

BOOK 650

**INSTRUCTION MANUAL
&
PARTS LIST**

**LISTER
AIR COOLED
MARINE DIESEL ENGINES**

TYPES LD & SL
1 - 2 - 3 CYLINDERS

R. A. LISTER & CO. LTD.

MARINE DIVISION

DURSLEY

GLOUCESTERSHIRE

ENGLAND

TELEGRAPHIC AND CABLE ADDRESS: POWER, DURSLEY. TELEPHONE: (0453) 4141
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handbook to the man who has to look after it.

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Do Not Sell.*

**THE REGULAR USE OF A SPANNER ON
LOOSE NUTS MAINTAINS A SOUND
ENGINE**

ENGINE	No.
GEAR BOX	No.
REDUCTION GEAR	No.
GENERATOR	No.
ALTERNATOR	No.
PUMP	No.
COMPRESSOR	No.

**PLEASE NOTE THE ENGINE NUMBER
AND ALWAYS QUOTE WHEN ORDERING
SPARE PARTS**

Correspondence and Spare Part Orders for Air Cooled Marine Diesel Engines should be addressed to:—

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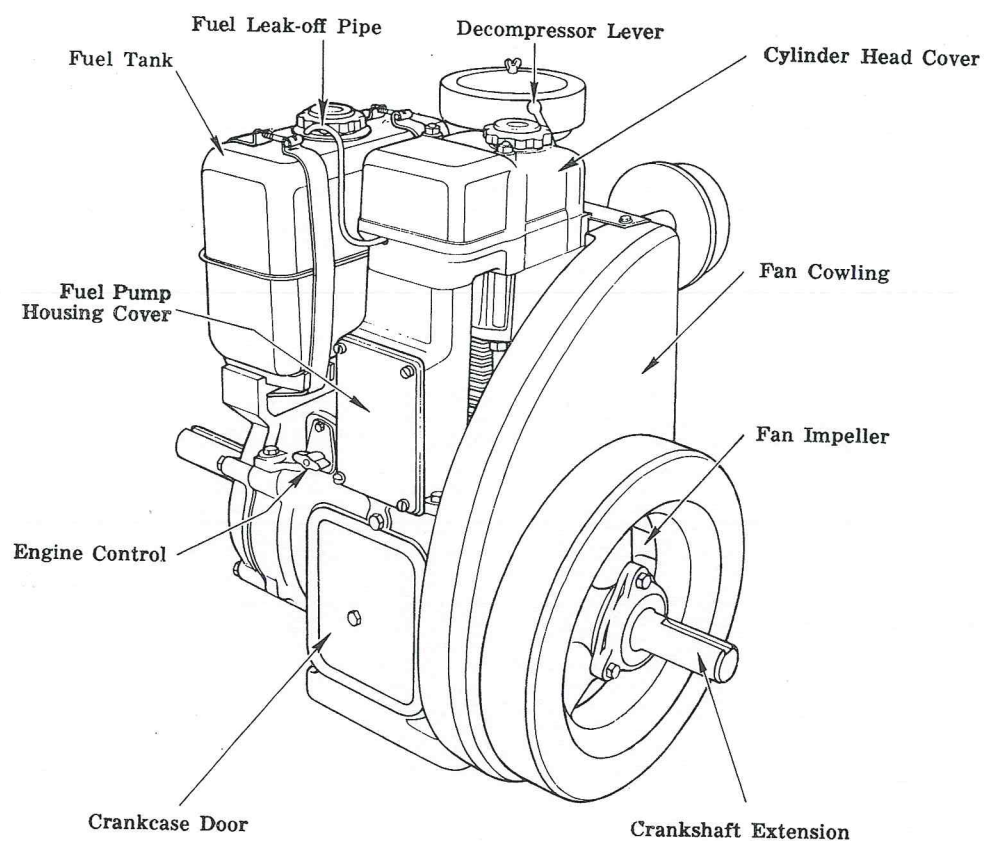


Fig. 1.—Type LD1 or SL1 Engine—Front View.
Auxiliary Engine

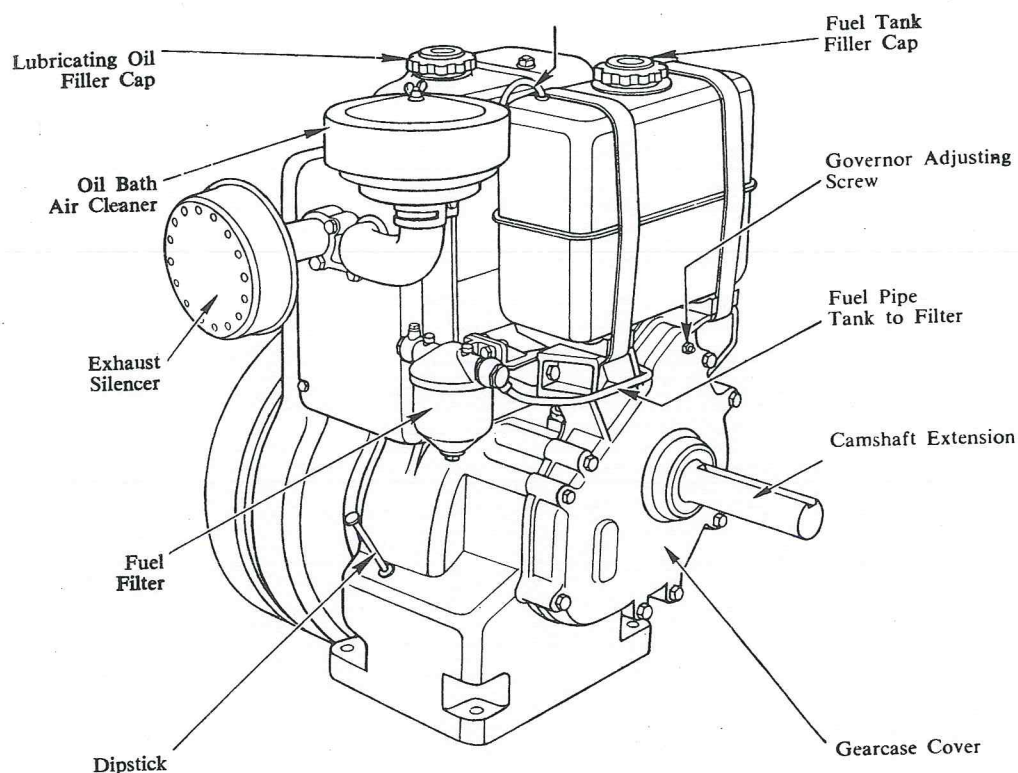


Fig. 2.—Type LD1 or SL1 Engine—Back View.
Auxiliary Engine

WHEN USING THIS INSTRUCTION MANUAL AND PARTS LIST, PLEASE NOTE THE FOLLOWING :—

1. Instructions and statements contained in this book are given with our best intentions and are correct at the time of going to press. They are subject at any time to alteration.
2. The illustrations are subject to modification and must not be taken as representative of any individual specification.
3. The exploded drawings illustrating the parts are not drawn to scale.

TECHNICAL DATA

		LD1	LD2	SL1	SL2	SL3
MAXIMUM GROSS BHP	... ..	5	10	6	12	18
RATED BHP	2000 rev/min.	—	—	4.75	9.5	—
(B.S. 649:1958)	1800 rev/min.	3.5	7	4.25	8.5	12.75
	1500 rev/min.	3	6	3.6	7.2	10.8
	1200 rev/min.	2.4	4.8	2.87	5.74	8.6
	1000 rev/min.	2	4	2.4	4.8	7.2
	800 rev/min.	1.6	3.2	1.9	3.8	5.7
CYLINDER BORE x STROKE	in. mm.	3 x 3½ 76.2 x 88.9		3⅜ x 3½ 80.96 x 88.9		
SWEPT VOLUME	cu. in.	24.7		27.9		
PER CYLINDER	cc.	405		458		
B.M.E.P. at 1800 rev/min., lb/sq.in.	...	62.3		67.4		
FUEL CONSUMPTION on full load in lb./hp/hr.	... ..	.55	.53	.54	.53	.52
Approximate FUEL CONSUMPTION on full load at maximum revolutions						
	pints/hour	1.8	3.5	2.4	4.8	6.3
	litres/hour	1	1.9	1.4	2.7	3.6
LUBRICATING OIL Consumption on full load at maximum revolutions						
	hours/pint	39	20.2	29.2	14.9	11.1
	hours/litre	68.6	35.5	51.4	26.2	19.5
LUBRICATING OIL SUMP (engine level)						
See page 14	Capacity—pints litres	3½ 2	9½ 5.4	3½ 2	9½ 5.4	13½ 7.7
EXHAUST CONNECTION B.S.P.	...	1"	1¼"	1"	1¼"	1½"
NETT WEIGHT OF ENGINE	lb. kg.	261 118	416 187	261 118	416 187	513 233
NETT WEIGHT OF ENGINE and REVERSE GEAR	lb. kg.	349 158	504 229	349 158	514 234	633 288
NETT WEIGHT OF ENGINE REVERSE GEAR AND REDUCTION GEAR	lb. kg.	369 168	524 238	369 168	534 242	653 296
STANDARD ROTATION CLOCKWISE LOOKING AT FLYWHEEL END						

Engine Rating

The Engine is rated in accordance with BSS 649 : 1958, i.e., the engine will develop its rated H.P. continuously including 10% overload for a period not exceeding 1 hour in any period of 12 hours consecutive running.

CARE OF YOUR NEW ENGINE

Before leaving the makers works, each engine is carefully tested and inspected; this includes full load running for several hours, followed by detailed examination and tightening of all nuts and unions.

When the engine is put into service, further setting of some joints will occur and the valve gear beds down. For these reasons, if the best results are to be obtained from the engine, it is important that it should receive regular attention, particularly during the first 500 hours of its life. The same applies to an engine which has been completely overhauled.

Initial Attention

It is recommended that the following are attended to after the engine has run 25 hours and again after the engine has run 250 hours.

1. Adjust tappet clearances (see page 24).
2. To ensure that the top cups of the push rods are full of oil and that the valve springs are lubricated, pour $\frac{1}{2}$ pint of lubricating oil per cylinder over the valve gear.
3. *Check, and tighten, the nuts on the following joints: end cover, cylinder head cover(s), fuel pipes, fuel pump housing cover.

In addition to the above the following should also be carried out.

- a. Change the lubricating oil for the first time after 100 hours. Thereafter every 250 hours.
- b. Clean the engine and keep it clean.
- c. Observe the exhaust at the normal full load. The exhaust must be free from soot. A black exhaust means that the engine is overloaded or that the injection equipment is out of order. Do not allow the engine to run with a dirty exhaust without investigating the cause as this may result in an expensive breakdown.

Routine Maintenance

Following the initial attention, the normal routine maintenance must be carried out as laid down on page 20.

Lubricating Oil

Always use oils of the correct viscosity and type (Heavy Duty diesel engine detergent lubricating oil. (See "Lubrication" page 14.)

This will ensure easy starting, lowest fuel consumption, minimum wear and longest periods between overhauls.

A list of oils which have been used with satisfaction is given under "Lubrication" (page 16)

*Note: Where torque spanners are available, the following tightening torques must be maintained:

Size	Torque		Component
	lb.ft.	kg.m.	
1/4" UNF	10	1.38	Injector clamp nuts, big end nuts. Balance weight setscrews. Cylinder head nuts.
5/16" UNF	15	2.07	
3/8" UNF	32	4.4	
7/16" UNF	50	6.9	
1/2" UNF	68	9.4	Flywheel to crankshaft setscrew.
3/4" UNF	200	27.6	

COOLING AIR CONSIDERATIONS PROPULSION ENGINES

The trunking and each cowl must have a minimum cross-sectional area of 30 sq. in. for LD1M and SL1M, 60 sq. in. for LD2M and SL2M and 90 sq. in. for SL3M engine.

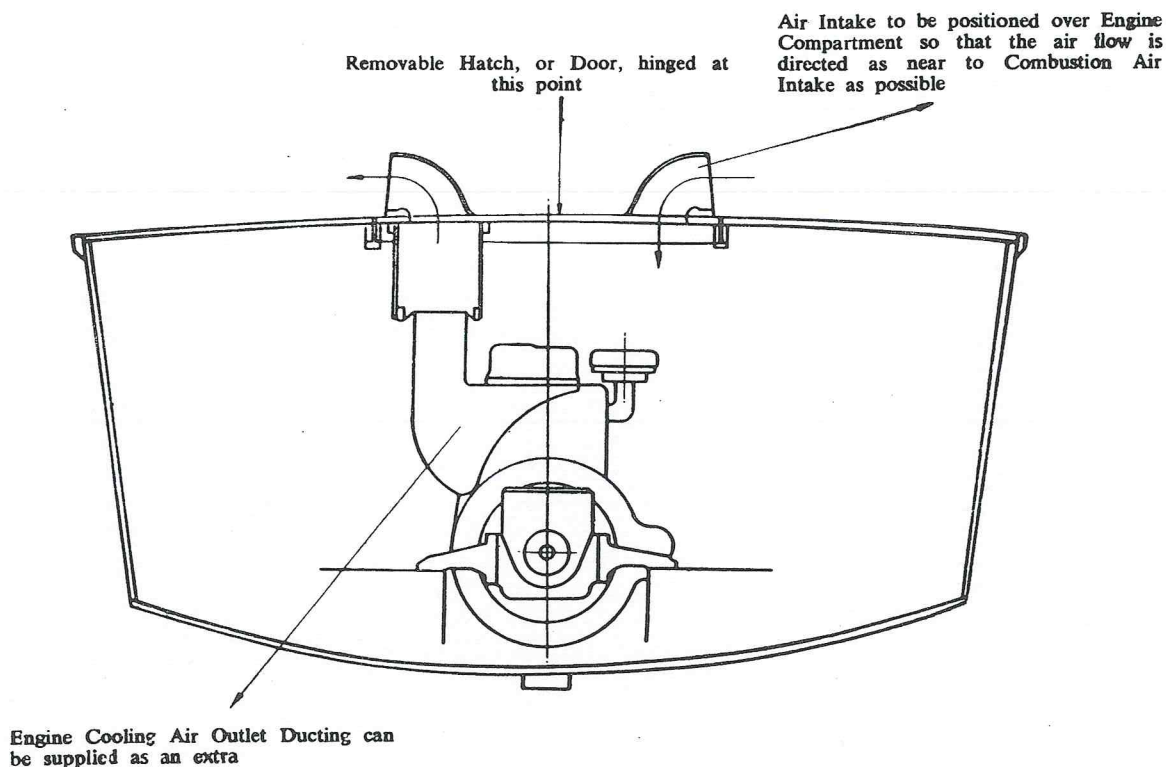


Fig. 3.—Vertical Trunking with Ventilator directly overhead

LD1M or SL1M with square outlet duct shown drawn. LD2M or SL2M & SL3M with a square outlet duct similarly installed.

Ducts may be adapted for circular trunking, in each case, for use in difficult installations where ventilator is not vertically above the engine outlet duct.

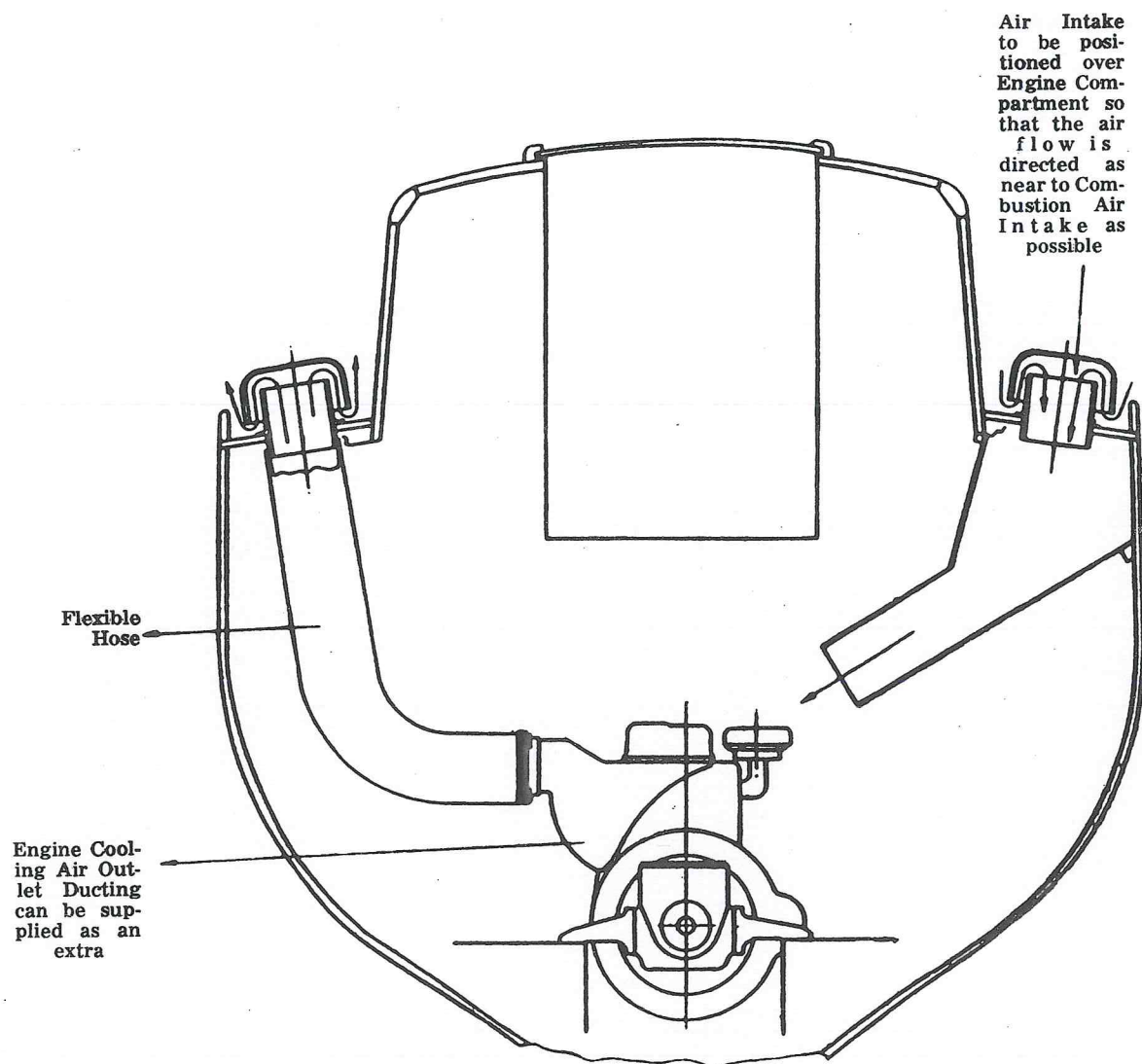


Fig. 4.—Horizontal Engine Duct adapted for Circular Trunking

Annular passages through each mushroom ventilator and through each trunking must have a minimum cross-sectional area of 30 sq.in. for LD1M and SL1M. 60 sq. in. for LD2M and SL2M and 90 sq. in. for SL3M Engines. **Important:** Water must not reach the engine through the air trunking.

LD1M and SL1M installations require a single hose.

LD2M and SL2M installations require two hoses.

SL3M installations require three hoses.

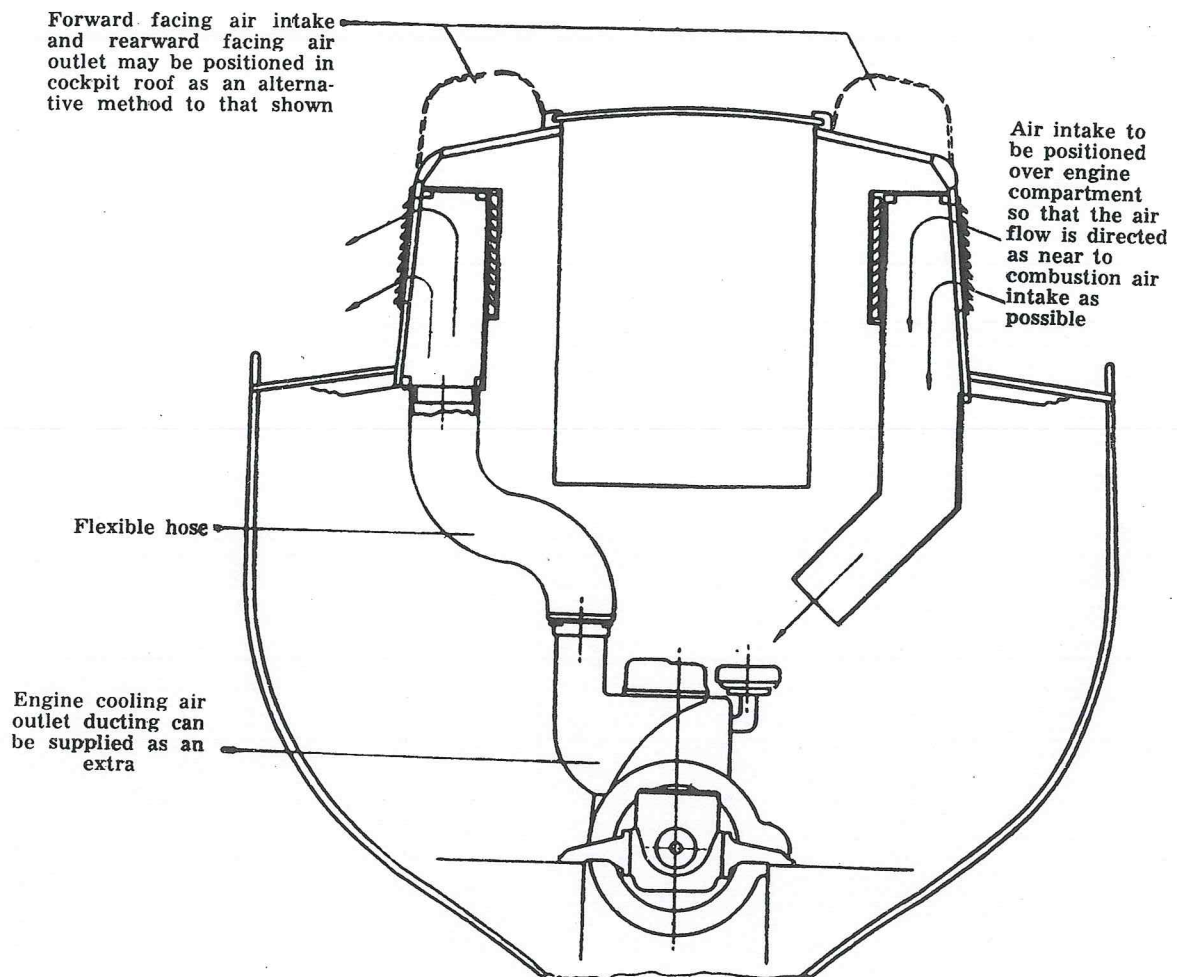


Fig. 5—Vertical Engine Duct adapted for Circular Trunking

Each inlet and outlet grille and each trunking must have a minimum cross-sectional area of 30 sq. in. for LD1M & SL1M, 60 sq. in. for LD2M & SL2M and 90 sq.in. for SL3M engine. (Note: This minimum area must be the total free area between the louvres and must not include the louvres themselves.) A weatherproof cover must be provided for each pair of grilles and fittings provided so that the cover can be easily removed from one side of the trunking and secured over the grille on the other side. Under normal weather conditions the covers should be placed over the inside grilles (as shown in drawing) but should be placed over the cockpit grilles in rough weather or whenever hot air from the engine is required for heating purposes. **Important:** Water must not reach the engine through the air trunking.

LD1M and SL1M installations (single outlet engine duct) require one length only of flexible trunking.

LD2M and SL2M installations (double outlet engine duct) require two lengths of flexible trunking.

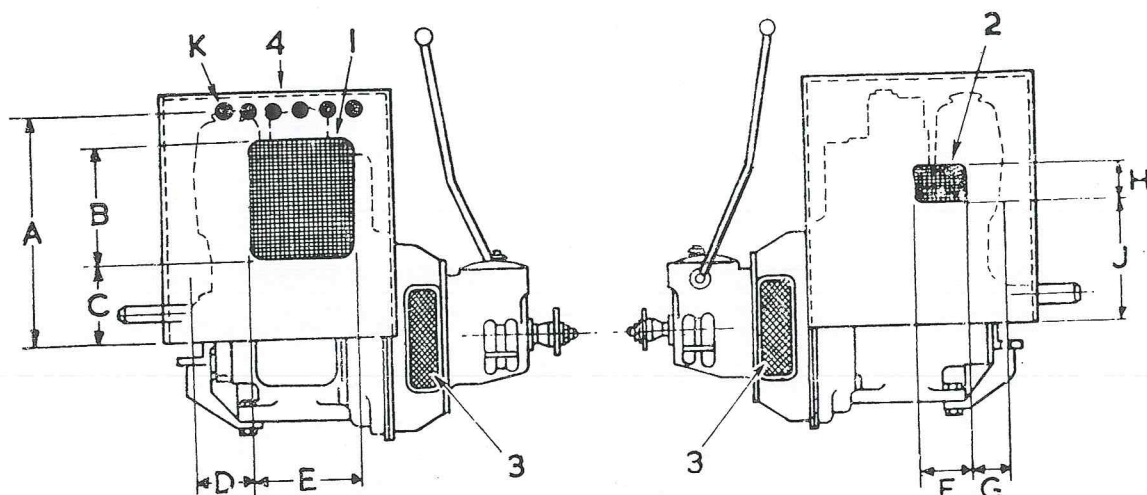


FIG. 6—CASINGS FOR PROPULSION ENGINES

KEY

1. Opening for Cooling Air Outlet.
2. Opening for Combustion Air Intake.
3. Cooling Air Intake, must NOT be obstructed.
4. Removable Lid to get at oil and fuel, fitting valve gear, air cleaner, decompressor, stopping lever, excess fuel control and dipstick (if the lid is hinged the hinge should be at the after end or port side).

	A	B	C	D	E	F	G	H	J	K
LD1M } in.	17 $\frac{3}{4}$	9 $\frac{1}{4}$	6 $\frac{1}{4}$	4 $\frac{1}{2}$	8 $\frac{3}{8}$	4	3 $\frac{1}{4}$	3	9 $\frac{1}{4}$	6-1" dia. holes 2" centres
SL1M } mm.	451	235	159	144	213	102	83	76	235	
LD2M } in.	20	9 $\frac{1}{4}$	6 $\frac{1}{4}$	4 $\frac{1}{2}$	13 $\frac{1}{2}$	7	6 $\frac{3}{4}$	3	15	8-1" dia. holes 2" centres
SL2M } mm.	508	235	159	144	343	178	176	76	381	
SL3M } in.	20	8 $\frac{1}{2}$	9 $\frac{5}{8}$	1 $\frac{1}{2}$	23 $\frac{1}{2}$	10	—	4	13 $\frac{1}{2}$	11-1" dia. holes 2" centres
	508	216	244.5	12.7	596	254	—	102	349	

NOTE.—Openings 1 and 2 may be covered with wire mesh, having not less than $\frac{1}{4}$ " x $\frac{1}{4}$ " spaces between wires, but the area taken by it must be allowed for.

WARNING.—Smaller gaps than stated will cause overheating.

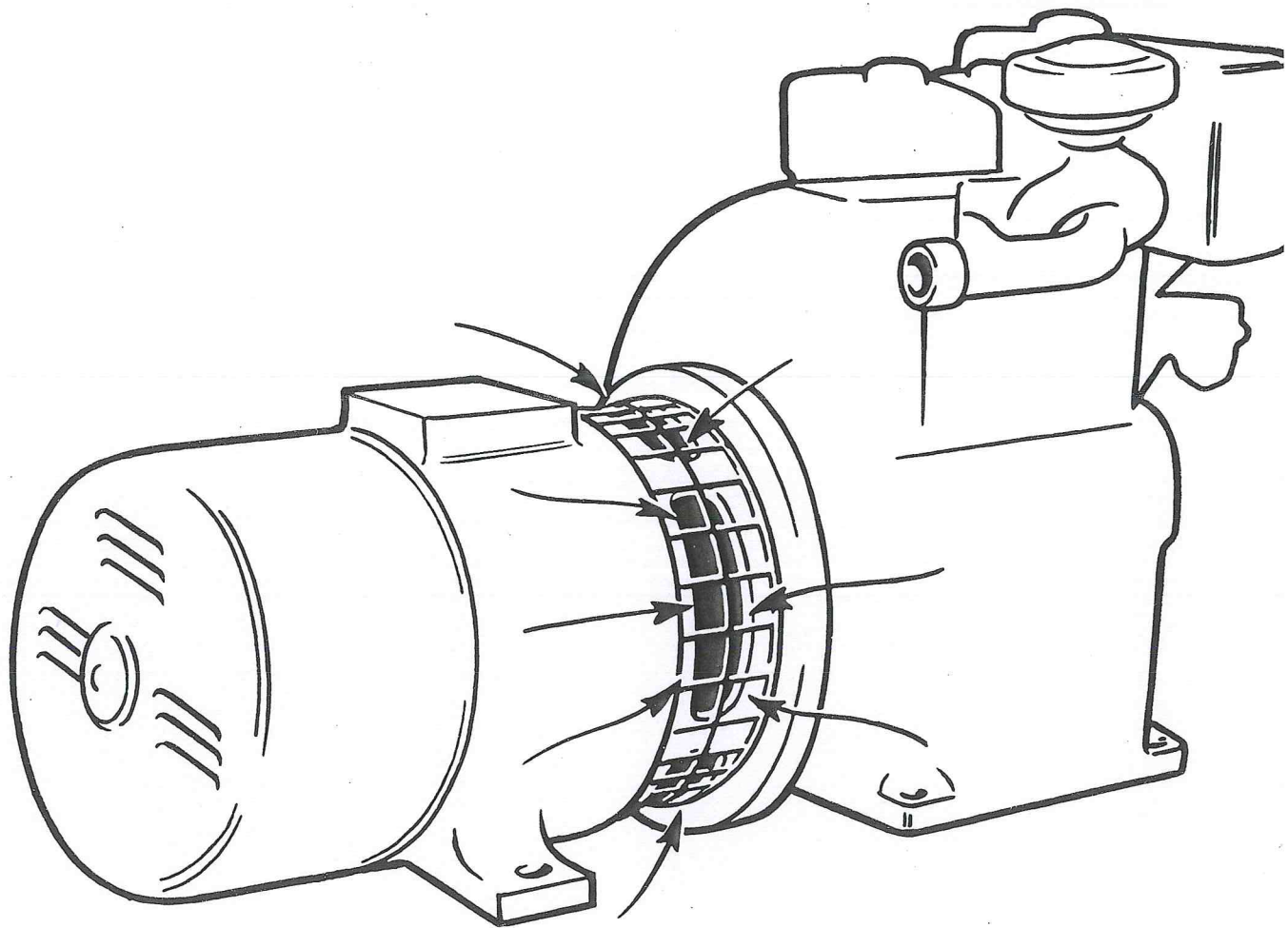


Fig. 7.—Engine close coupled to a driven machine

Air intake holes in adaptor. The absolute minimum area of the intakes must be
30 sq. ins. for SL & LD1.
60 sq. ins. for SL & LD2.
90 sq. ins. for SL3.

Larger areas are preferred. The coupling or clutch driving member at the flywheel end must not obstruct the air flow to the fan, and the areas above must be maintained at this point and through to the fan.

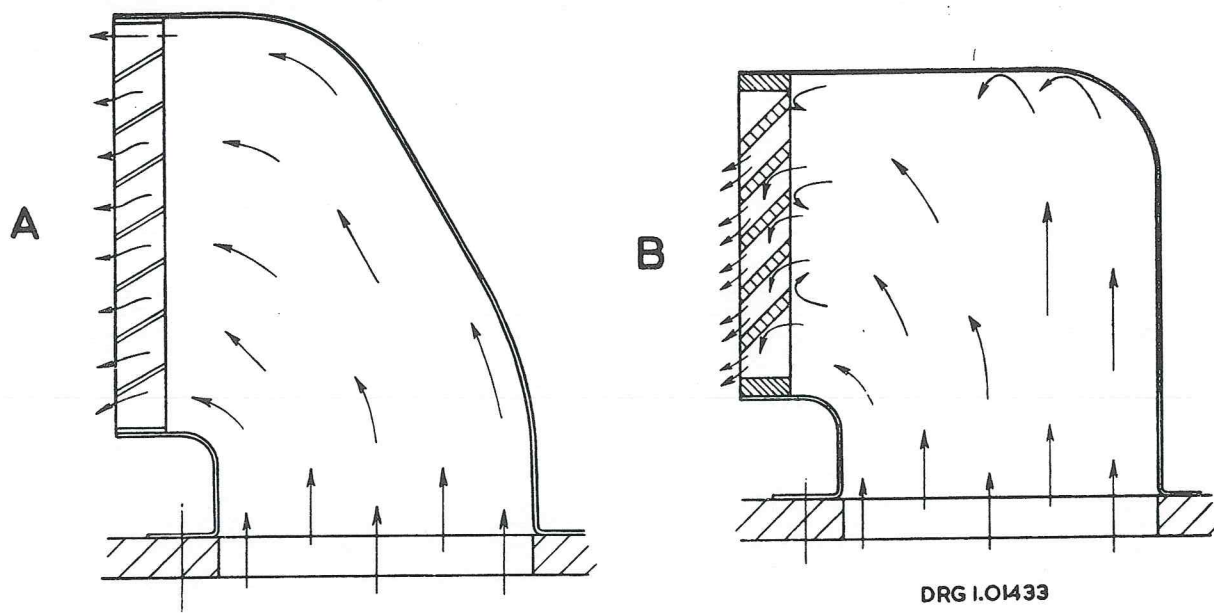


Fig. 8.—Cowls

CORRECT—

- A** Area through louvres or grille is at least 25 per cent greater than area of ducting.

WRONG—

- B** Louvres or grille obstructs air flow. Area through louvres is smaller than area of ducting. Grilles, wire mesh or louvres placed in the air stream are obstructions and allowance must be made for them. The free flow area of these must be calculated to ensure that it is at least 25% greater than that specified for the inlet and outlet passages.

INSTALLATION OF AIR COOLED MARINE ENGINES

Before arranging your installation it is imperative that careful consideration be given to the general layout of the machinery, and with air-cooled engines to the cooling of the engine; the guidance notes on the arrangement drawings must be followed.

It must be appreciated that the smaller the rated power of the engine, the greater must be the care given to detail.

Cooling. Unless an adequate supply of air is allowed to circulate around the engine, and means taken to prevent the same air re-circulating, the engine will lose power due to overheating. Air inlets and exits recommended on drawings and illustrations must be strictly observed. In an enclosed engine compartment, fresh air inlets must be provided and discharge ducts are recommended to lead the heated air away. This hot air can be usefully employed to heat accommodation and ventilate cupboards and closets, but re-circulation must be prevented. Cooling air outlet cowlings are available as accessories.

Exhaust. Pipes should slope gradually away from the engine down to outlet if this is taken to the ship's side or transom. Swan necks increase back pressure and make cleaning difficult. Wooden structure must be protected from exhaust heat by adequate clearance and lagging. A water pump to circulate sea water through the exhaust tail pipe is available as an extra.
A bad exhaust pipe can seriously reduce the engine output.

Alignment. Flexible couplings do not excuse bad alignment of engine to propeller shaft. A solid dummy bobbin should be used when aligning engine to shafting, and afterwards replaced by the flexible coupling. We will supply these solid bobbins on loan to the home market for a nominal charge. Misalignment stresses bearings, and may account for a loss of engine output.

Stern gear. Packing glands should allow free rotation of the tailshaft. Stern tubes should be filled with grease before inserting shaft. Before launching, run engine to ensure that packing glands do not overheat. If necessary slacken back gland.

Fuel. Clean fuel is essential for any diesel engine. Always fill tank through a clean tundish fitted with a fine gauze strainer. Injectors should be examined and checked periodically. A faulty injector may reduce engine output by 25%. The fuel tank must be checked or drained periodically to ensure that it does NOT contain water.

Propellers. Must be permitted to run in adequate apertures and never behind heavy square ended body posts. These should be tapered off to an inclusive angle of about 40°

If several of the above defects in installation or operation occur together, even a new engine will lose power, become overloaded, lose revolutions, and may even stop altogether.

Accepted so called standard practices are not always good enough, for air cooled engines the instructions as regards cooling must be carefully studied and applied.

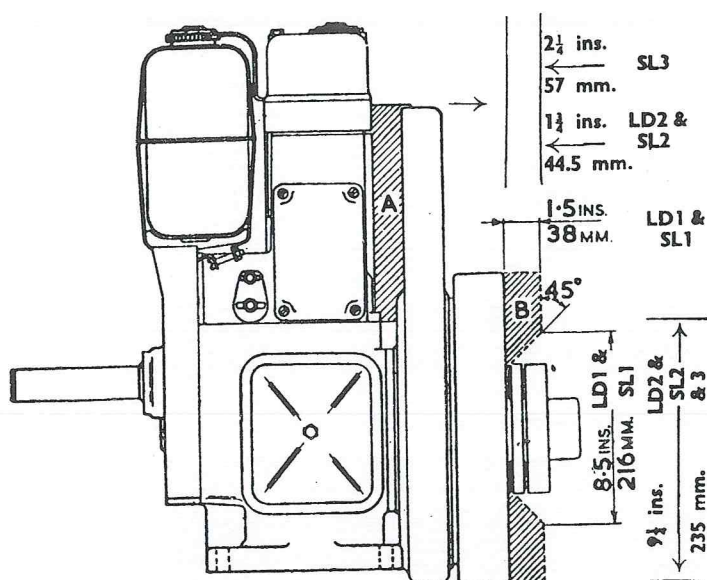


Fig. 9.—Essential Clearances

Cooling

The air for cooling the engine is drawn into the fan impeller from the Space 'B' and discharged from the shaded area 'A' after circulating around the fins of the cylinder(s) and cylinder head(s). It is most important that the areas 'A' and 'B' be kept free from restrictions, and that the discharge from the area 'A' be allowed to get away and not re-circulate back to the intake 'B', as this will cause the engine to overheat.

Casings

If the engine is enclosed in a housing, openings must be provided opposite the cooling air intake and outlet. The openings must have a total area of at least 30 sq. in. (194 sq. cm.) for the single cylinder engine and 60 sq. in. (388 sq. cm.) for the twin cylinder engine, and 90 sq. in. (620 sq. cm.) for the SL3. If they are covered with mesh, the area taken by it must be deducted.

The use of simple ducting or deflectors inside the housing to direct the hot air upwards is advisable. When the engine is installed in an engine room or cockpit the ducting may be extended upwards through the cabin top or canopy so that the hot air discharges clear of the engine room. Care must be taken in siting and designing the exhaust cowling to avoid any back pressure affecting the discharge of hot air, whether caused by wind or the movement of the craft.

Whenever possible the maker's approval should be obtained for installation arrangements in the case of engines installed in small housings.

Flexible Mountings

Allowance must be made for engine to clear bearers by at least $\frac{1}{2}$ " and to clear any casing, including air ducts or deflectors which might be fitted, by 1", to allow for engine movement.

Propulsion Engines

To provide a rigid bed free from alignment troubles it is essential in the case of wooden hulls to ensure that the engine bearers are made of well seasoned wood of liberal size, so arranged that they are an integral part of the ship's hull. In addition a $\frac{1}{4}$ " steel plate should be placed along the top of the bearer the length of the engine base to prevent the engine feet biting into the bearers.

Since NO PROVISION is made in the engine design to take END THRUST, a thrust block must be provided for all propulsion installations other than those supplied with Lister type Reverse Reduction Gear which is capable of absorbing up to 270 lbs. end thrust.

On LD1MG/R, SL1MG/R LD2MG/R and SL2MG/R propulsion units when a Flexible Coupling is fitted a Plummer Block must be fitted to the tailshaft, if the stern tube forward bearing is more than 9" from the edge of the tailshaft coupling.

General

Before installation careful consideration should be given to the layout ensuring accessibility and ease of maintenance, any housing must be constructed so that the sides and forward portion can be dismantled for servicing without disturbing the controls or instruments.

The engine is cooled by air and the cooling air intake and outlet must not be obstructed.

The exhaust pipe should be kept as short and straight as possible, the minimum radius of any bend should not be less than 5". Should there be any incline in the layout of the exhaust pipe, provision must be made for drainage.

Exhaust Pipe Diameter

	LD1 & SL1	LD2 & SL2	SL3
Up to 20ft. ...	1"	1 1/4"	1 1/2"
Over 20 ft. ...	1 1/4"	1 1/2"	2"

LUBRICATION

Specification

LD/SL engines must be run on good quality diesel engine heavy duty detergent lubricating oil.

In temperate climates (up to 85°F (30°C)) oils complying with BS1905 or DEF2101C or MIL-L-2104A must be used when load and servicing conditions are favourable but for arduous duties in temperate climates and for all applications in tropical climates (above 85°F (30°C)) the use of oils to supplement 1 level of detergency is recommended. Supplement 1 oils must also be used if the sulphur content of the fuel is 1% or more. Multigrade oils must have a degree of detergency equivalent to Supplement 1 level and **must not** be used for heavy duty applications.

Viscosity

up to 85°F (30°C)	...	...	...	use SAE 10W
above 85°F (30°C)	...	...	...	use SAE 20

DO NOT MIX TWO DIFFERENT BRANDS OF OIL. THOROUGHLY DRAIN OFF THE ONE BEFORE ADDING THE OTHER.

Lubricating Oil System

Oil is supplied under pressure from a plunger pump to all crankshaft bearings and the valve rockers.

The oil is drawn through a wire gauze strainer and ball suction valve. The suction valve and seating is screwed into the base of the crankcase. The delivery valve is carried in the bottom of a hollow plunger, the oil passing into the hollow tappet and out into a manifold. From the manifold the oil is distributed by two pipes pressed into the main bearing housings and a single pipe which lubricates the valve rocker gear.

The relief valve is carried in the securing plug for the oil pipes to the main bearings and incorporates a pressure reservoir which maintains oil pressure on the bearings during the suction stroke of the pump. The relief valve is set to open at 50 lbs./sq.in. and is not adjustable.

The crankcase may be drained through a drain plug at the back of the engine.

Before Initial Starting or After Overhaul

It is recommended that the fuel system be thoroughly flushed through with fuel oil and the fuel pump(s) control rod checked for free movement before initial start. **Do not allow fuel oil to enter the sump.**

Fill the engine crankcase through the oil filler to the mark "max" on the dipstick. Top up when the engine has been stopped after the initial run.

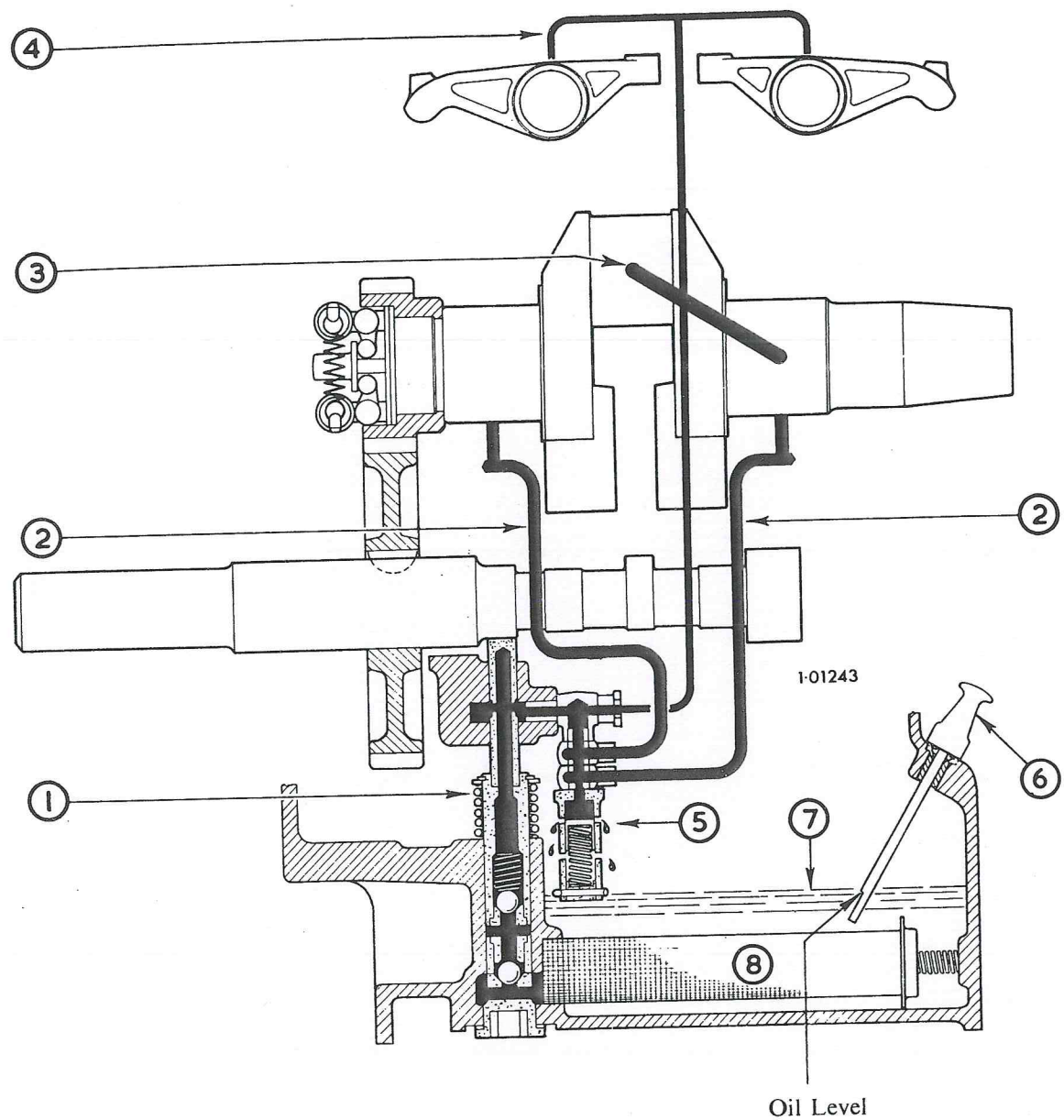
Remove crankcase door and turn engine fast until oil is seen to be discharged under pressure from the relief valve at each stroke of the pump.

Lubricating Oil Sump Capacity

Engine	Dipstick Position	Dipstick Identification No.	Max. angle of inclination at which engine may be run		Approx. Oil capacity with engine level
			Flywheel Down	Flywheel Up	
LD/SL1	Crankcase	1	10°	10°	
	Crankcase Door	17	10°	10°	3½ pints
LD/SL2	Crankcase	16	15°	15°	3½ pints
	Crankcase Door	19	15°	15°	9½ pints
	Crankcase Door	18	15°	15°	*9½ pints
SL3	Crankcase			13°	**11⅓ pints
	Crankcase	4	10°		
	Crankcase Door	8	15°	10°	13⅓ pints
	Crankcase Door	19	15°	15°	**12 pints
				10°	*13½ pints

*Door with Lift Pump, Oil Filter and Filler.

**Door with Dipstick only.



- | | |
|------------------------------------|--------------------------------------|
| 1. Lubricating Oil Pump. | 5. Lubricating Oil Relief Valve. |
| 2. Oil Pipe to Main Bearings. | 6. Lubricating Oil Dipstick. |
| 3. Oil passage to Big End Bearing. | 7. Lubricating Oil Level. |
| 4. Oil Pipe to Valve Rockers. | 8. Lubricating Oil Suction Strainer. |

Fig. 10.—Schematic diagram of Lubricating Oil System.

**LIST OF OILS COMPLYING WITH BSS.1905:1952, MIN. OF DEF. SPECN. DEF 2101 C AND
U.S. ARMY SPECN. MIL-L-2104A**

OIL COMPANY	SAE 10W	SAE 20 or 20W	SAE 30
Castrol Ltd.	Agricastrol HD 10 Deusol CR 10	Agricastrol HD 20 Deusol CR 20	Agricastrol HD 30 Deusol CR 30
Esso Petroleum Co. Ltd.	Essolube HD 10 Estor HD 10	Essolube HD 20 Estor HD 20	Essolube HD 30 Estor HD 30
A. Duckham & Co. Ltd.	Duckhams HD 10/MIL	Duckhams HD 20/MIL	Duckhams HD 30/MIL
Germ Lubricants Ltd.	Germil 101		Germil 303
Gulf Oil (Gt. Britain) Ltd.	Gulf Dieselube HD 10W (GB)	Gulf Dieselube HD 20/20W (GB)	Gulf Dieselube HD 30 (GB)
E. Joy & Sons Ltd.	Diesel "Filtrate" 10W	Diesel "Filtrate" 20	Diesel "Filtrate" 30
Mobil Oil Co. Ltd.	Delvac Oil 910 Mobiloil 10W (Overseas)	Delvac Oil 920 Mobiland Diesel 20	Delvac Oil 930 Mobiland Diesel 30
Petrofina (Gt. Britain) Ltd.	Motortonic SAE 10W Solna HD SAE 10W Solco HD SAE 10W	Motortonic SAE 20/20W Solna HD SAE 20/20W Solco HD SAE 20/20W	Motortonic SAE 30 Solna HD SAE 30 Solco HD SAE 30
Power Petroleum Co. Ltd. (U.K.) B.P. Companies (Overseas)	BP Energol DD 10W BP Energol IC-D 10	BP Energol DD 20W BP Energol IC-D 20	BP Energol DD 30 BP Energol IC-D 30
Regent Oil Co. Ltd.	RPM Delo Special 10W	RPM Delo Special SAE 20/20W	RPM Delo Special SAE 30
Shell-Mex & B.P. Ltd.	Shell Rotella Oil 10W Shell Talona Oil 10W	Shell Rotella Oil 20/20W Shell Talona 20	Shell Rotella Oil 30 Shell Talona Oil 30
Snowdrift Lubricants Ltd.	Apennine SAE 10	Apennine SAE 20	Apennine SAE 30
Valvoline Oil Co.	Super HPO 10	Super HPO 20	Super HPO 30
Vigzol Oil Co. Ltd.	New Ace 10	New Ace 20	New Ace 30

**OILS COMPLYING WITH SPECIFICATIONS MIL-L-2104A SUPPLEMENT 1 AND
DEF. 2101C SUPPLEMENT 1**

OIL COMPANY	SAE 10W	SAE 20 or 20W	SAE 30
Castrol Ltd.	Castrol CR 10 Deusol CR 10/1	Castrol CR 20 Deusol CR 20/1	Castrol CR 30 Deusol CR 30/1
Esso Petroleum Co. Ltd.		Estor HDX 20	Estor HDX 30
A. Duckham & Co. Ltd.	HD. 10/1	HD. 20/1	HD. 30/1
Germ Lubricants Ltd.	Germol D10/S1	Germol D20/S1	Germol D30/S1
Gulf Oil (Gt. Britain) Ltd.	Gulflube Motor Oil HD 10W	Gulflube Motor Oil HD 20/20W	Gulflube Motor Oil HD 30
E. Joy & Sons Ltd.	Diesel "Filtrate" 10W Supp. 1	Diesel "Filtrate" 20 Supp. 1	Diesel "Filtrate" 30 Supp. 1
Mobil Oil Co. Ltd.	Delvac Oil S110	Delvac Oil S120	Delvac Oil S130
Petrofina (Gt. Britain) Ltd.	Motortonic Delta SAE 10W Solna S1. SAE.10W	Motortonic Delta SAE 20/20W Solna S1. SAE.20/20W	Motortonic Delta SAE.30 Solna S1. SAE.30
Power Petroleum Co. Ltd. (U.K.) B.P. Companies (Overseas)	BP Energol DS1-10W	BP Energol DS1-20W	BP Energol DS1-30
Regent Oil Co. Ltd.	Super RPM Delo Special SAE.10W	Super RPM Delo Special SAE.20/20W	Super Delo Special SAE.30
Shell-Mex & B.P. Ltd.	Shell Rotella T oil 10W	Shell Rotella T oil 20/20W	Shell Rotella T oil 30
Snowdrift Lubricants Ltd.	Alpine SAE 10	Alpine SAE 20	Alpine SAE 30
Valvoline Oil Co.	Super HPO S-1 10	Super HPO S-1 20	Super HPO S-1 30
Vigzol Oil Co. Ltd.	New Ace 10 Sup. 1	New Ace 20 Sup. 1	New Ace 30 Sup. 1.

FUEL SUPPLY

It has not been found practicable to recommend any particular fuel for universal use, but the fuel must be a distillate, and not a residual oil or blend thereof. It should have a Specification conforming to British Standard No. 2865:1957, Class A.

				Class A
Viscosity, kinematic, at 100°F (37.8°C), centistokes, min.	...	...	...	1.6 (max. 7.5)
Redwood No. 1 secs @ 100°F min.	...	...	...	30 (max. 45)
Saybolt Universal secs @ 100°F min.	...	...	...	31 (max. 50)
Cetane number, min.	...	...	...	45
Carbon residue, Conradson, per cent by weight, max.	...	...	...	0.1
Distillation, recovery at 357°C per cent by volume, min.	...	...	...	90
Flash Point P.M. closed cup °F min.	...	...	...	130
Water content, per cent by volume max.	...	...	...	0.1
Sediment, per cent by weight, max.	...	...	...	0.01
Ash, per cent by weight, max.	...	...	...	0.01
Sulphur, corrosive	...	...	...	Not more than slight tarnish
Sulphur content, per cent by weight, max.	...	...	...	1.3
Strong acid number	...	...	...	Nil

The purchaser must satisfy himself that his engine is capable of dealing with the fuel at the lowest temperature to which it may be exposed.

The following fuel oils have been used with satisfaction in these Engines:—

Shell Gas Oil "C.I."	Regent Gas Oil
Esso Diesel Medium	Regent Derv.
Esso Marine Diesel Medium	

It must be understood, however, that different fuel oils become available in different areas and that variations in a particular brand of fuel oil may occur.

When in doubt as to the suitability of a fuel oil, the local dealer should be consulted.

Vaporising oils are unsuitable as fuel for Lister diesel engines.

In general, the fuel must be free from foreign matter or excessive wear will take place in the fuel injection system; some fuels are unsuitable owing to the excessive pressures resulting from their use or excessive carbon formation and chemical action on moving parts. The user is cautioned that although the engine may run satisfactorily for a short time on cheap fuel, excessive wear and damage will ultimately be suffered by the engine and its life materially shortened. For these reasons we can accept no responsibility for such damage or wear caused by the use of unsuitable or dirty fuels.

Clean fuel is of the utmost importance in maintaining standard performance.

Fuel Tank—Engine mounted—Optional fitting

The fuel tank, capacity 1½ gallons for single cylinder engines or 2½ gallons for twin cylinder engines, is carried on two cradles and secured by 2 steel straps to the front of the engine. The outlet connection projects upwards inside the tank to prevent any residue from entering the fuel system.

Always fill the fuel tank through a fine strainer, preferably at the end of a run. If any sediment is stirred up during the process this has time to settle before the Engine is used again. If cans are used avoid tipping out the last few drops.

Funnels are very difficult to keep clean in dusty conditions. Wash them before and after use and wrap them up when not required, or fill service tank direct from a small mouthed screw capped can such as a 2 gallon petrol can.

The SL3 engine is supplied with a separately mounted fuel tank.

STARTING AND STOPPING

To Start Engine

- (a) Check fuel and lubricating oil levels.
- (b) If oil bath air cleaner is fitted fill oil container with engine oil to the level marked on the air cleaner.
- (c) Ensure lubricating and fuel oil systems are primed. (See Pages 14 and 30.)
- (d) If engine is fitted with fuel lift pump prime fuel filter by using priming lever on lift pump.
- (e) Move decompressor lever(s) over towards the flywheel.
- (f) Pull control lever outwards and allow it to rotate anticlockwise so that it abuts against the top stop and it is in a vertical position, see illustrations below.
- (g) Lightly oil the end of the camshaft extension and fit the Starting Handle. It is recommended that this shaft should always be used for starting the engine.
- (h) **Important.**—Turn engine slowly from 3 to 20 turns on the camshaft according to the temperature and period of standing unused, in order to prime the combustion chamber(s) and the lubricating oil system.
- (i) Turn handle smartly in a clockwise direction, move decompression lever(s) towards fuel tank and continue turning. Slip off starting handle when the engine fires.
- (k) As soon as the engine reaches normal speed, turn the control lever clockwise to a horizontal position so that it abuts against the horizontal stop—THIS IS MOST IMPORTANT.

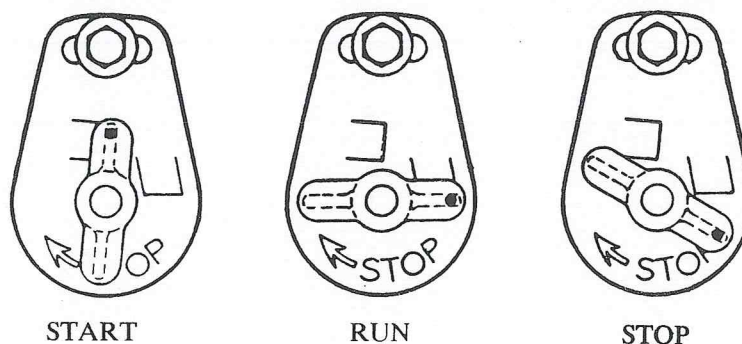


Fig. 11.—Engine Control

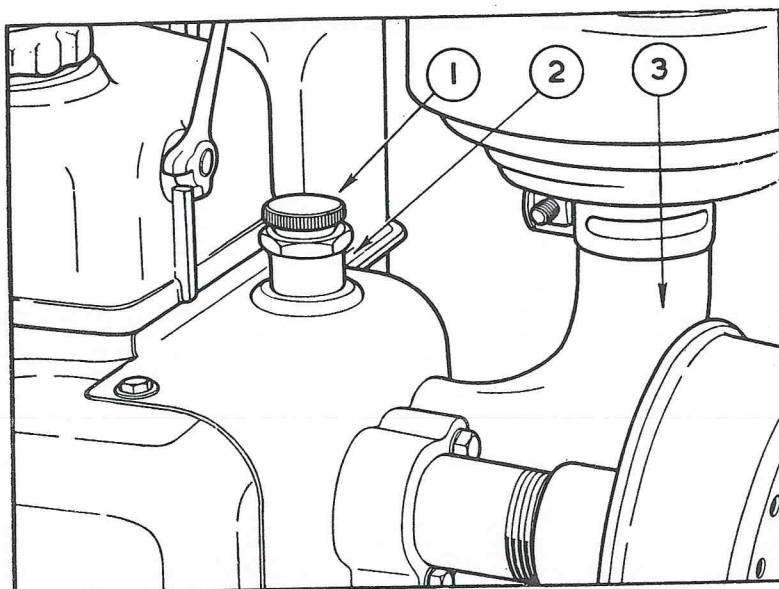
Starting Under Cold Conditions

An oil cup, mounted on the inlet valve port, is provided, to assist starting under frosty conditions and should be used as follows:—

For starting under normal frosty conditions the cup should be half filled with SAE10W lubricating oil, the plunger pressed to the bottom of its stroke and the engine turned at least 5 complete revolutions with the exhaust valve decompressed. The engine should then be started in the usual way.

For starting under extremely frosty conditions the cup should be completely filled with a mixture of 50% fuel oil and 50% SAE10W lubricating oil and then follow the procedure for normal frosty conditions.

The fuel and lubricating oil must be suitable for the temperature at which the engine has to be started—they must have a pour point lower than this temperature. For temperatures below 0°F it is permissible to dilute the SAE10W lubricating oil with up to 25% fuel oil, and to run and top up the sump with this mixture, or use SAE5W lubricating oil.



- 1.—Plunger.
- 2.—Oil Cup.
- 3.—Air Inlet.

Fig. 12.—Cold Starting Oil Injector Device

To Stop Engine

Turn control clockwise and hold in this position until engine stops. When remote control is fitted, move lever to "Stop" position.

