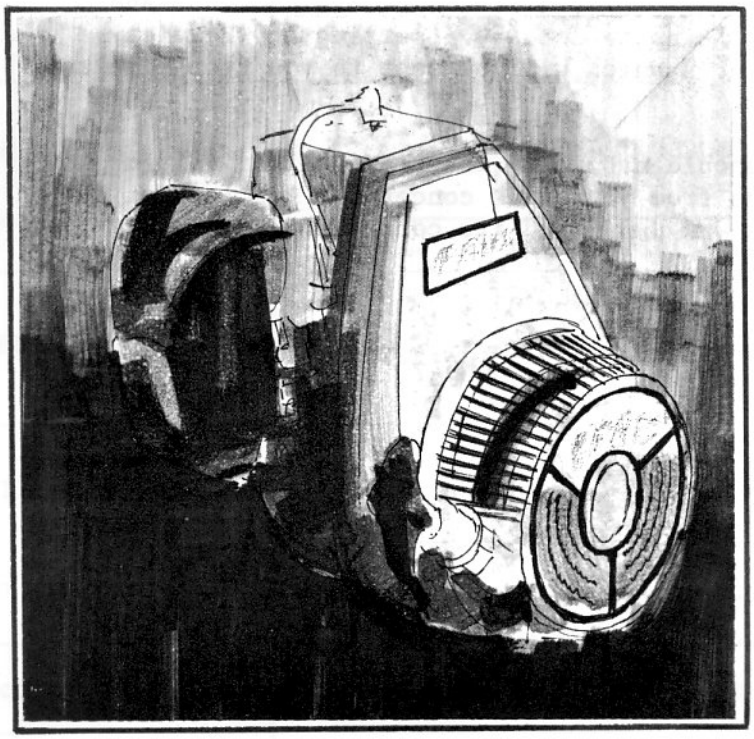
LLOYD

SERVICE MANUAL



SNOWMOBILE SERVICE LIMITED

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PREFACE

The intention of this technical handbook is to supply our Distributors, dealers and their staff with the adequate information they need in their daily work repairs.

Make yourself familiar with its contents and keep it up to date by inserting any Service Bulletin which will be sent to you from time to time.

We should naturally, be grateful for all suggestions from your side concerning the lay-out of this handbook and its contents.

SNOWMOBILE SERVICE LTD

LLOYD SNOWMOBILE ENGINES - 1970

MODEL	L S 400 / 18	L S 400 / 22
	TWO CYLINDER IN LINE	
TYPE	AIR COOLING RADIAL FAN ON CRANKSHAFT	
MAX. BRAKE-HP/RPM DIN.	18/5500	22/5500
DISPLACEMENT	386cc	386cc
BORE DIAMETER	62mm 2.440"	62mm 2.440"
STROKE	64mm 2.5196"	64mm 2.5196"
COMPRESSION RATIO	8.50:1	10.4:1
CYLINDER MATERIAL	ALUMINUM ALLOY WITH CHROMED BORE	
CONNECTING ROD UPPER BEARING	NEEDLE ROLLER CAGE	
MAIN BEARINGS	ANTI FRICTION BEARINGS	
ALTERNATOR: TYPE-BOSCH	BOSCH - FLYWHEEL DYNAMO MAGNETO WITH FIXED ADJUSTMENT 12^{V} 50^{W} or 12^{V} 75^{W}	
IGNITION- TIMING	22^{o} to 24^{o} B.T.D.C. 3.1 to 3.3mm = 0.126" to 0.130" BTDC	
CONTACT BREAKER GAP	.014" to -.018"	
SPARK PLUG: Recommended	Bosch: W 240T1 Champion: L 81	
STARTING METHOD	FAIRBANKS MORSE MANUAL RECOIL STARTER OPTION: BOSCH ELECTRICAL STARTER PINION TYPE	
RECOMM. CARBURATOR TILLOTSON TYPE	H R	
FUEL - OIL MIXTURE	40:1 NORMAL OPERATION (25:1 for the first 10 hrs)	
EXHAUST SYSTEM		
APPROXIMATE WEIGHT	47 lbs to 60 lbs depending on extra equipment	

ENGINE DISASSEMBLY

Before removing engine from vehicle, put matching numbers on or color code any wires which will have to be disconnected. Disconnect spark plug connectors and dismount ignition coils with its bracket.

