YOU WANT THE BEST OUT OF THIS MACHINE. GIVE THIS HANDBOOK TO THE MAN WHO HAS TO LOOK AFTER IT.

BOOK 383/858

PRICE 10/-

# MANUAL OF INSTRUCTIONS

# OPERATION

AND

# MAINTENANCE PARTS LIST

FOR THE

## TYPE JPM & JKM

## 2 & 3 Cylinder

## Marine Propulsion

## Diesel Engines

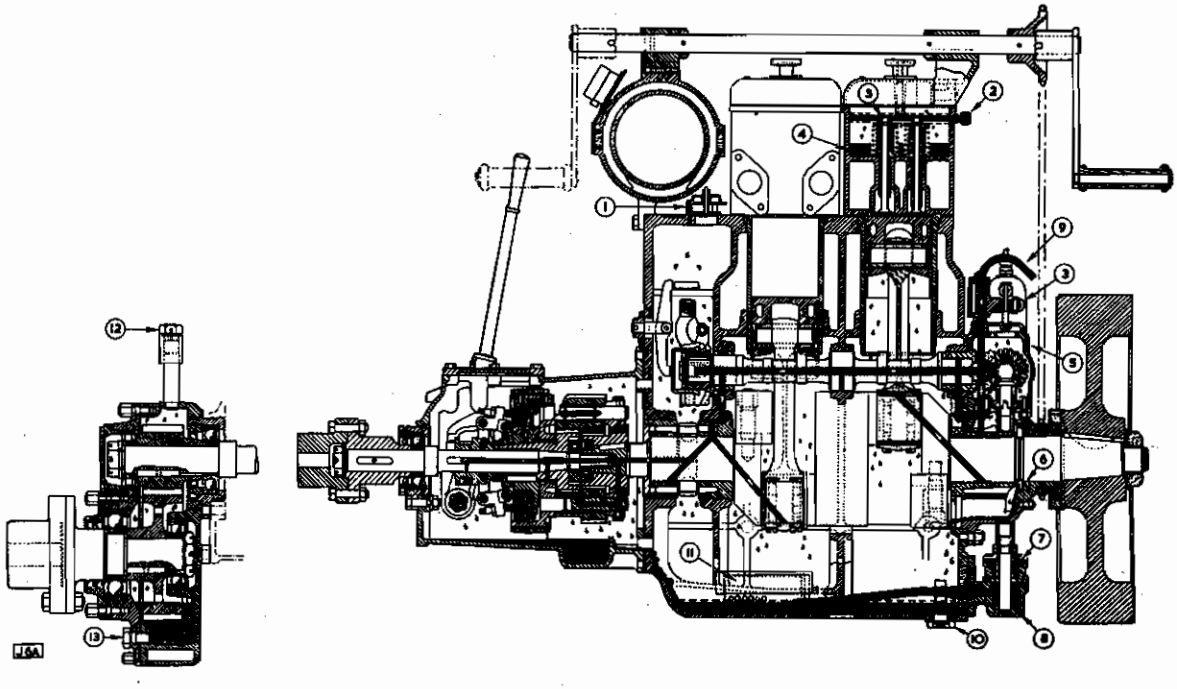

**LISTER BLACKSTONE MARINE LIMITED**

**DURSLEY - GLOUCESTERSHIRE - ENGLAND**

Telegraphic & Cable Address: POWER DURSLEY  Telephone: DURSLEY 2377

# LUBRICATING OIL SYSTEM

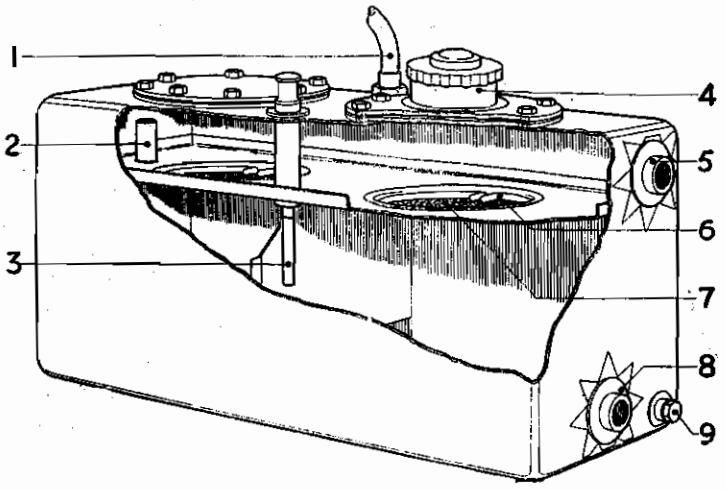
## LONGITUDINAL SECTION OF JP2MG/R ENGINE



1. Crankcase Breather.
2. Give grease cups half a turn daily for valve rocker lubrication. Refill as necessary (JPM only).
3. Every week fill tops of push rods with oil, also put a drop of oil on exposed joints such as governor connections, etc.
4. Fill with oil every week for valve lubrication.
5. Fuel Pump oil sump: Check oil level occasionally. Fill as necessary.
6. Felt oil retainer.
7. Lubricating oil pressure pump.
8. Lubricating oil scavenge pump.
9. Lubricating oil delivery pipe to crankcase.
10. Crankcase drain plug.
11. Lubricating oil scavenge pump suction strainer.
12. Filler Cap and Breather for Reduction Gear.
13. Reduction Gear drain plug.

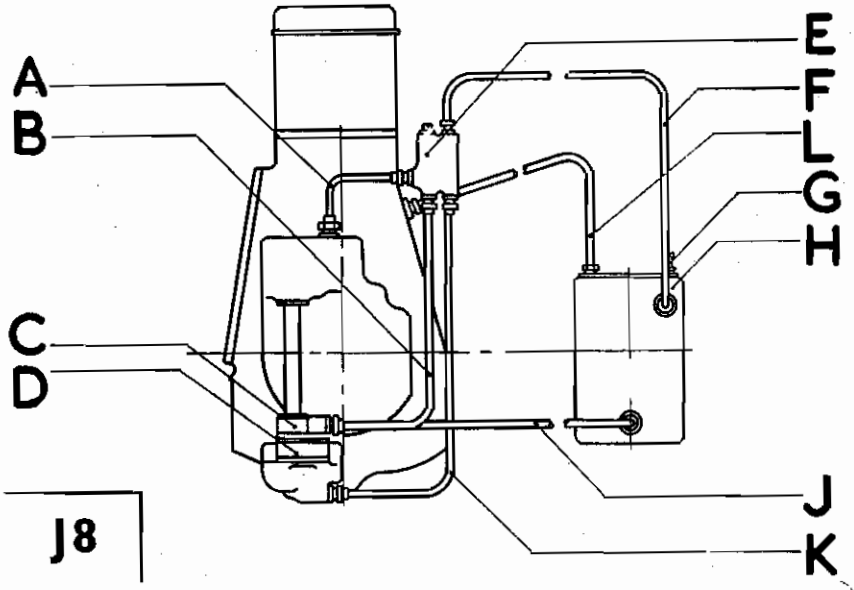
# DRY SUMP LUBRICATING SYSTEM

1.—Air Vent.
2.—By-pass tube.
3.—Dipstick.
4.—Filling Cap.
5.—Discharge to Tank.
6.—Strainer Clip.
7.—Strainer.
8.—Pressure Pump suction.
9.—Drain Plug.




**Lub. Oil Filter**

Remove access doors from dry sump tank cover and release the spring rings which lock the filter gauzes in place. Lift out gauzes and thoroughly clean out tank at each oil change.




Referring to Fig. J8, the principal features of this system of Engine lubrication are as follows :

The oil supply is contained in a separate and external scavenge tank (H).

The Tank must be mounted with the bottom level with the Pressure Pump. It is provided with two large gauze strainers, dipstick (G) and drain plug.

A pressure regulating valve and by-pass are contained in a casting (E) which is connected into the circuit between the scavenge pump (D) and tank (H) and secondly between the pressure pump (C) and engine supply pipe (A).

The oil is taken from the oil tank (H) by the pressure pump (C) and passed by way of the pressure regulating valve to the engine through pipe (A).

After passing through the engine, the oil is drawn from the sump by the scavenge pump (D), and thence passed by way of the pipes (K & F) to the tank (H).

The oil tank can be mounted on the engine support brackets, or in a convenient position adjacent to the engine so that the bottom of the tank is just above the pump level.

Referring next to the sectional drawing of the pressure regulating valve, Fig. J6, it will be seen that oil from the pressure pump is supplied to the underside of the check valve through which it passes to the engine bearings. The function of this check valve is that of preventing the flow of oil, under gravity, from the tank into the engine whilst the latter is at rest.

In the event of the oil pressure exceeding the desired maximum, as determined by the upper spring, the check valve will lift against the upper spring seat, and the surplus oil be permitted to by-pass into the main chamber (M) and return to the tank.

Keep the oil connections free from leaks, and to ensure efficient operation remove the gauze strainers at frequent intervals and wash off impurities and sludge.

# LUBRICATION

**General**

The type of lubricating oil suitable for use in a diesel engine is dependent on a number of factors of which the sulphur content of the fuel oil is perhaps the most important. In recent years the sulphur content of Class 'A' fuels has been increasing and fuels having a sulphur content of up to 1% and more are encountered. To minimise the ill effects of this high sulphur content only the best Heavy Duty Diesel Engine (Detergent) lubricants are recommended for use in Lister engines conforming to British Standard Specification 1905 or U.S.A. Specification MIL-L-2104A.

**Viscosity**—Grade of Oil recommended for different temperatures.

| Below 32°F. | 32°F.—85°F. | Above 85°F. |
|---|---|---|
| SAE 10 | SAE 20 | SAE 30 |

**Branded Oils**

In order to assist engine useres a list of brands of oil normally obtainable in world markets which have proved satisfactory in our engines is given on page 14.

**Mixing of Oils**

If an engine has been run on straight mineral oil for more than 250 hours since completely overhauled (or since new) before it is changed to Heavy Duty (Detergent) Lubricants, the deposits formed by the straight oils may be dislodged by the latter and choke the oilways and filters. For this reason it is necessary to flush the engine thoroughly with Heavy Duty (Detergent) oil and change the oil after 50 hours and then resume normal changes every 450 hours. The filters must receive frequent attention during this initial period.

Sometimes Heavy Duty (Detergent) oils increase the oil consumption in which case a heavier grade may be used.

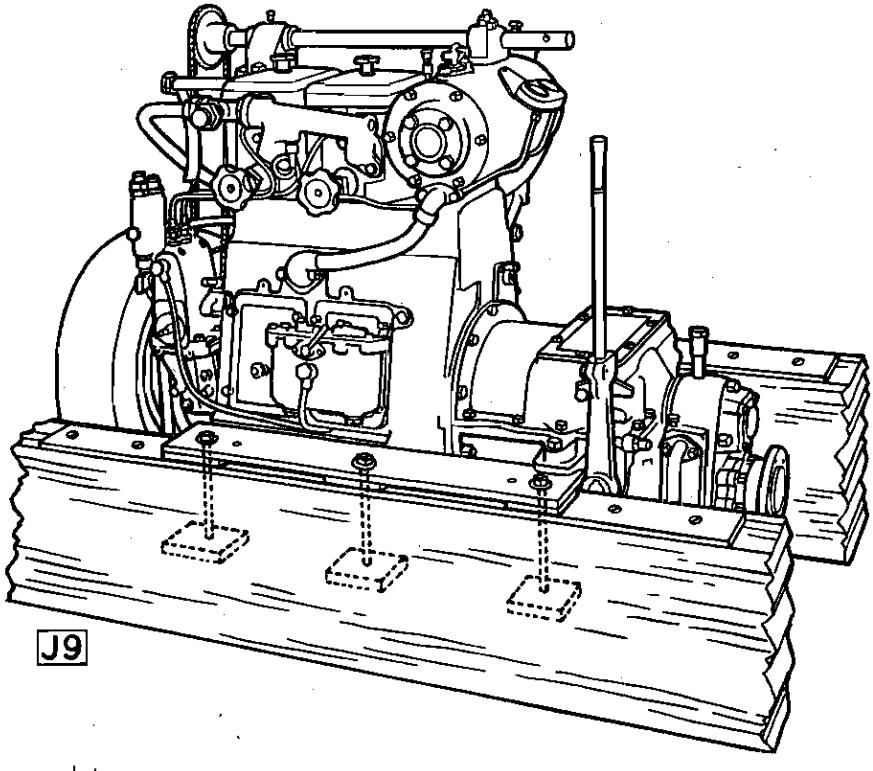
DO NOT MIX TWO DIFFERENT BRANDS OF OIL. THOROUGHLY DRAIN OFF THE ONE BEFORE ADDING THE OTHER.

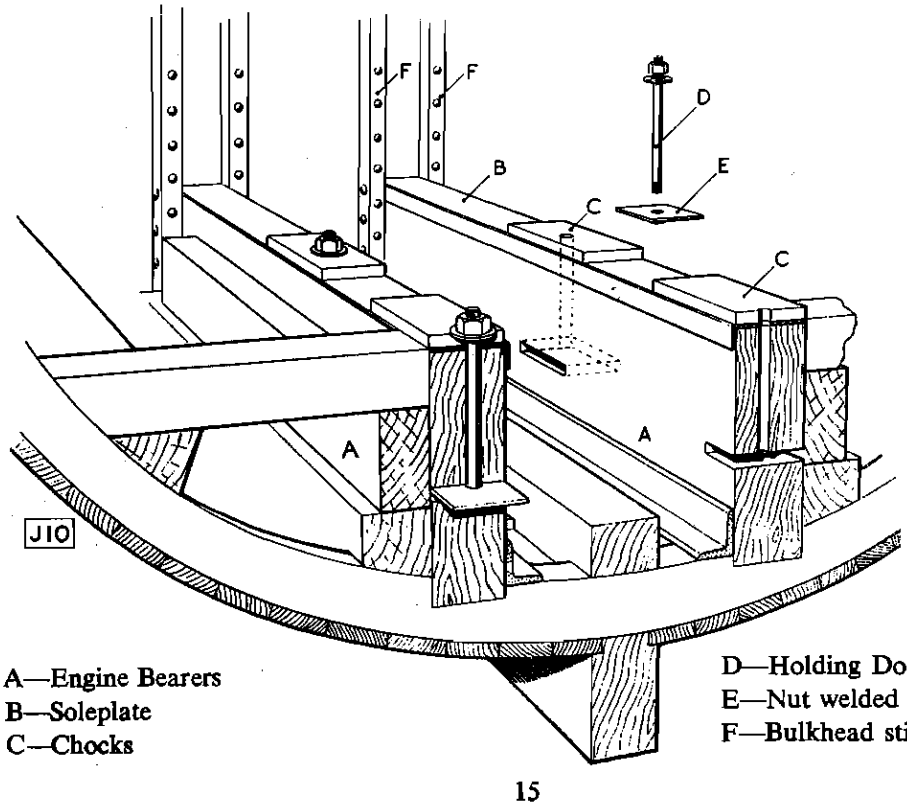
## LIST OF OILS COMPLYING WITH B.S. 1905/1952 AND U.S.A. SPECN. MIL-L-2104A

| OIL COMPANY | SAE 10 or 10W BRAND | SAE 20 or 20W BRAND | SAE 30 BRAND |
|---|---|---|---|
| **R. A. Lister & Co. Ltd.** | Listroil L10 | | |
| **Alexander Duckham & Co., Ltd.** | Duckhams HD 10/MIL | Duckhams HD 20/MIL<br>Tractor Diesel 20 | Duckhams HD 30/MIL<br>Tractor Diesel 30 |
| **Esso Petroleum Co., Ltd.** | Essolube HD 10<br>Estor HD 10<br>Tro-Mar HD10 | Essolube HD 20<br>Estor HD 20<br>Tro-Mar HD20 | Essolube HD 30<br>Estor HD 30<br>Tro-Mar HD30 |
| **Valvoline Oil Co.** | Super HPO 10 | Super HPO 20 | Super HPO 30 |
| **Germ Lubricants Ltd.** | Germil 101 | Germil 201 | Germil 303 |
| **Power Petroleum Co., Ltd. (U.K.)**<br>**BP Companies (Overseas)** | Energol Diesel D-SAE 10W | Energol Diesel D-SAE 20W | Energol Diesel D-SAE 30 |
| **Regent Oil Co., Ltd.**<br>**Texaco/Caltex** | Caltex RPM Delo Special SAE 10W<br>Ursa Oil HD-SAE 10W | Caltex RPM Delo Special SAE 20W<br>Ursa Oil HD-SAE 20W | Caltex RPM Delo Special SAE 30<br>Ursa Oil HD-SAE 30 |
| **Shell Group of Companies** | Shell Talona Oil 10W<br>Shell Rotella Oil 10W | Shell Talona Oil 20<br>Shell Rotella Oil 20/20W | Shell Talona Oil 30<br>Shell Rotella Oil 30 |
| **Snowdou, Sons & Co.** | Royal Snowdrift Apennine SAE 10 | Royal Snowdrift Apennine SAE 20 | Royal Snowdrift Apennine SAE 30 |
| **Mobil Oil Co., Ltd.** | Delvac Oil 910<br>Mobiloil 10W (Overseas) | Delvac Oil 920<br>Mobiland Diesel 20 | Delvac Oil 930<br>Mobiland Diesel 30 |
| **Vigzol Oil Co., Ltd.** | New Ace 10 | New Ace 20 | New Ace 30 |
| **C. C. Wakefield & Co., Ltd.** | Deusol CR 10<br>Agricastrol HD 10 | Deusol CR 20<br>Agricastrol HD 20 | Deusol CR 30<br>Agricastrol HD 30 |
| **Gulf Oil (Great Britain) Ltd.** | Gulflube Motor Oil HD 10W<br>Gulflube Motor Oil XHD 10W<br>Gulf Dieselube HD 10W | Gulflube Motor Oil HD 20/20W<br>Gulflube Motor Oil XHD 20/20W<br>Gulf Dieselube HD 20/20W | Gulflube Motor Oil HD 30<br>Gulflube Motor Oil XHD 30<br>Gulf Dieselube HD 30<br>Brit-Gulf HD 30 |
| **Fina Petroleum Products, Ltd.** | Solco HD 10 or 10W<br>Solna HD 10 or 10W | Solco HD 20 or 20W<br>Solna HD20 or 20W | |
| **Edward Joy & Sons.** | Diesel Filtrate 10 | Diesel Filtrate 20 | Diesel Filtrate 30 |

## INSTALLATION IN A WOODEN VESSEL

### JPM ENGINE




A—Engine Bearers
B—Soleplate
C—Chocks
D—Holding Down Bolt
E—Nut welded to steel plate
F—Bulkhead stiffening

# INSTALLATION

Careful planning is always advisable before installing a power unit, and Lister engines have been designed for maximum accessibility enabling a 100% overhaul in the craft. It therefore follows that advantage should be taken of these features, and the layout designed accordingly.

**Bearers.**

The engine bearers should always be of liberal thickness and as long as possible. They should form an integral part of the hull structure and be securely fastened throughout their length. At least two deep transverse floors should be provided in way of engine.

The primary objective when setting up bearers of a Marine Diesel Engine is to avoid a large concentration of stress that would endanger the fastenings and surrounding structural members. It is also essential that all holding down bolts should be a very neat fit. In wooden vessels the top of the bearers should be covered by a thin steel plate extending beyond the ends of the engine and secured in place by a number of counter sunk screws. The objective is not to provide strength but to supply a bearing surface for the engine bearers and holding down bolts. Long holding down bolts, preferably a large number of small diameter should be used to provide sufficient bearing surface to resist the thrust of the propeller and the torque reaction of the engine.

These bolts should be fitted at the lower ends with steel plates 2ins. x 3ins. (5 x 8 cm.), to which their nuts have been welded, to further spread the load over the bearers.

**Rake.**

The rake of these engines when installed, and craft on even keel, should not exceed 1 in 9 (i.e. 6½°).

**Piping.**

All pipes should have as short a run as possible in keeping with the space and facilities available. Where bends are necessary, however, they should be of a minimum radius not less than Diameter of Pipe x 5. Pipe friction reduces pump efficiency, but accessibility and ease of replacement are the major requirements.

**Ventilation.**

The efficient performance of any internal combustion engine depends on an adequate supply of cool fresh air. A rise of 10°F. (5°C.) in the air inlet temperature reduces the possible output of the engine by approximately 2%. It is therefore important that the engine room, or case, is well ventilated, admitting cool air below the engine and expelling hot air above.

**Lubricating Oil Tank.**

The Lubricating Oil Tank should be fitted in place as close to the engine as possible with the bottom on a level with the Crankshaft or not more than 12″ above.

**Fuel Oil Tank.**

The fuel tank should be mounted in an easily accessible position with the bottom of the tank not less than 2ft. 6ins. nor more than 6ft. above the Crankshaft centre line.

**Alignment of Engine and Tailshaft.**

Temporarily the engine may be aligned to the tailshaft whilst the craft is out of the water, but should be checked again when water-borne. The couplings should remain unbroken whilst launching.

The overhang of the propeller, i.e., distance between the propeller and the outboard gland, should not exceed half the Tailshaft diameter.

In wooden craft a steel strip not less than 3/16″ thick should be fitted along the top of the engine bearers, alignment can then be made with steel chocks as in steel ships. These chocks should be rectangular in shape 4″ x 6″ and thickness to suit, but not more than 1″ thick. The chocks are fitted in way of the holding down bolts between the engine rails and bearer. With the engine in position and resting on these chocks, draw the tailshaft coupling up to face the gear box half coupling.

If alignment is correct the clearance between the coupling faces should show no variation and the weight of the engine should be equally divided between the six chocks, this state can be obtained by adjusting the thickness of the chocks with steel shims or machining the chocks as the case may be.

In wooden ships it is advisable to have the engine sitting a little high, say .005″—.010″ to allow for pulling down when the holding down bolts are tightened up, due to compression of shims or bearer.

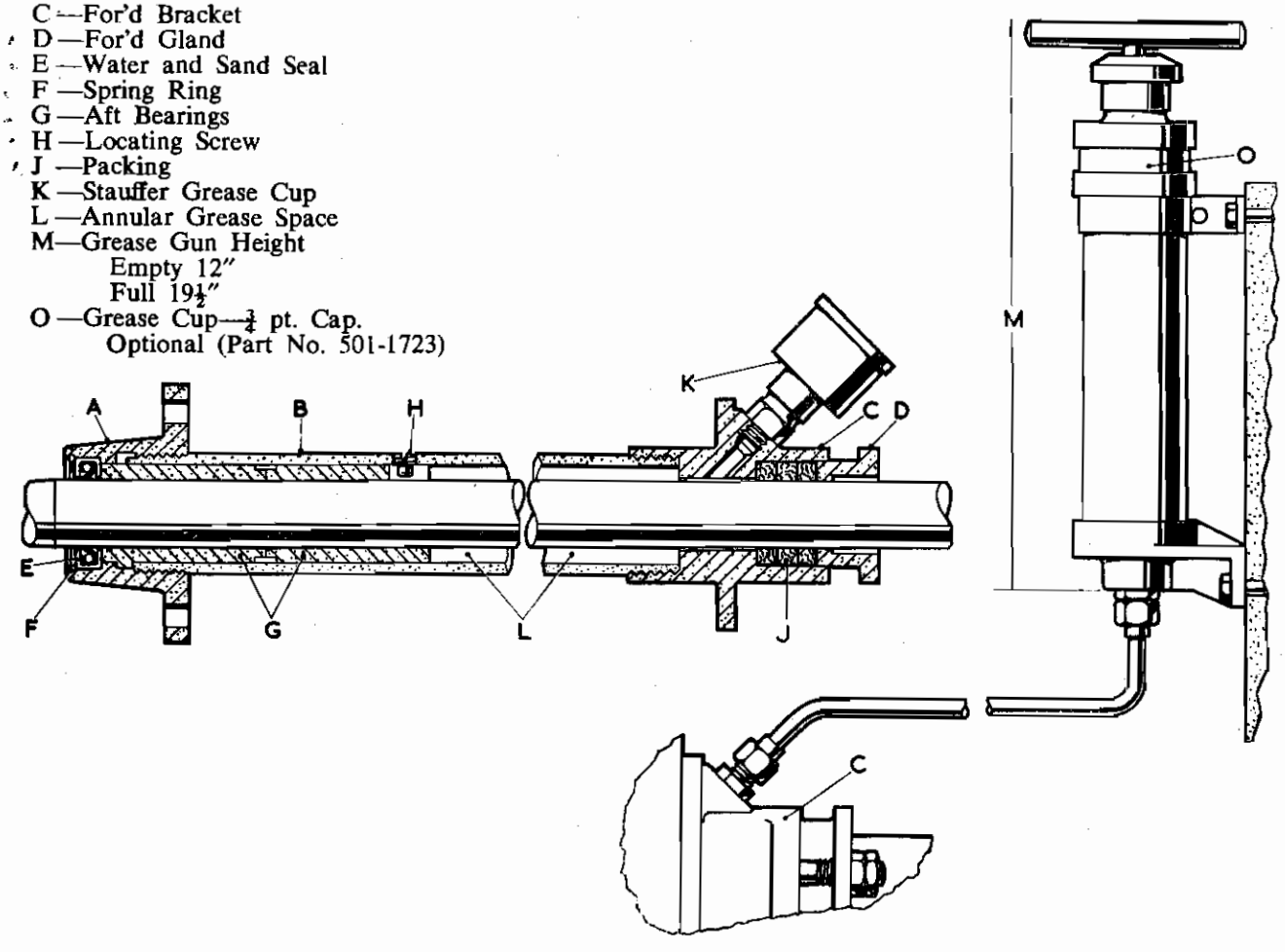
After hardening down, the alignment should be checked again before finally bolting up the coupling.

The coupling should be broken after its first run and checked and again periodically until the unit has finally settled down. New craft especially require careful attention during the first few hundred hours running, and all running temperatures should be carefully watched.

The foregoing should be STRICTLY adhered to.

**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 Cup—¾ pt. Cap.
Optional (Part No. 501-1723)




## 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.

## STANDARD TAILSHAFT SIZES AND STERNTUBE GREASE CAPACITIES

| Tailshaft size | 1½″–38·1 mm. | 1⅝″–41·27 mm. | 1¾″–44·45 mm. | 2″–50·8 mm. | 2¼″–57·15 mm. |
|---|---|---|---|---|---|
| Engine | JP2MG<br>JK2MG | JP3MG<br>JK3MG | JP2MGR<br>JK2MGR | JP2MGR3<br>JK2MGR3<br>JP3MGR2<br>JK3MGR2 | JP3MGR3<br>JK3MGR3 |
| Grease Capacity (pints) | ·96 | ·46 | ·34 | 1·03 | ·57 |
| litres | ·54 | ·26 | ·19 | ·59 | ·33 |

# STARTING

**Before Starting Engine for the First Time or after Overhaul.**

(a) Remove Crankcase Door and pour two gallons of oil into the sump, then four gallons into the tank. Turn engine by hand until oil is seen emerging from Big-end Bearings and returning to scavenge tank.

(b) Fill Grease Cups on Cylinder Heads and give several turns to lubricate Valve Rocker Arms. (JPM only).

(c) Fill recesses in Cylinder Head with lubricating oil to just below level of hollow studs through which Push-Rods operate; this is for valve lubrication. Also fill cups in tops of Push–Rods.

(d) Fill small sump in base of Fuel Pump to indicated mark with Engine Lubricating Oil.

(e) Lubricate water circulating pump, and any Auxiliary Machinery driven from Engine.

(f) When lubricating oil filter is fitted 2 extra gallons of lubricating oil must be added to fill the filter.

**Starting by Hand.**

It is advisable to always check Lubricating Oil level in Tank and Reduction Gear; check water system valves, and fuel valves, etc., before attempting to start the engine. Being satisfied that all is in order and that fuel system is primed proceed as follows :—

(a) Raise decompressors to vertical position.

(b) Screw in tightly the Compression Change Over Valves. (JPM only).

(c) Release governor lever by lifting locking pins, and lift overload pawl. (This will return to normal as soon as engine starts).

(d) Place Reverse Gear Lever in neutral position and move speed control lever to half speed.

(e) Turn starting handle smartly and when rotating at good speed knock down decompressor levers one after the other. The engine should fire immediately the first cylinder is on full compression.

(f) When engine starts, reduce speed to slow, and Check Lub. Oil pressure. Initially a very high pressure will be registered but on settling down and oil warmed through, the relief valve will regulate it to between 15 and 20 p.s.i.

(g) Check cooling water flow, and give two turns to the grease cups on the water pump.

(h) Before proceeding under way screw out the Change-Over Valves to low compression position, e.g., their full extent. For continued slow running over a long period at speeds below 850 r.p.m. the Change Over Valves should be screwed in. (JPM only).

(i) The engine slow speed should be adjusted to tick over at 450-500 r.p.m. and the gears should not be engaged ahead or astern at a speed in excess of this. Serious damage can easily be caused to the gear unit by disregarding this warning, which should be brought to the attention of all drivers and coxswains.

(j) When under way the water outlet temperature should be adjusted to 120°-130°F. (49°-54°C.) in salt water, but with closed circuit fresh water cooling it is permissible and beneficial to operate at temperatures up to 160°-180°F. (71°-82°C.).

**Air Starting.**

Check and set Engine as for hand starting.

Turn Flywheel to "START" position.

Screw in Compression Change-over Valves, except Air Start C.O.V. (JPM only).

Decompressor Levers must be left down.

Open Main Valve and Outlet Valve on receiver, and press Starting Lever. Engine should start in a few revolutions. Release Starting Lever.

Screw out Compression Change-over Valves (JPM only). Close Air Outlet Valve on Receiver and recharge Receiver.

**To Charge Air Receiver.**

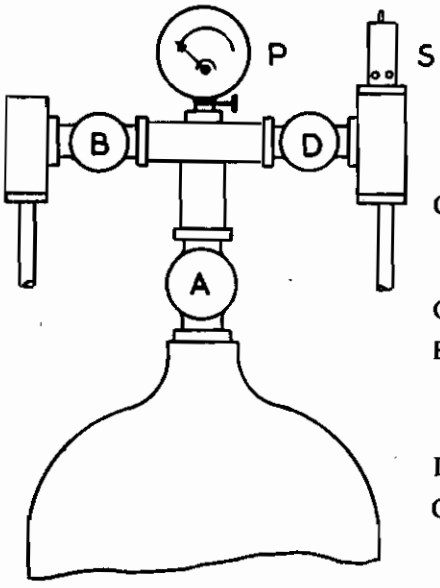
With the Engine running, open the Inlet Valve on Air Receiver, release the Compressor clutch lever catch and engage clutch gently.

When the Pressure Gauge shows 450lbs./sq. in. disengage clutch, lock back lever and close Inlet Valve.

Inspect oil level in Compressor daily.

Oil Clutch Lever mechanism.

Inspect Air Pipe joints and test with soapy water for leaks.




TO AIR STARTER

**To Start Engine**

Open A and B

Close D

**To Check Pressure**

B and D closed

Open A

TO AIR COMPRESSOR

**To Charge Bottle**

Open A and D—Close B

Engage Compresor Clutch

**Finish Charge**

Disengage Clutch

Close A and D

**AIR BOTTLE VALVE GROUP**

A Main Stop Valve.

B Discharge Stop Valve.

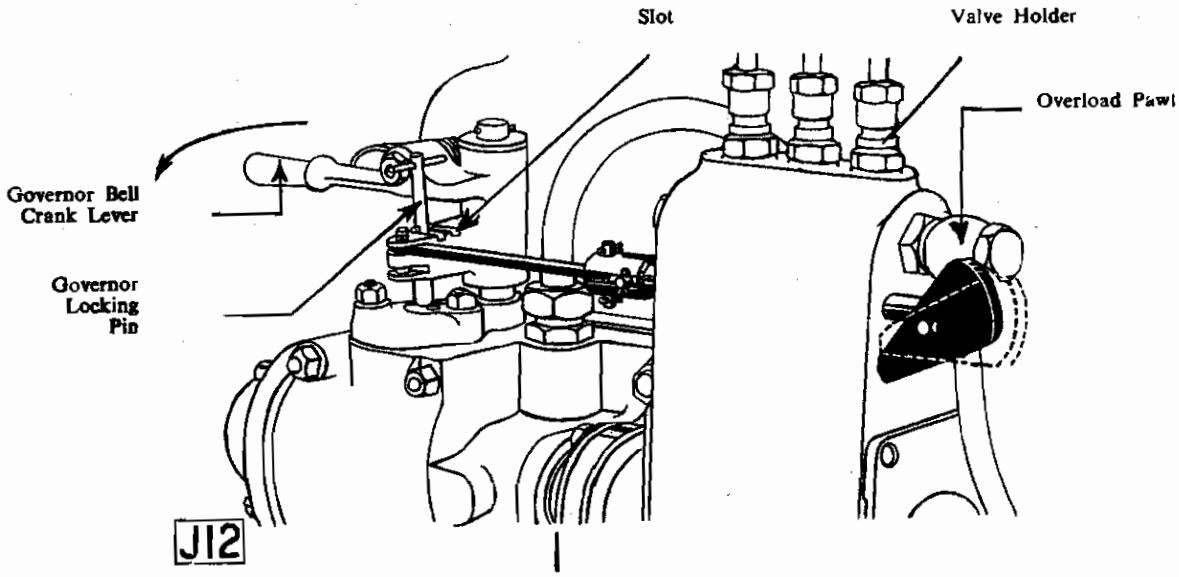
D Charge Stop Valve.

S Safety Valve—set to 500 lb. p.s.i.

P Pressure Gauge.

**Electric Starting.**

Check and set Engine as for Hand Starting.
In this case Decompressor Levers must be left down.
Press starter button and release as soon as the engine fires.
Do not motor the Engine continuously for more than 10 secs.




# STOPPING

**To Stop.**

(a) Reduce engine speed to idling (450–500 r.p.m.)

(b) Turn governor locking pin until its guide pins locate the deep slot.

(c) Move the lever towards the fuel pump until the locating pin drops into its locating hole.

(d) Shut sea cocks and check stern gland for leaks.

(e) Do NOT shut off fuel supply to injection pump unless it is intended to clean both filters or carry out repairs. The engine should never be stopped by shutting off fuel supply, or lifting decompressor lever.

# FAULTY STARTING OR RUNNING

**Essentials for Easy Starting.**

(a) Engine must 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 compresion, if not it may be due to :—
Worn Cylinder Liner.
Piston Rings carboned in grooves.
Leaking Inlet or Exhaust Valve.
Leaking Change-over Valve or not screwed in tightly (JPM only).

(d) Fuel pump rack to be free (Stopping lever moved).

(e) Overload Pawl on Fuel pump must be set for starting.

**Knocking.** This may be caused by :—

(a) Valve, probably Exhaust, sticking in guide, and fouling Piston—clean stems and guides.
(b) Slack bearing—fit new bearing.
(c) Insufficient clearance between Piston and Cylinder Head—Check and adjust. (See page 33).
(d) Injection too early—Check and adjust. (See page 39).
(e) Flywheel loose on Shaft.

**Carbon Deposit.** Excessive deposit may be due to :—

(a) Choked Exhaust system—dismantle and clean.
(b) Long period of idling—running too cool.
(c) Unsuitable Fuel Oil.
(d) Unsuitable Lubricating Oil.
(e) Injector not spraying correctly—clean nozzle.
(f) Late injection of fuel—check timing.

**Smoky Exhaust.** The exhaust should be clear at Full Load. If it is not, steps sould be taken to clear it. Black smoke is due to incomplete combustion of fuel caused by :—

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

Blue smoke, when faint, is generally the result of light load or over-cooling.

Heavy blue smoke is caused by lubricating oil passing the Piston Rings, because of either Piston Rings carboned in grooves or a worn Cylinder Liner or Rings.

**Engine Stops.** This may be due to :—

(a) Lack of Fuel. Air or Water in Fuel System. Fuel System choked.
(b) Overload.
(c) Overheating—shortage of water or lubricating oil.

**Loss of Power.** This may be due to :—

(a) Loss of compression.
(b) Incorrect Tappet clearance.
(c) Choked Exhaust Pipe.
(d) Fuel injection system. Injector out of order. Fuel Pump out of order, or timing slipped.

**Fresh Water Cooling.**

Fresh water cooling has been found, by experience, to prolong the engine life. Salt water causes corrosion and silting up of the water jackets, which is minimised by the use of clean fresh water.

Fresh water is circulated by an impeller pump through the water jackets by way of the crankcase ports, cylinder heads, water cooled exhaust manifold, and completes the circuit on returning to the heat exchanger. A drain cock is provided at the lowest point in the system for use especially in cold weather. A suitable 3 gallon make up fresh water header tank is provided to make good water losses from condensation and leakages.

It is important to note that the level of water in the fresh water header tank is maintained at all times and that the sea water suction strainer and sea cock are kept as clear as possible. The fitting of fresh water cooling does not allow the engine to be run in harbour when the tide is out, nor when the vessel is hauled out, unless an alternative cooling system is provided.

## SEA WATER COOLING (GEAR TYPE PUMP)

The sea water pump, a high speed gear type, is driven through the camshaft gearwheel: it is fitted with moulded rubber impellers and rotates at approximately two-thirds of the engine crankshaft speed.

The suction elbow is so designed that when the engine is stopped sufficient water is retained in the pump casing that it should never be necessary to prime on starting. If the engine has been standing sufficiently long to allow evaporation to take place, the pump should be primed with half a pint of water through the plug hole in the discharge elbow.

Sea water is drawn from the engine sea cock and strainer to the pump and discharged through the water manifold into the silencer, thence to a port in the crankcase. After circulating around the liners it enters the cylinder heads through water ports and is induced to flow at high velocity, past and around the injector pockets. It flows thence around the valves and out of the head into the water outlet rail on the opposite side of the exhaust ports and then through a temperature control valve and over-board. The temperature control valve allows a proportion of the cooling water to be by-passed back to the pump suction and the main outlet restricted so that when starting up in very cold weather the engine may reach its working temperature as quickly as possible. This valve can be manually operated and is situated on the outlet water rail.

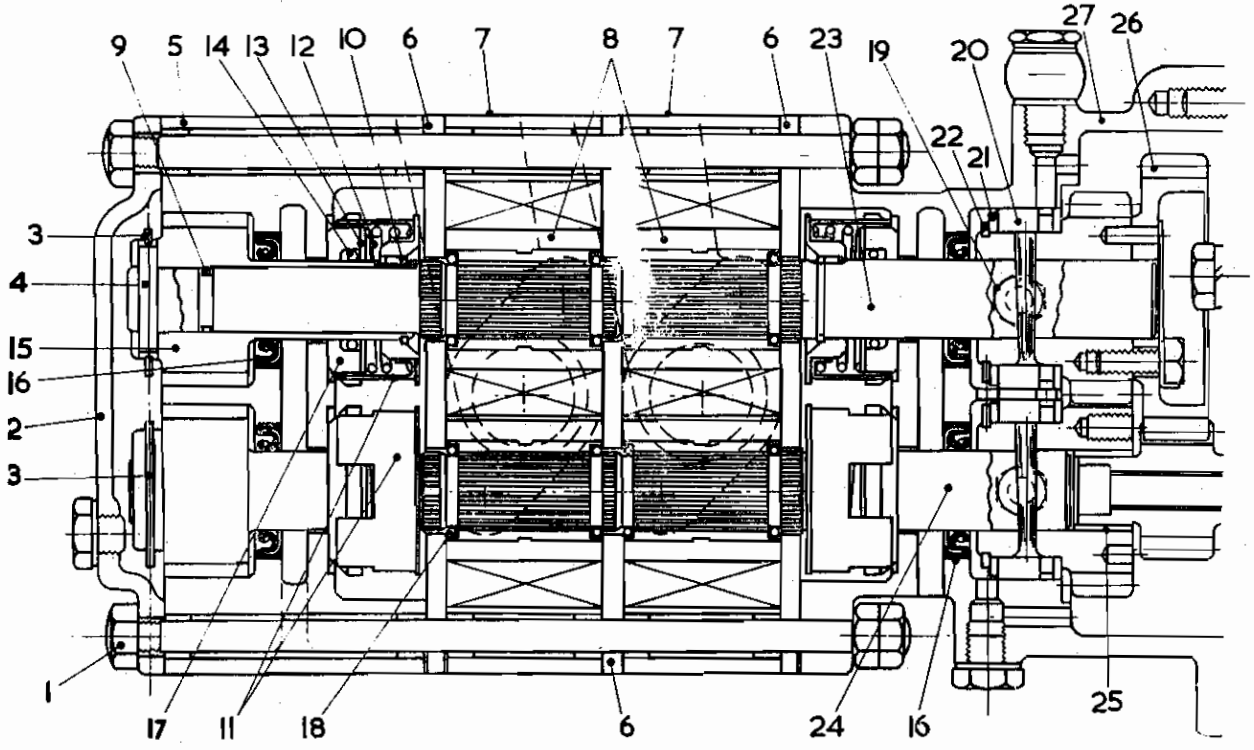
Relief valves are fitted on the discharge side of both the sea water and bilge pumps. The normal maximum operating pressure is 10 lbs. per sq.in and the relief valves are set to lift at 15 lbs. per sq.in. This will only occur in the event of a serious stoppage or defect in the piping system which should be rectified before further operation of the pump. In no circumstances should the pump be allowed to operate at a pressure in excess of that stated, or damage to the impellers will occur.

It therefore follows that the fittings on the sea water and bilge systems should be accessible and of an easily cleaned type. When engines are remotely controlled, or encased below decks, or where a complicated water system is employed, the relief valves should be resited on the end of a pipe and visible from the control position. It is important to fit a large capacity strainer in conjunction with the sea suction and to clear it at frequent intervals.

# BILGE PUMP

The bilge pump and the impellers are protected from damage through lack of water by a bleed from the sea water pump discharge into the suction side of the bilge pump. This short length of pipe should be blown through from time to time. Although these pumps are so designed to pass small solids without damage, it is advisable to fit the bilge suction pipe with a strainer of the "elephants foot" type. Rubber pipes and connections should not be used in the bilge system as there is always a strong possibility of oil in the bilges and oil attacks and softens rubber of ordinary commercial quality. The bilge pump should never need priming as the sea water keeps it primed at all times.

The outer bearings of the pumps are lubricated by oil carried in a reservoir cast into the bearing housing and enclosed by the end cover. The oil is passed by felts to the spindle bearings and should be kept to the level shown on the cover at all times. The inner bearings are lubricated under pressure from the engine oil supply and returned through the crankcase door back to the engine.




**Combined Sea Water and Bilge Pump**

# SEA WATER AND BILGE PUMP—GEAR TYPE

(a) **To Remove Impellers :**

Undo nuts (1) then remove four through bolts and end cover (2). Remove circlips (3) and pins (4). Slide the bearing housing (5) clear of the impeller shaft. Remove dividing plate (6) and pump body (7). Remove two rubber sealing rings (18) from shafts and slide off impellers. Further sealing rings on the shafts must then be removed. When a bilge and circulating pump is fitted it will be necessary to remove the second dividing plate (6), sealing rings and impellers.

(b) **To Replace Impellers :**

Reverse the above procedure. Fit new rubber sealing rings and paper joints between the dividing plates and housing, and between housing and end cover. The rubber rings must be fitted with soft soap. Pack the splines of the shafts with water pump grease before fitting sealing rings (18). Use only clean grease to stick the paper joints. After assembly fill the oil reservoir at the outer end of the bearing housing (5) with engine oil.

(c) **To Remove Carbon Seals in Bearing Housing :**

After removing the bearing housing as set out in paragraph (a), the following procedure should be adopted. Remove the circlips (10) then withdraw carbon seal driver (11), spring (12), thrust washer (13), rubber ring (14) and carbon seal (17) from the bearing block.

(d) **To Fit New Oil Seals in Bearing Housing :**

Proceed as paragraph (c). Remove bearing blocks (15) and oil seals (16). When pressing in new oil seals care must be taken not to damage the seal centre, and ensure they are correctly positioned. Before replacing the bearing block (15), to ensure that the centre of the oil seal will not be damaged, a knurled sleeve tool, Part Number 317-35, should be fitted into the bearing block housing and through the oil seal from the gear drive end. Then slide bearing block into position and withdraw knurled sleeve tool.

(e) **To Fit New Carbon Seals in Bearing Housing :**
Examine housing seal faces and where necessary lap these to ensure a flat surface for the carbon seal, fit each seal with new rubber rings (14) and circlips (10) to assembly, then reverse procedure in paragraph (c).

(f) **To Remove and Re-fit Carbon Seals in Gear Housing :**

Follow procedure as outlined in paragraph (a) and it will also be necessary to remove the remaining dividing plate (6), then follow the procedure in paragraphs (c) and (e) for removal of old parts and assembly of replacements, using the Circlip Assembly tool as follows :

1. Insert Tapered Circlip Loading Tool part No. 317-76 into Knurled Sleeve Tool part No. 317-75.
2. Place circlip on Tapered Circlip Loading Tool.
3. Push Circlip over the Tapered Loading Tool into position on the Knurled Sleeve Tool.
4. Slide Knurled Sleeve Tool over shaft serrations into required position and remove circlip with the aid of screw-driver or fingers.

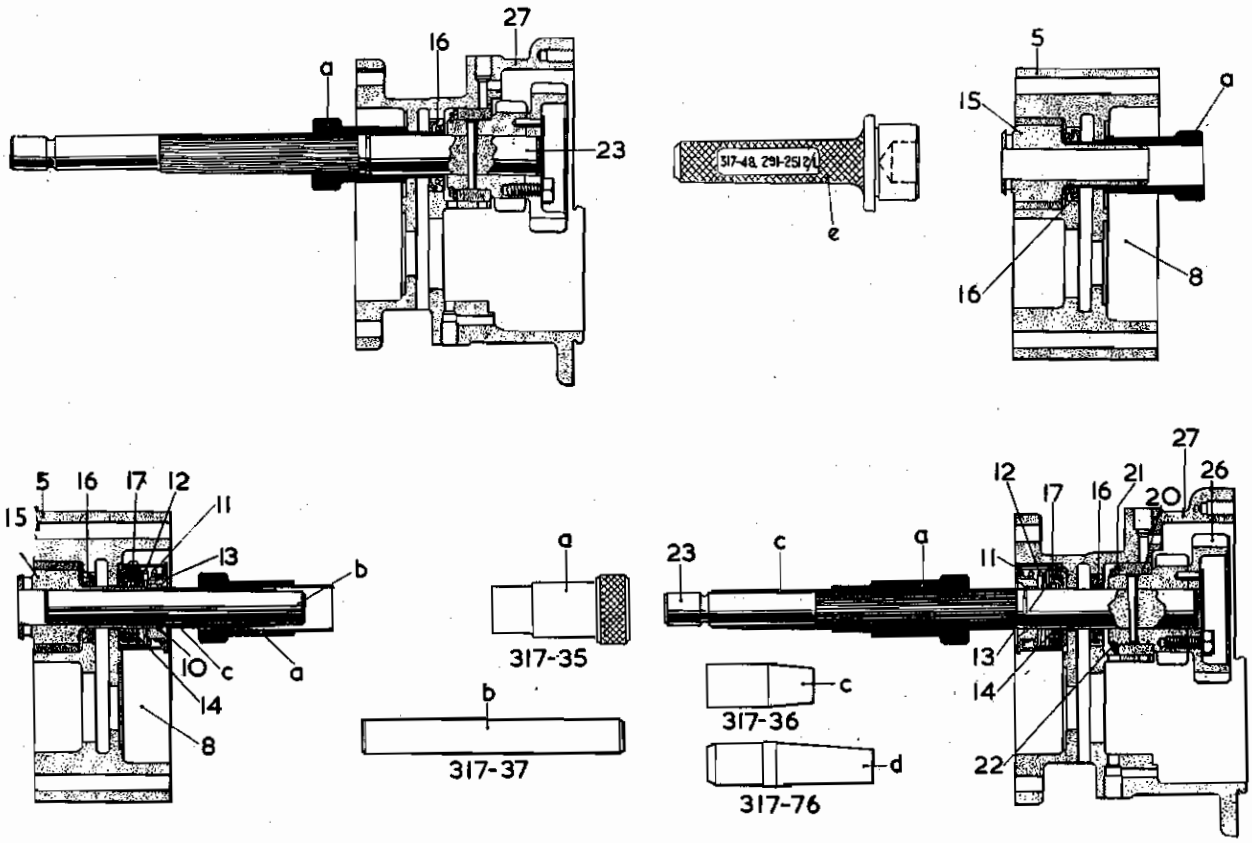
(g) **To Remove Impeller Shafts :**

Procedure as outlined in paragraphs (a), (c) and (f). Remove **bearing locating screws** (19) and when removing the shafts it is essential that both should be removed as a unit, and by placing a block of wood across the ends of these shafts and gently tapping out so ensuring that no damage is caused to either bearings (20) or the ends of the shafts (23) and (24).

(h) **To Fit Replacement Shafts :**

Fit bearings (20) keeping oil groove at gear teeth end, slide on thrust washer (21) and secure with circlips (22). After assembly of these parts ensure that there is free radial movement of the bearing on the shaft, then fit bearing bush (25) in the end of the recess of the bottom shaft (24). Before assembly of the shafts into the gear housing examine oil seals (16) for wear and if necessary renew. Assemble the shafts in position, putting the timing mark " O " on the tooth of the pinion of the top shaft (23) in between the " O " marks on the teeth of the pinion of the bottom shaft (24). Tap the gear shaft assemblies into the gear housing together, keeping the locating holes in the bearings in line with the locating screw holes in the housing (27), taking care not to damage the oil seals when fitting the shafts. This should not occur if the pump assembly tools as shown are used. To secure the shafts in position in the gear housing screw in position the locating screws (19) and secure. Fit the reduction gear (26) to top shaft (23), making sure the driving dowels are in position. To re-assemble pump, reverse the procedure of paragraphs (f), (b) and (a).

# TOOLS FOR GEAR PUMP




**Tools for Gear Type Water Pump**

| | | Part No. | | | Part No. |
|---|---|---|---|---|---|
| a | Knurled Sleeve Tool | 317-35 | 12 | Gland Spring | 291-2152/4 |
| b | Guide Bar Tool | 317-37 | 14 | Rubber Ring | 291-2527/1 |
| c | Tapered Sleeve Tool | 317-36 | 15 | Bearing Block | 291-2540/1 |
| d | Snap Ring Loading Tool | 317-76 | 16 | Oil Seal | 291-2153 |
| e | Bearing Block Bush Drift Tool | 317-48 | 17 | Carbon Seal | 291-2150/1 |
| 5 | Bearing Housing | 291-2514/1 | 23 | Pump Shaft | 291-2510/4 |
| 10 | Snap Ring | 291-2975 | 27 | Gear Housing | 291-2501/1 |

# MAINTENANCE ROUTINE

When Engine is in continuous use:-

**Daily**

Check supply of fuel oil.
Check leaks of oil, water, fuel.
Check level and state of lubricating oil.
Check level of oil in air compressor.
Turn Grease Cups. JPM only.
Check water circulation.
Check water temperature.
Check exhaust smoke.
Check lubricating oil pressure.