Remote Stopping Control

Remote control of the stopping lever is available if required, consisting of a hand lever and bowden cable. The control can be mounted on a panel together with variable speed lever, ammeter, electric starter push button and voltage control unit, should variable speed gear and/or electric starting be fitted. For cold starting the engine control (Fig. 11) must be set by hand to the start position.

Variable Speed Control

On all engines in place of the standard fixed control as shown, a variable speed control can be fitted with a range of 650 to maximum rev/min.. this arrangement is illustrated on pages 35 and 37.

Electric Starting

Electric starting is available and can be operated by either direct or remote control; diagrams of the electric circuit for both these methods of control are shown on pages 50 and 51.

Speed Adjustment

A slight adjustment of speed may be made by turning the screwed rod which projects through the gear case. Turn anti-clockwise to increase speed, clockwise to decrease. Secure locknut.

Do not increase speed above $2\frac{1}{2}\%$ without consulting Lister Blackstone Marine Ltd.

ROUTINE MAINTENANCE

When the engine is in continuous use :—

Daily :

- Check supply of fuel oil.
- Check level and condition of lubricating oil. (Also in gearbox if fitted).
- Clean air cleaner under very dusty conditions.
- Drain moisture trap in exhaust pipe, if fitted.

Every 100 Hours :

- Clean air cleaner under moderately dusty conditions.
- Check for oil and fuel leaks—tighten nuts and fittings if necessary.
- Wipe engine and baseplate clean.
- Clean cylinder, cylinder head and injector finning under very dusty conditions.

Every 250 Hours :

- Drain oil and refill with correct grade and type.
- Check injector spray and clean if necessary. Do not clean at shorter periods unless absolutely necessary.

Every 500 Hours :

- Decarbonise if engine shows loss of compression, or blow-by past the piston. Do not disturb otherwise.
- Adjust valve clearances.
- Wash engine down with paraffin or fuel oil.
- Clean cylinder, cylinder head and injector finning under dusty conditions.

Every 1000 hours :

- Clean air filter (or earlier depending on operating conditions).

Every 1500 Hours :

- Decarbonise.
- Clean inlet manifold and exhaust system.
- Examine fan blades and clean.
- Check free working of governor linkage.
- Drain and clean fuel tank.
- Renew fuel filter element.
- Adjust injector pressure setting.
- Check fuel pump timing and balancing.
- Clean cylinder, cylinder head and injector finning under normal conditions.
- Check lubricating oil pump valve assemblies.

Every 5000 Hours :

- Check big end and main bearings.

A reasonable amount of time spent in checking over the details as described in the foregoing is the user's best insurance against loss of valuable time and costly repairs.

The above routine is given as a guide but operating conditions will decide the actual hours working before carrying out the maintenance specified.

MAINTENANCE

Breather

The crankcase breather, in the form of a copper pipe, is screwed into the top of each Cylinder head and connects with the inlet port.

The oil laden vapour is drawn into the inlet port and a partial vacuum maintained in the crankcase. This prevents the lubricating oil from working out through the joints and bearings.

Fuel Filter

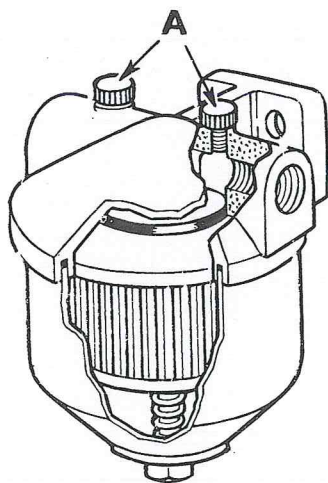
The fuel filter is an essential component of a diesel engine and it must not be removed or used without a filter element.

Renew the element every 1,500 hours if clean fuel is used, if fuel is known to be dirty for any reason attend to filter more often.

The element may be washed in clean paraffin or fuel oil, taking care to prevent dirt reaching the inside of the element or delivery pipes. Clean inside the bowl.

Assemble carefully and prime fuel system by slackening the two vent screws 'A' shown in the illustration below and one vent screw in the outlet banjo until all air is removed. Tighten the vent screws securely.

If the engine runs erratically it should be further primed at the fuel pump inlet union(s) which is (are) accessible after removing the fuel pump housing cover.



A—Vent Screws.

Air Cleaners

The frequency with which the air cleaner requires servicing varies greatly according to the amount of foreign matter in the air. It is recommended, however, that the element receives attention every 1000 hours, even when operating in substantially dust-free conditions; under less favourable conditions more frequent servicing will be necessary.

With oil bath type cleaners, after dismantling the filter, the element should be thoroughly washed in paraffin or fuel oil and the filter bowl cleaned out. On reassembly the filter must be filled with oil exactly up to the mark indicated on the filter bowl using the same grade and viscosity of oil as used in the sump.

Air cleaners with paper elements must have the elements **replaced** instead of trying to clean them. The remainder of the cleaner can be cleaned internally.

When reassembling air cleaners it must be ensured that all joints and connections on the cleaned air side are air tight so that no dust particles can enter the engine

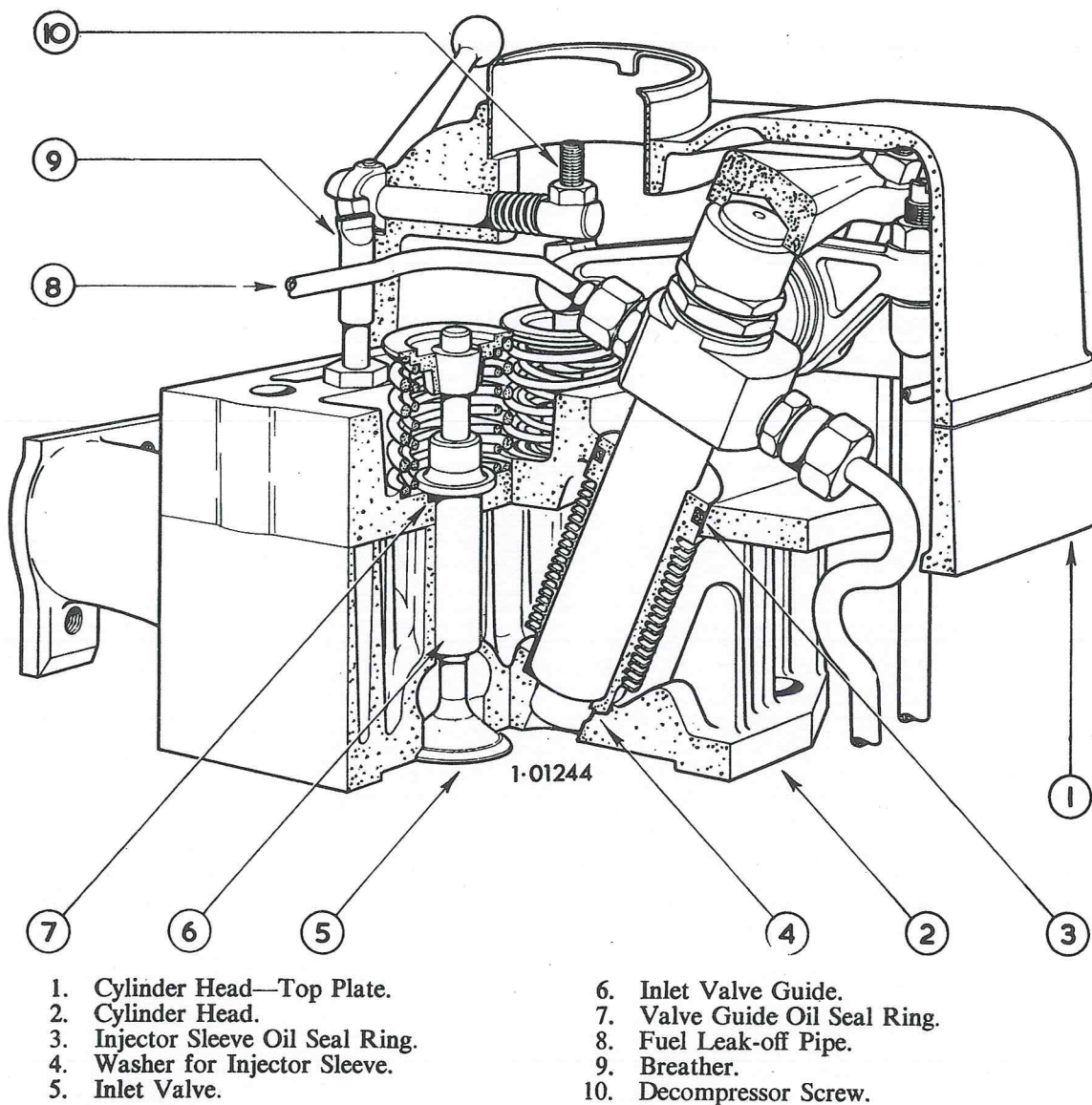


Fig. 14.—Cylinder Head

To Remove Cylinder Head

Remove :—

- (a) Cylinder head cover.
- (b) Fuel pump housing door.
- (c) Lubricating oil pipe to valve rockers.
- (d) Fuel leak-off pipe.
- (e) Fuel pipe—fuel pump to injector.
- (f) Fuel injector.
- (g) Inlet and exhaust manifold.
- (h) Oil starting reservoir.
- (j) Air shroud at back of cylinder.
- (k) Four holding down nuts and washers and lift off head.

Valve Guides

The cylinder head is in two parts (an upper and lower). The valve guides are a press fit in the lower half only and hold the two parts together. The Inlet Valve guide is jointed on a rubber ring under the collar at the top. The two parts should not be separated unless it is necessary to replace components.

The exhaust valve guide is recessed at the lower end.

Injector Sleeve

This need not be removed from the cylinder head unless it is necessary to separate the two parts. It may, however, lift out with the injector, in which case the carbon must be brushed from the projecting part of the injector with a wire brush, care being taken not to damage the pintle valve which projects through the end of the injector, and then push the injector out of the sleeve. Be careful to replace injector sleeve washer (No. 4, Fig. 14). There is no washer between the injector and its sleeve.

To Replace Cylinder Head

Examine cylinder head gasket—renew if damaged.

Replace cylinder head and pull down the 4 nuts evenly. Tighten to a torque of 50 lb. ft. This is very tightly with a spanner of about 7" long.

It is essential that these nuts be tightened before securing the injector.

Note :- The inlet and exhaust flanges of all cylinder heads must be lined up with a straight edge before finally tightening down to avoid distortion when fitting the manifolds.

To Check Cylinder Head Clearance

Place two pieces of lead wire 0.048" x 1" on top of piston clear of valve recesses and combustion chamber in the top of the piston and in line with the gudgeon pin.

Tighten down cylinder head and turn piston past T.D.C.

Remove cylinder head and measure thickness of lead. This should be between 0.030" (76 mm.) and 0.033" (0.84 mm.) and may be adjusted by copper shims 0.003" (0.075 mm.) thick placed between the cylinder head and the gasket. Only one joint must be used between the crankcase and the cylinder barrel.

To Remove Piston

- (a) Remove cylinder head.
- (b) Remove air guide plates at side of cylinder.
- (c) Remove crankcase door.
- (d) Disconnect connecting rod big end bearing.
- (e) Lift off cylinder complete with piston and connecting rod, after having marked the camshaft side of the barrel with chalk.

Withdraw piston from cylinder.

To remove gudgeon pin, immerse piston in hot water, remove spring circlip and gudgeon pin may be pushed out.

Piston rings may be removed by inserting thin metal strips between the ring and the piston and easing off the ring, but it is recommended that a ring expanding tool as made for car engines is used.

To Replace Piston Rings

Clean piston ring grooves, oil holes and rings carefully.

Roll each ring (except the top one which is taper sided) round in its own groove.

Measure the gap between the ends of a new ring when placed in the bottom of the cylinder. This should be between 0.012" and 0.016" (0.305-0.406 mm.).

The top ring is taper sided and chromium plated.

The second and third rings have tapered faces against the cylinder, these should be fitted with the larger diameter of the taper at the bottom. New rings are marked 'Top' on the top side.

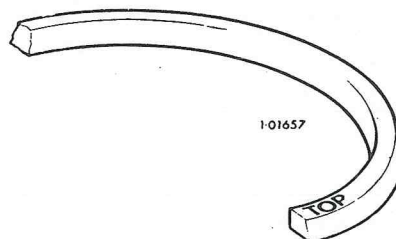


Fig. 15.—Piston Ring

To Replace Piston and Connecting Rod

Always check the clearance between the piston skirt and the cylinder which must not be less than 0.005" (0.127 mm.) measured with a feeler pushed between the two.

Oil and place piston and connecting rod in cylinder block. Place one copper joint at base of cylinder block.

Turn cylinder block with flats on the fins towards the flywheel and fuel tank ends respectively, and the side marked with chalk towards the camshaft.

Turn piston with wording 'CAMSHAFTSIDE' towards camshaft (fuel pump housing).

Turn crankshaft to T.D.C., lower into position cylinder complete with piston and connecting rod, and when the connecting rod bolts have passed over the crankpin, turn crank towards door as piston is pressed down.

Place top half of connecting rod bearing on crank pin and press piston and rod down on to bearing.

Assemble big end bearing according to the identification marks and secure with the self locking nuts. Correct tightening torque is 15 lb. ft.

Connecting Rod Big End Bearings

Big end bearings are copper-lead lined precision finished, and require no fitting; under no circumstances should they be scraped or touched up in any way.

If the big end has been dismantled because of failure of the metal, the oil passage in the crankshaft must also be examined for obstruction and fragments of metal. After cleaning out, it is advisable to crank the engine over by hand to see that oil reaches the bearing, and to flush out the oil passage.

Main Bearings

Engines are built with steel backed, split bush main bearings with separate thrust washers. The top half is whitmetal lined and the bottom half copper lead lined. When re-assembling an engine, care must be taken that the thrust washers are correctly positioned. The centre main bearing housing is located in the crankcase by means of a plain hollow dowel tapped at one end. Care should be taken to ensure that this is fitted with the tapped end outwards to assist removal. If new bearings are fitted, ensure that the oil holes are in line with the holes in the bearing housing, and that the end of bearing is 1/16" below housing on inside edge.

Valve Adjustment

Valves should be retained in their respective guides when decarbonising.

Valve clearance must be set to 0.002" (0.05 mm.) cold for both inlet and exhaust valves, above 1200 rev/min. Below 1200 rev/min, the clearance should be inlet 0.002", exhaust 0.006".

To adjust, turn the Piston to T.D.C. firing stroke. Remove cylinder head cover. Slacken locknut on adjusting screw and turn screw until correct clearance is obtained. Tighten locknut.

The valve rocker operates directly on to the valve stem.

Inlet Valve Opens 10° B.T.D.C.

Closes 30° A.B.D.C.

Exhaust Valve Opens 30° B.B.D.C.

Closes 10° A.T.D.C.

Valve heads must be between 0.015" and 0.020" (0.38—0.5 mm.) under the face of the cylinder head.

The width of valve seats must be 0.064"—0.083" (1.63—2.1 mm.). This width can be obtained by increasing the depth of the recess in the head using Tool No. 317-85 for the exhaust valve and 317-189 for the inlet valve.

Decarbonising

Decarbonise after about 1500 hours.

(a) Remove cylinder head(s).

(b) Remove piston(s) and rings.

All parts must be thoroughly cleaned and washed in paraffin.

Special care must be taken with regard to :—

(a) Recess in exhaust valve guide(s).

(b) Valve ports.

- (c) Piston rings and grooves.
- (d) Combustion chamber(s) in top of the piston(s). (Do not remove.)
- (e) Fins must be cleaned on cylinder(s), cylinder head(s) and injector sleeve(s). **This is very important.**
- (f) The inside of the piston(s).
- (g) Regrind valve seats if not in perfect condition.
- (h) Clean out exhaust piping and silencer.

To Adjust Decompressor

For engines provided with an oil filler hole in each cylinder head cover, access to the decompressors is through these holes.

Turn piston to TDC firing stroke.

Move decompressor lever over towards flywheel.

Slacken locknut and turn decompressor screw down until exhaust valve touches the piston.

Turn screw back $\frac{1}{2}$ turn and tighten locknut.

When no filler is provided in the cylinder head cover the decompressor should be adjusted so that when the cover is tightened down in position, the adjusting screw just touches the valve rocker when operated. The adjusting screw should then be screwed down a further $\frac{3}{4}$ turn and locked in position.

Flywheel

The flywheel is mounted on a taper. A withdrawing tool is required to remove it. Do not slacken the nut more than 2 turns before loosening the flywheel on the taper. On reassembling tighten the retaining setscrew to a torque of 200 lb.ft.

Cooling Air Fan

LD1/SL1 engines with sheet metal fan shrouds. Correct end float of the crankshaft is obtained by fitting metal shims between main bearing housing and crankcase. End float should be between 0.005"/0.009". Axial setting of the fan is obtained by fitting similar shims between main bearing housing and fan shroud. Axial clearance should be 0.040" to 0.090" (1.0 - 2.25 mm.).

All engines with cast fan shrouds. Crankshaft end float is obtained as set out for LD/SL1. Axial clearance is obtained by fitting strip shims between the fan shroud and the bosses on the crankcase. Clearance is as shown above. **GREAT CARE MUST BE TAKEN TO KEEP SHIMS FOR THEIR ORIGINAL POSITIONS.**

To Remove Fuel Pump

- (a) Drain fuel at fuel filter.
- (b) Remove fuel pipe to injector.
- (c) Disconnect fuel supply pipe.
- (d) Release governor adjusting spring.
- (e) Disconnect governor link.
- (f) Remove fuel pump clamp setscrew and clamp, lift out pump, taking care of adjusting shims below pump body.

When refitting the fuel pump, use two spanners to tighten the fuel delivery connection to prevent the pump being twisted on its seating—the pump racks **must** move freely.

Camshaft

The camshaft is carried in porous bronze bushes. One bush is pressed into the end cover and the remainder into the crankcase.

The camshaft is extended beyond the cover and is the same diameter as the crankshaft providing a second position for power take off at half the engine speed.

To Remove Camshaft

- (a) Remove fuel pump cover.
- (b) Disconnect governor adjusting spring.
- (c) Disconnect fuel pipe—filter to pump(s) and drain fuel.
- (d) Remove fuel pump(s) and tappet(s).
- (e) Remove set screws in gear end cover.
- (f) Turn camshaft keyway to bottom.
- (g) Remove crankcase door.
- (h) Slacken oil pump plug $\frac{1}{16}$ ", or alternatively remove it from crankcase to allow for compressing lubricating oil pump return spring until tappet is below crankshaft bearing.
- (i) Remove gear end cover.
- (j) Hold up tappets and slide out camshaft—collect tappets.

To Time Camshaft

The camshaft is timed by matching the letters 'O' on the camshaft gearwheel and the crankshaft pinion.

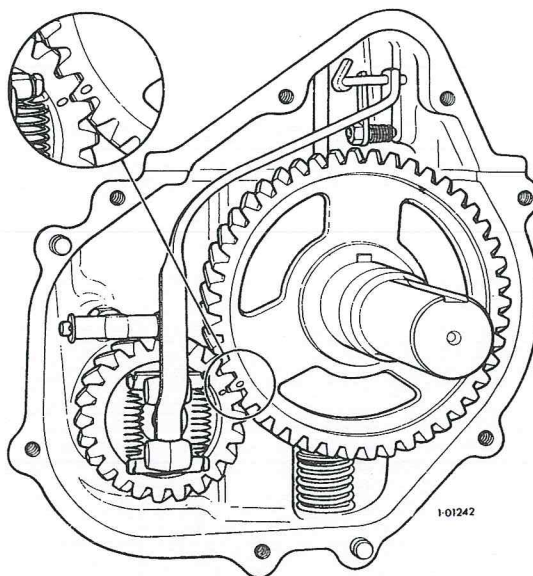


Fig. 16.—Camshaft Timing

Governor

The engine speed governor is attached to the pinion end of the crankshaft and secures the pinion to the shaft.

The governor weight carrier plate is fitted into a recess in the crankshaft pinion and is secured by two setscrews.

The governor lever operating the fuel pump(s) is carried in a fulcrum bearing secured to the crankcase above the pinion. This bearing, fitted so that the centre line of the bearing is approx. $\frac{3}{4}$ " from the facing on the crankcase, is adjusted in accordance with the instructions given under "Setting Fuel Pump" (Page 32), and secured with a lock nut.

The lever is curved to pass over the camshaft gearwheel and is joined to the fuel pump(s) by a link arm.

To Replace End Cover

- (a) Clean joint faces, fit new joint with sealing compound both sides.
- (b) Fit end cover. **NOTE : Care must be taken not to damage oil seal.**
- (c) Hook speeder spring onto governor link.
- (d) Fit seven setscrews and copper washers in end cover.
- (e) Fit banjo bolt and washers to connect fuel pipe to filter.
- (f) Fill tank with fuel.
- (g) Bleed fuel system at all points.
- (h) Replace fuel pump housing door.
- (i) Start engine.
- (k) Adjust speeder spring screw to required speed and tighten lock-nut.

CARE MUST BE TAKEN AT ALL TIMES TO PREVENT ANY FOREIGN MATTER ENTERING THE CRANKCASE.

Lubricating Oil Pump

The plunger type pump is cam operated from the camshaft and the suction valve being below the level of the oil should require little attention.

At times of major overhaul however, the pump should be dismantled for inspection.

Check that the plugs retaining the suction and delivery ball valves are solidly locked in position.

Under no circumstances dismantle these valve assemblies.

When reassembling the pump ensure that the hollow end of the pump tappet is to the bottom.

To Remove Lubricating Oil Pump

- (a) Compress pump return spring to relieve pressure on the circlip.
- (b) Remove circlip.
- (c) Release pump spring.
- (d) Remove suction valve assembly from bottom of crankcase.

Pump plunger and tappet may now be pushed out.

Remove spring and carrier ring from the crankcase.

The suction strainer is held in place by a spring end cap in front of the crankcase.

Main Bearing Housing

To remove:—

- (a) Remove flywheel.
- (b) Remove air and exhaust manifold(s).
- (c) Remove air shroud at back of cylinder(s).
- (d) Remove fan impeller trunking.
- (e) Remove crankcase door.
- (f) Remove lubricating oil relief valve and oil pipes to main bearings.

The Housing may now be removed from the crankcase.

Before replacing see the main bearing bush is in correct position—lubricating oil holes in line.

Crankshaft end play must be between 0.005" and 0.009" (0.12/0.21 mm.). This can be adjusted by **metal shims** of 0.005"/0.010" (0.127/0.254 mm) thickness between housing and crankcase. No paper joints must be used but the metal shims must be joined with clean jointing compound on both sides.

When replacing the fan cowling the vertical edge must be in line with the face of the inlet and exhaust port flange on the cylinder head.

To Remove Crankshaft

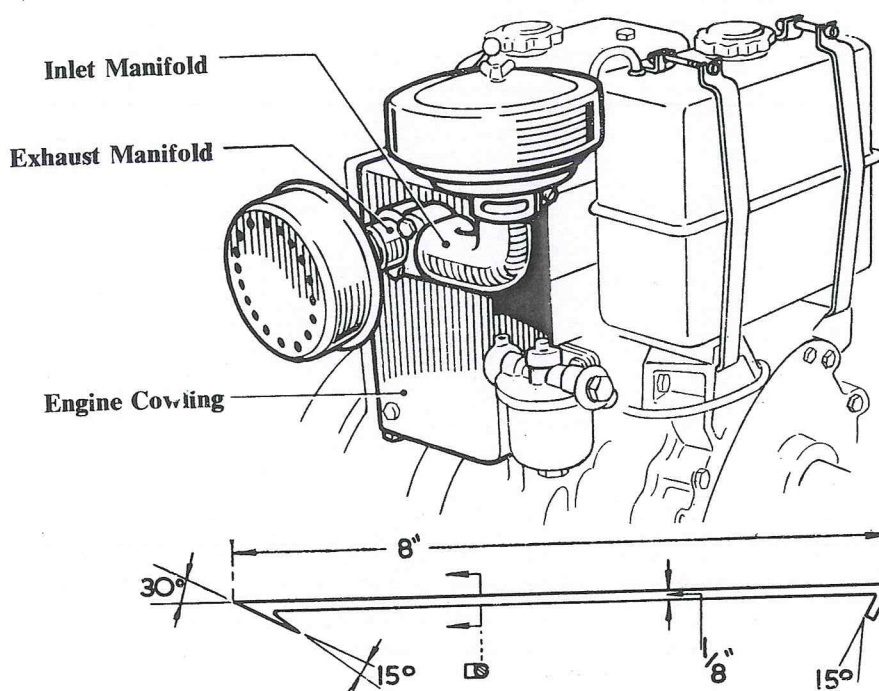
- (a) Remove piston(s) and connecting rod(s).
- (b) Remove gear end cover.
- (c) Remove governor and control rod.
- (d) Remove crankshaft pinion (shrunk and keyed to crankshaft, to replace heat in boiling water).
- (e) Remove main bearing housing and centre bearing locating dowel (using a $\frac{1}{4}$ " UNF bolt screwed into end), withdraw crankshaft through the housing bore.

Replace in the reverse order for removing.

Oil Seals

The crankcase is sealed at the crankshaft by screw type oil seals and felt rings and the camshaft is sealed in the end cover with a Gits Seal.

There is a ring type oil thrower on the flywheel end of the crankshaft and care must be taken to guide this ring over the end of the crankshaft when fitting the main bearing housing.



Engine fin rake (Cleaning Tool 367/16170)

Fig. 17.—Cleaning Cooling Fins

Cleaning of cooling fins

Under normal conditions the cylinder, cylinder head and injector cooling fins require cleaning at intervals of 1500 hours or even longer, but if the engine runs in a very dusty atmosphere cleaning may become necessary at 100 hour periods.

The engine has ample cooling capacity and therefore cleaning is not so important if the average load is light, but if the load is heavy, serious overheating can occur and this will damage the engine although the piston may not seize. Damage due to overheating may show itself as fuel injection trouble, stuck exhaust valves, with corresponding valve gear troubles, poor starting and scuffed piston rings and pistons.

To clean the fins it is necessary to remove the cooling air cowling (item 36, plate 1) and in order to do this the inlet and exhaust manifolds must be taken down. In many cases the inlet and exhaust manifold joint becomes damaged during this operation and a new joint must be fitted. The cleaning is effected with a special hooked wire tool, Part No. 367-16170, the dimensional illustration of which is shown on page 28. This tool is of special design to draw the deposits between the fins towards the operator and makes the cleaning operation speedy and effective.

To clean the injector sleeve fins it is necessary to withdraw the injector sleeve from the cylinder head, after removing the injector.

FUEL EQUIPMENT

These engines can be overloaded without the user realising it, because even a fraction of a horse power is a big proportion of the total engine output. If a smoky exhaust is noticed in an engine the first thing to check is the setting of the overload stop.

The directions on how to adjust the overload stop are given on page 32.

The injectors are most unlikely to be the cause of smoky exhausts in LD/SL engines and should only be disturbed after the overload stop has been properly set, if the exhaust is still unsatisfactory. The injection timing of the engine may produce a smoky exhaust if more than $\frac{1}{4}$ " (6 mm.) out on the flywheel.

Overheating of the engine, and of the combustion air reduces the weight of air available for combustion, produces a darker exhaust as well as a loss of power and can cause serious damage, so this matter must receive immediate attention.

Important —

When priming or checking the fuel pump timing, care must be taken to prevent the overflow of fuel passing into the crankcase.

Always fit a NEW joint washer when a joint has been broken.



Special care must be taken to see there is no leakage from the joints of the fuel pipe connection to the pump(s).

When tightening or loosening the fuel pump delivery connection, use two spanners to prevent the pump from twisting on its seating and causing misalignment and possibly jamming of the fuel pump rack.

To Prime Fuel System

- (i) Fill fuel tank.
- (ii) Vent fuel filter (See Page 21).
- (iii) Vent fuel pipe at fuel pump(s). Turn engine as for starting, i.e., 3 to 20 times until injector(s) 'creak(s)' and then attempt to start the engine. If the engine fails to start, a more detailed method of priming must be used as follows:—
 - (a) Remove cylinder head cover(s).
 - (b) Remove fuel injector pipe(s).
 - (c) Remove delivery valve holder and spring on each pump in turn and slightly raise delivery valve until fuel free from air flows. (At least $\frac{1}{4}$ pint fuel must be allowed to flow.)
 - (d) Replace delivery valve spring and holder and tighten down each pump in turn.
 - (e) Connect fuel injector pipe(s) to pump(s). Do not twist the pumps on their seatings.
 - (f) Set control to start position.
 - (g) Turn engine until fuel free from air flows from injector pipe(s). Secure pipe(s) to injector(s) and continue turning engine until injector(s) 'creak(s)'.

To Time Fuel Pump

- Set control to start position.
- Turn flywheel to firing position—on LD1 and SL1 engines, this is when mark  on the flywheel is opposite the centre mark on the fan shroud and both valves are closed. On LD2 SL2 and SL3 engines the firing position is when the mark  is opposite the arrow at the back of the fan shroud near the fuel pumps, and both valves are closed (see illustrations).
A table is given below showing the injection timing for all these engines.
- Disconnect fuel injector pipe at pump and injector.
- Remove delivery valve holder, delivery valve and spring. If fuel flows from pump turn crankshaft forward until flow ceases.
- Replace delivery valve holder without valve and spring and lightly tighten.
- Turn crankshaft backwards until fuel commences to flow then turn in direction of rotation until flow ceases. Blow fuel from top of holder to make sure flow has ceased. At this position the firing mark on the rim of the flywheel should be opposite the centre mark on the fan trunking. If it is not, the shims below the pump body must be adjusted.

Remove shims to advance.

Add shims to retard.

Shims of 0.005" and 0.010" to a total of about 0.035" are below the fuel pump.

0.005" (.125 mm.) shim is equal to 3/16" (4.76 mm.) on rim of 14" (35.5 cm.) flywheel and 13/64" (5.16 mm.) on a 15" flywheel (3.8 cm.)

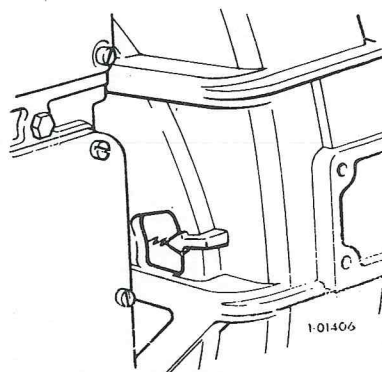



Fig. 20.—Fuel Pump Timing

FUEL INJECTION TIMING

Engine	B.T.D.C. Timing Degrees	Diameter of Flywheel	Distance Measured on Flywheel Rim
LD1	28	14" (35.6 cm.)	3.42" (8.8 cm.)
		16" (40.6 cm.)	3.91" (9.9 cm.)
SL1	30	14" (35.6 cm.)	3.66" (9.3 cm.)
		16" (40.6 cm.)	4.2" (11.2 cm.)
LD2, SL2 & SL3	30	15" (38.1 cm.)	3.93" (10.0 cm.)

*On SL2 and SL3 & LD2 engines the mark  is on the side of the flywheel—These figures which are measured on the flywheel rim, or periphery are given for guidance only.

Fuel Injector (Pintle Nozzle Type)

The fuel injector, located in the cylinder head, fits into a finned aluminium alloy sleeve. The sleeve is jointed at the bottom on an asbestos joint ring and at the top by a rubber ring which fits into a groove. See Fig. 14.

Each injector is secured by a clamp which fits over two studs screwed into the valve rocker bracket. The clamp nuts must be tightened evenly to 15 lb. ft. torque ensuring that the clamp is level and bears evenly on the injector. The steel fuel pipe from the pump to the injector must not be tightened until the clamp is correctly secured.

There is no joint between the injector and the sleeve.

SETTING OF FUEL PUMPS and GOVERNOR WEIGHTS (LD1 and 2—SL1-2-3 engines.)

1. On multi-cylinder engines, adjust linkage "A" so that all the calibration marks "B" accurately coincide with the sides of the fuel pumps within 0.005". The fuel pump racks must move freely after this adjustment.
2. Constant speed engines: Adjust fulcrum "C" so that when the calibration marks "B" are against the sides of the fuel pumps the distance "D" between the inside of the spring anchor slots is correct for the type of engine (see note re dimensions on page 31).

3. LD engines only

Insert a shim 0.023 to 0.027 thick at "G" between the stop "J" and control lever "F." Rotate the locating plate "E" so that, with the shim in position, the calibration marks "B" are against the pump sides. The full width of each calibration mark must be visible. Lock locating plate "E" with screw "H" when this condition is satisfied. This setting corresponds to a movement of the fuel rack of 0.074"/0.086" in the direction of the arrow.

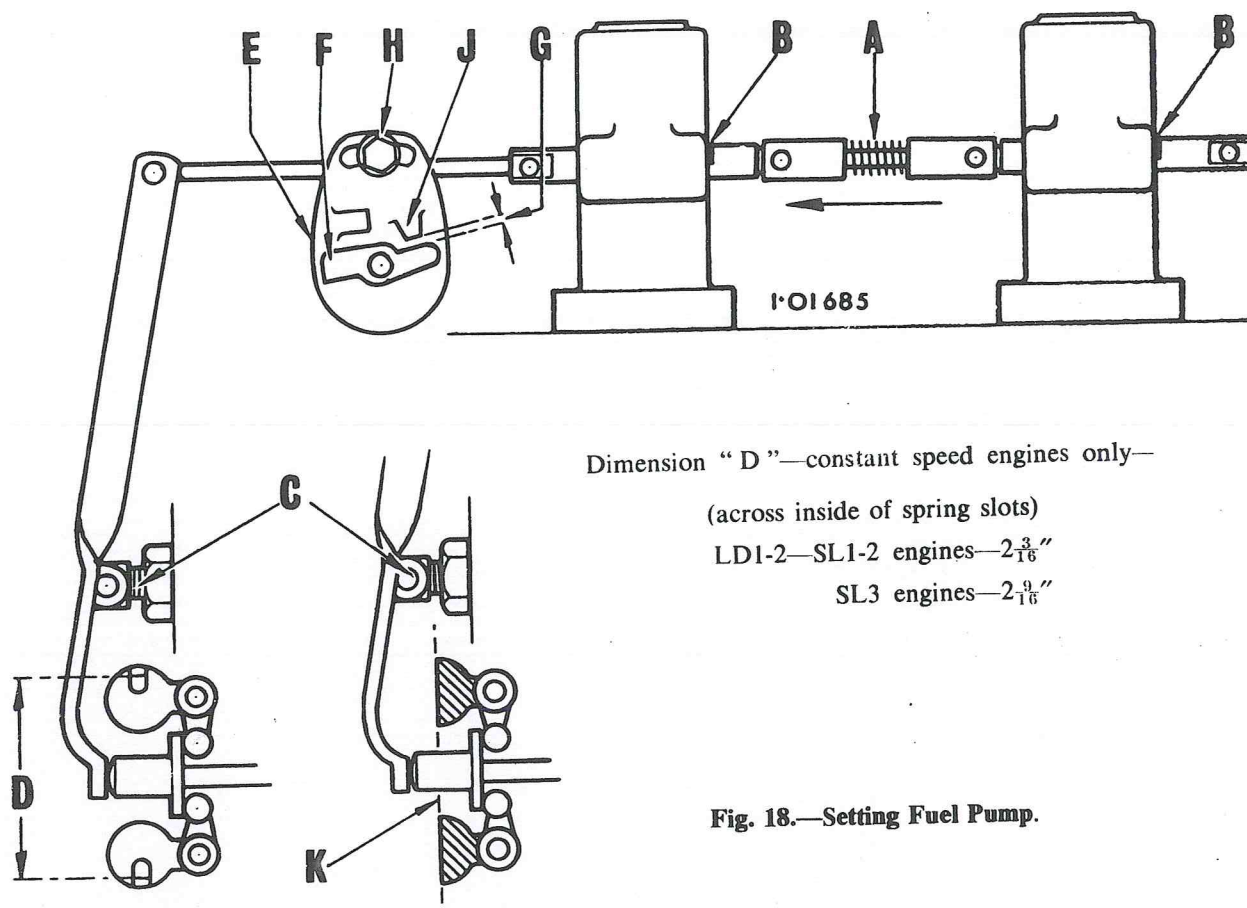
4. SL1-2-3 engines only

Proceed as 3 above but set to 0.028" to 0.032" instead of 0.023" to 0.027". The 0.074"/0.086" dimension becomes 0.090"/0.102".

5. The lower settings are acceptable provided the engines carry the normal load but the higher ones must not be exceeded.

Variable speed engines: In place of (2) above adjust the fulcrum "C" so that when the calibration marks "B" are against the sides of the fuel pump the faces of the governor weights "K" are in line with each other for LD/SL1 & 2 only.

For SL3 the centre of the weight fulcrum pin and the centre of the thrust end of weight (behind the governor sleeve) should be in line. See opposite page.



Dimension "D"—constant speed engines only—

(across inside of spring slots)

LD1-2—SL1-2 engines— $2\frac{3}{16}$ "

SL3 engines— $2\frac{9}{16}$ "

Fig. 18.—Setting Fuel Pump.

KEY :

A—Fuel pump linkage.

B—Calibration mark.

C—Fulcrum.

D—Dimensions across inside of spring seats.

K—Governor weights for variable speed governor.

E—Control lever locating plate.

F—Control lever.

G—Control lever stop.

H—Locating plate setscrew.

(see opposite page for setting instructions)

FUEL INJECTOR TESTING INSTRUCTIONS

Injectors. Testing Instructions

LD & SL engines are fitted with single hole, pintle type, injector nozzles, this being the most reliable type of nozzle known as it is almost impossible to block the hole completely.

The pintle nozzles used are of the delay type and this means that the profile of the pintle is such that on the first part of the needle lift a relatively small proportion of finely atomised fuel is delivered, the bulk of the fuel going through after the needle has lifted a fixed amount. This feature gives good combustion and quiet running.

It is strongly recommended that the nozzle is not cleaned unless it is absolutely necessary. It is customary for a nozzle to run for 1,000 hours or more without cleaning, but under adverse conditions it should be inspected every 250 hours and the instructions given below must be followed.

Due to the above mentioned features it is not possible to test these nozzles for spray in the ordinary hand pump as in most cases good nozzles will appear defective. The correct way to check nozzles is as follows :—

(a) Check the “bursting” pressure with an ordinary hand test pump and if necessary set the injector to 160 atmospheres. This setting is higher than the normal one of 150 atmospheres and is to allow for the inevitable fall in pressure during the running of the engine.

(b) While the injector is still connected to the hand pump check the tightness of the seating by drying the nozzle and applying a pressure of about 100 atmospheres when no leakage whatever should appear from the nozzle hole. At this stage the back leak past the lapped portion of the needle must be checked by bringing the pressure up to 150 atmospheres and noting the time the pressure takes to drop from 120 to 70 atmospheres. This time must be between 15 secs. and 70 secs. (Alternatively measure the time between 150 and 100 atmospheres which must be 10 secs. to 45 secs.). When an injector is working in an engine the leak off should be between 1% and 5% of the engine fuel consumption per cylinder.

(c) Check the spray by connecting the injector externally to the engine fuel pump by means of a special pipe* (Part Number 317/92). Set the overload stop to the running position (external lever horizontal) turn the engine from the camshaft at about 60 r.p.m. camshaft speed and observe the spray in the usual way. To test a nozzle remove the injector from the cylinder head and turn so that it sprays into the air away from the operator (the spray can easily penetrate the skin). A perfect spray is in the form of a fine mist and shows no signs of being “streaky” or “dribbling”.

A nozzle must only be cleaned with the necessary special tools and by a qualified service engineer.

Note.—*This can be made from a genuine spare pipe (correct length, bore and outside diameter) reversed and slightly set to allow the injector to be connected externally, through the fuel pump housing door. After the pipe is bent, it **must never** be used for anything but test purposes, it is impossible to straighten it again to a sufficient degree of accuracy to give a satisfactory fit in the engine.

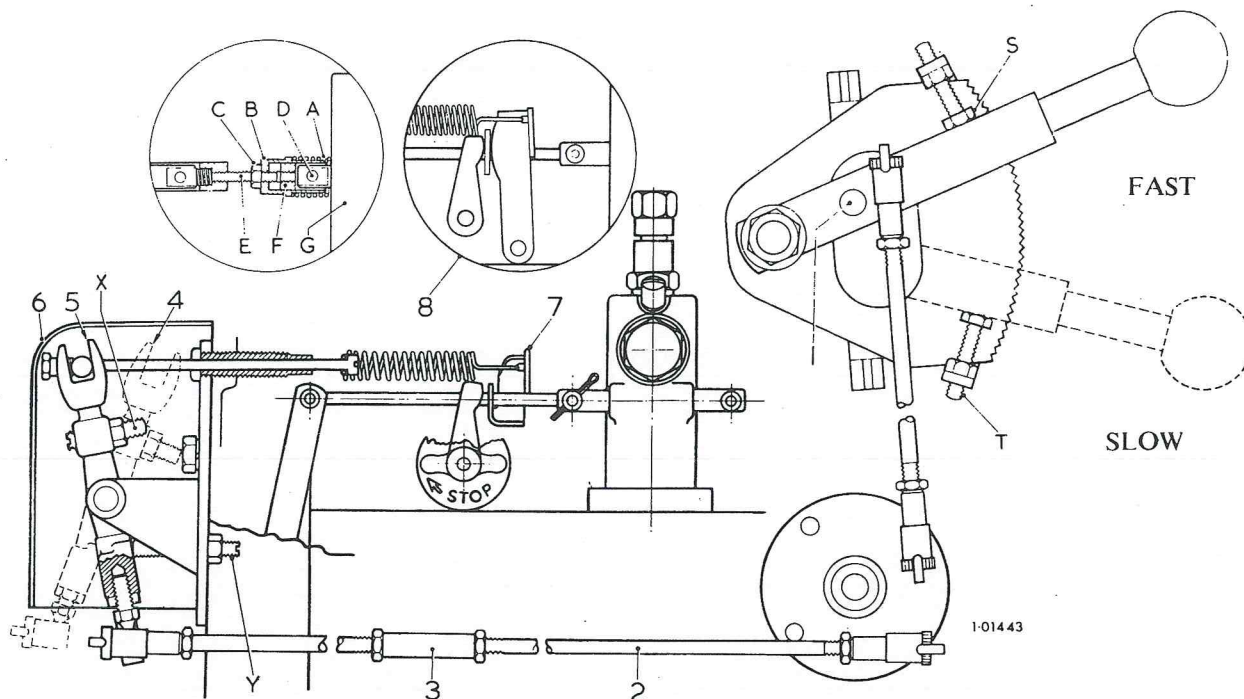


Fig. 18.—Arrangement of LD & SL Rod Operated Variable Speed Control

Cable operated arrangement is supplied as standard, rod operated is an alternative

1. Alternative position for connecting rod.
2. For flexibly mounted engines this connecting rod must lie in a plane close to the horizontal and must not be less than 10" (254 mm.) long. Where it is necessary to carry the rod upwards fit universal rod coupling as above. Further rod couplings may be fitted as required.
3. Muff coupling for extending rods if required.
4. Idling position.
5. Full speed position.
6. Cover—not supplied with raised hand starting.
7. Fuel pump linkage for LD1/2 and SL1/2 engines.
8. Fuel pump linkage for SL3 engine.

Instructions for Adjusting Speed Control

LD/SL1 engines only. With the control lever in the "Slow" position — engine in neutral — adjust screw 'X' until the idling speed is 650 rev/min. (approx.) and tighten nut.

LD/SL2 and SL3 engines. The idling device consists of a spring "A" which is mounted over the left hand shackle "F" of the flywheel end fuel pump and exerts a force on the fuel pump rack, by abutting against the pump body.

The fuel pump shackle "F" is fitted with a link stud "E" which has a long thread on which is screwed the idling spring adjusting sleeve "B". This sleeve when rotated controls the spring force and is locked in position by the lock nut "C".

To adjust the idling spring "A" the main speeder spring at the gear end of the engine is completely slackened and the adjusting sleeve "B" is rotated in the desired direction, until a steady idling of about one third of the rated engine speed is obtained, and then locked by the nut "C". Care must be taken that the shackle pin "D" is at least partially covered by the adjusting sleeve "B" as otherwise the pin is not located sideways and will fall out.

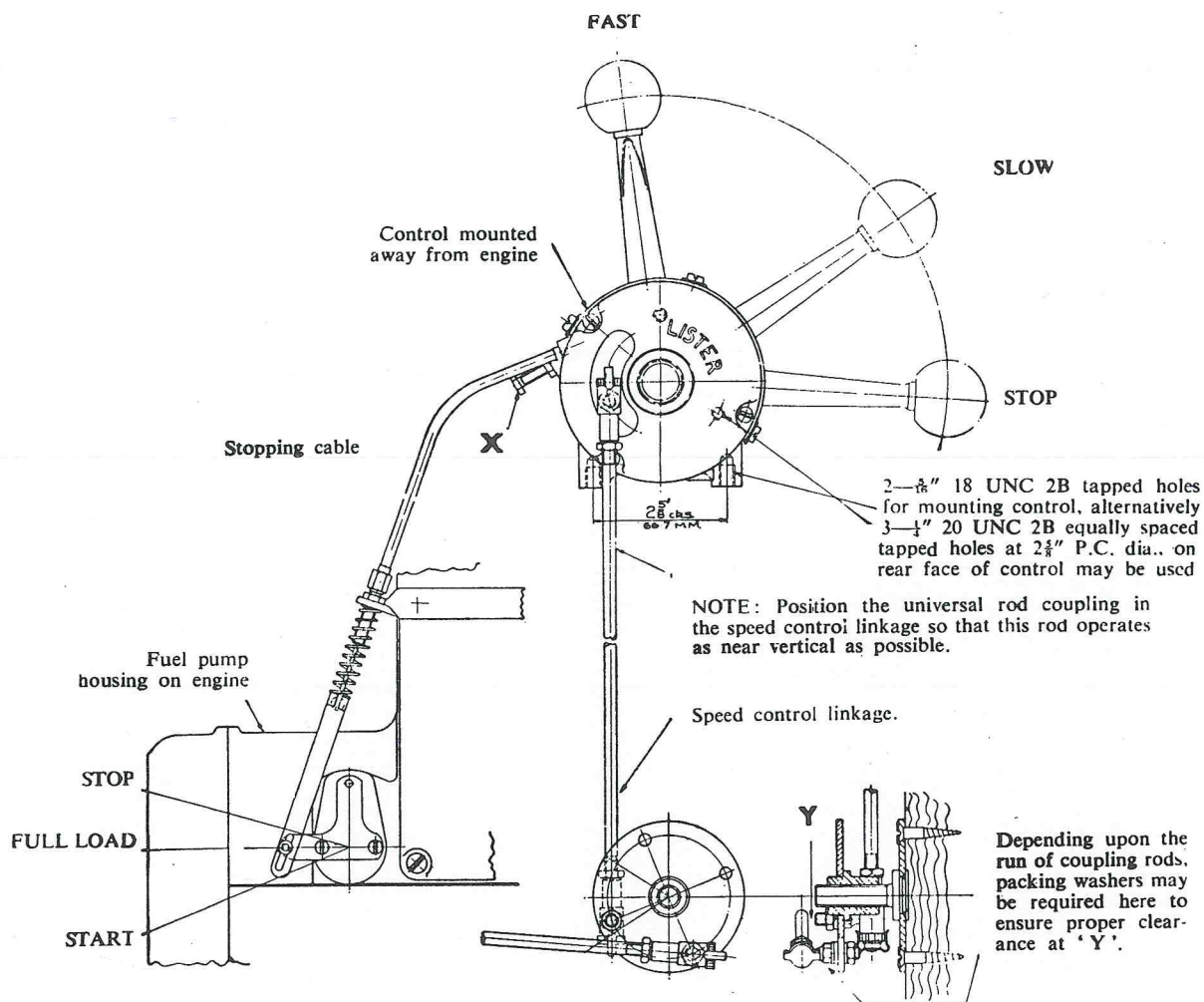
The speed control on the engine has an idling adjusting screw which should now be adjusted so that the main speeder spring just begins to increase the engine speed, and then screwed anti-clockwise one turn. The speeder spring must not exert any force when the engine is idling.

All engines. With control lever still held in "Slow" position adjust screw "T" until it just touches the operating lever and lock the nut.

All engines. Push the control lever in the direction of "Fast" and adjust screw "Y" until full revolutions are obtained and tighten locknut.

All engines. With control lever still held in "Fast" position adjust screw "S" until it just touches the operating lever and lock the nut.

N.B. Ensure that the ratchet is engaged between two teeth in the "Fast" position. Adjust the length of the connecting rod or cable to suit.



Arrangement of SL Marine Single Lever Speed and Stop Control

ADJUSTMENT

Engine idling at 650 r.p.m. : Adjust connecting rod to hand control so that the hand lever is in bottom notch of ratchet in the speed sector.

Engine at full speed 1800 r.p.m. : With hand lever held in the full speed position, set adjustable stop X so that it just touches the hand lever. Tighten lock nut.

Stopping control : Adjust cable so that the engine stops when the hand lever is at the limit of its travel in the stopping sector.

Speed Adjustment

A slight adjustment of speed may be made by turning the screwed rod which projects through the gear case. Turn anti-clockwise to increase speed, clockwise to decrease. Secure locknut.

Do not increase speed above $2\frac{1}{2}\%$ without consulting Lister Blackstone Marine Ltd.

Electric Starting

Electric Starting is available for both propulsion and auxiliary units and can be operated by either direct or remote control, diagrams of the electric circuit for both these methods of control are shown on Pages 52 and 53.

GOVERNOR WEIGHTS & SPRINGS — CONSTANT SPEED

BSS 649 : 1958 Class A

SINGLE & TWIN CYLINDER ENGINES—

ENGINE Speed rev/min.	WEIGHT SPRING 2 off		WEIGHTS 2 off		SPEEDER SPRING 1 off	
	Part No.	Type	Part No.	Colour	Part No.	Colour
750-850	201-10730	Plain	201-10821	Green	201-10901	Blue
850-1000	201-10730	Plain	201-10821	Green	201-10903	Yellow
*1100-1300	201-10730	Plain	201-10821	Green	201-10900	Red
1400-1700	201-10730	Plain	201-10820	Red	201-10900	Red
1700-1800	201-12960	Drilled	201-10820	Red	201-10900	Red
2000	201-10735	Milled	201-10820	Red	201-10900	Red

THREE CYLINDER ENGINE—

1000	354-28351	Compo'nd	201-10820	Red	201-10903	Yellow
*1150-1300	354-11500	Plain	201-10820	Red	201-10903	Yellow
1500	354-11500	Plain	203-10822	Yellow	203-10901	Green
1800	354-11501	Drilled	203-10822	Yellow	203-10901	Green
2000	351-11502	Drilled	203-10822	Yellow	203-10901	Green

*See Page 24—Valve Adjustment.

GOVERNOR WEIGHTS & SPRINGS — VARIABLE SPEED

BSS 649 : 1958 Class B

Engine Type	Speed Range Rev/min.	Governor Weight			Speeder Spring			Idling Spring	
		Part No.	Type	No. per Set	Part No.	Colour	No. per Set	Part No.	No. per Set
LD1 & SL1	600-1800	201-10733	Milled	2	201-10900	Red	1		
	700-2000	201-10732	Milled	2	201-10900	Red	1		
LD2 & SL2	600-1800	201-10733	Milled	2	201-10900	Red	1	204-21491	1
	700-2000	201-10732	Milled	2	201-10900	Red	1	204-21491	1
SL3	600-1800	354-21561	Milled	2	203-10903	White	1	204-21491	1

Note: There are no governor weight springs fitted to variable speed governors.

INSTRUCTIONS FOR CHANGING SPEEDS OF LD & SL ENGINES

FIXED SPEED

Note: Before starting consult table on page 38 to check which of the governor weights and springs are to be changed.

Remove fuel pump housing door.

Unhook speeder spring from governor link.

Drain fuel tank by removing banjo bolt at filter connecting the pipe to the pump.

Remove seven setscrews securing end cover.

Remove end cover complete with tank and filter.

To Change Governor Weight Springs Only

Unhook governor weight springs.

Fit new springs (consult table).

To Change Speeder Spring

Remove speed adjusting screw from end cover.

Remove existing spring and fit new speeder spring.

Fit adjusting screw into cover and adjust engine speed. Tighten lock-nut.

To Change Governor Weight

Remove split pins and washers from governor lever fulcrum pin, and outer end only of governor link.

Remove governor lever.

IMPORTANT NOTE: DO NOT ALTER THE GOVERNOR LEVER FULCRUM.

Remove governor thrust sleeve.

Remove two bolts securing the governor weight carrier.

Remove carrier and weights.

Remove pins, fit new governor weights and replace pins.

NOTE: Brass governor weights must be fitted with steel boots. If necessary use boots from weights being removed.

Re-fit carrier complete with weights and pins and secure by means of two setscrews.

Replace the governor sleeve, ensuring that it is perfectly clean.

Fit governor weight springs (consult table).

Replace governor lever and fit washers and split pins.

STARTING AND RUNNING FAULTS

Essentials for Easy Starting

- (a) Engine to turn easily when decompressed; if not it may be due to :—
 - Unsuitable lubricating oil (too heavy).
 - Incorrect decompressor clearance.
- (b) Injector creak must be heard (or felt). If not, it may be due to :—
 - No fuel in tank.
 - Air lock in system.
 - Injector nozzle valve stuck open.
 - Fuel pump delivery valve scored.
- (c) Good compression; if not, it may be due to :—
 - Worn cylinder.
 - Piston rings carboned in grooves.
 - Leaking inlet or exhaust valve.
 - Injector loose on seat.
- (d) Fuel pump rack(s) to be free.
- (e) Control must be vertical to give extra fuel for starting.

Knocking, this may be caused by :—

- (a) Valve, probably exhaust sticking in guide and touching piston — clean stems and guides.
- (b) Slack bearing — fit new bearing, if crankshaft is not worn.
- (c) Insufficient clearance between the Piston and cylinder head—check and adjust.
- (d) Injection too early—check and adjust.
- (e) Flywheel loose on shaft.
- (f) Excessive crankshaft end play.
- (g) Excessive carbon deposit on piston.

Carbon Deposit, excessive deposit may be due to :—

- (a) Choked exhaust system — dismantle and clean.
- (b) Long period of idling.
- (c) Unsuitable fuel oil.
- (d) Unsuitable lubricating oil.
- (e) Injector not spraying correctly — clean nozzle.
- (f) Late injection of fuel — check timing

Smoky Exhaust.—Black smoke due to incomplete combustion of fuel caused by :—

- (a) Overload, causing an excessive quantity of fuel to be injected.
- (b) Choked air intake.
- (c) Poor atomisation due to a choked injector nozzle.
- (d) Unsuitable fuel.

Note.—Blue smoke, when faint, is generally the result of light load.

Heavy blue smoke is caused by lubrication oil passing the piston rings, due to either stuck piston rings or a worn cylinder.

Engine Stops.—This may be due to :—

- (a) Lack of fuel—air or water in fuel system. Fuel system choked. (See Page 21.)
- (b) Overload.
- (c) Overheating, due to shortage of lubricating oil.
- (d) Loss of compression.
- (e) Dirt in injector or fuel system.

Loss of Power.—This may be due to :—

- (a) Loss of compression.
- (b) Incorrect tappet clearance.
- (c) Choked exhaust pipe.
- (d) Fuel injection system. Fuel injector or fuel pump out of order. Air in system.
- (e) Choked fuel filter.

Failure to Obtain Normal Speed

- (a) Engine started under overload.
- (b) Fuel system not primed properly.
- (c) Insufficient fuel.
- (d) Injection retarded.

Loss of Oil Pressure

- (a) Oil level below mark on dipstick.
- (b) Strainer choked.
- (c) Fractured pipe or leaking joint.
- (d) Badly worn or run out bearing.
- (e) Relief valve not seating due to dirt, or worn out.
- (f) Oil pump piston and valves, worn or dirty

LISTER DIRECT DRIVE CLUTCH

Direct Drive Clutch (Lister)

The clutch fitted to either the crankshaft or camshaft is of the multi plate type running in oil. It is toggle operated and is therefore self locking in either the engaged or disengaged position. Tension should be felt throughout the movement of the lever to engage the clutch and it should be released on completion of the movement.

The clutch housing is filled to the level of the side plug with light engine oil (SAE 10). The capacity is approximately $\frac{3}{4}$ imp. pint. An even lighter grade of oil may be used in cold weather to reduce oil drag of driven shaft.

Adjustment—see Fig. 21

The clutch plates are held between pressure plates when fully engaged. It is essential there should be no slip when fully engaged. If the full power is not being transmitted, the clutch should be adjusted as follows:—

- (1) Stop the engine.
- (2) Remove the inspection cover on top of the clutch casing.
- (3) With the lever in the “neutral” position, revolve the clutch until the adjusting plunger “C” is accessible.
- (4) Pull plunger “C” out of engagement and rotate adjusting ring clockwise 1 to 3 holes, re-engage plunger “C”, and then check “feel” of the clutch operating lever. After the adjustment until the full power is transmitted without slip.
- (5) Do not adjust more tightly than is necessary to transmit the full power without slip.
- (6) Ensure the clutch runs freely in the “neutral” position.

Direct Drive Clutch—Rockford—Adjustment

The clutch plate is held between two pressure plates when fully engaged. It is essential there should be no slip when fully engaged. If the full power is not being transmitted, the clutch should be adjusted as follows:—

- (1) Stop the engine.
- (2) Remove inspection cover on top of clutch casing.
- (3) With the lever in the “neutral” position, revolve the clutch until the adjusting ring locking plate is accessible.
- (4) Slacken the locking plate screw with a screw driver and when dis-engaged from the serrations turn the adjusting ring clockwise. Re-secure the locking plate.
- (5) Do not adjust more tightly than is necessary to transmit the full power without slip.
- (6) Ensure the clutch runs freely in the “neutral” position.

All parts are lubricated on assembly (Shell Alvania Grease No. 2) or other equivalent high melting point grease and a grease nipple is provided for the clutch cross shaft.

Reduction Gear—Auxiliary Engine

Where reduction gears are fitted, fill the gear case to the maximum mark on the dipstick with the same grade of lubricating oil as used in the engine sump.