1. Spark plug: remove both plugs.

2. Disconnect carburetor, inlet and exhaust manifolds.

3. Remove and lift air shroud cover off over top of cylinder barrels.

4. Detach recoil starter, blower housing.

5. Flywheel nut: Hold emergency starter hub with special tool # WO 119 and loosen the retaining nut M16 with a socket wrench or a torque wrench # WO220 (Fig. E1).

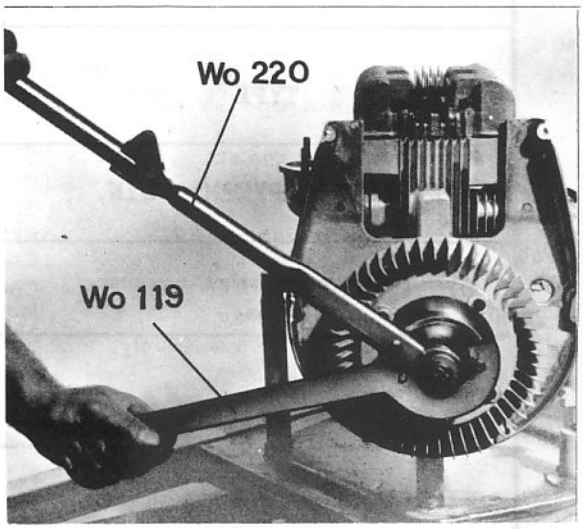


Fig. E1

6. Remove magnet support and blower wheel with special tool Wo30 (Fig. E2).

7. Remove: contact breaker plate - ignition cam (localise its original place) - washer and back panel of fan.

8. Before dissassembly further, put matchmark on intake side of cylinder heads, cylinders, crankcase halves.
   - Loosen cylinder head nuts, remove cylinder heads with gaskets.
   - Loosen cylinder base nuts with 13mm WO.3 box spanner.
   - Put piston at bottom dead center and remove the cylinder carefully without twisting.

9. Use slotted wooden board WO12 under piston, remove snap rings with pliers and extract piston pin.
   Remove piston and con rod upper needle bearings.
   Remove slotted wooden board.

10. Remove bearing plate at the drive shaft side - pull off bearing with an universal puller.

    Remove ring gear with special tool WO30.
    Loosen and unscrew 4 hexagonal screws 6 x 50 of crankcase.

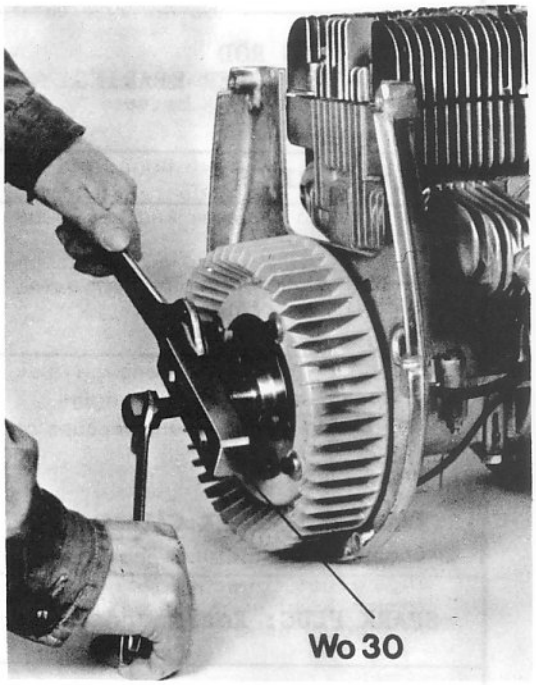


Fig. E2

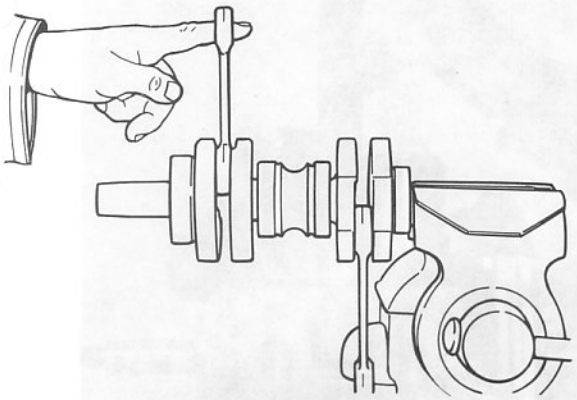


Fig E3

With a soft head hammer gently tap underside of crankshaft just forward of the point where it protudes from crankcase.