**100 hours.**

Clean Air Filters.
Oil Starter and Generator bearings.
Drain Moisture Trap (if fitted).
Check condition of Starter Battery (if Electric Starting).
Check tightness of all nuts.

**450 hours.**

Change Engine oil.
Clean Lubricating Oil Filter.
Check Water Pump and Air Compressor.
Remove Injectors and check fuel spray.
Check Reverse Gear Adjustment.
Lubricate auxiliary machinery.

**1,000—1,500 hours.**

Decarbonise.
Clean Fuel Filter.
Check Piston clearance if gasket is changed.
Grind in Valves.
Clean Compression ratio valve screw (JPM only)
Adjust Valve clearances.
Clean out Heat Exchanger (if fitted).

**3,000 hours.**

Clean out Inlet Manifold and Exhaust Pipes.
Check Water Jacket for scale.
Clean vent holes in Cylinder Block.
Check free working of Governor linkage.
Drain sediment from main Fuel Tank.
Renew Fuel Filter Elements.
Check Injector nozzles for obstructions or wear in orifice.
Check Big Ends 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.**

# MAINTENANCE

**Changing Lubricating Oil. Every 450 hours.**

Drain oil from Engine and tank when warm, through Drain Plug underneath the Engine close to the Lubricating Oil Pump. Drain and clean out tank.

Remove Crankcase Doors and wipe down inside as clean as possible.

If paraffin is used to swill out sludge, Crankcase must be wiped dry before recharging with fresh oil.

Remove, clean and replace Oil Filter in sump and Strainers in tank.

**Lubricating Oil Filter.**

To remove Filter (JP2M & JK2M Engine) remove crankcase door, remove nut in the top centre of the Scavenge Oil Pump casing; this will allow the filter to be extracted from the Crankcase. Do not lose two small fibre washers on end of the filter which seal inlet connection to the pump.

To remove Filter (JP3 & JK3M Engine) remove crankcase door, unscrew union nut on pipe securing it to the adaptor; filter and pipe may be extracted from Crankcase.

Wash both filters carefully in paraffin and examine fine gauze for perforations; renew if holed. Dry thoroughly and replace.

**Fuel Injector.**

Examine the nozzle periodically and clean if necessary. The use of absolutely clean fuel is essential for good injection and complete combustion.

A faulty nozzle may result in one or more of the following :—

(a) Smoky Exhaust (Black).
(b) Loss of Power.
(c) Knocking in the Cylinder.
(d) Engine overheating.
(e) Increased fuel consumption.

To test a nozzle, remove from Cylinder Head and re-connect to Fuel Injection pipe with the nozzle exposed. Turn the engine until the nozzle sprays into the air away from the operator (the spray will easily penetrate the skin of the hands), when it will be seen if the spray is " streaky " or " dribbling "; a perfect spray is in the form of a fine mist.

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

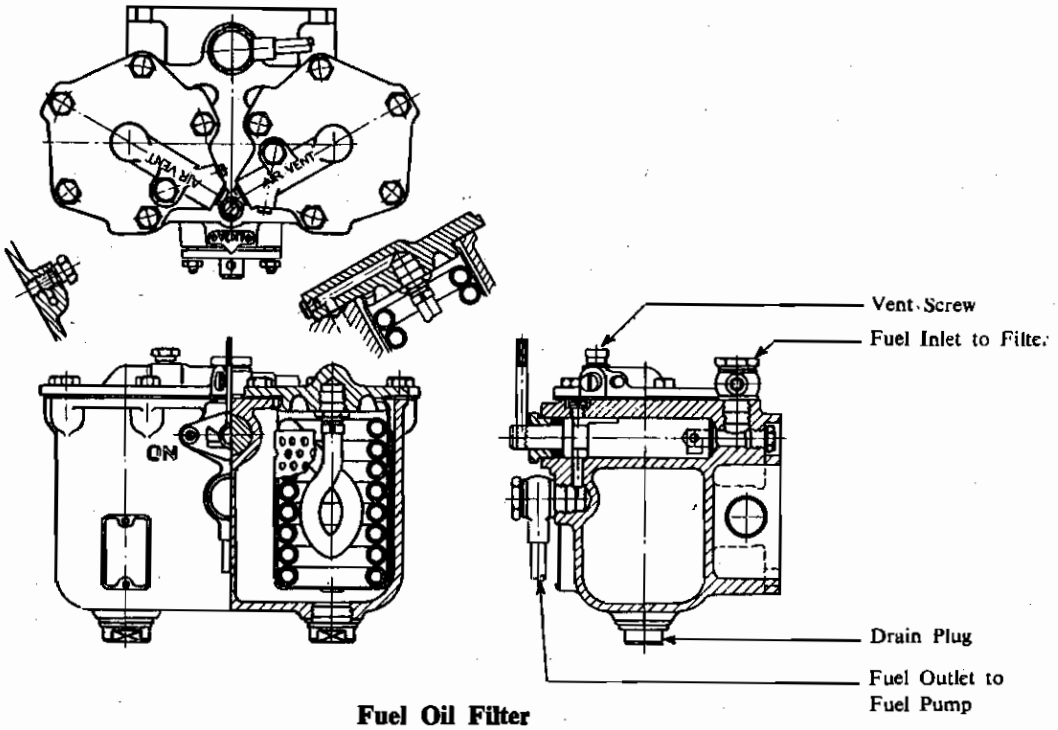
To remove the nozzle and valve, secure the injector body in a vice and unscrew nozzle cap nut. When replacing or renewing the nozzle and valve, it is essential to locate the two dowels and valve spindle correctly before replacing the cap nut.

If in any doubt, replace a complete Injector; body and nozzle.

The defective or dirty unit must be returned to a Service Depot for attention.

**Important.**

Apart from the attention given to the Fuel Pump Coupling, Delivery valve and seat and the changing of defective Injector nozzles and valves, ALL other work on the Fuel Injection System must be carried out by suitably equipped Service Depots.




**Fuel Oil Filter**

1. Vent Screws.
2. Filter Change-over Lever.
3. Filter in use—indicator.
4. Fuel INLET to Filter.
5. Fuel OUTLET to Fuel Pump.
6. Drain Plug.
7. Water Heating Inlet.
8. Water Heating Outlet.

**Cleaning Fuel Filter (1,000 - 1,500 hours).**

(a) Shut off fuel from Tank.
(b) Disconnect fuel pipe from Filter Cover and plug the hole in the cover with a wooden plug or cork.
(c) Undo nuts and remove cover together with Filter Element.
(d) Remove cage from the Filter Element but do not remove Filter Element from cover.
(e) Wash Filter Element in clean paraffin or fuel oil, taking care that no dirt or dirty liquid enters Filter Element through hole in cover.
(f) Empty and clean out Filter Body.
(g) Assemble by reversing order of dismantling.
(h) Open Fuel from Tank and prime Filter by slackening Vent Screw until all air has been driven out and only fuel flows.
(i) Should element require replacing it is important that the cover is thoroughly cleaned before removing the old element. This will prevent fine particles of foreign matter entering the threaded hole from the outlet connection.

**Vacuum Breather.**

The purpose of the Vacuum Breather on the Crankcase is to maintain a partial vacuum in the Crankcase so that the lubricating oil will not work out through the joints.

If the thin metal disc should become stuck with paint or grime, remove and scrape clean on a flat surface, care being taken not to kink or distort it. Do not mislay the small distance piece which supports the cover.

The Breather is fitted to the JP3M Engines only.

The JP2M Engines have the Body of the Breather without the metal disc.

**Compression Ratio Change-over Valve (JPM only).**

This is a device to give a high compression for starting, and a lower compression for normal running.

The valve screwed " IN " gives high compression and " OUT " gives low compression.

Do **not** run under heavy load with high compression.

For long runs at half load or less, use high compression.

Always see that the Valve is either **Fully in or Fully out.**

Keep the screw thread clean and bright.

**To Remove Compression Change-over Valve (JPM only).**

(a) Remove fuel pipes from injector and unscrew nut for releasing auxiliary chamber. This will withdraw the outer combustion chamber. Take note of the thin copper washer.

(b) The Main or Inner Combustion Chamber Plug may need to be loosened by compression.

Drive a hard wooden plug into the $\frac{1}{4}$" dia. hole in the centre to prevent air leakage and then replace the outer portions just removed, with the handwheel in the " out " position, and with the outer combustion chamber nut screwed into the head 3 or 4 turns, which will be sufficient to prevent the inner combustion chamber from being ejected too violently when subjected to the force of compression.

Stubborn cases will have to be treated by drilling and tapping the inner plug with a fine $\frac{1}{8}$" thread and drawing out with a screw.

(c) Unscrew small nuts in centre of hand wheel to extract Valve.

(d) Remove valve, taking care of spring, spring washer and woodruff key.

**To Remove Cylinder Head.**

(a) Drain water.

(If Compression Change-over Valve is to be removed, loosen at this stage). (JPM only).

(b) Remove Cylinder Head Cover.

(c) Remove Injector.

(d) Detach Inlet Manifold. Exhaust Manifold. Water Outlet Manifold.

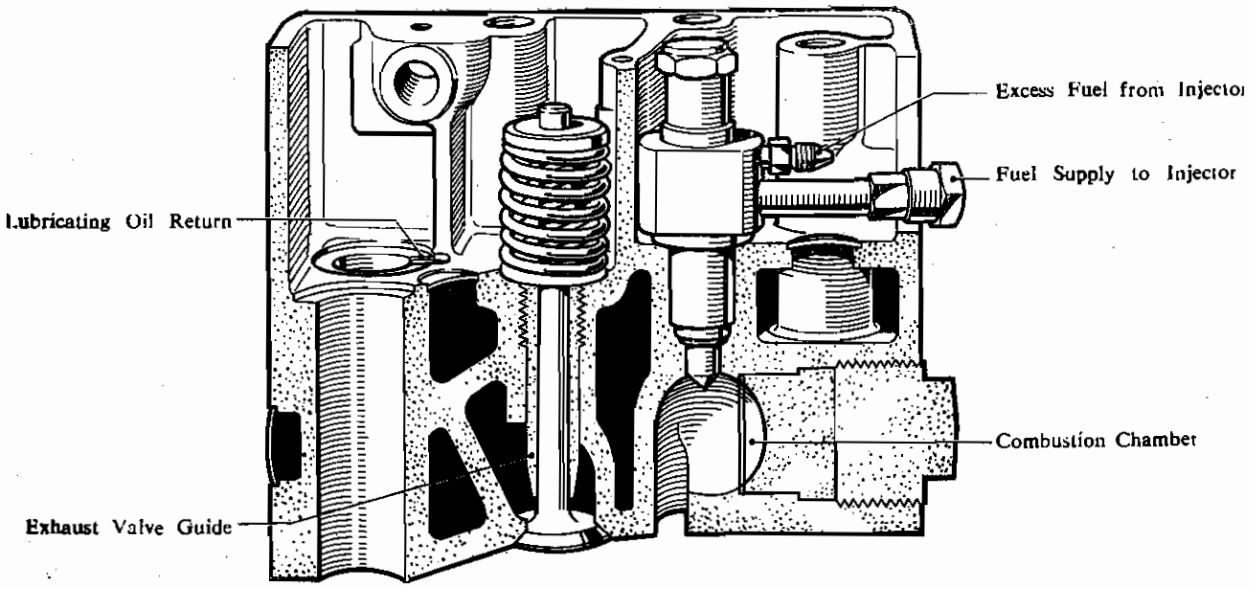
(e) Remove Valve Rockers by loosening small screws and sliding out Valve Rocker shaft.

(f) Remove Valve End Caps and lift out Push Rods.

(g) Unscrew nuts on Cylinder Head Studs and nuts on Hollow Studs.

(h) Lift off the Cylinder Head. In obstinate cases, replace the Injector (but not the Fuel pipes), Valve Rockers and 2 Cylinder Head holding down nuts ; slacken each of these holding down nuts about 2 turns and replace Cylinder Head Cover.

Next proceed as for starting, with the Decompressor Levers in the " UP " position, turn the starting handle quickly to get a good speed and then smartly knock down the appropriate Decompressor Lever, when the compression in the Cylinder should loosen the joint between Cylinder Head and Crankcase.




**Cylinder Head**

**To Remove Valve Guides.**

The Inlet Valve Guide may be driven out.

The Exhaust valve guide must be screwed out (turn anti-clockwise).

**To Replace Cylinder Head.**

(a) Refit Valve Guides, Inlet and Exhaust Valves; (Compression Change-over Valve JPM).

(b) See that Cylinder head gasket is undamaged and in place, i.e., located by dowel pin.

(c) Replace Cylinder Head on studs and tighten nuts finger tight.

**Note.**—Each Cylinder Head Gasket must be replaced on its own cylinder. If these have been changed, then the Head clearance must be checked as below.

(d) Fit exhaust and inlet Manifolds to ensure correct alignment. Failure to carry out this step will probably lead to cracked or broken Manifolds.

(e) Nuts to be tightened so that the Cylinder Head is pulled down flat. Tighten each nut a little at a time and go over all nuts 3 or 4 times.

(f) Replace Valve End Caps, Push Rods and Valve Rocker Gear and adjust valve clearances as under " Valve Adjustment."

**To Check Cylinder Head Clearance.**

Place two small pieces of lead on top of Piston, above the line of the Gudgeon Pin and not beneath the valves or transfer port. Tighten down Cylinder Had and turn Piston slowly past T.D.C. Remove Cylinder Head and measure thickness of lead; if this does not fall between .045in. and .050in., the clearance may be adjusted by the addition of a copper shim .005in. thick, placed next to Cylinder Head.

If the clearance is much too large it may be due to worn bearings or a bent Connecting Rod.

**To Remove Piston**

(a) Remove Cylinder Head.

(b) Remove Crankcase Doors.

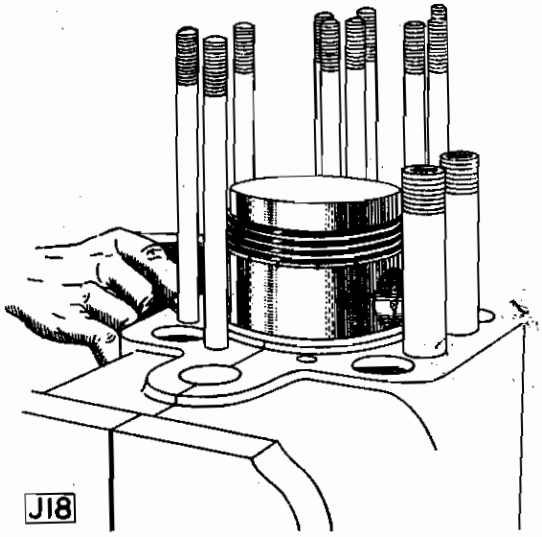
(c) Disconnect the Big End of the Connecting Rod. The best position for reaching the nuts will be found when the Piston is ¼" below T.D.C. Note the manner in which the Big End is marked.

(d) Bring the Crank into the vertical position, then raise the Connecting Rod, turn it through 90°, and stand it on the crank web

(e) The Cylinder Liner is cut away on either side. This allows the Connecting Rod to be pushed up until the Gudgeon Pin rises clear of the Cylinder. A wood block is placed for the Big End to stand on.

(f) Remove the spring circlip retaining the Gudgeon Pin on the side opposite the tubular studs.

(g) Warm the Piston (a cloth dipped in hot water, lightly wrung out and placed on top of the Piston once or twice), drive out the Gudgeon Pin and remove the Piston, the Connecting Rod can then be removed through small crankcase door.




**Withdrawing Piston**

**To Remove Piston Rings.**

First work them loose, then stand the Piston on a flat surfaee and insert thin strips of metal between the top Ring and the Piston at four different places. Ease the Ring off over the strips of metal and repeat the process for the other rings. Piston Rings are springy but will break if roughly handled.

**To Replace Piston Rings.**

(a) Piston, grooves and oil holes must be thoroughly clean. Piston Rings, if new, must be wiped clean of preservative grease; used ones must have any carbon deposits removed.

(b) To ensure that the Rings (except the top one which is tapered) will fit properly when assembled on the Piston, roll each one round in its own groove. Where a Ring is slack, and a new one is no improvement, it will be necessary to consider changing the Piston.

(c) Place the Ring in the lower part of the Liner and measure the gap between the two ends with a feeler gauge. The correct gap is not less than .012".

(d) The Rings must be replaced in their same grooves and the same way up. Wipe all parts clean and dry and assemble the Rings into their grooves by sliding them over strips of metal as in removal.

**To Replace Piston.**

(a) Oil the Cylinder bore copiously and place Connecting Rod in position (Standing on wooden block).

(b) Warm Piston, lower into bore and insert Gudgeon Pin. Tap well home and fit clips. Turn Connecting Rod 90°—see that Big End bearing marks are on correct side.

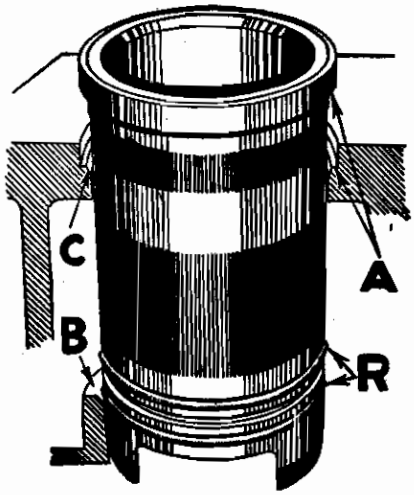
(c) Oil the Piston Rings and stagger the gaps. Place the Piston Ring clamp in position and compress the Rings. The clamp should close quite easily. If any force is required it is better to take it off and try again.

(d) Remove wood block from the Crank Web, oil and turn crank to T.D.C. and with a hammer shaft press the Piston down into the Cylinder. Maintain this pressure on the Piston while the crank is turned for assembly of the Big End bearing.

**To Replace Cylinder Liner.**

When fitting a new Liner ensure bore and shouldered seating " A " and rounded surface " B " are clean and smooth. If the shouldered seating in the Crankcase has a sharp edge this should be scraped or faced off to form a chamfer " C." Insert new Liner (without rubber rings) and grind in seatings " A " with grinding compound as for Valves. The top face should project from .006″ to .008″ above the face of the Crankcase. Smear two new rubber rings " R " with soft soap and place, without twisting, in top and bottom grooves on the Liner. Liner should slide freely into place, if it does not, remove and examine rubber rings. Renew if damaged.

Press Liner right home ensuring that line on flange of liner is in line with longitudinal centre line of the Crankcase. When a new Liner has been fitted, the Cylinder Head clearance should be adjusted.



Cylinder Liner

**IMPORTANT.**

The middle groove on Liner comes opposite the small " Tell Tale " hole in Crankcase, just above the inspection door. Should water pass the top rubber ring it would drain out through this hole which serves as a warning of the failure of the top ring.

**Connecting Rod Big Ends.**

These are fitted with steel backed white metal bearings, which should fit freely on the crankpin. The clearance should not exceed .004″. So that the two halves of the bearings shall register firmly one against the other, the Big End Cap is made to draw up to within .002″ of the top half. This " nip " should be measured with a feeler gauge after assembly with the Big End nuts just drawn up but not tightened. It may be necessary to scrape a new bearing to obtain a correct fit.

If the Big End has been dismantled because of failure of the white metal, the oil passage in the Crankshaft must also be examined for obstruction and fragments of white 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.**

These are of the bush type and need no attention as long as they are properly lubricated. Undersize main bearings are available .010", .020", and .040" undersize.

**Note.**—When a Crankshaft has been reground, an undersize Pinion will be required as well as the undersize bearings.

**Valve Adjustment.**

Valves should be set to .008" clearance when COLD.

To do this, remove Cylinder Head Cover, slacken off the locknut on top of the Valve Rocker, turn the adjusting screw until the correct clearance is obtained between the Valve and Rocker and then tighten the locknut. During this operation the Valve Tappet must be in its lowest position, and the rocker pressed firmly down on the tappet rod.

Inlet Valve opens 10° early and closes 50° late. Exhaust Valve opens 45° early and closes 15° late.

**To Remove Valves.**

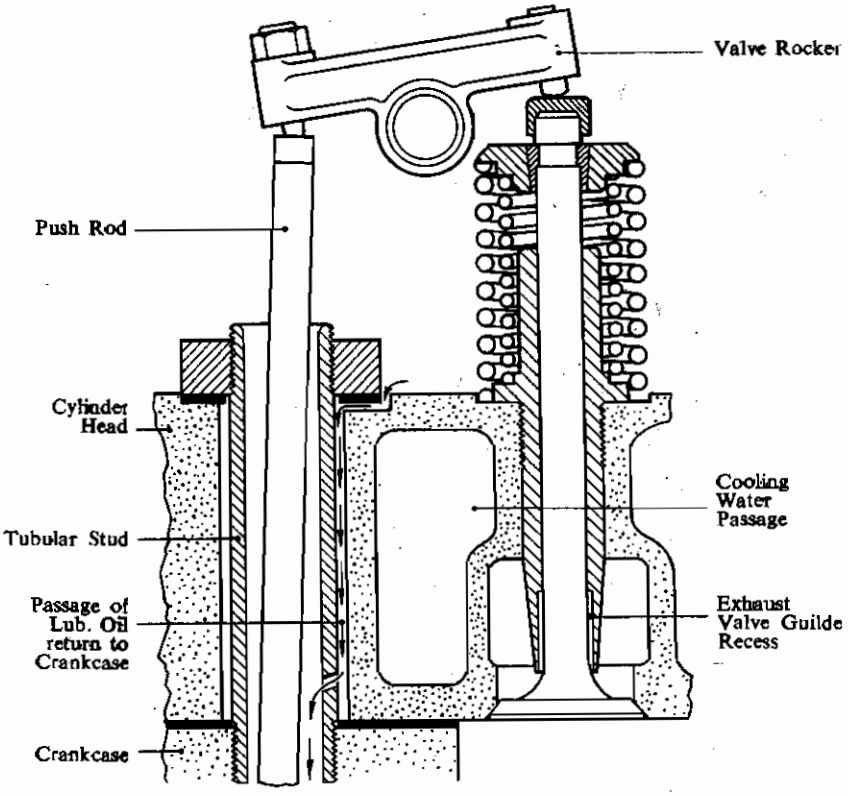
(a) Remove Cylinder Head. (See page 31).
(b) Lay head upright on bench.
(c) Depress Valve Spring Carrier.
(d) Remove Valve Stem Cone (in two halves).
(e) Remove Valve Spring Carrier and Valve Springs.
(f) Turn Cylinder Head over, and remove Valves.

**To Replace Valves.**

Replace components in the reverse order and check the Valve Head clearance.

**Position of Valve Heads.**

Exhaust Valve head must be not less than .012" under face of Cylinder Head. Inlet Valve must be not less than .004". The maximum for both Inlet and Exhaust Valves is .100".




**JKM Exhaust Valve Assembly**

**Decarbonising.**

Decarbonise the Engine after 1000 - 1500 hours running. This is an average figure and will depend on running conditions.

(a) Remove and dismantle Cylinder Head.

(b) Remove Piston and Rings.

**All Parts** must be scraped clean of deposits of carbon and washed in Paraffin before re-assembly.

Special care must taken with regard to :—

(a) Recess in bore of Exhaust Valve Guide

(b) Valve Ports.

(c) Piston Ring Grooves.

Regrind Valve seats if not in perfect condition.

This applies also to the Compression Change-over Valve (JPM only).

Clean out exhaust manifold and silencer. Every part must be scrupulously clean before being placed in position.

**To Adjust Decompressor.**

The Overhead type of Decompressor is spring loaded and will jump if for any reason the Piston should touch the Exhaust Valve Head. If this should happen, screw down the nut on top of the Cylinder Cover until the Decompressor can be operated without interference from the Piston.

**Flywheel.**

The Flywheel need not be disturbed except for the removal of main bearings or crankshaft. Should this be necessary, the flywheel nut must **Not** be unscrewed more than 2 turns before the flywheel is loosened.

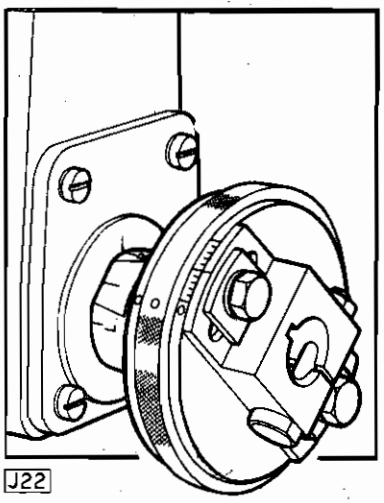
**Crankcase End Cover.**

Before removing the end cover, the exposed crankshaft must be made smooth and clean and the keyway turned to the bottom. This will preserve the Main Bearing which comes away with it.

**To Replace End Cover.**

The timing of the Fuel Pump Gear Drive is set when replacing the End Cover. Turn the Fuel Pump Coupling so that the line R on the coupling coincides with the vertical line on the pump body. Set No. 1 Piston to injection mark ⌇⌇ on Flywheel on compression stroke (No. 2 Piston for JP2M or JK2M) and push cover home. A slight mis-alignment of the R mark may be disregarded as this will be corrected at the final adjustment of the vernier coupling. No. 1 Cylinder is at Fuel Pump End of Engine.

Firing Order for 3 cylinder Engine : 1, 3, 2.




**Fuel Pump Coupling**

**To Remove Crankshaft.**

(a) Drain oil and water from Engine.

(b) Remove Cylinder Heads.

(c) Draw Pistons and Connecting Rods.

(d) Remove Flywheel and Crankcase End Cover.

(e) Remove Pressure Gear Cover and Gear Unit.

(f) Remove Crankshaft Spur Gear and Outer Main Bearing Gear End.

(g) Release any intermediate bearings. In 3 Cylinder Engines these are secured by long setscrews through the side of the Crankcase.

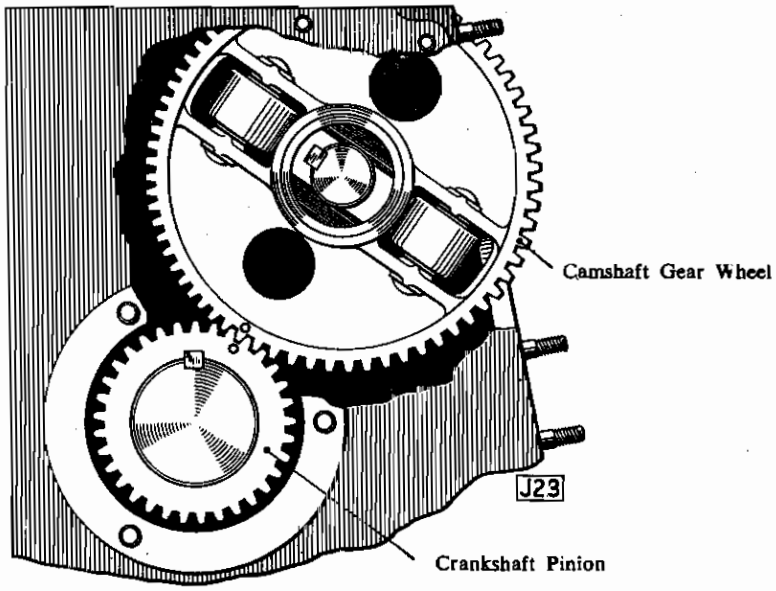
(h) The Crankshaft, together with Pinion, inner Main Bearing gear end and intermediate Main Bearings, is now free; lift the whole unit out through the Crankcase.

Before replacing Crankshaft, give all oil passages a thorough cleaning.

Take this opportunity to give the inside of the Crankcase a good wash down with paraffin.

Make certain that all bearings are entered the right way up for the oil holes, particularly the centre bearings for 3 cylinder engines.

The correct Crankshaft end clearance is .005" to .010". This clearance must be available on the locating main bearing before re-assembly in the crankcase. If it has been reduced after fitting the end cover, an additional end cover gasket must be fitted.




**Camshaft Timing**

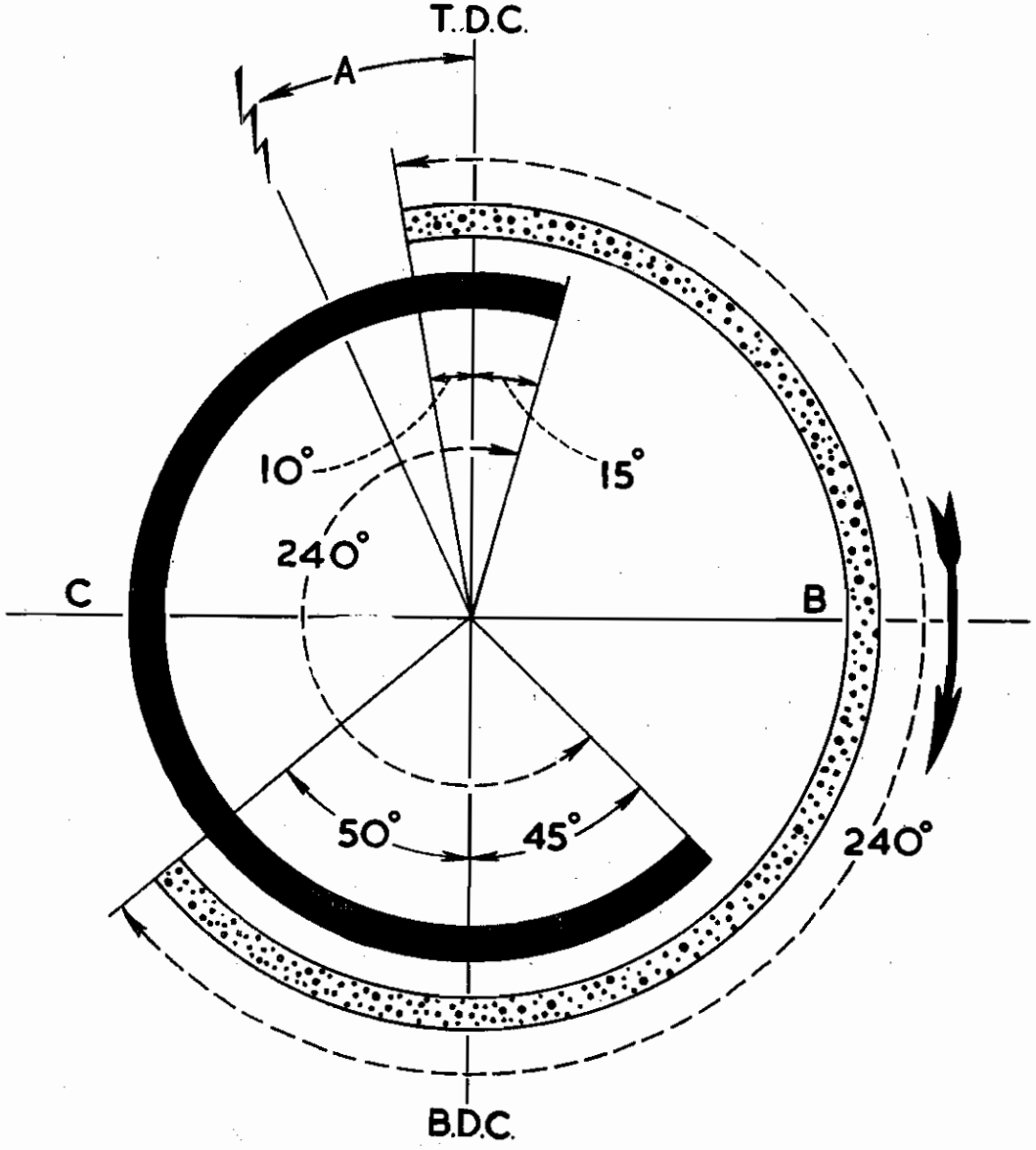
**To Time Camshaft.**

(a) Place Gear Wheel in position, engaging the tooth marked "O," with the corresponding gap on the Crankshaft Pinion. Allow the Gear Wheel to roll over and rest on the Crankcase.

(b) Insert Camshaft, with key in position, and work along through the bearings, at the same time, replacing the Tappets.

(c) Roll Gear Wheel back until it engages with the Camshaft end. Drive Gear Wheel home and fit securing nut and locking washer.

# TIMING DIAGRAM




**TIMING DIAGRAM**

A — Fuel Injection : 26° BTDC JPM & JKM over 1200 RPM.
24° BTDC JPM & JKM up to 1200 RPM.

Exhaust Valve Opens

Inlet Valve Opens

CYLINDER FIRING ORDER :

1, 3, 2—3 cylinder

# FUEL EQUIPMENT

**To Prime Fuel System.**

**Prime the fuel system by removing ALL air :—**

(a) With fuel tank filled, prime Filter by unscrewing Vent Screw on top of Filter until all air is released and the oil flows freely. Re-tighten screw.

(b) With Governor Lever Handle in " STOP " position, and locking pin in slot, disconnect fuel injection pipe from delivery valve holder on Fuel Pump, by unscrewing the union

(c) Remove delivery valve holder and spring, and with the fingers slightly raise delivery valve from its seating. As soon as this is done fuel should appear. Hold delivery valve off its seat until all air bubbles are out of the system and a solid column of fuel oil appears. Replace delivery valve holder and spring and tighten down holder firmly but not too vigorously.

(d) Connect fuel injection pipe again to Fuel Pump and loosen at Injector Union. Repeat for all cylinders.

(e) Place Governor Lever Handle in " START " position by withdrawing locking pin. Engage starting handle and turn Engine by hand until oil flows freely from Injector unions.

(f) Tighten unions and continue turning Engine until Injectors " creak " or a distinct " buzz " is felt in the Injector pipes.

**Timing Fuel Injection by Spill Cut off.**

This is to correct the rough timing given by the " R " mark.

(a) Set Governor Lever to Starting Position.

(b) **For JPM and JKM engines up to 1200 RPM.** Set the crankshaft in firing position for No. 1 cylinder (No. 2 cylinder on two cylinder engine) this is 24° before TDC, or 4.85″ measured on the rim of 23″ flywheel.

(bi) **For JPM and JKM engines over 1200 RPM.** Set the crankshaft in firing position for No. 1 cylinder (No. 2 cylinder on two cylinder engine), this is 26° before TDC, or 5.2″ measured on the rim of 23″ dia. flywheel.

(c) Disconnect the fuel injection pipe from No. 1 Cylinder of Fuel Pump, No. 2 on JP2M & JK2M. **Always** the Pump nearest the coupling.

(d) Remove delivery valve holder, delivery valve and spring.

**Note.**—Fuel may flow from the pump. If so, rotate Crankshaft forward till it ceases.

(e) Replace delivery valve holder (without valve and spring) and tighten lightly.

(f) Now turn the Engine backwards slowly until the fuel recommences to flow, then turn in the direction of rotation, until the fuel flow ceases. Blow fuel off the top of the delivery valve holder to make sure that the flow has definitely stopped. At this position the mark on the flywheel, which indicates injection should be immediately opposite the line on the end of the engine crankcase. If not, adjust the vernier coupling on the pump drive.

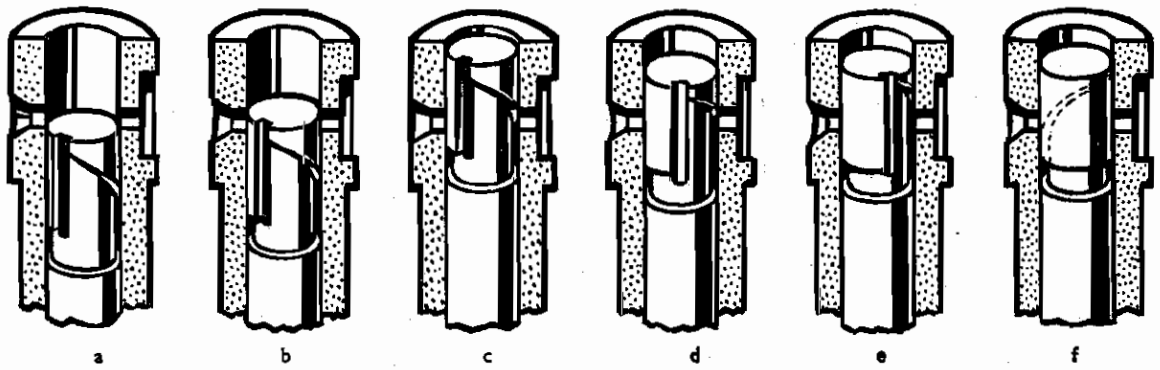
(g) Replace delivery valve and spring after washing them in clean fuel oil.

(h) Reconnect fuel injector pipe.

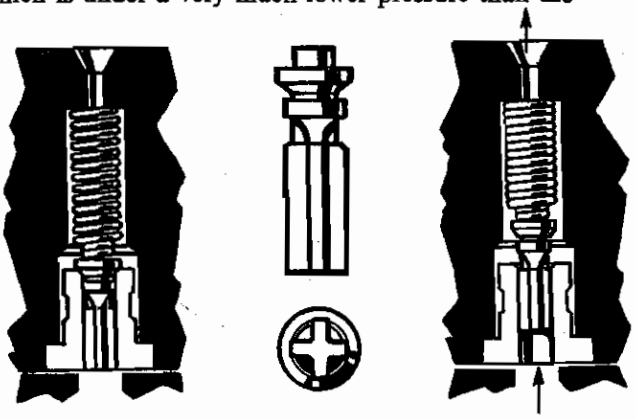
(i) The other cylinders could be checked in similar manner if in any doubt.

**C.A.V. Fuel Pump**

The pump element is comprised of the plunger and barrel as shown below. When the plunger is at B.D.C. as at (a), oil enters through the barrel ports by gravity from the daily service tank.




In a properly primed system the barrel and the pipes leading from the pumps to the injectors are full of fuel. As the pump plunger rises a certain amount of fuel is pushed back through the barrel ports, until the plunger reaches the position (b) where the top land of the plunger has closed both ports. The fuel above the plunger is then trapped, and its only outlet is via the delivery valve which is mounted on top of the pump barrel. The pressure exerted by the rising plunger upon the oil causes this to lift the valve and to enter the pipe which connects the pump to the injector. As this is itself already full of oil, the extra oil which is being pumped in at the pump end causes a rise in pressure throughout the line and lifts the nozzle needle (or injector valve). This permits oil to be sprayed into the engine combustion chamber. Thus at this moment we have oil being pumped into the line at the pump end, and an equal quantity being pushed out at the nozzle end. This continues until the plunger reaches the position shown at (c). Here the lower edge of the control helix has uncovered the barrel port, thus allowing fuel to be by-passed back to the suction chamber (which is under a very much lower pressure than the fuel oil above the plunger) by way of the vertical slot. This causes the delivery valve to shut under the action of its spring, and with the consequent collapse of pressure in the pipe line, the nozzle valve also shuts. The plunger stroke is always constant, but that part of it which is actually pumping is variable. By means of the helical edge which runs around the plunger, which itself can be rotated within the barrel, it is possible to make this point of cut-off occur earlier, or later in the stroke—compare positions shown at (c), (d) and (e) which show full load, half load and idling, respectively. To stop the engine the plunger is turned so that the vertical slot coincides with the barrel port (see f) during the whole of the plunger stroke ; thus no fuel is delivered. The position of the plunger stroke at which the helical edge will uncover the port is adjustable by rotating the plunger axially by means of a toothed quadrant which is clamped to the sleeve having slots engaging the lugs of the plunger at its lower end. The toothed quadrant engages with a collar provided on the control rod which similarly actuates all the pump elements in the unit, and is externally connected to the governor.



**Delivery Valve Unit**

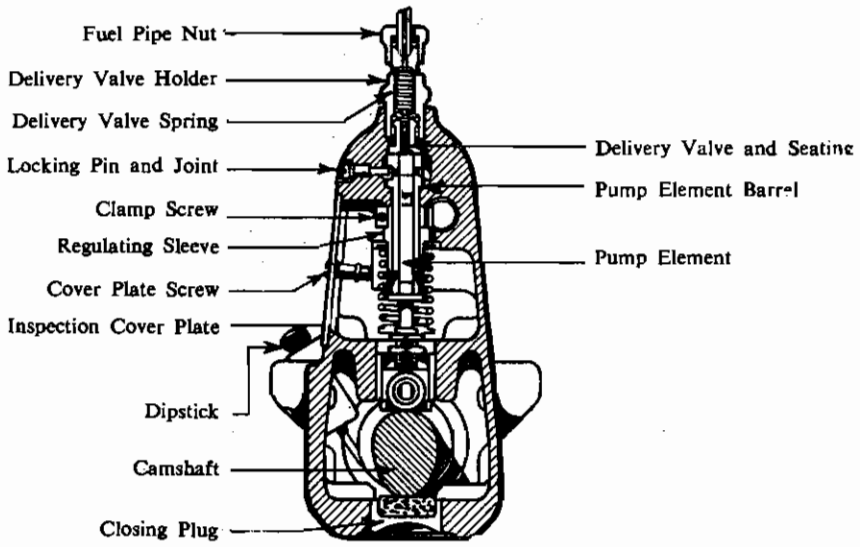
**Anti-Dribble Device.**

When the helical edge of the pump plunger uncovers the port on the pump barrel near the end of the delivery stroke, the pressure of fuel is immediately reduced so that the delivery valve at once drops on its seating, thus cutting off communication between the pump and the nozzle until the next delivery stroke takes place. In coming to its seat to act as a non-return valve, the delivery valve is, however, made to perform the other highly-important function of pressure unloading. The double function is obtained by means of the novel but entirely simple construction of the delivery valve unit, and reference to the Figure will show that it is an ordinary mitre-faced valve with a guide which has a circular groove cut in it, dividing the guide into two parts. The lower part has four longitudinal grooves communicating with the circular groove. The upper part of the guide forms a small piston, which is an accurately ground plunger fit for the valve seating which is also ground. When the pump is on its delivery stroke, the pressure of the fuel rises and the delivery valve is pushed up until the fuel can escape through the longitudinal grooves over the valve face to the nozzles. Immediately the pump plunger releases the pressure in the barrel, the delivery valve (under the influence of its spring and the great difference in pressures between the pump barrel and the delivery pipe) resumes its seat, causing the small piston part of the guide to sweep down the valve seating with a plunger action, thus increasing the space in the delivery pipe (by an amount equal to the volume of the small piston part of the valve guide) before the valve actually seats itself.

The effect of this increase in volume in the delivery pipe system is, of course, that of suddenly reducing the pressure of the fuel therein so that the nozzle valve in the nozzle can "snap" to its seat, thus terminating instantaneously the spray of fuel in the cylinder, entirely without "dribble."

**Control of Output.**

The word "Stop" and an arrow engraved on the top at one end of the control rod indicate which way the control rod should be moved to stop the engine.

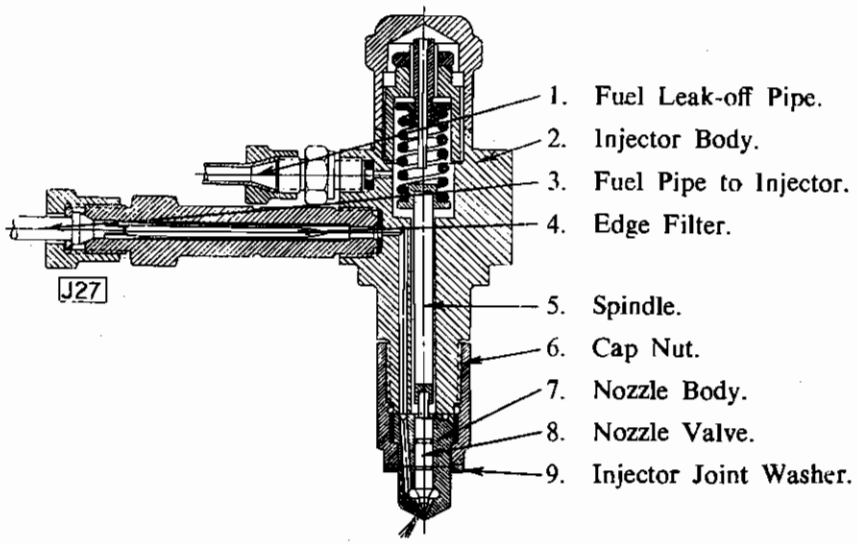



**Sectional View of Fuel Pump.**

**Injector.**

The complete injector consists of two parts, (a) the nozzle holder and (b) the nozzle.

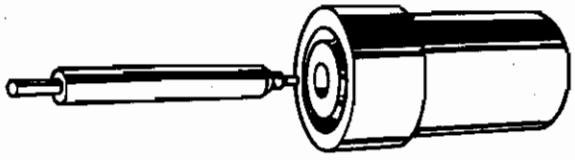
The nozzle holder contains the pressure controlling spring, and the pressure can be adjusted by the screw and locknut to 2200-2400 p.s.i. (154-168kgs./sq. cm.).




**C.A.V. Fuel Injector**

The nozzle valve and nozzle body are shown separately in the figure below. The nozzle valve takes the form of a plunger accurately lapped into the nozzle body to the closest possible fit, within which it will work freely. On one end of the nozzle valve, a stalk is provided, whilst at the other end it is reduced in diameter to produce a stem upon which a valve face is formed.

Fuel is fed to the mouth of the nozzle through small tunnels bored vertically in the nozzle body which terminate in an annular reservoir or " gallery " just above the valve seat. The nozzle valve is raised from its seat in the nozzle body by the pressure of fuel being fed from the injection pump, and the accumulated fuel in the " gallery " is forced by the upward movement of the plunger in the pump, through the hole or holes in the nozzle, thus forming a " spray " in the engine combustion chamber.



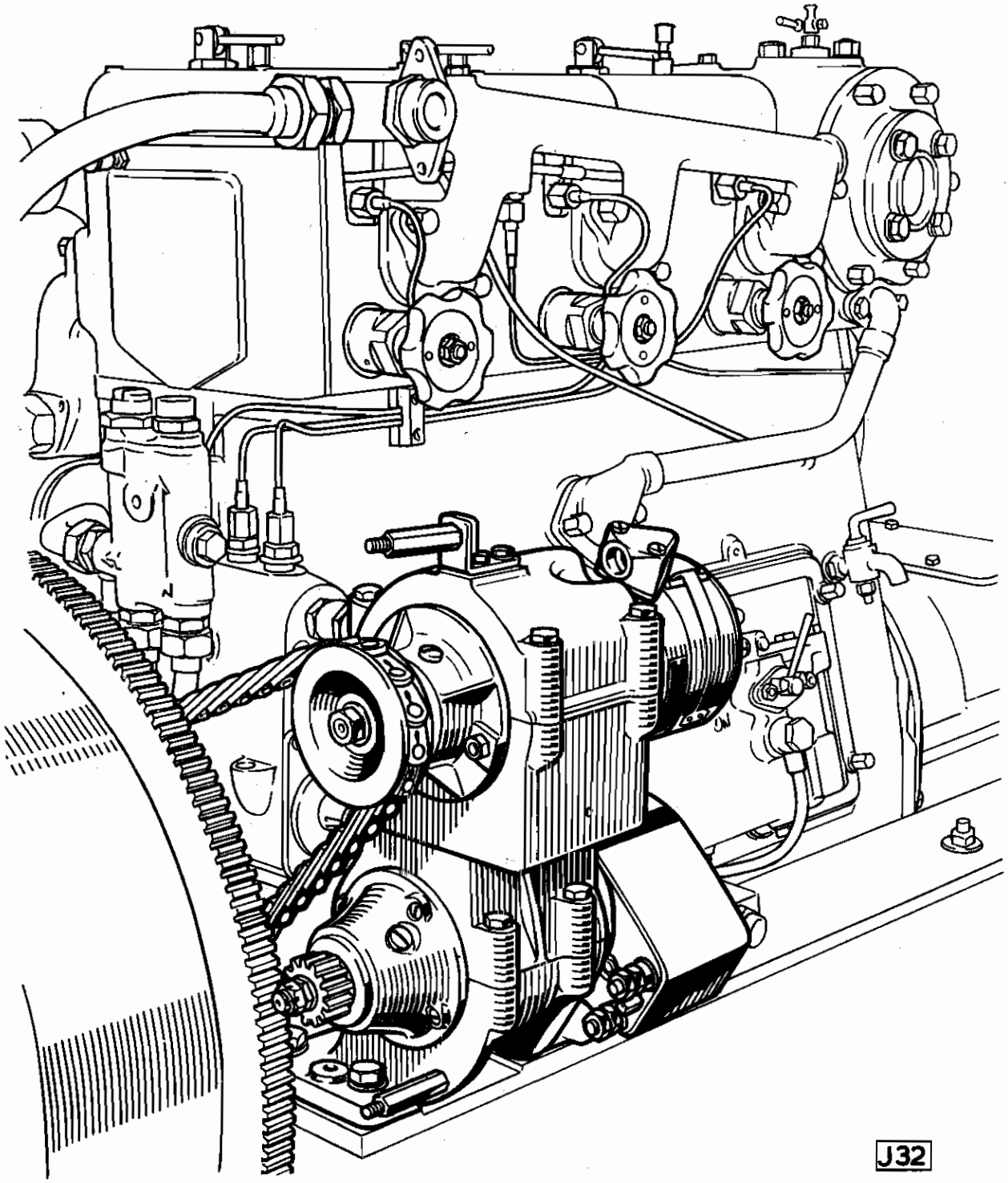
**C.A.V. Nozzle Valve and Body**

**FAULT LOCATION IN FUEL PUMP.**

| FAULT | PROBABLE CAUSE | SUGGESTED REMEDY |
|---|---|---|
| Pump does not deliver fuel. | 1. Fuel tank empty. | |
| | 2. Fuel inlet pipe choked or filter element dirty. | |
| | 3. Air lock in pipe line. | Partly unscrew vent plug until fuel flows freely, without any air bubbles. |
| | 4. Delivery valve remains suspended. | Remove and examine valve face and guide, as well as seating face. If either are damaged, the pair should be replaced. |
| The pump does not deliver fuel uniformly. | 5. Supply of inlet fuel to pumps insufficient. | Proceed as at 3. |
| | (a) Inlet pipe choked or filter element dirty. | |
| | (b) The "head" between the tank and the pump is too small. | Increase the head. |
| | 6. Air lock in pump shown by air bubbles issuing when the delivery valve holder has been unscrewed. | Proceed as at 3. |
| | 7. Delivery valve spring broken. | Replace. |
| | 8. Delivery valve damaged either on face or guide. | Fit new pair (i.e., new valve and seating complete). |
| Quantity of fuel delivered per stroke insufficient. | 9. Delivery valve leaky. | Fit new pair (i.e., valve and seating). |
| | 10. Leaky joints in the pressure | |

# 12v. ELECTRIC STARTING EQUIPMENT (JPM)

## DYNAMO AND STARTER MOTOR MOUNTING



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# DYNAMO AND STARTER

**Dynamo**

With the compensated voltage control system there is automatic adjustment of the charging rate in relation to the condition of the battery. Once a dynamo has exceeded the cutting-in speed, the output voltage is kept slightly in excess of the back pressure of the battery irrespective of any variation of speed. In addition the excess voltage of the dynamo is made greater as the battery becomes discharged and less as the battery becomes more fully charged. The current voltage control system charges a partially charged battery at a constant current until a certain battery voltage is reached when the charging changes to constant voltage control. This latter then allows the charging current to drop as the fully charged state in the battery is approached, until it reaches the normal trickle charge value.