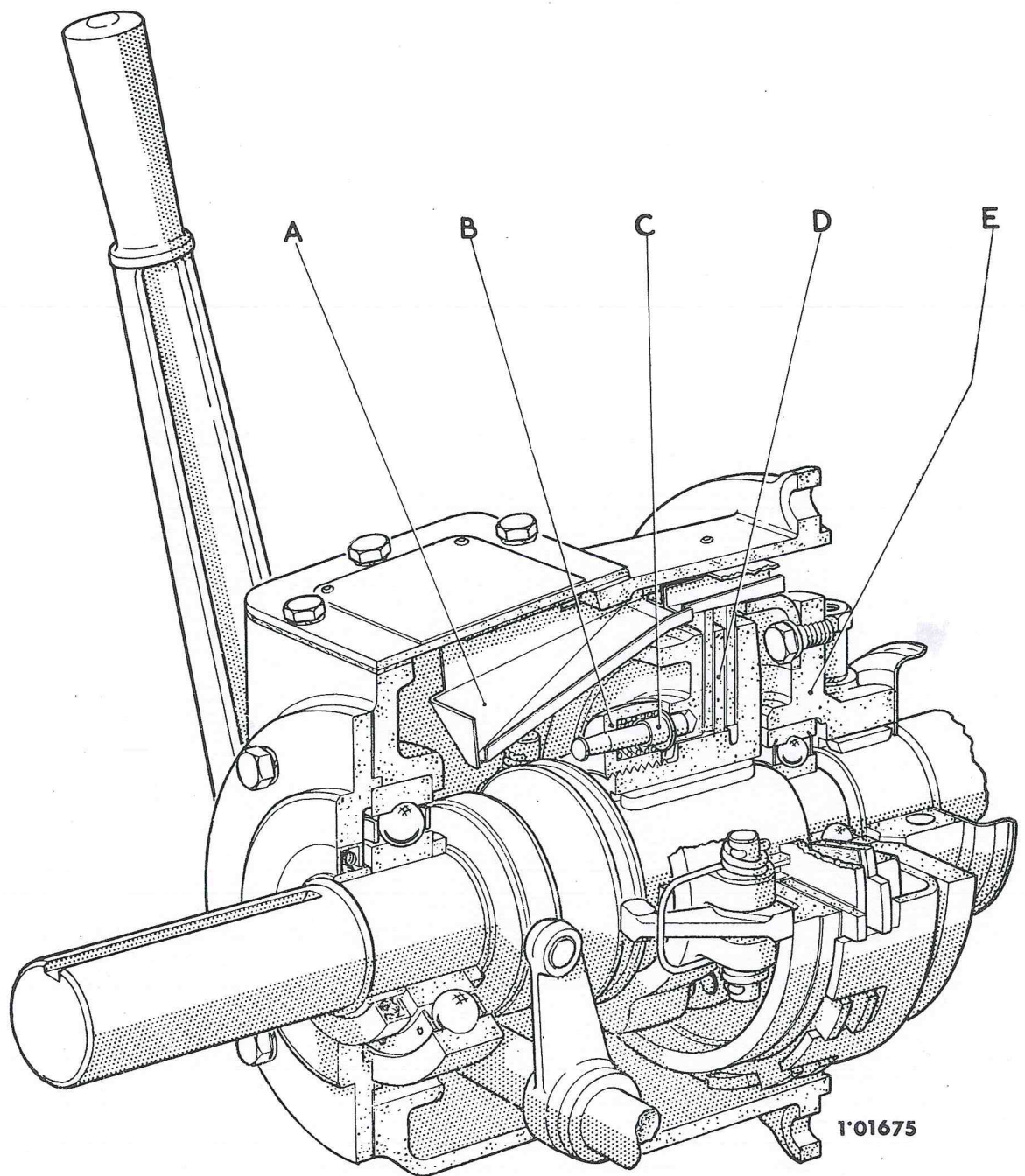


Fig. 21.—Clutch for LD and SL Engines

- A Lubricating oil return trough.
- B Clutch adjusting ring.
- C Clutch adjusting peg.
- D Clutch plates.
- E Clutch driving member.

LISTER REVERSE GEAR

General

The reverse gear is directly mounted on the engine fan shroud and also carries two brackets which support the after end of the engine. The gear box incorporates a cone type ahead clutch and an epicyclic reverse gear.

It is not necessary to fit a separate thrust block as the box is capable of absorbing the end thrust.

This box is robust and designed to give a long trouble free life. Abuse and/or the lack of maintenance will, however, affect this life, and the following points should be watched.

1. **Before changing gear, reduce engine speed.**
2. Move the gear lever firmly and steadily to change gear.
3. Never run with the reverse band slipping.
4. Check oil level in the reverse gear and also in the reduction gear (if fitted) every 24 running hours or weekly.

Operation—Neutral

Drive from the engine is passed initially from the crankshaft spur gear (1) to the stepped pinions (2). These in turn drive the two spur pinions (3), thus driving the clutch shaft spur gear. The latter is situated forward of clutch and is integral with the clutch shaft. When in neutral this gear remains at rest and the two sets of pinions revolve round it, carrying with them the clutch body (4).

Operation—Ahead

When the gear lever is engaged in the ahead position, the cross shaft (5) is partially rotated allowing the forward facing roller (6) to move across the formed face of the ahead operating lever (7). This removes the restraining force on the clutch operating yoke (8) and under the influence of the clutch springs (9) the inner clutch (10) moves forward and engages with the clutch body (4). As the inner clutch cone (10) is splined to the clutch shaft, a direct through drive is obtained.

Operation—Astern

When the gear lever is put in the astern position the cross shaft (5) causes the aft facing roller (11) to move the astern clutch operating lever (12). This tightens the brake band (13) on to the clutch body (4) and the latter ceases to revolve. The drive then passes through the stepped pinions (2) and the spur pinions (3) thus rotating the clutch shaft spur gear and clutch shaft in the astern direction.

Adjustment

Remove the gear box cover, and also the retaining screw at the port side end of the operating shaft (5). This will enable the shaft to be withdrawn sufficiently for the two rollers (6 and 11) to clear their respective levers (7 and 12).

Ahead Clutch

Adjust the forward facing roller (6) so that there is 1" (25 mm.) of free movement at the knob end of the hand lever when it is fully in the ahead position and the roller (6) is engaged with the lever (7). This free movement is important and should not be allowed to become less than $\frac{1}{2}$ " (12 mm.).

Reverse Band

Adjust the roller facing AFT so that the ASTERN drive can **just** be taken without the clutch slipping.

IMPORTANT.— DO NOT OVER ADJUST.

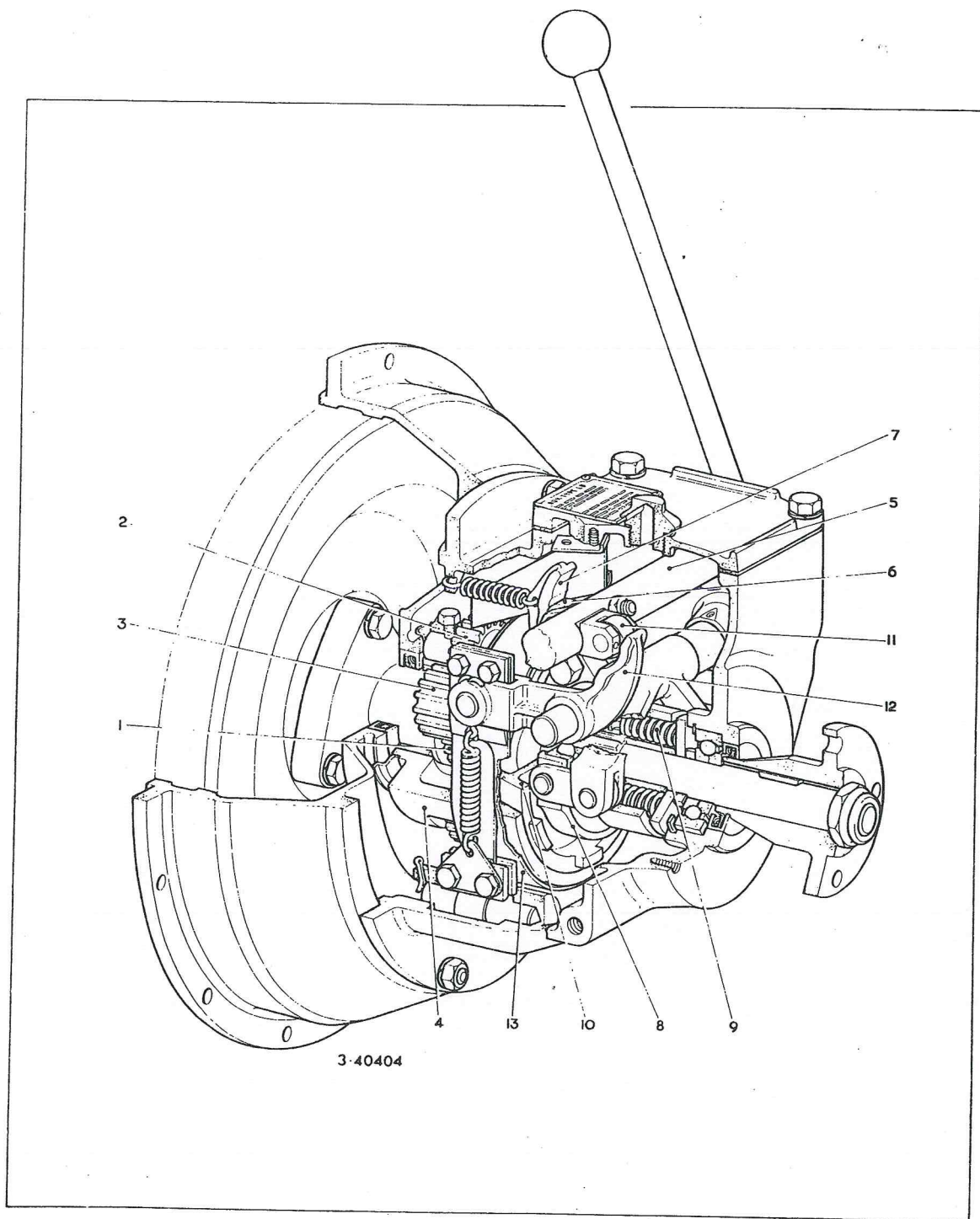


Fig. 22.—LISTER REVERSE GEAR—Manually Operated

Reverse Band (continued)

The roller facing aft (11) should be adjusted so that the full astern power can be taken without the clutch body slipping. It is very important, however, that the band is not overadjusted otherwise considerable damage may be caused. The force required to engage the hand lever at the knob should be about 30 lbs. (13 kgs.). When in the "off" position, the band rests on a lug in the bottom of the gear case, and it should be clear of the clutch body drum, although very light rubbing is permissible.

TO DISMANTLE REVERSE GEAR

Refer to page 133

Remove nuts (6) from reduction gear flange (4) and withdraw reduction gear.

Refer to page 122 to 126 & 133

Remove the following parts:— inspection cover (8) and joint (9), locating pin (92); draw operating shaft clear of operating levers (66 and 71); remove lock-nuts (98) and screw out roller adjusting screws (93) from shaft, now withdraw operating shaft (90) from reverse housing, remove retaining plug (87) and draw out fulcrum shaft (60), brake band anchor pin split pin (80), and anchor pin (79), remove nut (55), pinion (8), key (9), spacer (7)—see page 133—then supporting the gear, gently drive reverse gear through bearing (5). Having done this the bearing (5) can be removed, then remove circlip (6), gently tap bearing from housing from reduction gear end (re-fit this bearing into housing first on re-assembly). Now with reverse gear free from the housing remove thrust washer spacer (52), plate (51), spacer (50), springs (48), sleeve (49), circlip (47), ball race (46), yoke (45), cone (44), circlip (36), washer (35). To remove pinions withdraw screws (41), shaft (40) leaving gears (37 and 38) free to be removed from the housing. Withdraw bearing (34) and reverse gear shaft (33) can be withdrawn from gear housing.

TO REASSEMBLE

Assemble gear in reverse rotation to the above instructions to point where spacer (52) and ball race thrust washer is fitted to shaft. Slide brake band over gear housing making sure it is the right way round, then offer up gear assembly to ball race (5) in housing, and fit the other half of thrust washer, refit spacer (7), key (9), pinion (8), ball race (11), nut (13). Lock reverse gear and tighten nut (13).

The distance between sleeve (49) and retaining plate (51) when nut (13) has been secured should be approximately 5/16". This locates reduction pinion (8) in correct position to fit reduction gear.

Lubrication—Gear Box and Reduction Gear

In temperate climate use SAE50 oil in the reduction gearbox (SAE60 tropical climate).

Before initial starting, after installation or overhaul, fill the reverse gear with engine oil to the mark on the reverse gear dipstick.

Efficient lubrication of the epicyclic gears is ensured, oil flung up by the clutch body being caught and deflected back into the gears by a plate mounted on the inspection cover.

The external ends of the reverse gear operating shaft must be oiled frequently, particularly if the gearbox is little used, when rust formation may stiffen the shaft. To lubricate the port side of the shaft, the locating screw should be removed and a few drops of oil poured down the hole.

Flexible Coupling

A flexible coupling capable of taking the full thrust of the propeller is supplied to accommodate the movements of resiliently mounted engines. Should any other type of flexible coupling be fitted it must be capable of transmitting this thrust.

If the stern tube inboard gland is more than 9" from the flexible coupling, a bearing or plumber block must be fitted and positioned as near the coupling as practicable. If an intermediate shaft is installed, this bearing must be used close up to the coupling.

LISTER LH1 HYDRAULIC REVERSING GEAR MAINTENANCE INSTRUCTIONS

Lubrication

Fill the Reversing gear and Reduction gear (if fitted) to the marks on the respective dipsticks. Do not overfill. Capacity of Reversing gear approximately 2 pts. (1.2 lts.); of 2:1 Reduction gear .5 pts. (3 lts.); of 3:1 Reduction gear .5 pts. (.3 lts.). Use diesel engine Lubricating oil but having the following higher viscosities:- For engine room temperatures up to 40°F (5°C) SAE 20; from 40°F (5°C) up to 85°F (30°C) SAE 30; and above 85°F (30°C) SAE 50. Change the oil every 1000 hours and clean magnetic drain plug.

Special Features

Hydraulic pressure is used only to obtain "neutral" and "astern" positions. There is no high oil pressure in the ahead position and therefore the power loss in this position is small. If the hydraulic system fails the clutch remains engaged in the ahead position. The propeller shaft remains engaged with the crankshaft until the engine is started when it disengages instantly if the control is in neutral. If it is desired to free the ahead clutch with the engine stopped, as for example, for lining up the engine coupling during installation, the screw "A" is removed, replaced by screw "B" and screwed carefully until the clutch just disengages and no more. The screws must be replaced before starting the engine.

Adjustments

No regular adjustment of the gear box is required. The following settings should be checked once a year or after about 25,000 engagements of the clutch.

Oil pressure

Connect, with copper pipe having a bore of 1/16" (1.5mm), a 400 psi (28 Kg per sq.cm.) pressure gauge to screw "A".

1. Place control lever in neutral and run engine at about 600/800 rpm. The oil pressure should be about 250 psi (17.5 Kg per sq.cm.)
2. Remove plug "C", remove screw "D" which is under plug "C" and replace plug. Set control lever in astern position and run engine at about 600/800 rpm (propeller will not turn). The oil pressure should be about 320 psi (22.5 Kg per sq.cm.). Replace screw and plug in original position after testing.

If pressure (2) is not correct, within 10 psi (0.7 Kg per sq.cm.), it must be adjusted by removing the relief valve adjusting plug "E" (which is under a seal behind the control lever "K") and inserting or removing shims "F" under the spring "L". Before making any final adjustments ensure that the correct oil is used and that it is up to working temperature.

Ahead Adjustment

Remove the top cover and adjust screw "H" until the dimension "G" is 3/32" (2.5 mm) with the piston pushed right back.

Astern Adjustment

Remove the top cover and slacken nut "I" then holding this nut with a spanner, turn adjusting screw "J" anti-clockwise until the brake band is felt to be tight on the drum, then slacken the screw (clockwise) 3 complete turns and lock the nut "I".

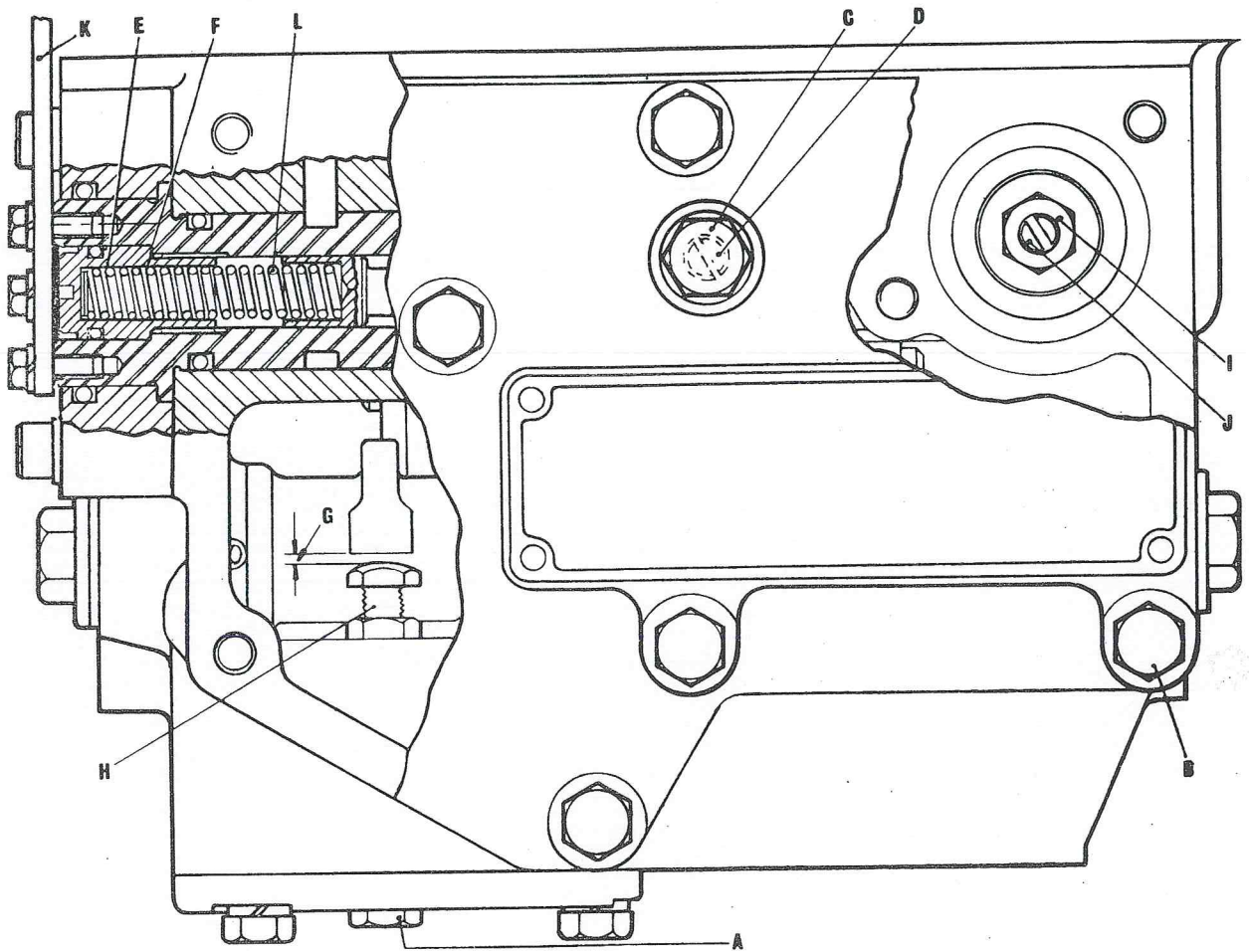


Fig. 23.—LISTER REVERSE GEAR—Hydraulic Operated.
Control Adjusting.

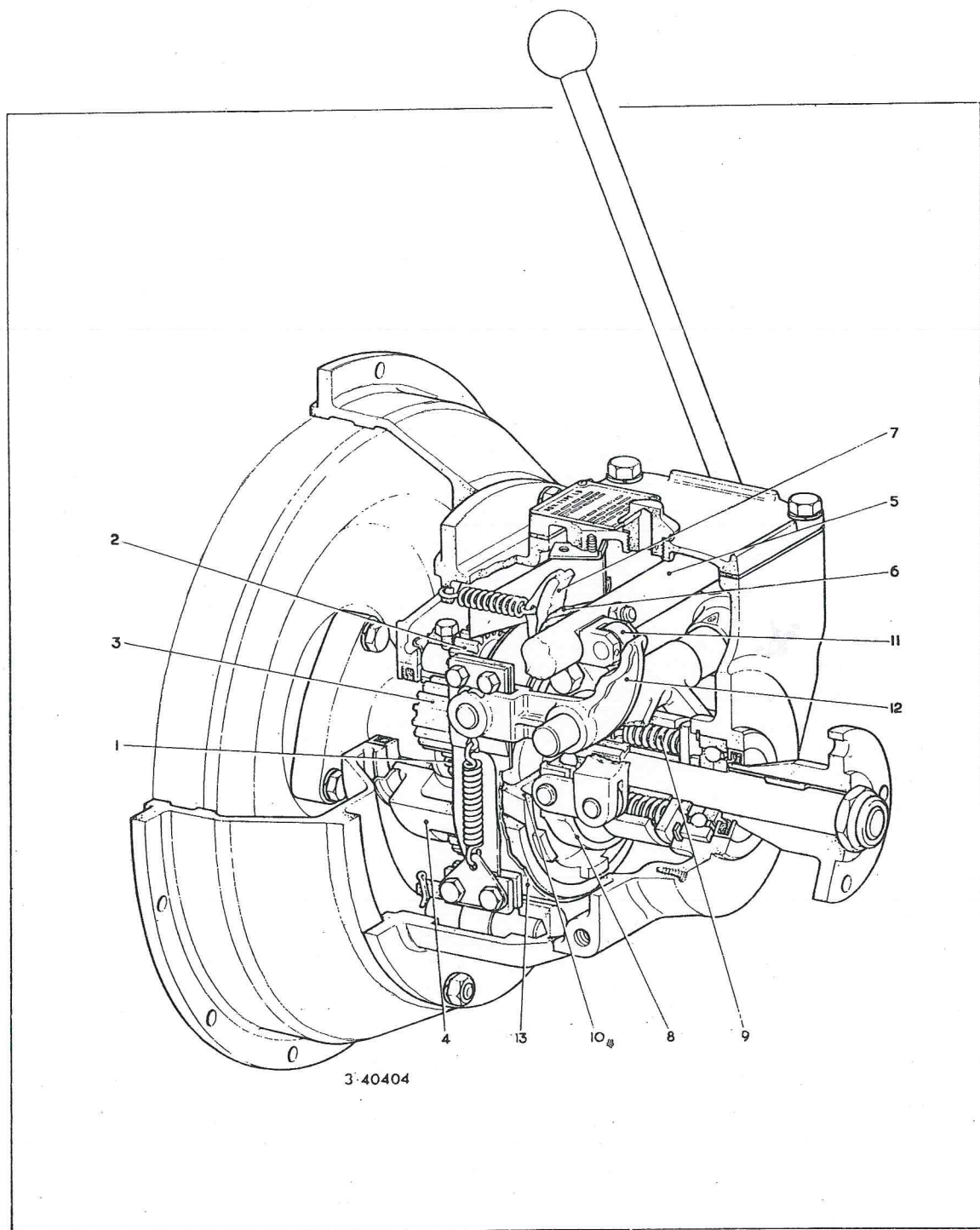


Fig. 22.—LISTER REVERSE GEAR—Manually Operated

LDM & SLM ENGINES

Instructions for adding Reduction Gear to Engines fitted with Reverse Gear only

Remove the following items referred to on Pages 122 to 126 and 132.

1. Reverse shaft nut 201-14440 (Item 55).
2. Reverse shaft half coupling 201-14430 (Item 53).
3. Oil seal 201-14120 (see note below) (Item 7).
4. Half coupling key 27-1228 (Item 54).

It will be necessary to remove the existing Studs in the Reverse Gear Casing and fit the following:—

2 off studs (long) 291-2077 on underside of case end.

2 off studs (short) 270-98 on the topside.

Spacer 201-14760 (Item 7) page 132, should be fitted over the reverse shaft 201-14341 (Item 33) before offering up the reduction gear to the reverse gear.

To compress the spring housing 201-14390 (Item 49) it is recommended that a small sleeve of 1" dia. bore, and approximately 2" length with a $\frac{3}{8}$ " slot cut back from one end approximately $1\frac{1}{4}$ " be made. The sleeve is fitted over the reverse shaft in line with the keyway in the shaft. Screw on the locking nut and compress the spring housing until the full keyway in the shaft is showing. Insert the key 27-1228 (Item 54) in the keyway, then unscrew the locknut and remove the sleeve. Inserting the key (Item 54) in the reverse shaft will stop the forward movement of the shaft when the nut is slackened off. Fit the reduction gear pinion (Item 8) and bearing (Item 11) and screw on nut and secure.

The clearance between the forward face of the clutch spring retaining plate (51), and the aft face of the housing sleeve (5) when in position, is approximately $5/16$ ".

VARIABLE PITCH PROPELLERS

LD1M & SL1M

Correct Assembly of Feathering Propeller when refitting blades

Observe the mark "X" in the following places:—

1. On the aft end of the boss C2, to one side.
2. On the end of the "T" head, C.10, to one side.
3. On the base of the flange of one blade only, at the side.
4. On the end of one blade operating pin C5.

These marks are a guide to correct assembly, keep them together. Examine the pins C5 again. The screwdriver slots cut across the end enable the pins to be turned a little one way or the other to engage the slots in the propeller blades, also when turned so that they are parallel with the shaft line, the flats are at the correct angle to enter these slots.

Note that one edge of the flats is rounded away to facilitate entry and also to clear the radius at the bottom of the slots cut in the propeller blades.

Proceed to assemble as follows:—

1. Insert the pins C5 with flats diametrically opposite one another and adjust as above.
2. Place the blades on the pin C11 of "T" head C10, carefully checking the "X" marks.
3. Ease the "T" head and blades back into the boss, again observing the "X" marks.
4. See that the blade slots engage the flats on the pins, adjusting the pins as necessary.
5. Once firmly engaged, the blades may be rolled home by twisting one blade against the other. To enable the teeth to be correctly engaged in the rack teeth, these are also marked. Observe that the blade marked with an "X" has two nicks cut across the top of one tooth and that the other blade has a tooth with only one nick. The rack teeth are also nicked to correspond. Engage the NICKED TEETH of the blades in the FIRST SPACE in their respective racks before rolling home. Spare blades or racks should be marked in the same manner and position as the originals when they are being fitted.

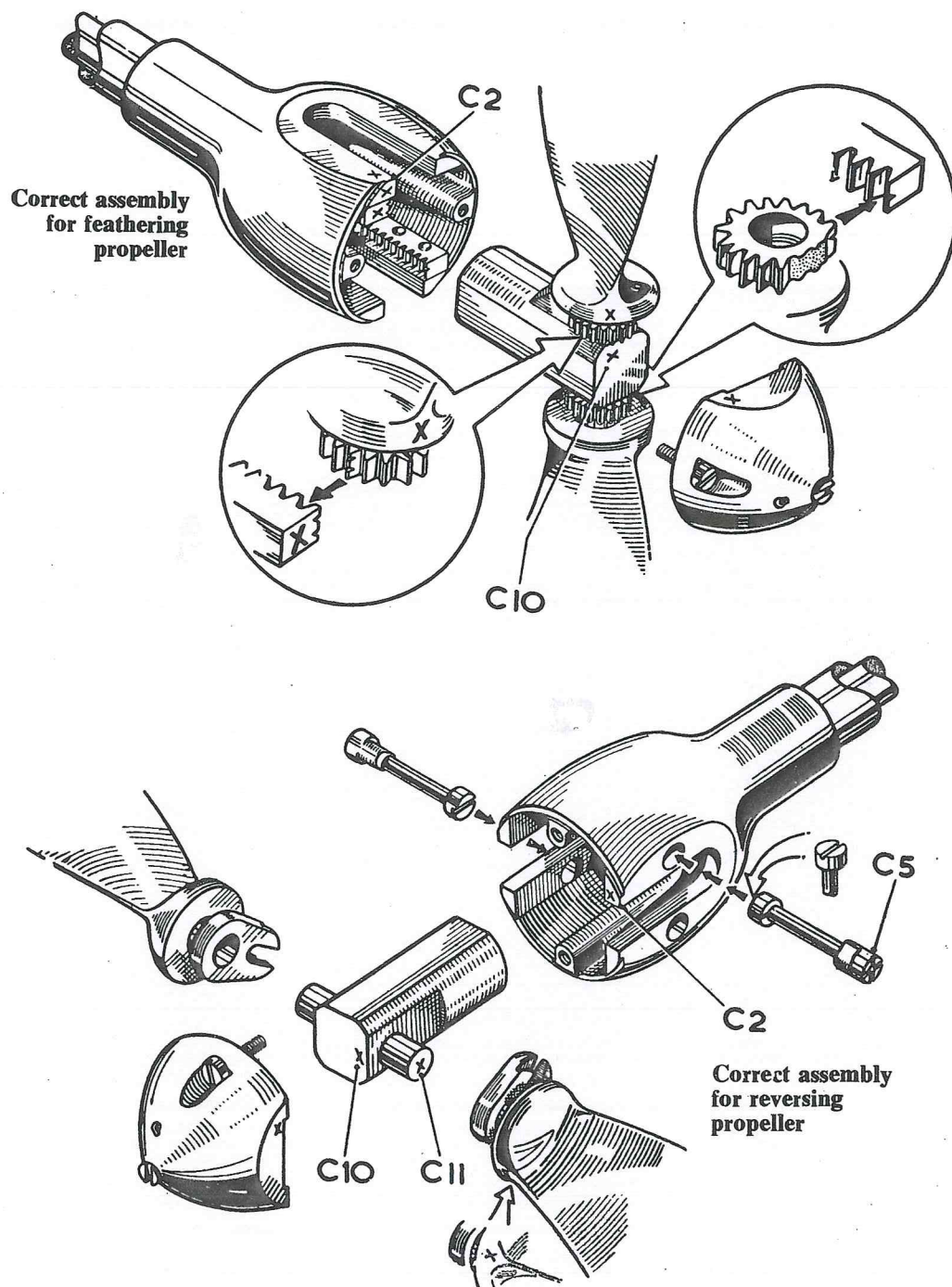
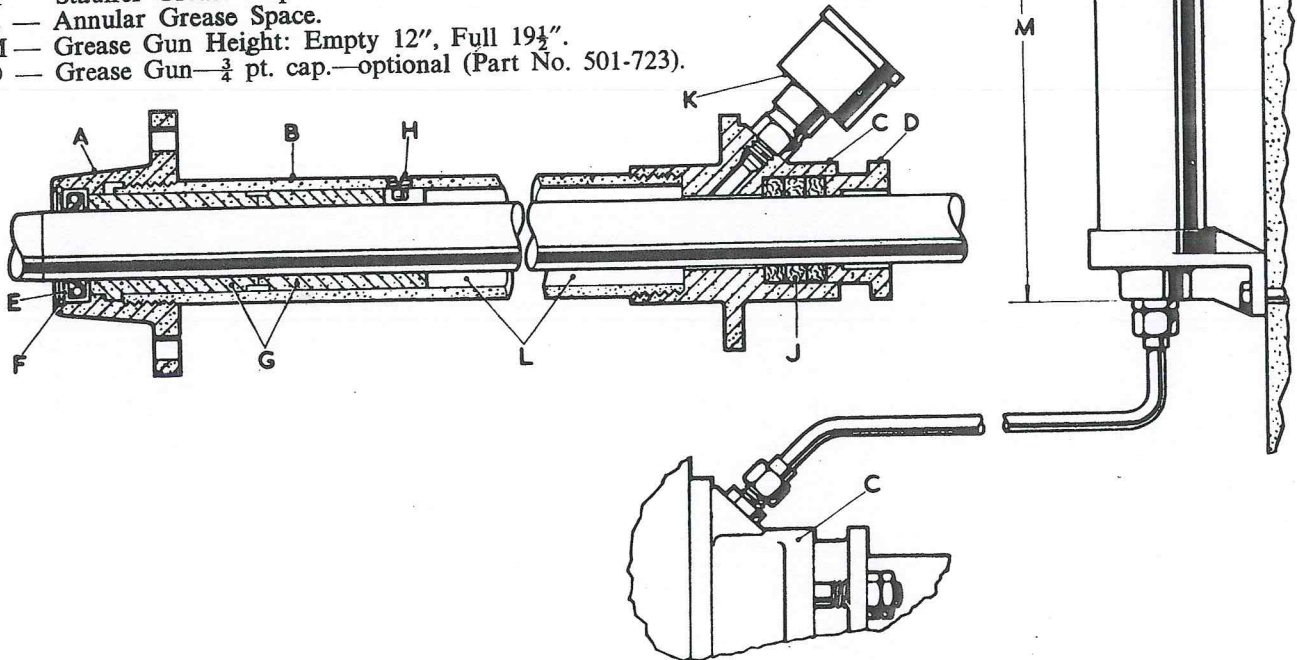


Fig. 24.—Variable Pitch and Feathering Propeller

STERN GEAR

KEY

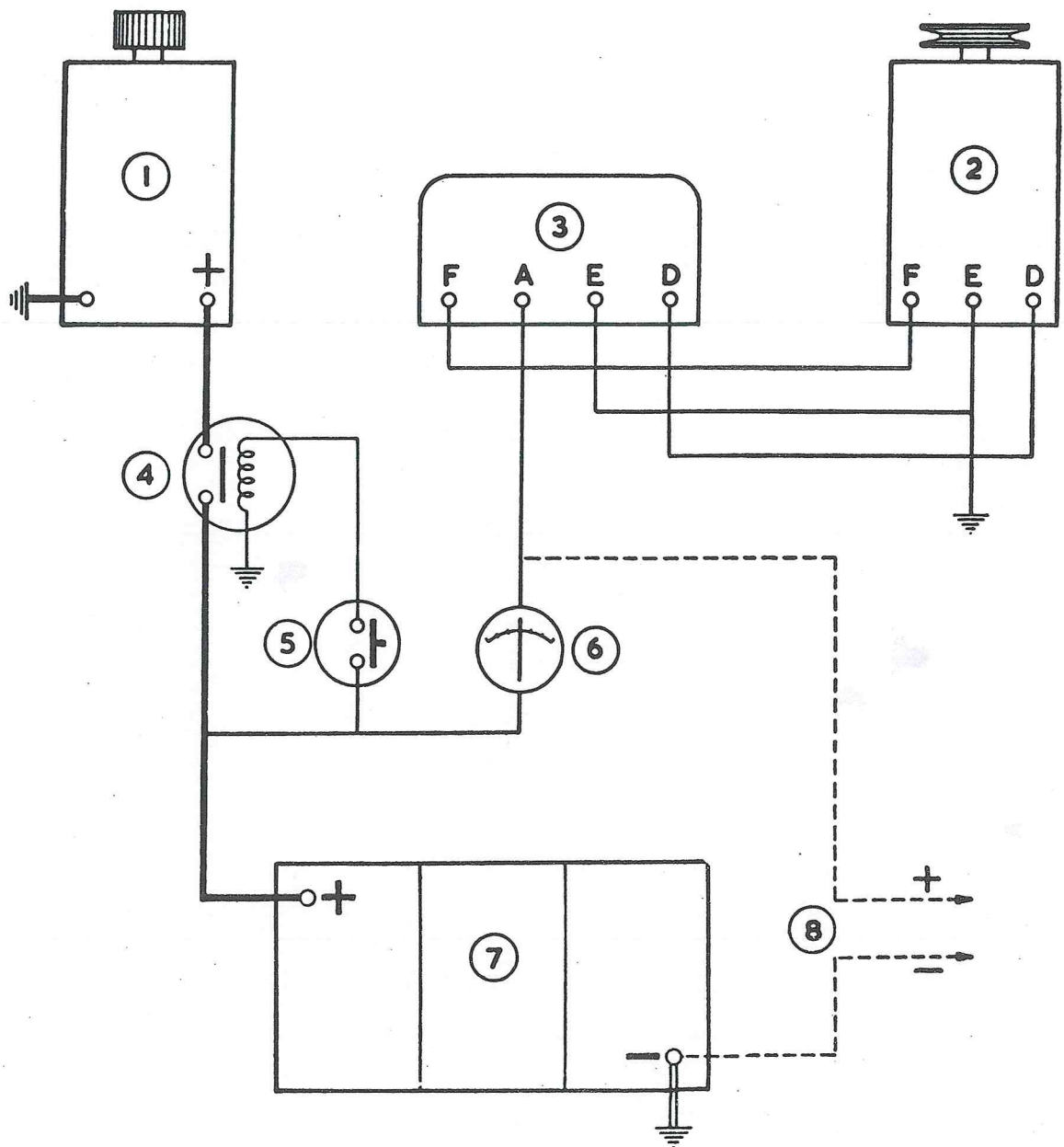
- A — Tail Housing.
- B — Stern Tube.
- C — For'd Bracket.
- D — For'd Gland.
- E — Water and Sand Seal.
- F — Spring Ring.
- G — Aft Bearings.
- H — Locating Screw.
- J — Packing.
- K — Stauffer Grease Cup.
- L — Annular Grease Space.
- M — Grease Gun Height: Empty 12", Full 19½".
- O — Grease Gun—¾ pt. cap.—optional (Part No. 501-723).



IMPORTANT—PROPULSION ENGINES

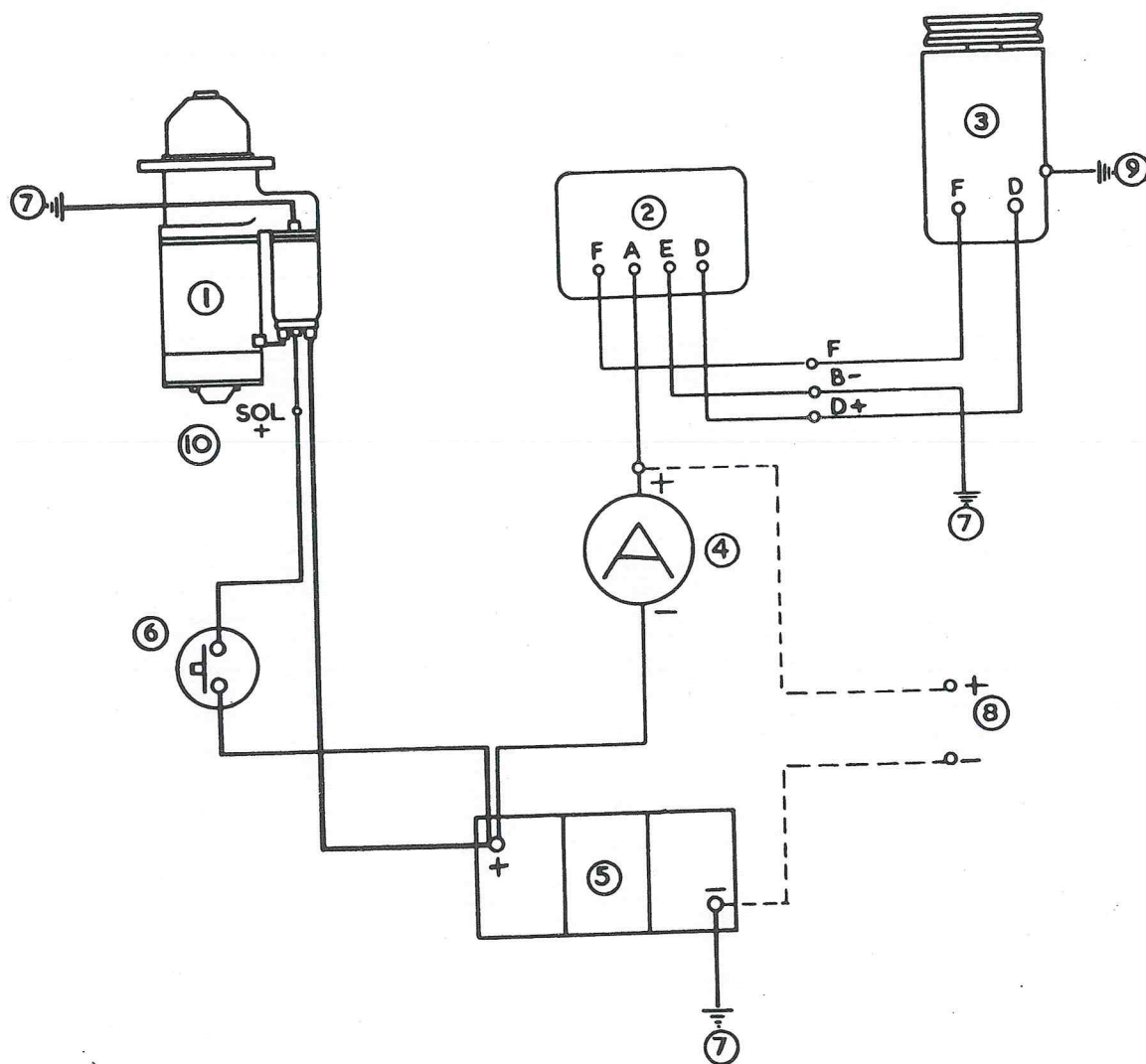
The sterntube **MUST** be filled with a suitable grease, such as Vickers "NEOX DT" immediately after installation. To ensure complete filling of the tube it is imperative that a grease gun be used for the initial filling. For service use regular attention to the grease cup provided should be sufficient to make up any loss incurred.

Tailshaft Size	$\frac{7}{8}$ in. - 22.2 mm.	1 in. - 25.4 mm.	$1\frac{1}{4}$ in. - 31.75 mm.	$1\frac{1}{2}$ in. - 38 mm.
Engine	SL1MG SL1MGR SL2MG	SL3MG	SL2MGR2 SL3MGR2	SL3MGR3
Grease Capacity				
Pints	.6	.75	.49	.96
Litres	.34	.41	.28	.54



- | | |
|---------------------------------|----------------------|
| 1. Starter Motor. | 5. Push Button. |
| 2. Dynamo. | 6. Ammeter. |
| 3. Cut-out and Controller Unit. | 7. Battery. |
| 4. Starter Solenoid. | 8. Lighting Circuit. |

LD1 & SL1 12v. Electric Starting Equipment — Wiring Diagram ED.6105



- | | |
|---------------------|----------------------------------|
| 1. Starter Motor. | 6. Starter Push Button. |
| 2. Controller Unit. | 7. Engine Earth. |
| 3. Dynamo. | 8. Lights—do not exceed 10 amps. |
| 4. Ammeter. | 9. Dynamo Frame Earth. |
| 5. Battery. | 10. Solenoid. |

LD2, SL2 & SL3 12v. Electric Starting Equipment — Wiring Diagram ED. 6838

LAYING-UP PROCEDURE

The following routine should be carried out when it is known that the engine will not be required for some months.

1. Replace fuel in tank with a small supply of Shell Fusus Oil A or equivalent.
2. Drain lubricating oil from sump and refill with Shell Ensis 20 oil or equivalent.
3. Run the engine for a period to circulate the Ensis oil through the system and to ensure the Fusus Oil is passed through the fuel pumps and injectors.
4. Stop the engine and drain off the Ensis lubricating oil from the sump, after which the crankshaft should NOT be turned until the engine is again required for service. The Fusus oil should be left in the fuel system.
5. Seal all openings on the engine with tape.
6. Remove batteries and store fully charged with terminals Vaseline'd. (Electric start engines.)
7. Grease all external bright parts and control linkage etc.
8. Tie labels on the engine clearly stating its condition.

If the above is not complied with the engine should be run for a minimum of 15 minutes every month.

Before returning the engine to service it should be turned by hand to ensure free movement of all working parts—See "Initial Starting" Page 14.

IMPORTANT

See also page 156

Spare Parts — Directions for Ordering

1. Always quote the Engine No., Part No. & Description of Part given in **bold** type when ordering Spare Parts. The Engine No. will be found on the plate on the Fuel Pump Housing Door and stamped on the Flywheel Rim.
2. The Engine components have been divided into convenient groups and illustrated. DO NOT quote illustration numbers when ordering.
3. Standard Rotation is Clockwise when looking on either shaft end.
4. Unified Threads are used where applicable throughout the Engine.
5. Undersize/Oversize Parts, Crankshaft, Main Bearings and Connecting Rod Big End Bearings may be obtained 0.010", 0.020" and 0.040" undersize. Pistons and Piston Rings may be obtained 0.010", 0.020" and 0.040" oversize.

Part No. for undersize/oversize parts is the same as the standard part no. but the undersize/oversize must be added.

Example:- Piston Ring 201-12310/20.

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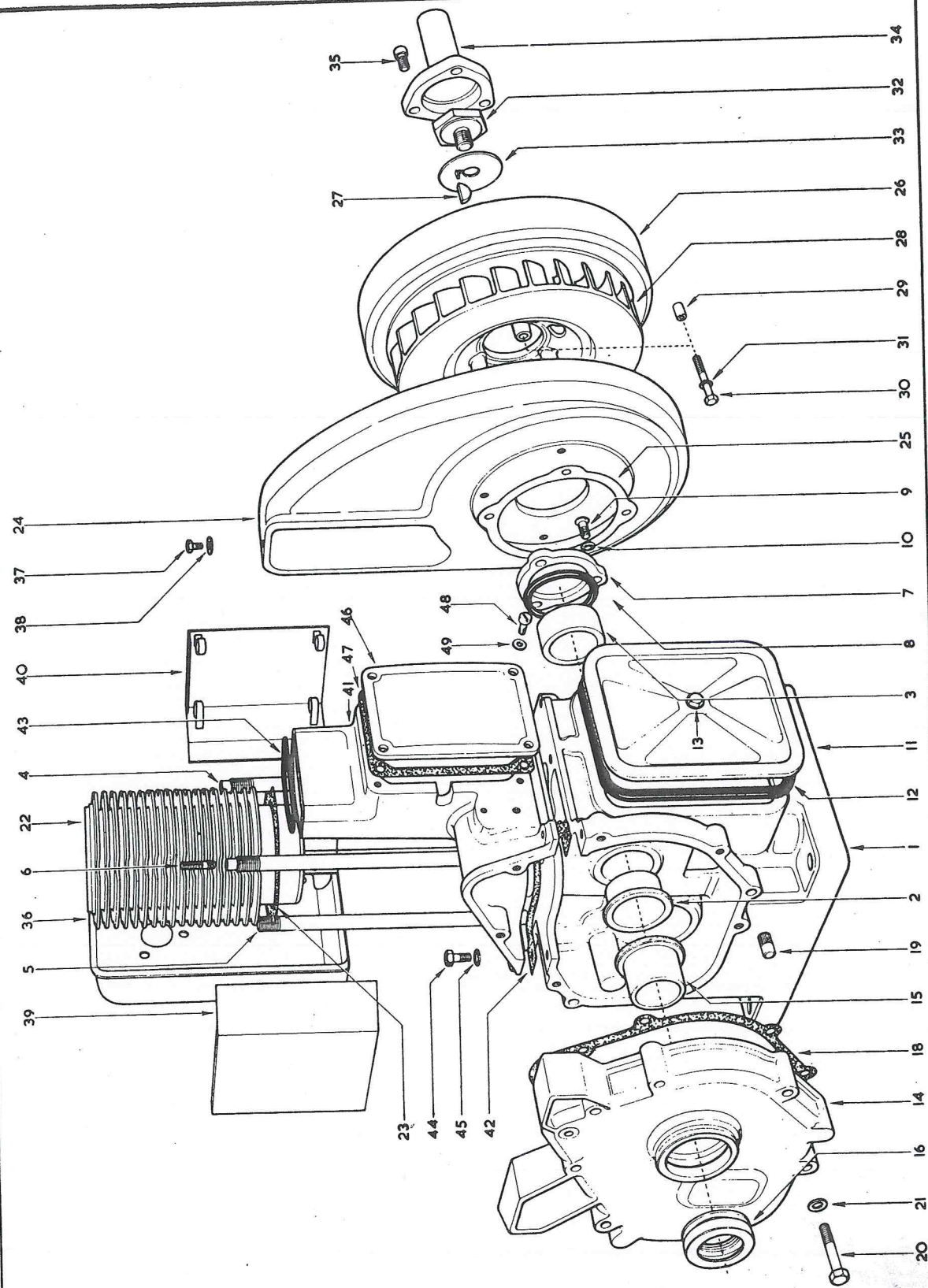
IMPORTANT
Unified threads conforming to International
Standard are used where applicable.

PARTS LIST

SEE PAGES 55 & 156 FOR ORDERING PROCEDURE

CRANKCASE, END COVER, CYLINDER BLOCK, SHIELD AND COWLING, FLYWHEEL FAN AND SHROUD, FUEL PUMP HOUSING

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
CRANKCASE					
1	Crankcase Assembly comprising:— Crankcase 201-10013 fitted with Oil gallery plug 201-13570, Main Bearing 201-10063, Camshaft Bush 201-10181, Camshaft Bush 201-10190, Oil pipe support 201-11340.	570-10090	1	—	—
	Crankcase Assembly comprising:— Crankcase 202-10014 fitted with Oil gallery plug 201-13570, Main Bearing 201-10063, Camshaft Bush 201-10181, Camshaft Bush 201-10190, Oil pipe support 201-11340, Camshaft Bush 202-12030.	570-10120	—	1	—
	Crankcase Assembly comprising:— Crankcase 203-10010 fitted with Plug 203-13570, Main Bearing 201-10063, Oil Pipe Support 203-11340 and Camshaft Bushes 201-10181, 201- 10190 and 202-12030(2)	570-10970	—	—	1
2	Camshaft Bush Gear End	201-10181	1	1	1
—	Camshaft Bush Centre Bearing	202-12030	—	1	2
3	Camshaft Bush Flywheel End	201-10190	1	1	1
4	Cylinder Head Stud—Long	201-11042	2	4	6
5	Cylinder Head Stud—Short	201-11052	2	4	6
6	Cylinder Head Cover Stud— $\frac{1}{4}$ " UNF x $\frac{1}{4}$ "	270-120	2	4	6
—	Dowel for Plugging Oil Hole	201-13570	1	1	—
—	Oil Hole Dowel	203-13570	—	—	1
—	Drain Plug	27-1815	1	1	1
—	Drain Plug Joint	291-3063	1	1	1
7	Camshaft End Cover	201-12392	1	1	1
8	Camshaft End Cover Joint	201-18540	1	1	1
9	Camshaft End Cover Screw— $\frac{1}{4}$ " UNF	270-208	3	3	3
10	Camshaft End Cover Washer	27-3988	3	3	3
11	Crankcase Door	201-11180	1	—	—
—	Crankcase Door	202-12690	—	1	—
—	Crankcase Door Dowel	203-12691	—	—	1
12	Crankcase Door Joint	201-13570	—	—	1
—	Crankcase Door Joint	291-22341	1	—	—
—	Crankcase Door Joint	202-12700	—	1	—
—	Crankcase Door Clamp Bar	203-12700	—	—	1
13	Crankcase Door Screw	291-2320	1	—	—
—	Crankcase Door Screw— $\frac{1}{4}$ " UNC x $\frac{5}{8}$ "	201-11190	1	—	—
—	Crankcase Door Washer	270-53	—	9	11
—	Crankcase Door Washer	616-1608	1	—	—
—	Crankcase Door Screw Split Pin	291-2609	—	9	11
—		27-2255	1	—	—
END COVER					
14	End Cover	201-11202	1	1	1
15	End Cover Bush	201-10171	1	1	1
16	End Cover Oil Seal	201-13190	1	1	1
18	End Cover Joint	201-11211	1	1	1
19	End Cover Dowel	27-1430	2	2	2
20	End Cover Setscrew— $\frac{5}{16}$ " UNF x $2\frac{1}{4}$ "	270-66	7	7	7
21	End Cover Setscrew Washer	616-1608	7	7	7



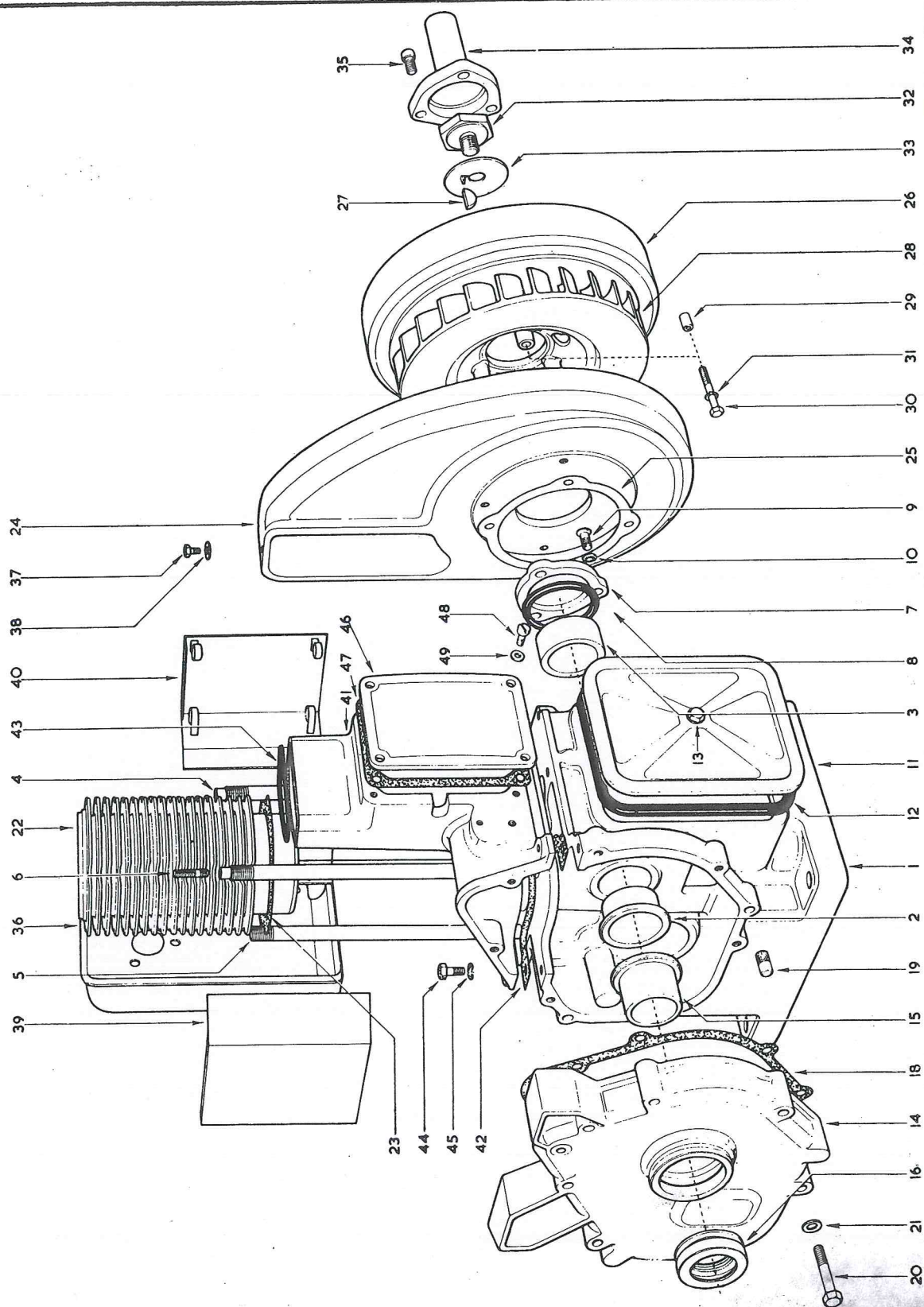
CRANKCASE, END COVER, CYLINDER BLOCK, SHIELD AND COWLING, FLYWHEEL FAN AND SHROUD, FUEL PUMP HOUSING (Contd.)

Illus. No.	Description	Part No	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
CYLINDER BLOCK, SHIELDS AND COWLING					
†22	Cylinder Block—LD Engines	201-10273	1	2	—
—	Cylinder Block—SL Engines	201-17520	1	2	3
23	Cylinder Block Joint	201-10390	1	2	3
—	Side Shield (Governor End) complete	201-12410	1	—	—
—	Side Shield (Governor End) complete	202-12420	—	1	—
—	Side Shield complete	203-12420	—	—	1
40	Side Shield (Flywheel End)	201-12420	1	1	—
—	Side Shield complete	203-12410	—	—	1
—	Air Deflector Plate (Dipstick Side)	202-12730	—	1	—
—	Air Deflector Plate (Fuel Pump Side)	202-13690	—	1	—
—	Air Deflector Plate complete	203-18060	—	—	2
36	Cowling	201-10460	1	—	—
—	Cowling	570-10570	—	1	—
—	Cowling	203-10460	—	—	1
37	Cowling Setscrew	27-1698	3	3	3
38	Cowling Washer	270-172	3	3	3
—	Cowling Reverse Rotation	201-12601	1	—	—
—	Cowling Reverse Rotation	570-10600	—	1	—
—	Cowling Reverse Rotation	570-10590	—	—	1
—	Cowling Strap Bolt— $\frac{3}{8}$ " UNC x $\frac{7}{8}$ "	270-286	—	2	2
—	Spring Washer	27-393	—	2	2
FLYWHEEL AND FAN SHROUD					
24	Fan Shroud—sheet metal	201-10423	1	—	—
—	Fan Shroud—cast iron	202-10426	—	1	1
—	Fan Shroud—sheet metal	202-24880	—	1	1
—	Fan Shroud (for Close Coupling)	201-12581	1	—	—
—	Fan Shroud (Reverse Rotation)	201-12590	1	—	—
—	Fan Shroud (Reverse Rotation)	202-12592	—	1	1
25	*Main Bearing Housing Fan Shroud Shim 0.010" (Sheet Metal Fan Shrouds)	201-12460	As req.	—	—
—	*Main Bearing Housing Fan Shroud Shim 0.005" (Sheet Metal Fan Shrouds)	201-12462	As req.	—	—
—	*Main Bearing Housing Fan Shroud Shim 0.048" (Sheet Metal Fan Shroud)	201-12461	As required		
—	Fan Shroud Strip Shim 0.002" (Cast Fan Shrouds)	201-13580	As req.	—	As req.
—	Fan Shroud Strip Shim 0.005" (Cast Fan Shrouds)	201-13581	As req.	—	As req.
—	Fan Shroud Strip Shim 0.010" (Cast Fan Shrouds)	201-13582	As req.	—	As req.
—	Fan Shroud Setscrew	270-539	—	4	4
—	Spring Washer	202-24060	—	4	4
—	Locking Washer	202-24050	—	4	4
—	Fan Shroud (Rev. Rotation—Close Coupling)	201-14951	1	—	—
—	Fan Shroud Screws (Close Coupling)	270-177	4	—	—
—	Fan Shroud Spring Washer (Close Coupling)	27-3929	4	—	—
26	Flywheel 14" dia. x $2\frac{3}{8}$ " face Std. all speeds and close coupled 1800 rpm	201-10203	1	—	—
—	Flywheel 14" dia. x $3\frac{1}{4}$ " face, close coupled 1500 rpm only, 230v. A.C. Sets	201-13640	1	—	—
—	Flywheel 16" x $2\frac{3}{8}$ " (Crankshaft Hand Starting)	201-10204	1	—	—

* These shims are used between the main bearing housing and the crankcase to locate the crankshaft on all engines.

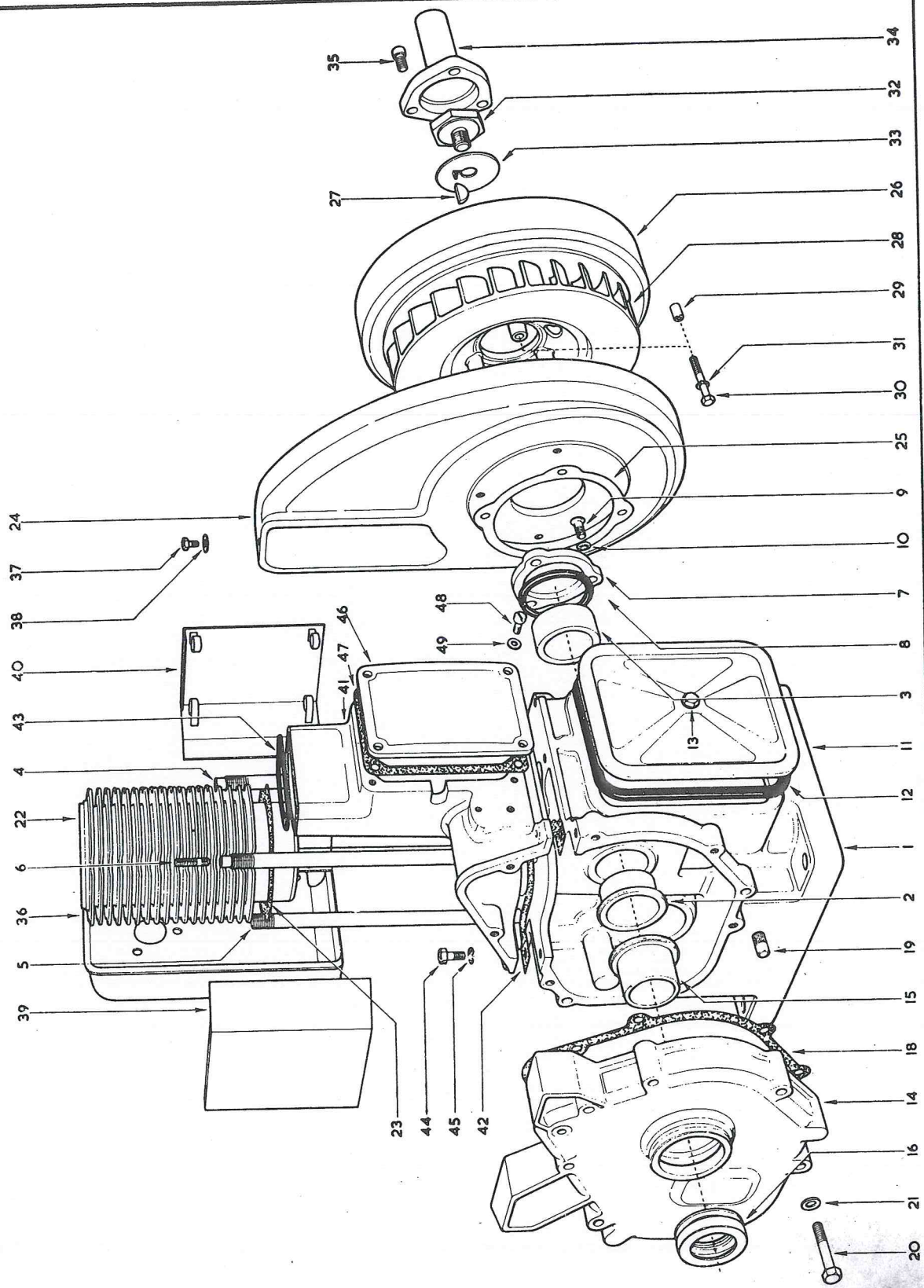
On engines with sheet metal fan shrouds they are also used between the main bearing housing and the fan shroud to locate the shroud relative to the flywheel.