Remove top half crankcase - crankshaft can be lifted out of bottom half with its seals. Clean all parts thoroughly, check for wear.

ENGINE RE-ASSEMBLY

The following procedure is the suggested sequence for re-assembly of a typical two-cylinder engine.

1. CRANKCASE - CRANKSHAFT

a) Clean crankcase thoroughly, remove varnish, gum, deposits from internal surface. Make sure that all screw threads, studs are clean and undamaged. Inspect carefully upper and lower halves of crankcase assy.
Check mating surfaces - replacement of crankcase assembly may be required if surfaces are badly nicked or grooved.

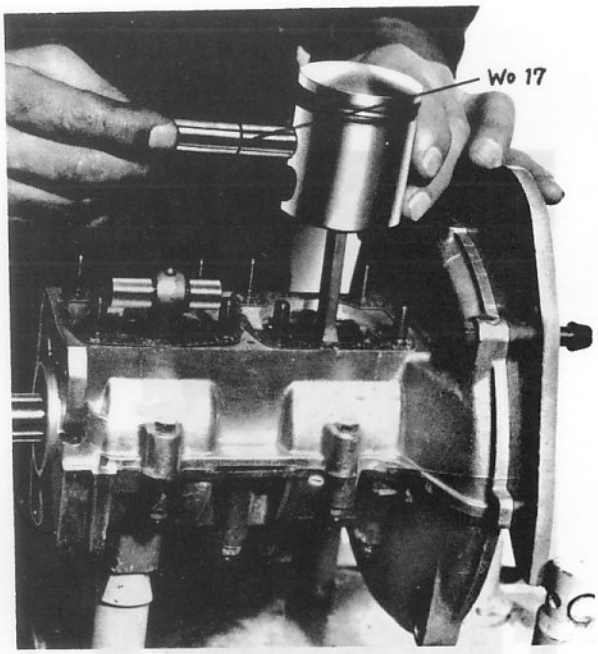


Fig. E4

b) Check crankshaft for excessive wear: change if necessary. Con rod bearing upper and lower should be in good condition, rotation must be smooth. (Fig. E3) Small end needle bearing may be changed if necessary.
Lower bearing of con rod cannot be removed; if these are damaged replace crankshaft assembly.
Complete crankshaft after overhauling, lower it into bottom half crankcase carefully.
Apply sealing compound to mating surfaces; install upper half crankcase and tighten screw.
Upper and lower crankcase shows an identical number, they must not be exchanged by mistake.

2. PISTONS

Install cylinder base gaskets. Position both pistons as they are marked with an arrow pointed towards exhaust ports. Lubricate needle bearing and insert bearing in connecting rod small end. Push piston pins into position and install circlips. (See Fig. E4)

Check connecting rod aligment with a square angle tool. (See Fig. E5) Due to chromed type cylinders; pistons and cylinders must be renewed in set as follows:

Cylinder Ø	Cylinder marking	Piston Ø
62.01	01	61.96
62.00	00	61.95
61.99	99	61.94
61.98	98	61.93
61.97	97	61.92

Piston clearance = 0.05mm = 0.0019

Push wooden board under piston as shown on Fig. E6 to install cylinder.