**Testing.**

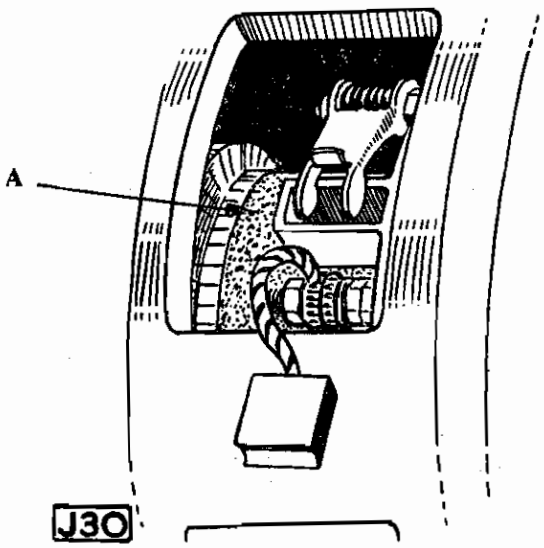
First remove all cables from the terminals. Then make a short wire connection between the terminal marked ' F " and the Positive main terminal, which is connected internally to the brush gear. Connect a moving coil type voltmeter, having a suitable range, across the two large main terminals, and run the engine up to such a speed as will give a reading of 13 volts on the voltmeter. Do not, however, exceed engine revs. of 850 r.p.m.

If the voltmeter remains at zero check the dynamo brush gear, and internal connections. A very low reading throughout the rise in engine speed indicates a possible faulty field winding, or possibly that the armature winding is faulty.

**Starter.**

The Starter is of the " Axial " type, so termed because the armature with its shaft, is capable of an axial movement in its bearings, and when extended it engages the pinion with the teeth on the flywheel rim. It is held in a disengaged position by means of a coil spring fitted inside the shaft at the commutator end, the armature being thus kept out of complete register with the pole shoes.

When the Starter Button is pressed a small current passes through the auxiliary windings, causing the armature to rotate slowly. Simultaneously, the magnetic field set up pulls the armature forward which brings the pinion gently into mesh with the engine flywheel teeth. This movement of the armature also causes the contacts of the solenoid switch to be released, thereby completing the main circuit. The full battery current then flows through the armature and the series field windings, and the motor exerts its full torque on the engine. When the engine itself gets under way, the motor current is greatly reduced, the magnetic field is decreased in power, the tension of the spring overcomes the force exerted by this residual magnetic field and the pinion automatically disengages.




A—Glass Paper.

**Bedding in Brushes**

**Testing.**

If the starter fails with a fully charged battery connect a voltmeter across the main terminals. If the reading is zero when the Starter Button is pressed again the fault lies between the Button and the Starter, or between the Battery and the Starter.

Bad electrical contacts in the switch, on the Starter Terminals, or on the Battery will give rise to intermittent operation of the Starter when the Button is pressed.

**Maintenance.**

Inspect the Brushes every six months, and see that they are free in their guides and that their flex leads are perfectly clear for movement. Positive and negative brushes and holders must be insulated from one another. These can be tested by means of a lamp but it is not necessary to remove the brushes while testing, provided that they are lifted from the commutator before commencing the test.

If, for any reason, they are removed, take care to replace them in exactly the same position in the brush holder, so that the bedding curvature will accurately conform to the diameter of the commutator. If they are not well bedded to this curvature, wrap a piece of fine glass paper around the commutator and, with the brushes in position, rotate the armature by hand in the normal direction of rotation until the correct brush shape is obtained.

See that they have not worn so that the trigger or spring is no longer providing effective pressure.

Test the brush spring pressure by means of a spring balance hooked under the spring trigger or spring tips.

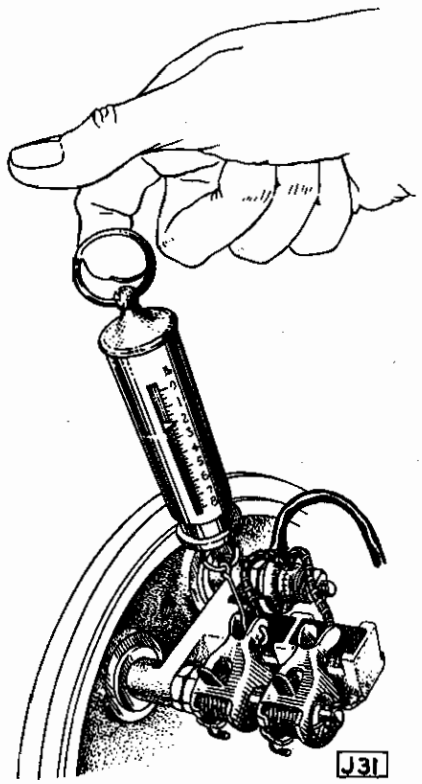
Dynamo Springs: 12-19 ozs. Starter Motor Springs: 32-40 ozs. The pressure can be varied by twisting the spring into different slots on the trigger.

Test if the brushes are free in their guides, cleaning all carbon deposits away with petrol or spirit, and if necessary ease the fit by lightly polishing the sides of the brush with a smooth file.

It is essential that replacement brushes are of the same grade as those originally specified for the machine.

The full travel of the armature is 31/32in. (24.6mm.). Check that the face of the flywheel ring of teeth is $\frac{1}{8}$in. (3.2mm.) from the engaging face of the Starter Motor Pinion when it is in the idling position. If the Pinion teeth are badly worn the pinion should be renewed: before using the starter again, however, the teeth on the flywheel ring should be carefully examined for damaging burrs, and these cleaned off with a smooth file.

For details of major overhauls and inspections of the Dynamo and Starter, see the maker's booklets issued with the engine.

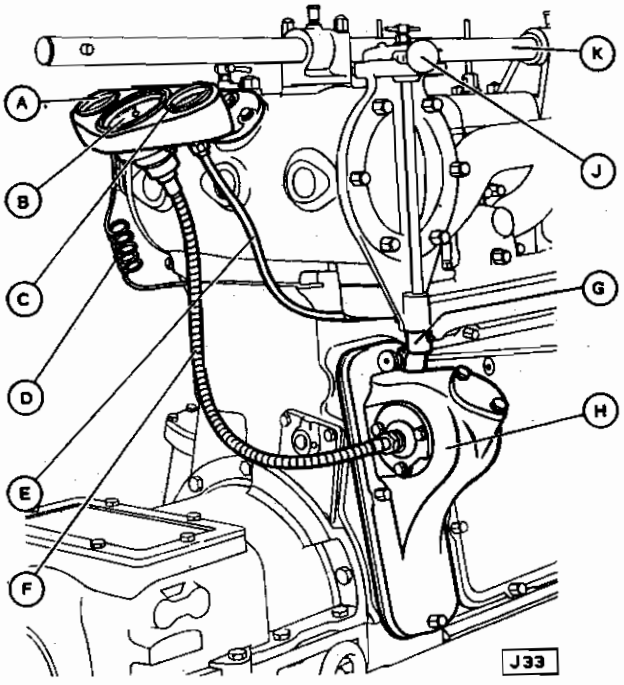



**Electric Starter.**

The clearance between the end of the Pinion on the Starter Motor and the side of the Gear Ring on the Flywheel should be 1/16th" to 3/32".

If the Starter Motor Bracket is removed note should be made of the number of paper shims underneath the Bracket. The thickness of these shims controls the amount of backlash when the Pinion is meshed with the Gear Ring. This should be 0.015".

# TACHOMETER AND INSTRUMENT PANEL




**Tachometer and Instrument Panel**

A. Temperature Gauge.
B. Tachometer.
C. Oil Pressure Gauge.
D. Temperature Gauge Capillary.
E. Oil Pressure Gauge Pipe.
F. Tachometer Drive Cable.
G. Speed Control Arm (Short).
H. Housing.
J. Speed Control Lever.
K. Starting Shaft.

# AIR COMPRESSOR

The Air Compressor is driven by belt from a pulley behind the flywheel at the forward end of the engine and controlled by a hand operated clutch.

**General Details.**

Type W & J G1419A. Bore 1⅛", Stroke 2". Displacement 1.5 cu.ft./mm. at 1080 R.P.M. either rotation. Max. pressure 450 p.s.i.

**Lubrication.**

By splash from sump in crankcase. Oil level checked by dipstick in end cover, or cock at side of crankcase. Remove breather for filling. Use good quality heavy oil S.A.E. 30 grade.

**Valves.**

Both valves are of special alloy steel. Care should be taken when replacing to ensure they are seating correctly when screwing down the plugs. The cylinder head should be removed after every three months' operation and thoroughly cleaned. When suction filter is fitted it should be cleaned every four weeks.

**Cooling.**

Cooling water is supplied from the engine system. Both outlets are connected by "Y" piece. The cooling water passing both sides of the delivery valve.

**Arrangement.**

There must be no stop-valve between the compressor and relief valve. It is advisable to fit a dirt and moisture trap in the delivery line close to the compressor.

**Operation.**

The compressor should always be unloaded when starting up by manipulating the unloader screw, and with the drain cock on the delivery line open. This ensures that all moisture is expelled from the system.

# LISTER REVERSE GEAR

The reverse gear is built integral with the engine, incorporating a multiple plate ahead clutch, and an epicyclic reverse gear. Lubrication is from the engine system.

As the ahead clutch is of the metal to Ferodo plate type, it is most important that no " slip " should occur, as this involves loss of power and undue wear and tear of the plates. Slipping causes heat to be generated so that on the first sign of excessive heat while going ahead the boat should be stopped and the clutch adjusted. After adjustment a well defined neutral position must exist.

The Thrust Bearing is situated at the extreme after end of the reverse gearbox and is lubricated from the main oil circulating system. When a reduction gear is fitted the thrust races are mounted in the reduction gearbox.

**Operation—Neutral.**

Drive from the engine is passed initially from the Crankshaft Spur Gear (1) to the two Stepped Pinions (2). These in turn drive the two Spur Pinions (3), thus driving the Clutch Shaft Spur Gear (4). This latter is keyed to the Clutch Spider (5). The Clutch Shaft Spur Gear (4) is keyed to the Clutch Shaft (6), and while in neutral this gear remains at rest and the two sets of Pinions revolve around it, carrying around with them the Clutch Body (7).

**Operation—Ahead.**

Three Clutch Plates (Large) (8) have teeth on their outer periphery meshing with internal teeth on the Clutch Body (7), and two Clutch Plates (Small) (9) are keyed to the Clutch Spider (5). Pushing the control Lever forward rotates the Cross Shaft (10), throwing forward the Sliding Sleeve (11), and forcing the Toggle Levers (12) outward and forward. The Adjusting Screws (13) mounted in the Toggle Levers (12) then press upon the Clutch Gripping Plate (14) which, although keyed to the Clutch Spider (5), can slide forward pressing the Clutch Plates (8 and 9) together. Referring to the paragraph above (Neutral), as long as the engine is running the larger Clutch Plates (8) are being driven round by the Clutch Body (7). When the Control Lever is pushed forward, and the Toggle Levers (12) press all the Clutch Plates together friction then drives the two smaller ones, keyed to the Clutch Spider (5), which is keyed also to the Clutch Shaft Spur Gear (4) and the Clutch Shaft (6) itself, giving forward drive to the Gear Box Half Coupling (15). The Sliding Sleeve (11) is keyed to the Clutch Shaft (6) and so the Toggle Levers (12) and Gripping Plate (14) revolve at the same time, eliminating wear at these points.

**Operation—Astern.**

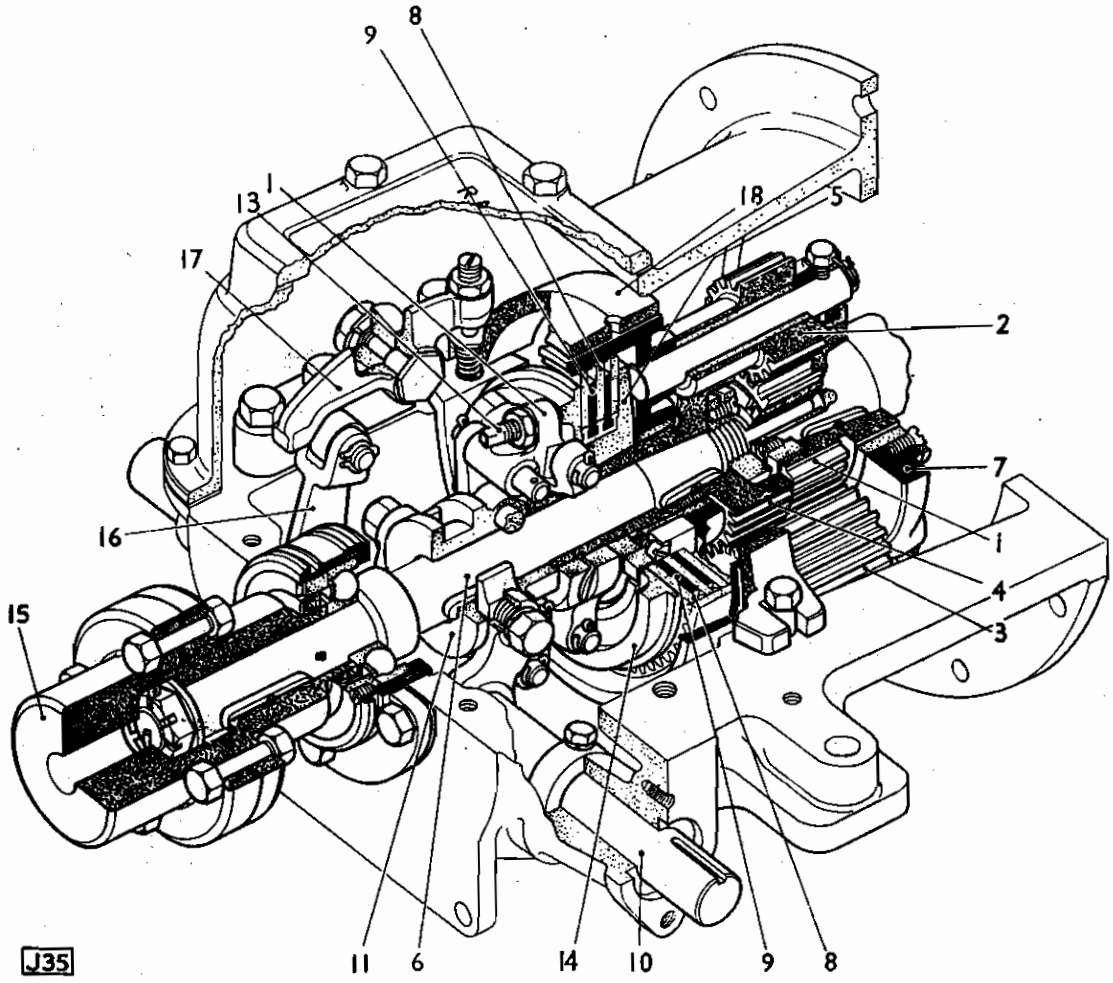
When the Control Lever is pulled aft, the Brake Band Roller Lever (16), operating through the Brake Band Lever (17) closes the Brake Band (18) around the Clutch Body (7) and holds it at rest. The drive from the engine then passes through the Stepped Pinions (2), and the Spur Pinions (3) and thus drives the Clutch Shaft Spur Gear (4) in the Astern direction of rotation. There is no applied pressure on to the Clutch Gripping Plate (14) so that the Clutch Spider (5) and the two Clutch Plates (Small) (9) drive round without transferring any drive to other components.

# ADJUSTING THE LISTER REVERSE GEAR

**Ahead.**

With the Reverse Control Gear Lever in neutral, remove the inspection cover, and turn the sliding sleeve, carrying the toggle lever round, until one toggle lever is at the top. Slack off the adjusting screw locknut slightly and screw in the adjusting screw one quarter turn. Without losing this setting, set up the locknut hard. Turn the sliding sleeve until the other toggle lever comes on top, and repeat the adjustment, being careful to obtain equal adjustment on both toggle lever screws. Engage Ahead Clutch. There should be an appreciable effort required to get it in, (60-80 lbs. on the end of the reverse lever), but once in, there must be no tendency to jump out. It is important that there should be as little movement possible between the operating die and control sleeve with the gear fully engaged. With the Ferodo plates, " bedding in " of these takes place during the first few hours of operation and it is most important that the adjustment be followed up, until the clutch is fully " bedded in."

# REVERSE GEAR

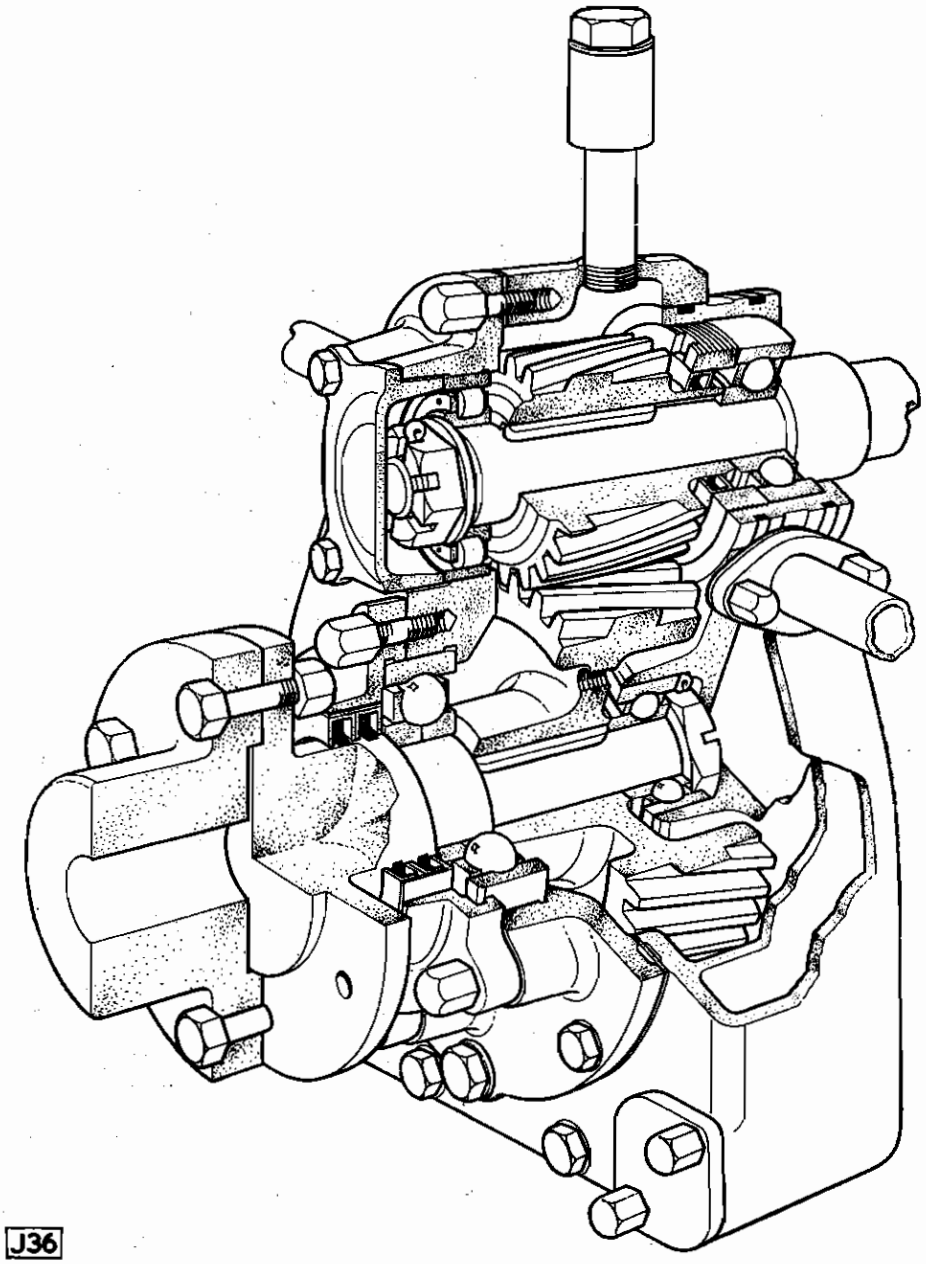



**Astern.**

Should there be any wear on the Brake Band the Gear will slip when engaged in astern. On the port side of the gear, under the Inspection Cover, an adjusting screw will be found on the Brake Band Lever over the tongue of the Brake Band. Put Hand Lever into neutral position, slacken the brake band lever adjusting screw locknut and adjust screw one ¼ turn in a clockwise direction and secure locknut. Put Hand Lever into the astern position. When gear is now engaged astern the same effect should be required to engage the gear as felt after adjusting the ahead clutch. Should the lever tend to jump out of engagement, ease the Brake Band adjustment when the gear is in the neutral position. Should the gear still slip in astern, tighten the Brake Band Lever Screw to suit.

**Note.**—Before adjustments are made to the reverse gear for ahead or astern running, the stop screws and locknuts on the locating plunger must be slackened off, and then secured when all adjustments have been made.

# REDUCTION GEAR



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It is important to see that the correct lubricating oil is used in the reduction gear box, i.e., SAE 50 Oil when working in an air temperature below 85°F., and SAE 90 in tropical climates.

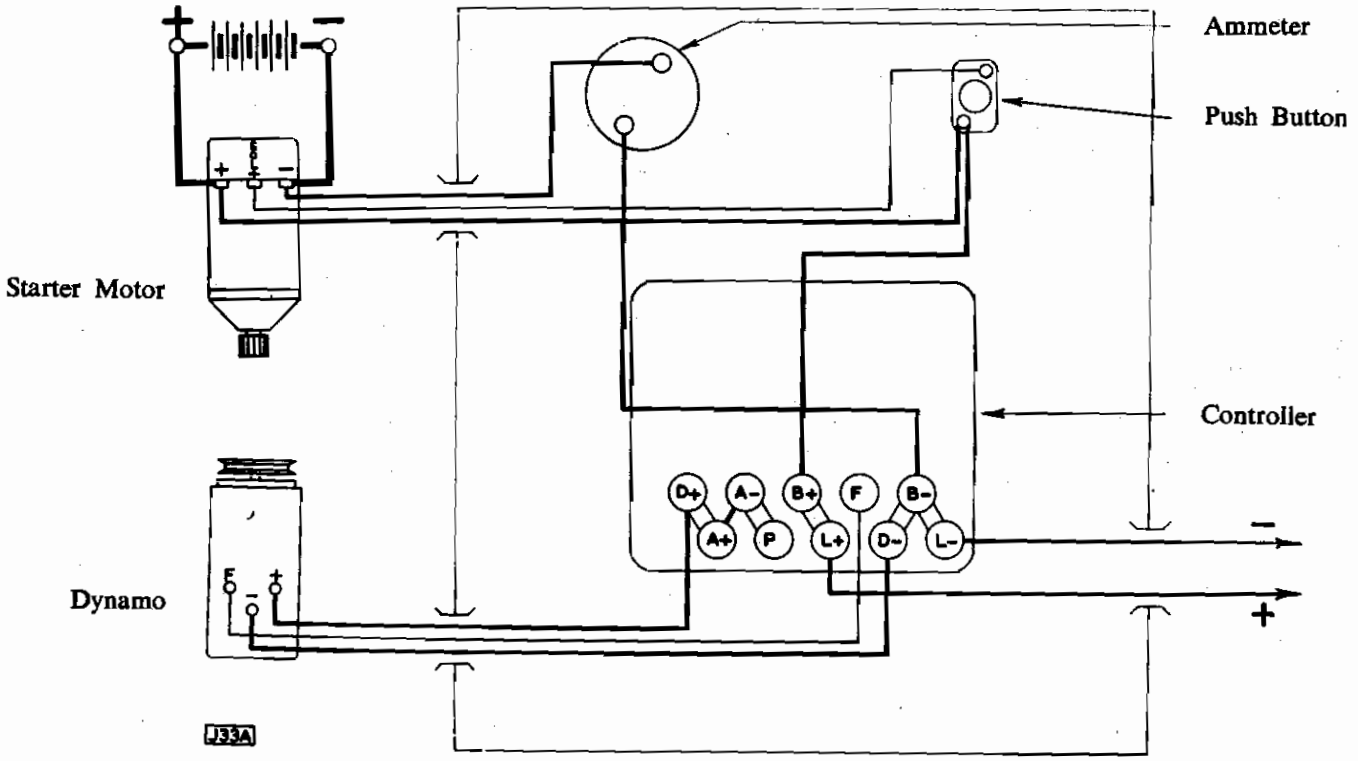
The level of oil in the casing should be examined daily at the same time as that in the lubricating oil tank, and the oil changed after every 450 hours running, the casing being thoroughly flushed out.

When an engine with reduction gear is to be laid up for any length of time, be careful to see that all cooling water is drained out of the reduction gear cooling jacket.

**(On no account use grease as a lubricant in these boxes.)**

# ELECTRIC STARTING EQUIPMENT

## WIRING DIAGRAM



# DIMENSIONS OF WEARING PARTS AND SCHEDULE OF RENEWAL LIMITS

**RECOMMENDED PERIOD FOR TOP OVERHAUL 1000 HOURS.**
**RECOMMENDED PERIOD FOR MAJOR OVERHAUL 3000/4000 HOURS.**

| GENERAL RECOMMENDATIONS ON WORKING CLEARANCE | | | | | |
|---|---|---|---|---|---|
| Part No. | Component | Initial Size | Permissible wear in 1/1000" | Initial Clearance where applicable in 1/1000" | Clearance above which Replacement of one or both Parts is advisable in 1/1000" |
| 12-5-61 ... 10-2-4 | Crankshaft End Journal ... | 3" — 2 — 2½ | 2 | 4 | 10 |
| 10-2-5 ... 10-2-6A | End Main Bearings ... ... | 3" + 2 + 3 | 3 | 4 | |
| 12-5-61 ... | Crankshaft Centre Journal ... | 3" — 2 — 2½ | 2 | 4 | 10 |
| 12-5-13 ... | Centre Main Bearing ... | 3" + 2 + 3 | 3 | 4 | |
| 12-5-61 ... | Crank Pin ... ... ... | 3" — 2 — 2½ | 1 | 3 | 5 |
| 10-4-8 ... | Big End Bearing ... ... | 3" + 1 + 1½ | 2 | 4 | |
| 12-6-1 ... | Camshaft Gear End Journal | 2" — 1¼ — 2½ | 3 | 1¾ | 10 |
| 10-6-2 ... | Camshaft Gear End Bearing | 2" + ½ + 1½ | 3 | 4 | |
| 12-6-1 ... | Camshaft Pump End Journal | 1¾" — 1¼ — 2½ | 3 | 1¾ | 10 |
| 10-6-3 ... | Camshaft Pump End Bearing | 1¾" + ½ + 1½ | 3 | 4 | |
| 12-6-1 ... | Camshaft Centre Journals ... | 2⅝" — 2 — 3 | 3 | 1½ | 10 |
| 12-2-244 Crankcase .. | Camshaft Centre Bearing ... | 2⅝" + 1 — ½ | 3 | 4 | |
| 10-4-3 ... | Gudgeon Pin ... ... ... | 1⅝" ± .00015 | 1½ | 1 | 4 |
| 10-4-7 ... | Bush ... ... ... ... | 1⅝" + 1 + 1½ | 1½ | 1½ | |
| 10-3-8A ... 10-3-181 | Valve Stems ... ... ... | 7/16" — 5 — 6 | 2 | 4½ | 10 |
| 10-3-39 ... 10-3-83 | Valve Guides ... ... | 7/16" ± ½ | 2 | 6½ | |

## GENERAL RECOMMENDATIONS ON WORKING CLEARANCE

| Part No. | Component | Initial Size | Permissible wear in 1/1000" | Initial Clearance where applicable in 1/1000" | Clearance above which Replacement of one or both Parts is advisable in 1/1000" |
|---|---|---|---|---|---|
| 10-2-56 ... | Valve Tappet ... ... | $\frac{5}{8}$" − 1 | 3 | 1 | |
| 10-2-10 ... | Valve Tappet Guides ... | − 1½ | | | 8 |
| | | $\frac{5}{8}$" + 1 | | | |
| | | − 0 | 3 | 2½ | |
| 10-4-61 ... | Piston Top Land ... ... | 4½"−23 | | 25 | |
| | | −25 | | 27 | |
| 10-4-61 ... | Piston 1st & 2nd Land ... | 4½"−18 | | 18 | |
| | | −20 | | 22 | |
| 10-4-61 ... | Piston 3rd Land ... ... | 4½"−14 | | 14 | |
| | | −16 | | 18 | |
| 10-4-61 ... | Piston Skirt ... ... ... | 4½"− 8 | 5 | 8 | |
| | | − 9 | | 11 | 18 |
| 10-2-247 ... | Cylinder Liner ... ... | 4½"+ 2 | | | |
| | | − 0 | | | |
| 10-4-18 ... | Piston Ring Gap } | .0115/ | | 11½ | |
| 614-888 ... | Piston Ring (Taper Side) Gap } | .0165 | | 16½ | 40 |
| 10-4-18 ... | Piston Rings Width ... ... | ⅛" + 0 | 4 | 2 | |
| | | − 1 | | | |
| 10-4-61 ... | Piston Groove Width ... | ⅛" + 3 | | | 12 |
| | | + 2 | | 4 | |
| 23-2299 ... | Piston Scraper Ring Width ... | 3/16"− 5 | 5 | | |
| | | − 6 | | | |
| 23-2299 ... | Piston Scraper Groove ... | − .0025 | | 7 | |
| | | 3/16"− .0015 | | 9 | |
| 11-13-639 & 40 | Oil Pump Gears Outside Dia. | 1.70"− 2½ | 3 | 2 | |
| | | − 4 | | | |
| 11-13-280 ... | Oil Pump Body Bore ... ... | 1.70"+ 1 | 3 | 5 | 8 |
| | | − ¼ | | | |
| 11-13-286 ... | Oil Pump Driving Spindle Dia. | ¼" − ½ | 3 | 2¾ | |
| | | − ¾ | | | 6 |
| 11-13-287 ... | Oil Pump Bush Bore ... ... | ¼" + 2½ | 3 | 4¼ | |
| | | + 3½ | | | |
| /E61 ... | Crankshaft Big End Width ... | 3" + 5 | | 4 | |
| | | +10 | | | |
| 10-4-8 ... | Crankshaft Big End Bearing ... | 3" ± 1 | | 11 | |

# IMPORTANT

**SPARE PARTS—Directions for Ordering**

Always state **Engine No., Part No.,** and **Description of Part** when ordering spares. **The Engine No.** will be found on brass plate attached to Crankcase and stamped on Flywheel Rim.

The Engine components have been divided into convenient groups and illustrated. **Do not** quote illustration Nos. when ordering.

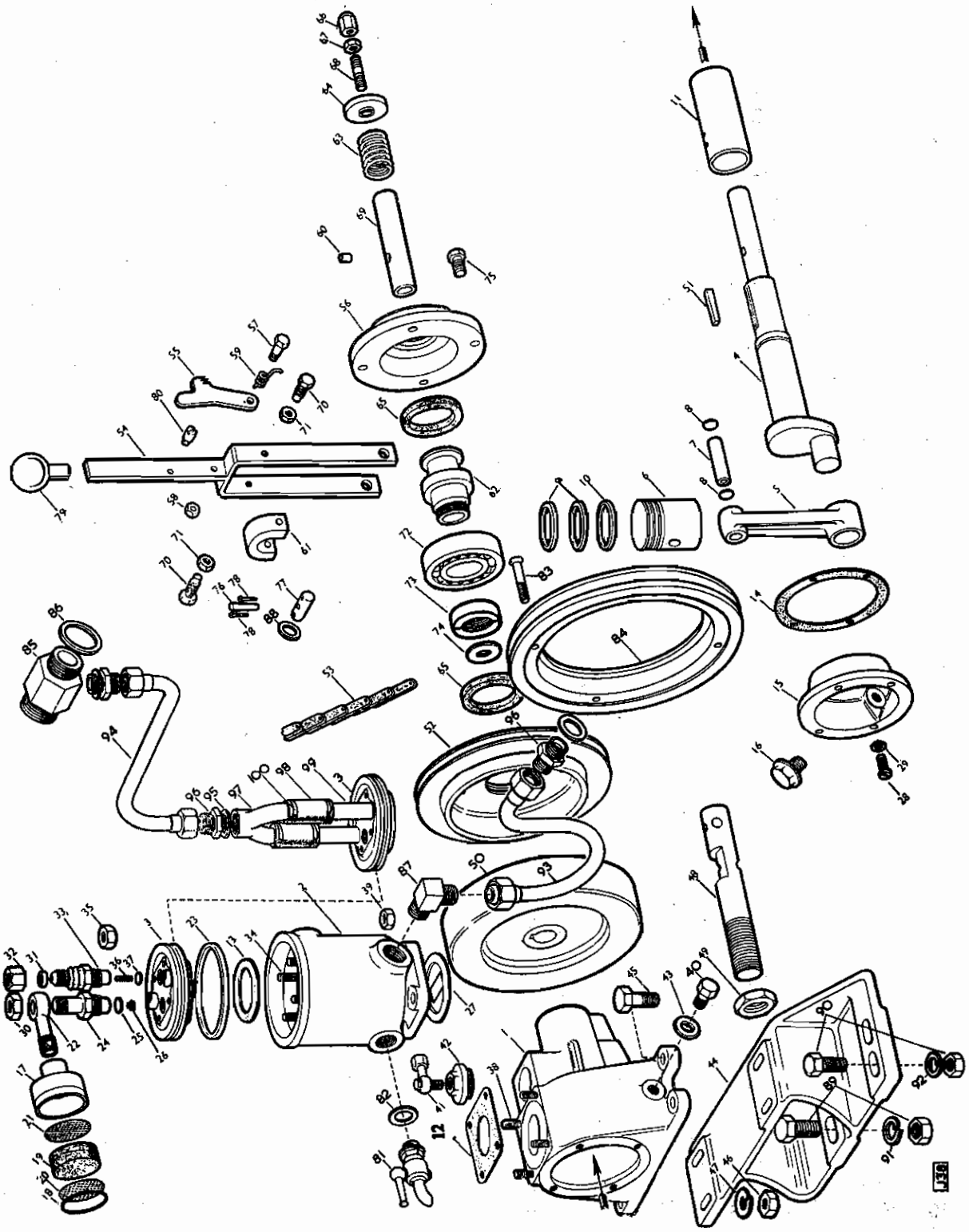
# INDEX TO PARTS LIST

# LIST OF PARTS

## Air Compressor

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | Air Compressor less Flywheel | 11-20-265 | 1 | 1 |
| 1 | Crankcase | 2401B | 1 | 1 |
| 2 | Cylinder | 6135 | 1 | 1 |
| 3 | Cylinder Head | 3419A | 1 | 1 |
| 4 | Crankshaft | 8754 | 1 | 1 |
| 5 | Connecting Rod | 8988 | 1 | 1 |
| – | Big End Bush | 9071 | 1 | 1 |
| – | Little End Bush | 9072 | 1 | 1 |
| 6 | Piston | 6116 | 1 | 1 |
| 7 | Gudgeon Pin | 5168B | 1 | 1 |
| 8 | End Pads | 5169 | 2 | 2 |
| 9 | Compression Rings | 6114 | 2 | 2 |
| 10 | Scraper Rings | 6115 | 1 | 1 |
| 11 | Marine Bearing Bush | 2002 | 1 | 1 |
| 12 | Cylinder Flange Gaskets | 2069 | 1 | 1 |
| 13 | Cylinder Head Gasket | 6698 | 1 | 1 |
| 14 | Front Cover Gasket | 9631 | 1 | 1 |
| 15 | Front Cover | 7662 | 1 | 1 |
| 16 | ½" Gas Plug | 11-13-198 | 1 | 1 |
| 17 | Air Filter Body | 4995 | 1 | 1 |
| 18 | Spring Ring | 2113 | 1 | 1 |
| 19 | Filter Pad | 4996 | 1 | 1 |
| 20 | Perforated Disc Outer | 2123 | 1 | 1 |
| 21 | Perforated Disc Inner | 2124 | 1 | 1 |
| 22 | Banjo Pin | 2234 | 1 | 1 |
| 23 | Cylinder Head Joint Ring | 9017/23 | 1 | 1 |
| 24 | Suction Valve Plug | 6137 | 1 | 1 |
| 25 | Disc Valve | 2672 | 1 | 1 |
| 26 | Suction Valve Spring | 2706 | 1 | 1 |
| 27 | Cylinder Baffle Plate | 3602 | 1 | 1 |
| 28 | Front Cover Screw | 4761/14 | 4 | 4 |
| 29 | Spring Washers | 9737/1 | 4 | 4 |
| 30 | Locknut | 4919/7 | 1 | 1 |
| 31 | Union Collar | 4602/3 | 1 | 1 |
| 32 | Union Nut | 4603/3 | 1 | 1 |
| 33 | Delivery Valve Plug | 3439S | 1 | 1 |
| 34 | Stud | SL2/45 | 4 | 4 |
| 35 | Nut | 4919/24 | 4 | 4 |
| 36 | Delivery Valve Spring | SP1/7 | 1 | 1 |
| 37 | Delivery Disc | 2672 | 1 | 1 |
| 38 | Cylinder Flange Stud | SL2/21 | 4 | 4 |
| 39 | Nut | 4919/24 | 8 | 8 |
| 40 | Oil Drain Plug | 8-2-6 | 1 | 1 |
| 41 | Oil Regulator Plug (F.L. only) | 6244 | 1 | 1 |
| 42 | Plug | 2014B | 1 | 1 |
| 43 | Oil Drain Plug Joint | 5197 | 1 | 1 |
| 44 | Compressor Support Bracket | 11-13-347 | 1 | 1 |
| 45 | Bolt to hold Compressor ⅜" x 1 1/16" | 27-201 | 4 | 4 |
| 46 | Nuts for ditto | 27-6 | 4 | 4 |
| 47 | Spring Washers for ditto | 27-393 | 4 | 4 |
| 48 | Support for Clutch Lever | 11-13-729 | 1 | 1 |

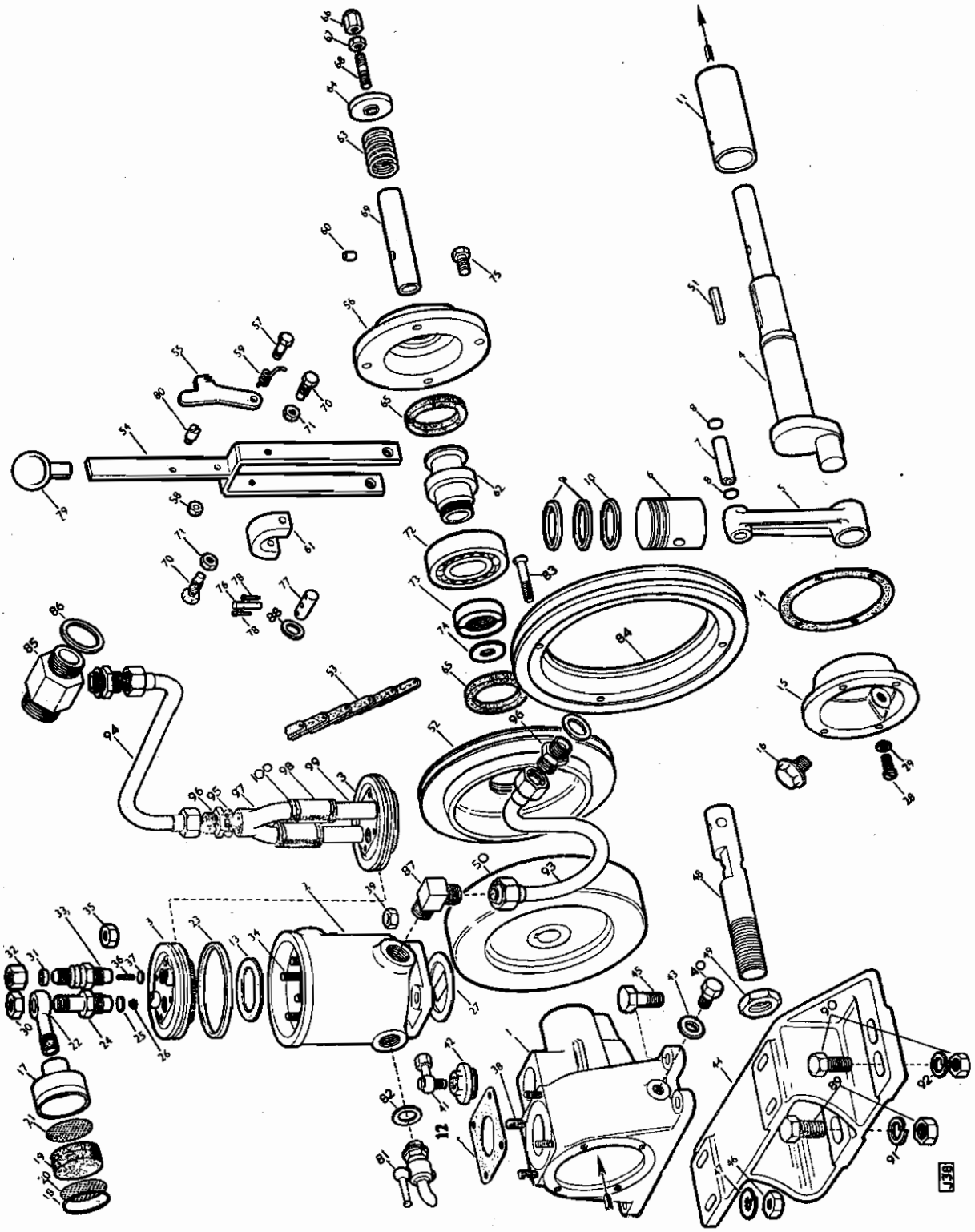
# AIR COMPRESSOR



# Air Compressor–(Cont.)

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 49 | Support Lock Nut | 27-689 | 1 | 1 |
| 50 | Flywheel for Compressor | 13-19-219 | 1 | 1 |
| 51 | Flywheel Key | 27-2446 | 1 | 1 |
| 52 | Pulley for Clutch | 11-13-350 | 1 | 1 |
| 53 | Driving Belt ½" x 5ft. | 10-9-154 | 1 | 1 |
| 54 | Clutch Lever | 13-20-728 | 1 | 1 |
| 55 | Clutch Lever Pawl | 13-19-231 | 1 | 1 |
| 56 | Pulley Bearing Housing | 11-13-351 | 1 | 1 |
| 57 | Fulcrum Screw for Pawl | 11-14-665 | 1 | 1 |
| 58 | Nuts for Fulcrum Pins | 27-905 | 1 | 1 |
| 59 | Return Spring for Clutch Pawl | 11-14-664 | 1 | 1 |
| 60 | Dowel | 27-3797 | 1 | 1 |
| 61 | Clutch Operating Collar | 13-19-229 | 1 | 1 |
| 62 | Clutch Operating Sleeve | 11-13-353 | 1 | 1 |
| 63 | Clutch Spring | 1-323 | 1 | 1 |
| 64 | Spring Retaining Washer | 11-13-225 | 1 | 1 |
| 65 | Felt Rings | 27-1507 | 2 | 2 |
| 66 | Cap Nut | 27-1856 | 1 | 1 |
| 67 | Lock Nut | 27-1332 | 1 | 1 |
| 68 | Stud for Crankshaft | 27-33 | 1 | 1 |
| 69 | Crankshaft Sleeve | 13-23-66 | 1 | 1 |
| 70 | Fulcrum Pin for Collar | 13-19-230 | 2 | 2 |
| 71 | Nuts for Fulcrum Screws | 27-235 | 2 | 2 |
| 72 | Ball Bearing | 1-7 | 1 | 1 |
| 73 | Clutch Operating Sleeve Nut | 11-13-354 | 1 | 1 |
| 74 | Clamping Washer | 13-23-67 | 1 | 1 |
| 75 | Bearing Housing to Clutch Pulley Screw | 27-888 | 4 | 4 |
| 76 | Taper Pin | 27-454 | 1 | 1 |
| 77 | Clutch Lever Fulcrum Pin | 13-20-729 | 1 | 1 |
| 78 | Split Pins | 27-123 | 2 | 2 |
| 79 | Clutch Lever Knob | 31-967 | 1 | 1 |
| 80 | Stop Pin | 27-204 | 1 | 1 |
| 81 | Compressor Water Drain Tap | 1-610 | 1 | 1 |
| 82 | Joint for Water Drain Tap | 5197 | | |
| 83 | Engine Flywheel Pulley Setscrews $\frac{5}{16}$" x 1½" | 27-2093 | 4 | 4 |
| 84 | Engine Flywheel Pulley | 11-13-727 | 1 | 1 |
| 85 | Water Pipe "T" Piece | 11-13-357 | 1 | 1 |
| 86 | Water Pipe Joint | 3306 | 1 | 1 |
| 87 | Water Pipe Elbow | 3411 | 1 | 1 |
| 88 | Washers | 27-545 | 1 | 1 |
| 89 | Screw (Compressor Bracket to Engine Support Bracket) ⅜" x 1¼" | 27-641 | 1 | 1 |
| 90 | Screw (Compressor Bracket to Engine Support Bracket) ⅜" x 1¼" | 27-63 | 2 | 2 |
| 91 | Washer for Ditto | 27-395 | 1 | 1 |
| 92 | Washer for Ditto | 27-394 | 2 | 2 |
| 93 | Water Pipe Inlet to Compressor | 12-13-952 | 1 | 1 |
| 94 | Water Pipe Outlet from Compressor | 12-13-953 | 1 | 1 |
| 95 | Joint for Water Pipe Unions | 12406 | 4 | 4 |
| 96 | Compressor Water Pipe Unions | 12427 | 4 | 4 |
| 97 | Water Outlet "Y" Piece | 3786 | 2 | 2 |
| 98 | Rubber Hose Connections | 3861 | 1 | 1 |
| 99 | Water Outlet Pipes | 3859 | 1 | 1 |
| 100 | Hose Clip Wire $\frac{5}{16}$" x 1½" | 27-2903 | 4 | 4 |

# AIR COMPRESSOR

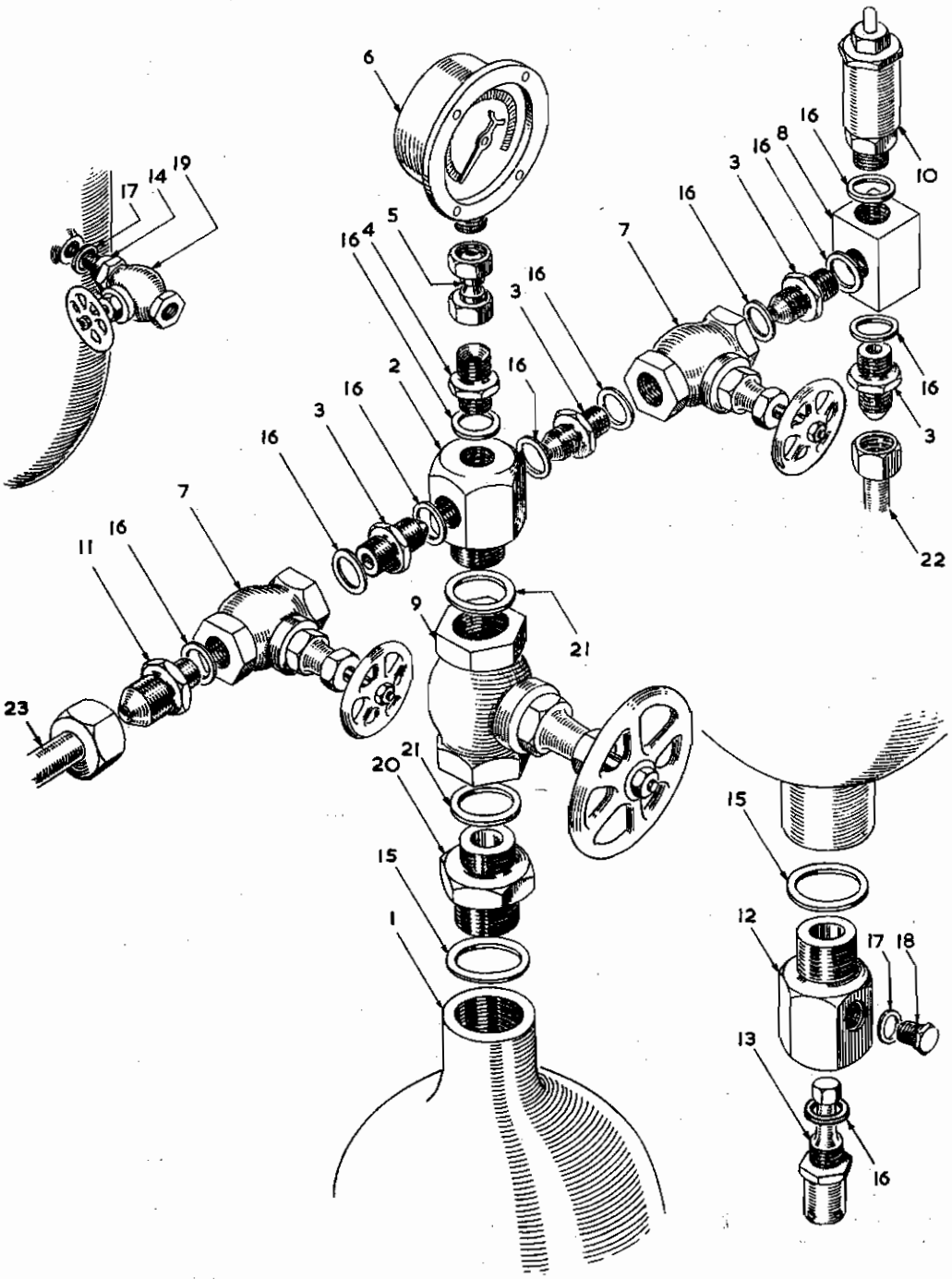


# Air Receiver and Air Pipes

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | AIR BOTTLE complete with valves, etc. ... ... ... | 13-22-263c | 1 | 1 |
| 1 | Air Bottle ... ... ... ... ... ... ... | 13-22-263 | 1 | 1 |
| 2 | 4-way Branch ... ... ... ... ... ... ... | 11-22-348 | 1 | 1 |
| 3 | Connection ... ... ... ... ... ... ... | 13-19-88 | 4 | 4 |
| 4 | Outlet Union to Pressure Gauge ... ... ... ... | 12427 | 1 | 1 |
| 5 | Adaptor for Pressure Gauge ... ... ... ... ... | 11-23-9 | 1 | 1 |
| 6 | Pressure Gauge ... ... ... ... ... ... ... | 10-19-47 | 1 | 1 |
| 7 | Wheel Valve ... ... ... ... ... ... ... | 13-19-93 | 2 | 2 |
| 8 | Adaptor for Relief Valve ... ... ... ... ... | 13-20-725 | 1 | 1 |
| 9 | 1″ Wheel Valve ... ... ... ... ... ... ... | 11-22-346 | 1 | 1 |
| 10 | Complete Relief Valve ... ... ... ... ... ... | 27-1870 | 1 | 1 |
| 11 | Outlet Connection in Wheel Valve ¾″ x ½″ BSP ... ... | 13-19-94 | 1 | 1 |
| 12 | Fusible Plug Adaptor 1½″ BSP x ½″ BSP ... ... ... | 11-22-986 | 1 | 1 |
| 13 | Fusible Plug ... ... ... ... ... ... ... | 11-22-308 | 1 | 1 |
| 14 | Union ¼″ BSP for Drain Valve ... ... ... ... | 103-106 | 1 | 1 |
| 15 | Joint Ring ... ... ... ... ... ... ... | 13-21-777 | 2 | 2 |
| 16 | Joint Ring ... ... ... ... ... ... ... | 13-21-778 | 12 | 12 |
| 17 | Joint Ring for Drain Plug ... ... ... ... ... | 13-22-350 | 3 | 3 |
| 18 | Drain Plug ... ... ... ... ... ... ... | 11-13-693 | 1 | 1 |
| 19 | Valve ¼″ BSP for Drain ... ... ... ... ... | 13-22-928 | 1 | 1 |
| 20 | Outlet Union 1¼″ x 1″ BSP ... ... ... ... ... | 11-22-330 | 1 | 1 |
| 21 | Joint for Wheel Valve ... ... ... ... ... ... | 13-21-787 | 2 | 2 |
| 22 | Air Pipe, Compressor to Relief Valve 10 m/m. x 6ft. ... | 13-19-85 | 1 | 1 |
| 23 | Air Pipe, Air Bottle to Starting Valve ⅝″ O/D x 6ft. ... ... | 13-19-95 | 1 | 1 |
| 24 | Air Pipe, Starting Valve to No. 1 Cylinder Head Compression Change-over Valve JPM only ... ... ... ... | 13-19-245 | – | 1 |
| | Air Pipe, Starting Valve to No. 1 Cylinder Head JKM only | 11-23-850 | 1 | – |
| 25 | Air Pipe, Starting Valve to No. 2 Cylinder Head Compression Change-over Valve JPM only ... ... ... ... | 11-19-245 | 1 | – |
| | Air Pipe, Starting Valve to No. 2 Cylinder Head JKM only | 12-23-850 | – | 1 |
| 26 | Union Nut for Air Pipe ... ... ... ... ... | 13-19-99 | 1 | 1 |
| 27 | Union Nut for Charging Pipe ... ... ... ... | 13-19-132 | 1 | 1 |
| 28 | Union Nipple for Charging Pipe ... ... ... ... | 13-19-131 | 1 | 1 |
| | *Copper Joint Washer 1¼″ BSP x .020″ ... ... ... | 11-22-993 | As reqd. | |
| | *Copper Joint Washer 1″ BSP x .020″ ... ... ... | 11-22-994 | As reqd. | |
| | *Copper Joint Washer ½″ BSP x .020″ ... ... ... | 11-22-995 | As reqd. | |

*These Washers are used in conjunction with Items 15-16-21 to adjust position of Valves and Adaptors.