CRANKCASE



**CRANKCASE, END COVER, CYLINDER BLOCK, SHIELD AND COWLING, FLYWHEEL
FAN AND SHROUD, FUEL PUMP HOUSING (Contd.)**

illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
FLYWHEEL AND FAN ASSEMBLY					
—	Standard Rotation Heavy Wheel	570-10140	—	1	—
—	Reverse Rotation Heavy Wheel	570-10141	—	1	—
—	Elect. Start Standard Rotation Heavy Wheel	570-10142	—	1	—
—	Standard Rotation Light Wheel	570-10143	—	1	—
—	Reverse Rotation Light Wheel	570-10144	—	1	—
—	Elect. Start Standard Rotation Light Wheel	570-10145	—	1	—
—	Flywheel Assembly	570-10160	—	—	1
—	Flywheel Assembly—reverse rotation	570-10161	—	—	1
27	Flywheel Key	27-1228	1	1	1
28	Fan	201-10543	1	—	—
—	Fan (Reverse Rotation)	201-12610	1	—	—
29	Fan Dowel	201-10760	1	—	—
30	Fan Setscrew— $\frac{1}{4}$ " UNF x $2\frac{1}{2}$ "	270-186	3	—	—
31	Fan Spring Washer	27-451	3	—	—
—	Fan Socket Cap Screw— $\frac{5}{16}$ " UNF x $2\frac{1}{2}$ "	270-107	—	6	—
—	Fan Disc Washer	27-3929	—	6	—
32	Flywheel Retaining Screw	201-12220	1	1	1
33	Flywheel Retaining Lockwasher	201-12230	1	1	1
—	Blanking Plate for Electric Starting Hole	201-13160	—	1	1
—	Blanking Plate Stud— $\frac{3}{8}$ " UNF-UNC x $1\frac{1}{2}$ "	270-260	—	3	3
—	Blanking Plate Nut— $\frac{3}{8}$ " UNF	270-4	—	3	3
—	Blanking Plate Spring Washer	27-393	—	3	3
34	Extension Shaft (Not for full power take off SL3)	202-12210	1	1	1
—	Extension Shaft Stud— $\frac{7}{16}$ " UNF x 2"	270-356	3	3	3
—	Extension Shaft Nut— $\frac{7}{16}$ " UNF-Self locking	270-311	3	3	3
—	Extension Shaft Spring Washer	27-984	3	3	3
—	Extension Shaft (Heavy Duty)	202-21700	—	1	1
—	Extension Shaft Spring Washer (Heavy Duty)	27-984	—	6	6
—	Extension Shaft Stud (Heavy Duty)	270-356	—	6	6
—	Extension Shaft Nut (Heavy Duty)	270-311	—	6	6
FUEL PUMP HOUSING					
41	Fuel Pump Housing	201-11174	1	—	—
—	Fuel Pump Housing	202-11174	—	1	—
—	Fuel Pump Housing	203-11170	—	—	1
42	Fuel Pump Housing Joint to Crankcase	201-11402	1	—	—
—	Fuel Pump Housing Joint to Crankcase	202-11402	—	1	—
—	Fuel Pump Housing Joint to Crankcase	203-11400	—	—	1
43	Fuel Pump Housing Joint to Top Plate	201-11413	1	2	3
44	Fuel Pump Housing Setscrew— $\frac{1}{4}$ " UNF x $\frac{7}{8}$ "	270-114	5	5	5
—	Spring Washer	27-451	—	1	—
45	Fuel Pump Housing Washer	291-2609	5	5	7
—	Fuel Pump Housing Setscrew— $\frac{1}{4}$ " UNF x $1\frac{1}{8}$ "	270-122	—	1	2
46	Fuel Pump Housing Door	201-11571	1	—	—
—	Fuel Pump Housing Door	202-11572	—	1	—
—	Door for Fuel Pump Housing	203-11570	—	—	1
47	Fuel Pump Housing Door Joint	201-11581	1	—	—
—	Fuel Pump Housing Door Joint	202-11582	—	1	—
—	Door Joint	203-11580	—	—	1
48	Fuel Pump Housing Door Screw— $\frac{1}{4}$ " UNC x $\frac{3}{8}$ "	270-53	4	6	9
49	Fuel Pump Housing Door Washer	291-2609	4	6	9
—	Engine Number Plate	27-4007	1	1	1
—	Engine Number Plate Screw	64-7175-1	2	2	2



CRANKCASE

CRANKSHAFT, MAIN BEARING HOUSING, CONNECTING ROD & PISTON

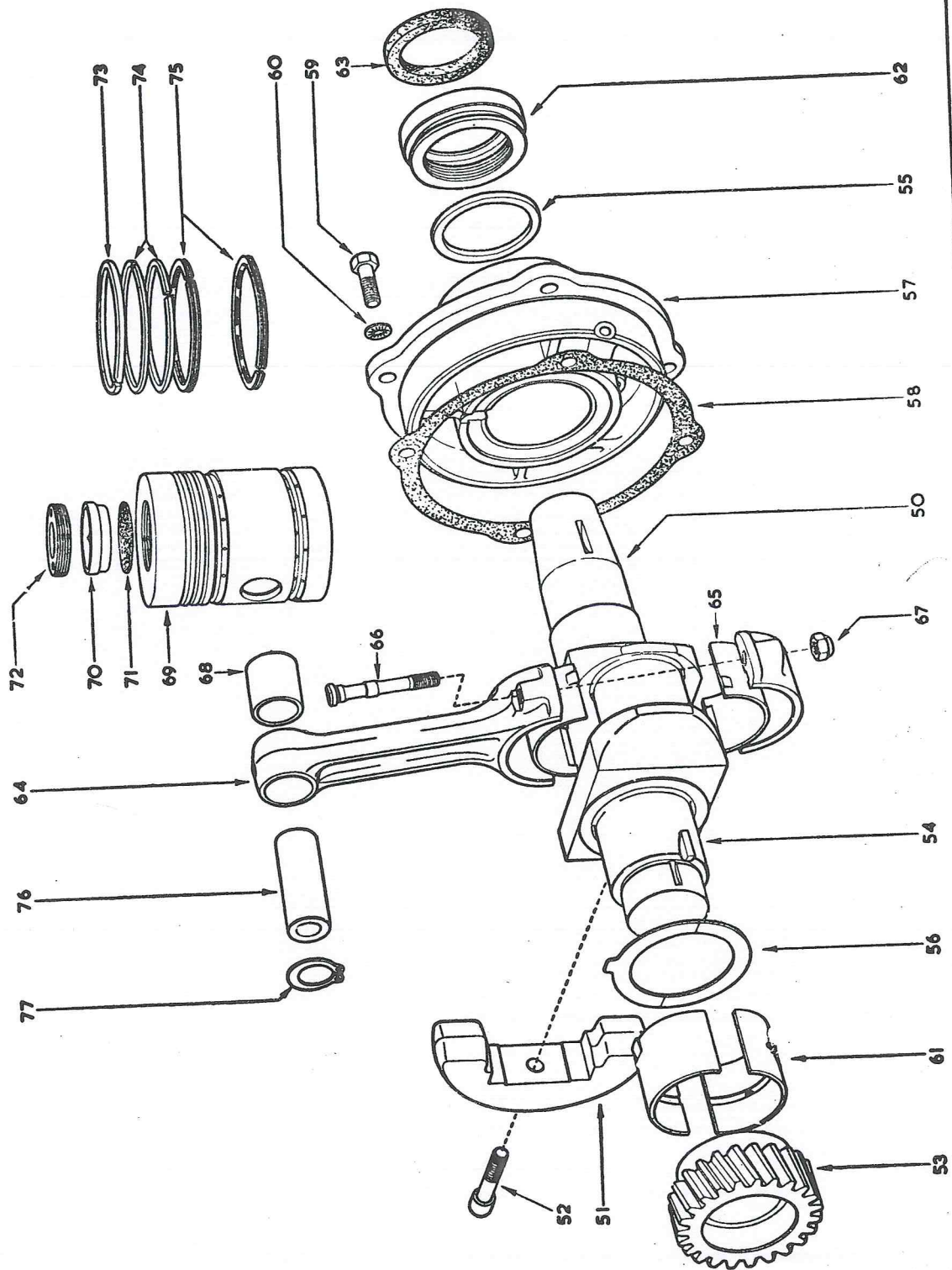
Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
CRANKSHAFT					
50	Crankshaft (Complete with weights and screws)	570-10000	1	—	—
—	Crankshaft (Complete with weights and screws)	570-10131	—	1	—
—	Crankshaft (Complete with weights and screws)	570-10350	—	—	1
51	Crankshaft Balance Weight	201-10142	2	4	—
—	Crankshaft Balance Weight	203-10140	—	—	4
52	Crankshaft Balance Weight Screw — $\frac{3}{8}$ " UNF x $1\frac{1}{2}$ "	270-185	2	4	4
53	Crankshaft Pinion	201-11141	1	—	—
—	Crankshaft Pinion	202-11141	—	1	—
—	Crankshaft Pinion	203-11140	—	—	1
—	Crankshaft Pinion Key	27-352	1	1	1
55	Crankshaft Oil Thrower	201-12240	1	1	1
56	Crankshaft Thrust Washer	201-12380	2	2	2
...	Crankshaft Oil Hole Plug Seven— $\frac{1}{4}$ " UNF x $\frac{3}{8}$ "	270-211	1	2	—
—	Centre Bearing Housing , comprising:—	202-11942	—	1	2
	Housing Top Half	202-11952	—	1	1
	Housing Bottom Half	202-11962	—	1	1
	Housing Dowel	10-2-110	—	2	2
	Housing Cap Screw — $\frac{5}{16}$ " UNF x $2\frac{1}{4}$ "	270-152	—	2	2
+	Centre Bearing	202-11972	—	2 halves	4 halves
	Centre Bearing Housing Dowel	202-11981	—	1	2

MAIN BEARINGS and HOUSING

57	Bearing Housing	201-10074	1	1	1
58	Housing Shim 0.010"	201-12460	As required		
—	Housing Shim 0.005"	201-12462	As required		
59	Housing Bolt — $\frac{5}{8}$ " UNF x $1\frac{1}{8}$ "	270-25	4	—	—
60	Housing Disc Washer	27-3929	4	—	—
—	Housing Bolt	270-540	—	4	4
—	Spring Washer	202-24060	—	4	4
—	Locking Plate	202-24040	—	2	2
61	Bearing , comprising:—	201-10063	2	2	2
—	Top Half (Whitemetal)	201-12910	2	2	2
—	Bottom Half (Copper Lead)	201-12920	2	2	2
62	Oil Retaining Ring	201-12890	1	1	1
—	Oil Retaining Ring (Reverse Rotation)	201-12630	1	1	1
63	Oil Retaining Ring Felt	201-12900	1	1	1

CONNECTING ROD—LD Engines

Connecting Rod complete , comprising items marked *		570-10011	1	2	—
64	*Connecting Rod	201-10031	1	2	—
65	*Connecting Rod Bearings (pair)	201-10040	1	2	—
66	*Connecting Rod Bolt — $\frac{5}{16}$ " UNF	201-50050	2	4	—
67	*Connecting Rod Nut — $\frac{5}{16}$ " UNF	270-154	2	4	—
68	*Connecting Rod Bush	201-10150	1	2	—



CRANKSHAFT, CONNECTING ROD & PISTON

CRANKSHAFT, MAIN BEARING HOUSING, CONNECTING ROD & PISTON—(Contd.)

illus.
No.

Description

Part No.

No. off per Engine
1 Cyl. 2 Cyl. 3 Cyl.

CONNECTING ROD—SL Engines

— Connecting Rod complete, comprising items marked *

64 *Connecting Rod ...

65 *Connecting Rod Bearings (pair) ...

66 *Connecting Rod Bolt ...

67 *Connecting Rod Nut— $\frac{5}{16}$ " UNF ...

68 *Connecting Rod Bush ...

570-10411

201-17480

201-10040

201-50050

270-154

201-17460

1

1

1

2

2

1

2

2

3

3

3

6

6

3

PISTON—LD Engines

— Piston complete with rings, gudgeon pin and circlips ...

— Piston complete, comprising items marked *

69 *Piston ...

73 Piston Ring $\frac{5}{32}$ " Taper ...

74 Piston Ring $\frac{3}{32}$ " ...

75 Piston Scraper Ring ...

76 *Gudgeon Pin (not supplied without piston) ...

77 *Gudgeon Pin Circlip ...

570-10110

570-10023

201-10082

201-12310

201-10121

201-10130

201-10090

201-10100

1

1

1

1

2

2

1

2

2

2

4

4

4

—

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—

—

—

PISTON—SL Engines

— Piston, comprising items marked * up to 1800 rev/min.

— Piston, comprising items marked † over 1800 rev/min.

69 *Piston up to 1800 rev/min. ...

— †Piston over 1800 rev/min. ...

73 Piston Ring— $\frac{5}{32}$ " Taper ...

74 Piston Ring— $\frac{3}{32}$ " Wide ...

75 Piston Ring—Scraper ...

76†*Gudgeon Pin (not supplied without Piston) ...

77†*Gudgeon Pin Circlip ...

— Piston complete with rings up to 1800 rev/min.

— Piston complete with rings over 1800 rev/min.

570-10250

570-10251

201-17440

201-17441

201-17490

201-17500

201-17510

201-17450

201-17470

570-10240

570-10241

1

1

1

1

1

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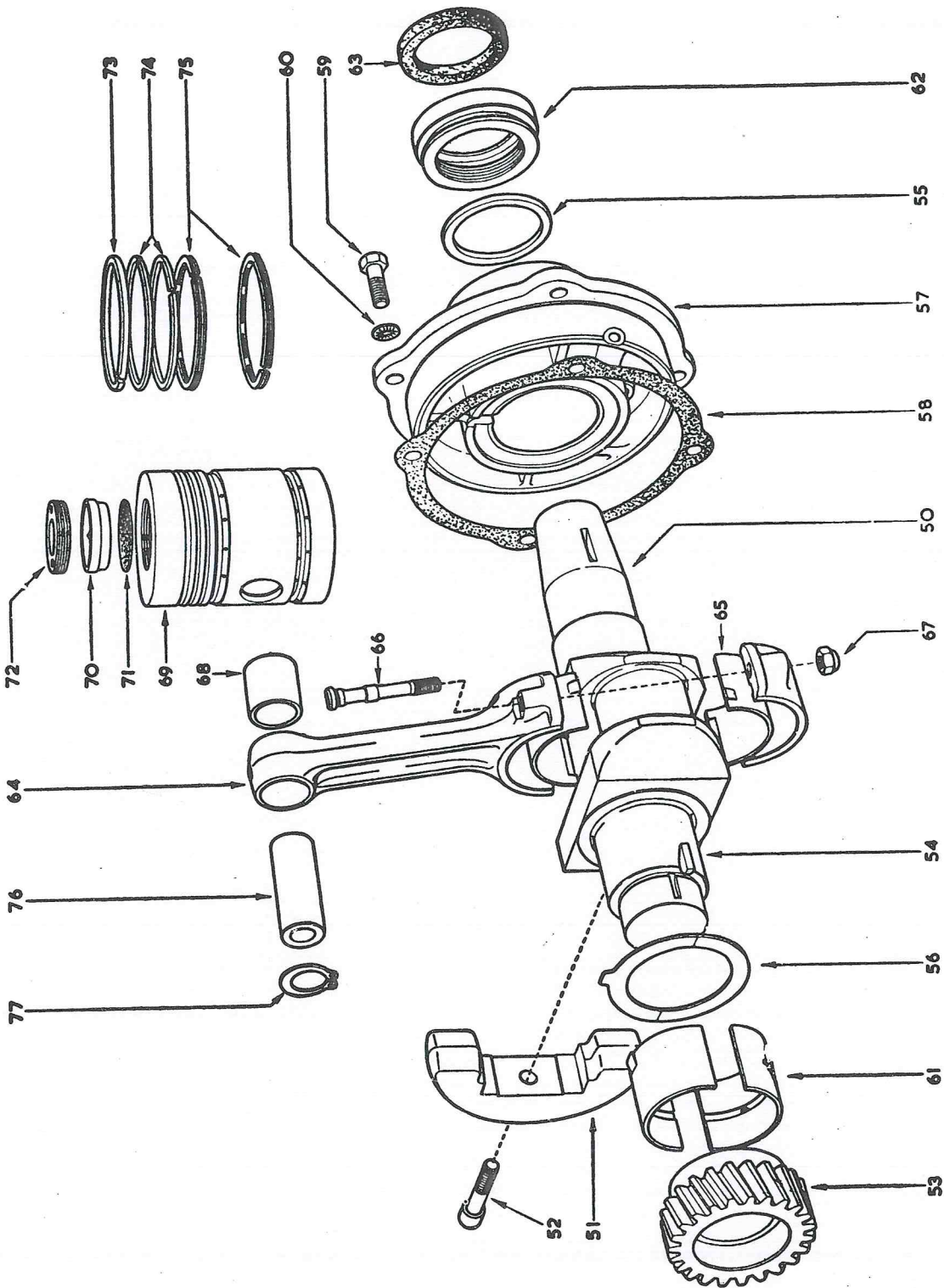
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—

Undersize bearings and oversize pistons 0.010", 0.020" and 0.040" are available.
Part No. remains the same as Standard but undersize or oversize must be quoted.

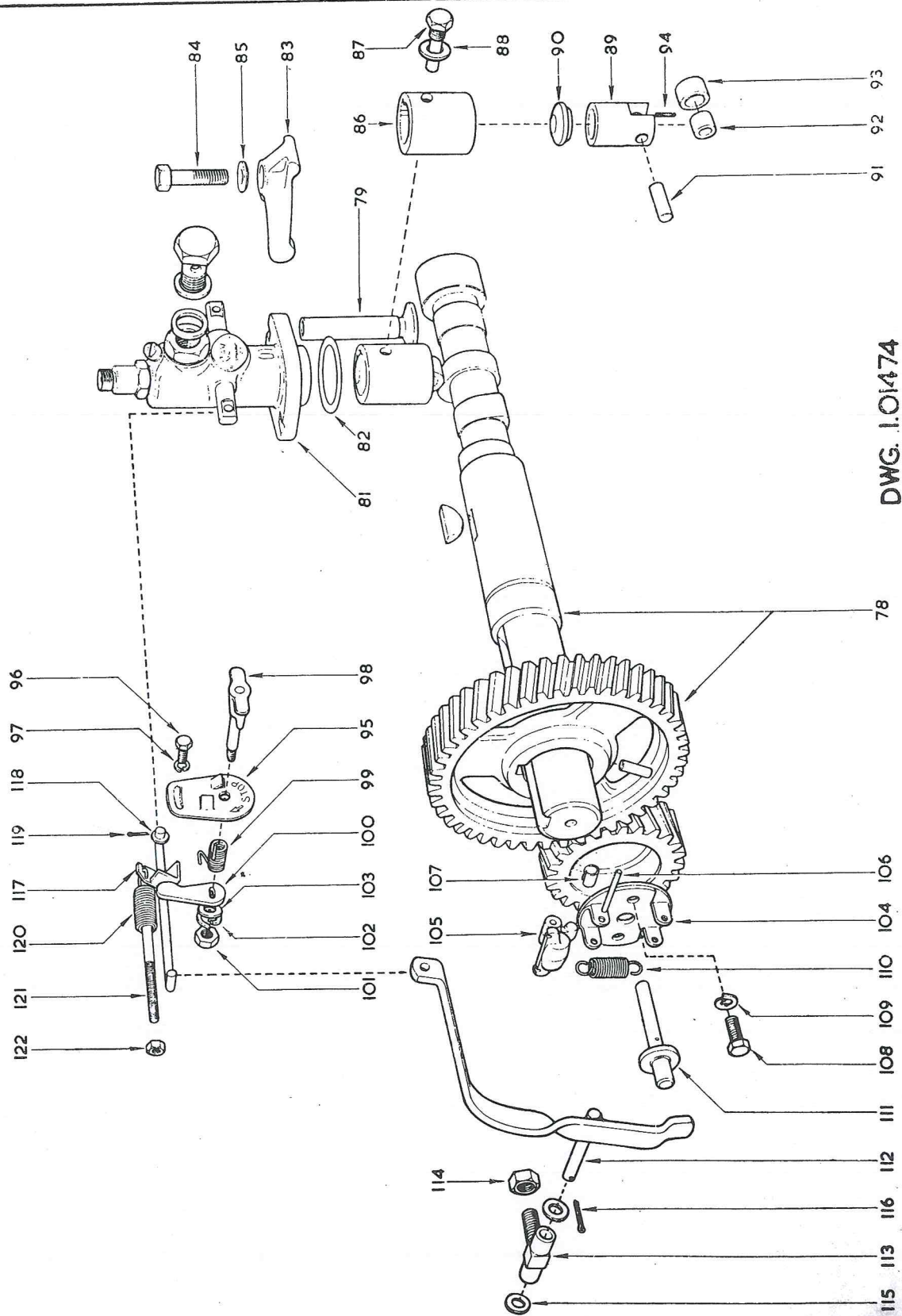


CRANKSHAFT, CONNECTING ROD & PISTON

CAMSHAFT AND GEARWHEEL, FUEL PUMP AND GOVERNOR

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
CAMSHAFT AND GEARWHEEL					
—	Camshaft and Gearwheel Assembly	201-11333	1	—	—
—	Standard Rotation	202-11335	—	1	—
		203-11331	—	—	1
--	Reverse Rotation	201-12681	1	—	—
		202-12681	—	1	—
		203-12681	—	—	1
—	Short Shaft Assembly	201-11334	1	—	—
—	Standard Rotation	202-11336	—	1	—
		203-11333	—	—	1
—	Reverse Rotation	201-15181	1	—	—
		202-15181	—	1	—
		203-15181	—	—	1
—	Camshaft Guard, Standard	201-13590	1	1	1
—	Camshaft Guard, Short	201-13591	1	1	1
79	Valve Tappet	291-2131	2	4	6
80	Push Rod	201-10311	2	4	6
FUEL PUMP					
81	Fuel Pump CAV BPFIA60AS 6453	201-11510	1	2	3
—	Fuel Pump Delivery Valve and Seat	660-10000	1	2	3
—	Fuel Pump Delivery Valve Holder	660-10010	1	2	3
—	Fuel Pump Element	660-10020	1	2	3
82	Fuel Pump Shim 0.005"	201-11520	As req.	—	—
—	Fuel Pump Shim 0.010"	201-11530	As req.	—	—
83	Fuel Pump Clamp	201-11540	1	2	3
84	Fuel Pump Clamp Bolt $\frac{5}{16}$ " UNF x $1\frac{1}{2}$ "	270-64	1	2	3
85	Fuel Pump Clamp Washer	201-11560	1	2	3
86	Guide for Fuel Pump Tappet	201-11471	1	2	3
87	Guide Locating Pin	201-11481	1	2	3
88	Guide Locating Pin Washer	616-1608	1	2	3
—	Fuel Pump Tappet Assembly, complete items marked *	570-10030	—	—	—
89	*Fuel Pump Tappet	201-11431	1	2	3
90	Fuel Pump Tappet Cap	201-11440	1	2	3
91	*Fuel Pump Tappet Roller Pin	201-11451	1	2	3
92	*Fuel Pump Tappet Roller Bush	291-2255	1	2	3
93	*Fuel Pump Tappet Roller	291-2256	1	2	3
94	*Retaining Pin for Roller Pin	201-11460	1	2	3
95	Locating Plate for Control Lever	201-12371	1	1	1
96	Locating Plate Setscrew No. 10. 190 x $\frac{1}{2}$ "	270-103	1	1	1
97	Locating Plate Spring Washer	27-717	1	1	1
103	Locating Plate Plain Washer	27-1698	1	1	1
98	Control Lever Spindle Assembly	201-12361	1	1	1
—	Control Lever Spindle Joint Ring	201-13120	1	1	1
99	Control Lever Spring	201-12330	1	1	1
100	Control Lever	201-12320	1	1	1
101	Control Lever Nut $\frac{1}{4}$ " UNF	270-2	1	1	1
102	Control Lever Spring Washer	27-451	1	1	1
—	Fuel Pump Shackle	202-12001	—	2	4
—	Fuel Pump Shackle Fulcrum Pin	202-13671	—	2	4
—	Fuel Pump Shackle Split Pin	27-1986	—	2	4

Items marked * cannot be supplied separately



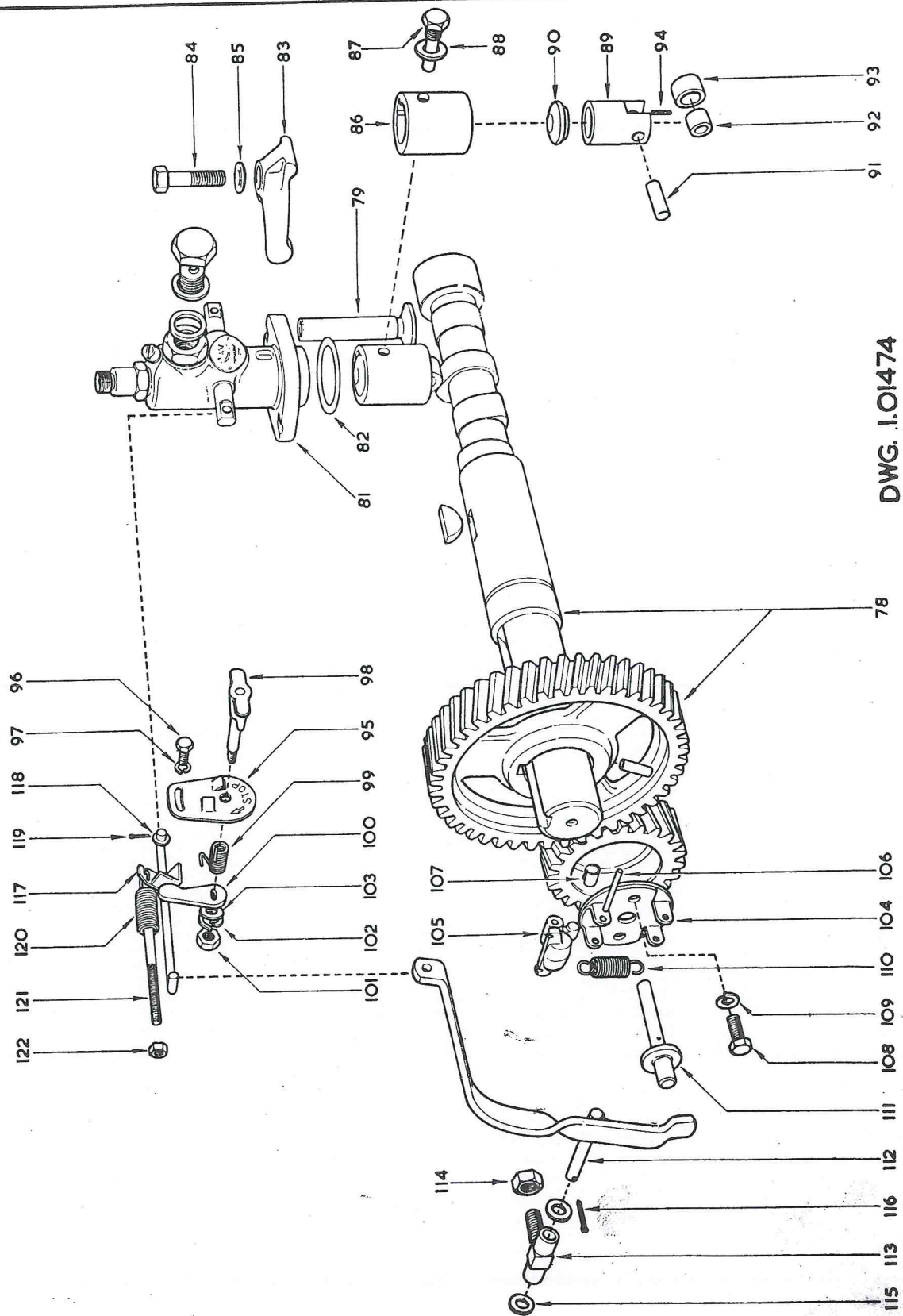
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CAMSHAFT, FUEL PUMP AND GOVERNOR

CAMSHAFT AND GEARWHEEL, FUEL PUMP AND GOVERNOR (Contd.)

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
—	Fuel Pump Shackle Spring	202-12020	—	2	4
—	Fuel Pump Shackle Rod	202-12011	—	1	2
—	Fuel Pump Shackle Washer	64-2580-4	—	2	4
—	External Spring	202-12710	—	1	2
—	Control Lever Pivot Pin	203-18090	—	—	1
—	Lever for Speeder Spring	203-18100	—	—	1
GOVERNOR*					
104	Governor Weight Carrier	201-10710	1	1	1
—	Governor Weight Block 1000 rev/min.	354-28341	—	—	1
106	Governor Weight Pin	201-10720	2	2	2
107	Governor Weight Shoe	201-10740	2	2	2
108	Governor Weight Carrier Setscrew $\frac{1}{4}$ " UNF x $\frac{5}{8}$ "	270-23	2	2	2
109	Governor Weight Carrier Spring Washer	27-451	2	2	2
—	Governor Sleeve, Assembly	570-10190	—	—	1
111	Governor Sleeve	201-10800	1	1	—
105	Governor Weight 750—1700 rev/min.	201-10730*	2	2	—
—	Governor Weight 1700—1800 rev/min.	201-12960	2	2	—
—	Governor Weight 2000 rev/min.	201-10735	2	2	—
110	Governor Weight Spring 750—1300 rev/min.	201-10821	2	2	—
—	Governor Weight Spring 1400—2000 rev/min.	201-10820	2	2	—
120	Governor Speeder Spring 750—850 rev/min.	201-10901	1	1	—
—	Governor Speeder Spring 850—1000 rev/min.	201-10903	1	1	—
—	Governor Speeder Spring 1100—2000 rev/min.	201-10900	1	1	—
—	Governor Weight 1000 rev/min.	354-28351	—	—	2
—	Governor Weight 1150—1300 rev/min.	351-11500	—	—	2
—	Governor Weight 1500 rev/min.	351-11500	—	—	2
—	Governor Weight 1800 rev/min.	351-11501	—	—	2
—	Governor Weight Spring 1000 rev/min.	201-10820	—	—	2
—	Governor Weight Spring 1500—1800 rev/min.	203-10822	—	—	2
—	Governor Weight Spring 1150—1300 rev/min.	201-10820	—	—	2
—	Governor Speeder Spring 1000 rev/min.	201-10903	—	—	1
—	Governor Speeder Spring 1500—1800 rev/min.	203-10901	—	—	1
—	Governor Speeder Spring 1150—1300 rev/min.	201-10903	—	—	1
GOVERNOR LEVER					
112	Governor Lever Assembly	201-10842	1	1	—
—	Governor Lever Assembly	203-10841	—	—	1
113	Governor Lever Fulcrum	201-10830	1	1	—
—	Governor Lever Fulcrum	203-10830	—	—	1
114	Governor Lever Fulcrum Nut $\frac{3}{8}$ " UNF	270-4	1	1	1
115	Governor Lever Fulcrum Washer	27-618	2	2	—
—	Governor Fulcrum Washer	351-10990	—	—	1
116	Governor Lever Fulcrum Split Pin	27-2255	1	1	1
—	Governor Fulcrum Ball Bearing	351-11480	—	—	2
117	Governor Link Assembly	201-10891	1	1	—
—	Governor Link Assembly	203-10890	—	—	1
118	Governor Link Washer	64-2580-4	2	2	2
119	Governor Link Split Pin	27-1986	2	2	2
121	Governor Adjusting Screw No. 10 UNF x 3"	270-112	1	1	1
122	Governor Adjusting Screw Nut $\frac{3}{16}$ " UNF	270-1	1	1	1

*For variable speed control—see pages 147-150.



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CAMSHAFT, FUEL PUMP AND GOVERNOR

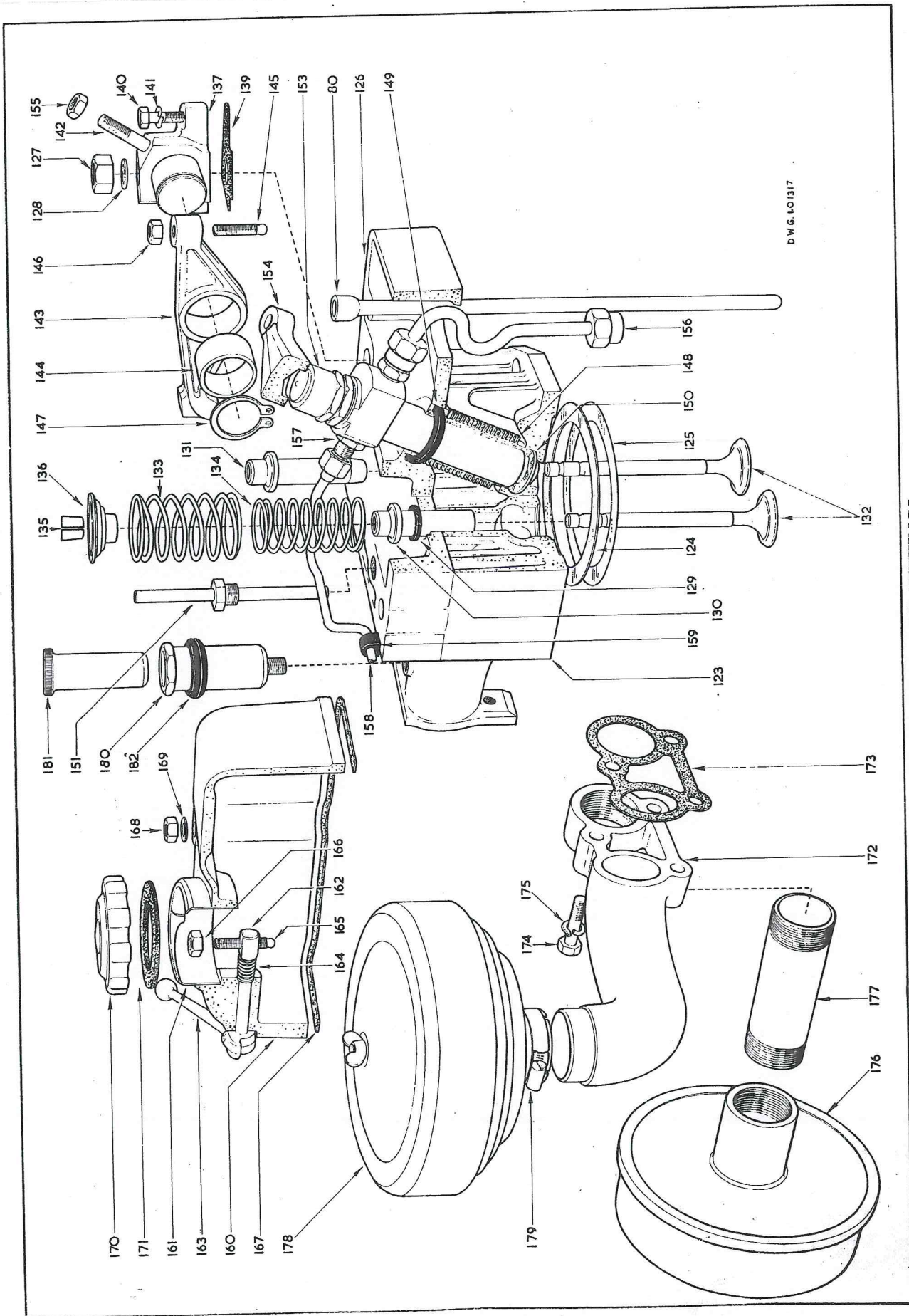
CYLINDER HEAD AND FITTINGS

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
CYLINDER HEAD AND FITTINGS					
	Cylinder Head assembly comprising *	570-10041	1	2	—
123	*Cylinder Head	201-10028	1	2	—
124	Cylinder Head Gasket	201-10382	1	2	—
125	Cylinder Head Shim	201-12300	As Req.	—	—
126	*Cylinder Head Top Plate	201-10505	1	2	—
132	*Inlet & Exhaust Valve	201-19360	2	4	—
	Cylinder Head assembly comprising †	570-10042	1	2	3
123	†Cylinder Head	201-10021	1	2	3
124	Cylinder Head Gasket	201-17530	1	2	3
125	Cylinder Head Shim	201-17540	As Required	—	—
126	†Cylinder Head Top Plate	201-10506	1	2	3
132	†Exhaust Valve	201-19360	1	2	3
	Inlet Valve	201-19350	1	2	3
129*	Oil Seal Ring for Inlet Valve Guides	616-1742	1	2	3
130*	Inlet Valve Guide	201-10400	1	2	3
131*	Exhaust Valve Guide	201-10321	1	2	3
133*	Valve Spring—Outer	291-20641	2	4	6
134*	Valve Spring—Inner	291-20651	2	4	6
135*	Valve Collets (Pairs)	204-189	2	4	6
136*	Valve Spring Carrier	201-10351	2	4	6
137	Exhaust Valve Rocker Bracket—LD	201-10533	1	2	3
—	Exhaust Valve Rocker Bracket—SL	201-19630	1	2	3
—	Inlet Valve Rocker Bracket—LD and SL	201-10533	1	2	3
127	Cylinder Head Nut $\frac{1}{16}$ " UNF	270-5	4	8	12
128	Washer for Cylinder Head Nut	27-545	4	8	12
139	Rocker Bracket Joint	201-11901	2	4	6
140	Rocker Bracket Setscrew $\frac{1}{4}$ " UNF x $\frac{7}{8}$ "	270-114	2	4	6
141	Rocker Bracket Spring Washer	27-451	2	4	6
142	Injector Clamp Stud $\frac{5}{16}$ " UNF	201-11061	2	4	6
143	Valve Rocker Lever	201-19370	2	4	6
144	Valve Rocker Lever Bush	291-2070	2	4	6
145	Valve Rocker Lever Adjusting Screw $\frac{5}{16}$ " UNF	292-167	2	4	6
146	Valve Rocker Lever Adjusting Screw Nut $\frac{5}{16}$ " UNF	270-3	2	4	6
147	Valve Rocker Lever Circlip	201-11630	2	4	6
148	Injector Sleeve	201-10938	1	2	3
149	Injector Sleeve Oil Seal Ring	201-11080	1	2	3
150	Injector Sleeve Washer	201-11720	1	2	3
151	Breather Assembly	201-10982	1	2	3

FUEL INJECTOR

153	Fuel Injector, comprising:	201-11770	1	2	3
—	Nozzle Holder—not supplied separately		1	2	3
—	Nozzle	201-12060	1	2	3
—	Injector Inlet Union and Edge Filter	572-10590	1	2	3
—	Joint—for Union	352-29960	1	2	3
154	Fuel Injector Clamp	201-10924	1	2	3
155	Fuel Injector Clamp Nut $\frac{5}{16}$ " UNF	270-3	2	4	6
156	Fuel Pipe—Pump to Injector	201-11111	1	2	3
157	Union for Leak-off Pipe	201-11690	1	2	3
158	†Fuel Leak-off Pipe	201-11102	1	—	—
—	†Fuel Leak-off Pipe	202-17131	—	1	—
—	†Fuel Leak-off Pipe	203-17131	—	—	1

† These are for auxiliary engines—for propulsion engines and auxiliary engines with self-venting fuel pumps see page 92.



DWG. 101317

CYLINDER HEAD AND FITTINGS

CYLINDER HEAD AND FITTINGS (Contd.)

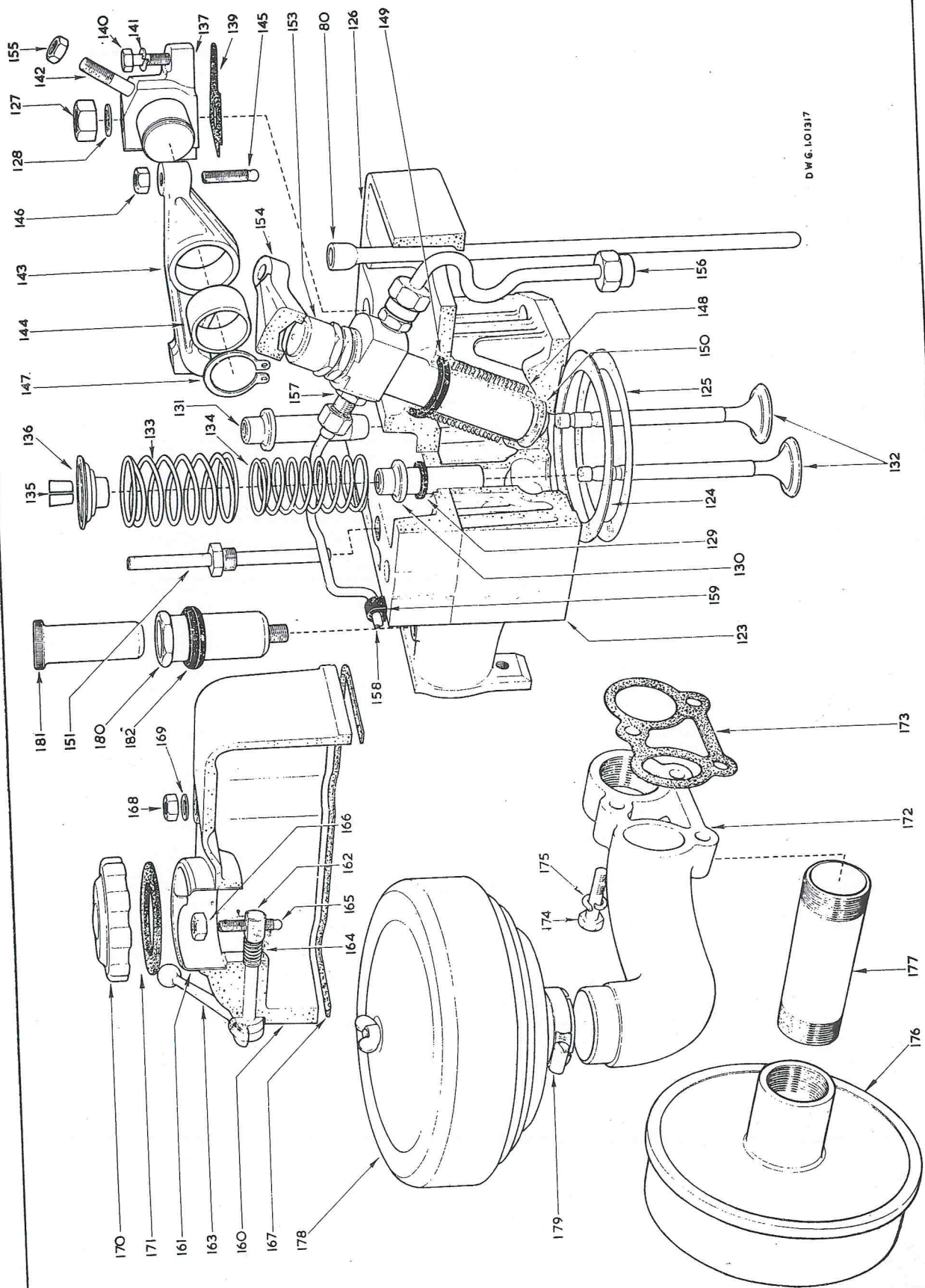
Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
—	Fuel Leak-off Pipe, Connection to Tank	202-17121	—	1	1
—	Leak-off Connection Joint	660-11330	1	2	3
159	Fuel Leak-off Pipe Bush	201-11090	1	2	3
—	Cleaning Kit for Injector	660-10070	—	—	—
—	Swivel Union Screw — replaces Vent Screw on self-venting fuel pumps	570-10660	1	2	3
—	Joint — for above	352-29370	2	4	6

CYLINDER HEAD COVER

—	Cylinder Head Cover Assembly , comprising:	201-17420	1	2	3
160	Cover	201-10492	1	2	3
161	Oil Filler	27-3821	1	2	3
162	Decompressor Shaft	201-10950	1	2	3
163	Decompressor Lever	351-13550	1	2	3
—	Decompressor Mills Pin	201-11730	1	2	3
164	Decompressor Spring	201-12270	1	2	3
165	Decompressor Screw	201-10960	1	2	3
166	Decompressor Screw Nut $\frac{1}{4}$ " UNF	270-2	1	2	3
167	Cylinder Head Cover Joint	201-10510	1	2	3
168	Cylinder Head Cover Nut $\frac{1}{4}$ " UNF	270-2	2	4	6
169	Cylinder Head Cover Washer	27-618	2	4	6
170	Oil Filler Cap	27-3824	1	2	3
171	Oil Filler Cap Joint	303-253	1	2	3
—	Engine Instruction Transfer (English)	201-13017	1	1	1
—	Lubricating Oil Transfer (English)	201-13730	1	1	1

INLET AND EXHAUST MANIFOLD

172	Inlet and Exhaust Manifold	201-11124	1	—	—
—	Exhaust Manifold	202-13990	—	1	—
—	Exhaust Manifold (Reverse Rotation)	202-13991	—	1	—
—	Exhaust Manifold	203-13990	—	—	1
—	Exhaust Manifold (Reverse Rotation)	203-13991	—	—	1
—	Air Inlet Manifold	202-14001	—	1	—
173	Manifold Joint	201-11131	1	2	—
—	Manifold Joint	203-11130	—	—	3
174	Manifold Bolt $\frac{1}{4}$ " UNF x $1\frac{3}{8}$ "	270-113	3	—	—
—	Securing Nuts	270-13	—	6	—
175	Spring Washer	27-451	3	6	—
—	Clamping Washer	202-14010	—	2	3
—	Air Inlet Manifold	203-14000	—	—	1
—	Air Inlet Manifold Stud $\frac{1}{4}$ " UNF x $2\frac{1}{2}$ "	270-110	—	—	3
—	Air Inlet Manifold Stud $\frac{1}{4}$ " UNF x $2\frac{1}{8}$ "	270-379	—	—	6
—	Air Inlet Manifold Nut $\frac{1}{4}$ " UNF—brass	270-13	—	—	9
—	Air Inlet Spring Washer	27-451	—	—	9
176	Exhaust Silencer (LD1 only)	1-301	1	—	—
—	Exhaust Silencer	2-101	1	1	—
—	Exhaust Silencer	102-101	—	—	1
177	Exhaust Silencer Pipe (1" BSP x $2\frac{3}{4}$ " long)	27-431	1	—	—
178	Air Cleaner (Oil Bath)	201-11421	1	1	—
—	Air Cleaner (Oil Bath)	203-11420	—	—	1
179	Air Cleaner Clip	27-4230	1	1	—
—	Air Cleaner Clip	27-4232	—	—	1



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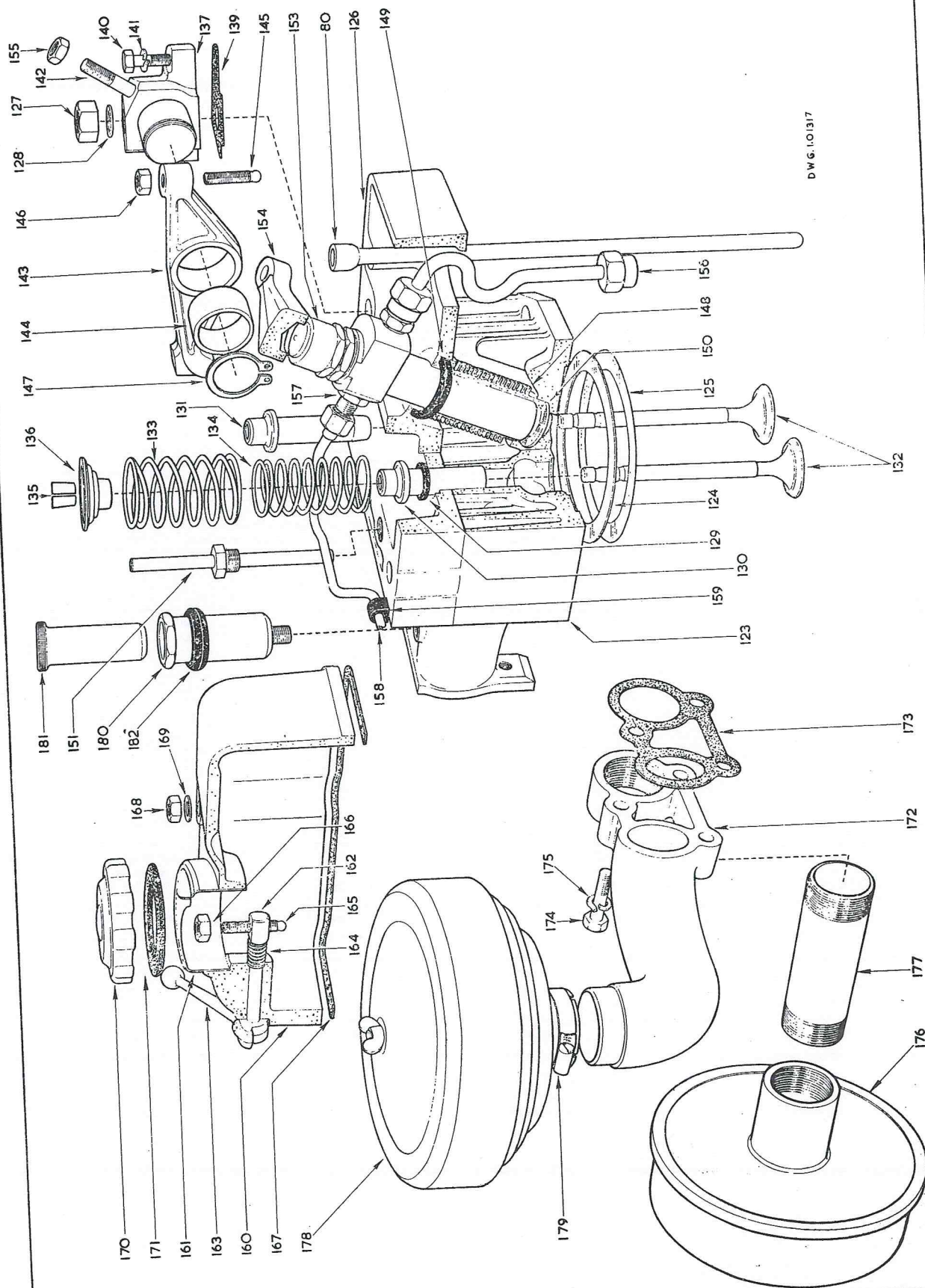
CYLINDER HEAD AND FITTINGS

CYLINDER HEAD AND FITTINGS (Contd.)

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
—	Manifold Fixing Stud $\frac{1}{4}$ " UNF x $1\frac{1}{2}$ "	270-264	—	4	—
—	Manifold Fixing Stud $\frac{1}{4}$ " UNF x $1\frac{1}{2}$ "	270-155	—	2	—
180	Oil Reservoir	201-12932	1	2	3
181	Oil Reservoir Plunger	201-12942	1	2	3
182	Oil Reservoir Grommet	201-12951	1	2	3
—	Reducing Socket (SL1 only)	27-4330	1	—	—
—	Distance Piece for Cylinder Head	203-18121	—	—	3
—	Air Cleaner (Dry type)	367-11780	1	1	—
—	Air Cleaner (Dry type)	203-18880	—	—	1
—	Air Cleaner Adaptor	203-19140	—	—	1
—	Clip for Adaptor	27-4233	—	—	1

FLEXIBLE EXHAUST

—	Exhaust Bend $1\frac{1}{4}$ " BSP 90°—SL1	27-181	1	—	—
—	Exhaust Bend—LD1	27-382	1	—	—
—	Exhaust Flange—LD1	1-302	2	—	—
—	Exhaust Flange Joint—LD1	1-1330	1	—	—
—	Exhaust and Flexible Pipe Connection	366-451	—	1	—
—	Exhaust and Flexible Pipe Connection Joint—SL1	366-453	2	2	—
—	Flexible Exhaust Pipe—LD1	366-14	1	—	—
—	Flexible Exhaust Pipe—SL1-2	366-448	1	1	—
—	Bolts $\frac{5}{16}$ " UNF x $\frac{3}{4}$ "—LD1	270-370	4	—	—
—	Bolts $\frac{5}{16}$ " UNF x $\frac{3}{8}$ "—LD2	270-62	—	2	—
—	Bolts $\frac{5}{16}$ " UNF x 2" brass—SL1	270-27	4	—	—
—	Nut $\frac{5}{16}$ " UNF—brass	270-14	4	4	—
—	Nut $\frac{5}{16}$ " UNF	270-3	—	4	—
—	Spring Washer	27-413	4	4	—
—	Bolt $\frac{5}{16}$ " UNF x 2"	270-65	—	2	—
—	Exhaust Flange—SL1-2	366-467	2	2	—
—	Silencer—Burgess	27-3880	1	—	—
—	Silencer—Burgess	27-3881	—	1	—
—	Silencer—Burgess	27-3882	—	—	1
—	Exhaust Flange	10-21-801	—	—	2
—	Joint	366-1287	—	—	2
—	Bolt $\frac{3}{8}$ " UNF x $1\frac{1}{2}$ "	270-75	—	—	4
—	Nut $\frac{3}{8}$ " UNF	270-4	—	—	4
—	Spring Washer	27-393	—	—	4
—	Flexible Exhaust Pipe	366-1286	—	—	1



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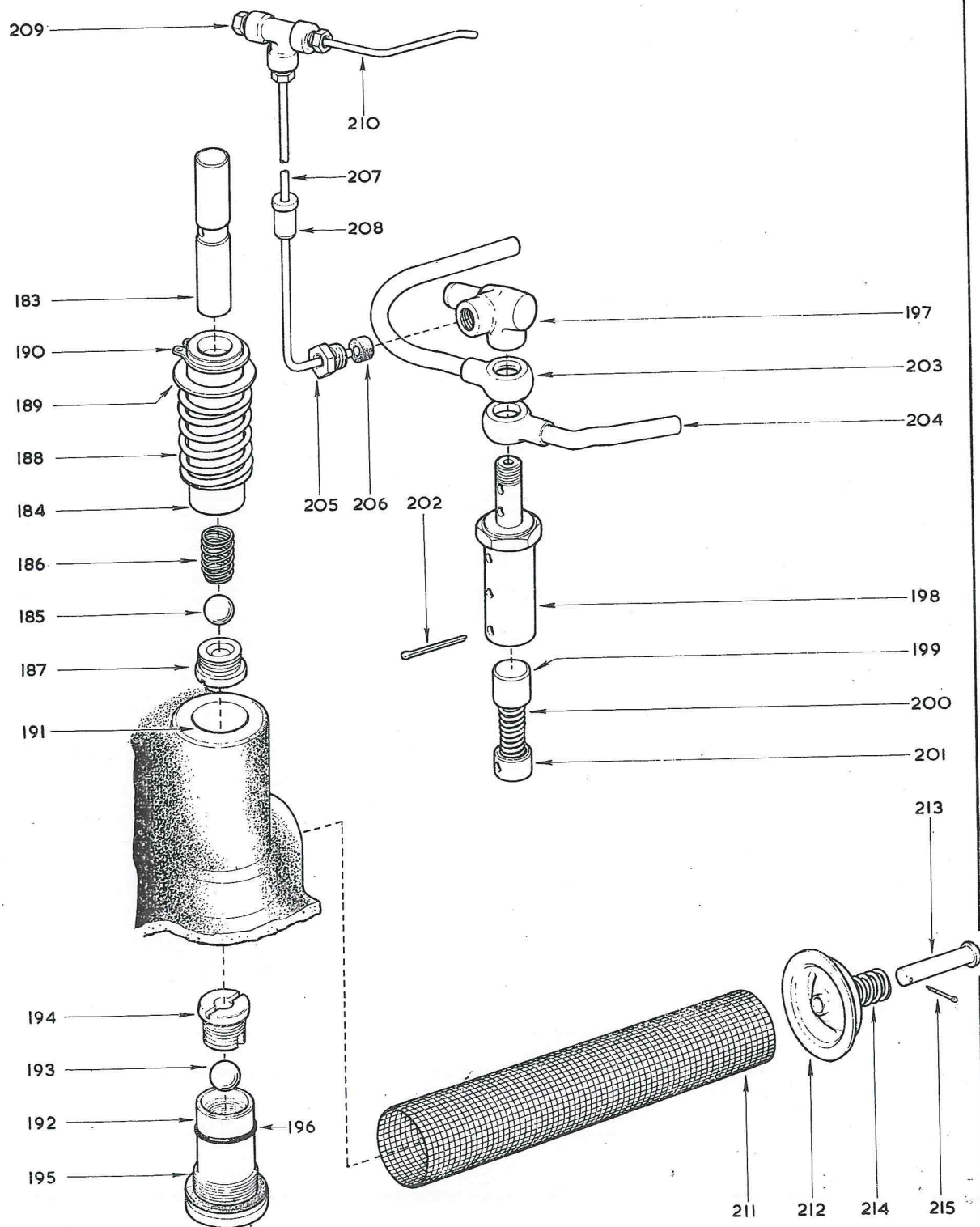
CYLINDER HEAD AND FITTINGS

LUBRICATING OIL SYSTEM—see also pages 98—100

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
183	Oil Pump Tappet	201-10651	1	1	—
—	Oil Pump Tappet	203-10651	—	—	1
—	Oil Pump Plunger Assembly	570-10061	1	—	—
184	Oil Pump Plunger	Assembly only supplied			
185	Oil Pump Plunger Ball Valve				
186	Oil Pump Plunger Ball Valve Spring				
187	Oil Pump Delivery Valve Seat	570-10081	—	1	—
—	Oil Pump Plunger Assembly, comprising:				
—	Oil Pump Plunger				
185	Oil Pump Plunger Ball Valve	Assembly only supplied			
186	Oil Pump Plunger Ball Valve Spring				
187	Oil Pump Delivery Valve Seat				
—	Oil Pump Plunger Assembly	570-10170	—	—	1
188	Oil Pump Return Spring	201-12450	1	1	1
189	Oil Pump Return Spring Washer	201-10660	1	1	1
190	Oil Pump Return Spring Circlip	201-10670	1	1	1
191	Seating Washer for Spring	203-18130	—	—	1
—	Suction Valve Assembly:	Assembly only supplied	1	1	—
192	Oil Pump Plug				
193	Oil Pump Ball Valve				
194	Oil Pump Suction Valve Retainer	570-10180	—	—	1
195	Oil Pump Plug Joint	291-3064	1	1	—
196	"O" Ring	201-24800	1	1	—
—	"O" Ring	203-24810	—	—	1
—	Plug Joint	616-1524	—	—	1
—	Crankcase Plug	203-1800	—	—	1
—	Crankcase Plug Joint	13-21-777	—	—	1
—	Clamp Bracket	203-17940	—	—	1
—	Clamp Bracket Bolt	270-182	—	—	1
—	Clamp Bracket Nut	270-3	—	—	1
—	Clamp Bracket Washer	27-413	—	—	1

LUBRICATING OIL RELIEF VALVE

197	Support for Valve Body	201-11340	1	1	—
198	Valve Body	201-12541	1	1	—
199	Valve	201-12551	1	1	—
200	Valve Spring	201-12561	1	1	—
201	Valve Spring Cap	201-12570	1	1	—
202	Valve Spring Cap Split Pin	27-2252	1	1	—
—	Support for Valve Body	203-11340	—	—	1
—	Valve Body	203-12540	—	—	1
—	Valve	203-12550	—	—	1
—	Valve Spring	203-12560	—	—	1
—	Valve Spring Cap	203-12570	—	—	1
—	Valve Spring Cap Split Pin	27-121	—	—	1
203	Lub. Oil Pipe to Main Bearing (Flywheel End)	201-11371	1	—	—
—	Lub. Oil Pipe to Main Bearing (Flywheel End)	202-11371	—	1	—
204	Lub. Oil Pipe to Main Bearing (Governor End)	201-11861	1	1	—
—	Lub. Oil Pipe to Main Bearing and No. 2 Centre Bearing	203-11860	—	—	1
—	Lub. Oil Pipe Centre Bearing No. 2/No. 3 and FW Bearing	203-11370	—	—	1
205	Gland Nut for Rocker Feed Pipe	201-11380	1	1	1



DWG. I.O 1293

LUBRICATING OIL SYSTEM

LUBRICATING OIL SYSTEM (Contd.)