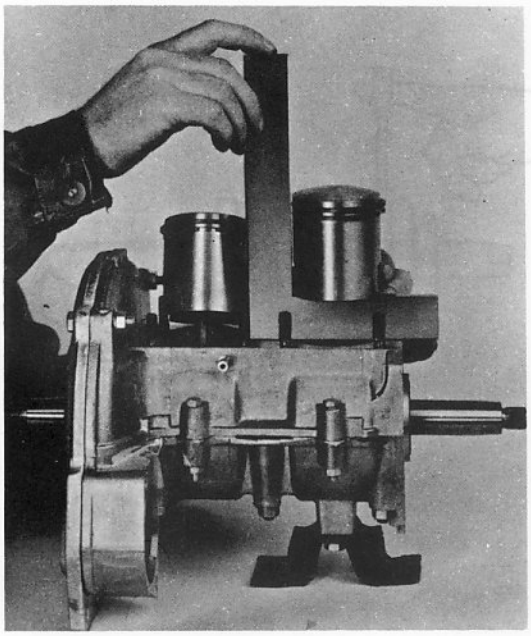


Fig. E5

3. CYLINDERS

Carefully observe cylinder bore for signs of wear - if any, you can replace cylinders with assorted pistons as per above mentioned table. After lubricating pistons and rings (turn rings into right position: groove on pin), carefully guide cylinder down over rings using piston clamp WO24 (See Fig. E6).
Remove slowly slotted wooden board as you slide down the cylinder.
Before securing the cylinders, install intake manifold to align it - then tighten cylinder base retaining nuts to: 16 ft. lbs. torque.

4. CYLINDER HEAD

- Make certain that cooling fins are unbroken and that spark plugs threads are clean and undamaged. Check gasket surface of head: replace head if internal surface is scratched, nicked or distorted.
- Clean out any carbon deposits from inside the combustion dome - if badly varnished or if carbon deposits cannot be removed, use a new cylinder head. Position new head gaskets on cylinder then reinstall heads.

N.B: Cylinder head #1 has a hole tapped for cylinder hood screw and outside ignition coil support.
Reinstall cylinder head nuts and tighten in criss-cross pattern to a torque value of : 20ft/lbs.