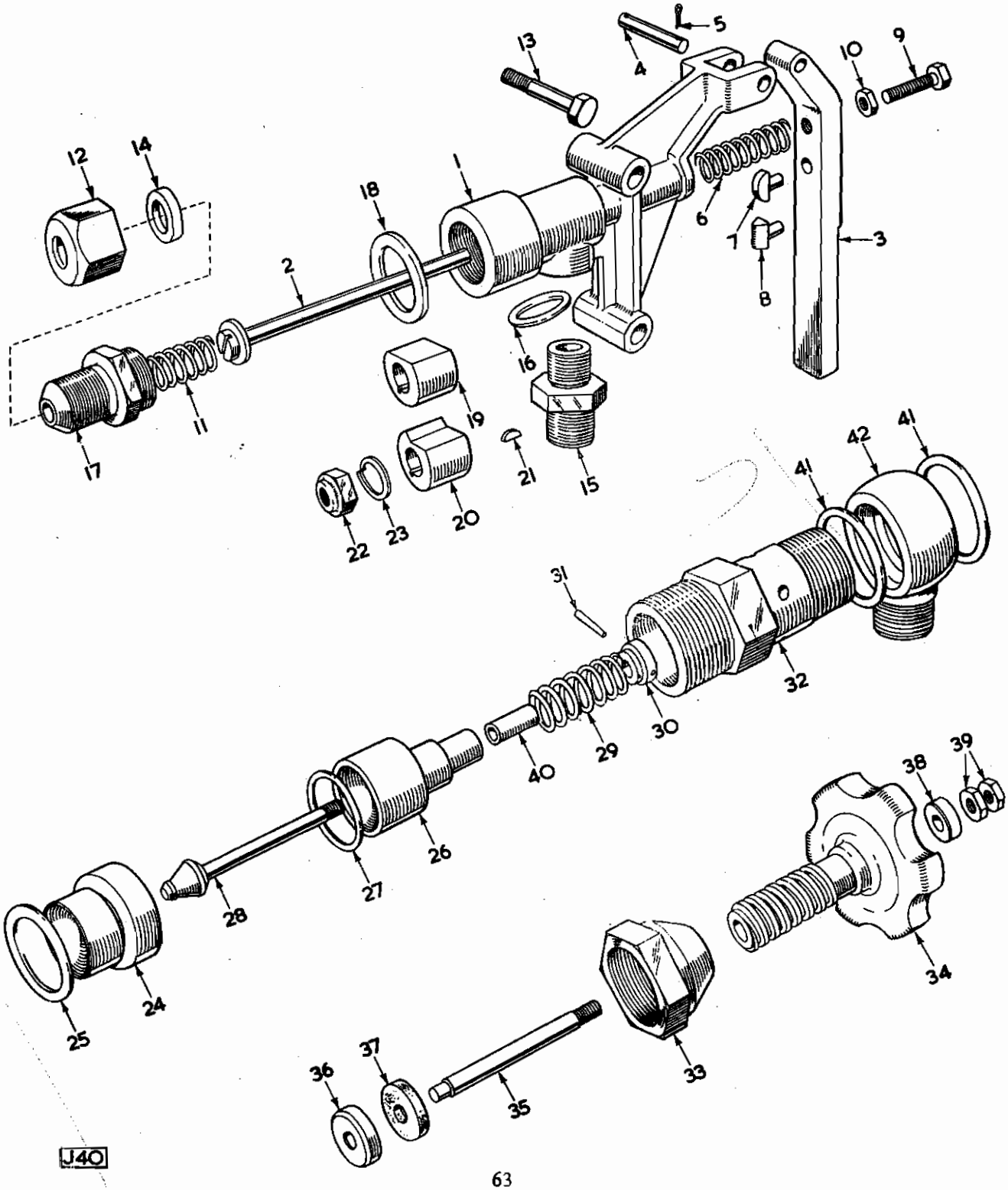
# AIR RECEIVER AND AIR PIPES



# Air Starting Valves

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | AIR STARTER VALVE complete | 11-20-270C | 1 | 1 |
| 1 | Valve Body | 12-19-164 | 1 | 1 |
| 2 | Valve | 12-19-165 | 1 | 1 |
| 3 | Valve Lever | 12-19-166 | 1 | 1 |
| 4 | Fulcrum Pin for Lever | 12-19-167 | 1 | 1 |
| 5 | Split Pin for Fulcrum Pin | 27-122 | 2 | 2 |
| 6 | Spring for Lever | 12-19-172 | 1 | 1 |
| 7 | Button for Lever | 11-19-782 | 1 | – |
| 8 | Button for Lever | 8-2-130 | – | 1 |
| 9 | Adjusting Screw for Lever | 27-62 | 1 | 1 |
| 10 | Lock Nut for Adjusting Screw | 27-18 | 1 | 1 |
| 11 | Spring for Valve | 10-20-355 | 1 | 1 |
| 12 | Nut for Inlet Union | 13-19-99 | 1 | 1 |
| 13 | Set Screws for Valve Body JP only | 27-38 | 2 | 2 |
| 14 | Nipple for Inlet Union | 13-19-98 | 1 | 1 |
| 15 | Union for Air Pipe to Cylinder Head | 13-19-94 | 1 | 1 |
| 16 | Union Joint | 13-21-778 | 1 | 1 |
| 17 | Union for Air Pipe from Bottle | 12-19-258 | 1 | 1 |
| 18 | Union Joint | 13-21-787 | 1 | 1 |
| 19 | Cam for Air Starter Valve JPM only | 11-19-781 | 1 | – |
| 20 | Cam for Air Starter Valve JPM only | 12-19-168 | – | 1 |
| | Cam for Air Start Valve JKM only | 11-23-843 | 1 | – |
| | Cam for Air Start Valve JKM only | 12-23-843 | – | 1 |
| 21 | Woodruff Key JPM only | 27-566 | 1 | 1 |
| 22 | Lock Nut for Cam JPM only | 12-19-169 | 1 | 1 |
| 23 | Spring Washer JPM only | 27-2061 | 1 | 1 |
| | Mounting Plate JKM only | 11-23-846 | 1 | 1 |
| | Woodruff Key JKM only | 27-107 | 1 | 1 |
| | Oil Seal JKM only | 27-4536 | 1 | 1 |
| | Bolt $\frac{3}{8}$" Whit. JKM only | 27-4528 | | |
| | Air Start Drive Assembly JKM only | 11-23-847 | 1 | 1 |
| | CHANGE-OVER VALVE (JPM only) VALVE FOR COMPRESSED AIR STARTING | | | |
| 24 | Combustion Chamber Main Plug | 10-8-140 | 1 | 1 |
| 25 | Joint between Main Plug and Cylinder Head | 10-3-91 | 1 | 1 |
| 26 | Combustion Chamber Auxiliary Plug | 12-19-175 | 1 | 1 |
| 27 | Joint Ring between Plugs | 10-3-6 | 1 | 1 |
| 28 | Combustion Chamber Change-over Valve | 10-19-731 | 1 | 1 |
| 29 | Combustion Chamber Valve Spring Valve | 11-19-777 | 1 | 1 |
| 30 | Combustion Chamber Valve Spring Collar | 10-19-728 | 1 | 1 |
| 31 | Taper Pin for Valve Spring Collar | 27-613 | 1 | 1 |
| 32 | Combustion Chamber Nut | 10-19-724C | 1 | 1 |
| 33 | Combustion Chamber Cap Nut | 10-19-725 | 1 | 1 |
| 34 | Handwheel and Screw complete | 10-3-68BC | 1 | 1 |
| 35 | Push Rod for Handwheel | 10-19-737 | 1 | 1 |
| 36 | End Washer for Push Rod | 10-19-730 | 1 | 1 |
| 37 | Leather Washer for Push Rod | 10-19-729 | 1 | 1 |
| 38 | End Boss for Push Rod | 10-19-732 | 1 | 1 |
| 39 | Lock Nuts for Push Rod | 27-235 | 2 | 2 |
| 40 | Bush for Change-over Valve | 12-19-196 | 1 | 1 |
| 41 | Joint Ring for Connector | 102-91 | 2 | 2 |
| 42 | Swivel Connector for Air Pipe | 10-19-726 | 1 | 1 |
| — | Combustion Chamber Nut (JKM only) | 616-1639 | 1 | 1 |

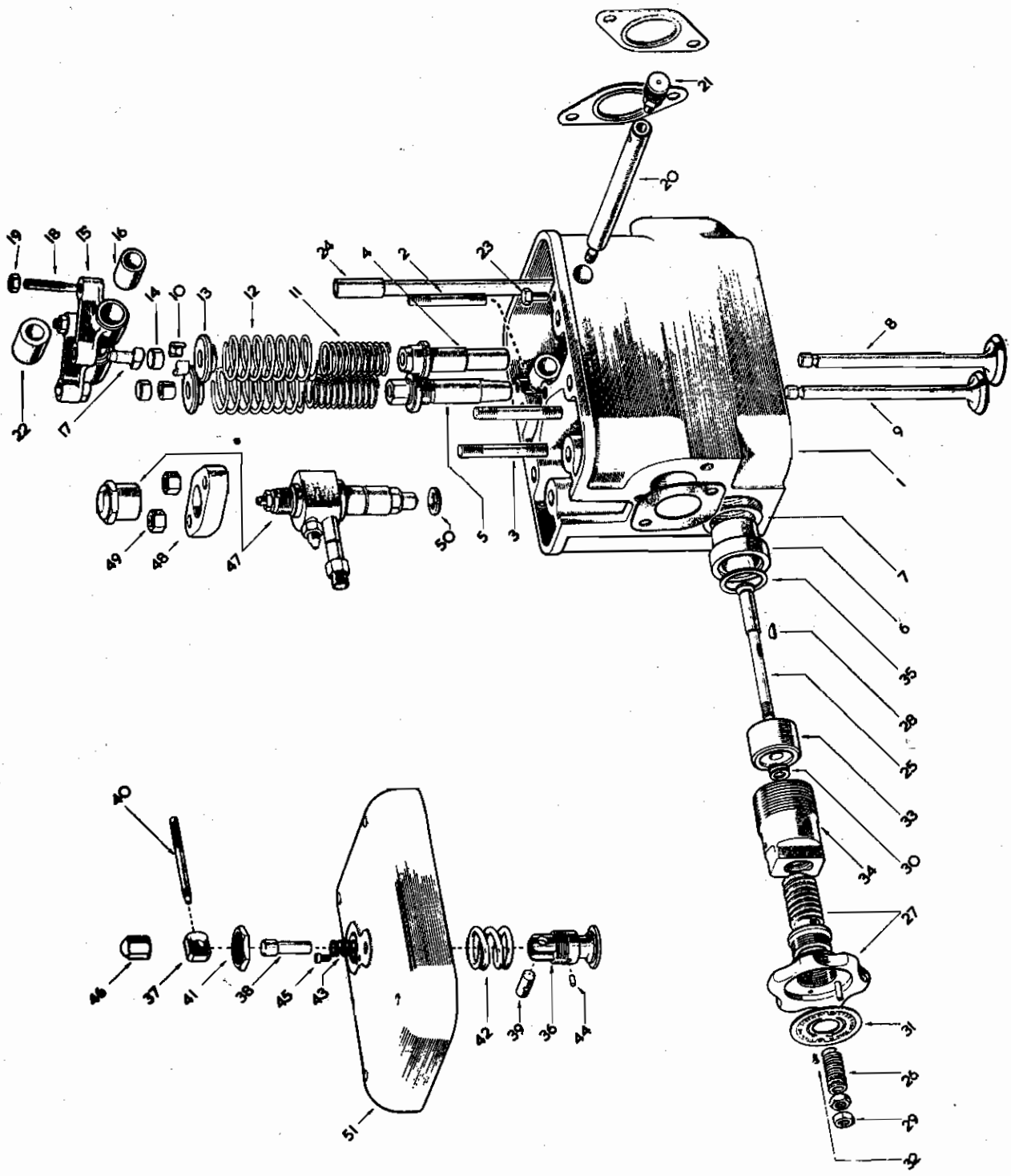
# AIR STARTING VALVES



# Cylinder Head and Change-Over Valve
# JPM only

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | CYLINDER HEAD (Studded) ... ... ... ... With Studs, Plugs and Valve Guides only, comprising the following parts :— | 10-3-170S | 2 | 3 |
| 1 | Cylinder Head ... ... ... ... ... ... | 10-3-170 | 2 | 3 |
| 2 | Cylinder Head Stud for Cover ... ... ... ... | 27-736 | 2 | 3 |
| 3 | Cylinder Head Stud for Injector ... ... ... ... | 27-769 | 4 | 6 |
| 4 | Cylinder Head Valve Guide (Inlet) ... ... ... | 10-3-39 | 2 | 3 |
| 5 | Cylinder Head Valve Guide (Exhaust) ... ... ... | 10-3-83 | 2 | 3 |
| *6 | Combustion Chamber Main Plug ... ... ... ... | 10-3-90 | 2 | 3 |
| *7 | Combustion Chamber Main Plug Joint ... ... ... | 10-3-91 | 2 | 3 |
| | (*These two items are not included with C.O.V. assembly 8-1/C5AC and if required must be ordered separately.) | | | |
| | CYLINDER HEAD with above fittings and complete with Valves, comprising :— | 10-3-170C | 2 | 3 |
| 8 | Cylinder Head Inlet Valve ... ... ... ... ... | 10-3-8A | 2 | 3 |
| 9 | Cylinder Head Exhaust Valve ... ... ... ... | 10-3-121 | 2 | 3 |
| 10 | Valve Split Collets (pairs) ... ... ... ... ... | 10-3-25 | 8 | 12 |
| 11 | Cylinder Head Valve Spring (Inner) ... ... ... | 12-3-219 | 4 | 6 |
| 12 | Cylinder Head Valve Spring (Outer) ... ... ... | 12-3-129 | 4 | 6 |
| 13 | Cylinder Valve Spring Carrier ... ... ... ... | 10-3-130 | 4 | 6 |
| 14 | Cylinder Valve Cap ... ... ... ... ... ... | 10-3-23 | 4 | 6 |
| | CYLINDER HEAD complete with compression ratio change-over valve, valve rockers and valve push rod, same as 10-3-170C and including the following parts :— | 10-3-170CR | 2 | 3 |
| 15 | Valve Rocker with Bush (JPM & JKM) ... ... ... | 10-3-13AB | 4 | 6 |
| 16 | Valve Rocker Bush (JPM & JKM) ... ... ... ... | 10-3-14A | 4 | 6 |
| 17 | Valve Rocker Striking Pin (JPM & JKM) ... ... ... | 10-3-15 | 4 | 6 |
| 18 | Valve Rocker Adjusting Screw (JPM & JKM) ... ... | 26-98 | 4 | 6 |
| 19 | Valve Rocker Adjusting Screw Locknut ... ... ... | 27-714 | 4 | 6 |
| 20 | Valve Rocker Shaft with Plug ... ... ... ... | 11-3-298 | 2 | 3 |
| | Valve Rocker Plug ... ... ... ... ... ... | 29-98 | 2 | 3 |
| 21 | Valve Rocker Shaft Greaser ... ... ... ... | 27-606 | 2 | 3 |
| | Valve Rocker Shaft Elbow ... ... ... ... | 27-462 | – | 1 |
| | Valve Rocker Shaft Nipple ... ... ... .. | 27-463 | – | 2 |
| 22 | Valve Rocker Distance Collar ... ... ... ... | 10-3-18 | 2 | 3 |
| | Valve Rocker Shaft Greaser Socket ... ... ... ... | 27-9 | – | 1 |
| 23 | Valve Rocker Set Screw ... ... ... ... ... | 27-150 | 2 | 3 |
| | Valve Rocker Assembly ... ... ... ... ... | 10-3-171 | 2 | 2 |
| | Valve Rocker Assembly ... ... ... ... ... | 12-3-171 | – | 1 |
| 24 | Valve Push Rod ... ... ... ... ... ... | 10-3-20AC | 4 | 6 |
| | CYLINDER HEAD with valves, rockers and compression change-over valve complete ... ... ... ... (as 10-3-170CR but with the following additional parts) :— | 10-3-170 CRCV | 2 | 3 |
| | Compression Ratio Change-over Valve complete comprising : | 10-3-5AC | 2 | 3 |
| 25 | Valve Spindle ... ... ... ... ... ... | 10-3-5A | 2 | 3 |
| 26 | Valve Spring ... ... ... ... ... ... ... | 10-3-11 | 2 | 3 |
| 27 | Valve Handwheel, comprising : ... ... ... ... | 10-3-68BC | 2 | 3 |
| | Handwheel ... ... ... ... | 10-2-224 | | |
| | Centre ... ... ... ... | 10-3-245 | | |
| | Dowel ... ... ... ... | 27-1224 | | |

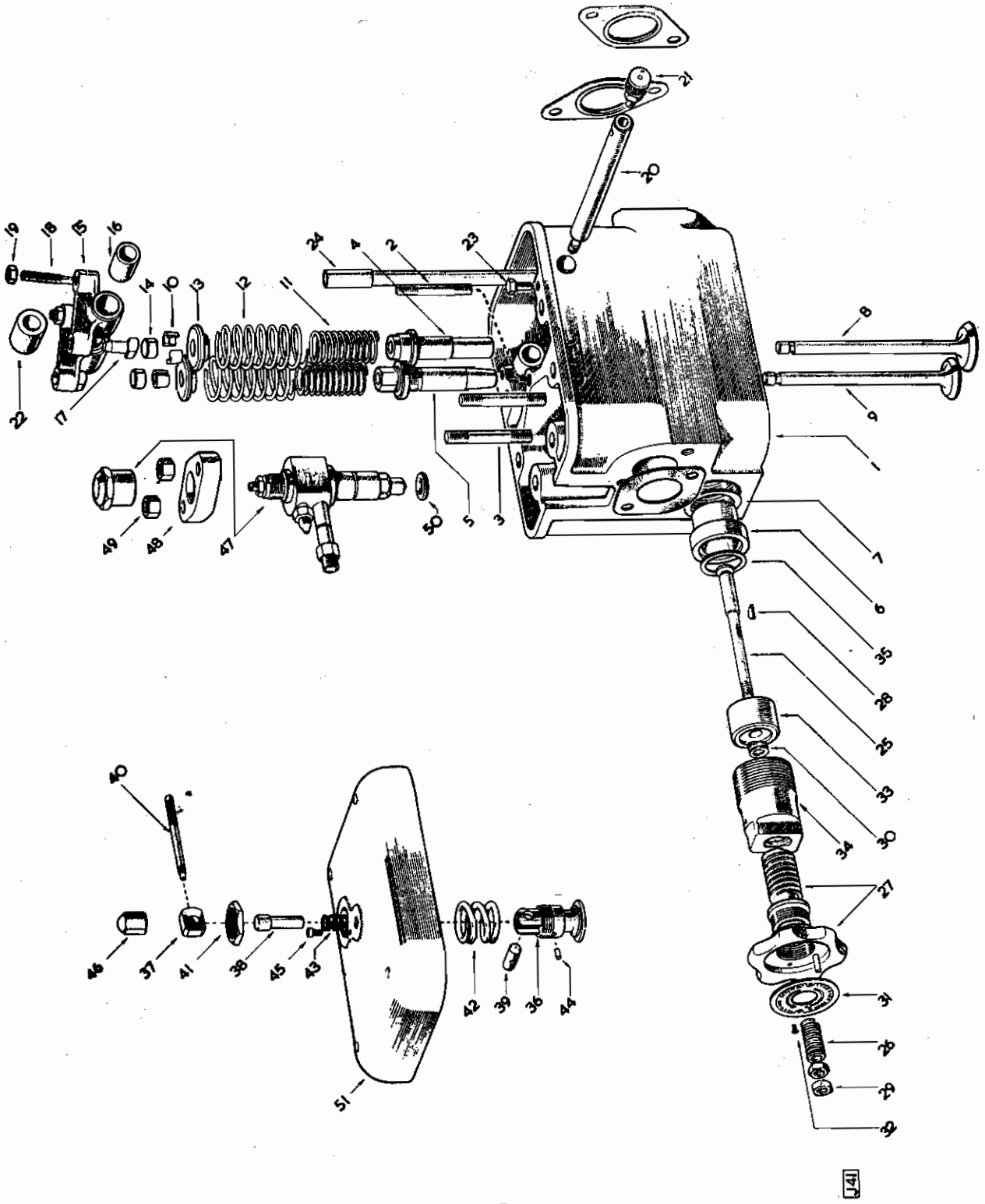
# CYLINDER HEAD AND CHANGE OVER VALVE
## JPM only



# Cylinder Head and Change-Over Valve–(Cont.)

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 28 | Valve Handwheel Key | 27-107 | 2 | 3 |
| 29 | Valve Handwheel Nut | 27-235 | 4 | 6 |
| 30 | Valve Handwheel Spring Washer | 27-1063 | 2 | 3 |
| 31 | Valve Instruction Plate | 27-3990 | 2 | 3 |
| 32 | Valve Instruction Plate Screw | 27-48 | 4 | 6 |
| 33 | Combustion Chamber Auxiliary Plug | 10-3-3 | 2 | 3 |
| 34 | Combustion Chamber Nut | 10-3-4A | 2 | 3 |
| 35 | Combustion Chamber (Aux.) Joint Ring | 10-3-6 | 2 | 3 |
| | DECOMPRESSOR | | | |
| 36 | Decompressor Body | 13-14-411 | 2 | 3 |
| 37 | Decompressor Cam | 13-14-412 | 2 | 3 |
| 38 | Decompressor Plunger | 13-14-413 | 2 | 3 |
| 39 | Decompressor Cam Spindle | 13-14-414 | 2 | 3 |
| 40 | Decompressor Lever | 13-14-415 | 2 | 3 |
| 41 | Decompressor Locknut | 13-14-416 | 2 | 3 |
| 42 | Decompressor Main Spring | 13-14-417 | 2 | 3 |
| 43 | Decompressor Auxiliary Spring | 13-14-418 | 2 | 3 |
| 44 | Decompressor Dowel Pin | 27-2069 | 2 | 3 |
| 45 | Decompressor Locking Screw | 27-204 | 2 | 3 |
| 46 | Cylinder Head Cover Cap Nut | 27-1974 | 2 | 3 |
| | FUEL INJECTOR | | | |
| 47 | Fuel Injector, complete | 616-2144 | 2 | 3 |
| — | Fuel Injector Nozzle Body and Valve | 616-2145 | 2 | 3 |
| 48 | Fuel Injector Flange | 10-3-31 | 2 | 3 |
| 49 | Fuel Injector Flange Nut $\frac{7}{16}$" Whit. | 27-5 | 4 | 6 |
| 50 | Fuel Injector Nozzle C.A. Joint | 10-3-41 | 3 | 6 |

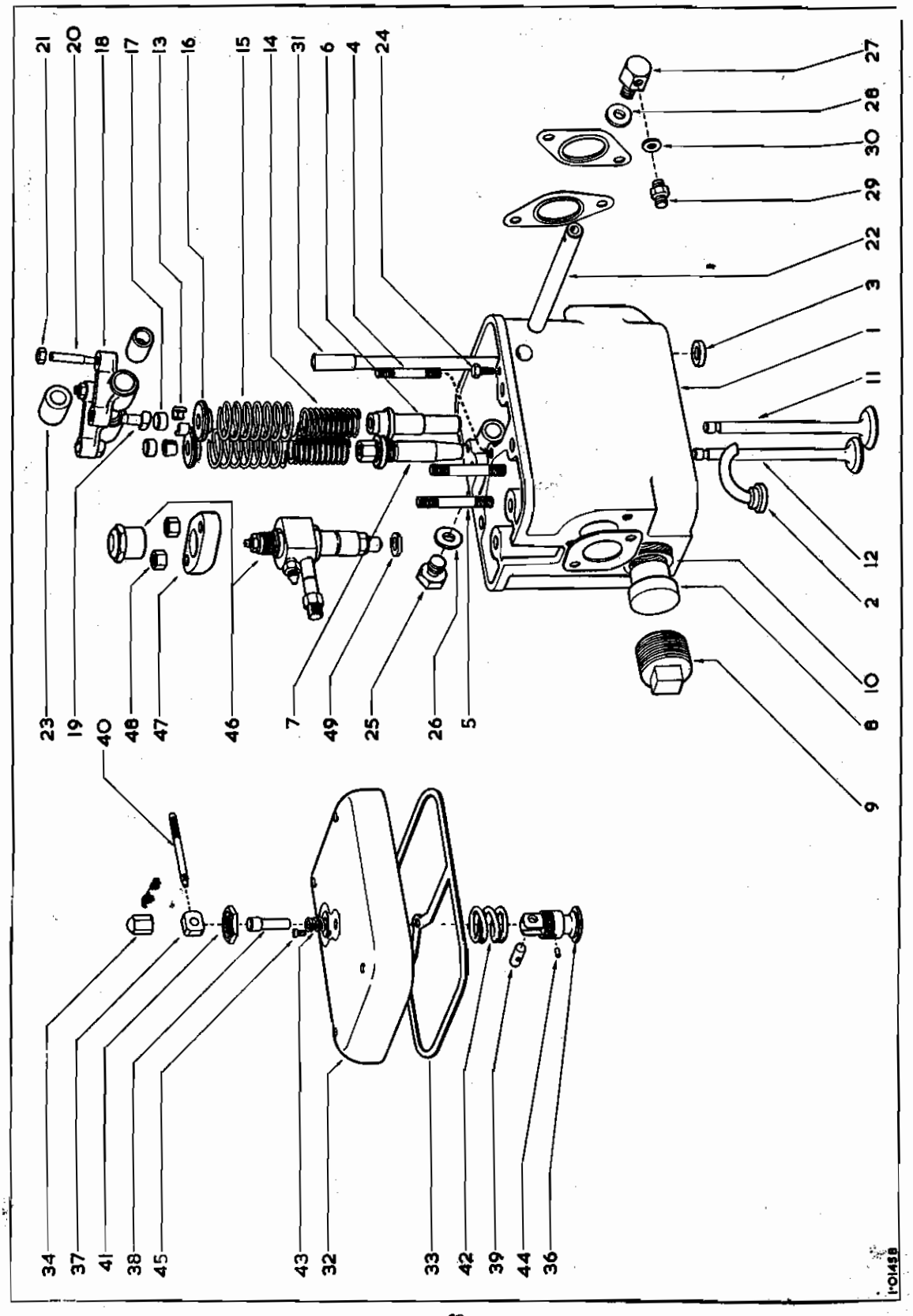
# CYLINDER HEAD AND CHANGE OVER VALVE
## JPM only



# Cylinder Head JKM only

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | CYLINDER HEAD (Studded) ... ... ... ... With Studs, Plugs and Valve Guides only, comprising the following parts :— | 11-3-290S | 2 | 3 |
| 1 | Cylinder Head ... ... ... ... ... ... ... | 11-3-290 | 2 | 3 |
| 2 | Water Pipe Ferrule Assy. ... ... ... ... ... | 11-3-299 | 2 | 3 |
| 3 | Water Pipe Restrictor ... ... ... ... ... | 11-3-294 | 6 | 9 |
| 4 | Stud for Cylinder Head Cover ... ... ... ... | 27-736 | 2 | 3 |
| 5 | Stud for Injector ... ... ... ... ... ... | 27-769 | 4 | 6 |
| 6 | Cylinder Head Valve Guide (Inlet) ... ... ... | 10-3-39 | 2 | 3 |
| 7 | Cylinder Head Valve Guide (Exhaust) ... ... ... | 10-3-83 | 2 | 3 |
| 8 | Combustion Chamber Main Plug ... ... ... ... | 11-3-305 | 2 | 3 |
| 9 | Combustion Chamber Sealing Plug ... ... ... | 8-3-179 | 2 | 3 |
| 10 | Combustion Chamber Main Plug Joint ... ... ... | 10-3-91 | 2 | 3 |
| | CYLINDER HEAD with above fittings and complete with Valves, comprising :— ... ... ... ... ... | 11-3-290C | 2 | 3 |
| 11 | Inlet Valve ... ... ... ... ... ... ... | 10-3-8A | 2 | 3 |
| 12 | Exhaust Valve ... ... ... ... ... ... ... | 10-3-121 | 2 | 3 |
| 13 | Valve Split Collets (pairs) ... ... ... ... ... | 10-3-25 | 8 | 12 |
| 14 | Valve Spring (Inner) ... ... ... ... ... | 12-3-219 | 4 | 6 |
| 15 | Valve Spring (Outer) ... ... ... ... ... | 12-3-129 | 4 | 6 |
| 16 | Valve Spring Carrier ... ... ... ... ... | 10-3-130 | 4 | 6 |
| 17 | Valve Cap ... ... ... ... ... ... ... | 10-3-23 | 4 | 6 |
| | CYLINDER HEAD complete with combustion chamber valve, valve rockers and valve push rods, same as 11-3-209C and including the following parts :— ... | 11-3-290CR | 2 | 3 |
| 18 | Valve Rocker with Bush ... ... ... ... ... | 10-3-13AB | 4 | 6 |
| 19 | Valve Rocker Striking Pin ... ... ... ... | 10-3-15 | 4 | 6 |
| 20 | Valve Rocker Adjusting Screw ... ... ... ... | 26-98 | 4 | 6 |
| 21 | Valve Rocker Adjusting Screw Locknut ... ... ... | 27-714 | 4 | 6 |
| 22 | Valve Rocker Shaft ... ... ... ... ... | 11-3-298 | 2 | 3 |
| 23 | Valve Rocker Bush ... ... ... ... ... ... | 10-3-14A | 4 | 6 |
| 24 | Valve Rocker Setscrew ... ... ... ... ... | 27-150 | 6 | 8 |
| 25 | Valve Rocker Shaft End Plug ... ... ... ... | 11-3-303 | 2 | 3 |
| 26 | Valve Rocker Shaft End Plug Joint ... ... ... | 12406 | 2 | 3 |
| 27 | Plug ... ... ... ... ... ... ... ... | 11-3-295 | 2 | 3 |
| 28 | Joint ... ... ... ... ... ... ... ... | 11-3-296 | 2 | 3 |
| 29 | Union ... ... ... ... ... ... ... ... | 291-2114/1 | 2 | 3 |
| 30 | Joint ... ... ... ... ... ... ... ... | 600-106 | 2 | 3 |
| 31 | Valve Push Rod ... ... ... ... ... ... ... | 10-3-20AC | 4 | 6 |
| 32 | Cylinder Head Cover ... ... ... ... ... | 13-14-419 | 2 | 3 |
| 33 | Cylinder Head Cover Joint ... ... ... ... | 11-3-291 | 2 | 3 |
| 34 | Cylinder Head Cover Cap Nut ... ... ... ... | 27-1974 | 2 | 3 |

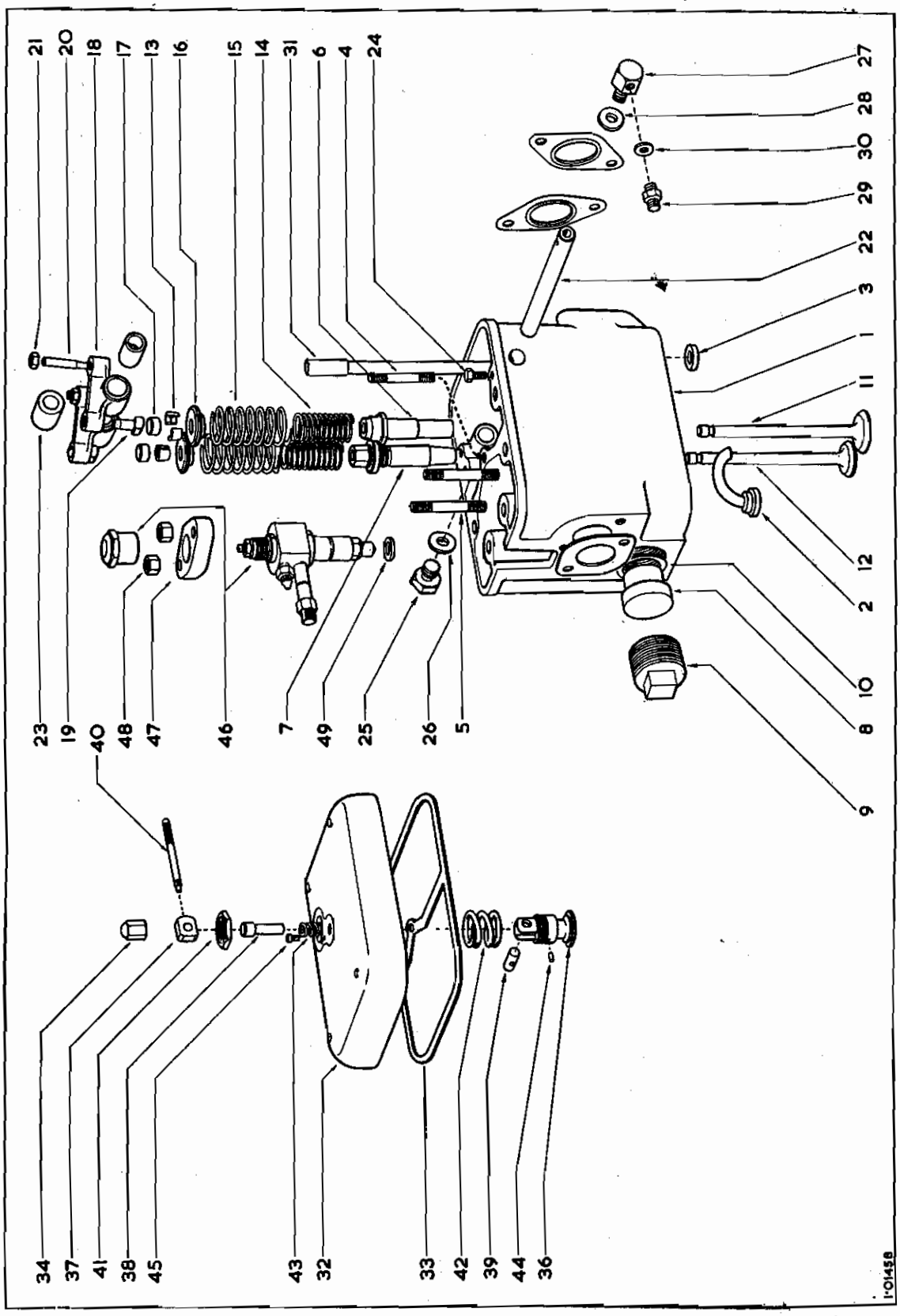
# CYLINDER HEAD–JKM only



# Cylinder Head–JKM only–(Cont.)

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | DECOMPRESSOR | | | |
| 36 | Decompressor Body | 13-14-411 | 2 | 3 |
| 37 | Decompressor Cam | 13-14-412 | 2 | 3 |
| 38 | Decompressor Plunger | 13-14-413 | 2 | 3 |
| 39 | Decompressor Cam Spindle | 13-14-414 | 2 | 3 |
| 40 | Decompressor Lever | 13-14-415 | 2 | 3 |
| 41 | Decompressor Locknut | 13-14-416 | 2 | 3 |
| 42 | Decompressor Main Spring | 13-14-417 | 2 | 3 |
| 43 | Decompressor Auxiliary Spring | 13-14-418 | 2 | 3 |
| 44 | Decompressor Dowel Pin | 27-2069 | 2 | 3 |
| 45 | Decompressor Locking Screw | 27-204 | 2 | 3 |
| | FUEL INJECTOR | | | |
| 46 | Fuel Injector, complete | 616-2144 | 2 | 3 |
| — | Fuel Injector Nozzle Body and Valve | 616-2145 | 2 | 3 |
| 47 | Fuel Injector Flange | 10-3-31 | 2 | 3 |
| 48 | Fuel Injector Flange Nut $\frac{7}{16}$" Whit. | 27-5 | 4 | 6 |
| 49 | Fuel Injector Nozzle C.A. Joint | 10-3-41 | 3 | 6 |

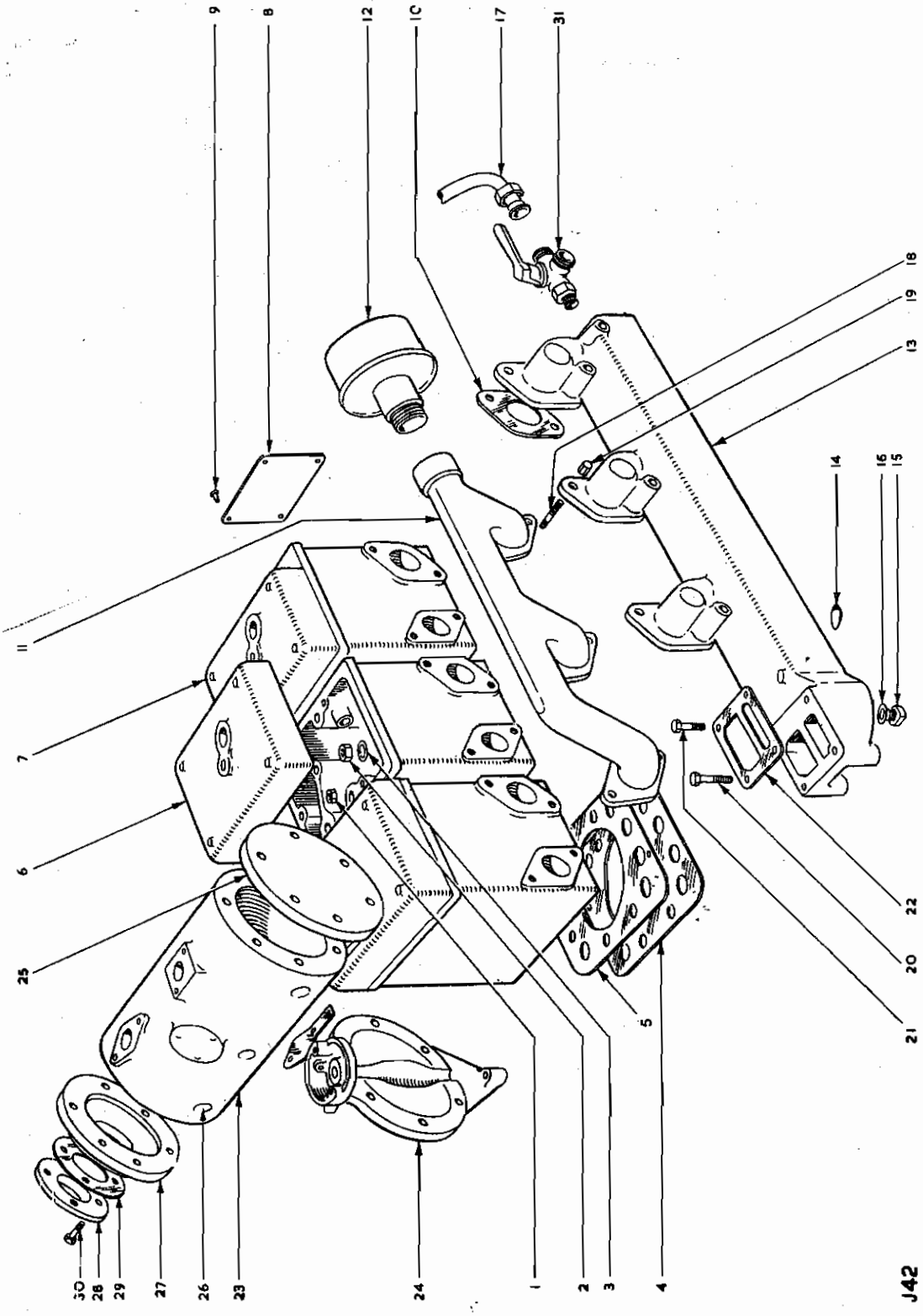
# CYLINDER HEAD–JKM only



# Cylinder Head Manifold Fittings

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | CYLINDER HEAD FITTINGS | | | |
| 1 | Cylinder Head Nuts for Stud | 27-1192 | 12 | 18 |
| 2 | Cylinder Head Nut for Tubular Stud | 27-794 | 4 | 6 |
| 3 | Cylinder Head Washer for Tubular Stud | 27-795 | 4 | 6 |
| 4 | Cylinder Head Gasket | 10-3-105 | 2 | 3 |
| 5 | Cylinder Head Copper Shim } Not supplied separately | 10-3-179 | 2 | 3 |
| 6 | Cylinder Head Cover | 13-14-419 | 1 | 2 |
| 7 | Cylinder Head Cover (For'd) Raised Starting | 13-14-420 | 1 | 1 |
| | Cylinder Head Cover Nut | 27-1974 | 2 | 3 |
| 8 | Cylinder Head Instruction Plate | 27-2449 | 1 | 1 |
| 9 | Cylinder Head Instruction Plate Dowel | 27-707 | 4 | 4 |
| 10 | Inlet and Exhaust Flange Joint | 10-3-57 | 4 | 6 |
| 11 | Air Inlet Manifold | 11-3-29 | 1 | – |
| | Air Inlet Manifold | 12-3-29 | – | 1 |
| 12 | Air Silencer | 11-13-62 | 1 | 1 |
| 13 | Water Cooled Exhaust Manifold | 11-13-202 | 1 | – |
| | Water Cooled Exhaust Manifold | 12-13-202 | – | 1 |
| 14 | Water Cooled Exhaust Manifold Expansion Plug | 27-768 | 3 | 3 |
| 15 | Water Cooled Exhaust Manifold Drain Plug | 21-153 | 3 | 1 |
| 16 | Joint | 5197 | 1 | 1 |
| 17 | Cylinder Head Water Outlet Pipe | 13-13-886 | 1 | – |
| | Cylinder Head Water Outlet Pipe | 12-13-470 | – | 1 |
| | Cylinder Head Water Outlet Pipe Joint | 10-2-59 | 2 | 3 |
| 18 | Inlet and Exhaust Manifold Stud | 27-57 | 6 | 9 |
| | Water Cooled Exhaust Manifold Stud (long) | 27-648 | 2 | 3 |
| | Cylinder Head Water Outlet Pipe | 12-13-872 | – | 1 |
| | Expansion Plug | 27-757 | 1 | 1 |
| | Cylinder Head Water Outlet Pipe Tee (JPM only) | 12-22-126 | 1 | 3 |
| | Cylinder Head Water Outlet Pipe Union (JPM only) | 11-13-268 | 1 | 1 |
| 19 | Cylinder Head Exhaust and Inlet Nuts | 27-1974 | 8 | 12 |
| 20 | Setscrews, Silencer to Manifold $\frac{3}{8}$" x $1\frac{3}{8}$" Whit. | 27-68 | 2 | 2 |
| 21 | Setscrews, Silencer to Manifold $\frac{3}{8}$" x 2" Whit. | 27-38 | 2 | 2 |
| — | Water Jet Pipe Assy. (JKM only) | 11-3-299 | 2 | 3 |
| — | Water Inlet Restrictor (JKM only) | 11-3-294 | 6 | 9 |
| — | Pipe Connecting Plug (JKM only) | 11-3-295 | 2 | 3 |
| — | Pipe Connecting Plug Joint (JKM only) | 11-3-296 | 2 | 3 |
| — | Cylinder Head Plug (JKM only) | 11-3-303 | 2 | 3 |
| — | Cylinder Head Plug Joint (JKM only) | 12406 | 2 | 3 |
| — | Union for Oil Pipe | 291-2114/1 | 2 | 3 |
| — | Camshaft to Rockershaft Oil Pipe Assembly (JKM only) | 11-15-495 | 1 | – |
| | | 12-15-495 | – | 1 |
| — | Fixing Screw (JKM only) | 11-2-478 | 1 | 1 |
| — | Fixing Screw Joint (JKM only) | 5197 | 2 | 2 |
| — | Adaptor Plug for Oil Pipe (JKM only) | 11-2-479 | 1 | 1 |
| — | "O" Ring for Plug (JKM only) | 201-13120 | 2 | 2 |
| — | Plug for Oil Drain Passage (JKM only) | 11-3-307 | 1 | 1 |
| — | Cylinder Head Low Joint (JKM only) | 11-3-291 | 2 | 3 |
| 22 | Exhaust Silencer to Manifold Jonit | 11-13-206 | 1 | 1 |
| 23 | Exhaust Silencer Body | 11-13-895 | 1 | 1 |
| 24 | Exhaust Silencer Control Side Cover | 11-13-369 | 1 | 1 |
| 25 | Exhaust Silencer Cover (without Control) | 11-13-875 | 1 | 1 |
| 26 | Exhaust Silencer Body Expansion Plug | 27-801 | 9 | 9 |
| 27 | Exhaust Silencer Outlet Cover | 11-13-148 | 1 | 1 |