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
206	Gland Nut Packing Washer	201-11390	1	1	1
—	Union Plug for Main Bearing Oil Pipe	842-359	—	1	2
207	Lub. Oil Pipe—Pump to Tee	201-12081	1	—	—
—	Lub. Oil Pipe—Pump to Tee	202-12080	—	1	—
—	Lub. Oil Pipe—Connector to No. 1 Tee	202-13700	—	1	—
—	Lub. Oil Pipe—Connector to No. 2 Tee	202-13710	—	1	1
—	Lub. Oil Pipe—Connector to No. 2 Tee	203-13710	—	—	1
—	Lub. Oil Pipe—Connector to No. 3 Tee	202-13710	—	—	1
—	Lub. Oil Pipe—Pump to Connector	203-12080	—	—	1
—	Lub. Oil Pipe—Connector to No. 1 Tee	203-13700	—	—	1
—	Four-way Connector	203-17980	—	—	1
208	Lub. Oil Pipe Bush	201-12280	1	1	—
209	Lub. Oil Pipe Tee	201-11662	1	3	3
210	Lub. Oil Pipe Tee to Rocker Bracket	201-11652	2	4	6

LUBRICATING OIL STRAINER AND DIPSTICK

211	Lubricating Oil Strainer	201-10771	1	1	—
212	Lubricating Oil Strainer End Cap	201-10780	1	1	—
213	Lubricating Oil Strainer Retaining Pin	201-10790	1	1	—
214	Lubricating Oil Strainer Retaining Spring	291-2195	1	1	—
215	Lubricating Oil Strainer Split Pin	27-2255	1	1	—
—	Dipstick Adaptor	27-4344	1	1	1
—	Lubricating Oil Strainer	203-17881	—	—	1
—	Lubricating Oil Strainer Plug	23-2308	—	—	1
—	Lubricating Oil Strainer Joint	13-21-777	—	—	2
—	Crankcase Plug	203-18000	—	—	1
—	Crankcase Plug Joint	13-21-777	—	—	1
—	Clamp Bracket	203-17941	—	—	1
—	Clamp Bracket Bolt	270-182	—	—	1
—	Clamp Bracket Nut	270-3	—	—	1
—	Clamp Bracket Washer	27-413	—	—	1

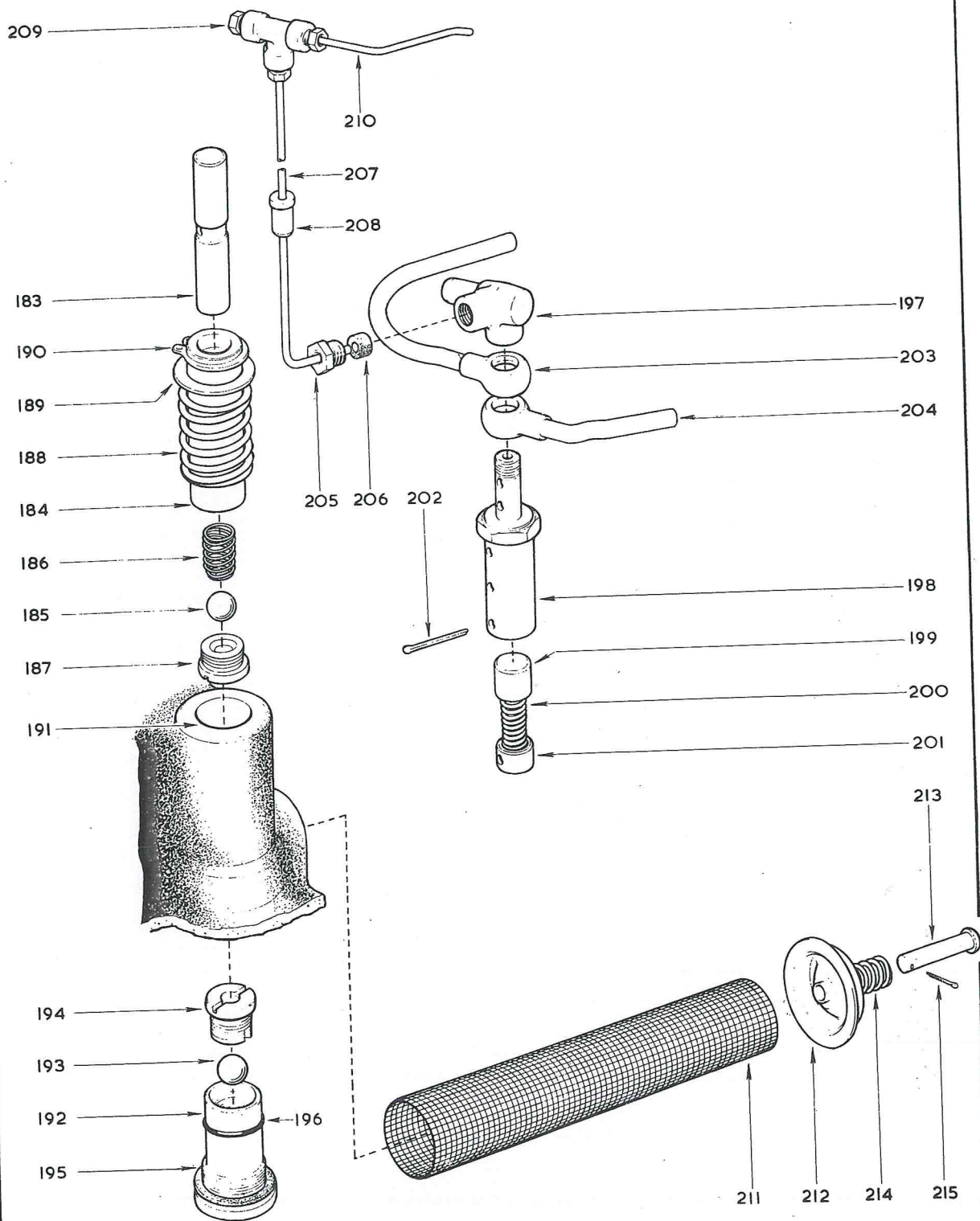
DIPSTICKS

Identification No.

Fitted in Crankcase	1	572-10210	1	—	—
Fitted in Crankcase Door	17	570-10211	1	—	—
Fitted in Crankcase Door with Lift Pump and Oil Filter	19	570-10390	—	1	1
Fitted in Crankcase	16	570-10370	—	1	—
Fitted in Crankcase Door	18	570-10380	—	1	—
Fitted in Crankcase	4	571-10160	—	—	1
Fitted in Crankcase Door	8	572-10240	—	—	1

0 RINGS

201-13120

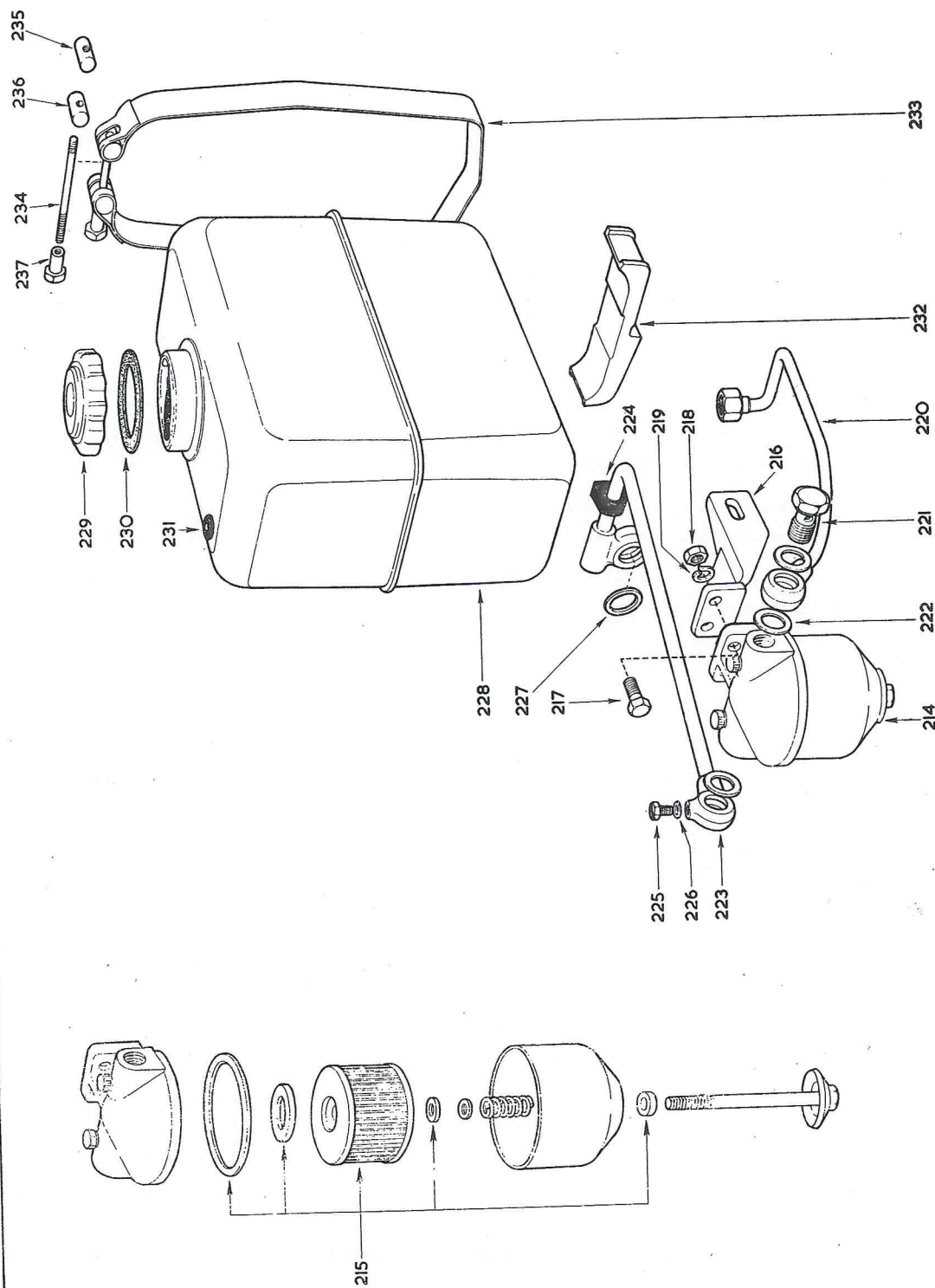


DWG. I.O1293

LUBRICATING OIL SYSTEM

FUEL FILTER AND TANK

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
FUEL FILTER					
214	Fuel Filter	201-11613	1	1	—
215	Fuel Filter Element C/W Joints	201-13116	1	1	—
216	Fuel Filter Bracket	201-11267	1	1	—
—	Fuel Filter	203-11610	—	—	1
—	Fuel Filter Element C/W Joints	203-13113	—	—	1
—	Fuel Filter Bracket	203-1261	—	—	1
—	Fuel Filter Bracket Bolt $\frac{5}{16}$ " UNF x 1"	270-61	1	1	2
—	Fuel Filter Bracket Nut $\frac{5}{16}$ " UNF	270-3	1	1	—
—	Fuel Filter Bracket Washer	27-82	2	2	—
—	Fuel Filter Bracket Spring Washer	27-413	1	1	2
217	Fuel Filter Bolt	270-219	2	2	2
218	Fuel Filter Nut	270-1	2	2	2
—	Fuel Filter Washer	27-1698	2	2	2
219	Fuel Filter Spring Washer	27-717	2	2	2
220	Fuel Pipe—Tank to Filter	201-11674	1	1	1
221	Swivel Union Plug	201-15400	2	2	2
222	Swivel Union Plug Joint Washer	13-22-350	4	4	4
223	Fuel Pipe—Filter to Pump	201-11644	1	—	—
—	Fuel Pipe—Filter to Pump	202-11644	—	1	—
—	Fuel Pipe—Filter to Pump	203-11641	—	—	1
224	Fuel Pipe Bush	201-11271	1	1	1
225	Fuel Pipe Vent Screw No. 10—190 x $\frac{3}{8}$ "	270-172	1	1	1
226	Fuel Pipe Vent Screw Washer	616-1601	1	1	1
227	Washer for F.P. Swivel Union Plug	201-12970	2	4	6
FUEL TANK—Optional Fitting					
228	Fuel Tank	201-11283	1	—	—
—	Fuel Tank	202-11280	—	1	1
229	Filler Cap	27-3824	1	1	1
230	Filler Cap Joint	303-253	1	1	1
231	Grommet for Leak-off Pipe	201-11710	1	1	1
232	Fuel Tank Block	201-11491	2	—	—
—	Fuel Tank Block	202-11490	—	2	2
—	Fan Shroud—with engine mounted tank (reverse rotation)	202-18310	—	1	1
—	Fan Shroud—with engine mounted tank (reverse rotation)	201-18310	1	—	—
—	Fuel Tank Strap Assembly—comprising *	570-10630	2	—	—
—	Fuel Tank Strap Assembly—comprising †	570-10640	—	2	2
233	*Fuel Tank Strap	201-11503	2	—	—
—	Fuel Tank Strap	202-11501	—	2	2
234*	Fuel Tank Strap Stud $\frac{1}{4}$ " UNF x $3\frac{1}{4}$ "	270-561	2	2	2
235*	Fuel Tank Strap Cross Piece	294-2707	2	2	2
236*	Fuel Tank Strap Cross Piece	294-2708	2	2	2
237†	Fuel Tank Strap Nut	201-18720	2	2	2
—	Lister Scroll Transfer	27-4114	1	1	1
—	Fuel Oil Transfer	201-13440	1	1	1

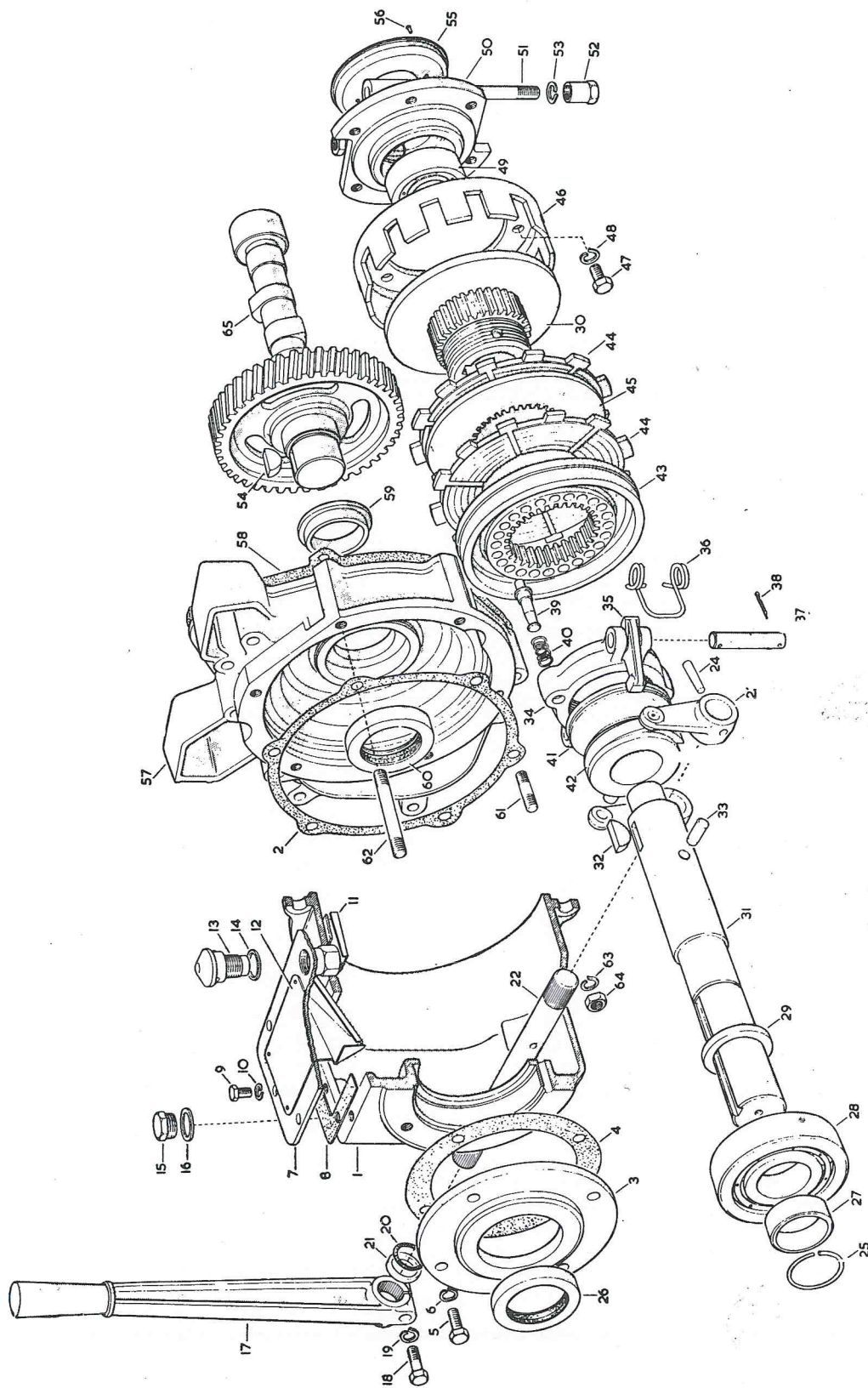


FUEL FILTER AND TANK

1-01312

AUXILIARY ENGINE DIRECT DRIVE CLUTCH — CAMSHAFT DRIVE — LISTER **LD & SL1-2-3 ENGINES**

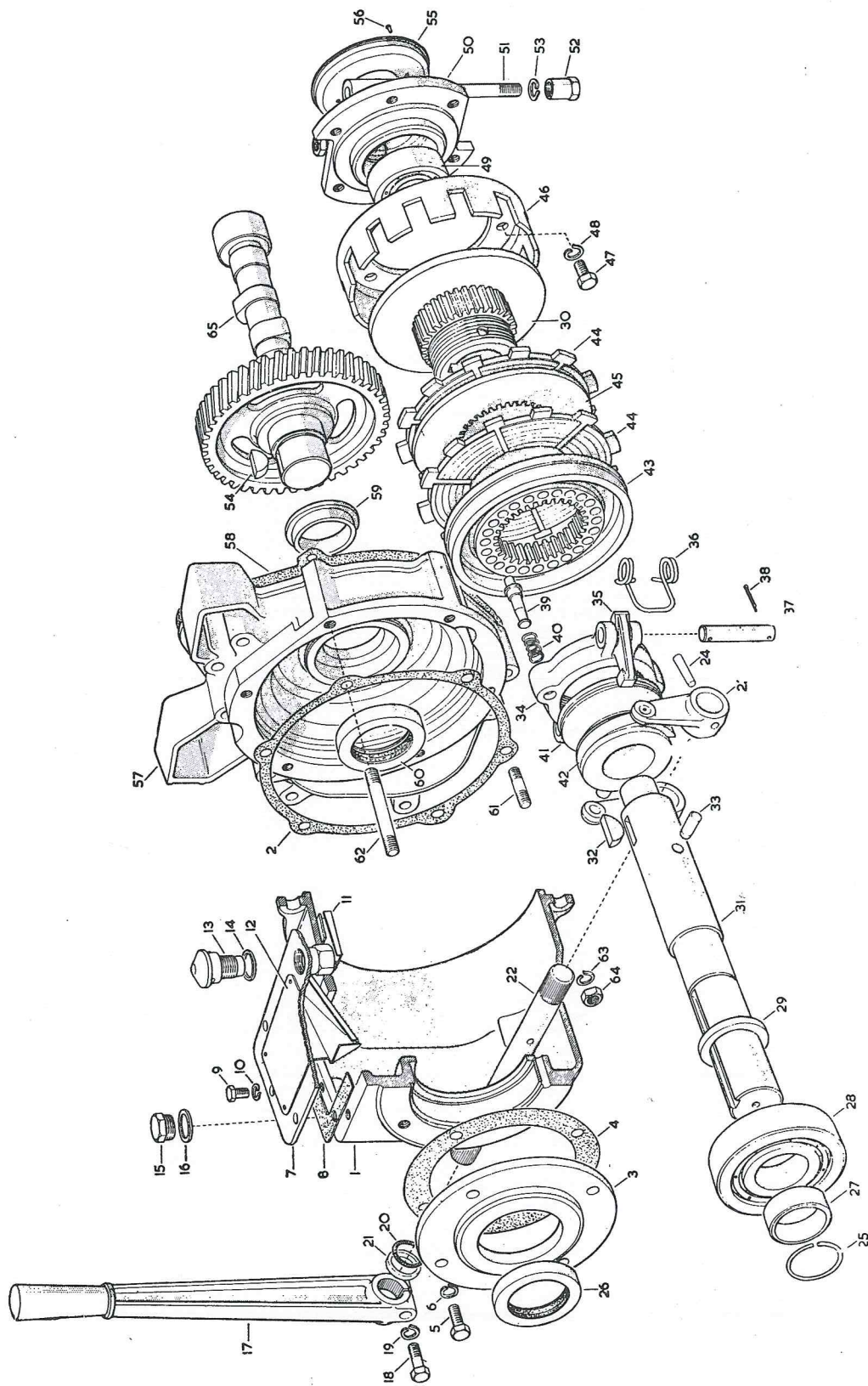
Illus. No.	Description	Part No.	No. per engine		
			1 Cyl.	2 Cyl.	3 Cyl.
1	Clutch Case	201-22900	1	1	1
2	Clutch Case Joint	203-19961	1	1	1
3	Clutch End Cover	201-22550	1	1	1
4	Clutch End Cover Joint	201-14741	1	1	1
5	Clutch End Cover Bolt	270-61	4	4	4
6	Clutch End Cover Bolt Spring Washer	27-413	4	4	4
7	Clutch Cover and Oil Return Trough Assembly — comprising :	201-22720	1	1	1
	Cover	201-22710	1	1	1
	Oil Trough	203-20010	1	1	1
	Breather Nut	201-24520	1	1	1
8	Clutch Cover Joint	203-20060	1	1	1
9	Clutch Cover Setscrew	270-54	6	6	6
10	Clutch Cover Setscrew Spring Washer	27-451	6	6	6
11	Oil Catcher Assembly — comprising :	203-20040	1	1	1
	Oil Catcher	203-20020	1	1	1
	Oil Catcher	203-20030	1	1	1
	Rivets for Oil Catcher	203-20840	2	2	2
12	Instruction Plate	203-20070	1	1	1
—	Rivets for Instruction Plate	203-20830	4	4	4
13	Oil Breather Plug Assembly — comprising :	570-10460	1	1	1
	Plug	201-22570	1	1	1
	Element	201-18561	1	1	1
	Dowel	27-707	1	1	1
14	Joint	13-22-350	1	1	1
15	Plug, Oil Filler and Drain	11-13-693	2	2	2
16	Joint	4-197	2	2	2
17	Operating Lever — Outside	23-3134	1	1	1
18	Operating Lever Locking Bolt	27-890	1	1	1
19	Operating Lever Spring Washer	27-413	1	1	1
20	Sealing Ring for Operating Shaft	201-14640	2	2	2
21	Sealing Ring Retaining Collar	203-20080	2	2	2
—	Operating Shaft Assembly — comprising :	203-20111	1	1	1
22	Operating Shaft	203-20130	1	1	1
23	Operating Lever Inside	210-249	2	2	2
24	Taper Pin	27-822	2	2	2
25	Retaining Spring	210-259	1	1	1
26	Oil Seal	201-22960	1	1	1
27	Oil Seal Bush	201-22560	1	1	1
28	Ball Journal	210-154	1	1	1
29	Spacing Collar	201-22700	1	1	1
—	Clutch Shaft Assembly — comprising :	570-10470	1	1	1
30	Clutch Centre	201-22840	1	1	1
31	Clutch Shaft	201-22690	1	1	1
32	Key	27-785	1	1	1
33	Locating Pin	201-11160	1	1	1
—	Clutch Adjusting Ring Assembly — comprising :	570-10650	1	1	1
34	Adjusting Ring	210-250	1	1	1
35	Clutch Engaging Arms	210-261	2	2	2
36	Spring for Arms	201-24590	2	2	2
37	Pin for Arm	201-24580	2	2	2
38	Split Pin	27-2274	4	4	4
39	Locating Pin	210-263	1	1	1
40	Locating Pin Spring	210-387	1	1	1



CAMSHAFT CLUTCH—LISTER

AUXILIARY ENGINE DIRECT DRIVE CLUTCH — CAMSHAFT DRIVE — LISTER
LD & SL1-2-3 ENGINES (cont.)

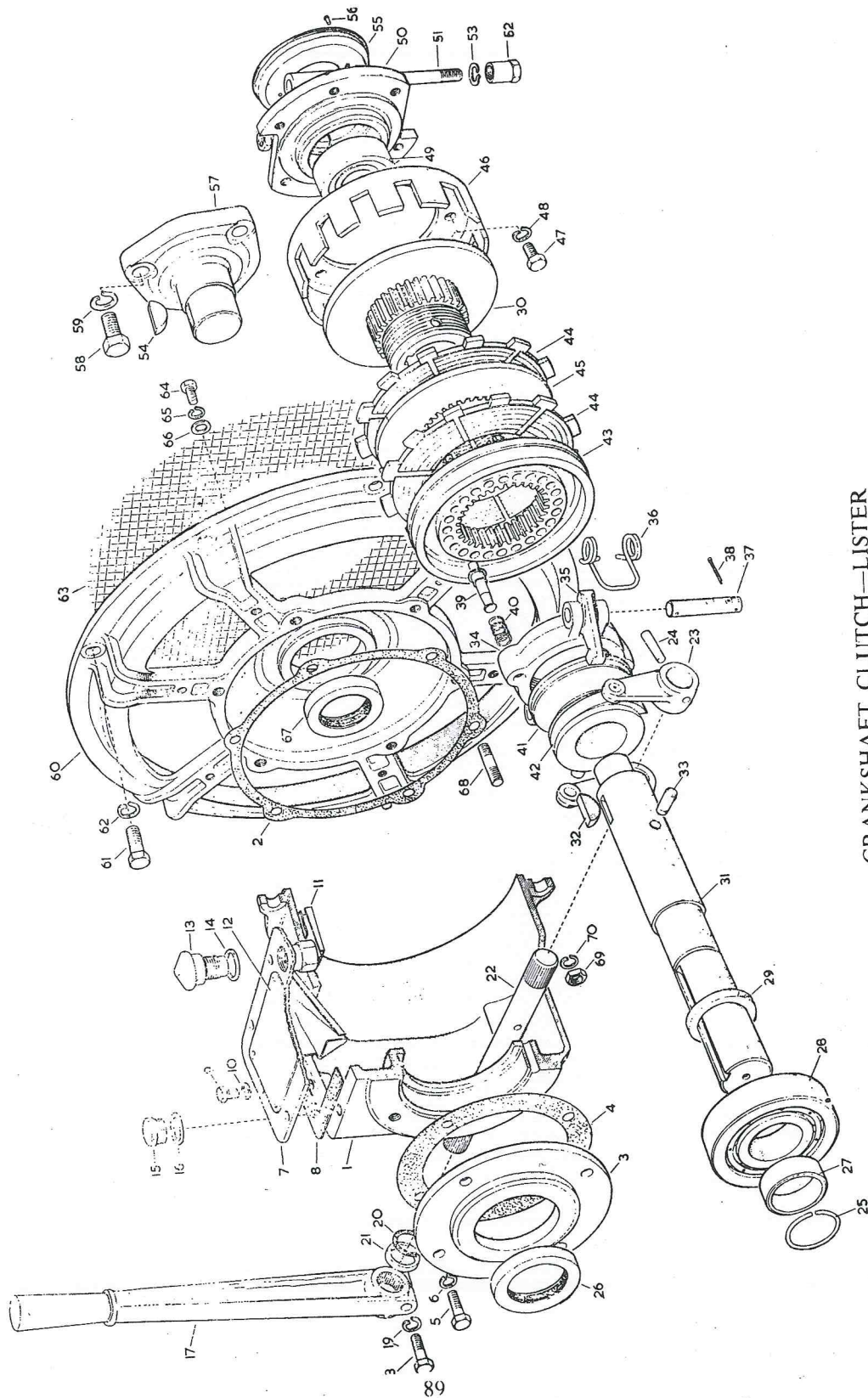
Illus. No.	Description	Part No.	No. per engine		
			1 Cyl.	2 Cyl.	3 Cyl.
41	Clutch Engaging Cone	210-283	1	1	1
42	Clutch Sliding Yoke Piece	210-256	1	1	1
43	Clutch Pressure Plate	201-22600	1	1	1
44	Clutch Driving Plate	201-22850	2	2	2
45	Clutch Driven Plate	201-22860	1	1	1
46	Clutch Body	201-22890	1	1	1
47	Setscrews for Clutch Body	270-59	6	6	6
48	Spring Washers for Clutch Body	27-413	6	6	6
49	Centre Bearing	201-22950	1	1	1
50	Clutch Driving Member	201-22870	1	1	1
51	Clutch Driving Member Stud	270-85	2	2	2
52	Clutch Driving Member Nut	201-22940	2	2	2
53	Clutch Driving Member Spring Washer	27-413	2	2	2
54	Clutch Driving Member Key	27-785	1	1	1
55	Oil Thrower	201-22750	1	1	1
56	Oil Thrower Dowels	27-707	2	2	2
57	Camshaft End Cover and Adaptor	201-22881	1	1	1
58	Camshaft End Cover Joint	201-11211	1	1	1
59	Camshaft End Cover Bearing	201-22910	1	1	1
60	Camshaft End Cover Oil Seal	201-13190	1	1	1
61	Stud—Clutch Case to End Cover	270-284	5	5	5
62	Stud—Clutch Case to End Cover	270-237	1	1	1
63	Spring Washer	27-413	6	6	6
64	Nut	270-3	6	6	6
65	Camshaft Assembly, Standard Rotation LD/SL1 —	201-22681	1	—	—
	comprising :				
	Camshaft	201-22671	1	—	—
	Gearwheel	201-11151	1	—	—
	Pin	201-11160	1	—	—
	Key	27-785	1	—	—
—	Camshaft Assembly, Reverse Rotation LD/SL1 —	201-22931	1	—	—
	comprising :				
	Camshaft	201-22921	1	—	—
	(Remainder as Standard Rotation)				
—	Camshaft Assembly, Standard Rotation SL2 ...	202-22681	—	1	—
	comprising :				
	Camshaft	202-22671	—	1	—
	Gearwheel	202-11151	—	1	—
	Pin	201-11160	—	1	—
	Key	27-785	—	1	—
—	Camshaft Assembly, Reverse Rotation SL2 ...	202-22931	—	1	—
	comprising :				
	Camshaft	202-22921	—	1	—
	(Remainder as Standard Rotation)				
—	Camshaft Assembly, Standard Rotation SL3 ...	203-22681	—	—	1
	comprising :				
	Camshaft	203-22671	—	—	1
	Gearwheel	203-11150	—	—	1
	Pin	201-11160	—	—	1
	Key	27-785	—	—	1
—	Camshaft Assembly, Reverse Rotation SL3 ...	203-22931	—	—	1
	comprising :				
	Camshaft	203-22921	—	—	1
	(Remainder as Standard Rotation)				
—	Bolt End Cover — Crankcase	270-65	—	—	1



CAMSHAFT CLUTCH—LISTER

AUXILIARY ENGINE DIRECT DRIVE CLUTCH — CRANKSHAFT — LISTER **LD & SL1-2-3 ENGINES**

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
1	Clutch Case	201-22900	1	1	1
2	Clutch Case Joint Use 2 paper joints (1 each side) if $\frac{1}{32}$ " shim is fitted or Shim $\frac{1}{32}$ " thick when necessary	203-19961 203-21950	1 —	1 —	1 —
3	Clutch End Cover	201-22550	1	1	1
4	Joint End Cover	201-14741	1	1	1
5	Bolt	270-61	4	4	4
6	Spring Washer	27-413	4	4	4
7	Clutch Cover and Oil Return Trough Assembly —	201-22720	1	1	1
	comprising:				
	Cover	201-22710	1	1	1
	Oil Trough	203-20010	1	1	1
	Breather Nut	201-24520	1	1	1
8	Clutch Cover Joint	203-20060	1	1	1
9	Clutch Cover Setscrew	270-54	6	6	6
10	Clutch Cover Spring Washer	27-451	6	6	6
11	Oil Catcher Assembly —comprising:	203-20040	1	1	1
	Oil Catcher	203-20020	1	1	1
	Oil Catcher	203-20030	1	1	1
	Rivets for Oil Catcher	203-20840	2	2	2
12	Instruction Plate	203-20070	1	1	1
	Rivets for Instruction Plate	203-20830	4	4	4
13	Oil Breather Plug Assembly , comprising:	570-10460	1	1	1
	Plug	201-22570	1	1	1
	Element	201-18561	1	1	1
	Dowel	27-707	1	1	1
14	Joint	13-22-350	1	1	1
15	Plug—Oil Filler and Drain	11-13-693	2	2	2
16	Joint	4-197	2	2	2
17	Operation Lever—Outside	23-3134	1	1	1
18	Operating Lever Locking Bolt	27-890	1	1	1
19	Operating Lever Spring Washer	27-413	1	1	1
20	Sealing Ring for Operating Shaft	201-14640	2	2	2
21	Sealing Ring Retaining Collar	203-20080	2	2	2
—	Operating Shaft Assembly —comprising:	203-20111	1	1	1
22	Operating Shaft	203-20130	1	1	1
23	Operating Lever Inside	210-249	2	2	2
24	Taper Pin	27-822	2	2	2
25	Retaining Spring	210-259	1	1	1
26	Oil Seal	201-22960	1	1	1
27	Oil Seal Bush	201-22560	1	1	1
28	Ball Journal	210-154	1	1	1
29	Spacing Collar	201-22700	1	1	1
—	Clutch Shaft Assembly —comprising:	570-10470	1	1	1
30	Clutch Centre	201-22840	1	1	1
31	Clutch Shaft	201-22690	1	1	1
32	Key	27-785	1	1	1
33	Locating Pin	201-11160	1	1	1
—	Clutch Adjusting Ring Assembly —comprising:	570-10650	1	1	1
34	Adjusting Ring	210-250	1	1	1
35	Clutch Engaging Arms	210-261	2	2	2
36	Spring for Arm	201-24590	2	2	2
37	Pin for Arm	201-24580	2	2	2
38	Split Pin	27-2274	4	4	4
39	Locating Pin	210-263	1	1	1
40	Locating Pin Spring	210-387	1	1	1



CRANKSHAFT CLUTCH—LISTER

AUXILIARY ENGINE DIRECT DRIVE CLUTCH — CRANKSHAFT — LISTER
LD & SL1-2-3 ENGINES (cont.)

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
41	Clutch Engaging Cone ...	210-283	1	1	1
42	Clutch Sliding Yoke Piece ...	210-256	1	1	1
43	Clutch Pressure Plate ...	201-22600	1	1	1
44	Clutch Driving Plate ...	201-22850	2	2	2
45	Clutch Driven Plate ...	201-22860	1	1	1
46	Clutch Body ...	201-22890	1	1	1
47	Setscrew for Clutch Body ...	270-59	6	6	6
48	Spring Washer ...	27-413	6	6	6
49	Centre Bearing ...	201-22950	1	1	1
50	Clutch Driving Member ...	201-22870	1	1	1
51	Clutch Driving Member Stud ...	270-85	2	2	2
52	Clutch Driving Member Nut ...	201-22940	2	2	2
53	Clutch Driving Member Spring Washer ...	27-413	2	2	2
54	Clutch Driving Member Key ...	27-785	1	1	1
55	Oil Thrower ...	201-22750	1	1	1
56	Oil Thrower Dowel ...	27-707	2	2	2
57	Crankshaft Extension ...	201-22740	1	1	1
58	Crankshaft Extension Bolt ...	270-274	3	3	3
59	Crankshaft Extension Bolt Spring Washer ...	27-984	3	3	3
60	Adaptor—Clutch Case to Fan Shroud. LD/SL1 ...	201-22730	1	—	—
—	Adaptor—Clutch Case to Fan Shroud. SL2/SL3 ...	202-22730	—	1	1
61	Bolt—Adaptor to Fan Shroud. LD/SL1 ...	270-24	5	—	—
—	Bolt—Adaptor to Fan Shroud. SL2/SL3 ...	270-286	—	8	8
62	Spring Washer. LD/SL1 ...	27-413	5	—	—
—	Spring Washer. SL2/SL3 ...	27-393	—	8	8
63	Guard. LD/SL1 ...	201-13810	1	—	—
—	Guard. SL2/SL3 ...	202-16060	—	1	1
64	Bolt ...	270-23	6	6	6
65	Spring Washer ...	27-451	6	6	6
66	Plain Washer ...	27-618	6	6	6
67	Oil Seal ...	201-13190	1	1	1
68	Stud—Clutch Case to Adaptor ...	270-81	6	6	6
69	Nut ...	270-3	6	6	6
70	Spring Washer ...	27-413	6	6	6
—	Fan Shroud LD/SL1 Standard Rotation Engines ...	201-12581	1	—	—
—	Fan Shroud LD/SL1 Reverse Rotation Engines ...	201-14591	1	—	—
—	Fan Shroud—Strip Shim. .002" steel ...	201-13580	—	as required	—
—	Fan Shroud—Strip Shim. .005" steel ...	201-13581	—	as required	—
—	Fan Shroud—Strip Shim. .010" steel ...	201-13582	—	as required	—
—	Socket Cap Screw ...	270-327	4	—	—
—	Fan Shroud Spring Washer ...	27-413	4	—	—
—	Fan Shroud Blanking Plate ...	201-13160	1	—	—
—	Fan Shroud Blanking Plate Bolt ...	270-222	3	—	—
—	Fan Shroud Blanking Plate Nut ...	270-4	3	—	—
—	Fan Shroud Blanking Plate Spring Washer ...	27-393	3	—	—
—	Fan Shroud Blanking Plate ...	201-13160	1	—	—
—	Fan Shroud Blanking Plate Bolt ...	270-73	3	—	—
—	Bolt—Adaptor to Shroud Reverse Rotation Engines ...	270-71	3	—	—
—	Spring Washer (3 only required for Electric Start) ...	27-393	6	—	—
—	Fan Shroud Bolt ...	270-25	4	—	—

FUEL LIFT PUMP — FITTINGS

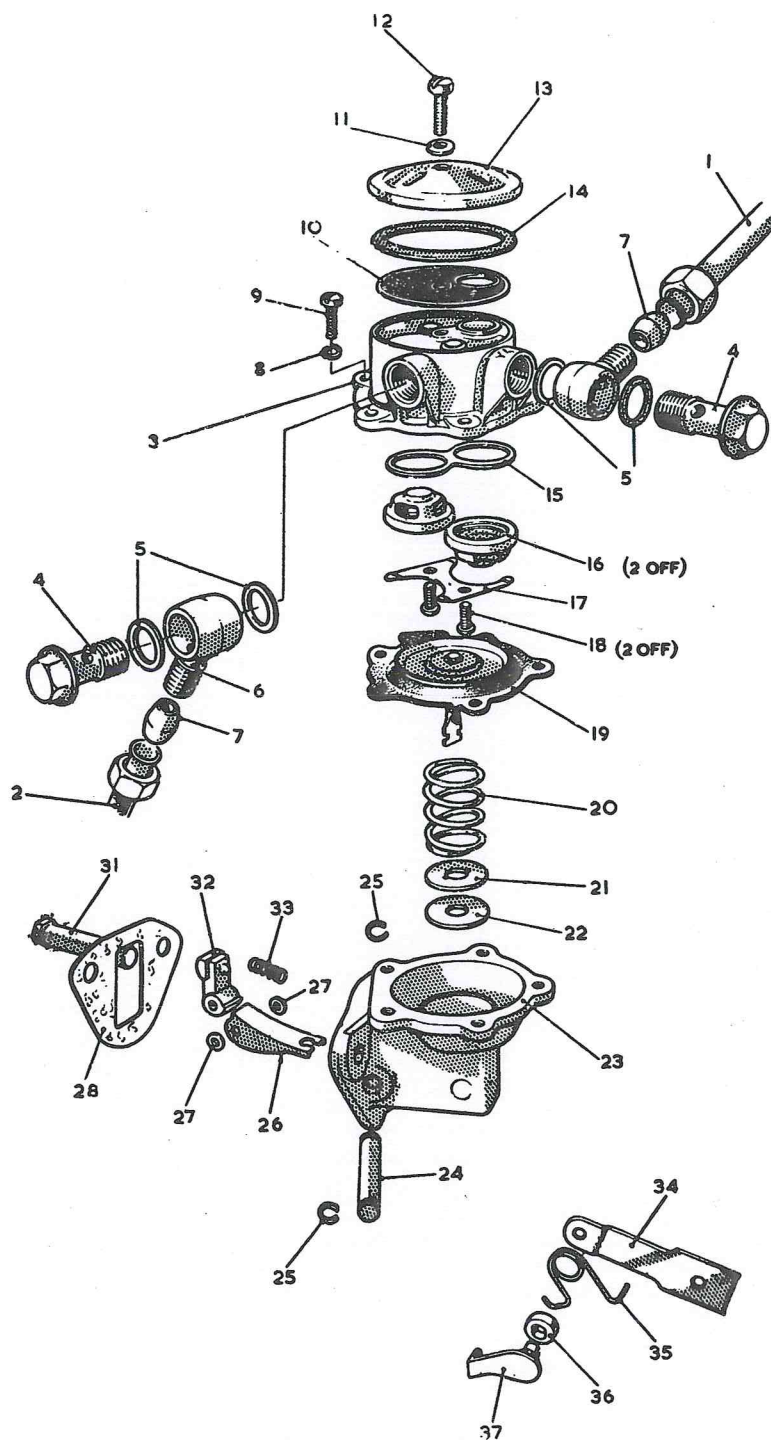
Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Door	201-17100	1	—	—
Door Joint	366-799	1	—	—
Guide Plate for Door Clamp	201-17180	1	—	—
Guide Plate Setscrew $\frac{1}{4}$ " UNF x $\frac{1}{2}$ "	270-54	1	—	—
Guide Plate Setscrew Washer	27-451	1	—	—
Clamp Bar	201-17310	1	—	—
Clamp Bar Split Pin	27-909	1	—	—
Clamp Bar Bolt	201-17190	1	—	—
Clamp Bar Washer	600-106	1	—	—
Door	202-17111	—	1	—
Door Joint	202-12700	—	1	—
Door	203-17111	—	—	1
Door Joint	203-12700	—	—	1
Crankcase Door Screw $\frac{1}{4}$ " UNC x $\frac{5}{8}$ "	270-53	—	9	11
Crankcase Door Washer	291-2609	—	9	11
Oil Filler	27-3821	—	1	1
Strainer	291-23751	—	1	1
Oil Filler Cap	27-3824	—	1	1
Oil Filler Cap Joint	303-253	—	1	1
Lub. Oil Dipstick	570-10211	1	—	—
Lub. Oil Dipstick	570-10390	—	1	1
Lub. Oil Dipstick Adaptor	27-4344	1	1	1
Tappet Bush	201-17300	1	1	1
Locating Pin for Fuel Pump Tappet	201-17200	1	—	—
Locating Pin Washer	201-11890	1	—	—
Spring Washer	27-413	2	2	2
Stud for Fuel Lift Pump to Door $\frac{5}{16}$ " UNF-UNC x $1\frac{1}{8}$ "	270-320	2	2	2
Nut for Fuel Lift Pump to Door $\frac{5}{16}$ " UNF	270-3	2	2	2
Tapped Plug for Swivel Union	201-17280	1	1	1
Air Vent Pipe (Filter to Tee Piece)	201-17080	1	1	—
Air Vent Pipe (Filter to Tee Piece)	203-17081	—	—	1
Swivel Union Plug	201-17270	1	1	1
Swivel Union Plug Joint	291-2609	2	2	2
Tee Piece $\frac{1}{8}$ " B.S.P. $\frac{3}{16}$ " Tube	201-17210	1	1	1
Joint Washer	600-106	2	2	2
Leak Off Pipe (Tee Piece to Fuel Tank)	291-366	1	1	1
Support Clip for Air Vent Pipe	201-17160	1	1	—
Felt for Clip	201-17170	2	2	—
Support Clip for Fuel Pipe	201-17150	1	1	—
Dowel to Plug Dipstick Hole	201-13570	1	1	1
Setscrew to Seal Filter Bracket Holes $\frac{3}{8}$ " :UNC x $\frac{1}{2}$ "	270-457	2	2	2
Washer to Seal Filter Bracket Holes	600-106	2	2	2
Blanking Plate (when Fuel Pump is not used)	352-16640	1	1	1
Blanking Plate Bolt $\frac{5}{16}$ " UNC x $\frac{5}{8}$ "	270-404	2	2	2
Blanking Plate Washer	27-413	2	2	2
Joint	351-12210	1	1	1
Bolt (when Purolator is not fitted) $\frac{3}{8}$ " UNC x $\frac{1}{4}$ "	270-457	2	2	2
Washer	600-106	2	2	2
Fuel Leak Off Pipe Injector to Connection	201-17070	1	—	—

FUEL LIFT PUMP

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl	3 Cyl.
—	Fuel Lift Pump complete	351-12150	1	1	1
1	Fuel Pipe —tank to lift pump (to suit installation) ...	...	1	1	1
2	Fuel Pipe —lift pump to filter	201-17090	1	1	—
—	Fuel Pipe —lift pump to filter	203-17090	—	—	1
3	Fuel Lift Pump—upper casting	662-10000	1	1	1
4	Swivel Union Plug	351-21610	2	2	2
5	Joint	351-21620	4	4	4
6	Swivel Union	351-21600	2	2	2
7	Olive Connection	351-21640	2	2	2
8	Cover Screw Washer	662-10010	5	5	5
9	Cover Screw	662-10020	5	5	5
10	Filter Screen	662-10030	1	1	1
11	Head Screw Gasket	662-10040	1	1	1
12	Head Screw	662-10050	1	1	1
13	Filter Cover	662-10060	1	1	1
14	Filter Gasket	662-10070	1	1	1
15	Valve Gasket	662-10080	1	1	1
16	Valve Assembly	662-10090	2	2	2
17	Valve Retaining Plate	662-10100	1	1	1
18	Valve Retaining Screw	662-10110	2	2	2
19	Diaphragm Assembly	662-10120	1	1	1
20	Diaphragm Spring	662-10130	1	1	1
21	Oil Seal Washer—metal	662-10140	1	1	1
22	Oil Seal Washer—fabric	662-10150	1	1	1
23	Pump Body	662-10160	1	1	1
24	Rocker Arm Pin—circlip type	662-10170	1	1	1
25	Rocker Arm Pin Circlip	662-10180	2	2	2
26	Link and Leaf Spring Assembly	662-10190	1	1	1
27	Rocker Arm Pin Washer	662-10200	2	2	2
28	Joint	351-12190	1	1	1
31	Pump Tappet	201-17290	1	1	1
32	Rocker Arm	662-10210	1	1	1
33	Rocker Arm Spring	662-10220	1	1	1
34	Primer Arm ... ..	...	...	...	...
35	Primer Return Spring	662-10230	1	1	1
36	Distance Piece ... ..	...	...	...	...
37	Primer Lever ... ..	...	...	...	...

FUEL PIPES—self-venting fuel system

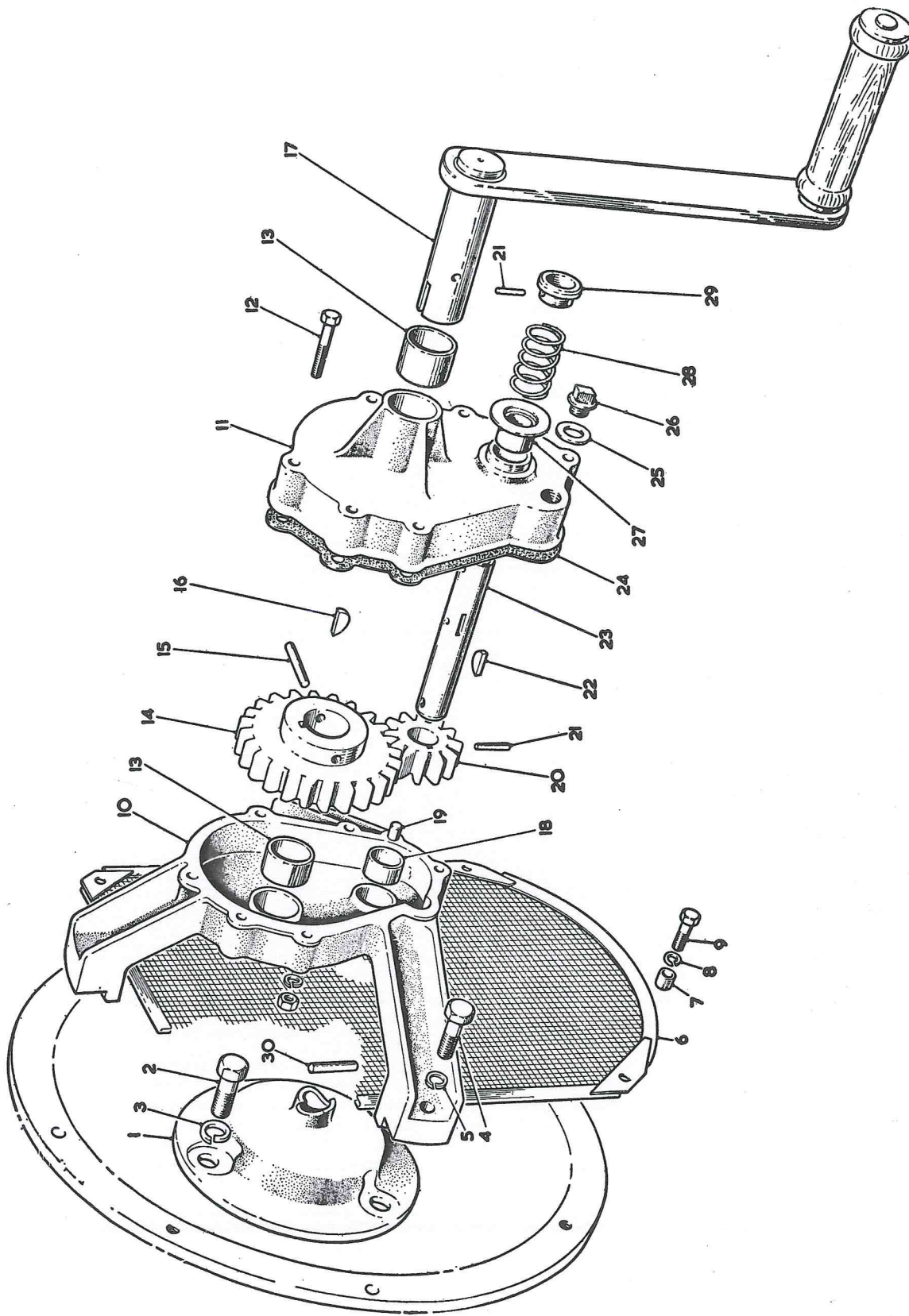
Fuel Leak-off Pipe	201-11103	1	—	—
Fuel Leak-off Pipe	202-17132	—	1	—
Fuel Leak-off Pipe	203-17132	—	—	1
Swivel Union Screw—on fuel pump	570-10660	1	2	3
Copper Joint	352-29370	2	4	6



FUEL LIFT PUMP

GEARED UP STARTING — SINGLE CYLINDER ENGINES

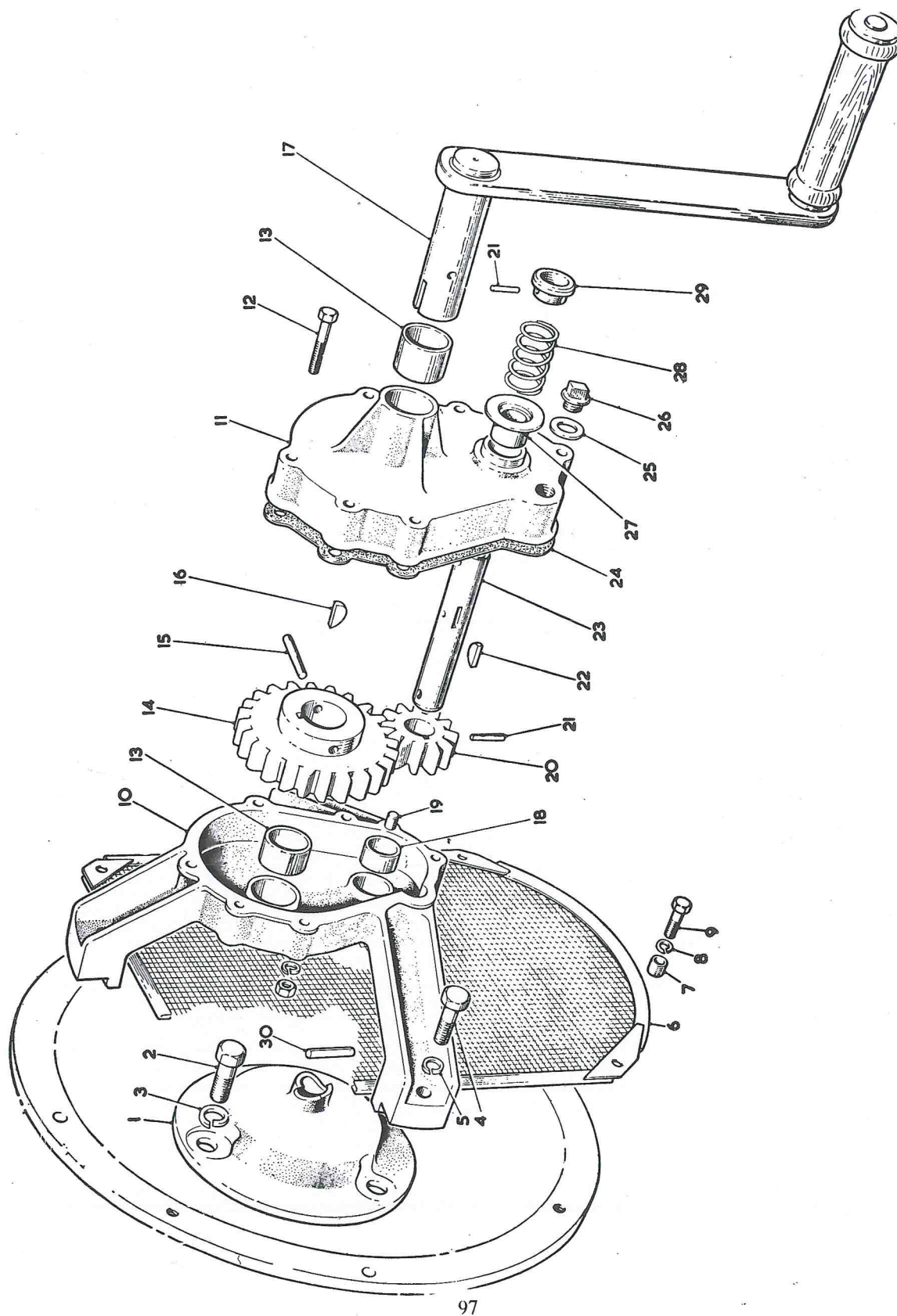
Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
	Fan Shroud	201-12581	1	—	—
	Fan shroud Shim .002"	201-13580	As Required	—	—
	Fan Shroud Shim .005"	201-13581	As Required	—	—
	Fan Shroud Shim .010"	201-13582	As Required	—	—
	Socket Cap Screw $\frac{5}{16}$ " UNF	270-327	4	—	—
	Spring Washer	27-413	4	—	—
	Bolt for Fan Shroud	270-25	4	—	—
	Blanking Plate	201-13160	1	—	—
	Bolt $\frac{3}{8}$ " UNF x $4\frac{1}{2}$ "	270-222	3	—	—
	Nut $\frac{3}{8}$ " UNF	270-4	3	—	—
	Spring Washer	27-393	3	—	—
1	Starting Dog Plate	202-16020	1	—	—
—	Starting Dog Plate R/R. only	202-16870	1	—	—
2	Starting Dog Plate Screw $\frac{7}{16}$ " UNF x $\frac{3}{8}$ "	270-301	3	—	—
3	Starting Dog Plate Spring Washer	27-984	3	—	—
4	Screw for Gear Box $\frac{5}{16}$ " UNF x 1"	270-61	4	—	—
5	Spring Washer Gear Box	27-413	4	—	—
10	Gear Box	201-18530	1	—	—
11	Gear Box Cover	202-16050	1	—	—
12	Gear Box Screw $\frac{1}{4}$ " UNC x 1"	270-262	6	—	—
—	Gear Box Spring Washer	27-451	6	—	—
13	Shaft Extension Bearing Bush	202-16320	2	—	—
14	Shaft Extension Gear	202-16340	1	—	—
15	Shaft Extension Pin	27-1442	1	—	—
16	Shaft Extension Key	27-566	1	—	—
17	Starting Handle (Complete)	202-16030	1	—	—
18	Engagement Shaft Bearing Bush	202-16310	2	—	—
19	Gear Box Dowel	27-3677	2	—	—
20	Engagement Shaft Gear	202-16330	1	—	—
21	Engagement Shaft Pin	27-630	2	—	—
22	Engagement Shaft Key	27-566	1	—	—
23	Engagement Shaft	202-16361	1	—	—
24	Gear Box Joint	202-16350	1	—	—
25	Gear Box Oil Filler Joint	4-197	1	—	—
26	Gear Box Oil Filler Plug	8-2-6	1	—	—
27	Engagement Shaft Release Washer	202-16300	1	—	—
28	Engagement Shaft Release Spring	202-16270	1	—	—
29	Engagement Shaft Knob	202-16280	1	—	—
30	Shaft Clutch Pin	210-143	1	—	—
—	Clutch Pin Washer	202-16290	1	—	—
—	Sealing Plate	201-18520	1	—	—
—	Dynamo Driving Pulley	202-18240	1	—	—
—	Engagement Shaft when Dynamo Pulley is fitted	202-16360	1	—	—
—	Set Bolt for Plate $\frac{7}{16}$ " UNF x $1\frac{1}{2}$ "	270-317	3	—	—



GEARED UP STARTING

GEARED UP STARTING — 2 and 3 CYLINDER ENGINES

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
1	Starting Dog Plate	202-16020	—	1	1
—	Starting Dog Plate—reverse rotation	202-16870	—	1	1
2	Starting Dog Plate Screw $\frac{7}{16}$ " UNF x $\frac{7}{8}$ "	270-301	—	3	3
3	Starting Dog Plate Spring Washer	27-984	—	3	3
4	Screw for Gearbox $\frac{3}{8}$ " UNC x $1\frac{5}{8}$ "	270-393	—	3	3
5	Spring Washer for Gearbox	27-393	—	3	3
6	Fan Shroud Guard, complete	202-18170	—	1	1
7	Distance Piece for Guard	390-1040	—	4	4
8	Set Bolt Spring Washer	27-393	—	4	4
9	Set Bolt for Guard $\frac{3}{8}$ " UNC x $1\frac{1}{4}$ "	270-349	—	4	4
10	Gear Box	202-16091	—	1	1
11	Gear Box Cover	202-16050	—	1	1
12	Gear Box Screw $\frac{1}{4}$ " UNC x 1"	270-262	—	6	6
—	Gear Box Spring Washer	27-451	—	6	6
13	Shaft Extension Bearing Bush	202-16320	—	2	2
14	Shaft Extension Gear	202-16340	—	1	1
15	Shaft Extension Pin	27-1442	—	1	1
16	Shaft Extension Key	27-566	—	1	1
17	Starting Handle, complete	202-16030	—	1	1
18	Engagement Shaft Bearing Bush	202-16310	—	2	2
19	Gear Box Dowel	27-3677	—	2	2
20	Engagement Shaft Gear	202-16330	—	1	1
21	Engagement Shaft Pin	27-630	—	2	2
22	Engagement Shaft Gear Key	27-566	—	1	1
23	Engagement Shaft	202-16361	—	1	1
24	Gear Box Joint	202-16350	—	1	1
25	Gear Box Oil Filler Joint	4-197	—	1	1
26	Gear Box Oil Filler Plug	8-2-6	—	1	1
27	Engagement Shaft Release Washer	202-16300	—	1	1
28	Engagement Shaft Release Spring	202-16270	—	1	1
29	Engagement Shaft Knob	202-16280	—	1	1
30	Engagement Shaft Clutch Pin	210-143	—	1	1
—	Washer for Clutch Pin	202-16290	—	1	1
—	Dynamo Driving Pulley—Optional Extra	202-18240	—	1	1
—	Engagement Shaft must be used when Dynamo Pulley is fitted	202-16360	—	1	1
—	Set Bolt for Engagement Shaft $\frac{7}{16}$ " UNF x $1\frac{1}{2}$ "	270-317	—	3	3
GUARD FOR CAMSHAFT (Standard)			1	1	1
Guard for Camshaft (Short)			1	1	1



GEARED UP STARTING

LUBRICATING OIL SUCTION on TILTING ENGINE—over 10°

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
The Following Parts should be omitted.				
Oil Pump Plug	201-10610	1	—	—
Lubricating Oil Strainer	201-10771	1	—	—
End Cap for do.	201-10780	1	—	—
End Cap Spring	291-2195	1	—	—
Retaining Pin	201-10790	1	—	—
Retaining Pin Split Pin	27-2255	1	—	—

The Following Fittings are required.

