeller, etc.
27. Packing for shipment and delivery F.O.B.

NOTE.—Items 5, 6, 7, 8 and 9.

Alternative lengths of flexible drive and tubing for remote reading instruments can be supplied on request.

Publication No. 752.1

Gurside & Jolley Ltd., Wilderspool Causeway, Warrington—18933/863

Scammell Pioneer

The Scammell Pioneer was developed in the late 1920s specifically for off road use. Similar vehicles were then being tested for use in the colonies where surfaced roads were scarce. The requirement matched that for military vehicles and the Army obtained a 20 ton tank recovery transporter from the Scammell Company in 1932. It was later followed by other Pioneers, gun tractors, more tank transporters and heavy breakdown tractors.

The essence of the Scammell's off road performance was its unique suspension system. Most Pioneers were driven only by the four rear wheels. These were mounted, two per side, on a metal casing containing a gear train. Each casing was pivoted at its centre allowing the two wheels to drive at a considerable angle from that of the vehicle's chassis. One rear axle transmitted power to the two gear trains.

The front unpowered axle was fitted with three attachment points, one at each end of the axle and the third, by means of an 'A' frame, under the cab. A single centrally pivoted transverse spring provided the suspension for this axle, with the result that it could rise and fall to a greater distance from the chassis than is possible in the case of the more common arrangement with a spring on each side.

The slow revving Gardner diesel engine and unusual suspension enabled the vehicle to haul prodigious weights, though at relatively low speeds, over very rough ground.

The initial tank transporter (with a Scammell petrol engine) was extensively used for pre-war training in tank

recovery. By the outbreak of World War 2, a small number of production transporters became available. The first four still used the same style of transporter semi-trailer with removable rear wheels but these were soon superseded by, first a 30 ton, and then a 20 ton semi-trailer with fixed wheels and hinged rear ramps. About 500 were built before the end of World War 2.

The Pioneers were all fitted with a chassis winch which, in the case of transporters, enabled unserviceable tanks to be winched on to the trailer. To provide recovery crew space behind the driver's cab the chassis of the tank transporter tractor was longer than those of the gun tractors and breakdown tractors. The semi-trailers were permanently coupled, that is, not designed to be easily unhooked like most commercial semi-trailers. Tractors for the 30 ton semi-trailers were fitted with 1500 x 20 inch tyres at the rear and 1350 x 20 inch tyres at the front. The other Pioneers used 1350 x 20 inch tyres all round.

The Scammell transporters made excellent recovery vehicles but had limitations. When used on roads in the UK during World War 2, loaded with many of the US built tanks, they were too high to pass under some bridges. In consequence, soon after the War most of the semi-trailers were sold off for scrap, but the tractor units were fitted with ballast bodies and used to tow normal trailers. Some of these survived to be restored in private hands to their original specification. Only one is known to exist complete with an original semi-trailer. The Museum's example is a tractor unit only.

	Tractor Unit	Complete Vehicle with semi-trailer
Length	6.70 m (22 ft)	10.97 m (36 ft 6 in)
Width	2.61 m (8 ft 7 in)	2.87 m (9 ft 5 in)
Height	2.87 m (9 ft 5 in)	3.27 m (10 ft 11 in)
Wheelbase	4.57 m (15 ft)	
Engine	Gardner 6 cylinder diesel (LW)	

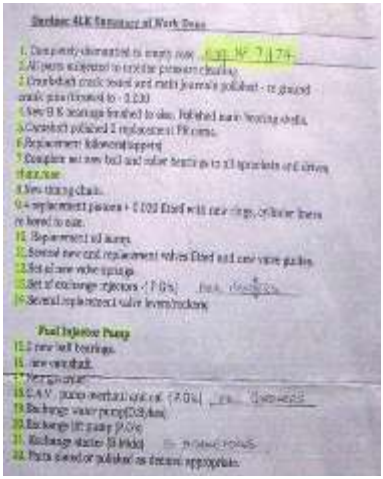
Photographed at a rally in Stourbridge Oct 2014 by S Gray
Text from REME Museum of Technology Web Site
http://www.rememuseum.org.uk/collections_view.aspx?id=2

For Sale

4LK with

PRM 500 Gearbox 1.5:1 Ratio

Engine No 71174
Dispatched March 1947
to Foden Ltd



Rebuilt by

Danny Williamson

Call 07973 460482

for more information

ASHORE'D BOAT MOVING

NARROWBOATS AND CRUISERS
MOVED ON ALL INLAND WATERWAYS.

OVER 25 YEARS EXPERIENCE.

C.C.B.M. & R.Y.A. INLAND WATERS HELMSMAN QUALIFICATIONS.

www.ashoredboatmovingservices.co.uk
Email: mike@ashoredboatmoving.co.uk
Tel: 07719 034 583

Classic Maritime Diesels.

Thames Diamond Jubilee Pageant: Gardner Engine Builder.

Gardner vintage oil engine specialists.

Marine engine erectors & repairers. Gearbox rebuilders.

Long skirt/offset pin LW pistons modified to suit

left hand L2 engines.

L2 & LK inlet valves manufactured. Timing chains renewed/adjusted.

LW conrod & crankcase conversions to thin wall (shell) bearings.

Cambox & governor rebuilds. Worn ram tappet bores sleeved.

Cyl. head & block overhauls. New pistons supplied & fitted.

Nationwide marine engine service for BCR/L2/L3/LK/LW/LX

Broken stud/screw extraction & stripped thread renovation.

Custom parts manufacture, milling,turning,etc.

Preferred supplier to premium boatbuilders & discerning owners.

Works Pithead Yard, Anson Engine Museum, Poynton, SK12 1TD.

07712 052 635. classicdiesel@hotmail.com

We actively support the Anson Engine Museum in preserving our Internal Combustion & Engineering heritage.

Disclaimer please see note 3 on page 1