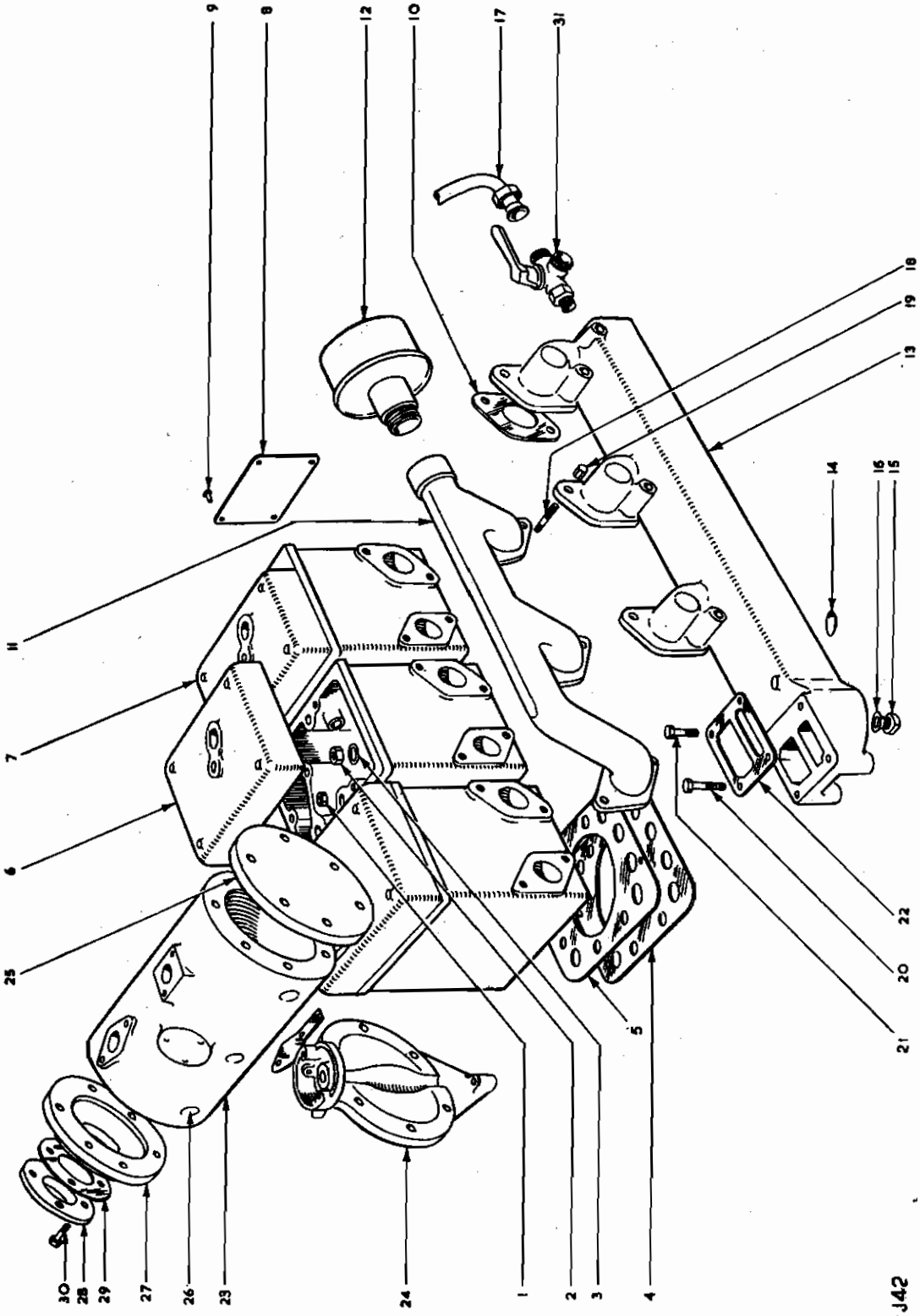
# CYLINDER HEAD MANIFOLD FITTINGS



# Cylinder Head Manifold Fittings-(Cont.)

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 28 | Exhaust Pipe Flange | 10-13-158 | 1 | 1 |
| 29 | Exhaust Pipe Flange Joint | 11-13-422 | 1 | 1 |
| 30 | Exhaust Pipe Flange Setscrew | 27-647 | 4 | 4 |
| 31 | Cylinder Head Water Temperature Regulating 3-way Cock (JPM only) | 11-13-468 | 1 | 1 |
| | Cylinder Head Pipe 3-way Cock to Tee Piece (JPM only) | 11-13-872 | 1 | 1 |
| | Cylinder Head Water Outlet Pipe Joint | 10-2-59 | 2 | 3 |
| | Vent Tap Plug | 11-13-452 | 1 | 1 |
| | Vent Tap Plug Joint | 3306 | 1 | 1 |
| | Vent Tap | 5137 | 1 | 1 |
| | Vent Tap Joint | 5197 | 1 | 1 |
| | Water Outlet Manifold Plug | 21-153 | 1 | 1 |
| | Water Outlet Manifold Plug Joint | 5197 | 1 | 1 |
| | Union Connection (JPM only) | 11-13-251 | 2 | 2 |
| | Union Connection Joint (JPM only) | 3306 | 5 | 5 |
| | Water Outlet Pipe to Cock | 11-13-871 | 1 | 1 |
| | Water Outlet Pipe Nut (JPM only) | 65-103 | 1 | 1 |
| | Water Outlet Pipe Nipple (JPM only) | 11-13-252 | 1 | 1 |
| | Water Outlet Pipe Joint (JPM only) | 12419 | 5 | 5 |
| | Flange Extension Piece 1¼" bore Joint | 11-15-568 | 1 | 1 |
| | Joint | 3309 | 2 | 2 |
| | Raw Water Delivery Pipe (Manifold end) | 11-15-552 | 1 | – |
| | By Pass Pipe | 11-15-559 | 1 | – |
| | By Pass Pipe | 12-15-559 | 1 | – |
| | Raw Water Delivery Pipe (Manifold end) | 12-15-559 | – | 1 |

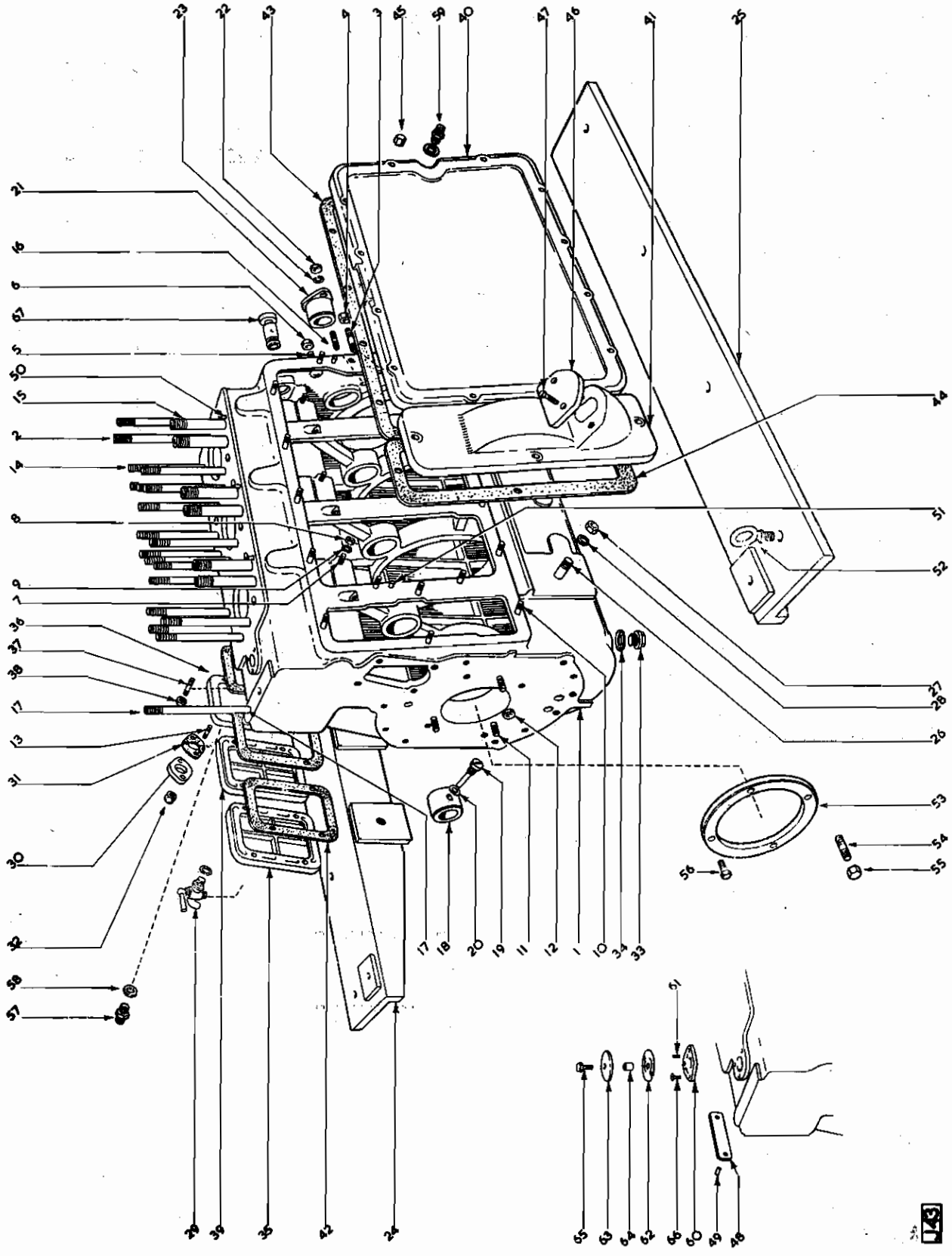
# CYLINDER HEAD MANIFOLD FITTINGS



# Crankcase

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 1 | Crankcase with Studs (JP2M up to December 1959) ... ... | 11-13-921S | 1 | – |
| 1 | Crankcase with Studs (JP3M up to December 1959) ... ... | 12-13-921S | – | 1 |
| – | Crankcase with Studs (JP2M, JK2M) ... ... ... | 11-15-494S | 1 | – |
| – | Crankcase with Studs (JP3M, JK3M) ... ... ... | 12-15-494S | – | 1 |
| 2 | Stud for For'd Starting Bracket (Raised Starting only)—10¾" | 27-1315 | 2 | 2 |
| 3 | Stud for End Cover ... ... ... ... ... ... | 27-35 | 7 | 7 |
| 4 | Nut for End Cover ... ... ... ... ... ... | 27-4 | 7 | 7 |
| 5 | Stud for End Cover ... ... ... ... ... ... | 27-536 | 2 | 2 |
| 6 | Nut for End Cover ... ... ... ... ... ... | 27-6 | 2 | 2 |
| 7 | Stud for Tappet Bracket ... ... ... ... ... | 27-214 | 4 | 6 |
| 8 | Nut for Tappet Bracket ... ... ... ... ... | 27-6 | 4 | 6 |
| 9 | Spring Washer ... ... ... ... ... ... | 27-393 | 4 | 6 |
| 10 | Stud for Doors ... ... ... ... ... ... ... | 27-33 | 20 | 28 |
| 11 | Stud for Crankshaft Bearing ... ... ... ... ... | 27-50 | 3 | 3 |
| 12 | Nut ... ... ... ... ... ... ... | 27-6 | 3 | 3 |
| 13 | Stud for Water Flange ... ... ... ... ... | 27-50 | 2 | 2 |
| 14 | Stud for Cylinder Head ... ... ... ... ... | 27-1190 | 10 | 16 |
| 15 | Stud (for Cylinder Head (Tubular) ... ... ... | 11-2-459 | 4 | 6 |
| 16 | Stud for Camshaft Bush ... ... ... ... ... | 27-65 | 2 | 2 |
| 17 | Stud for Water Cooled Silencer ... ... ... ... | 27-1519 | 2 | 2 |
| | Nut for Water Cooled Silencer ... ... ... ... | 27-26 | 2 | 2 |
| | Washer for Water Cooled Silencer ... ... ... | 27-807 | 2 | 2 |
| 18 | Crankcase Bush for Camshaft ... ... ... ... | 10-6-2 | 1 | 1 |
| 19 | Camshaft Bush Locating Screw ... ... ... ... | 11-2-55 | 1 | 1 |
| 20 | Joint for Camshaft Bearing Locating Screw ... ... ... | 10-2-180 | 1 | 1 |
| 21 | Camshaft Bush for Pump End ... ... ... ... | 10-6-3 | 1 | 1 |
| 22 | Camshaft Bush Nut 5/16" Whit. ... ... ... ... | 27-7 | 2 | 2 |
| 23 | Camshaft Bush Spring Washer ... ... ... ... | 27-413 | 2 | 2 |
| — | Crankcase Support Bracket (2 cyl.) Port ... ... ... | 11-13-762 | 1 | – |
| — | Crankcase Support Bracket (2 cyl) Starboard ... ... | 11-13-763 | 1 | – |
| 24 | Crankcase Support Bracket (3 cyl.) Port ... ... ... | 12-13-762 | – | 1 |
| 25 | Crankcase Support Bracket (3 cyl.) Starboard ... ... | 12-13-763 | – | 1 |
| 26 | Crankcase Support Bracket Stud ¼" Whit. x 4⅛" ... ... | 13-14-192 | 4 | 6 |
| 27 | Crankcase Support Bracket Nut ¼" ... ... ... | 27-2 | 4 | 6 |
| 28 | Crankcase Support Spring Washers ... ... ... | 27-396 | 6 | 6 |
| 29 | Crankcase Water Drain Tap ... ... ... ... | 27-128 | 1 | 1 |
| | Crankcase Water Drain Plug ... ... ... ... | 12407 | 1 | – |
| | Crankcase Water Drain Plug Joint ... ... ... ... | 12406 | 2 | 1 |
| 30 | Crankcase Water Flange ... ... ... ... ... | 102-296 | 1 | 1 |
| 31 | Crankcase Water Flange Joint ... ... ... ... | 10-2-59 | 3 | 4 |
| 32 | Crankcase Water Flange Nut ⅜" Whit. Dome ... ... | 27-1974 | 2 | 2 |
| 33 | Crankcase Oil Drain Plug ... ... ... ... ... | 10-13-132 | 1 | 1 |
| 34 | Crankcase Oil Drain Plug Joint ... ... ... ... | 3306 | 1 | 1 |
| 35 | Crankcase Door (Small) ... ... ... ... ... | 11-13-469 | – | 1 |
| 36 | Crankcase Door (Small for Filter) ... ... ... | 10-2-257 | 1 | 1 |
| 37 | Stud for Filter ... ... ... ... ... ... | 27-1579 | 4 | 4 |
| 38 | Nut for Filter Stud ... ... ... ... ... ... | 27-906 | 4 | 4 |
| 39 | Crankcase Door (Small for Vent Pipe) ... ... ... | 11-13-735 | 1 | 1 |
| — | Crankcase Door (Large) (JP2M only) ... ... ... | 11-2-454 | 1 | – |
| — | Crankcase Door (Large) (JK2M only) ... ... ... | 11-2-407 | 1 | – |
| 40 | Crankcase Door (Large) (JP3M only) ... ... ... | 12-2-407 | – | 1 |
| — | Crankase Door (Large) (JK3M only) ... ... ... | 12-2-454 | – | 1 |
| 41 | Crankcase Door Gearside ... ... ... ... ... | 11-2-19AS | 1 | 1 |

# CRANKCASE

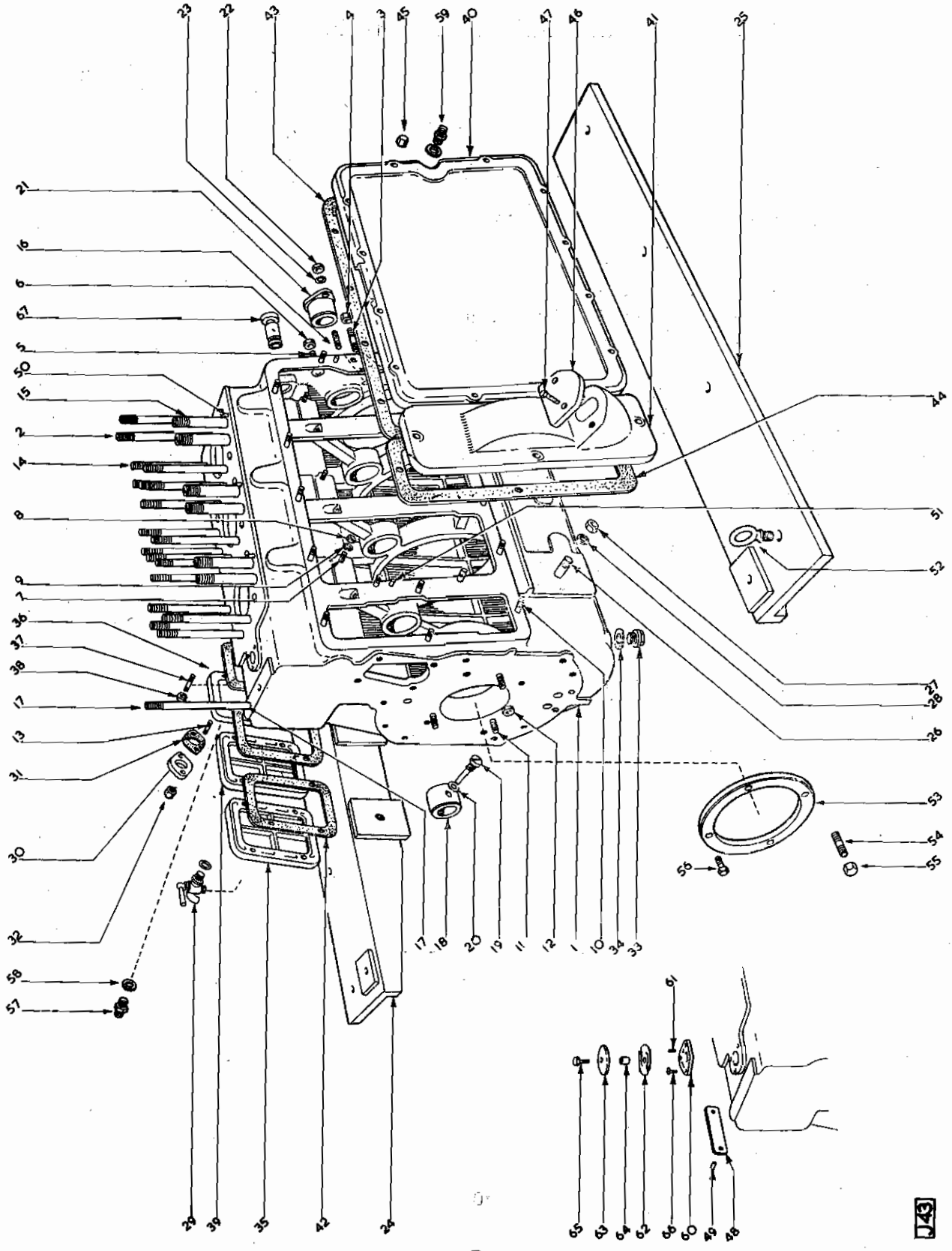


# Crankcase–(Cont.)

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 42 | Crankcase Door Joint (Small) | 10-2-61A | 2 | 3 |
| | Crankcase Door Joint (Large) | 10-2-68 | 1 | – |
| — | Crankcase Door (Small) for Filter | 10-2-257 | 1 | – |
| 43 | Crankcase Door Joint (Large) | 12-2-68 | – | 1 |
| 44 | Crankcase Door Joint (Gearside) | 11-2-60 | 1 | 1 |
| 45 | Crankcase Door Nut 5/16" Whit. Dome | 27-1856 | 20 | 28 |
| 46 | Crankcase Oil Filler Blank Flange | 11-13-396 | 1 | 1 |
| 47 | Crankcase Oil Filler Lid Screw | 27-150 | 2 | 2 |
| 48 | Crankcase Engine Specification Plate | 27-666 | 1 | 1 |
| 49 | Crankcase Engine Specification Plate Dowel | 27-707 | 4 | 4 |
| 50 | Crankcase Dowel for Cylinder Head | 10-2-110 | 4 | 6 |
| 51 | Crankcase Dowel for Door | 27-1087 | 2 | 3 |
| 52 | Lifting Eyebolt ¼" B.S.F. | 27-3697 | 4 | 4 |
| 53 | Register Ring for Reverse Gearcase | 11-13-575 | 1 | 1 |
| 54 | Stud Crankcase—Rev. Gearcase | 27-55 | 6 | 6 |
| 55 | Cap Nut for Stud | 27-708 | 6 | 6 |
| 56 | Setscrew Register Ring to Crankcase | 27-203 | 4 | 4 |
| 57 | ½" Union for Crankcase Door | 12427 | 1 | 1 |
| 58 | Union Joint | 12406 | 1 | 1 |
| 59 | Oil Pressure Gauge Pipe Union | 103-106 | 1 | 1 |
| | Oil Pressure Gauge Pipe Washer | 5197 | 1 | 1 |
| | BREATHER complete, JPM and JKM, comprising :— | 10-2-245c | 1 | 1 |
| 60 | Breather Plate | 10-2-245 | 1 | 1 |
| 61 | Breather Plate Dowel | 27-655 | 1 | 1 |
| 62 | Breather Disc | 21-112 | – | 1 |
| 63 | Breather Cover | 21-113 | 1 | 1 |
| 64 | Breather Spacing Bush | 21-114 | 1 | 1 |
| 65 | Breather Cover Screw | 27-1285 | 1 | 1 |
| 66 | Breather Plate Screw | 27-1552 | 3 | 3 |
| 67 | Governor Rod Bush | 11-6-18 | 1 | 1 |

**ALWAYS QUOTE ENGINE NUMBER WHEN ORDERING SPARES**

# CRANKCASE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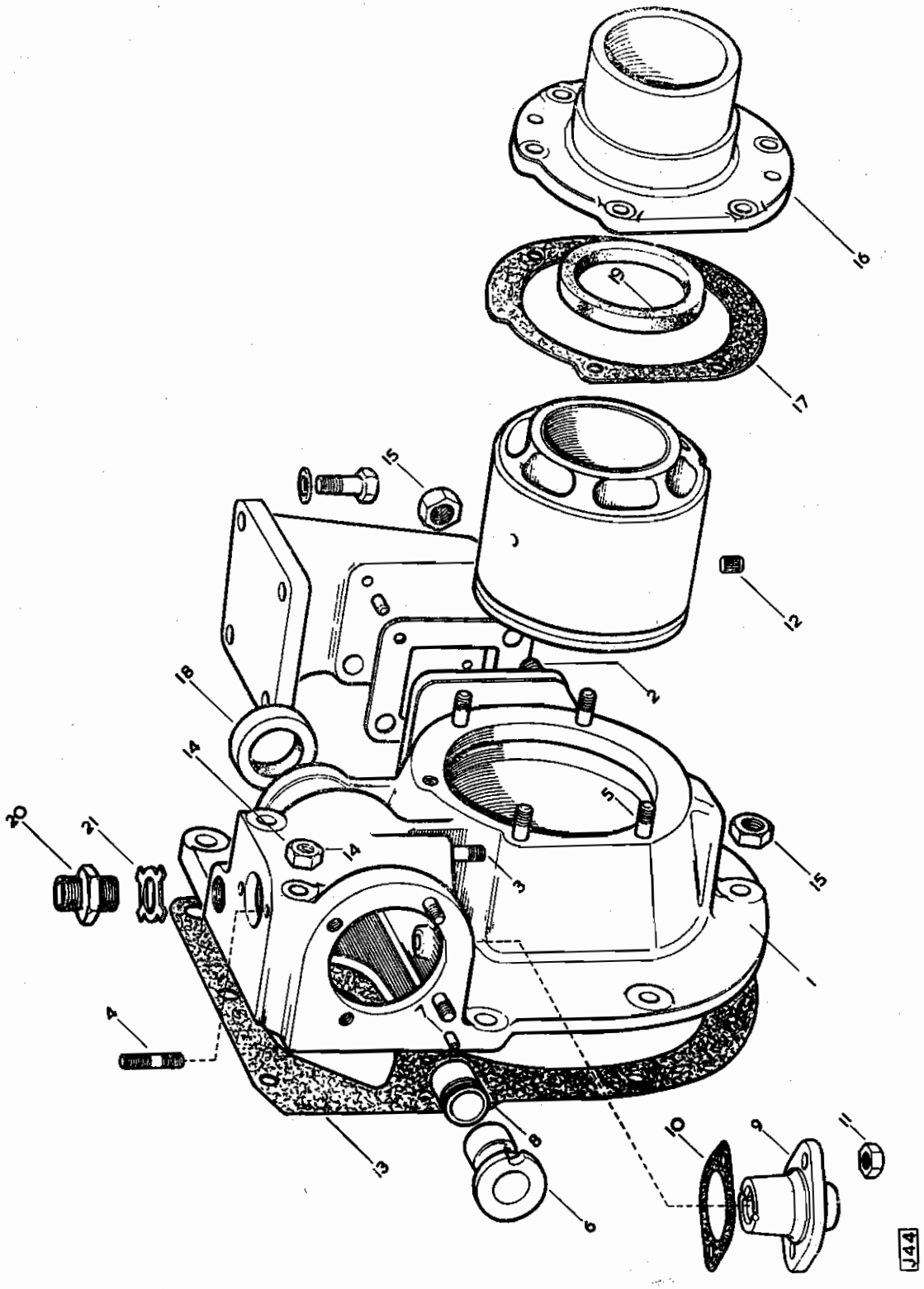
# Crankcase End Cover

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 1 | END COVER with Studs ... ... ... ... ... | 10-2-3AS | 1 | 1 |
| 2 | End Cover Stud for Fuel Pump Bracket ... ... ... | 27-194 | 2 | 2 |
| 3 | End Cover Stud for Bevel Wheel Housing ... ... ... | 27-45 | 2 | 2 |
| 4 | End Cover Stud for Governor Lever Support Flange ... | 27-33 | 2 | 2 |
| 5 | End Cover Stud for Dust Cover ... ... ... ... | 27-37 | 4 | 4 |
| 6 | End Cover Bevel Wheel Bush (Fuel Pump) ... ... ... | 10-2-238 - | 1 | 1 |
| 7 | End Cover Bevel Wheel Dowel ... ... ... ... | 27-1224 | 1 | 1 |
| 8 | End Cover Bevel Wheel Oil Thrower ... ... ... | 10-2-37 - | 1 | 1 |
| 9 | End Cover Bevel Wheel Housing ... ... ... ... | 10-2-93 | 1 | 1 |
| 10 | End Cover Bevel Wheel Housing Joint ... ... ... | 10-2-114 | 1 | 1 |
| 11 | End Cover Bevel Wheel Housing Nut ⅜" Whit. ... ... | 27-6 | 2 | 2 |
| 12 | End Cover Main Bearing Dowel ... ... ... ... | 10-2-231 | 1 | 1 |
| 13 | End Cover Joint ... ... ... ... ... ... | 10-2-63 | 1 | 1 |
| 14 | End Cover Nut ⅜" Whit. ... ... ... ... ... | 27-6 | 2 | 2 |
| 15 | End Cover Nut ½" Whit. ... ... ... ... ... | 27-4 | 7 | 7 |
| 16 | End Cover Ratchet Wheel Spigot ... ... ... ... | 11-13-404 | 1 | 1 |
| 17 | End Cover Dust Cover Joint ... ... ... ... | 10-2-64A | 1 | 1 |
| 18 | End Cover Oil Seal ... ... ... ... ... ... | 27-1739 | 1 | 1 |
| 19 | Felt Washer ... ... ... ... ... ... ... | 10-2-9 | 1 | 1 |
| 20 | Union for Lub. Oil Pipe ... ... ... ... ... | 10-2-85 | 1 | 1 |
| 21 | Union Tab Washer ... ... ... ... ... ... | 10-2-64 | 1 | 1 |
| — | Bevel Wheel Cover (JKM only) ... ... ... ... | 10-2-32 | 1 | 1 † |
| — | Bevel Wheel Cover Joint (JKM only) ... ... ... | 10-2-65 | 1 | 1 |
| — | End Cover Governor Lever Support Flange (JKM only) ... | 10-2-33 | 1 | 1 |
| — | End Cover Governor Lever Support Joint (JKM only) ... | 10-2-67A | 1 | 1 |

†NOT used with Air Starting.

**ALWAYS QUOTE ENGINE NUMBER WHEN ORDERING SPARES**

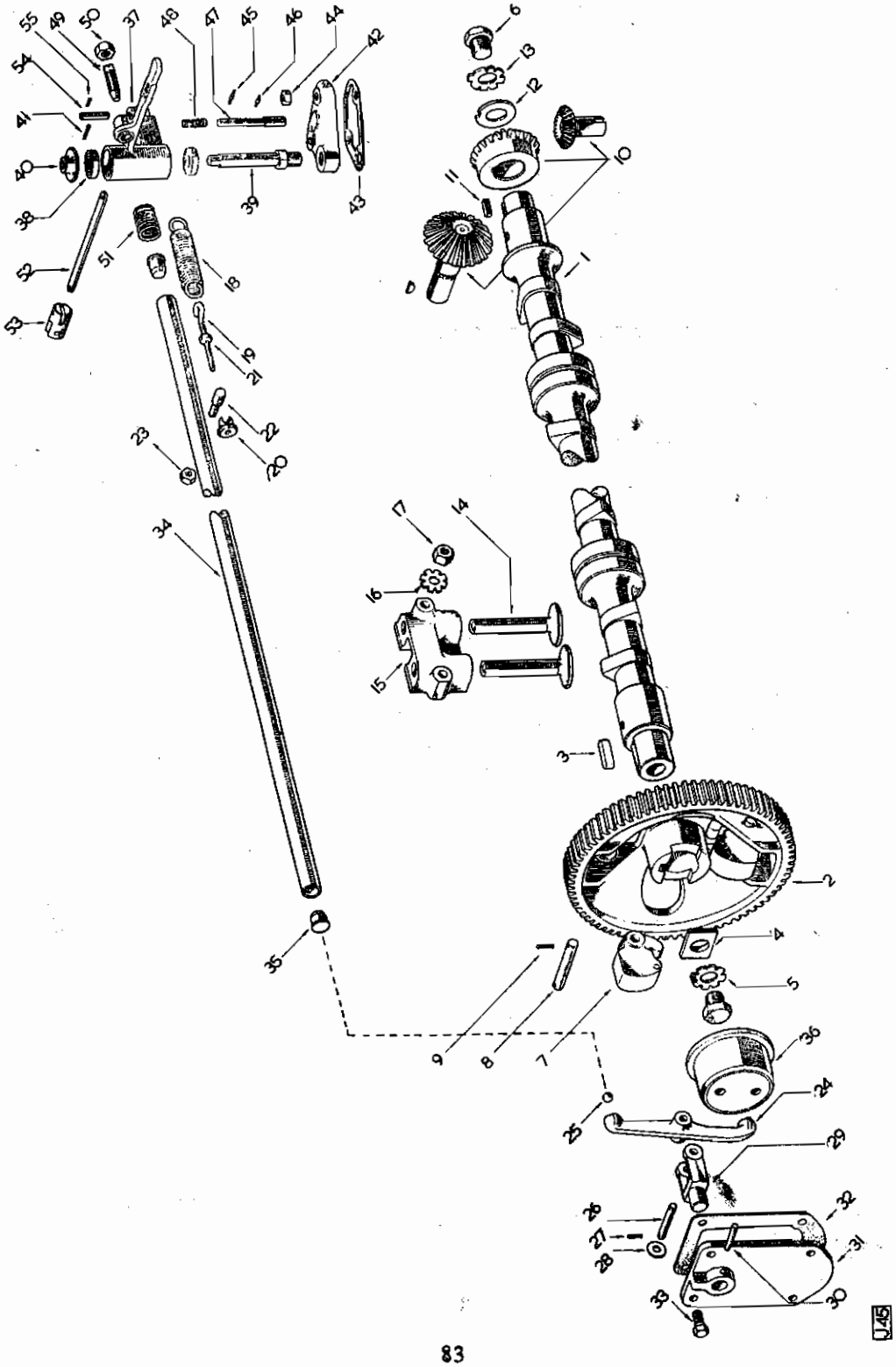
# CRANKCASE END COVER–JPM



# Camshaft, Bevel Gear and Governor

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | Camshaft complete (JP2M only) comprising ... ... | 11-6-1c | 1 | – |
| | Camshaft complete (JP3M only) comprising ... ... | 12-6-1c | – | 1 |
| | Camshaft Bare (JP2M only) ... ... ... ... ... | 11-6-1a | 1 | – |
| 1 | Camshaft Bare (JP3M only) ... ... ... ... ... | 12-6-1a | – | 1 |
| | Camshaft complete (JK2M) ... ... ... ... ... | 11-6-197c | 1 | – |
| | Camshaft complete (JK3M) ... ... ... ... ... | 12-6-197c | – | 1 |
| | Camshaft Bare (JK2M) ... ... ... ... ... | 11-6-197 | 1 | – |
| | Camshaft Bare (JK3M) ... ... ... ... ... | 12-6-197 | – | 1 |
| 2 | Camshaft Gear Wheel ... ... ... ... ... | 10-6-4 | 1 | 1 |
| 3 | Camshaft Gear Wheel Key ... ... ... ... ... | 10-6-5 | 1 | 1 |
| 4 | Camshaft Gear Wheel Locating Plate ... ... ... | 10-6-6 | 1 | 1 |
| 5 | Camshaft Gear Wheel Tab Washer ... ... ... ... | 10-6-64 | 1 | 1 |
| 6 | Camshaft Plug ... ... ... ... ... ... | 10-6-46 | 2 | 2 |
| | Camshaft Governor Weight (1000 R.P.M.) ... ... ... | 10-6-7A | 2 | 2 |
| 7 | Camshaft Governor Weight (1200 R.P.M.) ... ... ... | 10-6-70 | 2 | 2 |
| | Governor Weight 1500 R.P.M. ... ... ... ... | 11-6-198 | 2 | 2 |
| 8 | Camshaft Governor Weight Fulcrum Pin ... ... ... | 10-6-103 | 2 | 2 |
| 9 | Camshaft Governor Weight Fulcrum Split Pin ... ... | 27-911 | 4 | 4 |
| 10 | Camshaft Bevel Wheels (Set of Three) ... ... ... | 10-2-341 | 3 | 3 |
| | Camshaft Bevel Wheels (Set of Three)—Air Start ... ... | 11-2-474 | 1 | 1 |
| 11 | Camshaft Bevel Wheel Key ... ... ... ... ... | 10-6-35 | 1 | 1 |
| 12 | Camshaft Bevel Wheel Washer ... ... ... ... | 10-6-49 | 1 | 1 |
| 13 | Camshaft Bevel Wheel Tab Washer ... ... ... ... | 10-6-64 | 1 | 1 |
| 14 | Valve Tappet ... ... ... ... ... ... ... | 10-2-56 | 4 | 6 |
| 15 | Valve Tappet Bracket ... ... ... ... ... | 10-2-10 | 2 | 3 |
| 16 | Valve Tappet Bracket Lockwasher ... ... ... ... | 10-6-66 | 4 | 6 |
| 17 | Valve Tappet Bracket Nut ⅜" Whit. ... ... ... ... | 27-6 | 4 | 6 |
| | GOVERNOR | | | |
| | Governor Speeder Spring (850-1000 R.P.M.) ... ... ... | 10-6-60 | 1 | 1 |
| 18 | Governor Speeder Spring (Over 1000 R.P.M.) ... ... | 10-6-59 | 1 | 1 |
| 19 | Governor Speeder Spring Hook ... ... ... ... | 10-14-613 | 1 | 1 |
| 20 | Governor Speeder Spring Adjusting Nut ... ... ... | 3177 | 1 | 1 |
| 21 | Governor Speeder Spring Locknut ... ... ... ... | 27-15 | 1 | 1 |
| 22 | Governor Speeder Spring Anchor Pin ... ... ... | 1-240 | 1 | 1 |
| | Bracket for Anchor Pin ... ... ... ... ... | 11-15-604 | 1 | 1 |
| 23 | Governor Speeder Spring Anchor Pin Nut 5/16" Whit. ... | 27-7 | 1 | 1 |
| 24 | Governor Inside Lever with Bearing Pad ... ... ... | 10-6-12c | 1 | 1 |
| 25 | Governor Inside Lever Bearing Pad ... ... ... ... | 27-787 | 2 | 2 |
| 26 | Governor Inside Lever Fulcrum Pin ... ... ... | 10-6-13 | 1 | 1 |
| 27 | Governor Inside Lever Fulcrum Split Pin ... ... ... | 27-123 | 2 | 2 |
| 28 | Governor Inside Lever Fulcrum Pin Washer ... ... | 27-82 | 2 | 2 |
| 29 | Governor Inside Lever Fork ... ... ... ... ... | 10-6-40 | 1 | 1 |
| 30 | Governor Inside Lever Fork Taper Pin ... ... ... | 27-237 | 1 | 1 |
| 31 | Governor Inside Lever Bracket ... ... ... ... | 10-6-15A | 1 | 1 |
| 32 | Governor Inside Lever Bracket Joint ... ... ... | 10-6-48A | 1 | 1 |
| 33 | Governor Inside Lever Bracket Set Pin ... ... ... | 27-150 | 4 | 4 |
| | Governor Spindle (JP) ... ... ... ... ... | 11-6-16 | 1 | – |
| 34 | Governor Spindle (JK) ... ... ... ... ... | 12-6-16 | – | 1 |
| | Governor Spindle Bush ... ... ... ... ... | 11-6-18 | – | 1 |
| 35 | Governor Spindle Plug ... ... ... ... ... | 11-6-45 | 2 | 2 |
| 36 | Governor Sleeve ... ... ... ... ... ... | 10-6-20 | 1 | 1 |
| | Governor Adjusting Link ... ... ... ... ... | 31-1422 | 1 | 1 |

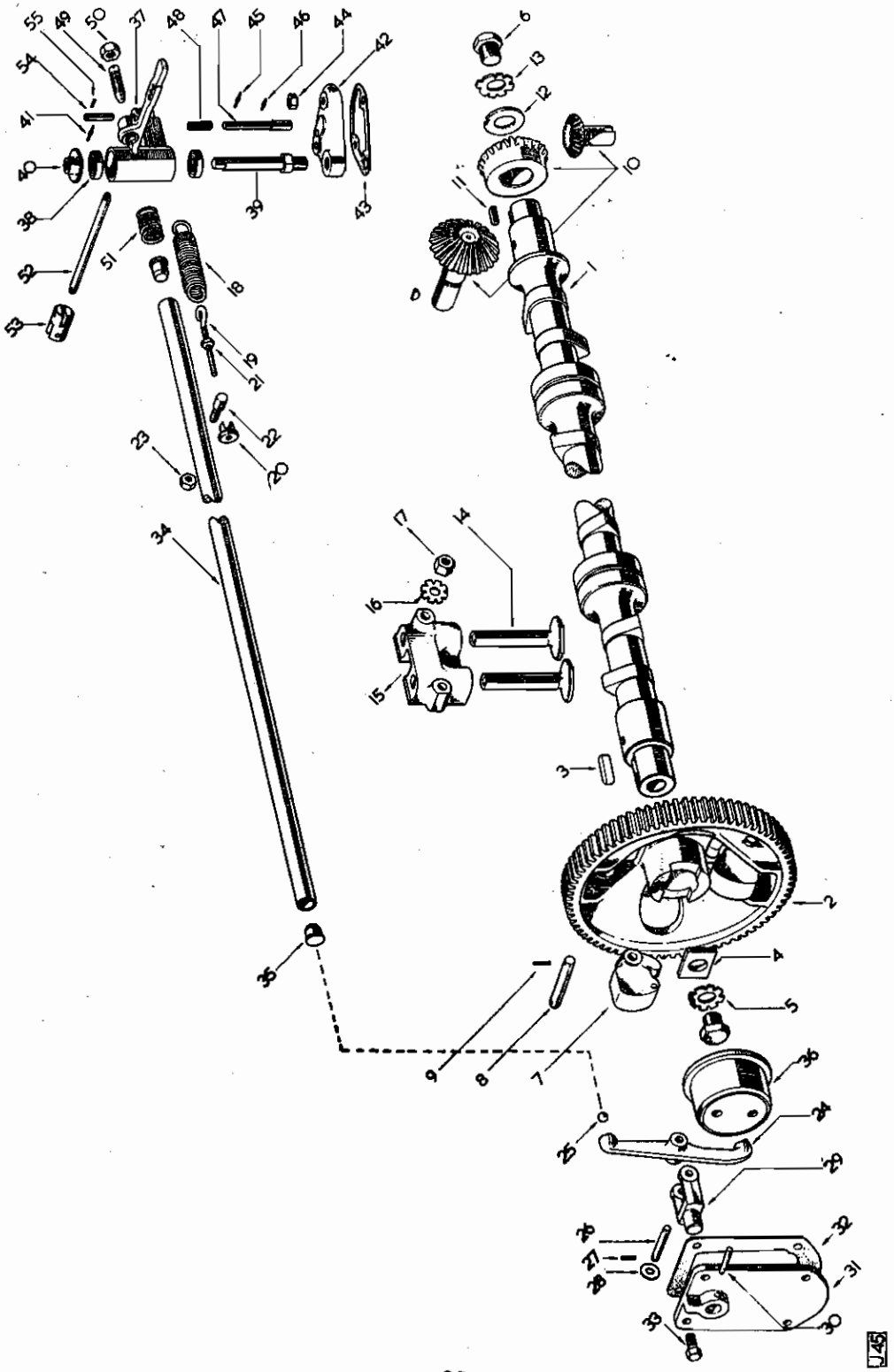
# CAMSHAFT BEVEL GEAR AND GOVERNOR



# Camshaft Bevel Gear and Governor–(Cont.)

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 37 | Governor Bell Crank Lever ... ... ... ... | 11-15-603 | 1 | 1 |
| 38 | Governor Bell Crank Lever Ball Bearing ... ... ... | 10-6-51 | 2 | 2 |
| 39 | Governor Bell Crank Lever Fulcrum Pin ... ... ... | 10-6-39A | 1 | 1 |
| 40 | Governor Bell Crank Lever Collar ... ... ... | 10-6-42 | 1 | 1 |
| 41 | Governor Bell Crank Lever Collar Split Pin ... ... | 27-236 | 1 | 1 |
| 42 | Governor Bell Crank Lever Support Flange ... ... | 10-2-33B | 1 | 1 |
| 43 | Governor Bell Crank Lever Support Flange Joint ... ... | 10-2-67A | 1 | 1 |
| 44 | Governor Bell Crank Lever Support Flange Nut ... ... | 27-7 | 2 | 2 |
| 45 | Governor Bell Crank Lever Stop (Long) Pin ... ... | 10-6-71 | 1 | 1 |
| 46 | Governor Bell Crank Lever Stop (Short) Pin ... ... | 10-6-72 | 1 | 1 |
| 47 | Governor Bell Crank Lever Stop ... ... ... ... | 10-6-68 | 1 | 1 |
| 48 | Governor Bell Crank Lever Stop Spring ... ... ... | 11-13-699 | 1 | 1 |
| 49 | Governor Bell Crank Lever Adjusting Screw ... ... | 26-98 | 1 | 1 |
| 50 | Governor Bell Crank Lever Lock Nut ... ... ... | 27-714 | 1 | 1 |
| 51 | Governor Bell Crank Lever Spring ... ... ... ... | 10-6-61 | 1 | 1 |
| 52 | Governor Control Rod ... ... ... ... ... | 11-13-697 | 1 | 1 |
| 53 | Governor Shackle for Fuel Pump ... ... ... ... | 11-13-696 | 1 | 1 |
| 54 | Governor Shackle Fulcrum Pin ... ... ... ... | 11-13-698 | 3 | 3 |
| 55 | Governor Shackle Fulcrum Pin Split Pin ... ... ... | 27-122 | 6 | 6 |

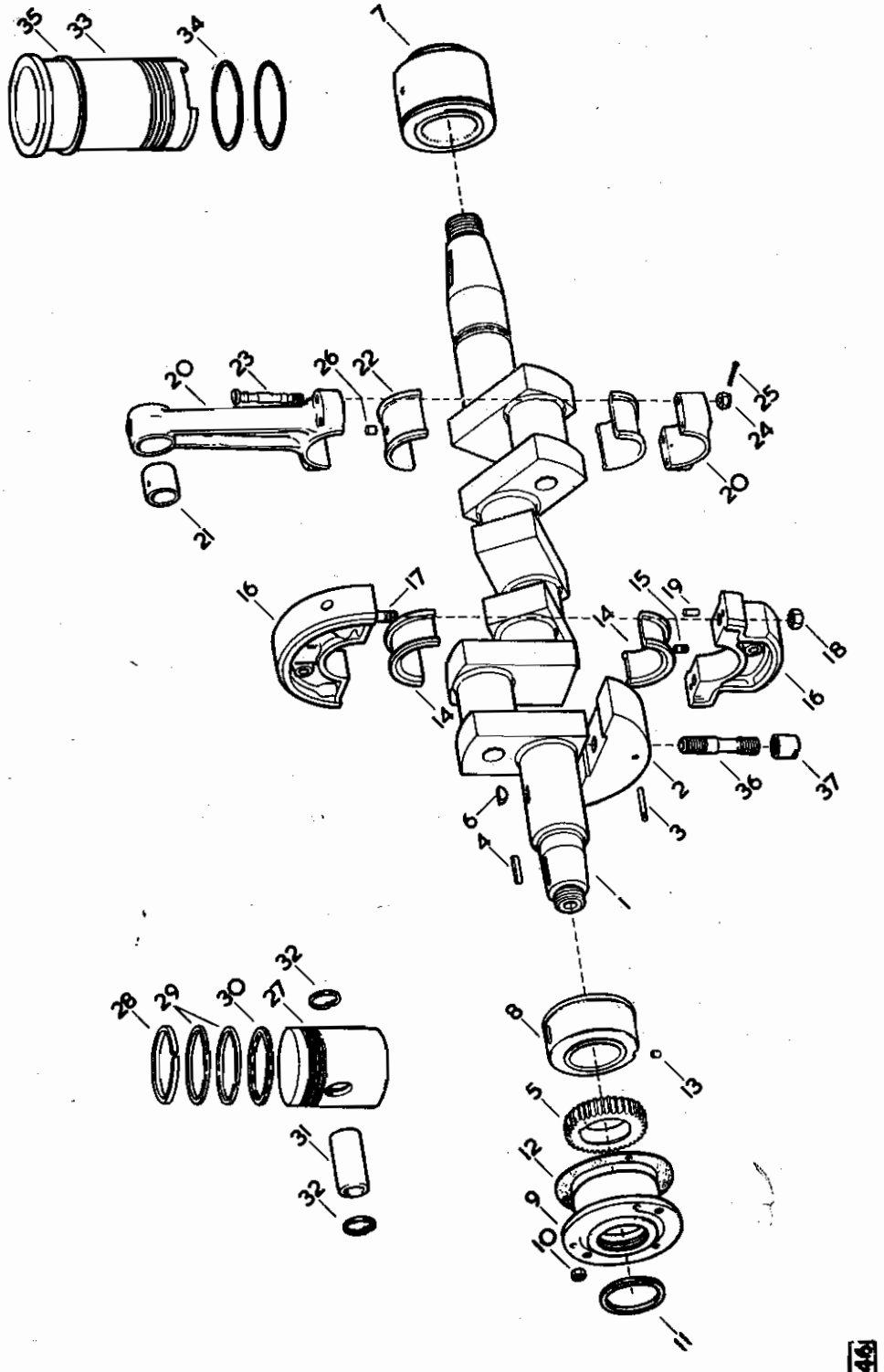
# CAMSHAFT BEVEL GEAR AND GOVERNOR



# Crankshaft and Piston Assembly

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | CRANKSHAFT | 11-13-113c | 1 | – |
| | Balance Weight ... ... ... ... ... ... ... | 10-5-62 | 2 | – |
| | Balance Weight Dowel ... ... ... ... ... | 27-800 | 2 | – |
| 1 | CRANKSHAFT ... ... ... ... ... ... | 12-13-760c | – | 1 |
| 2 | Balance Weight ... ... ... ... ... ... | 12-5-81 | – | 6 |
| 3 | Balance Weight Dowel ... ... ... ... ... | 27-800 | – | 6 |
| | Crankshaft Spigot Bush ... ... ... ... ... | 11-13-109 | 1 | 1 |
| 4 | Crankshaft Key for R.G. Sun Wheel ... ... ... | 10-13-114 | 1 | 1 |
| | Crankshaft Nut for R.G. Sun Wheel ... ... ... | X87/11022 | 1 | 1 |
| 5 | Crankshaft Pinion ... ... ... ... ... ... | 10-5-2 | 1 | 1 |
| | Crankshaft Spur Gear ... ... ... ... ... ... | X87/16740 | – | 1 |
| | Crankshaft Spur Gear ... ... ... ... ... ... | X87/11741 | 1 | – |
| 6 | Crankshaft Pinion Key ... ... ... ... ... | 27-785 | 1 | 1 |
| | CRANKSHAFT MAIN BEARINGS | | | |
| 7 | Main Bearing End Cover (Forward) ... ... ... | 10-2-408 | 1 | 1 |
| 8 | Main Bearing Gear End Inner ... ... ... ... | 10-2-409 | 1 | 1 |
| 9 | Main Bearing Gear End Outer (Aft) ... ... ... | 10-2-410 | 1 | 1 |
| 10 | Main Bearing Gear End Nut ⅜" Whit. ... ... ... | 27-6 | 3 | 3 |
| 11 | Main Bearing Gear End Felt Washer (in Spigot) ... ... | 10-2-9 | 1 | 1 |
| 12 | Main Bearing Gear End Joint ... ... ... ... | 10-2-62A | 1 | 1 |
| 13 | Main Bearing Gear End Dowel ... ... ... ... | 10-2-7 | 1 | 1 |
| 14 | Centre Bearing (in Halves) 27-3 only ... ... ... | 12-2-359 | – | 2 |
| 15 | Centre Bearing Dowel ... ... ... ... ... | 10-2-7 | – | 2 |
| 16 | Intermediate Bearing Housing with Studs ... ... ... | 12-5-15/16 | – | 1 |
| | Intermediate Bearing Housing 2nd Bearing ... ... | 12-5-17/18 | – | 1 |
| | Intermediate Bearing Housing Screw ... ... ... | 12-2-71 | – | 2 |
| 17 | Intermedate Bearing Housing Stud ... ... ... ... | 27-1075 | – | 4 |
| 18 | Intermediate Bearing Housing Nut ... ... ... ... | 27-26 | – | 4 |
| 19 | Intermediate Bearing Housing Dowel ... ... ... | 12-2-72 | – | 2 |
| | Bearing Shim (used as required) .005 thick ... ... | 10-2-12 | | |
| | CON ROD COMPLETE JK. | 573-11630 | | |
| | " " JP | 573-10400. | | |
| | CONNECTING ROD complete comprising : | 10-4-25c | 2 | 3 |
| 20 | Connecting Rod with Cap ... ... ... ... ... | 10-4-25 | 2 | 3 |
| 21 | Connecting Rod Bush (Small End) ... ... ... ... | 10-4-7 | 2 | 3 |
| 22 | Connecting Rod Bearing (Large End) JP ... 010-04008 | ~~10-4-8~~ | 2 | 3 |
| 23 | Connecting Rod Bolt ... ... ... ... ... | 10-4-14 | 8 | 12 |
| 24 | Connecting Rod Bolt Nut ... ... ... ... ... | 27-796 | 8 | 12 |
| 25 | Connecting Rod Bolt Split Pin ... ... ... ... | 27-121 | 8 | 12 |
| 26 | Connecting Rod Dowel ... ... ... ... ... | 10-2-7 | 2 | 3 |
| | CON ROD BEARING JK 010-04039 | | | |
| | PISTON (complete) ... ... ... ... 010-04061 | 10-4-61c | 2 | 3 |
| 27 | Piston (Bare) ... ... ... ... ... ... ... | 10-4-61 | 2 | 3 |
| 28 | Piston Ring Taper ... ... ... ... ... ... | 614-888 | 2 | 3 |
| 29 | Piston Ring ... ... ... ... ... ... ... | 10-4-18 | 4 | 6 |
| 30 | Piston Scraper Ring Slotted ... ... ... ... ... | 23-2299 | 2 | 3 |
| | PISTON RING SET | 674-10980 | | |