Valve Body and Connector Assembly	570-10481	1	—	—
Dowty Oil Seal	201-15240	1	—	—
Dowty Seal Washer	31-66806	1	—	—
Dowty Seal Washer	31-66802	5	—	—
Oil Pipe (Strainer to Pump)	201-15270	1	—	—
Swivel Union Plug	201-15260	1	—	—
Suction Pipe for Oil Filter	201-15290	1	—	—
Suction Strainer	201-15280	1	—	—
Clamp for Suction Strainer	201-15320	1	—	—
Set Bolt for Clamp	201-15330	2	—	—
Swivel Union Plug	201-15300	1	—	—
Dowty Seal Washer	31-61533	1	—	—
Drain Plug	11-13-693	1	—	—

LUBRICATING OIL FILTER—PUROLATOR—LD1-S7.1

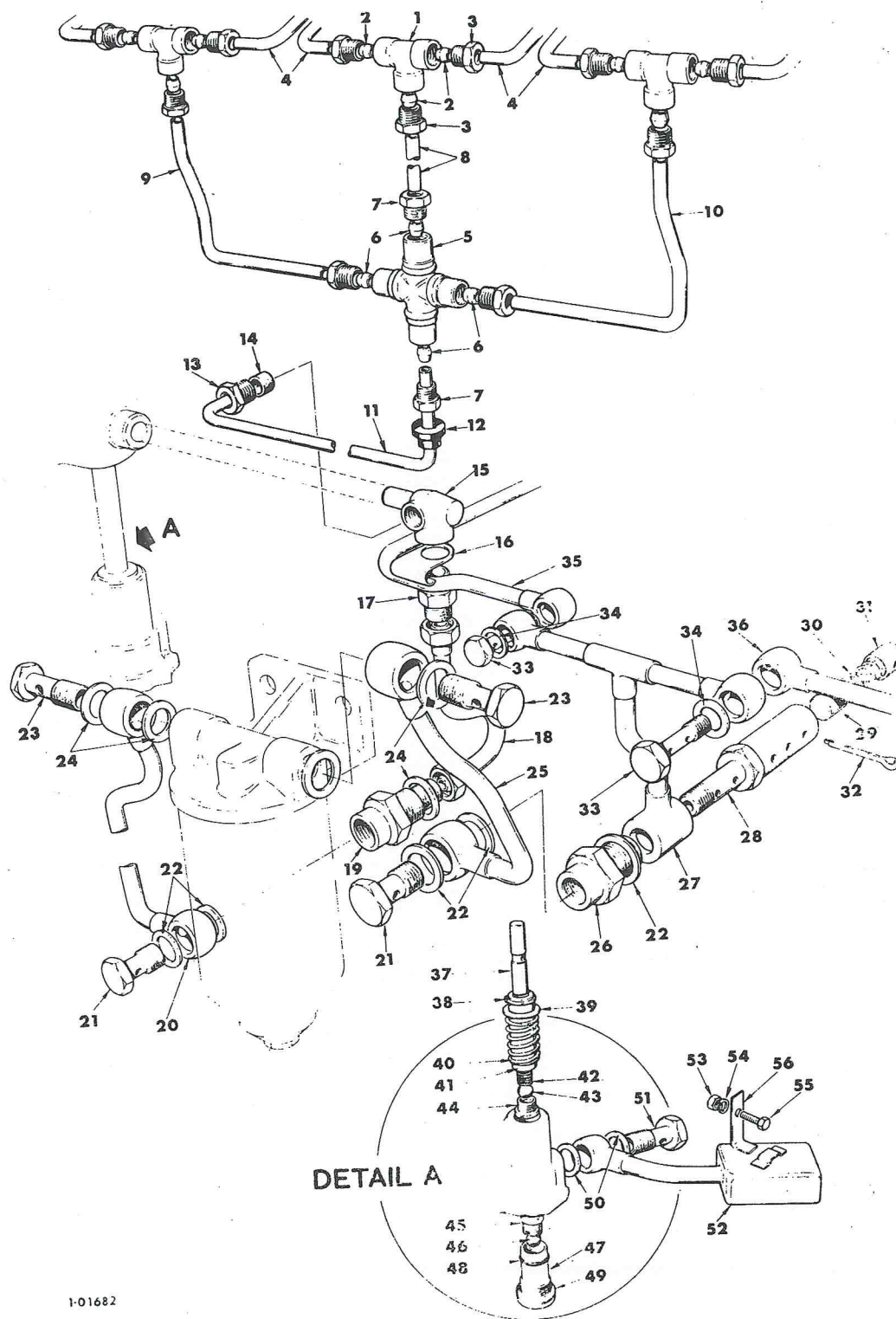
Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Crankcase	201-10015	1	—	—
Crankcase Door	201-17100	1	—	—
Oil Filter—Purolator MF 3902	366-896	1	—	—
Oil Filter Element (MF39A)	201-26020	1	—	—
Bolt— $\frac{3}{8}$ " UNF x 1"	270-73	1	—	—
Nut— $\frac{3}{8}$ " UNF	270-4	2	—	—
Bolt— $\frac{3}{8}$ " UNF x $1\frac{1}{4}$ "	270-74	1	—	—
Spring Washer	27-393	4	—	—
Support Bracket	366-1300	1	—	—
Support Bracket Spacing Washer	27-82	2	—	—
Screw $\frac{5}{16}$ " UNF x $2\frac{1}{2}$ "	270-67	2	—	—
Union	31-85733	1	—	—
Oil Pipe	366-1277	1	—	—
Copper Joint	291-3063	1	—	—
Lock-nut	27-17	1	—	—
Oil Pipe—Governor End Main Bearing	366-1278	1	—	—
Oil Pipe—Flywheel End Main Bearing	366-1279	1	—	—
Adaptor Plug	366-1271	1	—	—
Copper Joint	616-1524	1	—	—
Union Screw	366-1272	1	—	—
Copper Joint	13-22-350	1	—	—
"O" Ring	616-1742	1	—	—
Copper Joint	291-3064	1	—	—
Oil Pipe—Union to Filter Inlet	366-2153	1	—	—
Oil Pipe—Filter Outlet to Union	366-2152	1	—	—
Swivel Union Screw	366-888	2	—	—
Copper Joint	13-21-778	4	—	—
Support Clip	366-2154	1	—	—
Support Clip Retainer	366-2155	1	—	—
Retainer Bolt— $\frac{5}{16}$ " UNF x $\frac{7}{8}$ "	270-24	1	—	—
Nut— $\frac{5}{16}$ " UNF—self locking	270-154	1	—	—
Felt	366-2156	1	—	—

LUBRICATING OIL FILTER—PUROLATOR—LD2-SL2

Crankcase	366-881	—	1	—
Crankcase Door	202-17111	—	1	—
Oil Filter (MF 3902)	366-896	—	1	—
Oil Filter Element (MF39A)	201-26020	—	1	—
Stud— $\frac{3}{8}$ " UNF-UNC x $1\frac{1}{2}$ "	270-260	—	2	—
Nut— $\frac{3}{8}$ " UNF	270-4	—	2	—
Spring Washer	27-393	—	2	—
Union	31-85733	—	1	—
Oil Pipe—Pump to Union	366-883	—	1	—
Union	366-884	—	1	—
Oil Pipe—Union to Filter	366-886	—	1	—
Swivel Union Screw	366-888	—	2	—
Oil Pipe—Filter to Union	366-889	—	1	—
Union	366-890	—	1	—
Joint	291-3063	—	4	—
Joint	13-21-778	—	4	—
Oil Pipe—Main Bearing Flywheel end	366-891	—	1	—
Swivel Union Screw	366-894	—	1	—
Oil Pipe—Main Bearing Governor end	366-893	—	1	—
Swivel Union Screw	366-954	—	2	—
Support Clip	366-1678	—	1	—

LUBRICATING OIL FILTER—PUROLATOR—SL3

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
—	Crankcase	366-1288	—	—	1
—	Crankcase Door	203-17111	—	—	1
—	Oil Filter (MF3902)	366-896	—	—	1
—	Filter Element (MF39A)	201-26020	—	—	1
—	Stud	270-260	—	—	2
—	Spring Washer	27-393	—	—	2
—	Nut	270-4	—	—	2
—	Tee Piece comprising:—	201-11662	—	—	3
1	Tee Piece	201-12980	—	—	3
2	Olive	201-12990	—	—	9
3	Nut	201-12300	—	—	9
4	Oil Pipe—tee to rockers	201-11652	—	—	6
—	Four Way Connector comprises	203-17980	—	—	1
5	Connector	203-17990	—	—	1
6	Olive	201-12990	—	—	4
7	Nut	201-13000	—	—	4
8	Oil Pipe—to No. 2 Tee	203-13710	—	—	1
9	Oil Pipe—to No. 1 Tee	203-13700	—	—	1
10	Oil Pipe—to No. 3 Tee	202-13710	—	—	1
11	Oil Pipe—pump to connector	203-12080	—	—	1
12	Oil Pipe Bush	201-12280	—	—	1
13	Gland Nut	201-11380	—	—	1
14	Packing Washer	201-11390	—	—	1
15	Connector	203-11340	—	—	1
16	Oil Pipe Support Clip	366-1746	—	—	1
17	Union	366-1100	—	—	1
18	Oil Pipe—union to crankcase	366-1102	—	—	1
19	Union in crankcase	366-884	—	—	1
20	Oil Pipe—crankcase to filter	366-1103	—	—	1
21	Swivel Union Plug	366-954	—	—	2
24	Joint	291-3063	—	—	5
23	Swivel Union Plug	366-888	—	—	2
24	Joint	13-21-778	—	—	5
25	Oil Pipe—filter to crankcase	366-1104	—	—	1
26	Union—in crankcase	366-1101	—	—	1
27	Oil Pipe—between centre bearings and relief valve	366-1110	—	—	1
28	Relief Valve Body	203-12540	—	—	1
29	Relief Valve	203-12550	—	—	1
30	Relief Valve Spring	203-12560	—	—	1
31	Valve Spring Cap	203-12570	—	—	1
32	Split Pin	27-121	—	—	1
33	Swivel Union Plug	366-894	—	—	2
34	Joint	600-106	—	—	2
35	Oil Pipe—gear end main bearing	366-1111	—	—	1
36	Oil Pipe—flywheel end main bearing	366-1112	—	—	1
37	Oil Pump Tappet	203-10651	—	—	1
38	Oil Pump Return Spring Circlip	201-10670	—	—	1
39	Return Spring Washer	201-10660	—	—	1
—	Return Spring Washer Seating	203-18130	—	—	1
40	Return Spring	201-12450	—	—	1

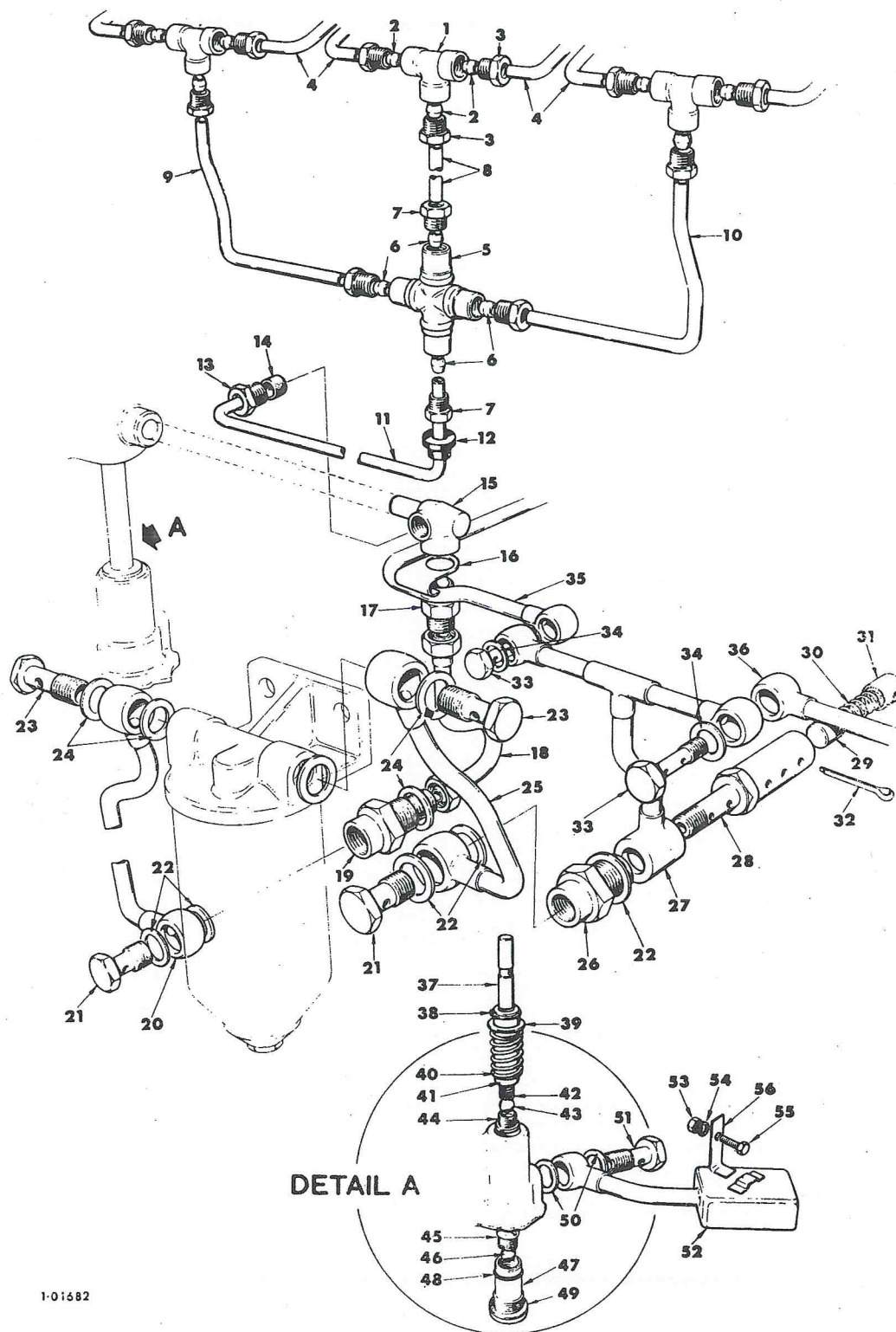


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LUBRICATING OIL FILTER—PUROLATOR—SL3

LUBRICATING OIL FILTER—PUROLATOR—SL3

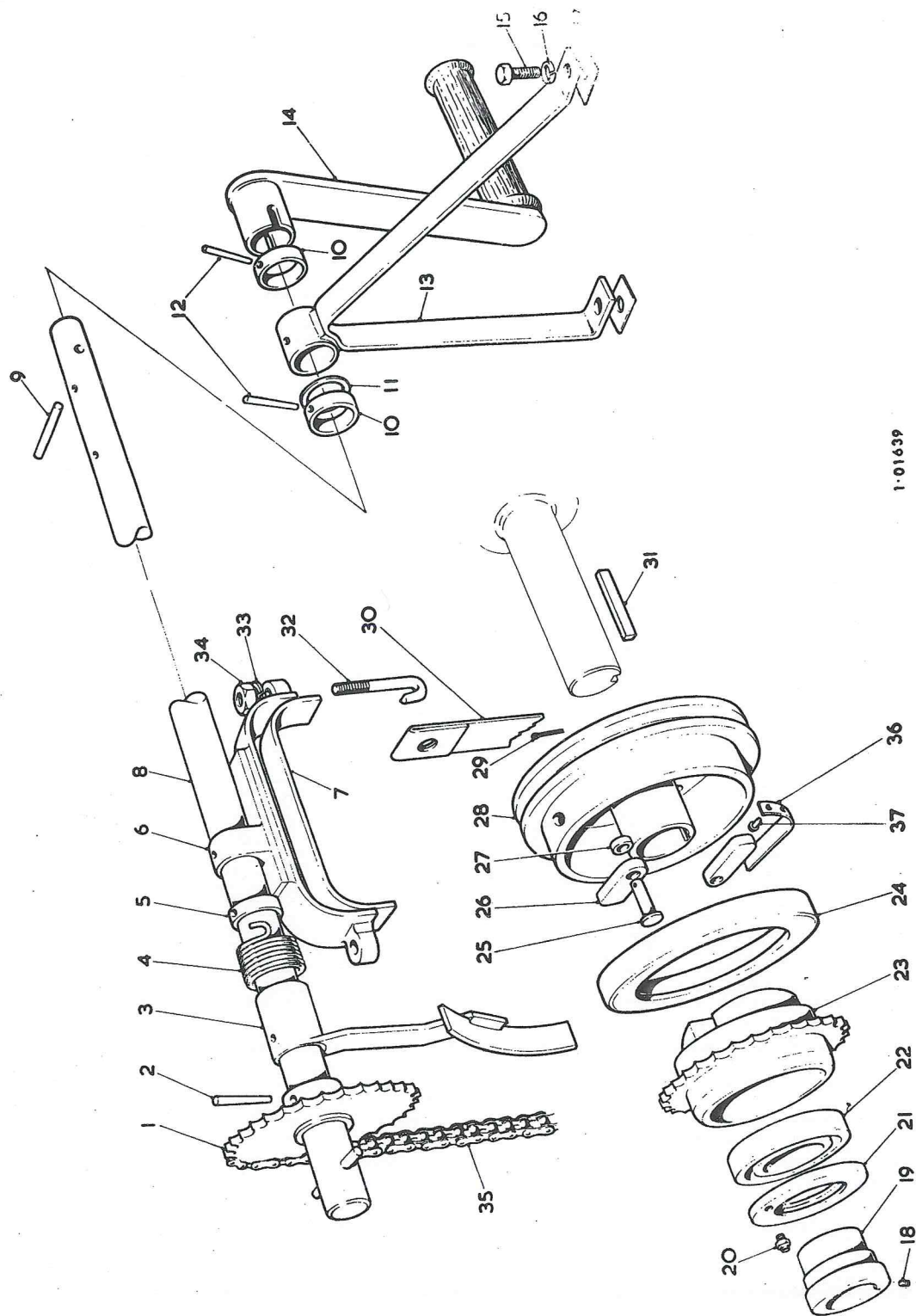
Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
—	Oil Pump Plunger Assembly comprising	570-10170	—	—	1
41	Oil Pump Plunger		—	—	1
42	Ball Valve Spring		—	—	1
43	Ball Valve		—	—	1
44	Ball Valve Seat		—	—	1
—	Suction Valve Assembly comprising	570-10180	—	—	1
45	Ball Valve Retainer				
46	Ball Valve				
47	Plug				
48	'O' Ring				
49	Joint	616-1524	—	—	1
50	Joint	13-12-778	—	—	2
51	Swivel Union Plug	23-2308	—	—	1
25	Oil Strainer	203-17881	—	—	1
53	Nut	270-3	—	—	1
54	Spring Washer	27-413	—	—	1
55	Bolt	270-182	—	—	1
56	Bracket	203-17941	—	—	1



LUBRICATING OIL FILTER—PUROLATOR—SL3

RAISED HAND STARTING

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
1	Chain Wheel	201-15600	1	1	1
2	Taper Pin	27-367	1	1	1
3	Chain Tensioner	201-15930	1	1	—
4	Spring	8-6-29	1	1	—
—	Chain Tensioner	351-13931	—	—	1
—	Spring	351-13891	—	—	1
5	Spring Hook	201-15970	1	1	—
—	Shaft Bracket	201-15840	1	—	—
6	Shaft Bracket	202-15630	—	1	—
7	Shim—for Tank Block	201-15620	As reqd.		
—	Shaft	201-15690	1	—	—
—	Shaft	202-15700	—	1	—
8	Shaft	203-18390	—	—	1
9	Pin	201-15710	1	1	1
10	Shaft Locating Collar	201-15670	1	1	1
11	Shim—for Shaft	201-15800	As required		
12	Taper Pin	27-1442	2	2	—
—	Taper Pin	27-1812	—	—	1
13	Bracket	202-15741	—	1	—
—	Bracket	201-15720	1	—	—
14	Starting Handle—complete	201-15750	1	1	1
15	Setscrew— $\frac{5}{16}$ " UNC x $\frac{3}{4}$ "	270-231	2	2	—
16	Spring Washer	27-413	2	2	—
17	Shim	201-15680	As Required		
18	Socket Screw—Bearing Collar and Dynamo Pulley	270-244	2	2	2
19	Bearing Collar	201-15490	1	1	1
20	Grease Nipple	27-2249	1	1	1
21	Bearing Plate	201-15500	1	1	1
22	Bearing	201-15830	1	1	1
23	Ratchet Wheel	201-15510	1	1	1
24	Ratchet Cover	201-15560	1	1	1
25	Pin—for Ratchet Pawl	201-15530	2	2	2
26	Ratchet Pawl	201-15520	2	2	2
27	Spacer—for Ratchet Pawl	201-15540	2	2	2
28	Dynamo Driving Pulley	201-15590	1	1	1
29	Split Pin	27-2252	2	2	2
30	Fuel Tank Strap	202-15610	—	2	—
—	Fuel Tank Strap	201-15860	2	—	—
31	Key	27-353	1	1	1
32	Hook Bolt—Tank Strap	8-7-103	4	4	—
33	Spring Washer	27-451	4	4	—
34	Nut	27-907	4	4	—
35	Chain	202-15570	—	1	—
36	Ratchet Pawl Leaf Spring	201-15550	1	1	1
37	Rivets—for spring	27-1674	2	2	2
—	Chain	201-15870	1	—	1
—	Fuel Tank Strap—complete	201-15890	1	—	—
—	Fuel Tank Strap—complete	202-15910	—	1	—
—	Fuel Tank Pads	201-12290	2	2	—
—	Fan Shroud	201-15470	1	—	—
—	Fan Shroud	202-15480	—	1	—
—	Fan Shroud	202-15480	—	—	1
—	Support Arm (Fan Shroud—Door Side)	203-18420	—	—	1
—	Bolt $\frac{5}{16}$ " UNC x $\frac{3}{4}$ "	270-231	—	—	1

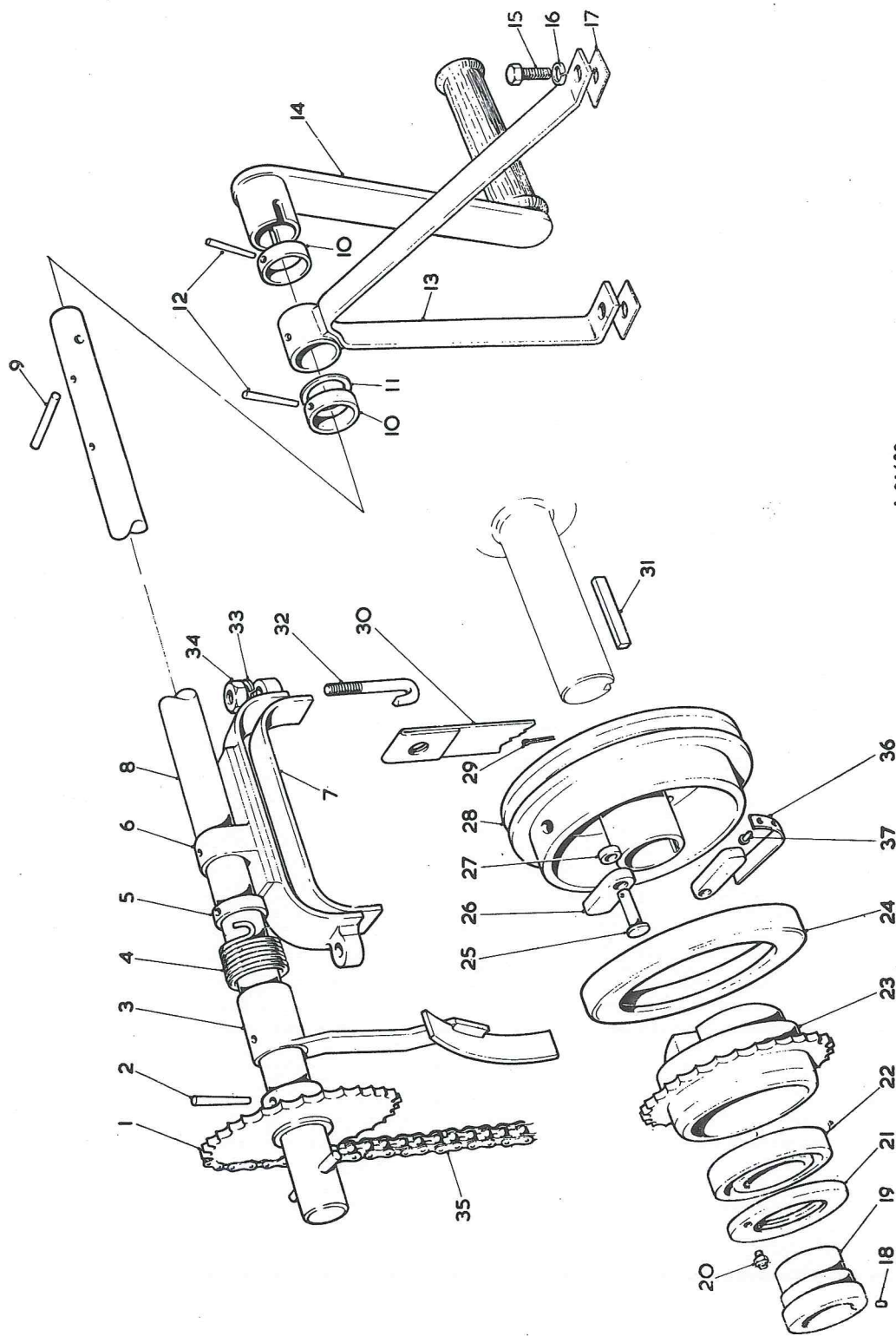


1-01639

RAISED HAND STARTING

RAISED HAND STARTING (Contd.)

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Spring Lock Washer	27-413	—	—	1
Support Arm (Fan Shroud—Top)	203-18410	—	—	1
Bolt $\frac{5}{16}$ " UNC x $\frac{3}{4}$ "	270-231	—	—	1
Spring Lock Washer	27-413	—	—	1
Clamp Collar	203-18400	—	—	1
Bolt $\frac{5}{16}$ " UNF x $2\frac{3}{4}$ "	270-68	—	—	1
Spring Lock Washer	27-413	—	—	1
Nut $\frac{5}{16}$ " UNF	270-3	—	—	1
End Cover—without Variable Speed Control	64-9159	—	—	1
End Cover—with Variable Speed Control	201-13450	—	—	1
Support Bracket (End Cover—Door Side)	203-18430	—	—	1
Bolt $\frac{1}{4}$ " UNF x $\frac{1}{4}$ "	270-55	—	—	1
Spring Lock Washer	27-451	—	—	2
Nut $\frac{1}{4}$ " UNF	270-2	—	—	2
Tee Bar	230-18490	—	—	2
Bolt $\frac{5}{16}$ " UNF x $\frac{7}{8}$ "	270-24	—	—	1
Bolt $\frac{5}{16}$ " UNF x 1"	270-61	—	—	1
Spring Lock Washer	27-413	—	—	1
Nut $\frac{5}{16}$ " UNF	270-3	—	—	2
Support Arm	203-18480	—	—	2
Bolt $\frac{1}{4}$ " UNF x $\frac{3}{4}$ "	270-55	—	—	1
Spring Lock Washer	27-451	—	—	1
Nut $\frac{1}{4}$ " UNF	270-2	—	—	1
Clamp Collar	203-18400	—	—	1
Bolt $\frac{5}{16}$ " UNF x $2\frac{3}{4}$ "	270-68	—	—	1
Spring Lock Washer	27-413	—	—	1
Nut $\frac{5}{16}$ " UNF	270-3	—	—	1
Starting Handle	201-15750	—	—	1
Shaft	203-18390	—	—	1
Starting Handle Pin	201-15710	—	—	1
Locating Collar	201-15670	—	—	2
Taper Pin	27-1812	—	—	1
Shim	201-15800	—	—	1
Tube Assembly	570-10220	As Required		
Grease Cup	27-606	—	—	1
Grease Cup Pad	351-13880	—	—	2
Grease Cup Washer	7-420	—	—	2
Locating Washer	203-18510	—	—	1

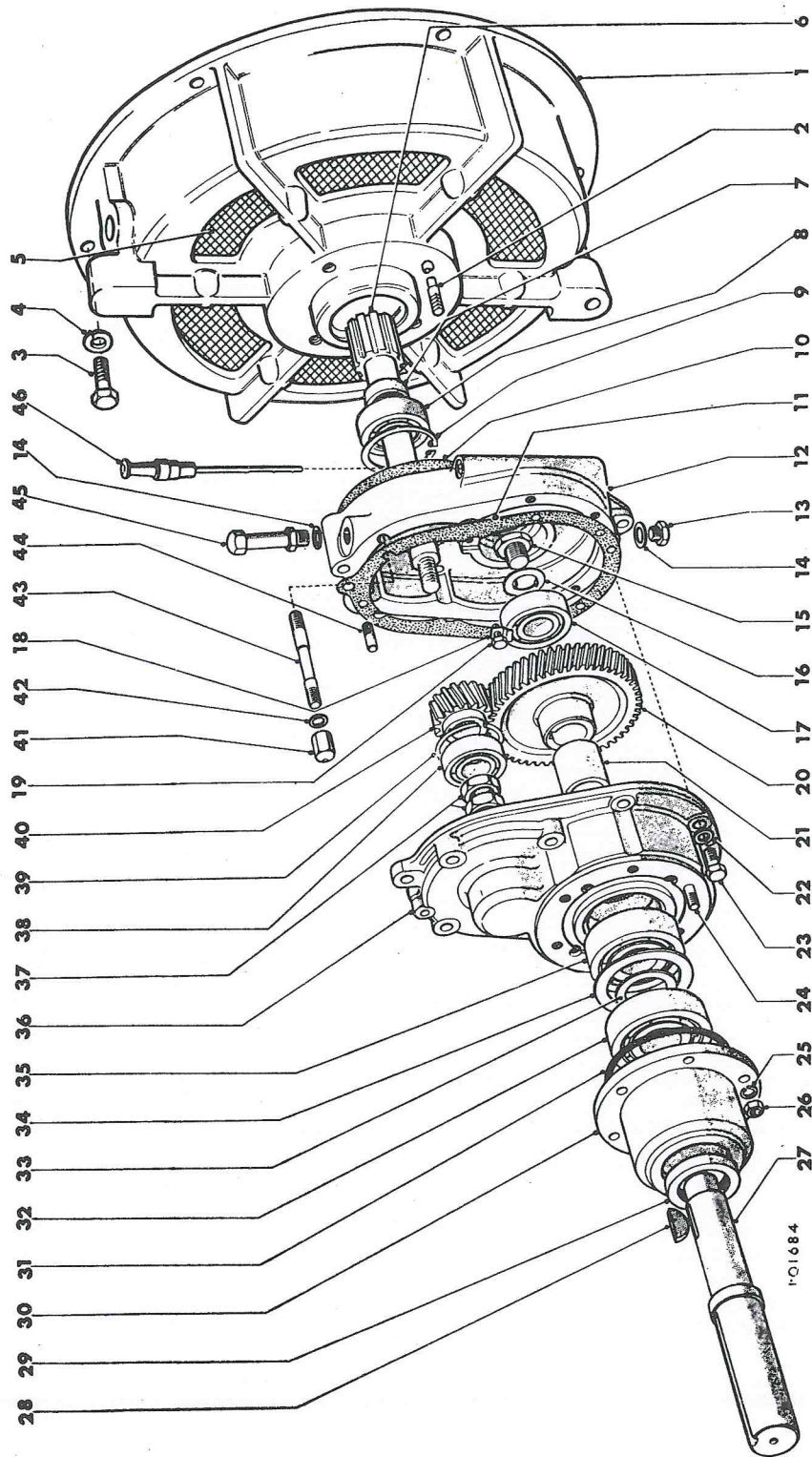


1-01639

RAISED HAND STARTING

REDUCTION GEAR 2:1, 3:1—Marine Auxiliary

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
—	Fan Shroud	201-12581	1	—	—
—	Fan Shroud	202-10426	—	1	1
—	Fan Shroud Strip Shim 0.002"	201-13580	—	as reqd.	—
—	Fan Shroud Strip Shim 0.005"	201-13581	—	as reqd.	—
—	Fan Shroud Strip Shim 0.010"	201-13582	—	as reqd.	—
1	Adaptor	201-16100	1	—	—
2	Stud—see item 43	...	...	...	...
3	Setscrew 5/16" UNC x 7/8"	...	...	...	...
4	Spring Washer	270-24	5	—	—
—	Adaptor	27-413	5	—	—
—	Setscrew 3/8" UNC x 3"	202-16100	—	1	1
—	Setscrew 3/8" UNC x 7/8"	270-373	—	1	1
—	Spring Washer	270-286	—	7	7
5	Adaptor Guard	27-393	—	8	8
—	Adaptor Guard	201-13810	1	—	—
—	Adaptor Guard Bolt	202-16060	—	1	1
—	Spring Washer	270-285	6	6	6
—	Plain Washer	27-451	6	6	6
6	Shaft	27-618	6	6	6
7	Spacer	201-22620	1	1	1
—	Oil Seal	202-16130	1	1	1
8	Ball Bearing	202-16240	1	1	1
9	Circlip	27-1638	1	1	1
10	Joint—reduction gear to adaptor	201-14110	1	1	1
11	Joint—gear case cover	201-14740	1	1	1
—	Gear Case Assembly, comprising*	201-22370	1	1	1
12	*Gear Case	570-10530	1	1	1
13	Oil Drain Plug	201-22200	1	1	1
14	Joint—drain plug and breather	11-13-693	1	1	1
15	Bearing Retaining Screw	4-197	2	2	2
16	Lockwasher	201-17600	1	1	1
17	Roller Bearing	201-17610	1	1	1
18	Bearing Retaining Clip	201-22400	1	1	1
19	Retaining Clip Screw	201-21060	1	1	1
20	Gearwheel 2:1	270-172	1	1	1
—	Gearwheel 3:1	201-22280	1	1	1
21	Spacer	201-22240	1	1	1
22	*Copper Washer	201-22380	1	1	1
23	*Setscrew—gearcase cover	616-1608	4	4	4
24	Stud	270-24	4	4	4
25	Spring Washer	270-83	6	6	6
26	Nut	27-413	6	6	6
27	Secondary Shaft	270-3	6	6	6
28	Key for shaft	201-22290	1	1	1
29	Oil Seal	27-2004	1	1	1
30	Bearing Housing	201-22420	1	1	1
31	Oil Sealing Ring	201-22220	1	1	1
32	Roller Bearing	292-1064	1	1	1
33	Inner Spacing Washer	201-22410	1	1	1
34	Outer Spacing Washer	201-22430	1	1	1
35	Ball Bearing	201-22440	1	1	1
36	*Gear Case Cover	31-936	1	1	1
37	Locknut	201-22210	1	1	1
38	Roller Bearing	201-17620	2	2	2
		201-17630	1	1	1



REDUCTION GEAR 2:1, 3:1

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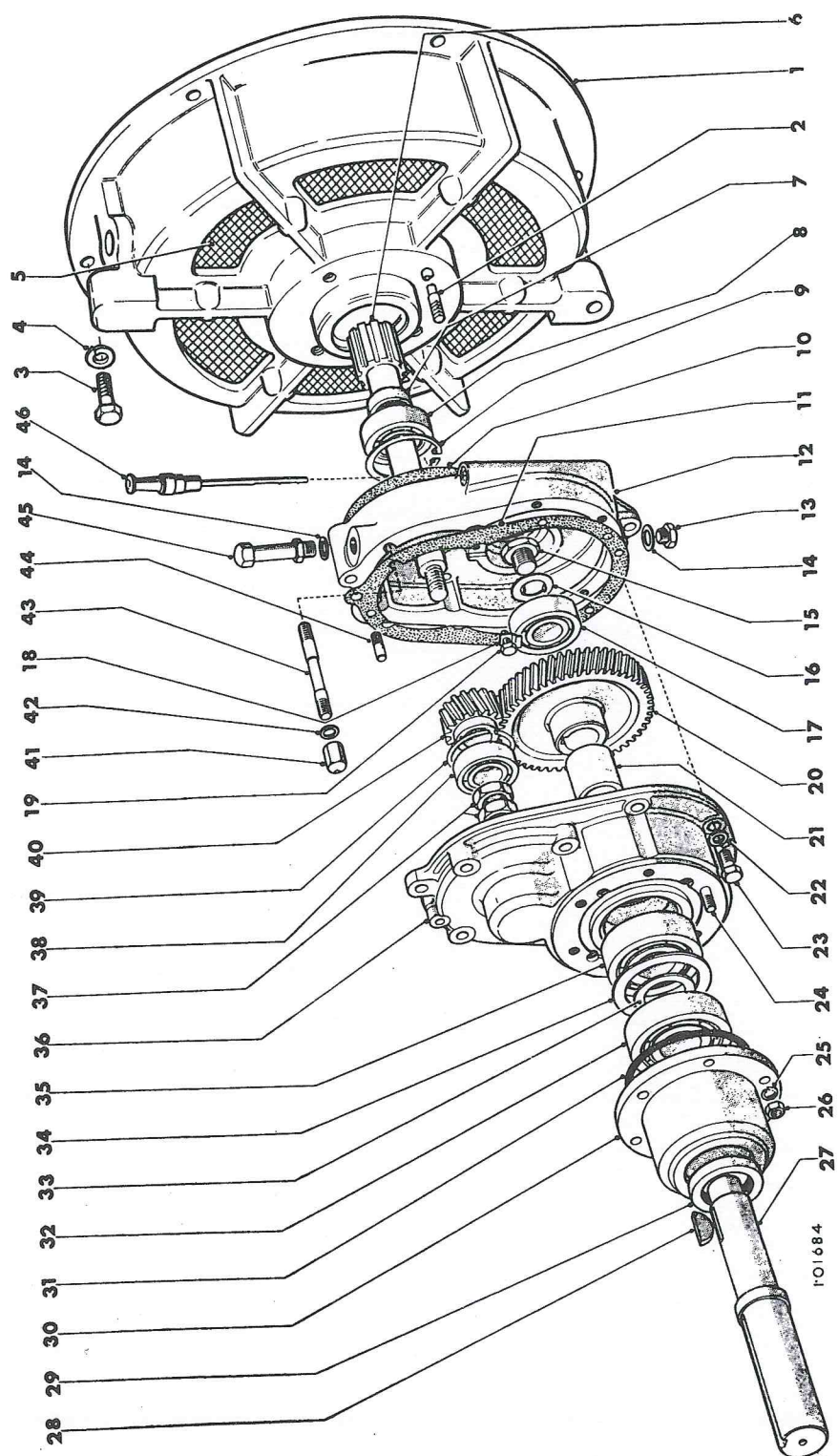
REDUCTION GEAR 2:1, 3:1 (Contd.)

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
39	Bearing Retaining Ring	201-14840	1	1	1
40	Pinion 2:1	201-22270	1	1	1
—	Pinion 3:1	201-22230	1	1	1
—	Pinion Key	27-1228	1	1	1
41	Nut	270-46	4	4	4
42	Copper Washer	616-1608	4	4	4
43	Stud	201-24530	4	4	4
44	*Dowel	27-3677	2	2	2
45	Oil Breather	570-10780	1	1	1
46	Dipstick—3:1	570-10200	1	1	1
—	Dipstick—2:1	570-10370	1	1	1

REMOTE CONTROLLED DECOMPRESSOR

Lever Assembly, comprising :	...	...	...	366-408	1	—	—
Lever	...	...	...	366-412	1	—	—
Spring Arm	...	...	...	366-413	1	—	—
Pivot	...	...	...	366-409	1	—	—
Bracket	...	...	...	366-410	1	—	—
Plug	...	...	...	366-411	1	—	—
Spring	...	...	...	64-8192	1	—	—
Bolts	...	...	...	270-103	3	—	—
Washers	...	...	...	27-1698	4	—	—
Bowden Cable	...	...	...	366-360	1	—	—
Control Lever	...	...	...	366-361	1	—	—
Nipple	...	...	...	361-414	1	—	—
Washer	...	...	...	27-117	1	—	—
Split Pin 3/32"	...	...	...	27-909	1	—	—
No. Taper Pin 1" long	...	...	...	27-630	1	—	—

Be sure to quote the
ENGINE NUMBER
when ordering spare parts



REDUCTION GEAR 2:1, 3:1

CRANKSHAFT CLUTCH WITH 2:1 AND 3:1 REDUCTION GEAR

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Adaptor	203-21800	1	1	1
Joint—adaptor to clutch housing	201-14741	1	1	1
Bearing Spacer	201-22810	1	1	1
Adaptor Oil Seal	202-16240	1	1	1
Adaptor Bearing	201-17430	1	1	1
Circlip	201-14110	1	1	1
Stud—clutch case to gearbox	201-24530	4	4	4
*Clutch Shaft Assembly, comprising:	201-22780	1	1	1
Clutch Shaft	201-22790	1	1	1
Clutch Centre	201-22840	1	1	1
Key	27-785	1	1	1
Locating Pin	201-11160	2	2	2
Bearing Spacer	202-16130	1	1	1
Joint—adaptor to reduction gear	201-17710	1	1	1
Stud—adaptor to gearbox	201-17590	4	4	4
Copper Washer	616-1608	4	4	4
Dome Nut	270-46	4	4	4
Pinion—2:1	201-22270	1	1	1
Pinion—3:1	201-22230	1	1	1
Key	27-1228	1	1	1
Gear Case Assembly, comprising:	570-10530	1	1	1
Gear Case	201-222000	1	1	1
End Cover	201-22210	1	1	1
Setscrew	270-24	4	4	4
Copper Washer	616-1608	4	4	4
Dowel	27-3677	2	2	2
Joint—gearcase end cover	201-22370	1	1	1
Roller Bearing	201-17630	1	1	1
Retaining Ring	201-14840	1	1	1
Locknut	201-17620	2	2	2
Secondary Shaft	201-22290	1	1	1
Ball Bearing	31-936	1	1	1
Bearing Housing	201-22220	1	1	1
Oil Sealing Ring	292-1064	1	1	1
Roller Bearing	201-22410	1	1	1
Bearing Spacer—outer	201-22440	1	1	1
Bearing Spacer—inner	201-22430	1	1	1
Oil Seal	201-22420	1	1	1
Stud—housing to gearcase cover	270-83	6	6	6
Spring Washer	27-413	6	6	6
Nut	270-3	6	6	6
Spacer—gear to bearing	201-22380	1	1	1
Gearwheel—2:1	201-22280	1	1	1
Gearwheel—3:1	201-22240	1	1	1
Key	27-2004	1	1	1

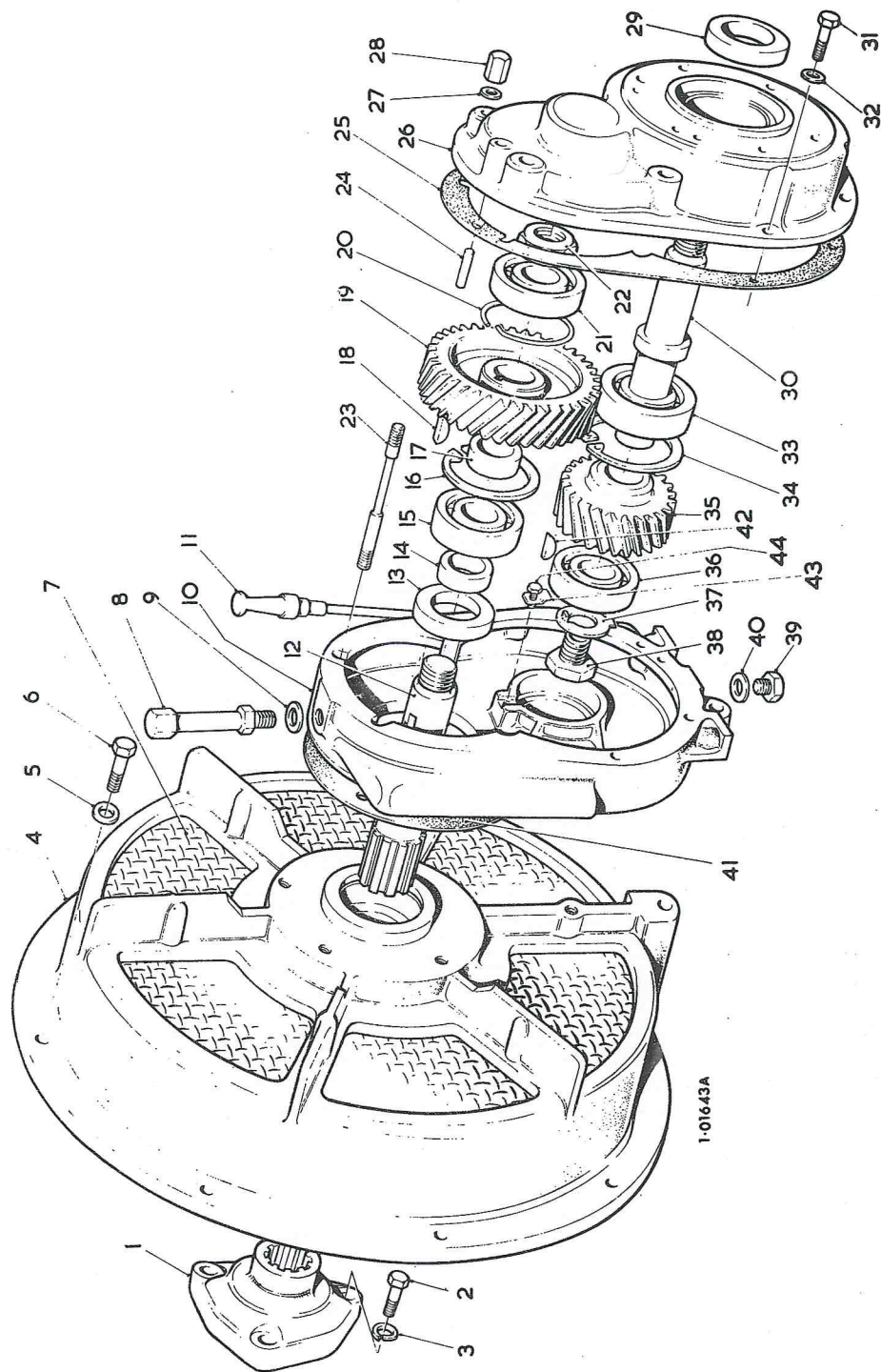
CRANKSHAFT CLUTCH WITH 2:1 AND 3:1 REDUCTION GEAR (Contd.)

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Roller Bearing	201-22400	1	1	1
Bearing Retaining Screw	201-17600	1	1	1
Lockwasher	201-17610	1	1	1
Retaining Clip	201-21060	1	1	1
Retaining Clip Screw	270-172	1	1	1
Oil Drain Plug	11-13-693	1	1	1
Joint	4-197	1	1	1
Breather Assembly	570-10780	1	1	1
Joint	4-197	1	1	1
Dipstick—2:1	570-10370	1	1	1
Dipstick—3:1	570-10200	1	1	1

*With the exception of the clutch shaft assembly noted in this list all other clutch parts are as listed on pages 88-90.

1 : 1.61 INCREASING GEAR FOR LD2, SL2 & SL3 ENGINES

Illus. No.	Description	Part No.	No. per Engine
1	Crankshaft Extension	202-16180	1
2	Setscrew—7/16" UNF x 1½"	270-274	3
3	Spring Washer	27-984	3
4	Adaptor	202-16100	1
5	Spring Washer	27-393	8
6	Setscrew—¾" UNC x 7/8"	270-286	7
—	Setscrew—¾" x 3"	270-373	1
7	Adaptor Guard	202-16060	1
—	Adaptor Guard Setscrew—¼" UNC x 5/8"	270-285	6
—	Spring Washer	27-393	6
—	Plain Washer	27-618	6
8	Oil Breather	570-10780	1
9	Joint	4-197	1
—	Gear Case Assembly comprising*	570-10520	1
10	*Gear Case	201-17720	1
11	Dipstick	570-10340	1
—	Dipstick Adaptor	27-4344	1
12	Shaft—splined	202-16190	1
13	Oil Seal	202-16240	1
14	Bearing Spacer	202-16130	1
15	Bearing	27-1638	1
16	Circlip	202-16250	1
17	Bearing Spacer	202-16140	1
18	Key	27-1228	2
19	Gear Wheel	201-17650	1
20	Retaining Ring	201-14840	1
21	Bearing—Roller	201-14790	1
22	Locknut	201-14440	1
23	Stud	201-17590	4
24	*Dowel—Cover to Gear Case	27-3677	2
25	Joint	201-17680	1
26	*Gear Case End Cover	201-17731	1
27	*Copper Washer	616-1608	4
28	Nut 5/16" UNF—Dome	270-46	4
29	Oil Seal	201-14120	1
30	Secondary Shaft	201-17690	1
31	*Setscrew—¼" UNF x 5/8"	270-276	4
32	Copper Washer	291-2609	4
33	Bearing	201-17430	1
34	Circlip	201-14110	1
35	Pinion	201-17640	1
36	Bearing	27-1638	1
37	Locking Washer	201-17610	1
38	Retaining Screw	201-17600	1
39	Oil Drain Plug	11-13-693	1
40	Joint	4-197	1
41	Joint—Gear Case to Adaptor	201-17710	1



1:1.61 INCREASING GEAR

MARINE BEARERS, FLEXIBLE MOUNTINGS AND CARDAN SHAFT

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.

NOTE.—The following FAN SHROUD and Fittings are required with MARINE BEARERS:—

1	Fan Shroud	201-12581	1	—	—
2	Fan Shroud Shim 0.002"	201-13580	As req.	—	—
—	Fan Shroud Shim 0.005"	201-13581	As req.	—	—
—	Fan Shroud Shim 0.010"	201-13582	As req.	—	—
3	Fan Shroud Bolt $\frac{5}{16}$ " UNF x $1\frac{1}{8}$ "	270-25	4	—	—
4	Socket Cap Screw $\frac{5}{16}$ " UNF x $\frac{3}{4}$ "	270-177	4	—	—
5	Fan Disc Washer	27-3929	4	—	—
6	Sealing Plate	201-13430	1	—	—
7	Setscrew $\frac{5}{16}$ " UNF x $\frac{5}{8}$ "	270-59	8	—	—
8	Spring Washer $\frac{5}{16}$ "	27-413	8	—	—
9	Filler Cap Assembly, comprising:	366-91	1	1	—
	Special Filler Cap	366-92	1	1	—
	Filler Cap Cover	366-93	1	1	—
10	Blanking Plate (not required with Electric Starting	201-13160	1	—	—
11	Bolt $\frac{3}{8}$ " UNF x $4\frac{1}{2}$ " (one for Electric Starting)	270-222	2	—	—
12	Bolt $\frac{3}{8}$ " UNF x 4"	270-245	1	—	—

NOTE.—The following basic parts are not required with Marine Bearers.

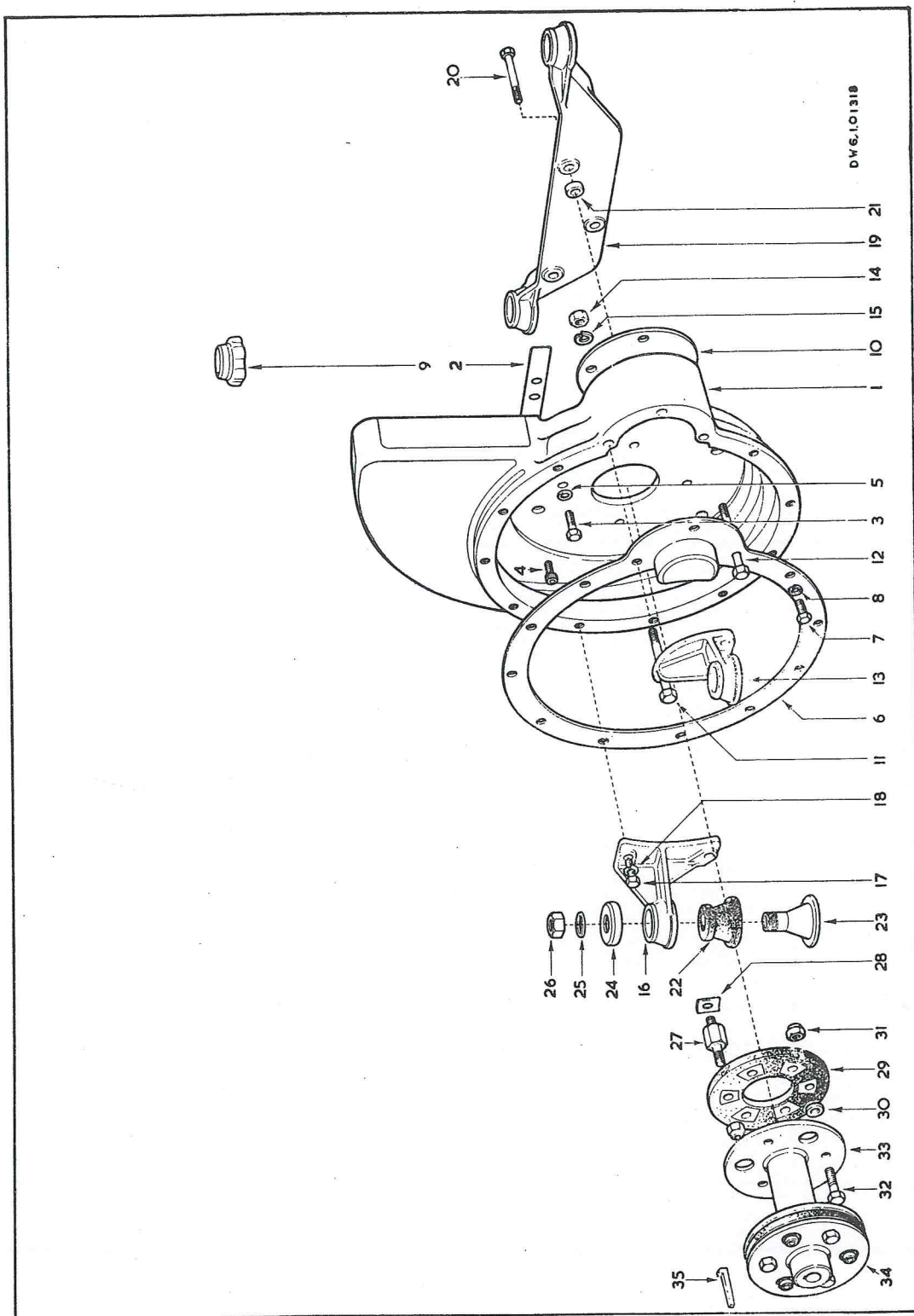
25	Shims 0.048"	201-12461	As req.	—	—
59	Bolt for Bearing Housing	270-61	4	—	—
24	Shroud	201-10422	1	—	—
20	End Cover Setscrews (Solid Mountings)	270-66	2	3	—
20	End Cover Setscrews (Flexible Mountings)	270-66	2	3	—
170	Oil Filler Cap	27-3824	1	—	—

MARINE ENGINE — FLEXIBLE MOUNTINGS

13	Marine Bearer—R.H. Aft	366-110	1	—	—
14	Nut $\frac{3}{8}$ " UNF	270-4	3	—	—
15	Spring Washer	27-393	3	—	—
16	Marine Bearer—L.H. Aft	366-109	1	—	—
17	Setscrew $\frac{5}{16}$ " UNF x $\frac{7}{8}$ "	270-61	2	—	—
18	Spring Washer	27-413	2	—	—
—	Marine Bearer—Rear	366-138	—	2	2
—	Stud $\frac{5}{8}$ " UNF-UNC x $3\frac{3}{4}$ "	270-248	—	4	4
—	Stud $\frac{5}{8}$ " UNF-UNC x $1\frac{1}{4}$ "	270-249	—	4	4
—	Nut $\frac{3}{8}$ " UNF	27-4	—	8	8
—	Spring Washer	27-393	—	8	8
—	Self Lock Nut for Forward End Bearer $\frac{5}{8}$ " UNF	270-154	3	3	3
19	Marine Bearer—Forward	366-2264	1	—	—
—	Marine Bearer—Forward	366-137	1	1	1
20	Bolt $\frac{5}{16}$ " UNF x $2\frac{3}{4}$ "	270-68	3	—	—
—	Stud $\frac{5}{16}$ " UNF x $3\frac{1}{4}$ " (replaces Std. Engine Bolt 270-66)	270-85	—	3	3
21	Distance Piece (2 only for Electric Starting)	291-3374	3	3	3
—	Plain Washer (Electric Starting only)	27-82	2	2	2

FLEXIBLE MOUNTINGS

—	Flexible Mounting, comprising:	366-111	4	4	4
22	Rubber Moulding	366-98	1	1	1
23	Centre	366-106	1	1	1
24	Shield	366-90	1	1	1
25	Fibre Washer	7-406	1	1	1
26	Nut $\frac{1}{2}$ " BSP	3-826	1	1	1



FLEXIBLE MOUNTINGS & CARDAN SHAFT

MARINE BEARERS, FLEXIBLE MOUNTINGS & CARDAN SHAFT (Contd.)