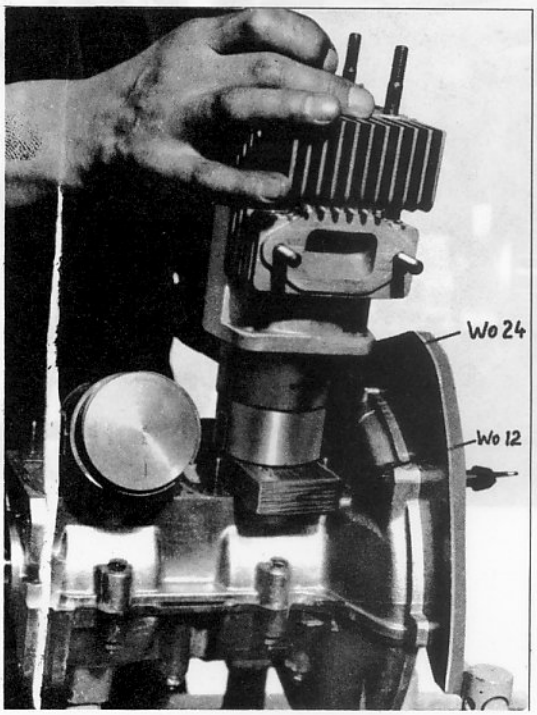


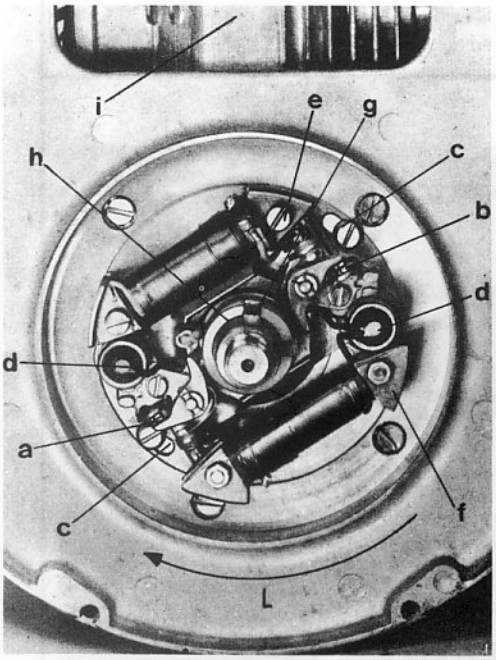
Fig. E6

5. Tighten exhaust manifolds nuts: 16 to 17 ft.lbs.

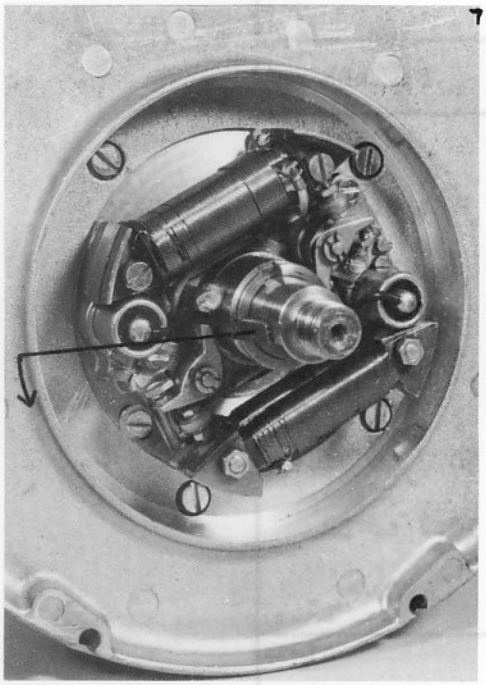
6. Tighten inlet manifold nuts, and install carburator and its gaskets.

7. Install spark plugs and fan back panel.

8. Assemble sleeve for oil seal on the magneto side with a spring washer on the shaft journal.



a) Contact breaker cylinder 1
b) Contact breaker cylinder 2
c) Screws for plate
d) Condensers
e) Alternator anchor
f) Ignition anchor
g) Key for breaker cam
h) Breaker cam
i) Cylinder 2
k) Wo 13
l) engine rotation direction



9. IGNITION ELECTRICAL SYSTEM

a) Mount magneto plate with wire and screw it loosely
b) Check surface of cam, if worn or damaged replace
c) Position woodruff key for breaker cam, (arrow to the left) it must lay in the key-way of the ignition cam.
d) Breaker points: check and replace if necessary: gaps = 0.014" to 0.018"
e) Condenser: check and replace if necessary
f) Ignition and lighting coils: check and replace if necessary
g) Timing: Use Bosch timing instructions for Lloyd.

10. Install magneto support with blower wheel.

11. Hold fast the recoil starter cup with special tool # WO119, install spring washer and M16 nut. The emergency starter cup #04 31 0602.00 must fit in the key way of the magneto support. Then tighten up the nut with a torque value of 50 to 58 ft. lbs.

12. Install blower hood

13. Install ring gear in case of electric starter type.
Warm up shaft side bearing cap to 210°F and install bearing on drive shaft. Screw-in bearing plate cover, starter, lock ring. Complete the engine as: cylinder hood, tighten spark plugs to 20 ft. lbs torque, spark plug connectors, etc.
- Make sure recoil starter is properly centered when reinstalled on engine. First reinstall starter loosely on engine, then pull handle out about 8" until it firmly engage, hold rope in this position while screwing starter mounting screws.

14. After the engine is completely reassembled and all adjustments have been made install engine on vehicle then check it out.
Make final adjustments under actual load conditions;
Run-in recommendations for a rebuilt engine are the same as for a new engine.

ENGINE SPECIAL TOOLS

WO 03 : 13mm box wrench for cylinder base nuts

WO 12 : Wooden slotted board

WO 17 : Piston pin extractor

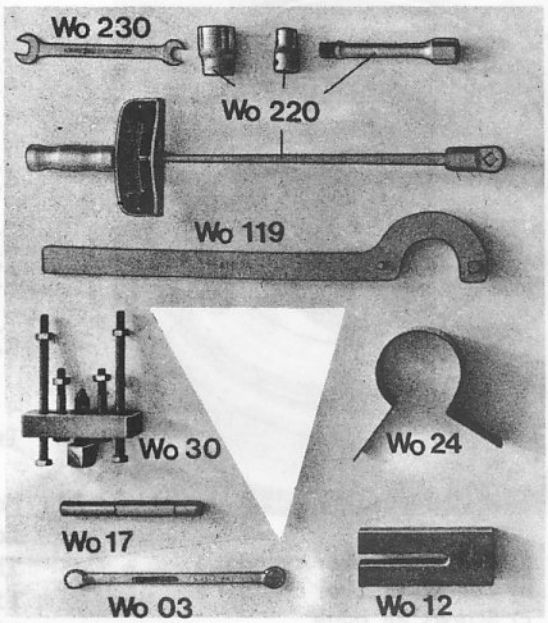
WO 24: Piston ring clamp

WO 30 : Puller: magnets support ring, gear

WO 119: Wrench

WO 220: Torque wrench with inserts of differents socket wrench sizes

WO 230: Double end wrenches of different sizes.