# CRANKSHAFT AND PISTON ASSEMBLY

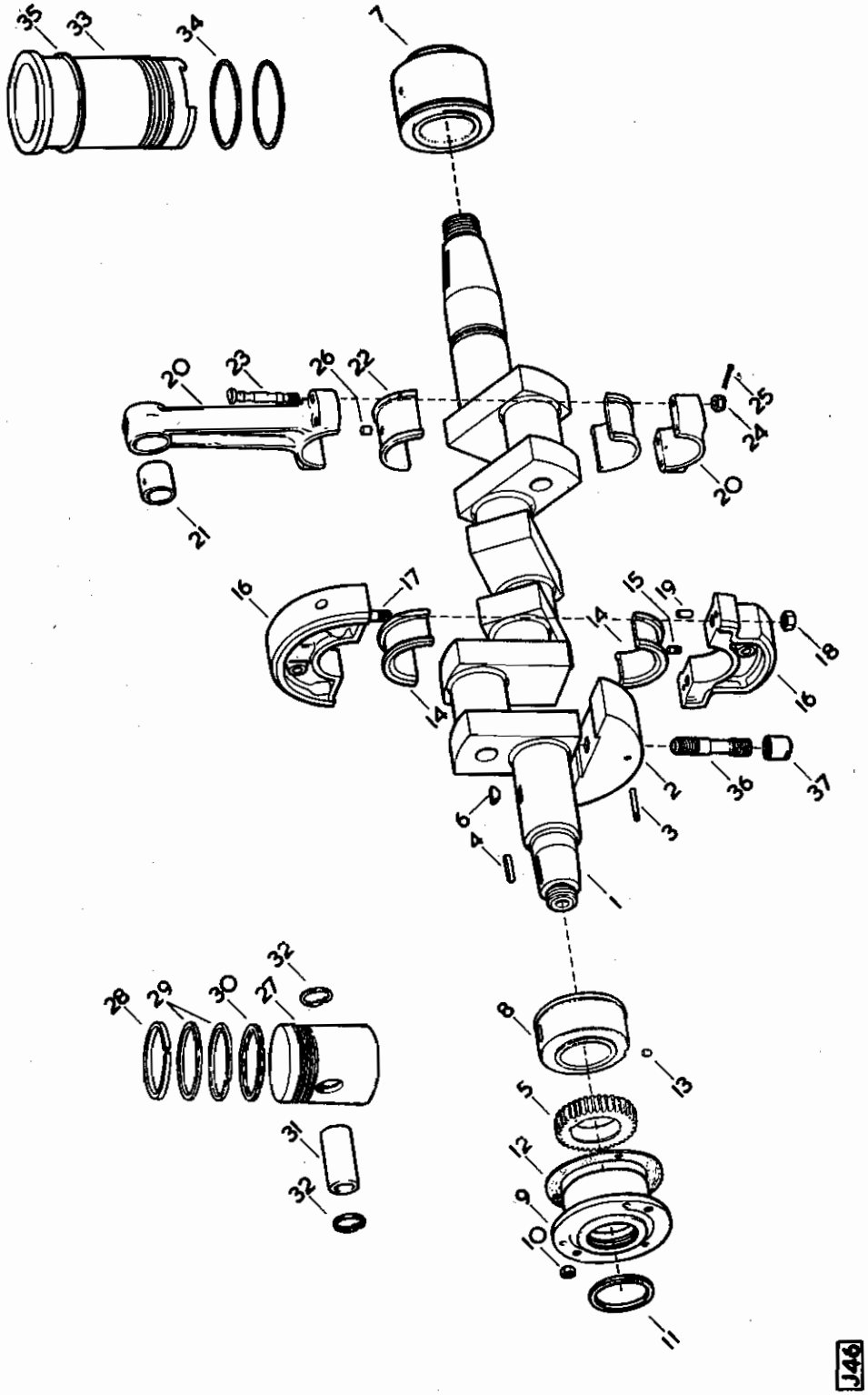


# Crankshaft and Piston Assembly

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | GUDGEON PIN | | | |
| 31 | Gudgeon Pin ... ... ... ... ... ... ... | 10-4-3 | 2 | 3 |
| 32 | Gudgeon Pin Spring Clip ... ... ... ... ... | 28-99 | 4 | 6 |
| | CYLINDER LINER "LISTARD" | | | |
| 33 | Cylinder Liner ..... ... ... ... ... ... | 10-2-247 | 2 | 3 |
| 34 | Cylinder Liner Rubber Ring ... ... ... ... | 10-2-116 | 4 | 6 |
| 35 | Cylinder Liner Adjusting Shim ... ... ... ... | 10-2-12 | As reqd. | |
| 36 | Balance Weight Stud ... ... ... ... ... | 10-5-63 | – | 6 |
| 37 | Balance Weight Nut ... ... ... ... ... ... | 10-5-14 | – | 6 |

**ALWAYS QUOTE ENGINE NUMBER WHEN ORDERING SPARES**

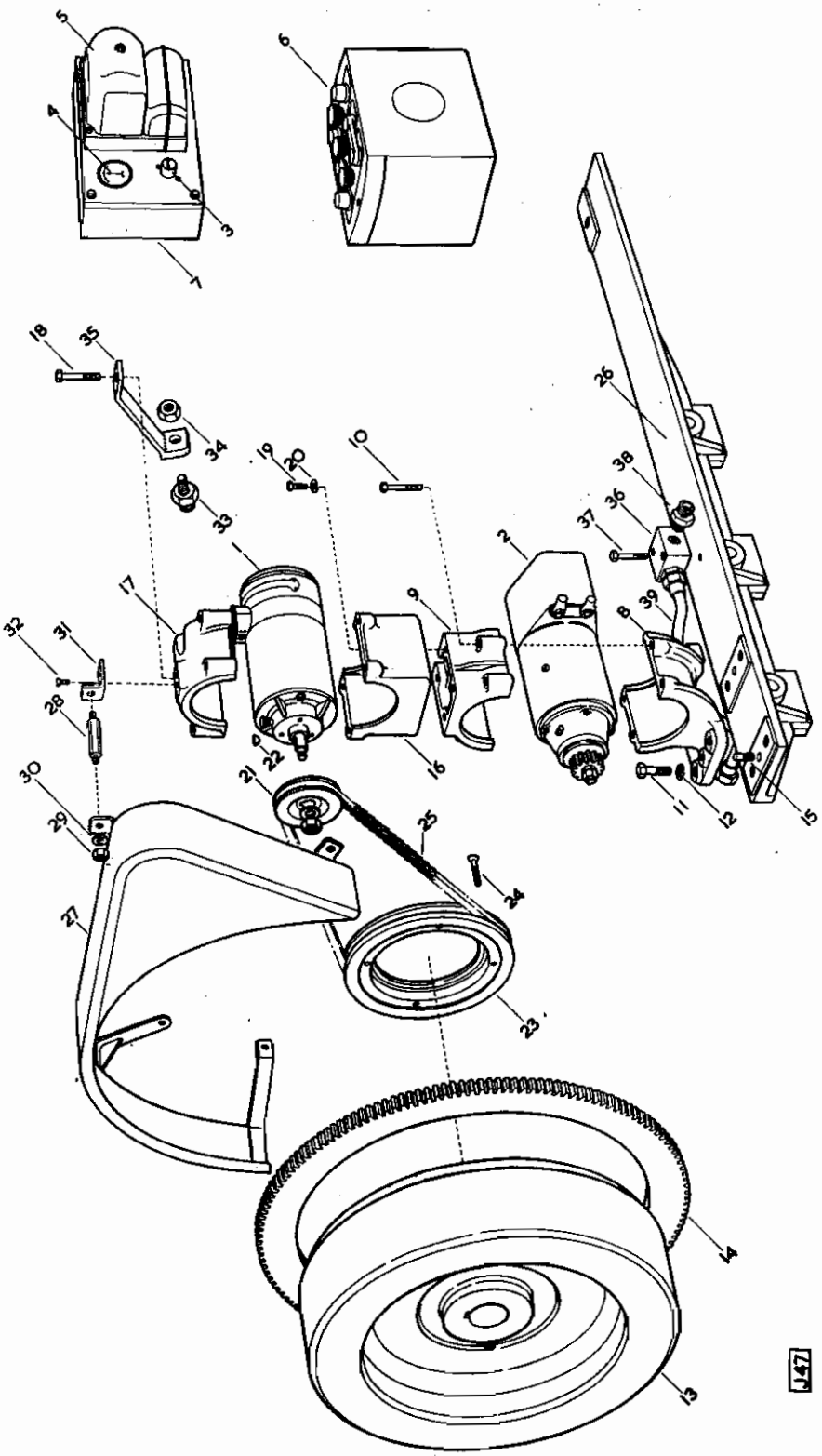
# CRANKSHAFT AND PISTON ASSEMBLY



# 12V. Electric Starting Equipment

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 1 | Dynamo Type D5LA9 C.A.V. ... ... ... ... | 12-8-346 | 1 | 1 |
| 2 | Starter Motor Type BS512K/3 C.A.V. ... ... ... | 12-8-360 | 1 | 1 |
| 3 | Press Button Type 108/1 C.A.V. ... ... ... ... | 12-8-364 | 1 | 1 |
| 4 | Ammeter 30-0-30 Type A4138B ... ... ... ... | 12-8-354 | 1 | 1 |
| 5 | Control Box Type 107A/1 ... ... ... ... ... | 12-8-351 | 1 | 1 |
| 6 | Battery Type 3XC/15/1H C.A.V. 6 Volt ... ... ... | 12-8-356 | 2 | 2 |
| 7 | Control Panel ... ... ... ... ... ... | 64-6212 | 1 | 1 |
| | Cradle for Starter Motor Assembly Comprising : ... | 24-5238 | 1 | 1 |
| 8 | Cradle ... ... ... ... ... ... ... ... | 24-5232 | 1 | 1 |
| 9 | Cradle Cap ... ... ... ... ... ... ... | 24-5233 | 1 | 1 |
| 10 | Setscrew (Cradle to Cap) $\frac{3}{8}$" B.S.F. ... ... ... | 24-5253 | 4 | 4 |
| 11 | Setscrew (Cradle to Bearer) $\frac{1}{2}$" x $1\frac{3}{4}$" B.S.F. ... ... ... | 27-1504 | 4 | 4 |
| 12 | Spring Washer $\frac{1}{2}$" dia. ... ... ... ... ... ... | 27-394 | 4 | 4 |
| 13 | Flywheel ... ... ... ... ... ... ... | 11-14-534 | 1 | 1 |
| 14 | Starter Gear Ring ... ... ... ... ... ... | 11-14-535 | 1 | 1 |
| 15 | Dowel for Starter Bracket ... ... ... ... ... | 210-410 | 2 | 2 |
| | Cradle for Dynamo Assembly ... ... ... ... ... Comprising : | 24-5328 | 1 | 1 |
| 16 | Cradle ... ... ... ... ... ... ... ... | 24-5236 | 1 | 1 |
| 17 | Cap ... ... ... ... ... ... ... ... | 24-5237 | 1 | 1 |
| 18 | Setscrew (Dynamo Cap to Cradle $\frac{3}{8}$" x $2\frac{5}{8}$" B.S.F. ... ... | 27-1686 | 4 | 4 |
| 19 | Setscrew (Dynamo Cap to Starter Cap) $\frac{3}{8}$" x $\frac{7}{8}$" ... ... | 27-974 | 4 | 4 |
| 20 | Spring Washer for do. ... ... ... ... ... | 27-393 | 4 | 4 |
| 21 | Pulley 4" O/D ... ... ... ... ... ... ... | 12-14-240 | 1 | 1 |
| 22 | Woodruff Key No. 8 ... ... ... ... ... ... | 27-2022 | 1 | 1 |
| 23 | Pulley on Flywheel $10\frac{1}{4}$" ... ... ... ... ... | 11-13-727 | 1 | 1 |
| 24 | Setscrew for Pulley 5/16" x $1\frac{1}{2}$" B.S.F. ... ... ... | 27-2093 | 4 | 4 |
| 25 | $\frac{1}{2}$" Whittle Belt x 60" ... ... ... ... ... | | 1 | 1 |
| 26 | Engine Bearer (Port Side) ... ... ... ... ... | 12-14-283 | – | 1 |
| | Engine Bearer (Port Side) ... ... ... ... ... | 11-14-283 | 1 | – |
| 27 | Flywheel Guard for Starter and Dynamo ... ... ... | 12-14-284 | 1 | 1 |
| 28 | Support for Guard ... ... ... ... ... ... | 24-5254 | 2 | 2 |
| 29 | Nut for Support ... ... ... ... ... ... | 27-905 | 2 | 2 |
| 30 | Washer for Support ... ... ... ... ... ... | 27-82 | 2 | 2 |
| 31 | Bracket for Guard ... ... ... ... ... ... | 24-5274 | 1 | 1 |
| 32 | Set Screw for Guard $\frac{1}{4}$" x $\frac{1}{2}$" B.S.F. ... ... ... ... | 27-899 | 2 | 2 |
| 33 | Stud for Dynamo Stay ... ... ... ... ... ... | 12-14-348 | 1 | 1 |
| 34 | Nut for Dynamo Stay $\frac{1}{2}$" Whit. ... ... ... ... | 27-4 | 1 | 1 |
| 35 | Stay for Dynamo ... ... ... ... ... ... | 12-14-536 | 1 | 1 |
| 36 | Anchor Block for Lub. Oil Pipe ... ... ... ... | 12-14-353 | 1 | 1 |
| 37 | Bolt for Block 5/16" x $2\frac{1}{8}$" B.S.F. ... ... ... ... | 27-1432 | 2 | 2 |
| 38 | Connection ... ... ... ... ... ... ... | 10-2-85 | 2 | 2 |
| 39 | Oil Pipe (Engine to Bearer) ... ... ... ... ... | 12-14-352 | 1 | 1 |

# 12-VOLT ELECTRIC STARTING EQUIPMENT

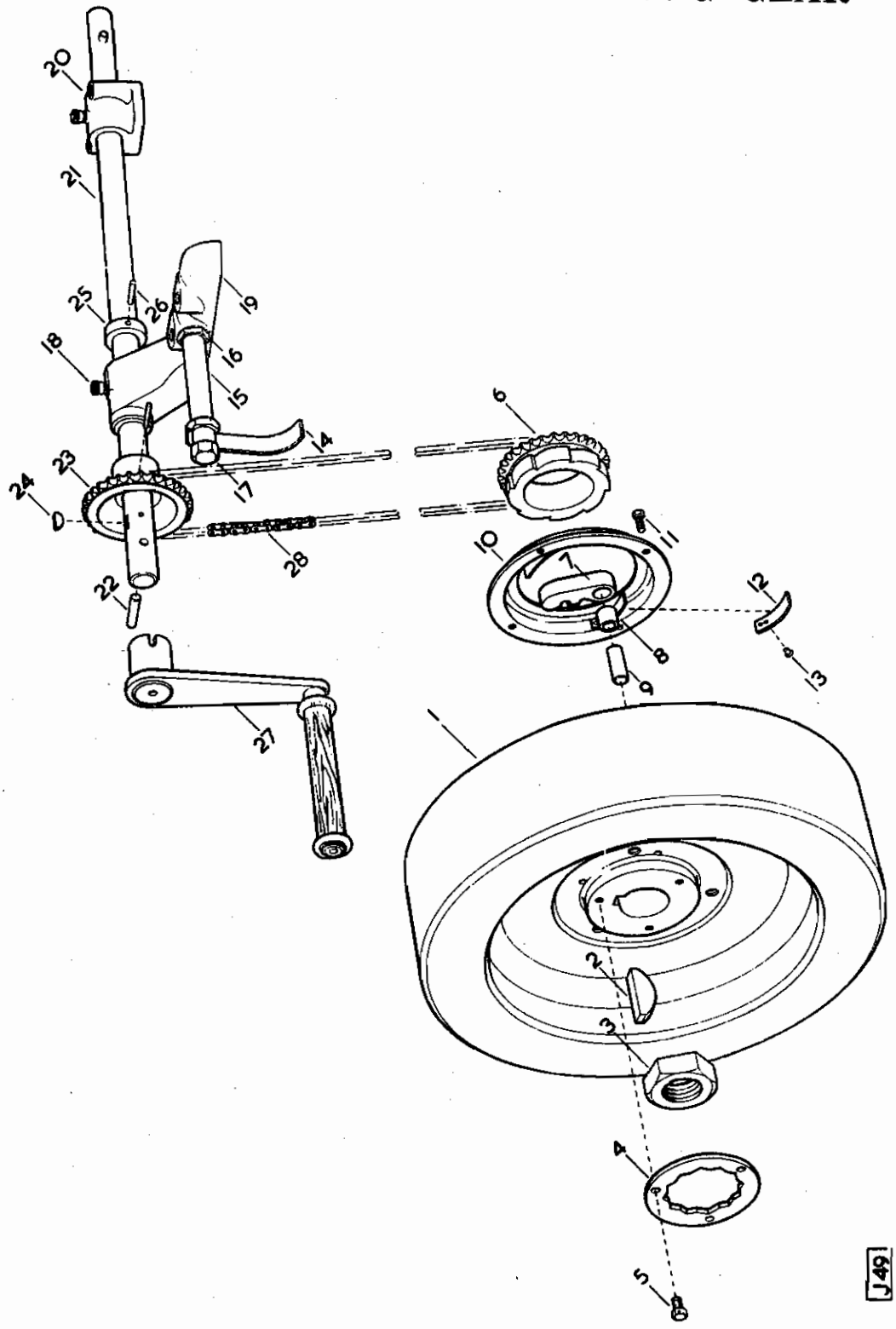


# Flywheel and Hand Starting Gear

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 1 | Flywheel 23″ Steel (Hand and Air Start only) | 11-14-491 | 1 | 1 |
| | Flywheel 23″ C.I. (Elect. start) | 11-14-534 | 1 | 1 |
| 2 | Flywheel Key | 27-1126 | 1 | 1 |
| 3 | Flywheel Nut | 10-5-39 | 1 | 1 |
| 4 | Flywheel Locking Plate | 10-5-40 | 1 | 1 |
| 5 | Flywheel Locking Set Screw | 10-5-41 | 3 | 3 |
| 6 | Ratchet and Starting Sprocket (Bottom) | 23-2216 | 1 | 1 |
| 7 | Ratchet Pawl | 23-2217 | 2 | 2 |
| 8 | Ratchet Pawl Bush | 23-2218 | 2 | 2 |
| 9 | Ratchet Pawl Fulcrum Pin | 23-697 | 2 | 2 |
| 10 | Ratchet Cover | 23-2220 | 1 | 1 |
| 11 | Ratchet Cover Screws | 10-5-41 | 4 | 4 |
| 12 | Ratchet Pawl Springs | 23-3826 | 2 | 2 |
| 13 | Rivets for Ratchet Springs | 27-3684 | 4 | 4 |
| | STARTING GEAR (Raised) | | | |
| 14 | Leaf Spring for Chain Adjuster | 11-14-265 | 1 | 1 |
| 15 | Support Tube for Leaf Spring | 11-14-266 | 1 | 1 |
| 16 | Locknut | 27-689 | 2 | 2 |
| 17 | Cap Nut | 291-2128 | 1 | 1 |
| 18 | Grease Nipple | 27-2021 | 2 | 2 |
| 19 | Starting Shaft Forward Bracket | 10-13-99 | 1 | 1 |
| 20 | Starting Shaft Aft Bracket | 10-13-122 | 1 | 1 |
| 21 | Starting Shaft | 11-13-408 | 1 | – |
| | Starting Shaft | 12-13-408 | – | 1 |
| 22 | Starting Shaft Pin for Handle | 23-2224 | 2 | 2 |
| 23 | Starting Shaft Pin for Handle | 10-13-126 | 1 | 1 |
| 24 | Woodruff Key | 27-105 | 1 | 1 |
| 25 | Shaft Collar | 8-13-84 | 2 | 2 |
| 26 | Taper Pin | 27-811 | 3 | 3 |
| 27 | Starting Handle complete | 23-3156c | 1 | 1 |
| 28 | Chain with Fastener 146 Pitches | 10-13-130 | 1 | 1 |
| | Starting Shaft (when tachometer is fitted) | 12-13-408 | 1 | – |
| | Starting Shaft (when tachometer is fitted) | 13-13-408 | – | 1 |
| | Spare Link for Starting Chain | 31-9148 | – | – |

**ALWAYS QUOTE ENGINE NUMBER WHEN ORDERING SPARES**

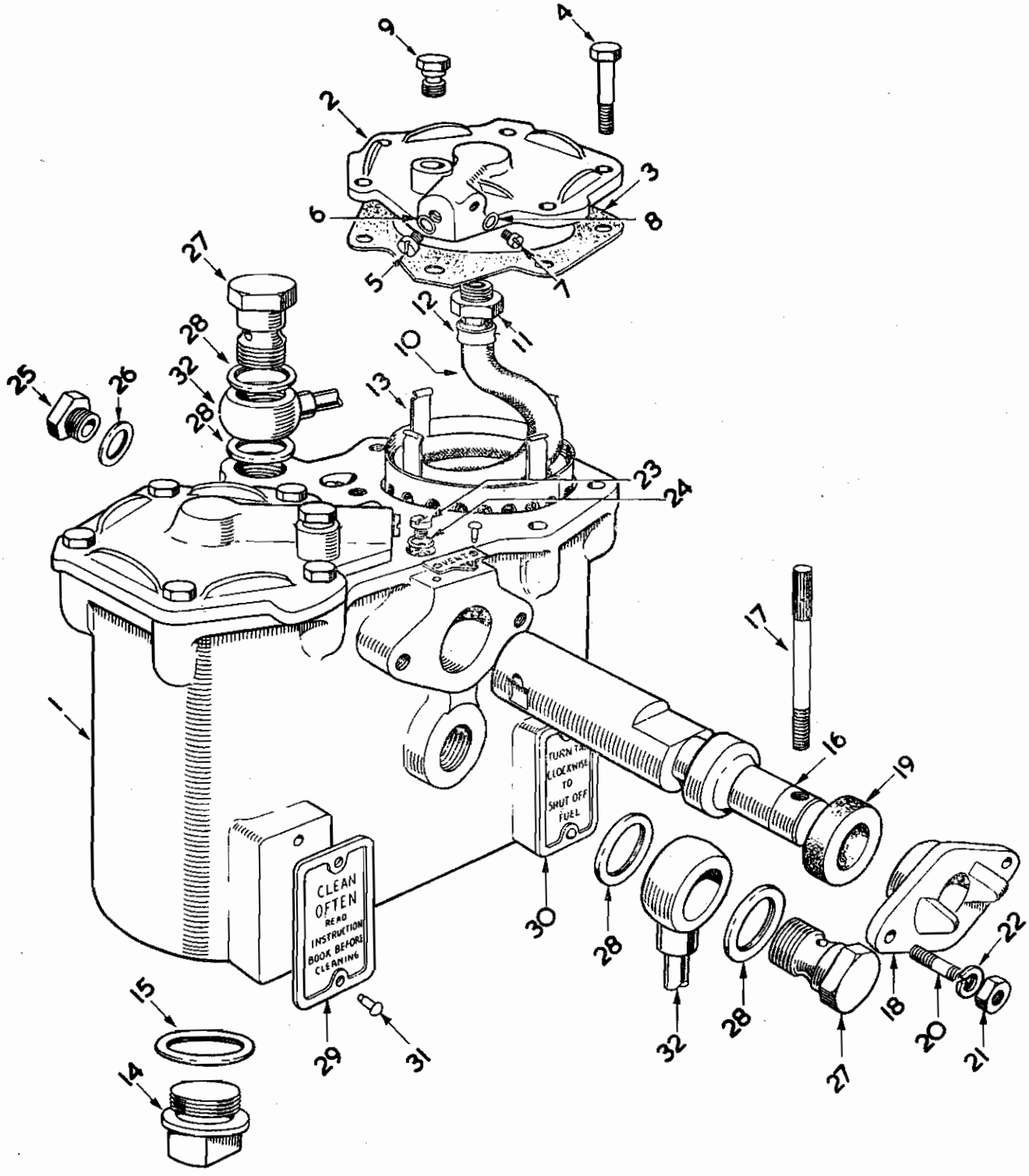
# FLYWHEEL AND HAND STARTING GEAR



# Fuel Filters

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | FUEL FILTER, Single, complete, comprising the following parts | 23-2283c | 1 | 1 |
| | Filter Body | 23-2283 | 1 | 1 |
| | Filter Cover | 23-2282 | 1 | 1 |
| | Filter Wick complete with connections | 23-2288c | 1 | 1 |
| | Filter Wick Container | 23-2279 | 1 | 1 |
| | Filter Wick Container Clip | 23-2280 | 2 | 2 |
| | Filter Wick Nipple | 23-2281 | 1 | 1 |
| | Filter Wick Nipple Clip | 23-2289 | 1 | 1 |
| | Filter Vent Plug | 10-2-89 | 1 | 1 |
| | Filter Joint for Cover | 23-2278 | 1 | 1 |
| | Set Pin | 27-888 | 4 | 4 |
| | Filter Drain Plug | 23-2291 | 1 | 1 |
| | Filter Drain Plug Joint | 103-91 | 1 | 1 |
| | Filter Swivel Union | 23-471 | 2 | 2 |
| | Filter Swivel Union Screw | 23-472 | 2 | 2 |
| | Filter Swivel Union Joint | 291-2265 | 4 | 4 |
| | Filter Instruction Plate | 27-1566 | 1 | 1 |
| | Filter Instruction Plate Dowel | 27-707 | 2 | 2 |
| | Filter Set Screw | 27-893 | 4 | 4 |
| | FUEL FILTER—DUPLEX | 10-2-321c | 1 | 1 |
| 1 | Filter Body | 10-2-321 | 1 | 1 |
| 2 | Filter Cover | 10-2-322 | 2 | 2 |
| 3 | Filter Cover Joint | 10-2-328 | 2 | 2 |
| 4 | Filter Cover Set Screw | 27-888 | 10 | 10 |
| 5 | Filter Cover Plug | 10-2-336 | 2 | 2 |
| 6 | Filter Cover Plug Joint | 10-2-338 | 2 | 2 |
| 7 | Filter Cover Plug | 10-2-337 | 2 | 2 |
| 8 | Filter Cover Plug Joint | 10-2-339 | 2 | 2 |
| 9 | Filter Vent Plug | 10-2-89 | 2 | 2 |
| 10 | Filter Wick, complete | 23-2288c | 2 | 2 |
| 11 | Filter Nipple | 23-2281 | 2 | 2 |
| 12 | Filter Clip | 23-2289 | 2 | 2 |
| 13 | Filter Wick Container | 23-2279 | 2 | 2 |
| 14 | Filter Drain Plug | 103-137 | 2 | 2 |
| 15 | Filter Drain Plug Joint | 103-91 | 2 | 2 |
| 16 | Filter Valve Spindle | 10-2-324 | 1 | 1 |
| 17 | Filter Valve Spindle Hand Lever | 10-2-325 | 1 | 1 |
| 18 | Filter Gland | 10-2-334 | 1 | 1 |
| 19 | Filter Gland Cork Joint | 10-2-335 | 1 | 1 |
| 20 | Filter Gland Stud | 27-1269 | 2 | 2 |
| 21 | Filter Gland Nut | 27-907 | 2 | 2 |
| 22 | Filter Gland Spring Washer | 27-1306 | 2 | 2 |
| 23 | Filter Body Plug | 10-2-336 | 3 | 3 |
| 24 | Filter Body Plug Joint | 10-2-338 | 3 | 3 |
| 25 | Filter Body Plug | 21-153 | 1 | 1 |
| 26 | Filter Body Plug Joint | 5197 | 1 | 1 |
| 27 | Filter Swivel Union Screw | 23-472 | 2 | 2 |
| 28 | Filter Swivel Union Screw Joint | 291-2265 | 4 | 4 |
| 29 | Filter Instruction Plate (Cleaning) | 27-1613 | 1 | 1 |
| 30 | Filter Instruction Plate | 27-2279 | 1 | 1 |
| 31 | Filter Instruction Plate Dowels | 27-707 | 6 | 6 |
| 32 | Filter Outlet Swivel Union | 23-471 | 1 | 1 |

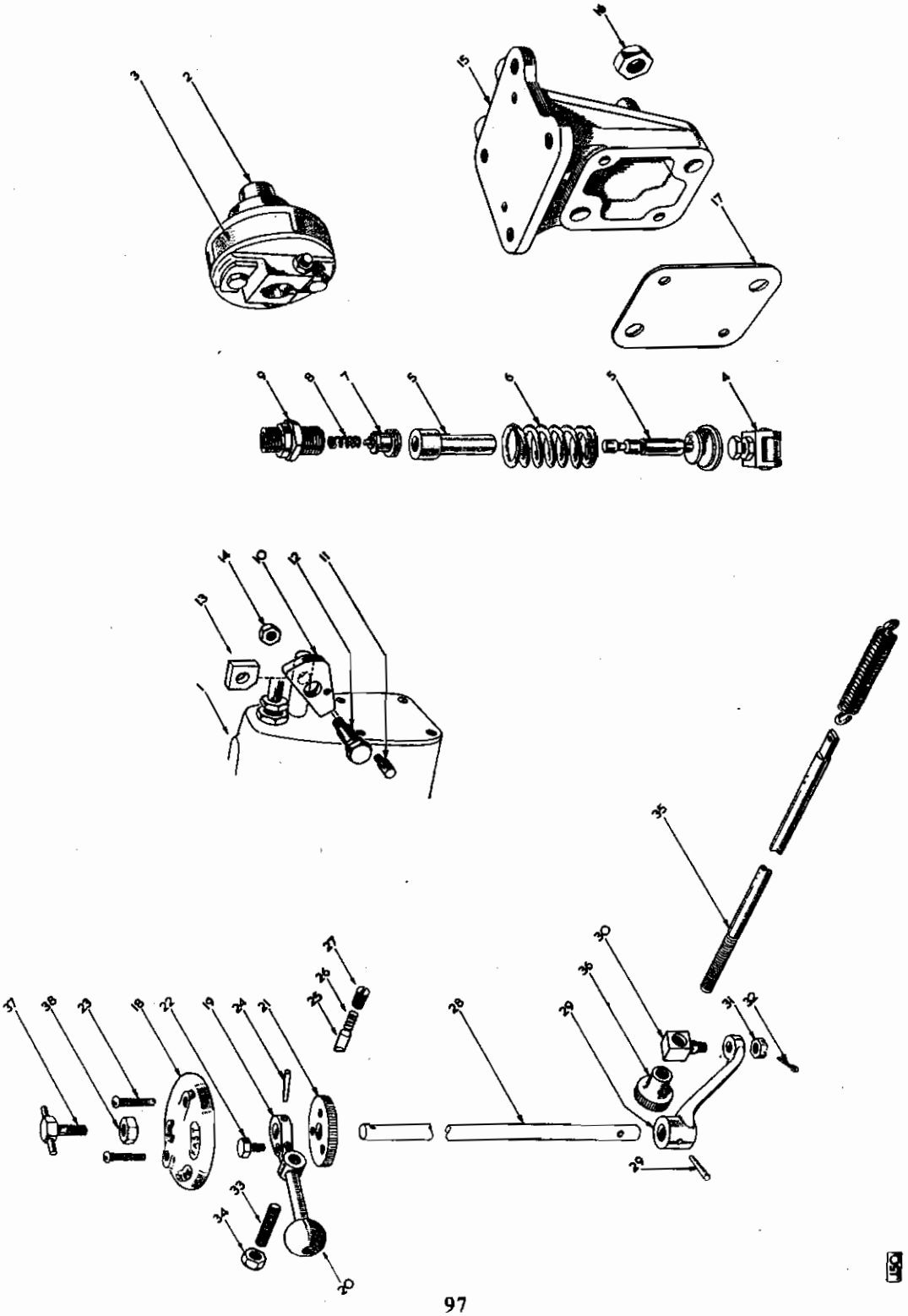
# FUEL FILTERS



# Fuel Pump and Speed Control

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | FUEL PUMP | | | |
| 1 | Fuel Pump complete | 11-2-437 | 1 | – |
| | Fuel Pump complete | 12-2-437 | – | 1 |
| 2 | Fuel Pump Coupling | 10-2-414 | 1 | 1 |
| 3 | Fuel Pump Coupling Fibre Disc | Y7021/129 | 1 | 1 |
| 4 | Fuel Pump Tappet Assembly | 7010/507 | 2 | 3 |
| 5 | Fuel Pump Element | 7009/44 | 2 | 3 |
| 6 | Fuel Pump Helical Spring for Plunger | 7010/9 | 2 | 3 |
| 7 | Fuel Pump Delivery Valve and Seating | 7010/188 | 2 | 3 |
| 8 | Fuel Pump Delivery Valve Spring | 7032/7 | 2 | 3 |
| 9 | Fuel Pump Delivery Valve Holder | 7010/479 | 2 | 3 |
| 10 | Fuel Pump Pawl | 11-13-701 | 1 | 1 |
| 11 | Fuel Pump Pawl Check Pin | 10-2-190 | 1 | 1 |
| 12 | Fuel Pump Pawl Fulcrum Pin | 11-13-703 | 1 | 1 |
| 13 | Fuel Pump Pawl Check Plate | 11-13-702 | 1 | 1 |
| 14 | Fuel Pump Pawl Nut $\frac{3}{16}$" BSF | 27-1997 | 1 | 1 |
| 15 | Fuel Pump Bracket (JP2M) | 11-2-41 | 1 | – |
| | Fuel Pump Bracket (JP3M) | 12-2-41 | – | 1 |
| | Fuel Pump Bracket (JK2M only) | 11-2-453 | 1 | – |
| | Fuel Pump Bracket (JK3M only) | 12-2-453 | – | 1 |
| 16 | Fuel Pump Bracket Nut $\frac{1}{2}$" Whit. | 27-4 | 2 | 2 |
| 17 | Fuel Pump Bracket Shim | 10-2-241 | 1 | 1 |
| | Fuel Pump Set Pin | 13-2-140 | – | 4 |
| | Fuel Pump Set Pin | 27-203 | 4 | – |
| | Dowel for Bracket | 10-2-110 | – | 2 |
| | Spring Washer for Pump Bracket | 27-393 | – | 4 |
| | Plain Washer for Pump Bracket | 27-184 | 4 | – |
| | SPEED CONTROL | | | |
| 18 | Speed Control Cover | 11-13-373 | 1 | 1 |
| 19 | Speed Control Handle | 23-2932 | 1 | 1 |
| 20 | Knob for Control Handle | 31-967 | 1 | 1 |
| 21 | Knurled Disc | 23-2933 | 1 | 1 |
| 22 | Screw (Disc to Handle) | 27-3681 | 1 | 1 |
| 23 | Screw (Cover to Bracket) | 27-1524 | 2 | 2 |
| 24 | Taper Pin (Handle and Lever to Spindle) | 27-454 | 2 | 2 |
| 25 | Detent Plug | 23-679 | 2 | 2 |
| 26 | Detent Spring | 351-19510 ~~29-100~~ | 2 | 2 |
| 27 | Detent Grub Screw | 27-3678 | 2 | 2 |
| 28 | Spindle | 11-13-370 | 1 | 1 |
| 29 | Bottom End Lever | 13-14-171 | 1 | 1 |
| 30 | Swivel Pin | 11-13-384 | 1 | 1 |
| 31 | Swivel Pin Nut | 27-1359 | 1 | 1 |
| 32 | Swivel Pin Nut Split Pin | 27-909 | 1 | 1 |
| 33 | Adjusting Screw for Handle | 27-3680 | 1 | 1 |
| 34 | Adjusting Screw Locknut | 27-905 | 1 | 1 |
| | Speed Control Rod | 12-14-173 | – | 1 |
| 35 | Speed Control Rod | 11-14-173 | 1 | – |
| 36 | Speed Control Rod Adjusting Nuts | 13-14-172 | 2 | 2 |
| | Speed Control Rod Bracket | 11-15-565 | 1 | 1 |
| 37 | Locking Screw (Speed Cover) | 23-2324 | 1 | 1 |
| | Tommy Bar (Screw) | 23-2325 | 1 | 1 |
| 38 | Lock Nut | 27-1453 | 2 | 2 |

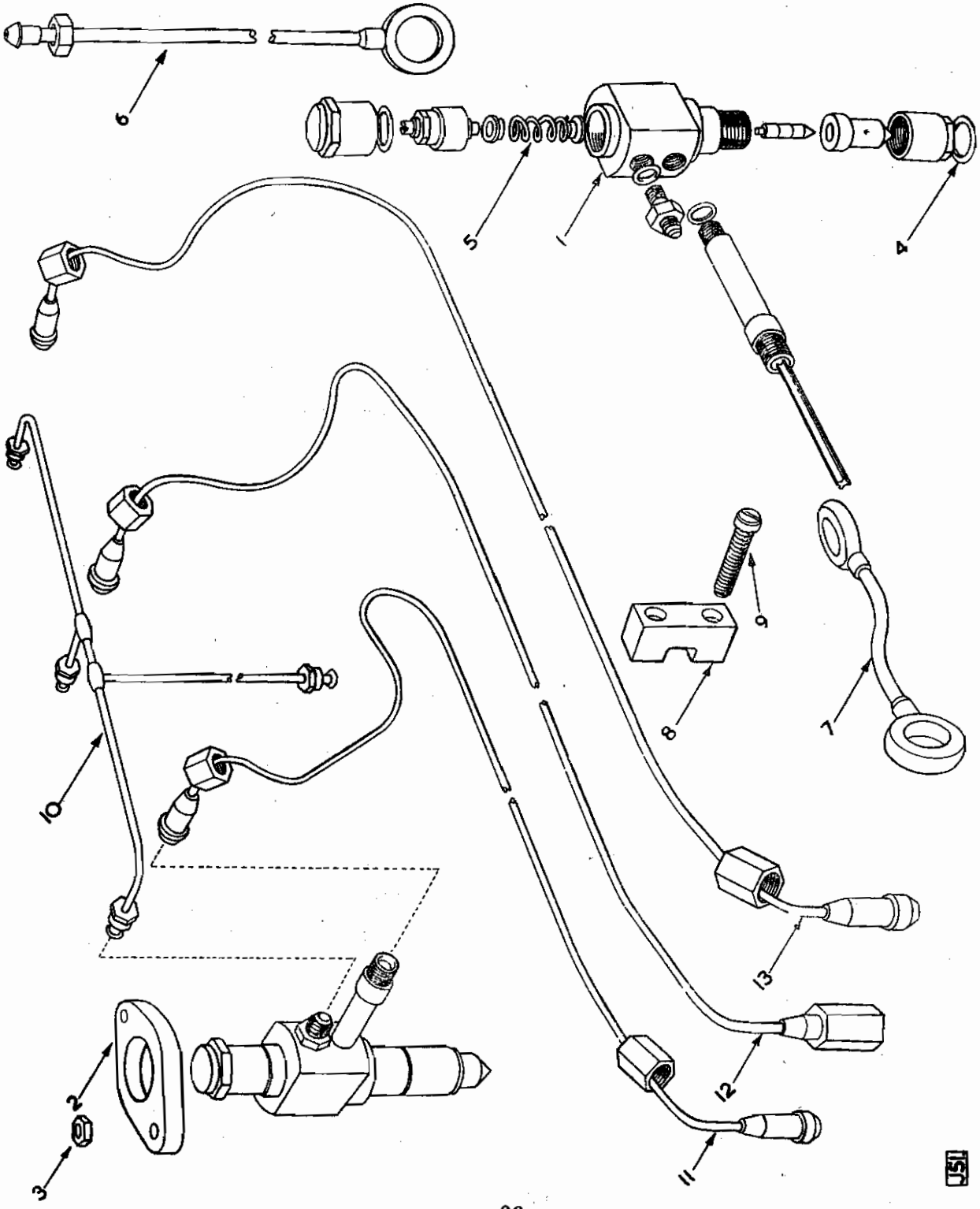
# FUEL PUMP AND SPEED CONTROL



# Fuel Injector and Pipes

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | FUEL INJECTOR (C.A.V.) | | | |
| | Fuel Injector complete ... ... ... ... ... ... comprising :— | 616-2I44 | 2 | 3 |
| 1 | Fuel Injector Nozzle Body and Valve ... ... ... | 616-2145 | 2 | 3 |
| 2 | Fuel Injector Flange ... ... ... ... ... | 10-3-31 | 2 | 3 |
| 3 | Fuel Injector Flange Nut $\frac{7}{16}$" Whit. ... ... ... ... | 27-5 | 4 | 6 |
| 4 | Fuel Injector Copper Asbestos Joint ... ... ... ... | 10-3-41 | 2 | 3 |
| 5 | Fuel Injector Valve Spring ... ... ... ... | 7008/7 | 2 | 3 |
| | FUEL PIPES AND DRIP CAN | | | |
| 6 | Fuel Pipe Tank to Filter ... ... ... ... ... | 11-7-34 | 1 | 1 |
| 7 | Fuel Pipe Filter to Pump ... ... ... ... ... | 11-2-252 | 1 | – |
| | Fuel Pipe Filter to Pump ... ... ... ... ... | 12-2-252 | – | 1 |
| 8 | Fuel Pipe Clip for 2 Pipes ... ... ... ... | 26-218 | 1 | – |
| | Fuel Pipe Clip for 3 Pipes ... ... ... ... | 26-217 | – | 2 |
| 9 | Fuel Pipe Clip Screws ... ... ... ... ... | 27-483 | 2 | 4 |
| | Fuel Pipe Injector to Non-Return Valve ... ... ... | 11-3-183 | 1 | – |
| | Non-Return Valve, complete ... ... ... ... | 10-7-145 | 1 | 1 |
| 10 | Fuel Pipe Injector to Non-Return Valve ... ... ... | 12-3-183 | – | 1 |
| | Fuel Pipe Pump to Injector ... ... 011-02475 | ~~11-2-499~~ | 1 | – |
| | Fuel Pipe Pump to Injector ... ... 011-02475 | ~~11-2-450~~ | 1 | – |
| 11 | Fuel Pipe Pump to Injector ... ... ... ... | 12-2-449 | – | 1 |
| 12 | Fuel Pipe Pump to Injector ... ... ... ... | 12-2-450 | – | 1 |
| 13 | Fuel Pipe Pump to Injector ... ... ... ... | 12-2-451 | – | 1 |
| | Fuel Pipe Clip Pad (JKM only) ... ... ... ... | 11-3-248 | 1 | 1 |
| | Fuel Pipe Clip Pad (JKM only) ... ... ... ... | 12-3-248 | – | 2 |
| | Fuel Pipe Clamping Plate (JKM only) ... ... ... | 616-2277 | – | 1 |
| | Fuel Pipe Clamping Plate (JKM only) ... ... ... | 616-2279 | 1 | 1 |

# FUEL INJECTOR AND PIPES

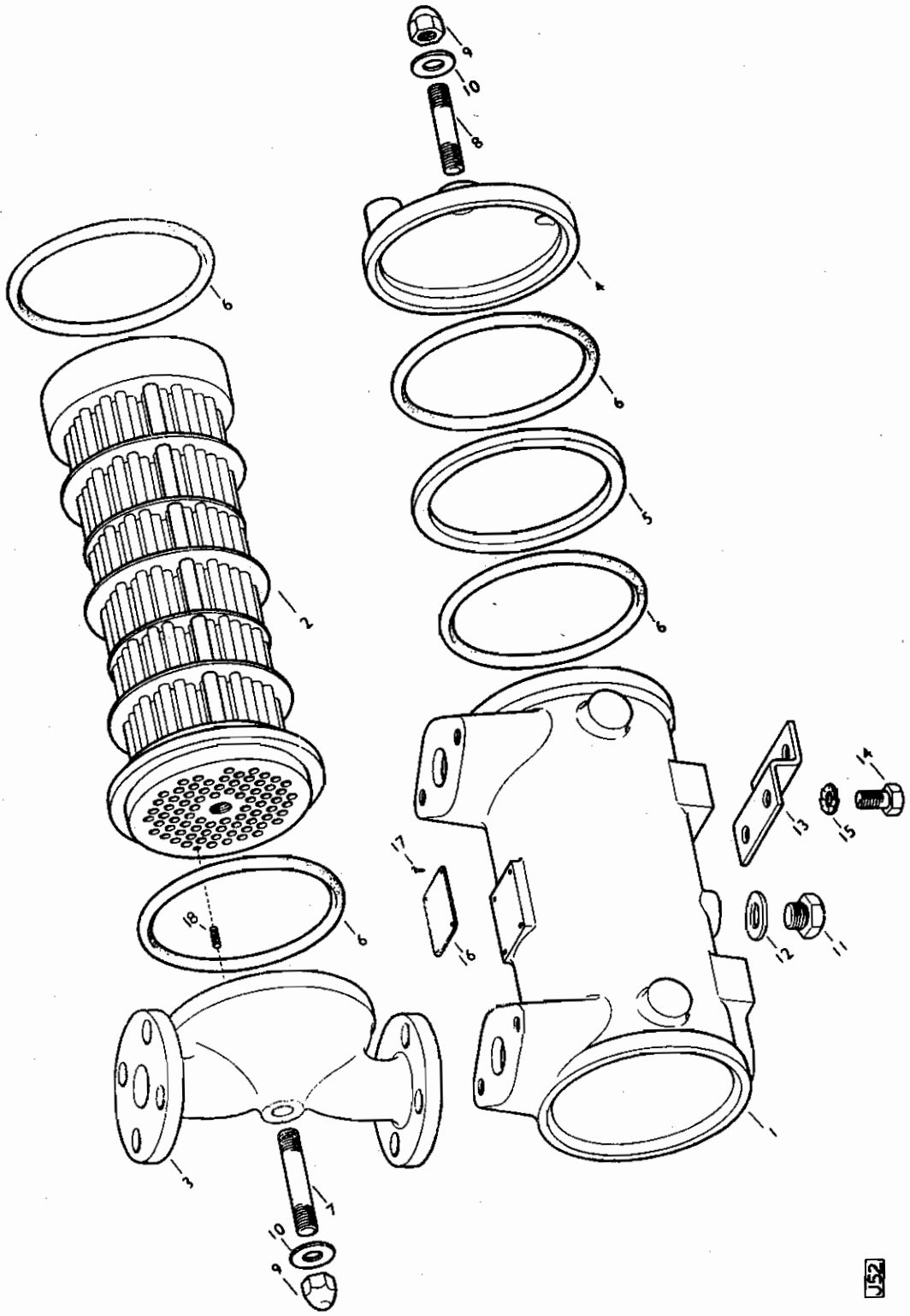


# Heat Exchanger–JPM

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 1 | Cylinder | Z18112/8 | 1 | – |
| | Cylinder | Z18112/12 | – | 1 |
| 2 | Tube Stack | Z18103/8D | 1 | – |
| | Tube Stack | Z18103/12D | – | 1 |
| 3 | End Box (Fixed) | MZ7411 | 1 | 1 |
| 4 | End Box (Expansion) | MZ7412 | 1 | 1 |
| 5 | Leakage Ring | BZ3089/2 | 1 | 1 |
| 6 | Joint Ring | BZ3097/4 | 4 | 4 |
| 7 | Stud (Fixed End) | BZ3087/14 | 1 | 1 |
| 8 | Stud (Expansion End) | BZ3087/15 | 1 | 1 |
| 9 | Cap Nut | BZ3014B/2 | 2 | 2 |
| 10 | Cap Nut Washer | BZ3013/3 | 2 | 2 |
| 11 | Plug | BZ3247/2 | 5 | 5 |
| 12 | Plug Joint | BZ3013/2 | 5 | 5 |
| 13 | Loose Feet | MZ7364 | 2 | 2 |
| 14 | Set Pin ½" Whit. x ¾" | | 4 | 4 |
| 15 | Shake Proof Washer ½" | | 4 | 4 |
| 16 | Nameplate | BZ3141/A | 1 | 1 |
| 17 | Nameplate Drive Pin | | 4 | 4 |
| 18 | Locating Stud | BZ3129/1 | 1 | 1 |
| | Heat Exchanger complete | 11-14-947 | 1 | – |
| | Heat Exchanger complete | 13-14-874 | – | 1 |
| | Union | 11-13-251 | 2 | 2 |
| | Nuts | 65-103 | 2 | 2 |
| | Nipples | 616-1708 | 2 | 2 |
| | Flanges | 616-1836 | 2 | 2 |
| | Joints | 616-1840 | 2 | 2 |
| | Setscrews ½" x 1" | 27-1329 | 4 | 4 |

**ALWAYS QUOTE SERIAL NUMBER OF COOLER WHEN ORDERING SPARES**

# HEAT EXCHANGER–JPM

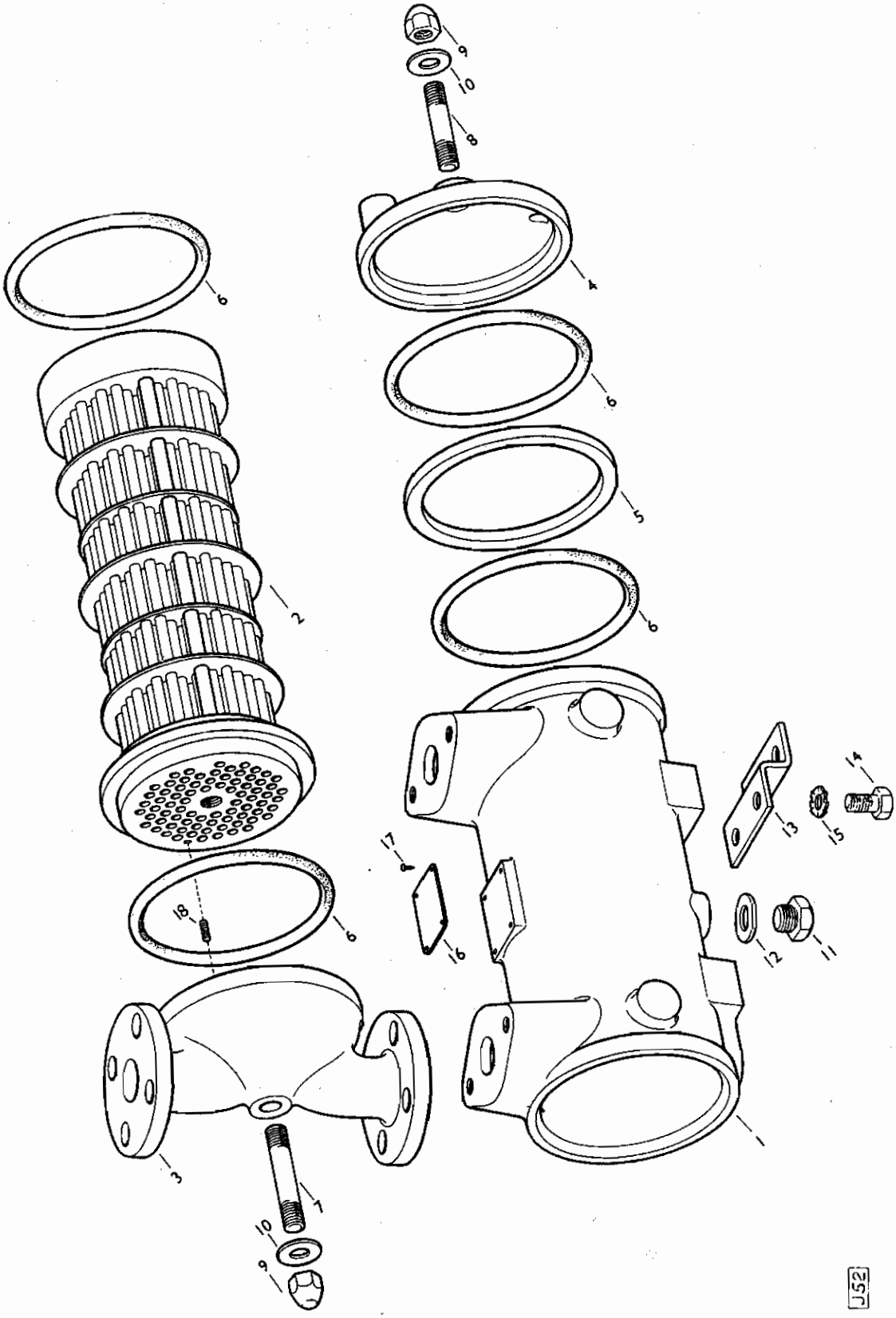



J52

# Heat Exchanger–JKM

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | Heat Exchanger (complete) ... ... ... ... ... | 292-3267 | 1 | – |
| | Heat Exchanger (complete) ... ... ... ... ... | 11-14-947 | – | 1 |
| 1 | Cylinder ... ... ... ... ... ... ... | Z18104/4 | 1 | – |
| | Cylinder ... ... ... ... ... ... ... | Z18112/8 | – | 1 |
| 2 | Tube Stack ... ... ... ... ... ... ... | Z18103/4D | 1 | – |
| | Tube Stack ... ... ... ... ... ... ... | Z18103/8D | – | 1 |
| 3 | End Box (Fixed) ... ... ... ... ... ... | MZ7411 | 1 | 1 |
| 4 | End Box (Expansion) ... ... ... ... ... | MZ7412 | 1 | 1 |
| 5 | Leakage Ring ... ... ... ... ... ... ... | BZ3089/2 | 1 | 1 |
| 6 | Joint Ring ... ... ... ... ... ... ... | BZ3097/4 | 4 | 4 |
| 7 | Stud (Fixed End) ... ... ... ... ... ... | BZ3037/14 | 1 | 1 |
| 8 | Stud (Expansion End) ... ... ... ... ... ... | BZ3087/15 | 1 | 1 |
| 9 | Cap Nut ... ... ... ... ... ... ... | BZ3014B/2 | 2 | 2 |
| 10 | Cap Nut Washer ... ... ... ... ... ... | BZ3013/3 | 2 | 2 |
| 11 | Plug ... ... ... ... ... ... ... ... | BZ3247/2 | 5 | 5 |
| 12 | Plug Joint ... ... ... ... ... ... ... | BZ3013/2 | 5 | 5 |
| 13 | Loose Feet ... ... ... ... ... ... ... | MZ7364 | 2 | 2 |
| 16 | Name Plate ... ... ... ... ... ... ... | BZ3141/A | 1 | 1 |
| 17 | Name Plate Drive Pin $\frac{1}{8}$" x $\frac{1}{4}$" Steel ... ... ... ... | | 4 | 4 |
| 18 | Locating Stud ... ... ... ... ... ... ... | BZ3129/1 | 1 | 1 |