MARINE BEARERS, FLEXIBLE MOUNTINGS & CARDAN SHAFT							No. off per Engine		
Illus. No.	Description					Part No.	1 Cyl.	2 Cyl.	3 Cyl.
CARDAN SHAFT									
						201-12800	3	—	—
27	Coupling Stud	...	...	...	...	202-12800	—	3	—
—	Coupling Stud	...	...	...	...	201-13170	3	—	—
28	Coupling Stud Tab Washer	...	...	...	...	202-13170	—	3	—
—	Coupling Stud Tab Washer	...	...	...	...	30-307	2	2	—
29	Coupling Disc	...	...	...	...	201-13180	9	9	—
30	Plain Washer	...	...	...	...	270-159	9	9	—
31	Self Locking Nut $\frac{3}{8}$ " UNF	...	...	...	...	270-75	9	9	—
32	Bolt $\frac{3}{8}$ " UNF x $1\frac{1}{2}$"	...	...	...	...	366-26	1	1	—
33	Cardan Shaft	...	...	...	...	366-27	1	1	—
34	Coupling	...	...	...	...	366-28	1	1	—
35	Coupling Key	...	...	...	...

MARINE BEARERS & FLEXIBLE MOUNTINGS

MARINE PROPULSION ENGINE—LISTER REVERSE GEAR—FLEXIBLE MOUNTINGS

—	Marine Bearer—Forward	366-2264	1	—	—
—	Marine Bearer—Forward	366-137	—	1	1
—	*Bolt $\frac{5}{16}$ " UNF x $2\frac{3}{4}$ "	270-68	3	—	—
—	Stud $\frac{5}{16}$ " UNF x $3\frac{1}{4}$ "	270-85	—	3	3
—	Distance Piece (2 only with Electric Starting)	291-3374	3	3	3
—	Plain Washer (for Electric Starting only)	27-82	2	2	2
—	Self Lock Nut for Forward End Bearer $\frac{5}{16}$ " UNF	270-154	—	3	3
—	Filler Cap Assembly	366-91	1	1	1

MARINE PROPULSION ENGINE—LISTER REVERSE GEAR—SOLID MOUNTINGS

—	Marine Bearer—Forward	366-2	1	—	—
—	Bolt $\frac{5}{16}$ " UNF x $2\frac{3}{4}$ "	270-68	2	2	2
—	Plain Washer (1 only with Electric Starting)	27-82	2	2	2
—	Bolt $\frac{1}{2}$ " UNF x $2\frac{1}{4}$ "	270-474	2	2	2
—	Nut $\frac{1}{2}$ " UNF	270-6	2	2	2
—	Spring Washer	27-394	2	2	2
—	Marine Bearer—Forward	366-139	—	1	1
—	Distance Piece (1 only with Electric Starting)	291-3374	2	2	2
—	Filler Cap Assembly	366-91	—	1	1

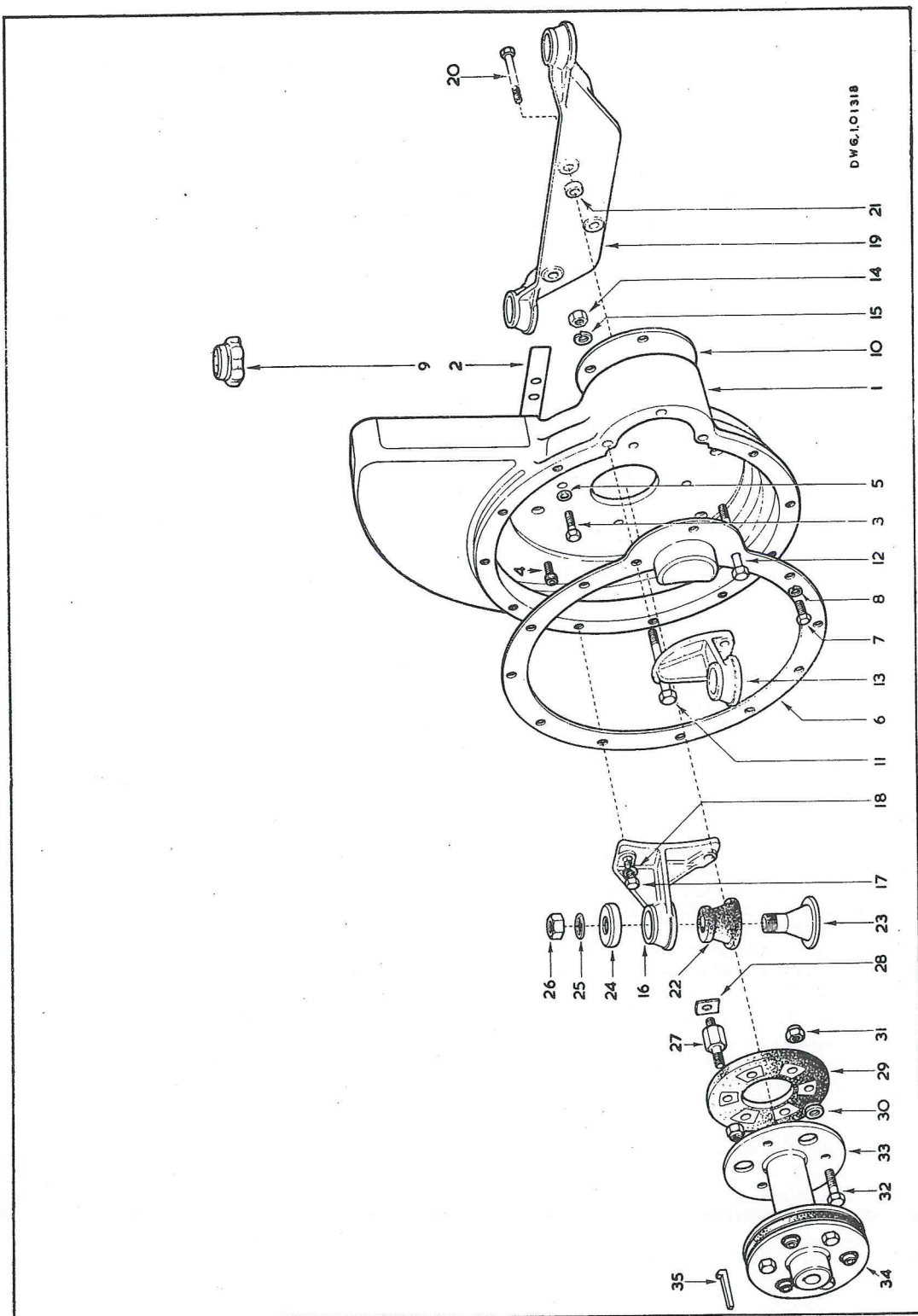
MARINE PROPULSION ENGINE—LISTER REVERSE GEAR—SOLID MOUNTINGS (AFT)

—	Support Bracket	201-14200	1	—	—
—	Support Bracket	202-14200	—	1	1
—	Support Bracket Stud $\frac{3}{8}$ " UNF x $1\frac{1}{4}$ "	270-91	8	8	8
—	Support Bracket Nut $\frac{3}{8}$ " UNF	270-4	8	8	8
—	Support Bracket Spring Washer	27-393	8	8	8
—	Filler Cap Assembly	366-91	—	1	1

MARINE BEARERS—SOLID TYPE

—	Marine Bearer—Flywheel End R.H.	366-3	1	—	—
—	Nut $\frac{3}{8}$ " UNF	270-4	3	—	—
—	Spring Washer $\frac{3}{8}$ "	27-393	3	—	—
—	Marine Bearer—Flywheel End L.H.	366-1	1	—	—

*Alternatively may be Stud 270-123 and Nut 270-3.

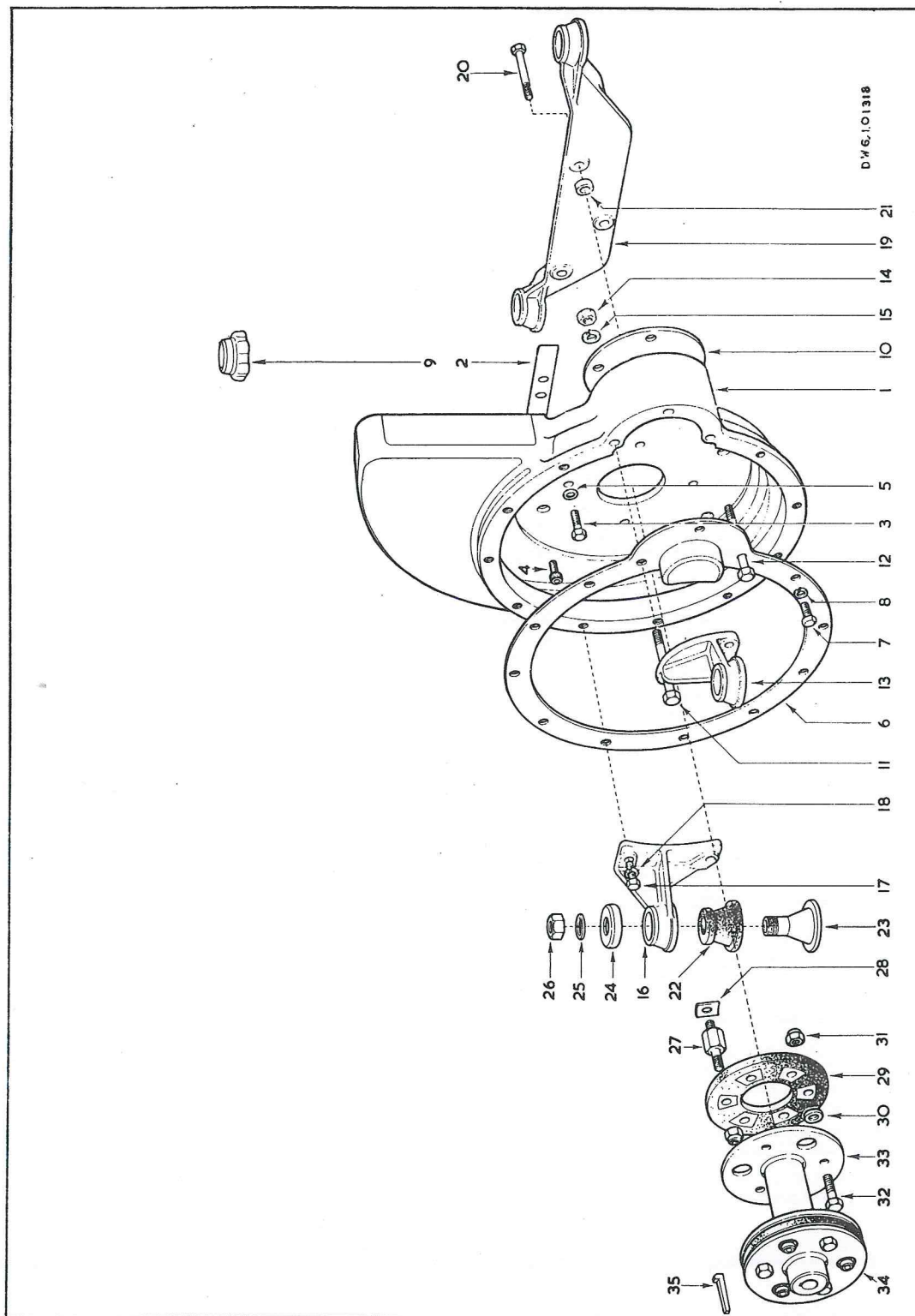


FLEXIBLE MOUNTINGS & CARDAN SHAFT

MARINE BEARERS, FLEXIBLE MOUNTINGS & CARDAN SHAFT (Contd.)

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Setscrew $\frac{5}{16}$ " UNF x 1"	270-61	2	—	—
Spring Washer $\frac{5}{16}$ "	27-413	2	—	—
Marine Bearer—Rear	366-140	—	2	2
Stud $\frac{3}{8}$ " UNF-UNC x $1\frac{3}{4}$ "	270-249	—	8	8
Nut $\frac{3}{8}$ " UNF	270-4	—	8	8
Spring Washer	27-393	—	8	8
Marine Bearer—Timing Gear End	366-2	1	—	—
Stud (replaces St'd End Cover Bolt 270-66)	270-85	2	—	—
Plain Washer $\frac{5}{16}$ " (5 only with Electric Starting)	27-82	8	—	—
Setscrew $\frac{1}{2}$ " UNF x $2\frac{1}{4}$ "	270-169	2	—	—
Nut $\frac{1}{2}$ " UNF	270-6	2	—	—
Spring Washer	27-394	2	—	—
Marine Bearer—Forward	366-139	—	1	1
Stud $\frac{5}{16}$ " UNF x $3\frac{1}{4}$ "	270-85	—	3	3
Distance Piece	291-3374	—	3	3
Plain Washer	27-82	—	2	2
Self Locking Nut $\frac{5}{16}$ " UNF	270-154	—	3	3

Be sure to quote the
ENGINE NUMBER
when ordering spare parts

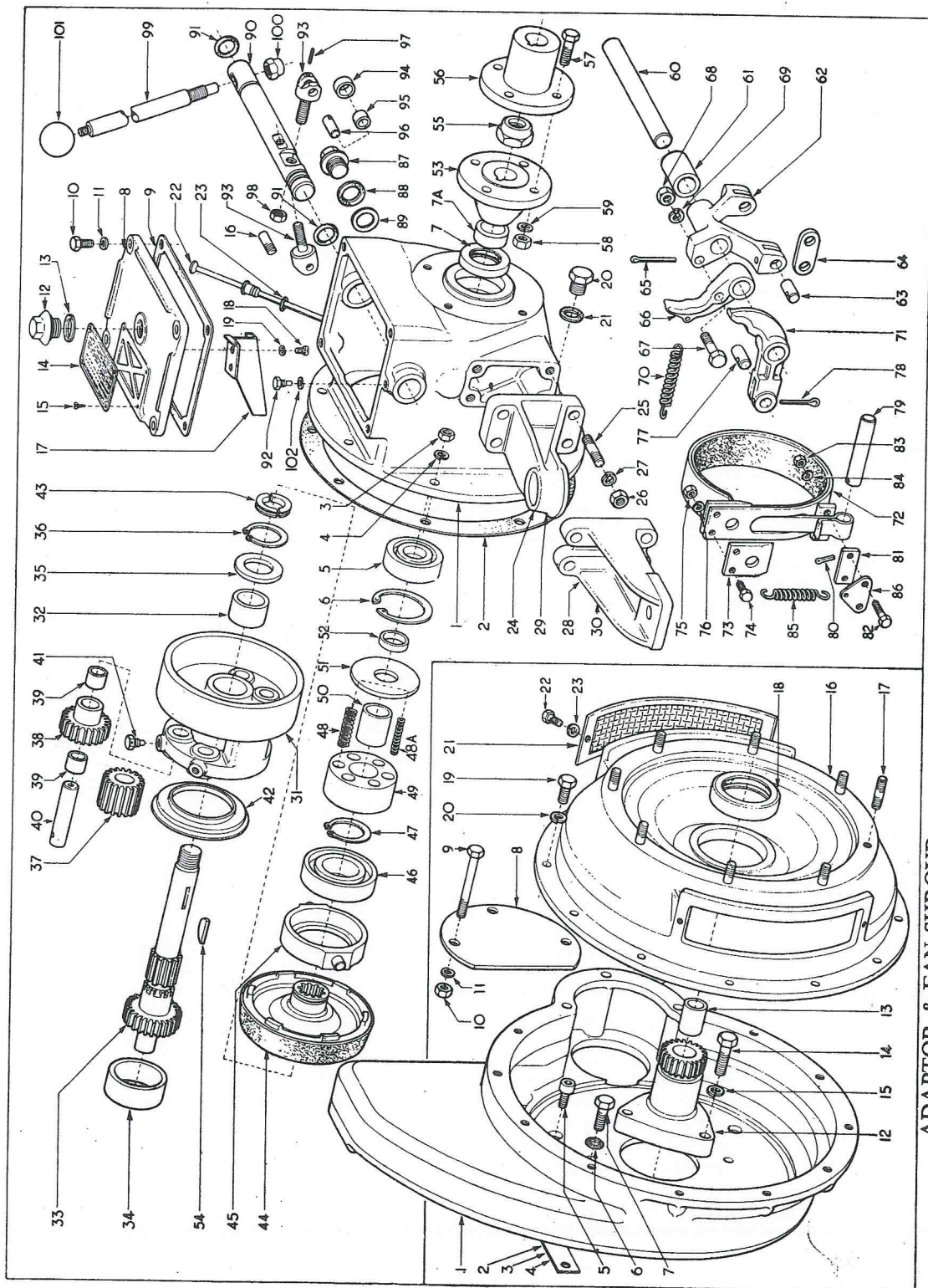


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FLEXIBLE MOUNTINGS & CARDAN SHAFT

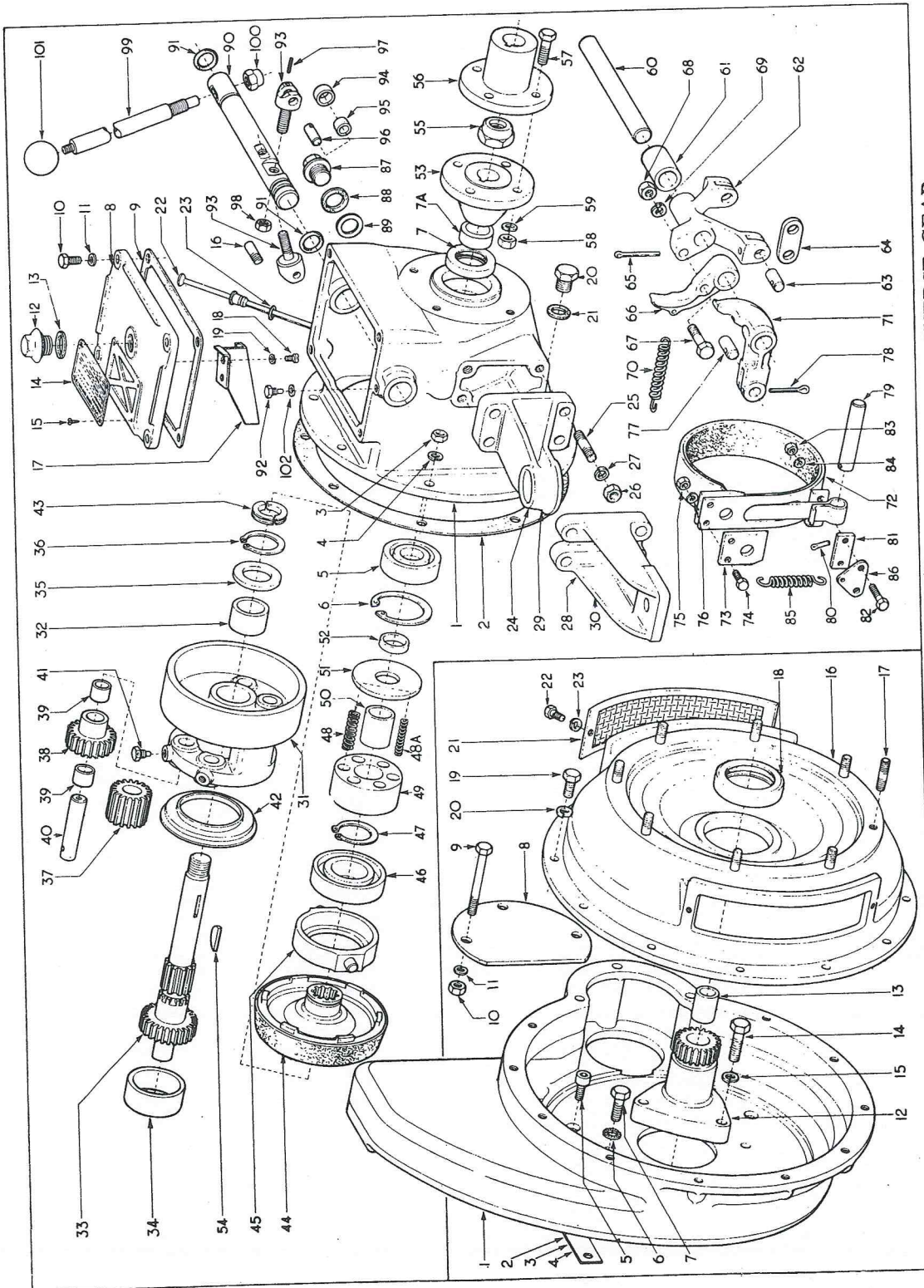
LISTER MARINE REVERSE GEAR

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
1	Casing ...	201-14080	1	1	1
2	Casing Joint ...	201-14090	1	1	1
3	Casing Nut $\frac{3}{8}$ " UNF ...	270-4	8	8	8
4	Casing Spring Washer ...	27-393	8	8	8
5	Casing Bearing ...	201-14100	1	1	1
6	Casing Circlip ...	201-14110	1	1	1
7	Casing Oil Seal ...	201-14120	1	1	1
7A	Oil Seal Bush ...	201-14990	1	1	1
8	Inspection Cover ...	201-14131	1	1	1
9	Inspection Cover Joint ...	201-14140	1	1	1
10	Inspection Cover Setscrew $\frac{5}{16}$ " UNF x $\frac{3}{4}$ " ...	270-60	4	4	4
11	Inspection Cover Spring Washer ...	27-413	4	4	4
12	Oil Filter and Breather Plug ...	201-14150	1	1	1
13	Oil Filter and Breather Plug Joint ...	13-21-778	1	1	1
14	Instruction Plate ...	203-14160	1	1	1
15	Instruction Plate Dowel ...	27-707	4	4	4
16	Locating Stud for Handle ...	201-14170	2	2	2
17	Oil Deflector ...	201-14181	1	1	1
18	Screw for Oil Deflector $\frac{3}{16}$ " UNF x $\frac{1}{4}$ " ...	270-272	2	2	2
19	Spring Washer for do. ...	27-717	2	2	2
20	Drain Plug ...	27-1815	1	1	1
21	Drain Plug Joint ...	291-3063	1	1	1
22	Dipstick (including Ring 201-13120) ...	572-10210	1	1	1
23	Dipstick Adaptor ...	27-4344	1	1	1
SUPPORT BRACKETS					
24	Support Bracket (Flexible mounting only) ...	201-14190	2	—	—
25	Support Bracket Stud $\frac{3}{8}$ " UNF x $1\frac{5}{8}$ " ...	270-90	8	8	8
26	Support Bracket Nut $\frac{3}{8}$ " UNF ...	270-4	8	8	8
—	Nut— $\frac{3}{8}$ " UNF—Cap—solid mounting only ...	270-207	8	8	8
27	Support Bracket Spring Washer ...	27-393	8	8	8
28	Support Bracket (Solid mountings only) ...	201-14200	2	—	—
29	Support Bracket (Flexible mounting) ...	202-14210	—	2	2
30	Support Bracket (Solid mounting) ...	202-14220	—	2	2
CLUTCH BODY					
31	Clutch Body ...	201-22761	1	1	1
32	Clutch Body Bush—small ...	201-22580	1	1	1
33	Reverse Shaft ...	201-14341	1	1	1
34	Clutch Body Bush—large ...	201-14250	1	1	1
35	Reverse Shaft Locating Washer ...	201-14260	1	1	1
36	Reverse Shaft Circlip ...	201-13830	1	1	1
37	Reverse Pinion ...	201-14271	2	2	2
38	Reverse Pinion—stepped ...	201-14281	2	2	2
39	Reverse Pinion Bush ...	201-22590	8	8	8
40	Reverse Pinion Shaft ...	201-22650	4	4	4
41	Reverse Pinion Shaft Locking Screw ...	201-22660	4	4	4
42	Clutch Body Oil Thrower ...	201-14320	1	1	1
43	Clutch Body Retainer (Two halves) ...	201-14330	1	1	1
—	Thrust Washer ...	201-22630	1	1	1
—	Thrust Washer ...	201-22640	1	1	1
—	Inner Clutch Cone Assy. ...	570-10311	1	1	1
44	Inner Clutch Cone ...	203-14351	1	1	1
—	Clutch Cone Lining ...	203-20730	1	1	1
—	Rivets for Lining ...	203-20740	12	12	12



LISTER MARINE REVERSE GEAR (Contd.)

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
CLUTCH					
45	Clutch Operating Yoke	201-14360	1	1	1
46	Clutch Operating Yoke Bearing	201-14370	1	1	1
47	Clutch Operating Yoke Circlip	201-13830	1	1	1
48	Clutch Spring (Outer)	203-14380	6	6	6
48	Clutch Spring (Inner)	203-14381	6	6	6
49	Clutch Spring Housing	204-22770	1	1	1
50	Clutch Spring Housing Sleeve	201-14400	1	1	1
51	Clutch Spring Retaining Plate	201-14410	1	1	1
52	Distance Piece	201-14420	1	1	1
53	Half Coupling (Not required with Reduction Gear)	201-14430	1	1	1
54	Half Coupling Key	27-1228	1	1	1
55	Half Coupling Nut	201-14440	1	1	1
56	Tail Shaft Half Coupling	201-14450	1	1	1
57	Tail Shaft Half Coupling Bolt	270-74	4	4	4
58	Tail Shaft Half Coupling Nut	270-4	4	4	4
59	Tail Shaft Half Coupling Spring Washer	27-393	4	4	4
—	Packing Disc	204-23610	1	1	1
OPERATING LEVERS					
60	Fulcrum Shaft	201-14460	1	1	1
61	Fulcrum Shaft Distance Piece	201-14470	1	1	1
62	Clutch Operating Lever	201-14480	1	1	1
63	Clutch Operating Lever Pin	201-14490	2	2	2
64	Clutch Operating Lever Link	201-14500	2	2	2
65	Clutch Operating Lever Split Pin	27-2253	2	2	2
66	Clutch Operating Cam Lever	204-14510	1	1	1
67	Clutch Operating Cam Lever Pin	201-14520	1	1	1
68	Clutch Operating Cam Lever Nut $\frac{3}{8}$ " UNF	270-4	1	1	1
69	Clutch Operating Cam Spring Washer	27-393	1	1	1
70	Clutch Operating Cam Spring	201-14530	1	1	1
71	Brake Band Lever	201-14540	1	1	1
72	Brake Band Complete	203-20750	1	1	1
73	Brake Band End Plate	201-14560	2	2	2
74	Brake Band End Plate Bolt $\frac{1}{4}$ " UNF x $\frac{5}{8}$ "	270-23	2	2	2
75	Brake Band End Plate Nut $\frac{1}{4}$ " UNF	270-2	2	2	2
OPERATING MECHANISM					
76	Brake Band Clamp Spring Washer	27-451	2	2	2
77	Brake Band Pin	201-14570	1	1	1
78	Brake Band Split Pin	27-1363	1	1	1
79	Brake Band Anchor Pin	201-14580	1	1	1
80	Brake Band Anchor Pin Split Pin	27-981	1	1	1
81	Brake Band Clamping Plate	201-14590	2	2	2
82	Brake Band Clamping Plate Bolt $\frac{1}{4}$ " UNF x 1"	270-56	2	2	2
83	Brake Band Clamping Plate Nut $\frac{1}{4}$ " UNF	270-2	2	2	2
84	Brake Band Spring Washer	27-451	2	2	2
85	Brake Band Spring	201-14600	1	1	1
86	Brake Band Spring Anchor Plate	201-14610	1	1	1
87	Fulcrum Shaft Retaining Plug	7-407	1	1	1
88	Fulcrum Shaft Retaining Joint	13-21-778	1	1	1
89	Fulcrum Shaft Distance Washer (if necessary)	201-14620	1	1	1



LISTER MARINE REVERSE GEAR (Contd.)

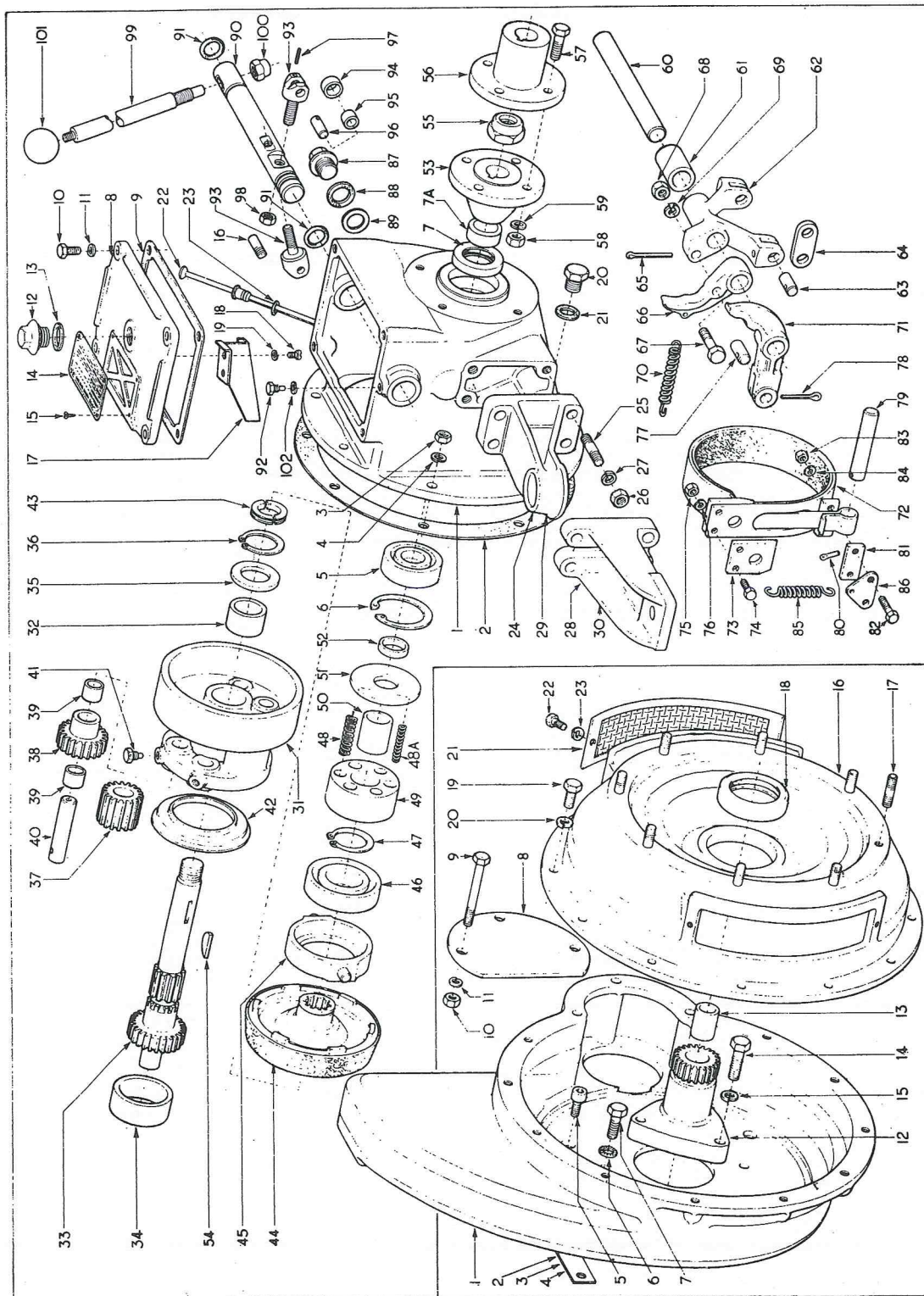
Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
REVERSE LEVER AND SHAFT					
90	Operating Shaft	201-14362	1	1	1
91	Operating Shaft Sealing Ring	201-14640	2	2	2
92	Operating Shaft Locating Set Screw	201-14651	1	1	1
—	Locating Bolt—when reverse lever is fitted to port side	201-23510	1	1	1
—	Nut ½" UNF—self locking	270-236	1	1	1
—	Roller Adjusting Screw Assembly—Items 93-97 ...	570-10150	—	—	—
93	Roller Adjusting Screw	201-14661	2	2	2
94	Roller	291-2256	2	2	2
95	Roller Bush	291-2255	2	2	2
96	Roller Pin	201-11451	2	2	2
97	Roller Pin Retaining Pin	201-11460	2	2	2
98	Adjusting Screw Lock Nut	201-16400	2	2	2
99	Reverse Lever (includes parts No. 201-14710, 201-14720, 201-14731)	201-14671	1	1	1
100	Reverse Lever Nut ½" UNF—self locking	270-236	1	1	1
101	Reverse Lever Knob	291-3019	1	1	1
102	Spring Washer for Locating Set Screw	27-451	1	1	1

LISTER MARINE REVERSE GEAR FAN SHROUD, DRIVING GEAR & ADAPTOR

1	Fan Shroud	201-12581	1	—	—
2	Fan Shroud Strip Shim 0.002"	201-13580	As req.	—	—
3	Fan Shroud Strip Shim 0.005"	201-13581	As req.	—	—
4	Fan Shroud Strip Shim 0.010"	201-13582	As req.	—	—
5	Fan Shroud Socket Cap Screw $\frac{5}{16}$ " UNF x $\frac{3}{4}$ "	270-327	4	—	—
6	Fan Shroud Spring Washer	27-413	4	—	—
7	Fan Shroud Bolt $\frac{5}{16}$ " UNF x $\frac{1}{8}$ "	270-25	4	—	—
8	Blanking Plate (Not required with Electric Starting)	201-13160	1	—	—
9	Blanking Plate Bolt $\frac{3}{8}$ " UNF x $\frac{1}{2}$ "	270-222	3	—	—
10	Blanking Plate Nut $\frac{3}{8}$ " UNF	270-4	3	—	—
11	Blanking Plate Spring Washer	27-393	3	—	—
12	Driving Gear	202-14691	1	1	1
13	Driving Gear Bush	201-14680	1	1	1
14	Driving Gear Bolt $\frac{1}{16}$ " UNF x $\frac{1}{2}$ "	270-317	3	3	3
15	Driving Gear Spring Washer	27-984	3	3	3
16	Adaptor Casing to Fan Shroud	201-14060	1	—	—
—	Adaptor Casing to Fan Shroud	202-14030	—	1	1
17	Adaptor Stud to Casing $\frac{3}{8}$ " UNF-UNC x $\frac{1}{2}$ "	270-260	8	8	8
18	Adaptor Oil Seal	503-2202	1	1	1
19	Adaptor Bolt to Fan Shroud $\frac{5}{16}$ " UNF x $\frac{7}{8}$ "	270-24	10	10	10
—	Adaptor Stud to Fan Shroud $\frac{3}{8}$ " UNF-UNC x $\frac{3}{4}$ "	270-248	—	8	8
—	Adaptor Nut to Fan Shroud $\frac{3}{8}$ " UNF	270-4	—	8	8
20	Adaptor Spring Washer	27-413	10	10	10
—	Adaptor Spring Washer	27-393	—	8	8
21	Air Intake Guard	201-14070	2	2	2
—	Air Intake Guard	202-14040	—	1	1
—	Air Intake Guard	202-14050	—	1	1
22	Air Intake Guard Screw $\frac{1}{4}$ " UNF x $\frac{5}{8}$ "	270-276	4	4	4
23	Spring Washer	27-451	4	4	4
—	Holding Strap	202-14700	—	7	7
—	Clutch Instruction Plate	203-14160	1	1	1

1" JABSCO PUMP AND DRIVE

JABSCO PUMP, 1"	390-649	—	1	1
Brammer Belt 40°	390-648	—	1	1
Engine Half Speed Shaft Pulley	366-970	—	1	1
Key	366-201	—	1	1
Grub Screw $\frac{1}{4}$ " UNF 28-2A x $\frac{3}{8}$ "	270-211	—	1	1



MARINE REVERSE GEAR

ADAPTOR & FAN SHROUD

HYDRAULIC REVERSE GEAR

FAN SHROUD, DRIVING GEAR & ADAPTOR

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Fan Shroud	201-12581	1	—	—
Shim—0.002"	201-13580	as required		
Shim—0.005"	201-13581	as required		
Shim—0.010"	201-13582	as required		
Socket Cap Screws	270-327	4	—	—
Spring Washer	27-413	4	—	—
Bolt	270-25	4	—	—
Blanking Plate	201-13160	1	—	—
Bolt	270-222	3	—	—
Nut	270-4	3	—	—
Spring Washer	27-393	3	—	—
Driving Gear	201-25700	1	1	1
Driving Gear Bush	201-14680	1	1	1
Bolt for Driving Gear	270-317	3	3	3
Spring Washer	27-984	3	3	3
Adaptor—case to fan shroud	201-25710	1	—	—
Adaptor—case to fan shroud	201-25720	—	1	1
Bolt—adaptor to fan shroud	270-24	10	—	—
Spring Washer	27-413	10	—	—
Adaptor Oil Seal	351-13150	1	1	1
Stud—adaptor to case	270-260	8	8	8
Spring Washer	27-393	8	8	8
Nut	270-207	8	8	8
Stud—adaptor to fan shroud	270-248	—	8	8
Nut	270-207	—	8	8
Spring Washer	27-393	—	8	8
Air Intake Guard	201-14070	1	—	—
Air Intake Guard	202-14041	—	1	1
Setscrew	270-285	4	—	—
Spring Washer	27-451	4	—	—
Plug	201-25800	1	1	1
Copper Joint	616-1608	1	1	1
'O' Ring for Driving Gear	66-7857	1	1	1

CLUTCH CASING

Casing	201-25320	1	1	1
Joint—casing to adaptor	201-25740	1	1	1
Thrust Bearing	201-22500	1	1	1
Circlip	201-22530	1	1	1
Oil Seal & Bearing Bush	201-22480	1	1	1
Oil Seal	201-14120	1	1	1
Inspection Cover	201-25330	1	1	1
Cover Joint	201-25340	1	1	1
Setscrew	270-61	9	9	9
Spring Washer	27-413	9	9	9
Oil Filler and Breather Plug	201-14150	1	1	1
Joint	13-21-778	1	1	1
Instruction Plate—English		1	1	1
Dowel for plate	27-707	4	4	4
Magnetic Drain Plug	201-25360	1	1	1
Joint for Plug	291-3063	1	1	1
Dipstick	572-10210	1	1	1
Dipstick Adaptor	27-4344	1	1	1

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Splash Guard Assembly comprising:—	201-25372	1	1	1
Guard	201-25380	1	1	1
Legs	201-25390	2	2	2
Setscrew	270-54	2	2	2
Spring Washer	27-451	2	2	2
Plug for casing	270-193	1	1	1
Plug—for inspection cover	21-153	1	1	1
Joint—for Plug	13-22-350	1	1	1
Oil Drip Feed Pipe	201-25820	1	1	1
Swivel Union Plug	201-25830	1	1	1
Joint—for plug	600-106	2	2	2

CLUTCH BODY

Clutch Body	201-25760	1	1	1
Clutch Body Bush (Small)	201-22580	1	1	1
Reverse Shaft	201-22470	1	1	1
Clutch Body Bush (Large)	201-14250	1	1	1
Reverse Shaft Thrust Washer	201-22630	1	1	1
Reverse Shaft Thrust Washer (Large)	201-22640	1	1	1
Reverse Shaft Locating Washer	201-14260	1	1	1
Clutch Body Retainer (2 halves)	201-14330	1	1	1
Circlip	201-13830	1	1	1
Reverse Shaft Pinion	201-14271	2	2	2
Reverse Shaft Pinion (stepped)	201-14281	2	2	2
Pinion Bush	201-22590	8	8	8
Spur Pinion Shaft	201-22650	4	4	4
Locking Screw—to be wired in pairs	201-22660	4	4	4
Locking Wire—16G or 17G Bright MS		as required		

CLUTCH OPERATING PISTON AND LEVER

Clutch Lever Operating Piston	201-25400	1	1	1
Piston Ring	201-25410	1	1	1
Adjusting Screw	201-25420	1	1	1
Locknut	270-538	1	1	1
Circlip	201-25430	1	1	1
Piston Cover	201-25440	1	1	1
'O' Ring—for cover	201-25780	1	1	1
Retaining Screw for Cover	270-60	3	3	3
Spring Washer	27-413	3	3	3
Clutch Operating Lever	201-25450	1	1	1
Operating Lever Pivot Pin	201-25460	2	2	2
Retaining Plug	7-407	2	2	2
Copper Joint	13-21-778	2	2	2
Clutch Operating Lever Link	201-14500	2	2	2
Split Pin	27-2253	2	2	2
Operating Lever Pin	201-14490	2	2	2
Plug—for Piston Cover	201-25800	1	1	1
Copper Joint	616-1608	1	1	1

SUPPORT BRACKETS

Support Bracket—flexible mountings only	201-14190	2	—	—
Support Bracket—flexible mountings only	201-14210	—	2	2
Stud—both flexible and solid mountings	270-90	8	8	8

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
SUPPORT BRACKETS (Contd.)				
Nut— $\frac{3}{8}$ " UNF—flexible mountings only	270-4	8	8	8
Spring Washer—both flexible and solid mountings	27-393	8	8	8
Support Bracket—solid mountings only	201-14200	2	—	—
Support Bracket—solid mountings only	201-14220	—	2	2
Nut—cap brass— $\frac{3}{8}$ " U.N.F.—solid mountings only	270-207	8	8	8
COUPLING				
Half Coupling—direct drive	201-14430	1	1	1
Key	27-1228	1	1	1
Coupling Nut	201-14440	1	1	1
Tail Shaft Half Coupling	201-14450	1	1	1
Coupling Bolt	270-74	4	4	4
Coupling Nut	270-4	4	4	4
Spring Washer	27-393	4	4	4
BRAKE BAND & OPERATING PISTONS				
Brake Band Operating System	201-25470	1	1	1
Piston Ring	201-25480	1	1	1
Brake Band Actuating Spindle	201-25490	1	1	1
Spindle Nut	270-154	1	1	1
Washer	201-25510	1	1	1
'O' Ring	352-11840	2	2	2
Brake Band Clamping Piece	201-25520	2	2	2
Bolt	270-366	2	2	2
Bolt	270-55	1	1	1
Spring Washer	27-451	3	3	3
Nut	270-2	3	3	3
Push-off Spring	201-25530	1	1	1
Brake Band	203-20750	1	1	1
Clamping Plate—for brake band	201-14950	2	2	2
Bolt	270-56	2	2	2
Nut	270-2	2	2	2
Spring Washer	27-451	2	2	2
Brake Band Anchor Pin	201-14580	1	1	1
Split Pin	27-981	1	1	1
HYDRAULIC PUMP				
Pump—standard rotation	202-25910	1	1	1
Strainer comprising:—	201-25600	1	1	1
Body Inner	201-25610			
End Cover Inner	201-25620			
Outer Gauze	201-25640			
Beading	201-25630			
Strainer Retaining Nut	270-1	2	2	2
Spring Washer	27-717	2	2	2
Setscrew	270-23	2	2	2
Spring Washer	27-451	2	2	2
Pump Gear	201-25650	1	1	1
Key—for gear	201-25660	1	1	1
Washer	27-618	1	1	1
Retaining Nut	270-153	1	1	1

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Pump Driving Gear	201-25670	1	1	1
Oil Delivery Pipe	201-25680	1	1	1
Union Plug	2-508	1	1	1
Copper Joint	13-22-350	2	2	2
'O' Ring—for flange	352-11840	1	1	1
Retaining Screw	201-25900	2	2	2
Locking Wire—16 or 17G M.S.		as required		

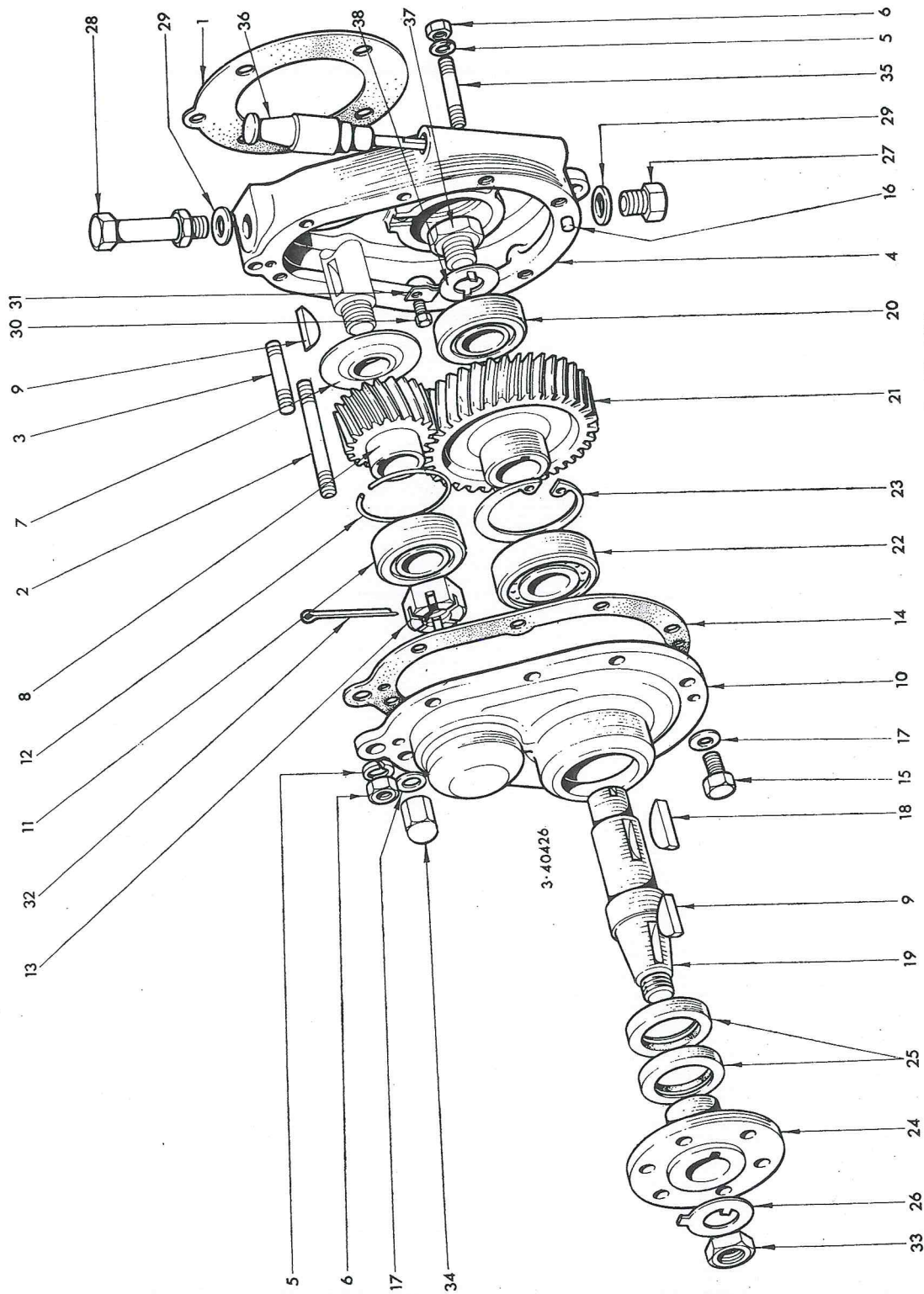
SELECTOR VALVE

Selector Valve	201-25540	1	1	1
'O' Ring	291-3512	2	2	2
Relief Valve	201-25554	1	1	1
or Relief Valve	201-25555	1	1	1
or Relief Valve	201-25556	1	1	1
or Relief Valve	201-25557	1	1	1
or Relief Valve	201-25558	1	1	1
Relief Valve Spring	201-25561	1	1	1
Relief Valve Adjusting Screw	201-25571	1	1	1
'O' Ring	203-40140	1	1	1
Selector Valve Retaining Cover	201-25580	1	1	1
Cover Joint	201-25790	1	1	1
Cover 'O' Ring	616-1895	1	1	1
Retaining Screw	270-235	2	2	2
Copper Washer	616-1608	2	2	2
Selector Valve Locating Ball	138	1	1	1
Spring—for locating ball	100	1	1	1
Selector Valve Lever	201-25591	1	1	1
Setscrew	270-103	4	4	4
Spring Washer	27-717	4	4	4
Shim for relief valve spring	201-25840	as required		
Joint	201-26080	1	1	1
Reflux Valve Disc	201-25860	1	1	1
Reflux Valve Spring	201-25870	1	1	1
Reflux Valve Plug	201-25880	1	1	1
Blanking Screw—for retaining cover	270-501	1	1	1
Spring Washer	27-413	1	1	1

REDUCTION GEAR—2:1-3:1—With Hydraulic Reverse Gear LD/SL1-2 and SL3 Engines

Illus. No.	Description	Part No.	No. Fitted
1	Joint		
2	Stud 5/16" UNF x 3 3/4"	201-22490	1
3	Stud 3/8" UNF x 3 1/2"	270-452	4
—	Gear Case Assembly comprising *	270-94	1
4	*Gear Case	570-10530	
5	Spring Washer	201-22200	1
6	Nut 3/8" UNF	27-393	3
7	Oil Trap	270-4	3
8	Pinion 2:1	204-24920	1
—	Pinion 3:1	201-22270	1
9	Pinion and Half Coupling Key	201-22230	1
10	*Gear Case Cover	27-1228	2
11	Roller Bearing	201-22210	1
12	Bearing Retaining Ring	201-17630	1
13	Pinion Nut	201-14840	1
14	Joint	204-24930	1
15	*Setscrew—Gear Case Cover	201-22370	1
16	*Dowel	270-24	4
17	*Copper Washer	27-3677	2
18	Gear Wheel Key	616-1608	4
19	Secondary Shaft	27-2004	1
20	Secondary Shaft Roller Bearing	201-22301	1
21	Gear Wheel 2:1	201-22400	1
—	Gear Wheel 3:1	201-22280	1
22	Thrust Bearing	201-22240	1
23	Circlip	201-22450	1
24	Half Coupling—SAE No. 2	201-22390	1
25	Oil Seal	204-22350	1
26	Lockwasher	201-22420	2
27	Drain Plug	201-25030	1
28	Oil Breather Assembly	11-13-693	1
29	Drain Plug & Breather Joint	570-10780	1
30	Bearing Retaining Clip Screw	4-197	2
31	Bearing Retaining Clip	270-172	1
32	Split Pin	201-21060	1
33	Nut—Secondary Shaft	27-121	1
34	Dome Nut—5/16" UNF	270-579	1
35	Stud 3/8" UNF x 1 1/8"	270-46	4
36	Dipstick 2:1	270-111	2
37	Lockwasher	570-10370	1
38	Bearing Retaining Screw	201-17610	1
—	Dipstick 3:1	201-17600	1
—	Dipstick Adaptor	570-10200	1
—	Tailshaft Half Coupling	27-4344	1
—	Bolt	204-22340	1
—	Spring Washer	270-317	6
—	Nut	27-984	6
		270-5	6

NOTE:- Pinions and gearwheels are only supplied in matched pairs.

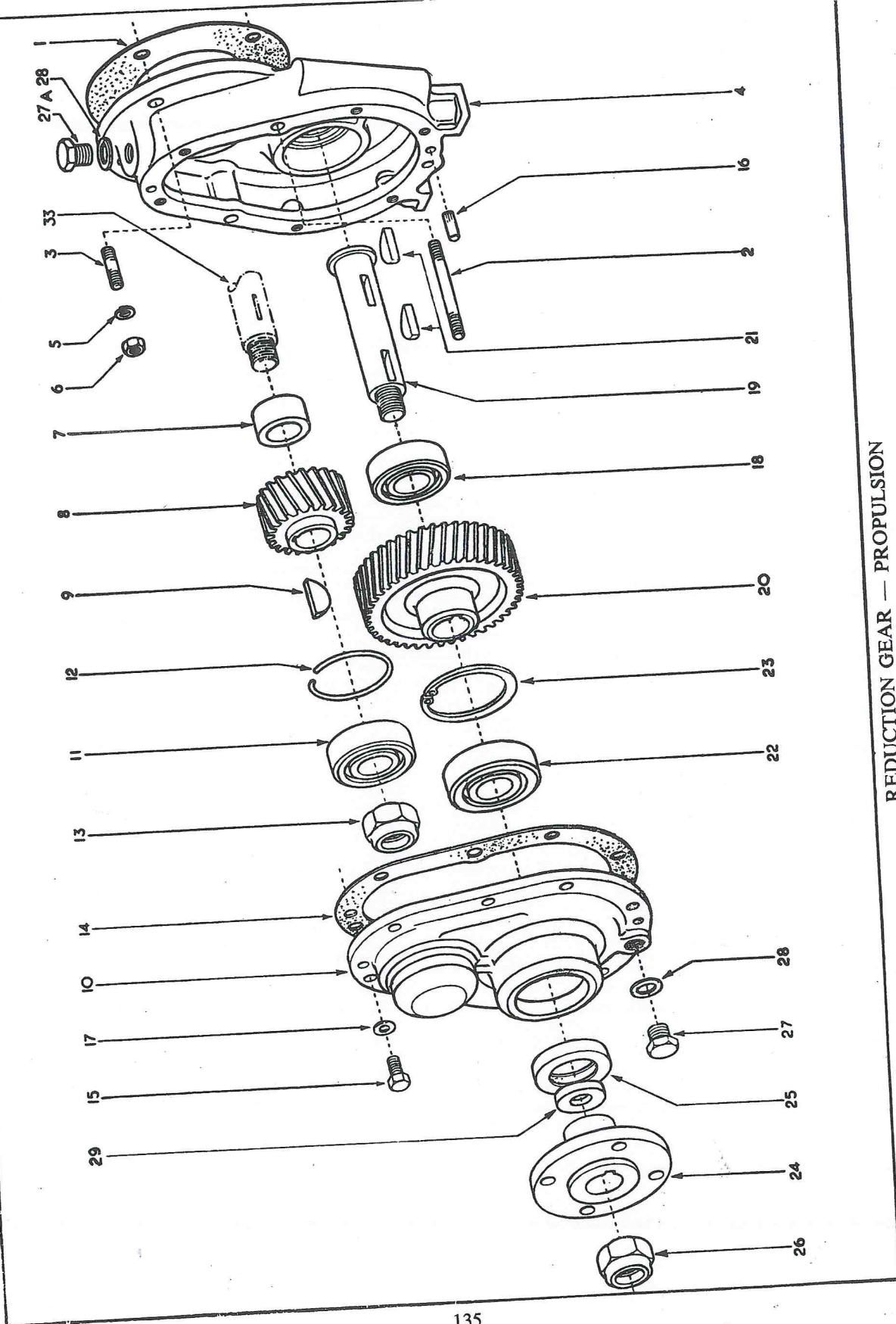


2-1 REDUCTION GEAR (PROPULSION)—MANUALLY OPERATED REVERSE GEAR

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
—	Reduction Gear—complete	366-953	—	—	—
1	Joint, Reverse to Reduction Gear	201-14740	1	1	1
2	Stud, Reverse to Reduction Gear	291-2077	2	2	2
3	Stud, Reverse to Reduction Gear $\frac{5}{16}$ " UNF x $1\frac{1}{8}$ "	270-98	2	2	2
—	Gearcase Assembly — comprising *	570-10510	—	—	—
4	*Reduction Gear Case	201-14750	1	1	1
5	Spring Washer $\frac{5}{16}$ "	27-413	4	4	4
6	Nut $\frac{5}{16}$ " UNF—brass	270-14	4	4	4
7	Pinion Spacer	201-14760	1	1	1
8	Pinion	203-14770	1	1	1
9	Key	27-1228	1	1	1
10	*Gear Case End Cover	201-14780	1	1	1
11	Bearing (Roller, light)	201-14790	1	1	1
12	Retaining Ring	201-14840	1	1	1
13	Lock Nut (Normally fitted to Reverse Gear)	201-14440	1	1	1
14	Joint (Gear Case)	201-14800	1	1	1
15	*Setscrew $\frac{1}{4}$ " UNF x $\frac{5}{8}$ "	270-276	6	6	6
16	*Dowel	27-3677	2	2	2
17	*Copper Washer	291-2609	6	6	6
18	Bearing (Secondary Shaft)	27-1638	1	1	1
19	Secondary Shaft	201-14810	1	1	1
20	Gear Wheel	203-14820	1	1	1
21	Key	27-1228	2	2	2
22	Bearing (Thrust)	201-14100	1	1	1
23	Circlip	201-14110	1	1	1
24	Half Coupling	201-14830	1	1	1
25	Oil Seal	201-14120	1	1	1
26	Lock Nut	201-14440	1	1	1
27	Plug (Oil Drain)	11-13-693	2	2	2
27A	Oil Filler and Breather Plug Assembly	570-10231	1	1	1
—	Dipstick	572-10210	1	1	1
—	Dipstick Adaptor	27-4344	1	1	1
28	Joint Washer	4-197	2	2	2
29	Oil Seal Bush	201-14990	1	1	1

3-1 REDUCTION GEAR (PROPULSION)—MANUALLY OPERATED REVERSE GEAR

—	Reduction Gear—complete	366-1539	—	—	—
—	Joint (Reverse to Reduction Gear)	201-14740	—	—	1
—	Stud (Reverse to Reduction Gear) $\frac{5}{16}$ " UNF x $3\frac{3}{4}$ "	270-452	—	—	4
—	Copper Washer	616-1608	—	—	4
—	Domed Nut $\frac{5}{16}$ " UNF—brass	270-46	—	—	4
—	Gearcase Assembly — comprising *	570-10520	—	—	—
—	*Gear Case	201-17720	—	—	1
—	Pinion	201-17661	—	—	1
—	Key	27-1228	—	—	1
—	*Gear Case End Cover	201-17731	—	—	1
—	Pinion Spacer	201-14760	—	—	1
—	Roller Bearing	201-17630	—	—	1
—	Locknut	201-17620	—	—	1
—	Retaining Ring	201-14840	—	—	1
—	Joint (Gear Case Cover)	201-17680	—	—	1
—	*Setscrew (Gear Case Cover) $\frac{1}{4}$ " UNF x $\frac{5}{8}$ "	270-276	—	—	4
—	*Copper Washers	291-2609	—	—	4
—	*Dowel (Cover to Gear Case)	27-3677	—	—	2



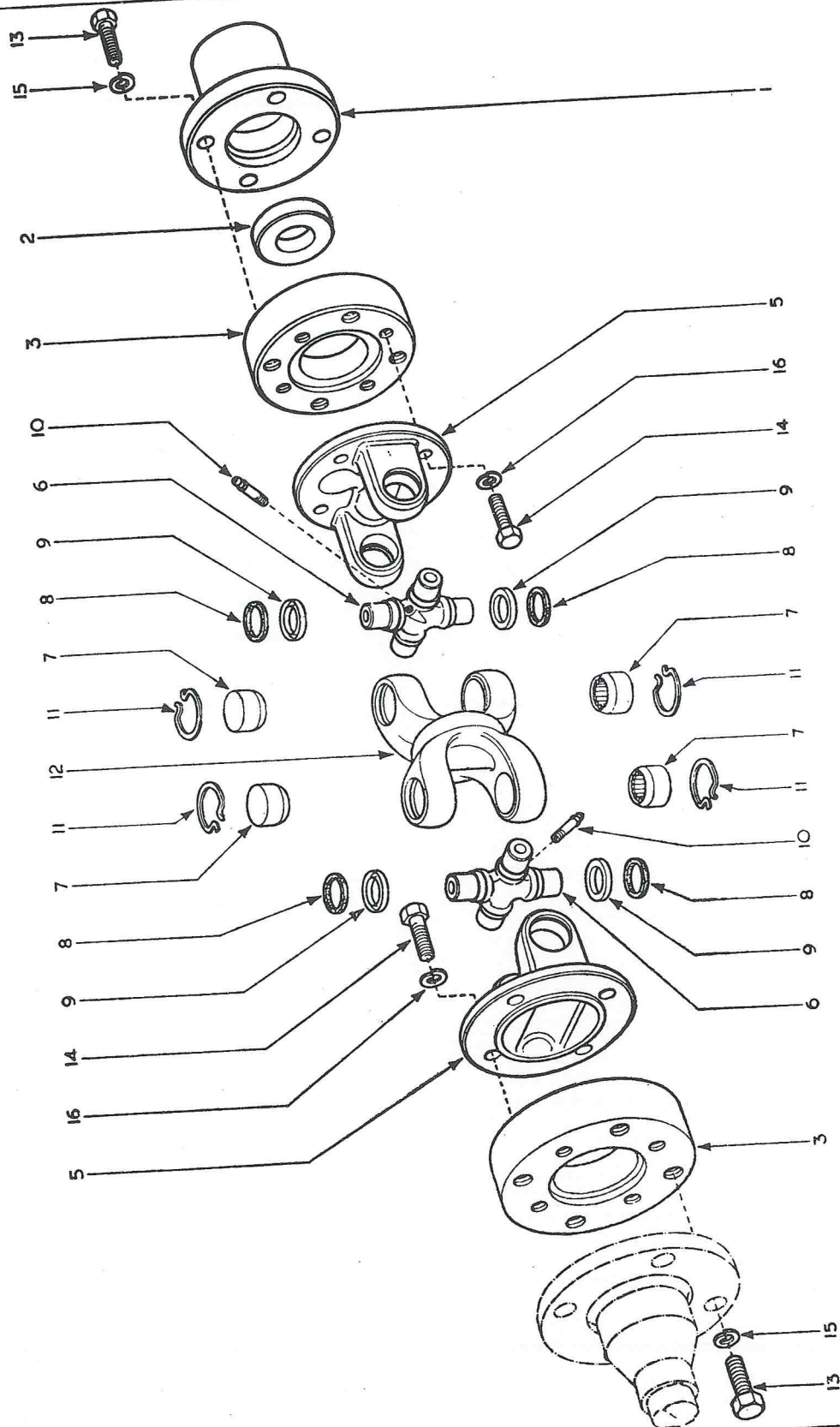
REDUCTION GEAR — PROPULSION

3-1 REDUCTION GEAR (PROPULSION)—(Contd.)