TIGHTENING TORQUES FOR BOLTS AND NUTS

Description	MKG		FT. LBS
Inlet manifold	2.3	=	16.7
Exhaust manifold	2.3	=	16.7
Exhaust pipe	3.75	=	27.
Cylinder head	2.8	=	20.
Cylinder base	2.3	=	16.7
Drive shaft	7 to 8	=	50.7 to 58.
Magneto support	7 to 8	=	50.7 to 58.
Spark plugs(14mm)	2.8	=	20

1 mkg = 7.25 ft. lbs

W A R R A N T Y

LLOYD 2-CYCLE ENGINE WARRANTY

We warrant each new engine sold by us to be free from manufacturing defects in normal service for a period of (1) year commencing with delivery to the original user.

OUR OBLIGATION UNDER THIS WARRANTY IS EXPRESSLY LIMITED TO THE REPLACEMENT OR REPAIR AT A POINT DESIGNATED BY US, OF SUCH PART OR PARTS AS SHALL APPEAR TO US TO HAVE BEEN DEFECTIVE.

WE SHALL NOT BE LIABLE FOR CONSEQUENTIAL LABOR COSTS OR TRANSPORTATION CHARGES IN CONNECTION WITH THE REPLACEMENT OR REPAIR OF DEFECTIVE PARTS.

WARRANTY IS VOIDED BY UNAUTHORIZED REPAIRS OR MODIFICATIONS OR USE OF ENGINES IN ANY FORM OF COMPETITION.

WE SHALL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES OR CONTINGENT LIABILITIES NOR FOR THE FITNESS OF ANY ENGINE FOR ANY PARTICULAR PURPOSE.

WE MAKE NO OTHER EXPRESS, IMPLIED OR STATUTORY WARRANTY, NOR IS ANYONE AUTHORIZED TO MAKE ANY IN OUR BEHALF.

The following conditions are not considered to be manufacturing defects and will not be covered by Warranty:

1. Normal engine wear, routine tune-ups and adjustments.
2. Damage due to improper handling or accidents.
3. Scored piston or cylinder from negligent maintenance such as:
   a. Failure to use proper fuel and/or fuel-oil mixture or oil other than specified.
   b. Improperly adjusted carburetor to cause lean mixture.
4. Damage due to changes to clutch or sprocket ratio to allow operation at speeds, loads, or conditions contrary to published specifications or recommendations.
5. Damage due to changes to --other than Lloyd-- specified carburetion, compression ratio, or ignition timing.
6. Damage due to operation in dusty conditions, such as summertime operation on fields (air cleaners are not provided for such use).

STANDARD REPAIR-RATES FOR LLOYD ENGINE

Code No:		Rate
LM 1	Removing and refitting one cylinder head	$ 1.25
LM 2	Removing and refitting two cylinder heads	$ 1.65
LM 3	Removing and refitting one cylinder with its head	$ 2.50
LM 4	Removing and refitting two cylinders with its heads	$ 3.30
LM 5	Removing and refitting one piston only. (Cylinder and heads are already removed). For a complete operation add LM 3	$ 0.80
LM 6	Removing and refitting two pistons only. (Cylinder and heads are removed). For a complete operation add LM 4	$ 1.65
LM 7	Removing and refitting rings on one piston only. (Cylinders and components are removed). For a complete operation add LM 3	$ 0.80
LM 8	Removing and refitting rings on both pistons only. (Cylinders & components are removed) For a complete operation add LM 4	$ 1.65
LM 9	Removing and refitting crankshaft or crankcase only. For complete operation add LM 4 and LM 6	$ 5.00
LM 10	Replace radial oil seal only on crankshaft (drive shaft side). For complete operation add LM 4, LM 6, LM 9.	$ 0.80
LM 11	Replace radial oil seal only (magnets side). For complete operation add LM4, LM 6, LM 9.	$ 0.40
LM 12	Removing and refitting bearing 6205 Z on drive shaft side including removal & refitting of bearing cap.	$ 1.25
LM 13	Removing and refitting ring gear. For complete operation add LM 12	$ 1.25
LB 1	Removing and replacing blower wheel with its component	$ 2.50
LZ 1	Timing the engine	$ 1.25
LZ 2	Removing and refitting ignition coils	$ 0.80
LZ 3	Removing and refitting contact breaker plate or breaker lever	$ 1.25
LS 1	Removing and refitting an electrical starter	$ 0.80