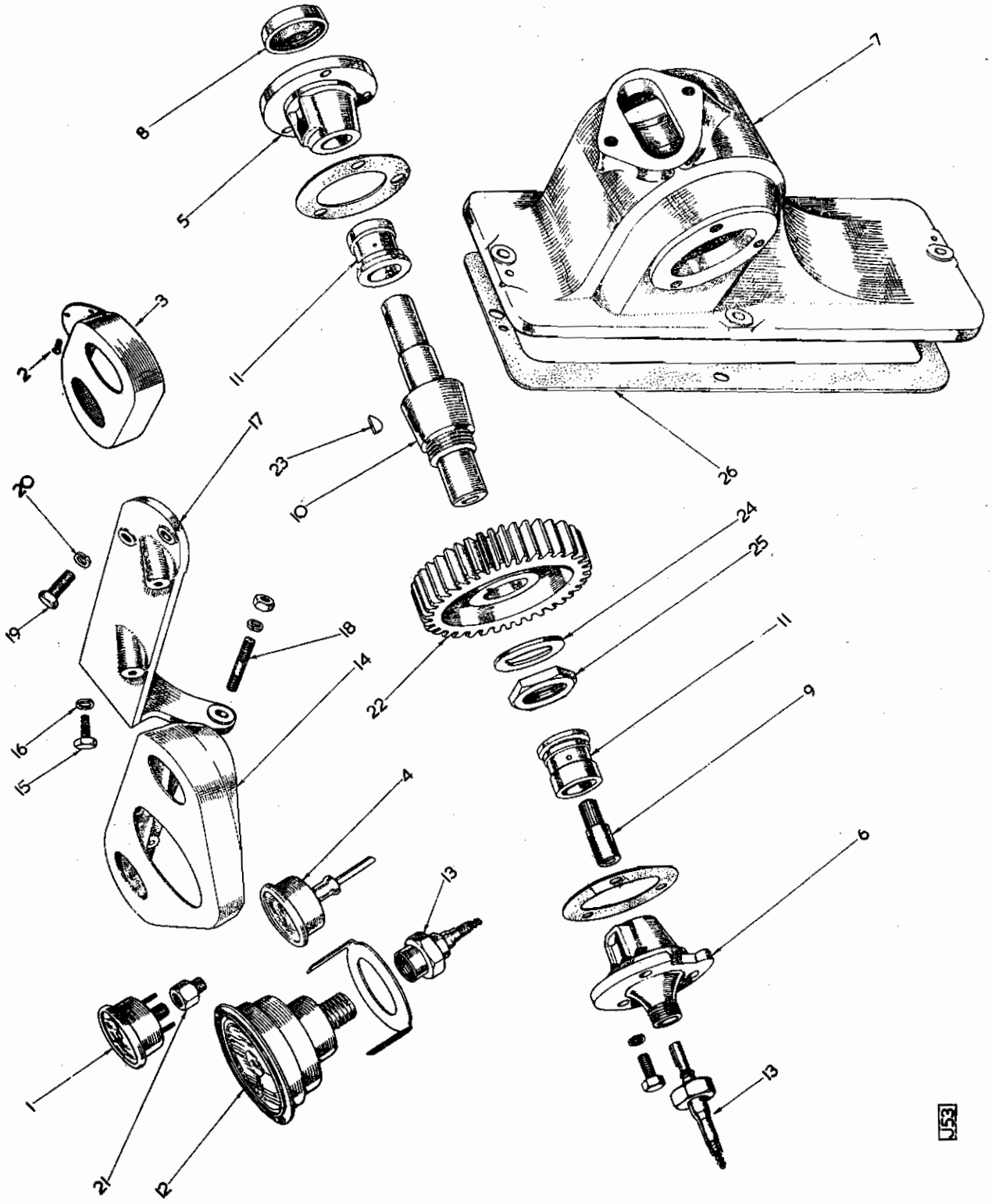
# HEAT EXCHANGER–JKM



# Instruments and Panels

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 1 | Oil Pressure Gauge | 616-1537 | 1 | 1 |
| 2 | Screws | 27-48 | 3 | 3 |
| 3 | Instrument Panel (Small) complete, comprising : | 13-14-439 | 1 | 1 |
| | Instrument Panel | 13-14-440 | 1 | 1 |
| | Instrument Panel Support | 616-1533 | 1 | 1 |
| 4 | Water Temperature Gauge 3ft. Tube | 616-1559 | 1 | – |
| | Water Temperature Gauge 4ft. 6ins. Tube | 616-1558 | – | 1 |
| | Water Temperature Gauge 6ft. Tube | 616-1536 | To order | |
| | Water Temperature Gauge 12ft. Tube | 616-1832 | To order | |
| | Water Temperature Gauge 15ft. Tube | 616-2043 | To order | |
| 5 | Drive Bearing Housing | 614-371 | | |
| 6 | Drive Bearing Housing | 13-14-549 | 1 | 1 |
| 7 | Drive Housing | 13-14-144 | 1 | 1 |
| 8 | Gitseal | 27-2070 | 1 | 1 |
| 9 | Tachometer Driving Sleeve | 13-14-550 | 1 | 1 |
| 10 | Driving Shaft (Short) JPM only | 614-793 | 1 | 1 |
| 11 | Driving Shaft Bush | 614-397 | 2 | 2 |
| 12 | Tachometer (Standard Rotation) | 13-14-984 | 1 | 1 |
| 13 | Tachometer Drive Cable | 13-14-986 | 1 | 1 |
| 14 | Instrument Panel (Large) | 13-14-545 | 1 | 1 |
| 15 | Screws $\frac{1}{4}$" BSF x $\frac{3}{4}$" | 27-1195 | 2 | 2 |
| 16 | Spring Washers | 27-451 | 2 | 2 |
| 17 | Instrument Panel Bracket | 13-14-546 | 1 | 1 |
| 18 | Studs $\frac{3}{8}$" Whit. x $1\frac{15}{16}$" | 27-36 | 2 | 2 |
| 19 | Setscrews $\frac{1}{4}$" BSF x $\frac{3}{4}$" | 27-1195 | 2 | 2 |
| 20 | Spring Washer $\frac{1}{4}$" | 27-451 | 2 | 2 |
| 21 | Oil Pressure Gauge Adaptor | 11-14-654 | 1 | 1 |
| 22 | Drive Gear Wheel | 614-792 | 1 | 1 |
| 23 | Drive Gear Wheel Key | 27-352 | 1 | 1 |
| 24 | Drive Gear Lockwasher | 614-674 | 1 | 1 |
| 25 | Driv Gear Locknut | 614-673 | 1 | 1 |
| 26 | Joint | 614-434 | 2 | 2 |
| 27 | Housing Joint | 13-14-166 | As reqd. | |
| 28 | Adaptor Plate | 13-15-475 | 1 | 1 |
| | Drive Shaft (JKM only) | 11-15-543 | 1 | 1 |
| | Fixing Plug (JKM only) | 201-15400 | 1 | 1 |
| | Joint for Adaptor (JKM only) | 11-15-501 | 2 | 2 |
| | Housing Joint | 13-14-166 | As reqd. | |

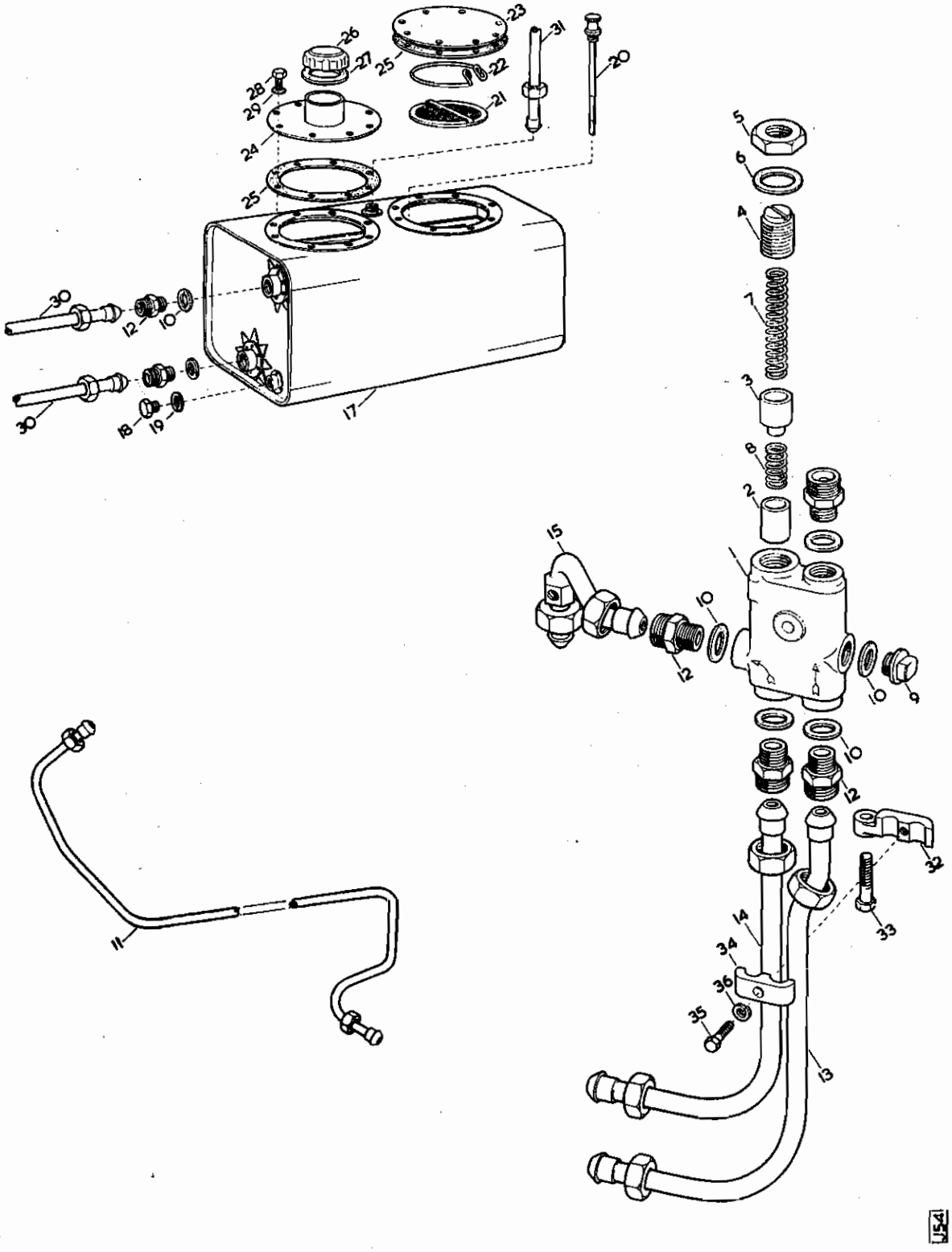
# INSTRUMENTS AND PANELS



# Lubricating Oil Relief Valve, Pipes and Tank

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | LUBRICATING OIL RELIEF VALVE | | | |
| 1 | Body | 11-13-406 | 1 | 1 |
| 2 | Plunger | 11-13-439 | 1 | 1 |
| 3 | Spring Seat | 11-13-440 | 1 | 1 |
| 4 | Adjusting Screw | 11-13-292 | 1 | 1 |
| 5 | Lock Nut | 27-1996 | 1 | 1 |
| 6 | Joint Washer | 3306 | 1 | 1 |
| 7 | Spring (Large) | 11-13-957 | 1 | 1 |
| 8 | Spring (Small) | 11-13-441 | 1 | 1 |
| 9 | Plug for Body | 12407 | 1 | 1 |
| 10 | Joint for Plug | 12406 | 8 | 8 |
| 11 | Pipe (Pressure Gauge to Crankcase) | 11-13-970 | 1 | – |
| | Pipe Pressure Gauge—Crankcase | 12-13-970 | – | 1 |
| 12 | Union Connection for $\frac{1}{8}$" O.D. Pipe | 10-2-85 | 8 | 8 |
| | Washer for Union | 10-6-64 | 8 | 8 |
| 13 | Lub. Pipe—Scavenge to Relief Valve | 12-13-955 | 1 | 1 |
| 14 | Lub. Pipe—Pressure to Relief Valve | 12-13-954 | 1 | 1 |
| 15 | Lub. Pipe—Relief Valve to Engine | 12-13-956 | 1 | 1 |
| 16 | Lub. Pipe—to Water Pump (JPM only) | 12-13-958 | 1 | 1 |
| | Lub. Pipe—to Water Pump (JK2M only) | 11-15-498 | 1 | – |
| | Lub. Pipe—to Water Pump (JK3M only) | 12-15-498 | – | 1 |
| | LUBRICATING OIL TANK | | | |
| 17 | Complete | 390-184 | 1 | 1 |
| 18 | Drain Plug | 11-13-693 | 1 | 1 |
| 19 | Drain Plug Joint | 5197 | 1 | 1 |
| 20 | Dipstick | 390-197 | 1 | 1 |
| 21 | Gauze Strainer with handle | 23-3212 | 2 | 2 |
| 22 | Spring Cup for Strainer | 151-3 | 2 | 2 |
| 23 | Cover Plate (Plain) | 390-191 | 1 | 1 |
| 24 | Cover Plate (with Filler) | 390-200 | 1 | 1 |
| 25 | Joint for Cover Plates | 23-3207 | 1 | 1 |
| 26 | Filler Cap | 390-198 | 1 | 1 |
| 27 | Joint for Filler Cap | 303-253 | 1 | 1 |
| 28 | Setscrew for Cover Plates | 27-4074 | 16 | 16 |
| 29 | Washer for Cover Plates | 27-551 | 16 | 16 |
| 30 | Pipe (Relief Valve to Tank and Tank to Pressure Pump) | 616-1680 | 3 | 3 |
| 31 | Breather Pipe | 616-1674 | 1 | 1 |
| 32 | Clamp Bracket for Oil Pipes | 11-14-685 | 1 | 1 |
| 33 | Setscrew for Bracket | 27-201 | 1 | 1 |
| 34 | Clamp | 11-14-686 | 1 | 1 |
| 35 | Clamp Setscrew | 27-1991 | 1 | 1 |
| 36 | Clamp Setscrew Spring Washer | 27-451 | 1 | 1 |

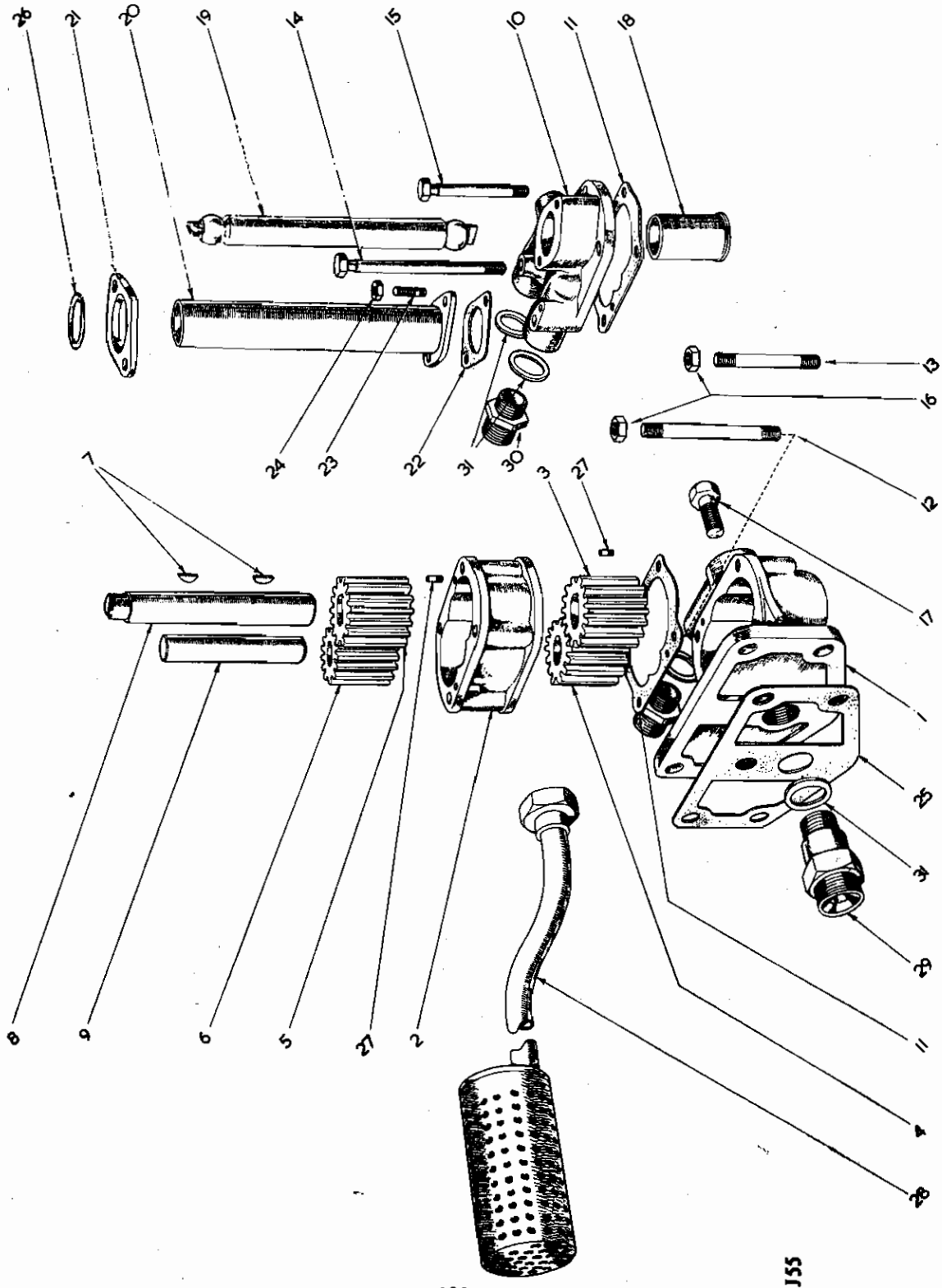
# LUBRICATING OIL RELIEF VALVE, PIPES AND TANK



# Lubricating Oil Pump and Strainer

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | LUBRICATING OIL PUMP complete ... ... ... | 11-13-280c | 1 | 1 |
| 1 | Scavenge Lubricating Pump Body ... ... ... ... | 11-13-280 | 1 | 1 |
| 2 | Supply Lubricating Pump Body ... ... ... ... | 11-13-281 | 1 | 1 |
| 3 | Driving Gear for Scavenge Pump ... ... ... ... | 11-13-639 | 1 | 1 |
| 4 | Driven Gear for Scavenge Pump ... ... ... ... | 11-13-640 | 1 | 1 |
| 5 | Driving Gear (Supply Pump) ... ... ... ... ... | 10-2-158 | 1 | 1 |
| 6 | Driven Gear (Supply Pump) ... ... ... ... ... | 10-2-159 | 1 | 1 |
| 7 | Woodruff Key for Driven Gears ... ... ... ... | 27-566 | 2 | 2 |
| 8 | Spindle Driving Gear ... ... ... ... ... ... | 11-13-286 | 1 | 1 |
| 9 | Spindle Driven Gears ... ... ... ... ... ... | 11-13-285 | 1 | 1 |
| 10 | Cover for Supply Pump ... ... ... ... ... | 11-13-282 | 1 | 1 |
| 11 | Cover Joint ... ... ... ... ... ... | 10-2-113 | 2 | 2 |
| 12 | Studs for Cover (Long) ... ... ... ... ... | 11-13-297 | 1 | 1 |
| 13 | Studs for Cover (Short) ... ... ... ... ... | 11-13-298 | 1 | 1 |
| 14 | Bolts for Cover (Long) ... ... ... ... ... | 11-13-343 | 1 | 1 |
| 15 | Bolts for Cover (Short) ... ... ... ... ... | 11-13-344 | 1 | 1 |
| 16 | Nuts for Studs ... ... ... ... ... ... ... | 27-7 | 2 | 2 |
| 17 | Set Screw (Pump to Crankcase) ... ... ... ... | 27-1329 | 4 | 4 |
| 18 | Bush for Supply Cover ... ... ... ... ... ... | 11-13-287 | 1 | 1 |
| 19 | Vertical Driving Shaft ... ... ... ... ... ... | 11-13-288 | 1 | 1 |
| 20 | Tube for Shaft ... ... ... ... ... ... | 11-13-289 | 1 | 1 |
| 21 | Loose Flange for Tube (Top) ... ... ... ... ... | 10-2-94 | 1 | 1 |
| 22 | Joint for Bottom Flange ... ... ... ... ... | 10-2-115 | 1 | 1 |
| 23 | Stud for Bottom Flange ... ... ... ... ... | 27-1333 | 2 | 2 |
| 24 | Nut for Bottom Flange ... ... ... ... ... ... | 27-1334 | 2 | 2 |
| 25 | Pump Casing Joints (to Crankcase) ... ... ... ... | 10-2-112 | 1 | 1 |
| 26 | Joint for Top Flange (Rubber) ... ... ... ... | 10-3-38 | 1 | 1 |
| 27 | Dowel for Pump Casing ... ... ... ... ... | 10-2-110 | 2 | 1 |
| 28 | LUBRICATING OIL STRAINER complete ... ... | 11-13-882c | 1 | 1 |
| | Oil Strainer Gauze complete ... ... ... ... ... | 10-2-107c | 1 | 1 |
| | Oil Strainer Flange ... ... ... ... ... ... | 10-13-152 | 1 | 1 |
| | Oil Strainer Suction Pipe ... ... ... ... ... | 11-13-881 | 1 | 1 |
| | Strainer Suction Pipe ... ... ... ... ... | 23-1769 | 1 | 1 |
| | Strainer Suction Pipe Nut ... ... ... ... ... | 23-1768 | 1 | 1 |
| 29 | Pipe Connection ... ... ... ... ... ... | 10-13-151 | 1 | 1 |
| 30 | Pipe Connection Joint ... ... ... ... ... | 12406 | 1 | 1 |

# LUBRICATING OIL PUMP AND PIPES

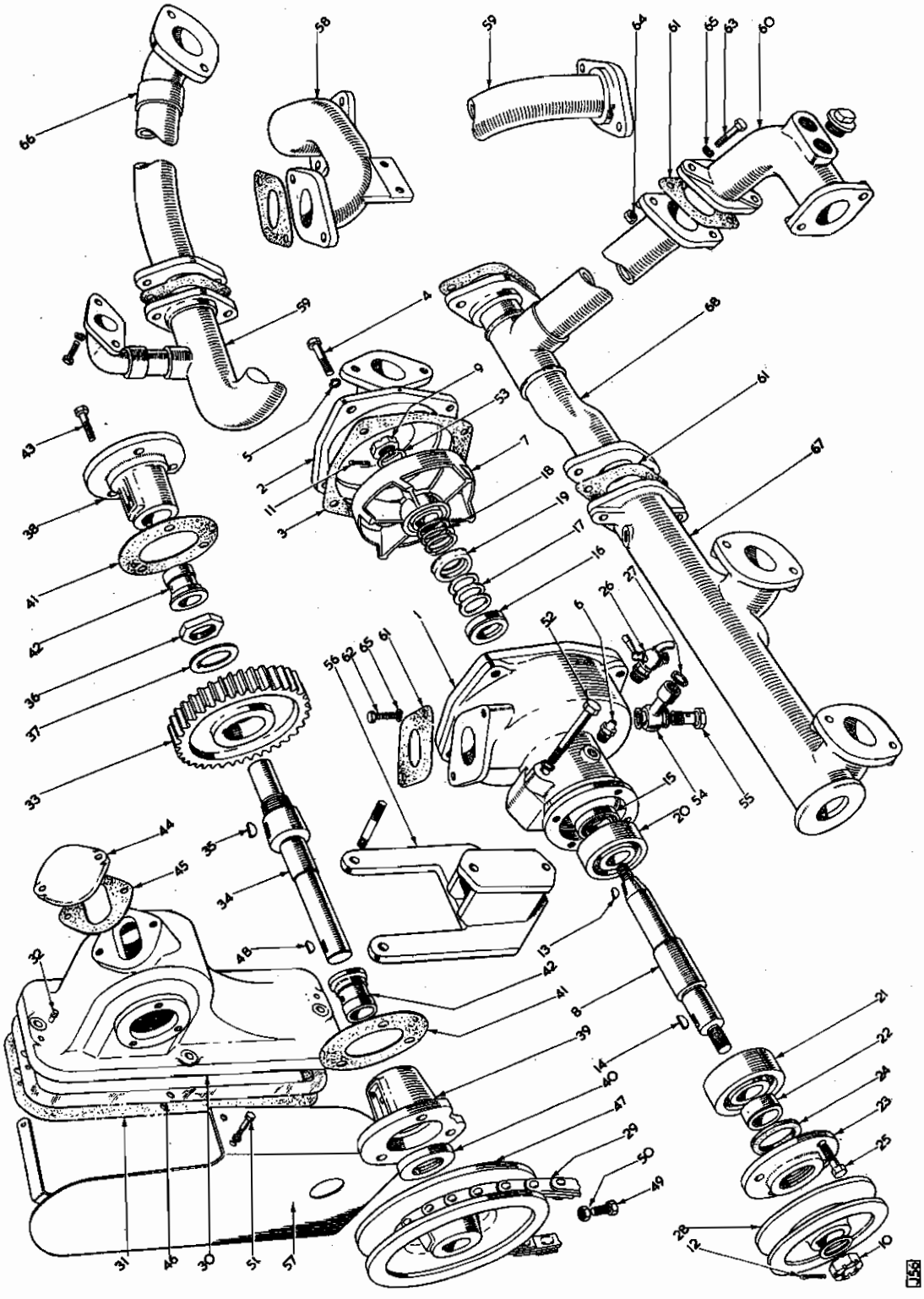



J55

# Centrifugal Circulating Pump

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | CIRCULATING PUMP complete ... ... ... ... | 616-1720c | 1 | 1 |
| 1 | Pump Body ... ... ... ... ... ... ... | 616-1720 | 1 | 1 |
| 2 | Inlet Cover ... ... ... ... ... ... ... | 616-790 | 1 | 1 |
| 3 | Inlet Cover Joint ... ... ... ... ... ... | 294-725 | 1 | 1 |
| 4 | Setscrew $\frac{3}{8}$" BSF x $\frac{3}{4}$" ... ... ... ... ... ... | 27-902 | 4 | 4 |
| 5 | Spring Washer ... ... ... ... ... ... ... | 27-393 | 4 | 4 |
| 6 | Grease Nipple ... ... ... ... ... ... ... | 27-920 | 1 | 1 |
| 7 | Impeller ... ... ... ... ... ... ... | 616-1722 | 1 | 1 |
| 8 | Impeller Spindle ... ... ... ... ... ... | 616-1757 | 1 | 1 |
| 9 | Nut (Slotted Brass) $\frac{1}{2}$" ... ... ... ... ... ... | 23-619 | 1 | 1 |
| 10 | Nut (Slotted) $\frac{1}{2}$" ... ... ... ... ... ... | 27-1305 | 1 | 1 |
| 11 | Split Pin ... ... ... ... ... ... ... ... | 27-3713 | 1 | 1 |
| 12 | Split Pin ... ... ... ... ... ... ... ... | 27-913 | 1 | 1 |
| 13 | Key (Impeller) ... ... ... ... ... ... | 27-107 | 1 | 1 |
| 14 | Key (Pulley) ... ... ... ... ... ... ... | 27-566 | 1 | 1 |
| 15 | Oil Seal (Gaco) ... ... ... ... ... ... ... | 291-2153 | 1 | 1 |
| 16 | Carbon Ring ... ... ... ... ... ... ... | 291-2150/1 | 1 | 1 |
| 17 | Rubber Ring ... ... ... ... ... ... ... | 291-2527/1 | 2 | 2 |
| | Seal Washer ... ... ... ... ... ... ... | 291-37910 | 1 | 1 |
| 18 | Spring ... ... ... ... ... ... ... ... | 291-2152/4 | 1 | 1 |
| 19 | Spring Cage ... ... ... ... ... ... ... | 291-2974 | 1 | 1 |
| 20 | Bearing (Impeller End) M.S.8 ... ... ... ... | 11-13-321 | 1 | 1 |
| 21 | Bearing (Pulley End) ... ... ... ... ... ... | 27-1753 | 1 | 1 |
| 22 | Packing Ring ... ... ... ... ... ... ... | 11-19-850 | 1 | 1 |
| 23 | End Plate ... ... ... ... ... ... ... | 11-19-851 | 1 | 1 |
| 24 | Felt Ring ... ... ... ... ... ... ... | 10-2-34 | 1 | 1 |
| 25 | Setscrew ... ... ... ... ... ... ... | 27-1195 | 4 | 4 |
| 26 | Drain Tap $\frac{1}{4}$" BSP ... ... ... ... ... ... | 5137 | 1 | 1 |
| 27 | Joint ... ... ... ... ... ... ... ... | 5197 | 3 | 3 |
| 28 | Pulley (Driven) ... ... ... ... ... ... ... | 11-14-584 | 1 | 1 |
| 29 | Belting ... ... ... ... ... ... ... ... | 11-2-458 | 1 | 1 |
| 30 | Pump Drive Housing ... ... ... ... ... | 13-14-144 | 1 | 1 |
| | Pump Drive Housing (JKM only) ... ... ... ... | 11-15-500 | 1 | 1 |
| 31 | Pump Driving Housing Joint .005" ... ... ... | 13-14-166 | 1 | 1 |
| 32 | Pump Driving Housing Dowel ... ... ... ... | 10-2-110 | 2 | 2 |
| 33 | Pump Drive Gear Wheel ... ... ... ... ... | 614-792 | 1 | 1 |
| 34 | Pump Drive Gear Wheel Shaft ... ... ... ... | 614-793 | 1 | 1 |
| | Pump Drive Gear Wheel Shaft (JKM only) ... ... | 11-15-531 | 1 | 1 |
| 35 | Pump Drive Gear Wheel Shaft Key ... ... ... ... | 27-352 | 1 | 1 |
| 36 | Pump Drive Gear Wheel Lock Nut ... ... ... | 614-673 | 1 | 1 |
| 37 | Pump Drive Gear Wheel Washer ... ... ... | 614-674 | 1 | 1 |
| 38 | Bearing Housing (Blind) ... ... ... ... ... | 614-370 | 1 | 1 |
| 39 | Bearing Housing (Open) ... ... ... ... ... | 614-371 | 1 | 1 |
| | Bearing Housing (Open) (JKM only) ... ... ... | 13-15-474 | 1 | 1 |
| 40 | Bearing Housing Oil Seal ... ... ... ... ... | 27-2070 | 1 | 1 |
| 41 | Bearing Housing Joint .005" ... ... ... ... ... | 11-15-561 | 2 | 2 |
| 42 | Shaft Bush ... ... ... ... ... ... ... | 614-397 | 2 | 2 |
| 43 | Setscrews ... ... ... ... ... ... ... | 27-1985 | 5 | 5 |
| 44 | Blank Cover Plate ... ... ... ... ... ... | 13-14-152 | 1 | 1 |
| 45 | Blank Cover Plate Joint ... ... ... ... ... | 13-14-153 | 1 | 1 |
| 46 | Shim .030" (Drive Housing to C/case Door) ... ... ... | 13-14-167 | As reqd. | |
| | Shim .010" (Drive Housing to C/case Door) ... ... ... | 13-14-168 | As reqd. | |
| | Studs $\frac{5}{16}$" Whit. x $2\frac{1}{8}$" ... ... ... ... ... ... | 27-217 | 3 | 3 |
| 47 | Pulley (Driver) ... ... ... ... ... ... ... | 11-14-583 | 1 | 1 |

# FRESH WATER CENTRIFUGAL PUMP–JPM only

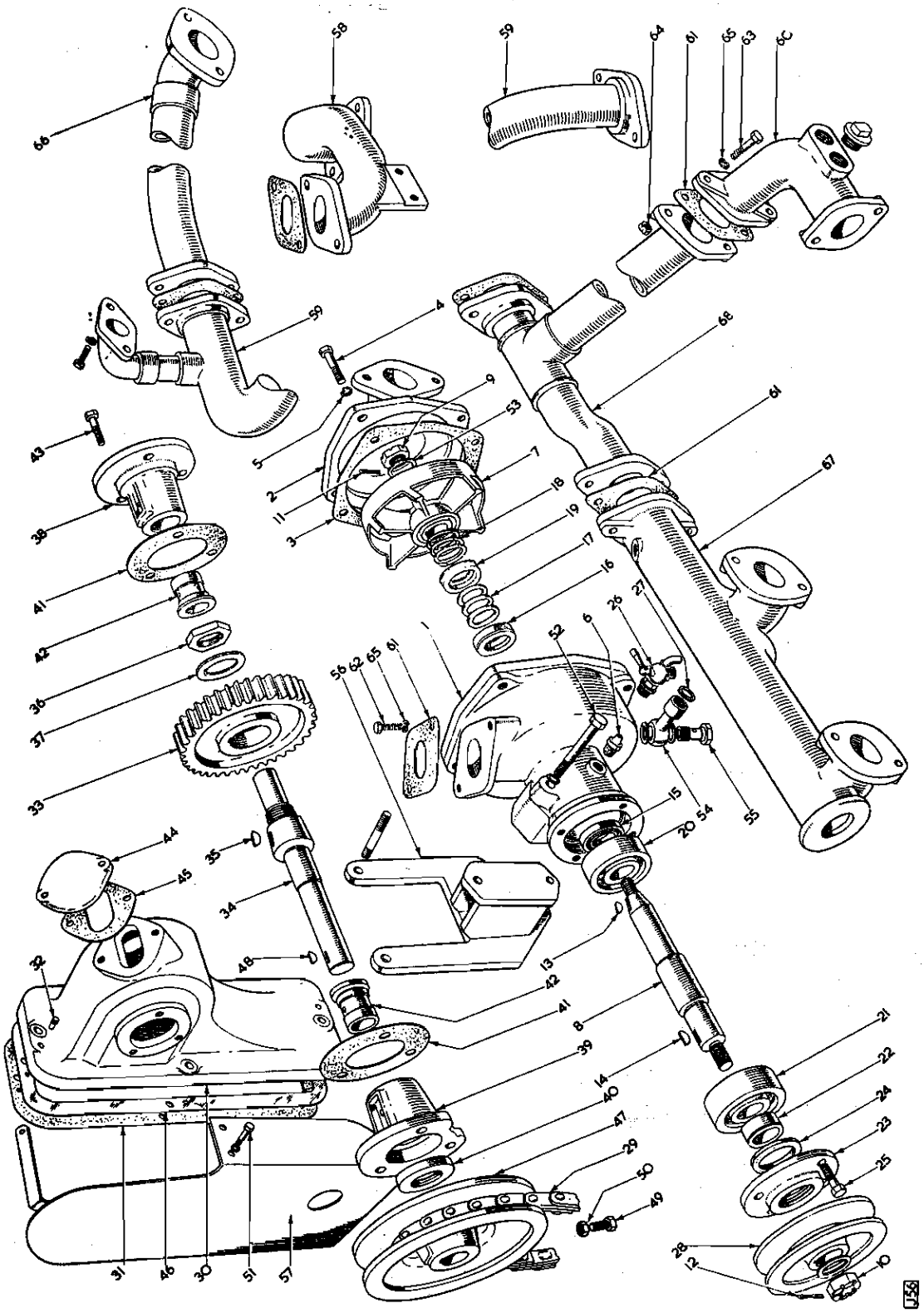


# Centrifugal Circulating Pump–(Cont.)

| Item No. | Description | Part No. | Cylinders 2 | Cylinders 3 |
|---|---|---|---|---|
| 48 | Pulley Key 5/32″ x $\frac{5}{8}$″ Woodruff | 27-566 | 1 | 1 |
| 49 | Setscrew $\frac{1}{4}$″ BSF x 2 1/32″ | 27-1285 | 1 | 1 |
| 50 | Nut $\frac{1}{4}$″ BSF | 27-907 | 1 | 1 |
| 51 | Setscrew $\frac{1}{2}$″ Whit. x $\frac{9}{16}$″ (Drive Guard) | 27-1711 | 2 | 2 |
| | Spring Washer $\frac{1}{4}$″ | 27-451 | 2 | 2 |
| 52 | Setscrew $\frac{3}{8}$″ Whit. x 3″ (Pump to Bracket) | 27-1255 | 2 | 2 |
| 53 | Washer $\frac{1}{2}$″ | 614-811 | 1 | 1 |
| 54 | Drain Extension | 616-1593 | 1 | 1 |
| 55 | Screw | 2-508 | 1 | 1 |
| 56 | Pump Bracket | 11-14-563 | 1 | 1 |
| 57 | Drive Guard } Not supplied | 11-14-570 | 1 | 1 |
| | Drive Guard Stay } separately | 11-14-571 | 1 | 1 |
| 58 | Pump Outlet Bend | 11-14-568 | 1 | 1 |
| 59 | Inlet Pipe to Silencer | 11-14-580 | 1 | 1 |
| 60 | Outlet Bend from Exhaust Manifold | 13-14-464 | 1 | 1 |
| 61 | Oval Joint | 3309 | 6 | 6 |
| 62 | Set Pins $\frac{5}{16}$″ BSF x $\frac{7}{8}$″ | 27-1994 | 2 | 2 |
| | Set Pins $\frac{5}{16}$″ Whit. x $\frac{7}{8}$″ | 27-196 | 2 | 2 |
| 63 | Bolts $\frac{5}{16}$″ Whit. x 1$\frac{1}{4}$″ | 27-66 | 8 | 8 |
| 64 | Nuts $\frac{5}{16}$″ | 27-7 | 8 | 8 |
| 65 | Washer $\frac{5}{16}$″ | 27-413 | 12 | 12 |
| | Union $\frac{3}{8}$″ x $\frac{1}{4}$″ BSP | 616-968 | 1 | 1 |
| 66 | Inlet Pipe to Crankcase | 11-14-578 | 1 | – |
| | Inlet Pipe to Crankcase | 12-14-578 | – | 1 |
| 67 | Outlet Manifold | 13-13-886 | 1 | – |
| | Outlet Manifold | 12-13-470 | – | 1 |
| 68 | Outlet Pipe | 11-14-465 | 1 | – |
| | W/C Manifold (Flanged Outlet) | 11-13-202 | 1 | – |
| | W/C Manifold (Flanged Outlet) | 12-13-202 | – | 1 |
| | Water Inlet Restrictor | 11-3-294 | 6 | 6 |
| | Pipe and Ferrule Assembly | 11-3-299 | 2 | 2 |

**ALWAYS QUOTE ENGINE NUMBER WHEN ORDERING SPARES**

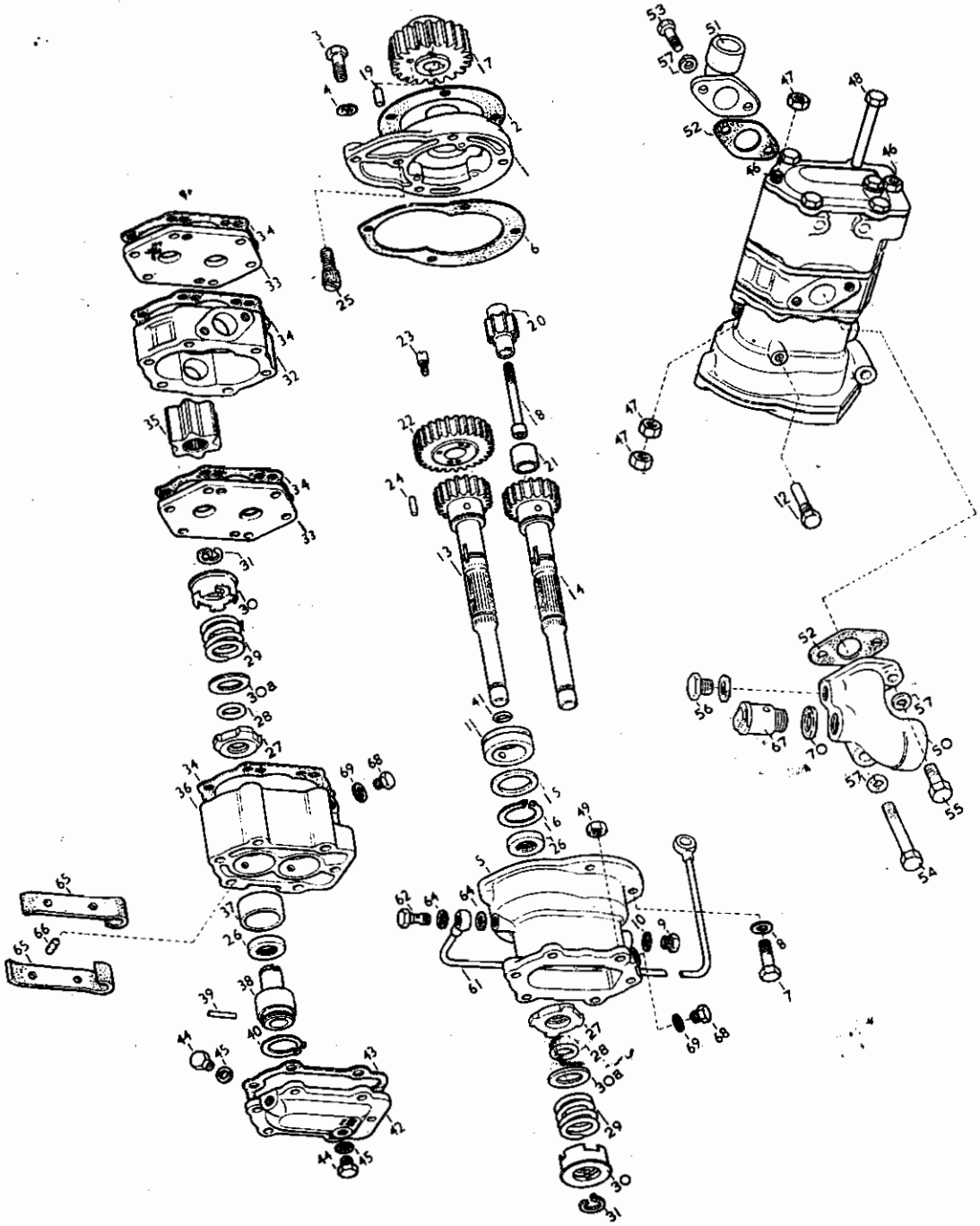
# FRESH WATER CENTRIFUGAL PUMP–JPM only



# Sea Water Pump

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | Raw Water Pump complete | 11-15-571 | 1 | 1 |
| 1 | Adaptor Plate | 11-15-539 | 1 | 1 |
| 2 | Adaptor Plate Joint | 11-15-501 | 1 | 1 |
| 3 | Setscrew | 270-24 | 2 | 2 |
| 4 | Spring Washer | 27-413 | 1 | 1 |
| *5 | Driving Gear Housing | 291-2501/1 | 1 | 1 |
| 6 | Housing Joint | 291-2502 | 1 | 1 |
| 7 | Setscrew | 270-25 | 3 | 3 |
| 8 | Spring Washer | 27-1976 | 3 | 3 |
| *9 | Plug for Oil Hole | 211-540 | 1 | 1 |
| *10 | Plug Joint | 600-106 | 1 | 1 |
| *11 | Locating Bearing | 291-2980 | 2 | 2 |
| *12 | Locating Bearing Pin | 291-2987 | 2 | 2 |
| *13 | Driving Gear Shaft Assembly | 291-3095/2 | 1 | 1 |
| *14 | Driven Gear Shaft Assembly | 291-3096/2 | 1 | 1 |
| *15 | Thrust Washer | 291-2983 | 2 | 2 |
| *16 | Circlip | 291-2988 | 2 | 2 |
| 17 | Driving Gear | 614-792 | 1 | 1 |
| *18 | Cap Screw | 27-4414 | 1 | 1 |
| *19 | Dowel | 291-2522 | 2 | 2 |
| *20 | Reduction Pinion | 11-15-530 | 1 | 1 |
| *21 | Pinion Bush | 291-2511 | 1 | 1 |
| *22 | Reduction Gear | 11-15-529 | 1 | 1 |
| *23 | Setscrew | 270-195 | 3 | 3 |
| *24 | Dowel | 291-2522 | 2 | 2 |
| *25 | Cheese Head Set Screw | 27-4386 | 3 | 3 |
| *26 | Gear Shaft Oil Seal | 291-2153 | 4 | 4 |
| *27 | Seal Ring | 291-21502 | 4 | 4 |
| *28 | Rubber Ring | 291-2527/1 | 8 | 8 |
| *29 | Seal Spring | 291-2152/4 | 4 | 4 |
| *30 | Cage for Carbon Seal | 291-39600 | 4 | 4 |
| *30a | Thrust Washer | 291-38860 | 4 | 4 |
| *31 | Snap Ring | 291-39570 | 4 | 4 |
| | Rubber Ring | ~~520-7577~~ | 1 | 1 |
| *32 | Pump Body | 291-2517/1 | 1 | 1 |
| *33 | Dividing Plate | 291-2515/1 | 2 | 2 |
| *34 | Joint | 291-2516/1 | 6 | 6 |
| *35 | Impeller complete | 291-2487/5 | 2 | 2 |
| *36 | Bearing Housing | 291-2514/1 | 1 | 1 |
| *37 | Bearing Bush | 291-2512/1 | 2 | 2 |
| *38 | Bearing Block | 291-2540/1 | 2 | 2 |
| *39 | Driving Pin | 291-2976 | 2 | 2 |
| *40 | Circlip for Driving Pin | 291-2037 | 2 | 2 |
| *41 | Rubber Sealing Ring | 291-2989 | 2 | 2 |
| *42 | Cover for Bearing Housing | 291-2513/1 | 1 | 1 |
| *43 | Cover Joint | 291-2885/1 | 1 | 1 |
| *44 | Filling and Level Oil Plugs | 211-540 | 2 | 2 |
| *45 | Plug Joint | 600-106 | 2 | 2 |
| *46 | Locating Pin | 291-3099 | 2 | 2 |
| *47 | Locating Nuts | 270-14 | 6 | 6 |
| *48 | Through Bolts | 291-2519/1 | 4 | 4 |
| *49 | Through Bolts Nuts | 270-14 | 4 | 4 |
| 50 | Delivery Bend | 291-3153 | 1 | 1 |
| 51 | Suction Elbow | 11-15-547 | 1 | 1 |