Illus. No.	Description	Part No.	No. off per engine		
			1 Cyl.	2 Cyl.	3 Cyl.
—	Bearing (Secondary Shaft)	27-1638	—	—	1
—	Secondary Shaft	201-14810	1	—	—
—	Gear Wheel	201-17671	1	—	—
—	Key for do.	27-1228	2	—	—
—	Bearing (Thrust)	201-14100	1	—	—
—	Circlip	201-14110	1	—	—
—	Half Coupling	201-14830	1	—	—
—	Oil Seal	201-14120	1	—	—
—	Lock Nut	201-14440	1	—	—
—	Plug (Oil Drain)	11-13-693	1	—	—
—	Oil Breather Plug (complete)	570-10231	1	—	—
—	Joint Washer	4-197	2	—	—
—	Oil Seal Bush	201-14990	1	—	—
—	Dipstick	570-10200	1	—	—
—	Dipstick Adaptor	27-4344	1	—	—

FLEXIBLE COUPLING—PROPULSION

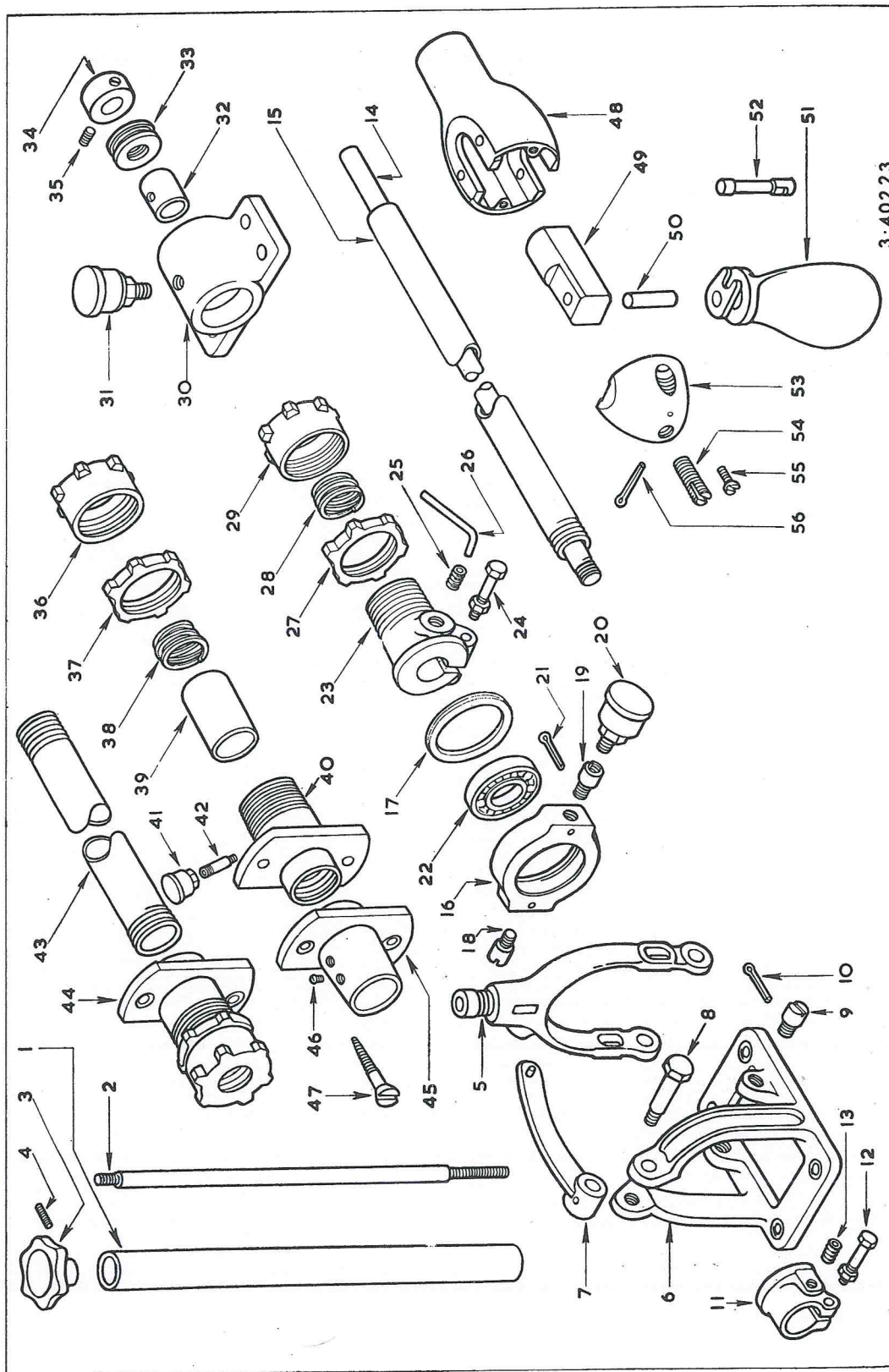
1	Pilot Bored Coupling	201-14450	1	1	1
2	Spigot Plate	366-621	1	1	1
3	Adaptor Plate	366-622	2	2	2
4	Flexible Coupling, comprising :	366-592	1	1	1
5	Flange Yoke	673-10000	2	2	2
—	Journal Assembly, comprising :	673-10010	2	2	2
6	Journal	673-10020	2	2	2
7	Bearing Race Assembly	673-10030	8	8	8
8	Journal Gasket	673-10040	8	8	8
9	Journal Gasket Retainer	673-10050	8	8	8
10	Journal Greaser	673-10060	2	2	2
11	Circlip	673-10070	8	8	8
12	Stub Base Yoke Assembly	673-10080	1	1	1
13	Setscrew $\frac{3}{8}$ " UNF x $\frac{7}{8}$ "	270-72	8	8	8
14	Setscrew $\frac{5}{16}$ " UNF x $\frac{3}{4}$ "—brass	270-26	8	8	8
15	Washers	27-393	8	8	8
16	Washers	27-413	8	8	8



FLEXIBLE COUPLING — PROPULSION

**VARIABLE PITCH REVERSIBLE PROPELLER (LD1M & SL1M)
(OPTIONAL EXTRA)**

Illus. No.	Description	Part No.	No off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
—	CONTROL LEVER ASSEMBLY	667-10000	1	—	—
1	Tube for Control Fork	667-10010	1	—	—
2	Locking Rod for Lever	667-10020	1	—	—
3	Knob for Locking Rod	667-10030	1	—	—
4	Securing Pin for Knob	667-10040	1	—	—
5	Control Fork	667-10050	1	—	—
6	Control Bracket	667-10060	1	—	—
7	Quadrant for Bracket	667-10070	1	—	—
8	Bolt for Quadrant	667-10080	1	—	—
9	Fulcrum Pin	667-10090	2	—	—
10	Split Pin for Fulcrum Pin	667-10100	2	—	—
—	AFT CLAMP COLLAR ASSEMBLY	667-10110	1	—	—
11	Aft Clamp Collar only	667-10120	1	—	—
12	Aft Clamp Collar Bolt and Nut	667-10130	1	—	—
13	Aft Clamp Collar Allen Screw	667-10140	2	—	—
14	Propeller Shaft (specify length) up to 5ft.	667-10150	1	—	—
15	Operating Tube (specify length) up to 4½ft.	667-10160	1	—	—
16	Trunnion Control Ring only	667-10170	1	—	—
17	Trunnion Control Lock Ring	667-10180	1	—	—
18	Pin for Control Ring	667-10190	1	—	—
19	Pin for Control Ring (tapped for Greaser)	667-10200	1	—	—
20	Grease Lubricator for Control Ring Bearnig	667-10210	1	—	—
21	Split Pin for Control Pins	667-10220	2	—	—
22	Ball Bearing for Control Ring	667-10230	1	—	—
—	CLAMP CONTROL GLAND ASSEMBLY	667-10240	1	—	—
23	Clamp Control Gland only	667-10250	1	—	—
24	Clamp Control Gland Bolt and Nut	667-10130	1	—	—
25	Allen Screw	667-10140	2	—	—
26	Hexagon Key for Allen Screws	667-10260	1	—	—
27	Clamp Control Gland Lock Nut	667-10270	1	—	—
28	Gland Packing	667-10280	1	—	—
29	Gland Nut	667-10290	1	—	—
30	THRUST BLOCK ASSEMBLY	667-10300	1	—	—
31	Grease Lubricator	667-10210	1	—	—
32	Bush only for Thrust Block	667-10310	1	—	—
33	Thrust Race for Thrust Block	667-10320	2	—	—
34	Collar for Thrust Block	667-10330	2	—	—
35	Allen Screw for Collars	667-10140	2	—	—
—	STERN TUBE ASSEMBLY (Specify Length) up to 2ft.	667-10340	1	—	—
36	Gland Nut for Inside Bearing	667-10350	1	—	—
37	Lock Nut for Gland	667-10270	1	—	—
38	Gland Packing for Stern Bearings	667-10280	1	—	—
39	Anti-Friction Liner only for Bearings	667-10360	2	—	—
40	Inside Gland Bearing complete	667-10370	1	—	—
41	Grease Lubricator for Inside Gland Bearing	667-10380	1	—	—
42	Extension Tube for Greaser	667-10390	1	—	—
43	Stern Tube only (specify length) up to 2ft.	667-10400	1	—	—
44	Outside Gland Bearing Assy. Alternative to item 45	667-10410	1	—	—
45	Outside Plain Bearing complete	667-10420	1	—	—
46	Grub Screw Securing Liner	667-10430	4	—	—



3-40223

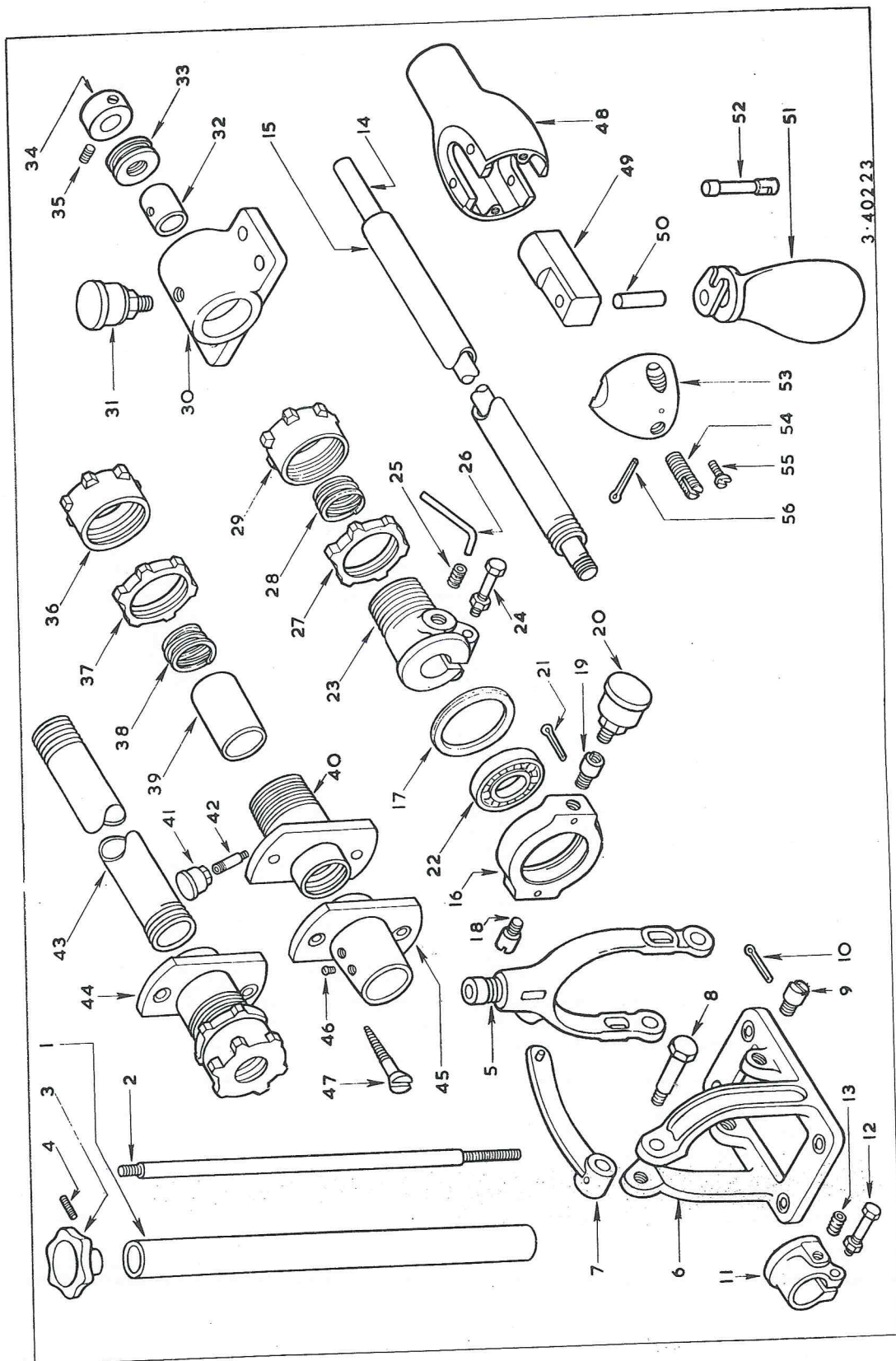
VARIABLE PITCH PROPELLERS

**VARIABLE PITCH REVERSIBLE PROPELLER (LD1M & SLIM)
(OPTIONAL EXTRA)—(Contd.)**

Illus. No.	Description	Part No.	No. off per Engine		
			1 Cyl.	2 Cyl.	3 Cyl.
47	Wood Screw for Stern Bearing	667-10440	4	—	—
—	PROPELLER ASSEMBLY 11" Right Hand ...	667-10450	1	—	—
48	Propeller Boss only	667-10460	1	—	—
—	Trunnion Head Assembly	667-10470	1	—	—
49	Trunnion Head only	667-10480	1	—	—
50	Trunnion Head Pin	667-10490	1	—	—
51	Propeller Blade 11" Right Hand	667-10500	2	—	—
52	Blade Operating Pin	667-10510	2	—	—
53	Propeller Boss Cap	667-10520	1	—	—
54	Pitch Limit Screw	667-10530	1	—	—
55	Screw for Cap	667-10540	2	—	—
56	Split Pin for Limit Screw	667-10550	1	—	—

NOTE : (1) *Items can be obtained in various lengths.

(2) When ordering spare parts quote number stamped on propeller boss.



3-40223

VARIABLE PITCH PROPELLERS

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
STARTING HANDLE				
Starting Handle Complete (Standard Rot.) } comprising:	201-12510	1	1	1
Starting Handle Complete (Reverse Rot.) }	201-13320	1	1	1
Starting Handle Crank (Standard Rotation) ...	201-12500	1	1	1
Starting Handle Crank (Reverse Rotation)	201-13310	1	1	1
Clutch Pin	2-125	1	1	1
Clutch Pin Spring	2-126	1	1	1
Split Pin	27-120	1	1	1
Wood Grip	3-364	1	1	1
Quill Iron	201-12520	1	1	1
Washer	27-85	1	1	1
PULLEYS (Bolt on Flywheel—without Extension Shaft)				
Pulley 3½" dia. x 4½" Face (Non Stan.) } Must NOT	201-13330	1	—	—
Pulley 4" dia. x 4½" Face } be used on	201-13340	1	—	—
Pulley 5" dia. x 4½" Face } SL3	201-13350	1	—	—
Pulley 6" dia. x 4½" Face	201-13360	1	1	1
Pulley 7" dia. x 6" Face (Non Standard LD1) ...	201-26030	1	1	1
Pulley 8" dia. x 6½" Face (Non Standard LD1) ...	201-26040	1	1	1
Pulley 9" dia. x 6½" Face (Non Standard)	201-26050	—	1	1
Stud—Pulley to Flywheel 7/16" UNF x 1½"	270-298	3	3	3
Nut—Pulley to Flywheel 7/16" UNF	270-5	3	3	3
Spring Washer	27-984	3	3	3
PULLEYS—Key on Camshaft				
Pulley 5" dia. x 4½" Face	201-13390	1	—	—
Pulley 6" dia. x 4½" Face (Non St. LD2) } be used on	201-13400	1	1	1
Pulley 7" dia. x 4½" Face (Non St. LD1) } SL3	201-13410	1	1	—
Pulley 8" dia. x 4½" Face (Non Standard LD1) ...	201-13420	1	1	1
Pulley 9" dia. x 4½" Face (Non Standard)	202-14970	1	1	1
Pulley Key	27-353	1	1	1
Pulley Key Setscrew 5/16" UNF x ¾"	270-60	1	1	1
SPANNERS				
Double Ended Spanner 7/16" x ½" AF	27-3838	1	1	1
Double Ended Spanner 9/16" BSW x 11/16" AF	27-4076	1	1	1
Double Ended Spanner 3/8" x 7/16" Whit.	27-339	1	1	1
Double Ended Spanner 9/16" x 5/8" AF	27-3839	1	1	1
Special Flat Spanner	27-4075	1	1	1
FLEXIBLE COUPLING—Marine Auxiliary				
Coupling Stud	202-12800	3	3	—
Tab Washer	202-13170	3	3	—
Hardy Coupling Disc	30-307	1	1	—
Distance Washer	27-184	3	3	—
Coupling Rough Bored 11/16" dia.	1-1172	1	1	—
Coupling Bolt 3/8" BSW	27-201	3	3	—
Coupling Nut 3/8" BSW	27-6	3	3	—
Self Lock Nut 3/8" UNF	270-159	3	3	—
Lock-Washer for Coupling Bolt	27-393	3	3	—
Coupling Plate	203-18150	—	—	1
Coupling Plate Stud 7/16" UNF x 1½"	270-392	—	—	3
Coupling Plate Nut 7/16" UNF—self locking	270-311	—	—	3

FLEXIBLE COUPLING (Contd.)

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Coupling Stud	203-12800	—	—	3
Coupling Tab Washer	202-13170	—	—	3
Coupling Disc	203-18160	—	—	1
Coupling Nut $\frac{3}{8}$ " UNF—self locking	270-159	—	—	3
Half Coupling	1-1172	—	—	1
Half Coupling Distance Washer	201-13180	—	—	3
Half Coupling Bolt	27-201	—	—	3
Half Coupling Nut	27-6	—	—	3

SPECIAL TOOLS

Extractor for Crankshaft Pinion	317-81
Tapered Guide Sleeve	317-82
Flywheel Ret. Screw Insert for 10-7-194	317-6
Tool for Assembly & Extraction of Main and Camshaft Bearing	317-84
Valve Seat Recess Cutter—for exhaust valve	317-85
Valve Seat Recess Cutter—for inlet valve	317-189
Valve Seat Cutter 26433	317-86
Withdrawal Clamp for Flywheel	317-87
Reamer & Fixture for Small End Bushes	317-88
Piston Ring Clamp	317-90
Valve Spring Compressor SK.201.42	317-91
Pipe for Injector Testing Set	317-92
Nozzle Cleaning Kit ET.140	317-117
Bent Nose Circlip Pliers	317-95
Shank for Valve Cutter 17230	317-96
Pliers for Gudgeon Pin Circlips	317-53
Pipe for Injector Timing	317-98
Spanner for Coupling Stud $\frac{3}{4}$ " A.F. King Dick NO.O.C.A. 2224	27-4197
Spanner for Fuel Oil Union $\frac{5}{16}$ " x $\frac{3}{8}$ "	27-151
Spanner for Injector $\frac{5}{8}$ " B.S.F.	27-518
Spanner for Cylinder Head $\frac{11}{16}$ " x $\frac{13}{16}$ "	27-4175
$\frac{3}{8}$ " UNF Bolts for use with 317/87	270-74
Combination Spanner	27-4075

WOLFE KING 202-12870 STD ROT } 2/3 GALS
202-12871 REV ROT }

ELECTRIC STARTING—LUCAS

(See Drawings ED.6105 and ED.6838)

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Flywheel and Starter Ring Assembly 1800 r.p.m.	201-12880	1	—	—
Flywheel and Starter Ring Assembly 1500 r.p.m.	201-13660	1	—	—
Flywheel and Starter Ring Assembly	570-10142	—	1	—
Flywheel and Fan Assembly	570-10162	—	—	1
Flywheel and Fan Assembly—Rev. Rot.	570-10163	—	—	1
Flywheel and Fan Assembly—Rev. Rot.	570-10147	—	1	—
Starter Motor Distance Piece	202-13720	—	1	1
Starter Motor Stud	270-325	—	3	3
Dynamo Bracket—Cast Iron	201-12760	1	1	1
Dynamo Bracket—Steel	201-12770	1	1	1
Dynamo Bracket Stud $\frac{5}{16}$ " UNF x $1\frac{1}{8}$	270-98	2	2	2
Nut $\frac{5}{16}$ " UNF	270-3	4	4	4
Spring Washer	27-413	7	7	7
Setscrew $\frac{5}{16}$ " UNF x $2\frac{1}{2}$ " (Not supplied with Marine Bearers)	270-67	1	1	1
Adjusting Link	201-12850	1	1	1
Adjusting Link Washer	27-85	1	1	1
Bolt $\frac{5}{16}$ " UNF x $1\frac{1}{8}$ "	270-25	1	1	1
Bolt $\frac{5}{16}$ " UNF x 1"	270-61	1	1	1
Setscrew	291-3694	1	1	1
Fan Shroud	201-12581	1	—	—
Fan Shroud Shim 0.002"	201-1358 ⁷	As req.	—	—
Fan Shroud Shim 0.005"	201-1358 ₁	As req.	—	—
Fan Shroud Shim 0.010"	201-13582	As req.	—	—
Socket Cap Screw $\frac{5}{16}$ " UNF x $\frac{3}{4}$ "	270-177	4	—	—
Fan Disc Washer $\frac{5}{16}$ "	27-3929	4	—	—
Bolt for Fan Shroud	270-25	4	—	—
Sealing Plate	201-13430	1	—	—
Setscrew $\frac{5}{16}$ " UNF x $\frac{5}{8}$ "	270-59	10	—	—
Spring Washer $\frac{5}{16}$ "	27-413	10	—	—
Bolt $\frac{3}{8}$ " UNF x $\frac{1}{2}$ "	270-222	3	—	—
Nut $\frac{3}{8}$ " UNF	270-4	3	—	—
Spring Washer $\frac{3}{8}$ "	27-393	3	—	—
Dynamo Driving Pulley	201-12840	1	1	1
Dynamo Driven Pulley	201-12830	1	1	1
Dynamo Driving Belt	201-12780	1	—	—
Dynamo Driving Belt	202-12780	—	1	1
Dynamo Driving Pulley Key	27-4057	1	1	1
Socket Setscrew	270-225	1	1	1
Lucas Starter Motor Type M35-G-1	201-13270	1	—	—
Lucas Starter Motor	202-17010	—	1	1
Lucas Dynamo, Type C40A	291-36961	1	1	1
Lucas Controller	64-19099	1	1	1
Lucas ST. 18 Starter Switch (Not required for Remote Control)	201-13290	1	—	—
Lucas Ammeter BM4	291-3705	1	1	1
Battery Lug. Positive	64-6922	1	1	1
Battery Lug. Negative	64-6923	1	1	1
Battery Cables	—	2	2	2
Battery	291-32331	1	1	1
Push Button—Type SS5	64-9266	—	1	1
Wiring Diagram	ED.6105	1	—	—
Wiring Diagram	ED.6838	—	1	1

AUTO-LITE ELECTRIC STARTING SL3—NORTH AMERICA ONLY

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
AUTO-LITE DYNAMO (Not supplied by Lister Blackstone Marine)	201-15110	—	—	1
Dynamo Driving Pulley	201-12840	—	—	—
Key	27-4057	—	—	1
Socket Setscrew $\frac{3}{8}$ " UNF x $\frac{3}{8}$ "	270-225	—	—	1
Belt	201-15050	—	—	1
Dynamo Pulley	201-15040	—	—	1
AUTO-LITE STARTER MOTOR (Not supplied by Lister Blackstone Marine)	202-15120	—	—	1
Distance Piece	202-15420	—	—	1
Push Button Starter Switch (Not supplied by Lister Blackstone Marine)	201-15100	—	—	1
Ammeter (Optional Extra)	291-3705	—	—	1
Battery Lug, Positive (Optional Extra)	64-6922	—	—	1
Battery Lug, Negative (Optional Extra)	64-6923	—	—	1
Battery Cables (Optional Extra)	ED.6562	—	1	2
Wiring Diagram	92321	—	1	1
Arrangement Drawing	111979	—	—	1
Arrangement Drawing—SL3MGR				
FLYWHEEL AND FAN ASSEMBLY	570-10162	—	—	1
Flywheel and Fan Assembly—Rev. Rot.	570-10163	1	1	1
Support Bracket for Dynamo	202-15430	—	—	1
Support Bracket Shim	201-15060	—	—	As req.
Support Bracket Stud $\frac{5}{16}$ " UNF x $1\frac{1}{4}$ "	270-81	—	—	2
Support Bracket Spring Washer	27-413	—	—	2
Support Bracket Nut $\frac{5}{16}$ " UNF	270-3	—	—	2
Stud for Starter Motor $\frac{3}{8}$ " UNF-UNC x $3\frac{1}{4}$ "	270-259	—	—	3
Bracing Stay	203-15460	—	—	1
Bracing Stay Setscrew $\frac{5}{16}$ " UNF x $\frac{3}{4}$ "	270-60	—	—	1
Bracing Stay Spring Washer	27-413	—	—	1
Bracing Stay Nut $\frac{5}{16}$ " UNF	270-3	—	—	1
Support Plate for Dynamo	202-23950	—	—	1
Support Plate Packing Washer	27-82	—	—	2
Support Plate Bolt $\frac{5}{16}$ " UNF x $2\frac{1}{2}$ "	270-67	—	—	2
Adjusting Link for Dynamo	201-15020	—	—	1
Adjusting Link—Rev. Rot.	201-23770	—	1	1
Adjusting Link Distance Piece	203-23970	—	—	1
Adjusting Link Spring Washer	27-413	—	—	2
Adjusting Link Nut $\frac{5}{16}$ " UNF	270-3	—	—	2
Adjusting Link Setscrew $\frac{5}{16}$ " UNC x $\frac{3}{4}$ "	270-231	—	—	1
Adjusting Link Plain Washer	27-82	—	—	1
Adjusting Link Spring Washer	27-413	—	—	1
Bolt (Dynamo to Bracket) $\frac{5}{16}$ " UNF x $1\frac{1}{8}$ "	270-25	—	—	2
Bolt (Dynamo to Bracket) Rev. Rot. with 1—270-25	270-63	—	1	1
Spring Washer	27-413	—	—	2
Nut $\frac{5}{16}$ " UNF	270-3	—	—	1
MARINE CONTROL PANEL—ELECTRIC STARTING				
Control Panel Assembly	570-10051	1	1	1
Control Panel	366-1207	1	1	1
Instruction Plate	366-1208	1	1	1
Instruction Plate Screw	64-7175-1	4	4	4
Sealing Ring for Ammeter	366-176	1	1	1
Solenoid Switch (Not required with LD2)	351-31480	1	—	1
Lucas Starter Button	64-9266	1	1	1

CONTROL PANEL ASSEMBLY—HAND STARTING

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Control Panel Assembly	570-10101	1	1	1
Control Panel	366-1207	1	1	1
Instruction Plate	366-1209	1	1	1
Instruction Plate Screw	64-7175-1	4	4	4
Blanking Plate for Ammeter Hole	291-3217	1	1	1
Blanking Plate Strap	291-3218	1	1	1
Blanking Plate Screw	270-53	1	1	1
Blanking Plate Nut	270-13	1	1	1
Blanking Plate Spring Washer	27-451	1	1	1
VARIABLE SPEED CONTROL				
End Cover	201-13450	1	1	1
Governor Weight 600-1800 rev/min.	201-10733	2	2	—
Governor Weight 600-1800 rev/min.	201-10732	2	2	—
Governor Weight 700-2000 rev/min.	354-21561	—	—	2
Governor Link Assembly	201-10892	1	1	—
Bracket	201-19240	1	1	1
Lever	201-19180	1	1	1
Distance Piece	201-19200	1	1	1
Bolt $\frac{5}{16}$ " UNF x $1\frac{1}{4}$ "—brass	270-416	1	1	1
Plain Washers	64-6612-8	2	2	2
Nut $\frac{5}{16}$ " UNF—brass	270-14	1	1	1
Adjusting Stud—Short	201-17061	1	1	1
Adjusting Stud—Long	201-15161	1	1	1
Nuts $\frac{1}{4}$ " UNF	270-2	2	2	2
Adjuster	201-19210	1	1	1
Speeder Spring 700-2000 rev/min.	201-10900	1	1	1
Speeder Spring 600-1800 rev/min.	203-10903	—	—	1
Cable and Wire Assembly 3ft.	351-16370	1	1	1
or Cable and Wire Assembly 6ft.	351-16371	1	1	1
Bracket for Control Cable	201-19280	1	1	1
Bolt $\frac{1}{4}$ " UNF x $\frac{3}{4}$ "	270-55	1	1	1
Spring Washer	27-451	1	1	1
Nut $\frac{1}{4}$ " UNF	270-2	1	1	1
Cover	201-19270	1	1	1
Connection Screw for Bowden Cable	201-19190	1	1	1
Lock Nut	64-2577-7	1	1	1
Return Spring	366-175	1	1	1
Operating Lever Assembly—items marked *	572-10360	1	1	1
*Detent Plate Assembly	351-15911	1	1	1
*Control Lever Assembly	351-15961	1	1	1
*Fulcrum Pin	351-15991	1	1	1
*Fulcrum Pin Key	351-19490	1	1	1
*Fulcrum Pin Spring Washer	351-19530	2	2	2
*Fulcrum Pin Washer	351-19500	1	1	1
*Fulcrum Pin Self-Locking Nut $\frac{1}{2}$ " UNF	270-236	1	1	1
*Spring Washer	27-394	3	3	3
*Nut	270-6	2	2	2
*Control Lever Knob	291-3019	1	1	1
*Ratchet	351-16021	1	1	1
*Ratchet Spring	351-19510	1	1	1
*Ratchet Split Pin	27-4336	1	1	1
*Stop Screw $\frac{1}{4}$ " UNF x $1\frac{1}{4}$ "—over 1500 r.p.m.	270-200	2	2	2
*Stop Screw—under 1500 r.p.m.—with 1—270-200	270-491	1	1	1
*Stop Screw Nut $\frac{1}{4}$ " UNF—brass	270-13	2	2	2

*Supplied as an alternative when cable control is not required.

VARIABLE SPEED CONTROL (Contd.)

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Cable Nipple	351-16001	1	1	1
Cable Nipple Split Pin	27-4363	1	1	1
Cable Nipple Screw	270-239	1	1	1
*Rod Connection	351-16011	1	1	1
Idling Control Shackle	204-12000	—	1	1
Idling Control Connecting Rod	204-12010	—	1	1
Idling Control Shackle Pin	204-13670	—	1	1
Idling Control Adjusting Sleeve	204-21480	—	1	1
Idling Control Nut	204-21500	—	1	1
Idling Spring	204-21491	—	1	1
Spindle	201-13510	1	1	1
Trunnion	572-10120	1	1	1
Nut	291-2231	1	1	1
Ball Joint	351-16500	3	3	3
Ball Joint Spring Washer	64-2582-3	3	3	3
Ball Joint Washer	616-1414	3	3	3
Control Rod	366-1200	2	2	2
Control Rod Lock Nut	64-2577-7	4	4	4
Muff Coupling for Control Rod	366-1201	1	1	1
Lock Nut for Muff Coupling	27-907	2	2	2

STOPPING CONTROL

Control Lever	64-9705	1	1	—
Screw No. 10 UNF x $\frac{3}{8}$ "—brass	270-239	2	2	—
Washer	64-2582-2	2	2	—
Stopping Link	366-122	1	1	—
Washer for Control Lever Pin	64-2581-2	1	1	—
Split Pin for Control Lever Pin	27-1986	1	1	—
Spring Washer for Control Lever	64-2583-1	1	1	—
Holder for Cable Adjuster	366-123	1	—	—
Holder for Cable Adjuster	366-506	—	1	—
Holder Screw $\frac{1}{4}$ " UNF x 1"	270-56	2	2	—
Holder Copper Washer	291-2609	2	6	—
Return Spring	366-175	1	1	—
"AMAL" Control Lever, complete	23-4216	1	1	—
"BOWDENITE" Conduit and Cable 3ft.	201-13540	1	1	—
"BOWDENITE" Conduit and Cable 6ft.	201-13541	1	1	—

COMBINED STOP & SPEED CONTROL (MARINE PROPULSION)

CONTROL — Complete	572-10430	1	1	1
Body	351-15241	1	1	1
Hand Lever Cover	351-15251	1	1	1
Control Cover	351-15261	1	1	1
Set Bolt for Cover No. 10 UNC x $\frac{1}{4}$ "	270-360	6	6	6
Cover Plate	351-15271	1	1	1
Cover Plate Set Bolt No. 10 UNC x $\frac{3}{8}$ "	270-399	3	3	3
Cover Plate Washer	64-6618-5	2	2	2
Lever Stop Adjusting Screw $\frac{1}{4}$ " UNF x $2\frac{1}{4}$ "—brass	270-494	1	1	1
Lever Stop Locking Nut $\frac{1}{4}$ " UNF—brass	270-13	1	1	1
Lever Assembly, comprising:	572-10130	1	1	1
Spindle	351-15280	1	1	1
Washer	351-15290	1	1	1
Speed Control Lever	351-15300	1	1	1

COMBINED STOP & SPEED CONTROL MARINE PROPULSION (Contd.)

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Stopping Control Lever	351-15310	1	1	1
Stopping Control Lever	351-15320	1	1	1
Locking Pin	351-15330	1	1	1
Friction Disc	351-15350	1	1	1
Pressure Plate	351-15362	1	1	1
Lever	351-15374	1	1	1
Pivot Pin	351-18231	1	1	1
Locking Pin for Pivot Pin	351-18240	2	2	2
Locking Pin	351-15340	1	1	1
Spring	351-15381	1	1	1
Detent Peg	351-15390	1	1	1
Detent Peg Nut .190	270-12	1	1	1
Detent Plate	351-15400	1	1	1
Detent Plate Setbolt No. 10 UNC x $\frac{7}{8}$ "—brass	270-359	2	2	2
Spring	351-15410	1	1	1
Shim for Spring	351-15420	As required		
Lever Knob	291-3019	1	1	1

UNIVERSAL ROD ASSEMBLY

Pivot Assembly, comprising :

Spindle and Plate	366-1202	1	1	1
Rod Coupling Assembly, comprising :				
Boss and Plate	366-1205	1	1	1
Ball Joint	351-16500	2	2	2
Ball Joint Spring Washer	64-2582-3	2	2	2
Ball Joint Nut	64-2577-7	2	2	2
Control Rod Lock Nut	64-2577-7	2	2	2
Muff Coupling for Control Rod	366-1201	1	1	1
Muff Coupling Lock Nut	64-2577-7	2	2	2
Return Spring	10-6-59	—	—	1
Anchor—for Spring	389-116	—	—	1
Anchor Setscrew	270-454	—	—	1

N.B. Number of Universal Rod Couplings and (or) Muff Couplings supplied to suit Customer's requirements.

REMOTE STOPPING (with Single Control)

Control Knob and Spindle Assembly	64-9703	1	1	1
Control Lever Assembly	366-1198	1	1	1
Control Lever Screw No. 10 UNF x $\frac{3}{8}$ "—brass	270-239	2	2	2
Control Lever Spring Washer	64-2582-2	2	2	2
Stopping Link	366-1197	1	1	1
Stopping Link Washer	64-2581-2	1	1	1
Stopping Link Split Pin	27-1986	1	1	1
Stopping Link Spring Washer	64-2583-1	1	—	—
Holder for Cable Adjuster (LD1M & SL1M)	366-123	1	—	—
Holder for Cable Adjuster (LD2M & SL2M)	366-506	—	1	—
Holder for Cable Adjuster (SL3)	366-1264	—	—	1
Holder Screw $\frac{1}{4}$ " UNF x 1"	270-56	2	2	2
Holder Copper Washer	291-2609	2	6	6
Return Spring	366-175	1	1	1
Cable and Wire Assembly—3ft. or	351-16350	1	1	1
Cable and Wire Assembly—6ft.	351-15351	1	1	1
Control Lever	366-1199	1	1	1
Control Lever Pin	64-9691	1	1	1

REMOTE STOPPING (with Single Control)—(Contd.)

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Control Lever Clamp Piece	201-17040	1	1	1
End Cover—without variable speed control	64-9159	—	1	1
End Cover—with variable speed control	201-13450	—	1	1
Holder for Cable Adjuster	366-931	—	1	1
Setscrews	270-55	—	2	2
Plain Washers	27-618	—	2	2
Spring Washers	27-451	—	2	2
Nut $\frac{1}{4}$ " UNF	270-2	—	2	2

ROD OPERATED MARINE SPEED CONTROL

End Cover	201-13450	1	1	1
Governor Weight	201-10730	2	2	2
Governor Link Assembly	201-10892	1	1	1
Speeder Spring	201-10900	1	1	—
Speeder Spring	203-10903	—	—	1
Bracket	201-19240	1	1	1
Adjuster	201-19210	1	1	1
Connecting Spindle Assembly	570-10260	1	1	1
Lever	201-10180	1	1	1
Distance Piece	201-19200	2	2	2
Bolt $\frac{5}{16}$ " UNF x $1\frac{1}{8}$ "—brass	270-416	2	2	2
Washer	64-6612-8	2	2	2
Nut $\frac{5}{16}$ " UNF—brass	270-14	1	1	1
Cover	201-19270	1	1	1
Adjusting Stud—Long	201-15161	1	1	1
Adjusting Stud—Short	201-17061	1	1	1
Nut $\frac{1}{4}$ " UNF	270-2	2	2	2
Ball Joint	351-16500	1	1	1
Ball Joint Spring Washer	64-2582-3	1	1	1
Ball Joint Nut	64-2577-7	1	1	1
Control Rod	366-1200	2	2	2
Control Rod Lock Nut	64-2577-7	2	2	2
Ball Joint	351-16500	1	1	1
Ball Joint Washer	616-1414	2	2	2
Governor Weight	354-21561	—	—	2

SPEED CONTROL OPERATING LEVER complete

comprising parts marked*	572-10360	1	1	1
*Detent Plate Assembly, comprising :	351-15911	1	1	1
Plate	351-15920	1	1	1
Boss	351-15930	1	1	1
Block	351-15940	2	2	2
Bracket	351-15950	2	2	2
*Control Lever Assembly, comprising :	351-15961	1	1	1
Fork	351-15971	1	1	1
Spindle	351-15981	1	1	1
*Fulcrum Pin	351-15991	1	1	1
*Fulcrum Pin Key	351-19490	1	1	1
*Fulcrum Pin Spring Washer	351-19530	2	2	2
*Fulcrum Pin Washer	351-19500	1	1	1
*Fulcrum Pin Self Locking Nut $\frac{1}{2}$ " UNF	270-236	1	1	1
*Control Lever Knob	291-3019	1	1	1
*Ratchet	351-16021	1	1	1
*Ratchet Spring	351-19510	1	1	1

SPEED CONTROL OPERATING LEVER (Contd.)

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
*Ratchet Split Pin	27-4336	1	1	1
Cable Nipple (Not supplied with Rod Control) ...	351-16001	1	1	1
Cable Nipple Split Pin (Not supplied with Rod Control)	27-4363	1	1	1
Cable Nipple Screw (Not supplied with Rod Control)	270-239	1	1	1
*Stop Screw $\frac{1}{4}$ " UNF x $1\frac{1}{4}$ "	270-200	2	2	2
*Stop Screw Nut $\frac{1}{4}$ " UNF—brass	270-13	2	2	2
*Rod Connection (Supplied as an alternative when Cable Control is NOT required)	351-16011	1	1	1
*Distance Piece for Operating Lever	351-16620	—	—	2
*Fulcrum Pin Nut $\frac{1}{4}$ " UNF	270-6	—	—	1
*Fulcrum Pin Spring Washer	27-394	—	—	1
Bolts—Operating Lever to Bracket (for Bracket Mounting)—(Bracket not supplied by Lister-Blackstone)	270-64	—	—	1
Nut $\frac{5}{16}$ " UNF—brass	270-14	—	—	2
Spring Washer	27-413	—	—	2
Bolts (Operating Lever to Panel)—(for Panel mounting)	270-410	—	—	2
Spring Washer	27-413	—	—	2
Pivot Assembly, comprising	366-1202	—	—	1
Spindle	366-1203	—	—	1
Plate	366-1204	—	—	1
Rod Coupling Plate Assembly, comprising:	366-1205	—	—	1
Boss	366-1206	—	—	1
Plate	366-1204	—	—	1
Ball Joint	351-16500	—	—	2
Ball Joint Spring Washer	64-2582-3	—	—	2
Ball Joint Nut	64-2577-7	—	—	2
Control Rod Locknut	64-2577-7	—	—	2
Muff Coupling for Control Rod	366-120	—	—	1
Muff Coupling Locknut	64-2577-7	—	—	2

SUMP PUMP

Sump Pump	291-3058	1	—	—
Bracket	291-33101	1	—	—
Bolt $\frac{1}{4}$ " UNF x $\frac{3}{4}$ "	270-55	2	—	—
Nut $\frac{1}{4}$ " UNF	270-13	2	—	—
Washer	27-451	2	—	—
Hex. Union	103-106	1	—	—
Copper Washer	13-22-350	3	—	—
Pipe—Sump to Pump	201-21880	1	—	—
Nipple	27-3730	1	—	—
Nut	27-3731	1	—	—
Swivel Union	2-507	1	—	—
Swivel Union Screw	201-15400	1	—	—
Reducing Bush $\frac{3}{8}$ "- $\frac{1}{4}$ " BSP	27-2496	1	—	—

Additional Parts when Reduction Gear fitted.

3-Way Tap	370-11280	1	—	—
Pipe—gearbox to pump	201-21880	1	—	—
Nipple	27-3730	1	—	—
Nut	27-3731	1	—	—
Swivel Union	201-15410	1	—	—
Swivel Union Screw	201-15400	1	—	—
Reducing Bush	27-2496	1	—	—
Copper Joint	13-22-350	2	—	—

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
COOLING AIR OUTLET DUCT FOR LD1 & SL1 MARINE ENGINE				
AIR OUTLET DUCT (Vertical Outlet)	366-864	1	—	—
AIR OUTLET DUCT (Horizontal Outlet)	366-1195	1	—	—
Fan Shroud	366-865	1	—	—
Fuel Pump Housing Door	366-866	1	—	—
Bracket for Outlet Duct	366-867	1	—	—
Set Bolt (Bracket to Fuel Pump Housing Door)	270-114	1	—	—
Copper Washer (Bracket to Fuel Pump Housing Door)	291-2609	2	—	—
Plain Washer (Bracket to Fuel Pump Housing Door)	27-618	1	—	—
Spring Washer (Bracket to Fuel Pump Housing Door)	27-451	1	—	—
Nut (Bracket to Fuel Pump Housing Door)	270-2	2	—	—
Set Bolt (Bracket to Outlet Duct)	270-54	2	—	—
Spring Washer (Bracket to Outlet Duct)	27-451	2	—	—
Distance Piece for Outlet Duct (Bracket to Fan Shroud)	366-868	1	—	—
Nut (Bracket to Fan Shroud)	270-3	1	—	—
Set Bolt (Bracket to Fan Shroud)	270-231	1	—	—
Spring Washer (Bracket to Fan Shroud)	27-413	3	—	—
Set Bolt (Bracket to Fan Shroud)	270-54	1	—	—
Spring Washer (Bracket to Fan Shroud)	27-451	1	—	—
Sealing Strip (For Standard Square Outlet Duct)	366-869	4	—	—
Backing Strip (For Standard Square Outlet Duct)	366-870	4	—	—
Wood Screw (For Standard Square Outlet Duct)	366-871	20	—	—
HOSE AND ADAPTOR FOR AIR OUTLET DUCT				
Adaptor (For Standard Duct with Circular Adaptor)	366-932	1	—	—
Set Bolt (For Standard Duct with Circular Adaptor)	270-23	2	—	—
Spring Washer (For Standard Duct with Circular Adaptor)	27-451	2	—	—
Flexible Hose (For Standard Duct with Circular Adaptor)	366-873	1	—	—
Hose Clips (For Standard Duct with Circular Adaptor)	27-4312	2	—	—
COOLING AIR OUTLET DUCT FOR LD2 & SL2 MARINE ENGINE				
AIR OUTLET DUCT (Horizontal)	366-907	—	1	—
AIR OUTLET DUCT (Vertical)	366-1173	—	1	—
Fan Shroud	202-15480	—	1	—
Fuel Pump Housing Door	366-963	—	1	—
Studs for Duct $\frac{1}{4}$ " UNC x $\frac{3}{4}$ "	270-377	—	2	—
Nuts for Duct $\frac{1}{4}$ " UN	270-2	—	2	—
Spring Washers	27-451	1	2	—
Side Shield for Engine	366-909	—	1	—
Securing Rod	366-911	—	1	—
Stud	366-964	—	1	—
Plain Washers	27-618	—	2	—
Nut $\frac{1}{4}$ " UNF	270-2	—	1	—
Spring Washers	27-451	—	1	—
Bracket for Duct	366-910	—	1	—
Bolt $\frac{1}{4}$ " UNF x $\frac{3}{4}$ "	270-55	—	1	—
Bolt $\frac{1}{4}$ " UNF x $\frac{3}{8}$ "	270-23	—	1	—
Nut $\frac{1}{4}$ " UNF	270-2	—	1	—
Spring Washer	27-451	—	2	—
Air Deflector	366-908	—	1	—

Description	Part No.	No. off per Engine		
		1 Cyl.	2 Cyl.	3 Cyl.
Sealing Strip (For standard square Outlet Duct) ...	366-869	—	8	—
Backing Strip (For standard square Outlet Duct) ...	366-870	—	8	—
Wood Screw (For standard square Outlet Duct) ...	366-871	—	40	—
Adaptor (For standard Duct with Circular Adaptor) ...	366-932	—	2	—
Setbolt (For standard Duct with Circular Adaptor) ...	270-23	—	4	—
Spring Washer (For standard Duct with Circular Adaptor) ...	27-451	—	4	—
Flexible Hose (For standard Duct with Circular Adaptor) ...	366-873	—	2	—
Hose Clip (For standard Duct with Circular Adaptor) ...	27-4312	—	4	—

COOLING AIR DUCT FOR SL3 MARINE ENGINE

Air Outlet Duct ...	366-1039	—	—	1
Fan Shroud ...	202-15480	—	—	1
Fuel Pump Housing Door ...	366-1032	—	—	1
Studs for Duct $\frac{1}{4}$ " UNF x $\frac{3}{4}$ " ...	270-377	—	—	3
Nuts ...	270-2	—	—	3
Spring Washer ...	27-451	—	—	3
Bracket for Duct ...	366-910	—	—	1
Bolt $\frac{1}{4}$ " UNF x $\frac{3}{4}$ " ...	270-55	—	—	1
Bolt $\frac{1}{4}$ " UNF x $\frac{5}{8}$ " ...	270-23	—	—	1
Nut $\frac{1}{4}$ " UNF ...	270-2	—	—	1
Spring Washer ...	27-451	—	—	2
Air Deflector ...	366-908	—	—	1
Plate for Air Duct Bracket ...	366-1038	—	—	1
Fuel Leak Off Pipe ...	366-1031	—	—	1
Sealing Strip ...	366-3040	—	—	2
Backing Strip ...	366-3129	—	—	2
Backing Strip ...	366-3139	—	—	2
Sealing Strip ...	366-3130	—	—	2
Wood Screw ...	366-871	—	—	36

STERNGEAR — SL1-2-3 MG/R

Description	Standard Sterngear Size *							
	$\frac{7}{8}$ in.		1 in.		$1\frac{1}{4}$ in.		$1\frac{1}{2}$ in.	
	Part No.	Qty.	Part No.	Qty.	Part No.	Qty.	Part No.	Qty.
Propeller Nut Split Pin ...	360-205	1	360-205	1	360-205	1	360-805	1
Propeller Nut ...	360-2003	1	360-103	1	360-203	1	360-503	1
Propeller Key ...	360-2004	1	360-105	1	350-204	1	350-504	1
Tailshaft ...	360-2012	1	360-2112	1	360-2212	1	360-512	1
Tail Housing ...	360-2008	1	360-107	1	360-207	1	360-607	1
Spring Ring ...			360-211	1	350-211	1	350-411	1
Water Seal ...			360-101	1	360-201	1	360-501	1
Coachscrew ...	360-20	2	360-20	2	360-20	2	360-22	2
Aft Bearing ...	360-2000	1	360-100	1	360-200	1		
Aft Bearing—front half ...							360-500	1
Aft Bearing—rear half ...							360-500-1	1
Locating Screw ...	360-602	1	360-602	1	360-602	1	360-602	1
Stern tube ...	360-2013	1	360-213	1	360-213	1	360-613	1
For'd Bracket ...	360-2008	1	360-108	1	360-208	1	360-508	1
Greaser ...	360-40	1	360-40	1	360-40	1	360-40	1
Gland Packing ...	360-2407	6	360-2408	3	360-2409	5	360-2410	3
Gland ...	360-2009	2	360-109	1	360-209	1	360-509	1
Gland Stud ...	360-2010	4	360-1710	2	360-1710	2	360-1710	2
Gland Nut ...	360-3	4	360-4	2	360-4	2	360-4	2
Locknut ...	360-9	4	360-10	2	360-10	2	360-10	2
Coachscrew ...	360-20	2	360-20	3	360-20	3	360-22	3
Locking Pin ...	360-2015	1	360-2115	1	360-2215	1	360-1415	1
Key ...							360-514	1
Coupling ...	360-2016	1	360-2116	1	360-2216	1	360-516	1

* Sterngear size is based on the tailshaft diameter.

COMPLETE SET OF JOINTS FOR TYPE LD1 AND SL1 ENGINES

Description	Part No.	Material	LD1 Qty.	SL1 Qty.
Camshaft End Cover	201-18540	Rubber	1	1
Control Spindle	201-13120	Rubber	1	1
Crankcase Door	291-22341	Rubber	1	1
Cylinder Block	*201-10390	Copper	1	—
Cylinder Head Cover	*201-10510	Cork & Paper	1	1
Cylinder Head Gasket	*201-10382	Copper	1	—
Cylinder Head Gasket	*201-17530	Copper	—	1
Cylinder Head Gasket Shim	*201-12300	Copper	3	—
Cylinder Head Gasket Shim	*201-17540	Copper	—	3
Cylinder Head Nut Washer	*27-545	Steel	4	4
End Cover	201-11211	Paper	1	1
Fuel Pump Inlet Washer	201-12970	Steel & Rubber	2	2
Fuel Pump Housing	201-11402	Fibre	1	1
Fuel Pump Housing	201-11413	Rubber	1	1
Fuel Pump Housing Door	201-11581	Cork	1	1
Fuel Swivel Union Plug	13-22-350	Copper	4	4
Fuel Tank Cap and Oil Filler	303-253	Cork	2	2
Fuel Tank Cap and Oil Filler	616-1601	Copper	1	1
Fuel Banjo Vent Screw	*201-11720	Fibre	1	1
Injector Sleeve Oil Seal	*201-11080	Rubber	1	1
Inlet & Exhaust Manifold	*201-11130	Fibre	1	1
Lubricating Oil Drain Plug	*291-3063	Copper	1	1
Lubricating Oil Drain Plug	291-3064	Copper	1	1
Oil Reservoir Grommet	*201-12951	Rubber	1	1
Valve Rocker Bracket	*201-11901	Paper	2	2
Valve Rocker Oil Pipe Gland Nut	201-11390	Rubber	1	1
Valve Guide Seal Ring	616-1742	Rubber	1	1
Leak-off Pipe Grommet	*201-11710	Rubber	1	1
Leak-off Pipe Bush	*201-11090	Rubber	1	1
Fuel Pipe Bush	201-11271	Rubber	1	1
Fuel Pump Housing Door Washer	291-2609	Copper	4	4
Fuel Pump Housing Washer	291-2609	Copper	5	5

*Joints for Decarbonising.

Ordering Reference for Joints:

*LD1 Decarbonising Set	...	657-10000
LD1 Overhaul Set	...	657-10010
*SL1 Decarbonising Set	...	657-10020
SL1 Overhaul Set	...	657-10030

COMPLETE SET OF JOINTS FOR TYPE LD2 & SL2 ENGINE

Description	Part No.	Material	LD2 Qty.	SL2 Qty.
Camshaft End Cover	201-18540	Rubber	1	1
Oil Filler Cap	303-253	Cork	3	3
End Cover	201-11211	Paper	1	1
Crankcase Door	202-12700	Langite	1	1
Fuel Pump Housing to Crankcase	202-11402	Langite	1	1
Fuel Pump Housing to Top Plate	201-11413	Rubber	2	2
Housing Door	202-11582	Langite	1	1
Swivel Union Plug Joint Washer	291-3062	Copper	4	4
Fuel Banjo Vent Screw	616-1601	Copper	4	4
Control Lever Spindle	201-13120	Rubber	1	1
Fuel Pump Inlet Washer (Dowty)	201-12970	Steel & Rubber	4	4
Lubricating Oil Pump Plug Washer	291-3063	Copper	1	1
Gland Nut Packing Washer	201-11390	Rubber	1	1
Cylinder Block	*201-10390	Copper	2	2
Cylinder Head Gasket	*201-10382	Copper	2	—
Cylinder Head Gasket	*201-17530	Copper	—	2
Rocker Bracket	*201-11901	Paper	4	4
Injector Sleeve Oil Seal Ring	*201-11080	Rubber	2	2
Cylinder Head Cover	*201-10510	Cork & Paper	2	2
Oil Reservoir Grommet	*201-12951	Rubber	2	2
Exhaust Manifold	*201-11130	Fibre	2	2
Cylinder Head Shim	*201-12300	Copper	6	—
Cylinder Head Shim	*201-17540	Copper	—	6
Cylinder Head Nut Washer	*27-545	Steel	8	8
Injector Sleeve Washer	*201-11720	Fibre	2	2
Lubricating Oil Drain Plug	*291-3063	Copper	1	1
Oil Seal Ring for Valve Guides	616-1742	Rubber	2	2
Leak-off Pipe Grommet	*201-11710	Rubber	2	2
Leak-off Pipe Bush	*201-11090	Rubber	2	2
Fuel Pipe Bush	201-11271	Rubber	1	1
Fuel Pump Housing Washer	291-2609	Copper	6	6
Fuel Pump Housing Door Washer	291-2609	Copper	6	6

* Joints for Decarbonising.

Ordering Reference for Joints:

*LD2 Decarbonising Set	...	657-10040
LD2 Overhaul Set	...	657-10050
*SL2 Decarbonising Set	...	657-10060
SL2 Overhaul Set	...	657-10070

COMPLETE SET OF JOINTS FOR TYPE SL3 ENGINE

Description	Part No.	Material	Quantity
Camshaft End Cover	201-18540	Rubber	1
Oil Filler Cap	303-253	Cork	3
End Cover	201-11211	Paper	1
Crankcase Door	203-12700	Langite	1
Fuel Pump Housing to Crankcase	203-11400	Langite	1
Fuel Pump Housing to Top Plate	201-11413	Rubber	3
Housing Door	203-11580	Langite	1
Swivel Union Plug Joint Washer	13-22-350	Copper	4
Fuel Banjo Vent Screw	616-1601	Copper	1
Rubber Ring for Dipstick	201-13120	Rubber	1
Fuel Pump Inlet (Dowty)	201-12970	Steel & Rubber	6
Lubricating Oil Pump Plug Washer	616-1524	Copper	1
Gland Nut Packing Washer	201-11390	Rubber	1
Cylinder Block	*201-10390	Copper	3
Cylinder Head Gasket	*201-17530	Copper	3
Rocker Bracket	*201-11901	Paper	6
Injector Sleeve Oil Seal Ring	*201-11080	Rubber	3
Cylinder Head Cover	*201-10510	Cork & Paper	3
Oil Reservoir Grommet	*201-12951	Rubber	3
Air Manifold Joint	*203-11130	Fibre	3
Cylinder Head Shim	*201-17540	Copper	9
Cylinder Head Nut Washer	*27-545	Steel	12
Injector Sleeve Washer	*201-11720	Fibre	3
Lubricating Oil Drain Plug	*291-3063	Copper	1
Oil Seal Ring for Valve Guides	616-1742	Rubber	3
Leak-off Pipe Bush	*201-11090	Rubber	3
Fuel Pipe Bush	201-11271	Rubber	1
Fuel Pump Housing Washer	291-2609	Copper	7
Fuel Pump Housing Door Washer	291-2609	Copper	9

* Joints for Decarbonising.

Ordering Reference for Joints:

*SL3 Decarbonising Set	657-10080
SL3 Overhaul Set	657-10090

INTERNAL FUEL SYSTEM JOINTS

Description		Part No.	Material	1cyl.	2cyl.	3cyl.
Fuel Pump—Barrel Locking Pin	...	660-10030	Aluminium	1	2	3
Fuel Pump—Air Vent Screw	...	660-10040	Fibre	1	2	3
Fuel Injector—Inlet Connection	...	660-10050	Iron	1	2	3
Fuel Pump—Delivery Valve	...	660-10060	Fibre	1	2	3
Fuel Pump—Inlet Connection	...	201-12970	Steel & Rubber	2	4	6

SPECIMEN ORDER FORM FOR SPARE PARTS

IMPORTANT – See Page 55

“ SPARE PARTS — DIRECTIONS FOR ORDERING ”

TO

FROM

YOUR NORMAL SUPPLIER

ORDER NO. DATE

LISTER ENGINE SERIAL NUMBER

Item No.	Description	Part No.	Quantity	Remarks
1	Inlet Valve	201-19350	3	
2	Exhaust Valve	201-19360	3	
3	Valve Spring	291-20641	6	
4	Valve Spring	291-20651	6	
5	Piston Ring	201-17490	3	
6	Piston Ring	201-17500	6	
7	Piston Ring	201-17510	3	

DESPATCH INSTRUCTIONS