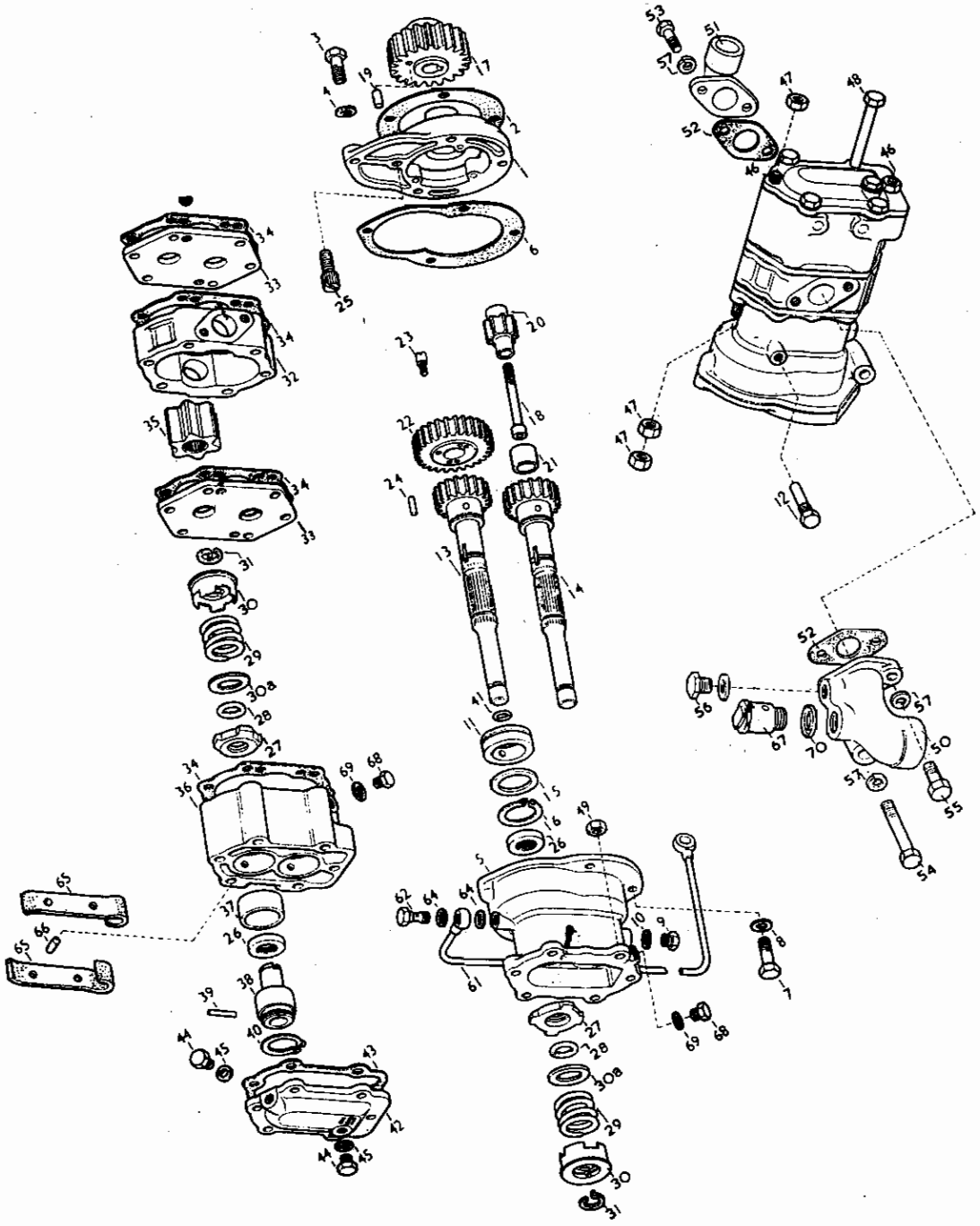
# SEA WATER PUMP



# Sea Water Pump–(Contd.)

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 52 | Joint | 23-1766 | 2 | 2 |
| 53 | Setscrew (Suction) | 270-26 | 2 | 2 |
| 54 | Delivery Elbow Setscrew | 270-28 | 1 | 1 |
| 55 | Delivery Elbow Setscrew | 270-25 | 1 | 1 |
| 56 | Plug for Bend and Elbow | 21-153 | 2 | 2 |
| 57 | Spring Washer | 27-1976 | 8 | 8 |
| 61 | Lub. Oil Feed Pipe | 11-15-498 | 1 | – |
| | Lub. Oil Feed Pipe | 12-15-498 | – | 1 |
| | Lub. Oil Feed Pipe Union | 103-106 | – | 1 |
| | Swivel Union Plug | 23-4315 | 1 | – |
| *62 | Fixing Plug | 842-359 | 1 | 1 |
| 64 | Joints | 600-106 | 2 | 2 |
| *65 | Felt Lubricating Strip | 291-2521 | 2 | 2 |
| *66 | Felt Lubricating Plug | 291-2520 | 4 | 4 |
| 67 | Safety Valve complete | 291-2990 | 1 | 1 |
| | comprising :—Body | 291-2991 | 1 | 1 |
| | Plunger | 291-2992 | 1 | 1 |
| | Rubber Washer | 291-2993 | 1 | 1 |
| | Spring | 291-3061 | 1 | 1 |
| | Plug | 11-13-198 | 1 | 1 |
| | Joint | 13-21-778 | 1 | 1 |
| *68 | Water Drain Plug | 291-40790 | 2 | 2 |
| *69 | Water Drain Plug Joint | 291-2609 | 2 | 2 |
| 70 | Safety Valve Joint | 13-21-778 | 1 | 1 |

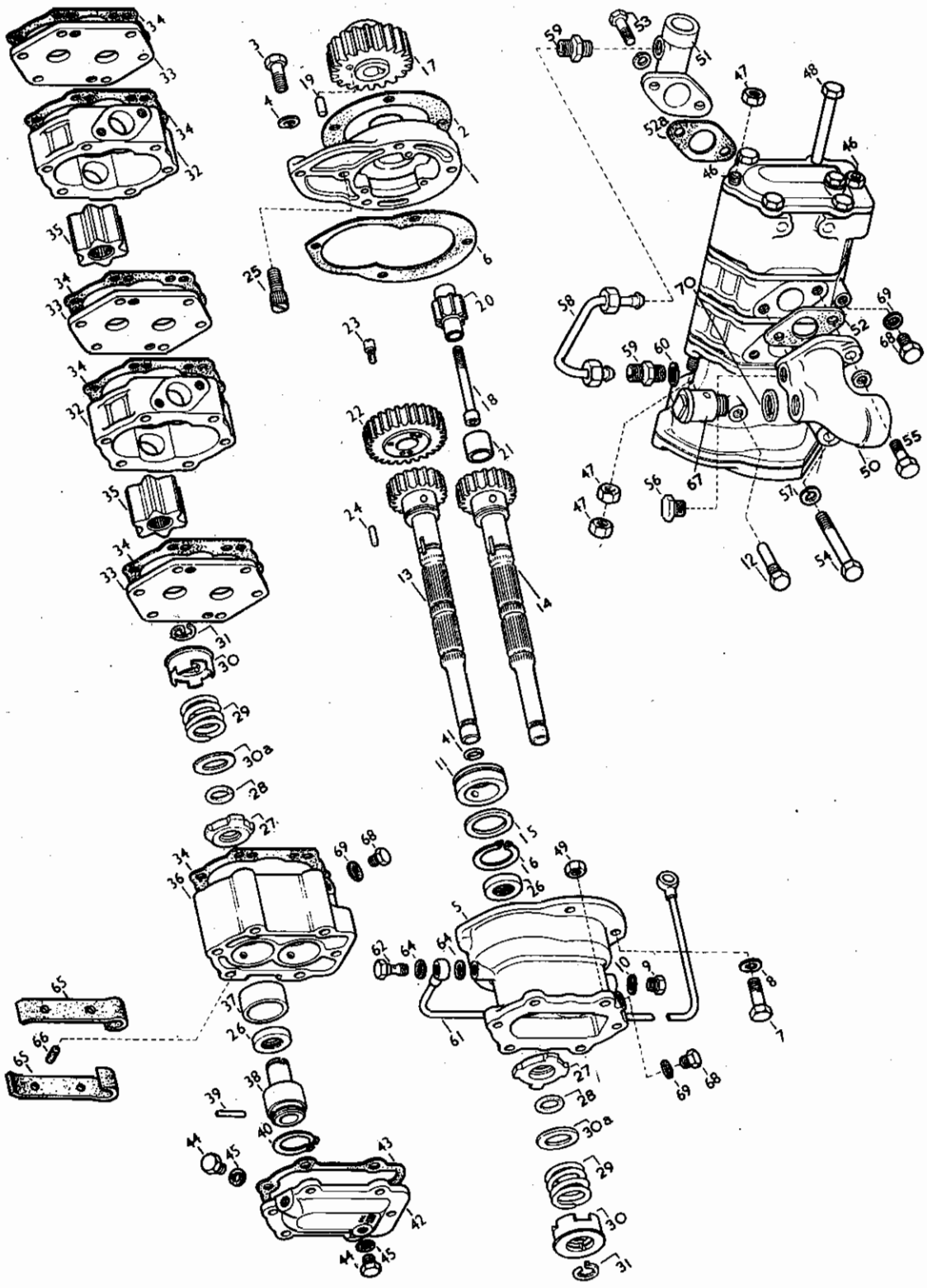
# SEA WATER PUMP



# Sea Water & Bilge Pump

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | Sea Water and Bilge Pump complete | 11-15-572 | 1 | 1 |
| 1 | Adaptor Plate | 11-15-539 | 1 | 1 |
| 2 | Adaptor Plate Joint | 11-15-501 | 1 | 1 |
| 3 | Setscrew | 270-24 | 2 | 2 |
| 4 | Spring Washer | 27-413 | 2 | 2 |
| *5 | Driving Gear Housing | 291-2501/1 | 1 | 1 |
| 6 | Housing Joint | 291-2502 | 1 | 1 |
| 7 | Setscrew | 270-25 | 3 | 3 |
| 8 | Spring Washer | 27-1976 | 3 | 3 |
| *9 | Plug for Oil Hole | 211-540 | 1 | 1 |
| *10 | Plug Joint | 600-106 | 1 | 1 |
| *11 | Locating Bearing | 291-2980 | 2 | 2 |
| *12 | Locating Bearing Pin | 291-2987 | 2 | 2 |
| *13 | Driving Gear Shaft Assembly | 291-2507/4 | 1 | 1 |
| *14 | Driven Gear Shaft Assembly | 291-2510/4 | 1 | 1 |
| *15 | Thrust Washer | 291-2983 | 2 | 2 |
| *16 | Circlip | 291-2988 | 2 | 2 |
| 17 | Driving Gear | 614-792 | 1 | 1 |
| *18 | Cap Screw | 27-4414 | 1 | 1 |
| *19 | Dowel | 291-2522 | 1 | 1 |
| *20 | Reduction Pinion | 11-15-530 | 1 | 1 |
| *21 | Pinion Bush | 291-2511 | 1 | 1 |
| *22 | Reduction Gear | 11-15-529 | 1 | 1 |
| *23 | Cap Head Setscrew | 270-195 | 3 | 3 |
| *24 | Dowel | 291-2522 | 2 | 2 |
| *25 | Cheesehead Screw | 27-4386 | 1 | 1 |
| *26 | Gear Shaft Oil Seal | 291-2153 | 4 | 4 |
| *27 | Seal Ring | 291-21502 | 4 | 4 |
| *28 | Rubber Ring | 291-2527/1 | 20 | 20 |
| *29 | Seal Spring | 291-2152/4 | 4 | 4 |
| *30 | Cage for Carbon | 291-39600 | 4 | 4 |
| *30a | Thrust Washer | 291-38860 | 4 | 4 |
| *31 | Snap Ring | 291-39570 | 4 | 4 |
| | Rubber Ring | 520-7577 | 4 | 4 |
| *32 | Pump Body | 291-2517/1 | 2 | 2 |
| *33 | Dividing Plate | 291-2515/1 | 3 | 3 |
| *34 | Joint | 291-2516/1 | 6 | 6 |
| *35 | Impeller complete | 291-2487/5 | 4 | 4 |
| *36 | Bearing Housing | 291-2514/1 | 1 | 1 |
| *37 | Bearing Bush | 291-2512/1 | 2 | 2 |
| *38 | Bearing Block | 291-2540/1 | 2 | 2 |
| *39 | Driving Pin | 291-2976 | 2 | 2 |
| *40 | Circlip for Driving Pin | 291-2037 | 2 | 2 |
| *41 | Rubber Sealing Ring | 291-2989 | 2 | 2 |
| *42 | Cover for Bearing Housing | 291-2513/1 | 1 | 1 |
| *43 | Cover Joint | 291-2885/1 | 1 | 1 |
| *44 | Filling and Level Oil Plugs | 211-540 | 2 | 2 |
| *45 | Plug Joint | 600-106 | 2 | 2 |
| *46 | Locating Pin | 291-2518/1 | 2 | 2 |
| *47 | Locating Nuts | 270-14 | 6 | 6 |
| *48 | Through Bolts | 291-2519/1 | 4 | 4 |
| *49 | Through Bolts Nuts | 270-14 | 4 | 4 |
| 50 | Delivery Elbow | 292-3153 | 2 | 2 |
| | Delivery Bend (Reverse Rotation) | 291-3153 | 2 | 2 |

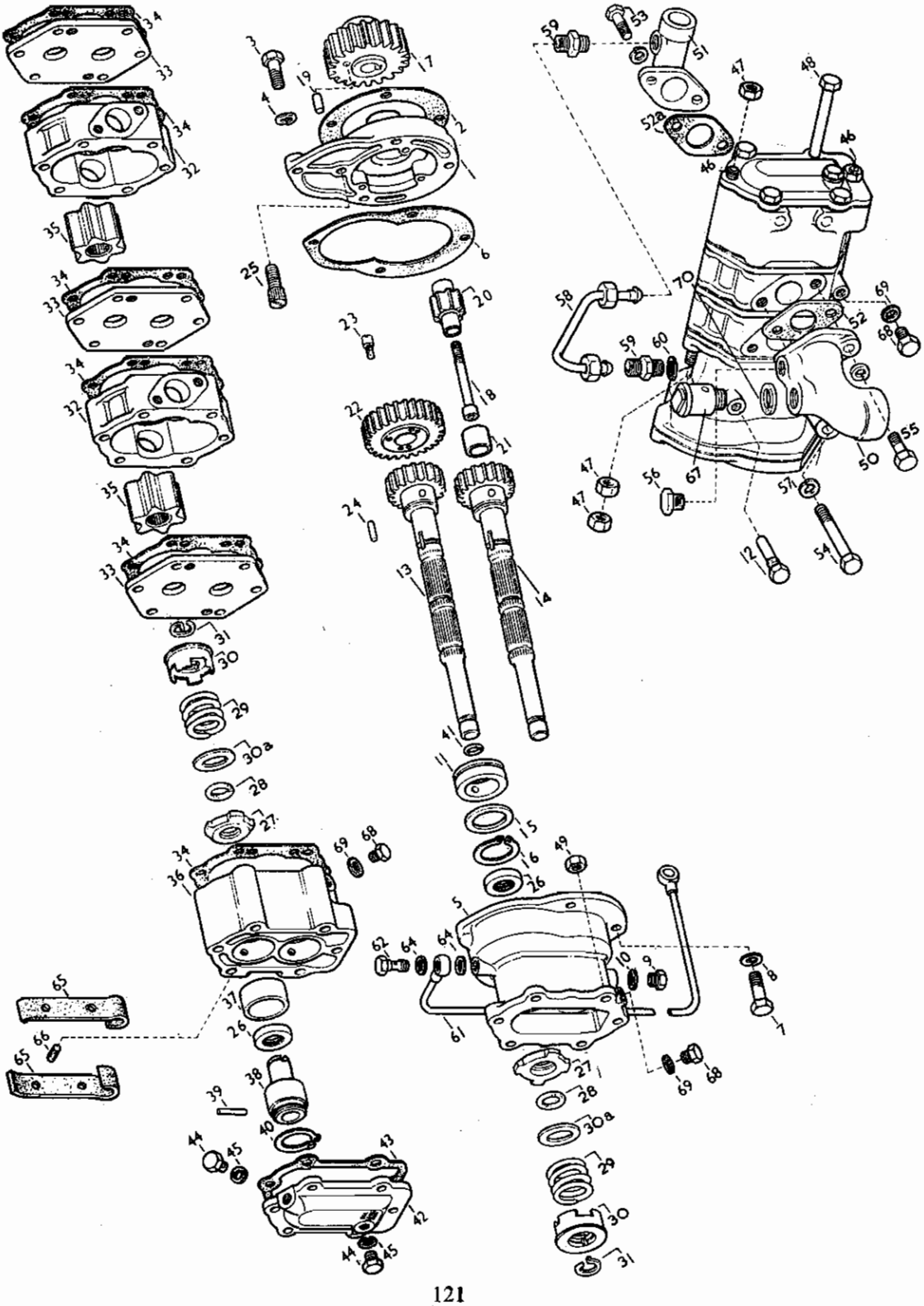
# SEA WATER & BILGE PUMP



# Sea Water & Bilge Pump–(Contd.)

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 51 | Suction Elbow (Bilge) | 11-15-499 | 1 | 1 |
| | Suction Elbow | 11-15-547 | 1 | 1 |
| | Joint (Suction) | 23-1766 | 1 | 1 |
| 52 | Joint (Delivery) | 23-1766 | – | – |
| 52a | Joint | 13-22-350 | 2 | 2 |
| 53 | Setscrew (Suction) | 270-26 | 2 | 2 |
| 54 | Delivery Bend Setscrew | 270-28 | 2 | 2 |
| 55 | Delivery Elbow Setscrew | 270-26 | 1 | 1 |
| 56 | Plug for Bend and Elbow | 21-153 | 2 | 2 |
| 57 | Spring Washer | 27-413 | 8 | 8 |
| 58 | Wetting Pipe for Bilge Pump | 11-15-503 | 1 | 1 |
| 59 | Union | 291-3320 | 2 | 2 |
| 60 | Joint for Wetting Union Pipe | 13-22-350 | 2 | 2 |
| 61 | Lub. Oil Feed Pipe | 11-15-498 | 1 | – |
| | Lub. Oil Feed Pipe | 12-15-498 | – | 1 |
| | Lub. Oil Feed Pipe Union | 103-106 | – | 1 |
| *62 | Fixing Plug | 842-359 | 1 | 1 |
| 64 | Joints | 600-106 | 2 | 2 |
| *65 | Felt Lubricating Strip | 291-2521 | 2 | 2 |
| *66 | Felt Lubricating Plug | 291-2520 | 4 | 4 |
| 67 | Safety Valve complete | 291-2990 | 2 | 2 |
| | comprising :—Body | 291-2991 | 2 | 2 |
| | Plunger | 291-2992 | 2 | 2 |
| | Rubber Washer | 291-2993 | 2 | 2 |
| | Spring | 291-3061 | 2 | 2 |
| | Plug | 11-13-198 | 2 | 2 |
| | Joint | 13-21-778 | 2 | 2 |
| *68 | Water Drain Plug | 291-40790 | 4 | 4 |
| *69 | Water Drain Plug Joint | 291-2609 | 4 | 4 |
| 70 | Safety Valve Joint | 13-21-778 | 2 | 2 |

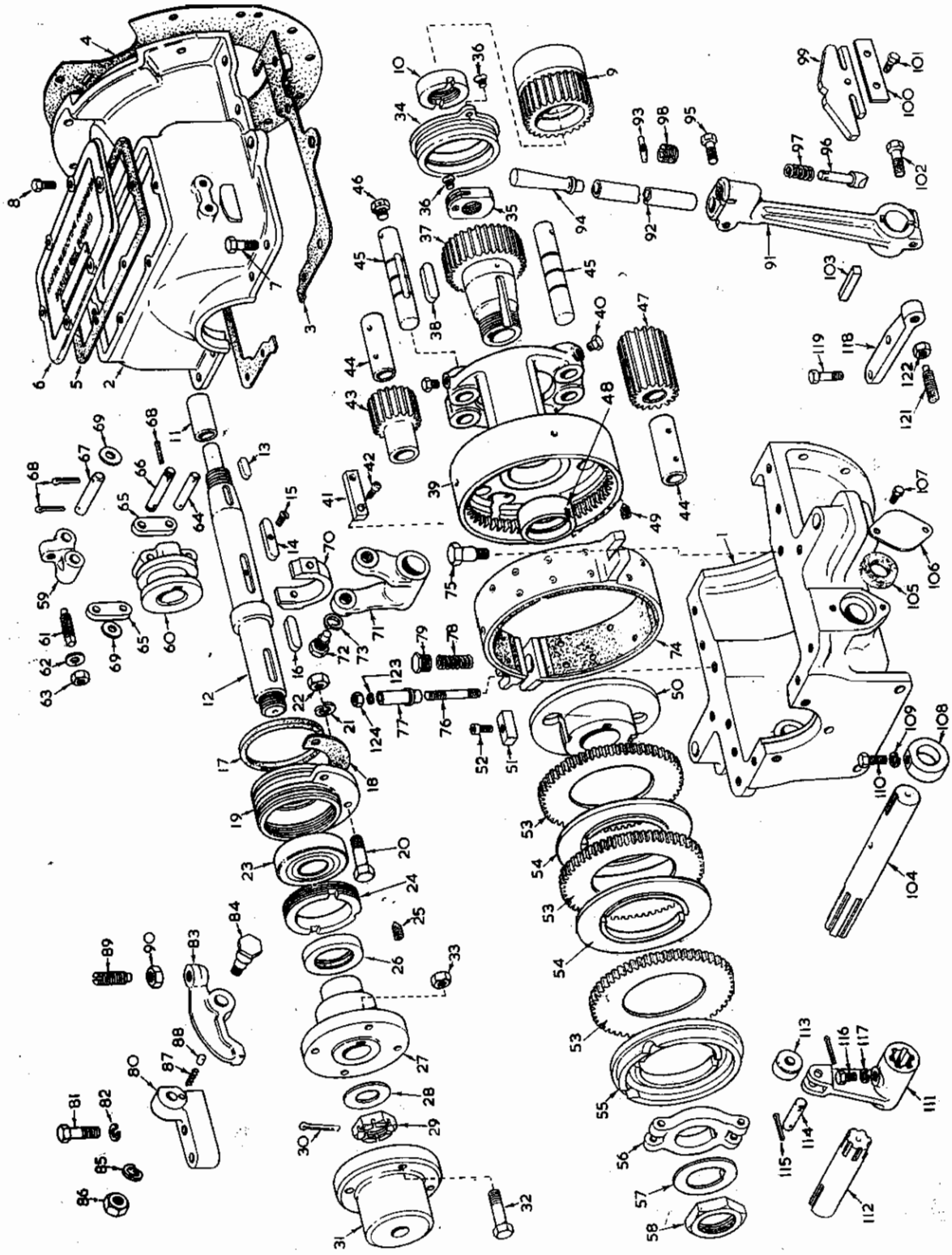
# SEA WATER & BILGE PUMP



# Reverse Gear

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | Casing Top and Bottom Halves (complete) ... ... ... | 11-13-856 | 1 | 1 |
| 1 | Casing Bottom Half R.H. ... ... ... ... ... | 11-13-854 | 1 | 1 |
| | Casing Bottom Half L.H. ... ... ... ... ... | 11-13-857 | 1 | 1 |
| 2 | Casing Top Half ... ... ... ... ... ... | 11-13-855 | 1 | 1 |
| 3 | Casing Top to Bottom Joint ... ... ... | 614-558 | 1 | 1 |
| 4 | Casing to Engine Joint ... ... ... ... ... | 614-557 | 1 | 1 |
| 5 | Casing Inspection Cover ... ... ... ... ... | 23-3259 | 1 | 1 |
| 6 | Inspection Cover Joint ... ... ... ... ... ... | 23-3453 | 1 | 1 |
| 7 | Setscrew $\frac{7}{16}$" B.S. Whit. ... ... ... ... ... | 27-1338 | 8 | 8 |
| 8 | Setscrew $\frac{1}{8}$" B.S. Whit. ... ... ... ... ... ... | 27-203 | 6 | 6 |
| 9 | Crankshaft Spur Gear ... ... ... ... ... | X87/11741 | 1 | – |
| | Crankshaft Spur Gear ... ... ... ... ... | X87/16740 | – | 1 |
| 10 | Crankshaft Nut ... ... ... ... ... ... | X87/11022 | 1 | 1 |
| 11 | Crankshaft Bush ... ... ... ... ... ... | X87/11910 | 1 | 1 |
| 12 | Clutch Shaft ... ... ... ... ... ... | X87/11047 | 1 | 1 |
| 13 | Reverse Shaft Spur Gear Key ... ... ... ... ... | X99/3288 | 1 | 1 |
| 14 | Sliding Sleeve Key ... ... ... ... ... | X99/2327 | 1 | 1 |
| 15 | Countersunk Head Screw $\frac{1}{4}$" BSF ... ... ... ... | X99/8997 | 1 | 1 |
| 16 | Half Coupling or Pinion Key ... ... ... ... ... | X99/3856 | 1 | 1 |
| 17 | Joint Ring ... ... ... ... ... ... ... | 12-15-483 | 1 | 1 |
| 18 | Joint ... ... ... ... ... ... ... ... | X87/11820 | 1 | 1 |
| 19 | Ball Bearing Housing ... ... ... ... ... ... | 12-15-482 | 1 | 1 |
| 20 | Bolt—$\frac{1}{2}$" Whit. ... ... ... ... ... ... ... | 27-426 | 3 | 3 |
| 21 | Spring Washer ... ... ... ... ... ... ... | 13-22-350 | 3 | 3 |
| 22 | Nut—$\frac{1}{2}$" Whit. ... ... ... ... ... ... ... | 27-4 | 3 | 3 |
| 23 | Ball Bearing (Direct Drive only) ... ... ... ... | X99/3989 | 1 | 1 |
| 24 | Locating Ring Nut ... ... ... ... ... ... | X87/11300 | 1 | 1 |
| 25 | Allen Setscrew $\frac{1}{4}$" BSF ... ... ... ... ... ... | X99/5203 | 1 | 1 |
| 26 | Weston Seal ... ... ... ... ... ... ... | X99/2331 | 1 | 1 |
| 27 | Half Coupling (Direct Drive only) ... ... ... ... | X87/11101 | 1 | 1 |
| 28 | Pinion Retaining Nut Washer ... ... ... ... ... | X87/11200 | 1 | 1 |
| 29 | Pinion or Coupling Retaining Nut ... ... ... ... | X87/11980 | 1 | 1 |
| 30 | Split Pin ... ... ... ... ... ... ... | X99/2673 | 1 | 1 |
| 31 | Tail Shaft Half Coupling (Direct Drive only) ... ... | X87/11861 | 1 | 1 |
| 32 | Coupling Bolt (Direct Drive only) ... ... ... ... | X87/19330 | 4 | 4 |
| 33 | Coupling Bolt Nut ... ... ... ... ... ... | X99/5358 | 4 | 4 |
| 34 | Clutch Body Bush (large) ... ... ... ... ... | X87/11110 | 1 | 1 |
| 35 | Clutch Shaft Nut ... ... ... ... ... ... | X87/11063 | 1 | 1 |
| 36 | Countersunk Head Screw—$\frac{5}{16}$" BSF ... ... ... ... | X99/2640 | 3 | 3 |
| 37 | Clutch Shaft Spur Gear ... ... ... ... ... | X87/11053 | 1 | 1 |
| 38 | Clutch Spider Spur Gear Key (Inner) ... ... ... | X99/3289 | 1 | 1 |
| 39 | Clutch Body ... ... ... ... ... ... ... | 294-40300 | 1 | 1 |
| 40 | Spur Pinion Shaft Locking Screw ... ... ... ... | X87/14521 | 4 | 4 |
| 41 | Clutch Body Key ... ... ... ... ... ... | X87/11120 | 2 | 2 |
| 42 | Clutch Body Key Socket Head Screw $\frac{1}{4}$" BSF ... ... | X99/8996 | 4 | 4 |
| 43 | Spur Pinion Stepped ... ... ... ... ... | X87/11141 | 2 | 2 |
| 44 | Spur Pinion Bush ... ... ... ... ... ... | X87/11710 | 4 | 4 |
| 45 | Spur Pinion Shaft ... ... ... ... ... ... | X87/11161 | 4 | 4 |
| 46 | Spur Pinion Shaft Oil Hole Plug ... ... ... ... | X87/11181 | 4 | 4 |
| 47 | Spur Pinion ... ... ... ... ... ... ... | X87/11131 | 2 | 2 |
| 48 | Clutch Body Bush (small) ... ... ... ... ... | X87/11090 | 1 | 1 |
| 49 | Clutch Body Bush Joint Screw—3/16" B.S.F. ... ... | X99/4131 | 1 | 1 |
| 50 | Clutch Spider ... ... ... ... ... ... | 294-40340 | 1 | 1 |
| 51 | Clutch Spider Key ... ... ... ... ... ... | X87/11210 | 2 | 2 |

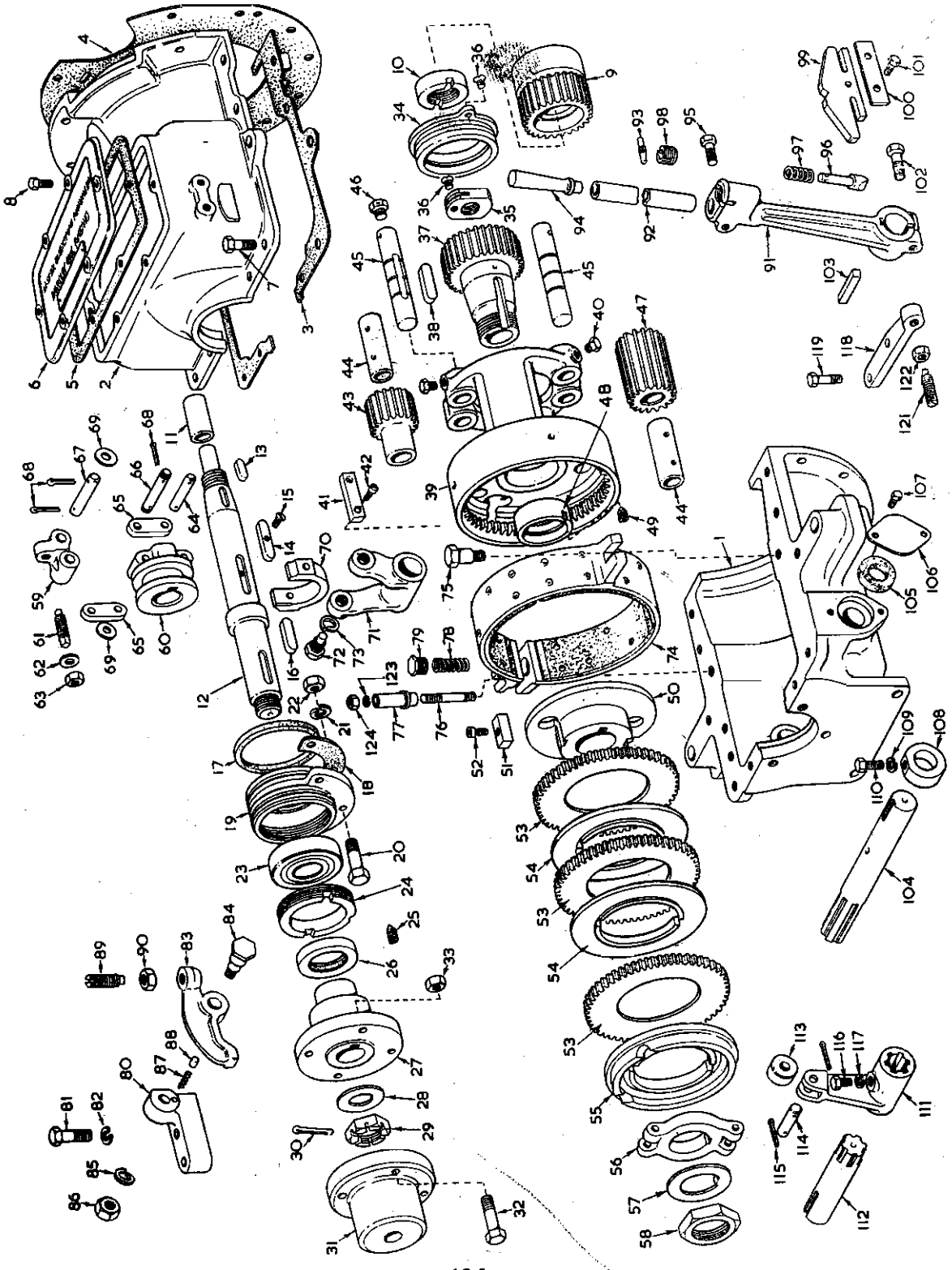
# REVERSE GEAR



# Reverse Gear–(Cont.)

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 52 | Clutch Spider Key Socket Head Screw | X99/8996 | 2 | 2 |
| 53 | Clutch Plate (large) | 294-40320 | 3 | 3 |
| 54 | Clutch Plate (small) | 294-40310 | 2 | 2 |
| 55 | Clutch Gripping Plate | 294-40330 | 1 | 1 |
| 56 | Toggle Lever Plate | X87/11250 | 1 | 1 |
| 57 | Toggle Lever Plate Nut Locking Plate | X87/11270 | 1 | 1 |
| 58 | Toggle Lever Plate Nut | X87/11260 | 1 | 1 |
| 59 | Toggle Lever | X87/11291 | 2 | 2 |
| 60 | Sliding Sleeve | X87/11341 | 1 | 1 |
| 61 | Toggle Lever Screw | X87/11311 | 2 | 2 |
| 62 | Toggle Lever Screw Washer | X99/2577 | 2 | 2 |
| 63 | Locknut—7/16" B.S.F. | X99/2467 | 2 | 2 |
| 64 | Sliding Sleeve Link Pin | X87/11332 | 2 | 2 |
| 65 | Sliding Sleeve Link | X87/11322 | 4 | 4 |
| 66 | Toggle Lever Link Pin | 294-3029 | 2 | 2 |
| 67 | Toggle Lever Fulcrum Pin | X87/11282 | 2 | 2 |
| 68 | Split Pin | X99/2454 | 14 | 14 |
| 69 | Link Pin Washer | X99/1704 | 10 | 10 |
| 70 | Sliding Sleeve Fork Lever Die | X87/11371 | 1 | 1 |
| 71 | Sliding Sleeve Fork Lever | X87/11383 | 1 | 1 |
| 72 | Sliding Sleeve Die Screw | X87/11362 | 2 | 2 |
| 73 | Spring Washer | X99/2577 | 2 | 2 |
| 74 | Brake Band Lining Assembly, complete | 294-40240 | 1 | 1 |
| | Brake Band | 294-39811 | 1 | 1 |
| | Brake Band Lining | 294-39820 | 3 | 3 |
| | Brake Band Lining Rivet | 294-40250 | 21 | 21 |
| 75 | Brake Band Position Screw | X87/11831 | 1 | 1 |
| 76 | Brake Band Position Stud | 27-769 | 1 | 1 |
| | Brake Band Position Spring Washer | 27-984 | 1 | 1 |
| | Brake Band Position Nut—7/16" Whit. | 27-4 | 1 | 1 |
| 77 | Brake Band Position Sleeve | 294-39850 | 1 | 1 |
| 78 | Brake Band Spring | 2-1864 | 1 | 1 |
| 79 | Brake Band Spring Cap | 294-39860 | 1 | 1 |
| 80 | Brake Band Lever Bracket (Standard rotation) | X87/11733 | 1 | 1 |
| | Brake Band Lever Bracket (Rev. rotation) | X87/11721 | 1 | 1 |
| 81 | Brake Band Lever Bracket Set Screw—½" Whit. | 27-426 | 2 | 2 |
| 82 | Brake Band Lever Bracket Spring Washer | 27-394 | 2 | 2 |
| 83 | Brake Band Lever (Standard rotation) | 294-39870 | 1 | 1 |
| | Brake Band Lever (Reverse rotation) | 294-39880 | 1 | 1 |
| 84 | Brake Band Lever Fulcrum Pin | X87/11521 | 1 | 1 |
| 85 | Brake Band Lever Fulcrum Pin Washer | X99/2577 | 1 | 1 |
| 86 | Brake Band Lever Fulcrum Pin Locknut | X99/2470 | 1 | 1 |
| 87 | Locking Plunger Spring | X87/11760 | 1 | 1 |
| 88 | Lever Bracket Plunger | X87/11750 | 1 | 1 |
| 89 | Lever Adjusting Screw | X87/11512 | 1 | 1 |
| 90 | Lever Adjusting Screw Locknut—½" B.S.F. | X99/2468 | 1 | 1 |
| 91 | Reverse Lever Socket | X87/11663 | 1 | 1 |
| 92 | Reverse Lever | X87/11572 | 1 | 1 |
| 93 | Reverse Lever Locating Plunger Pin | X87/14680 | 1 | 1 |
| 94 | Reverse Lever Grip | X87/11672 | 1 | 1 |
| 95 | Reverse Lever Setscrew—¼" B.S.F. | X99/3645 | 1 | 1 |
| 96 | Reverse Lever Locating Plunger | X87/14670 | 1 | 1 |
| 97 | Reverse Lever Locating Plunger Spring | X99/5871 | 1 | 1 |
| 98 | Reverse Lever Locating Plunger Guide | X87/11970 | 1 | 1 |

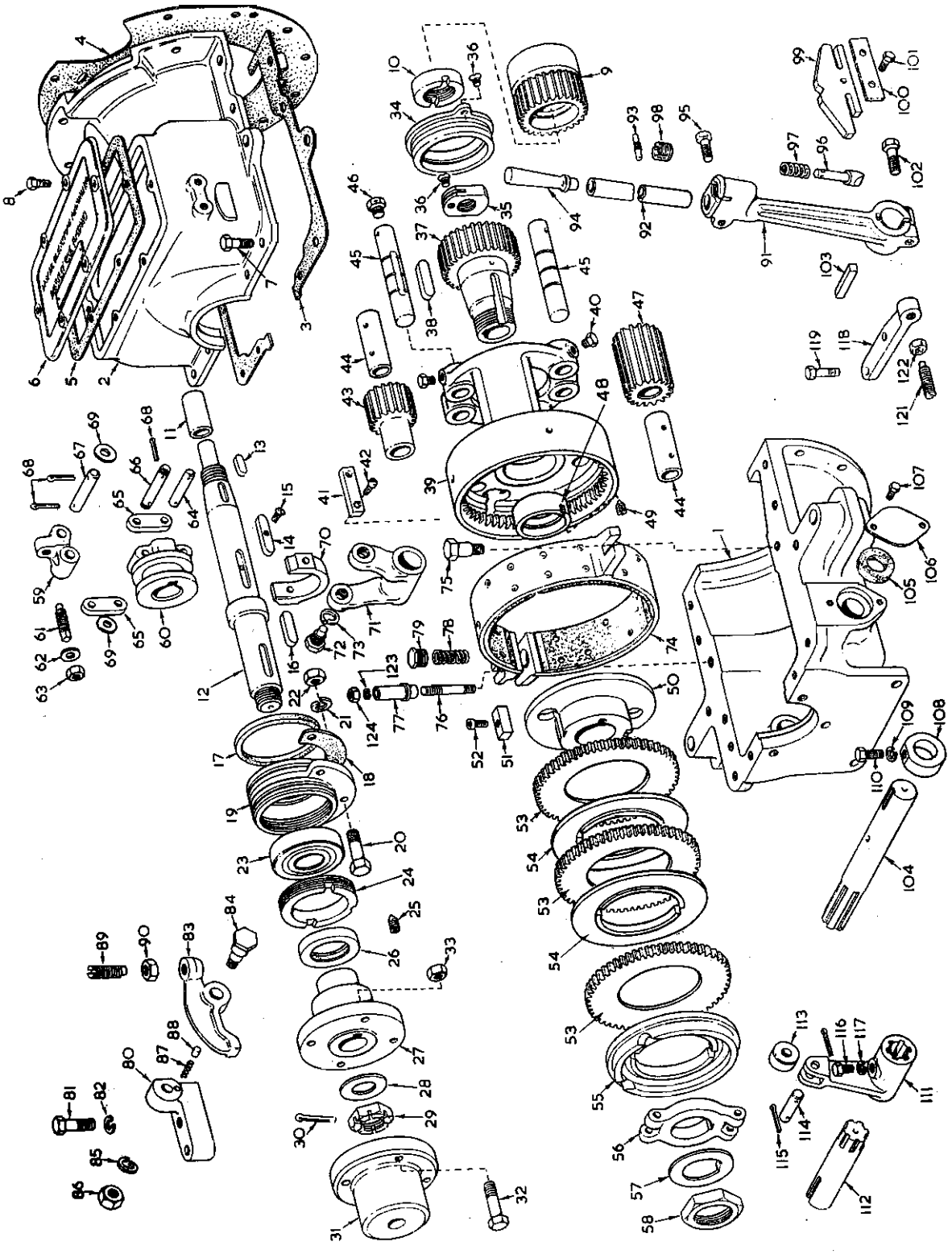
# REVERSE GEAR



# Reverse Gear-(Cont.)

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 99 | Reverse Lever Locating Plate ... ... ... ... | 24-5130 | 1 | 1 |
| | Reverse Lever Locating Plate Dowel Pin ... ... | 10-2-110 | 1 | 1 |
| 100 | Locating Plate Setscrew, Locking Plate ... ... ... | 24-5131 | 1 | 1 |
| 101 | Locking Plate Setscrew—$\frac{3}{8}$" Whit. ... ... ... ... | 27-203 | 2 | 2 |
| 102 | Reverse Lever Setscrew—$\frac{3}{8}$" B.S.F. ... ... ... | X99/3815 | 1 | 1 |
| 103 | Reverse Lever Key ... ... ... ... ... ... | X87/11790 | 1 | 1 |
| 104 | Fork Lever Cross Shafts ... ... ... ... ... | X87/11392 | 1 | 1 |
| 105 | Felt Washer ... ... ... ... ... ... ... | 27-1094 | 1 | 1 |
| 106 | Felt Washer Retaining Plate ... ... ... ... | 296-515 | 1 | 1 |
| 107 | Felt Washer Retaining Plate Setscrew—5/16" Whit. ... | 27-150 | 4 | 4 |
| 108 | Cross Shaft Collar ... ... ... ... ... ... | X87/11411 | 1 | 1 |
| 109 | Cross Shaft Collar Spring Washer ... ... ... | X99/2573 | 1 | 1 |
| 110 | Cross Shaft Collar Setscrew—7/16" Whit. ... ... ... | 27-1338 | 1 | 1 |
| 111 | Brake Band Roller Lever (Standard rotation) ... ... | X87/11431 | 1 | 1 |
| | Brake Band Roller Lever (Rev. rotation) ... ... | X87/11441 | 1 | 1 |
| 112 | Lever Cross Shaft ... ... ... ... ... ... | X87/11442 | 1 | 1 |
| 113 | Brake Band Lever Roller ... ... ... ... ... | X87/11460 | 1 | 1 |
| 114 | Lever Roller Pin ... ... ... ... ... ... | X87/11472 | 1 | 1 |
| 115 | Split Pin ... ... ... ... ... ... ... | X99/2454 | 12 | 12 |
| 116 | Cross Shaft Locating Screw ... ... ... ... | X87/11451 | 2 | 2 |
| 117 | Spring Washer ... ... ... ... ... ... | X99/2573 | 1 | 1 |
| 118 | Reverse Lever Stop ... ... ... ... ... ... | 11-13-792 | 1 | 1 |
| 119 | Reverse Lever Stop Setscrew ... ... ... ... | 27-1883 | 2 | 2 |
| | Locking Wire 16 S.W.G. x 5" long ... ... ... | X99/5866 | 4 | 4 |
| | No. 6 Drive Pins ... ... ... ... ... ... | X99/1612 | 2 | 2 |
| | Reverse Gear Number Plate ... ... ... ... | X87/11890 | 1 | 1 |
| | Warning Plate ... ... ... ... ... ... | 27-3943 | 1 | 1 |
| | Warning Plate Screws ... ... ... ... ... | 64/7175/1 | 2 | 2 |
| 121 | Adjusting Screw for Reverse Lever Stop ... ... ... | X87/11512 | 1 | 1 |
| 122 | Adjusting Screw Lock Nut ... ... ... ... ... | X99/2468 | 1 | 1 |
| | SPECIAL TOOLS | | | |
| | Clutch Shaft Nut Spanner ... ... ... ... ... | X87/11920 | 1 | 1 |
| | Crankshaft Nut Spanner ... ... ... ... ... | X87/11940 | 1 | 1 |
| | Spanner Tommy Bar ... ... ... ... ... | X87/11930 | 1 | 1 |

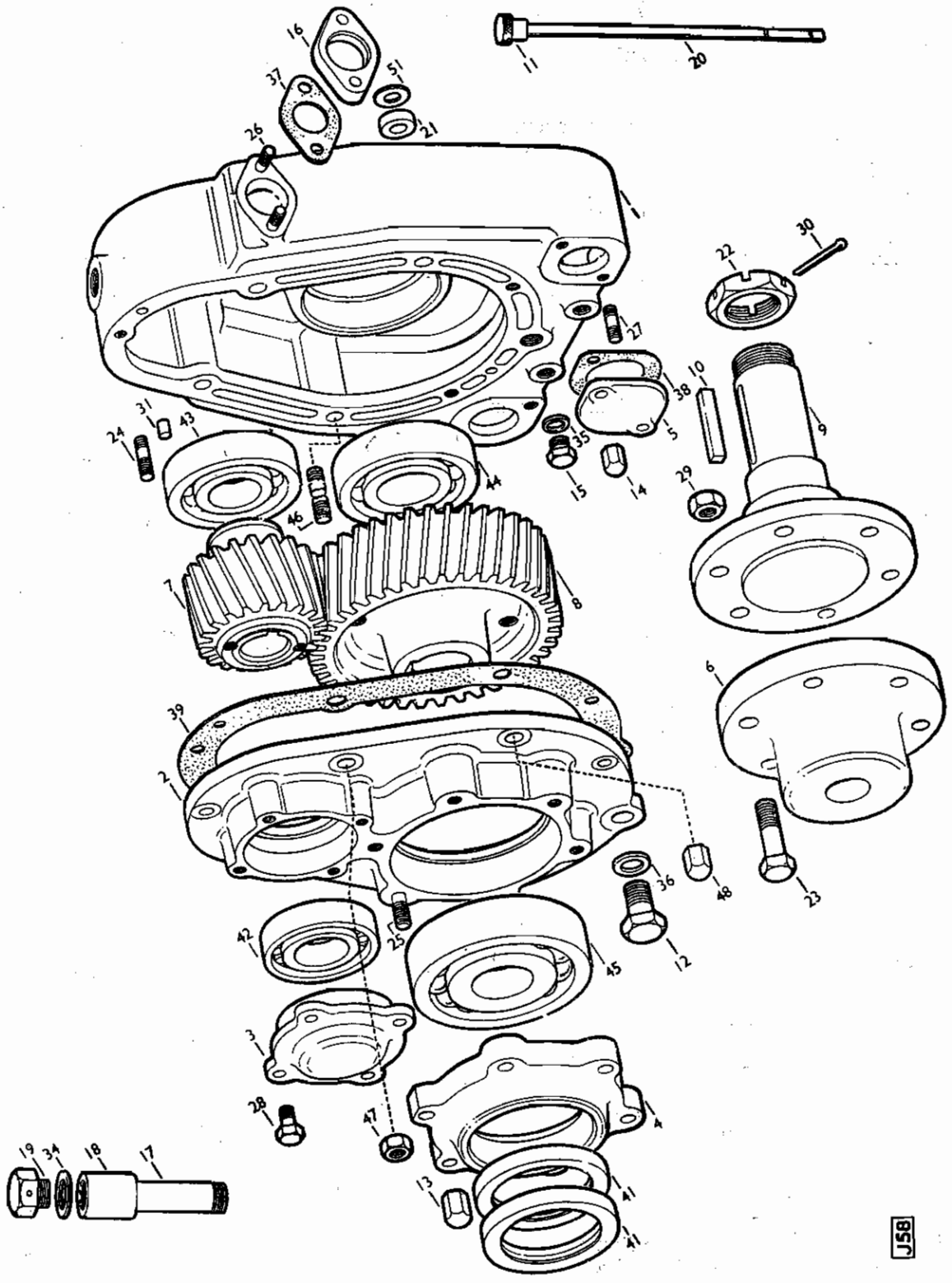
# REVERSE GEAR



# 2 : 1 Reduction Gear

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 1 | Gear Casing | X87/17011 | 1 | 1 |
| 2 | Gear Casing Cover | X87/17020 | 1 | 1 |
| 3 | Reversing Shaft End Cover | X87/17050 | 1 | 1 |
| 4 | Secondary Shaft End Cover | X87/17170 | 1 | 1 |
| 5 | Cover for Water Jacket | X87/10190 | 2 | 2 |
| 6 | Tail Shaft Half Coupling | X87/11870 | 1 | 1 |
| 7 | 20 Teeth Pinion } only supplied | 294-38480 | 1 | 1 |
| 8 | 41 Teeth Gear } together | 294-38490 | 1 | 1 |
| 9 | Secondary Shaft | X87/17120 | 1 | 1 |
| 10 | Key | X99/3884 | 1 | 1 |
| 11 | Dipstick Knob | X87/10260 | 1 | 1 |
| 12 | Oil Drain Plug | X87/10180 | 1 | 1 |
| 13 | Cap Nut $\frac{3}{8}$" B.S.F. | X99/2195 | 9 | 9 |
| 14 | Cap Nut 5/16" B.S.F. | X99/2194 | 8 | 8 |
| 15 | Water Drain Plug | X99/5844 | 2 | 2 |
| | Water Pipe—Reduction Gear to Pump | 11-15-554 | 1 | 1 |
| 16 | Flange | X87/10280 | 1 | 1 |
| | Nut | 65-103 | 1 | 1 |
| | Nipple | 11-13-252 | 1 | 1 |
| | Water Pipe—Inlet to Reduction Gear—1.112" O.D. x 6' Copper Pipe | 11-13-947 | 1 | 1 |
| 17 | Breather Pipe | X87/10320 | 1 | 1 |
| 18 | Breather Pipe Socket | X99/1376 | 1 | 1 |
| 19 | Breather Pipe Plug | X99/5843 | 1 | 1 |
| 20 | Dipstick | X87/10210 | 1 | 1 |
| 21 | Distance Piece | X87/10270 | 2 | 2 |
| 22 | Secondary Shaft Nut | X87/10141 | 1 | 1 |
| 23 | Coupling Bolt | X87/11880 | 6 | 6 |
| 24 | Gear Casing Cover Stud | X99/1802 | 3 | 3 |
| 25 | Secondary Shaft End Cover Stud | X99/1752 | 6 | 6 |
| 26 | Water Flange Stud | X99/1850 | 4 | 4 |
| 27 | Water Jacket Cover Stud | X99/1884 | 4 | 4 |
| 28 | End Cover Setscrew | X99/3224 | 4 | 4 |
| 29 | Coupling Bolt Nut | X99/5358 | 6 | 6 |
| 30 | Split Pin | X99/2663 | 1 | 1 |
| 31 | Dowel Pin $\frac{3}{8}$" | X99/3567 | 2 | 2 |
| | Drive Pin | X99/1612 | 2 | 2 |
| 33 | Reduction Gear Number Plate | X87/10310 | 1 | 1 |
| 34 | Breathing Pipe Plug Joint | X99/5845 | 1 | 1 |
| 35 | Water Drain Plug Joint | X99/5846 | 2 | 2 |
| 36 | Oil Drain Plug Joint | X99/2210 | 1 | 1 |
| 37 | Water Flange Joint | X87/10290 | 2 | 2 |
| 38 | Water Jacket Cover Joint | X99/2214 | 2 | 2 |
| 39 | End Cover Joint | X99/2215 | 1 | 1 |
| 41 | Weston Seal | X99/1749 | 2 | 2 |
| 42 | Roller Bearing $1\frac{1}{2}$" x $3\frac{1}{4}$" x $\frac{3}{4}$" | X99/3985 | 1 | 1 |
| 43 | Ball Bearing $1\frac{1}{2}$" x $3\frac{1}{4}$" x $\frac{15}{16}$" | X99/4027 | 1 | 1 |
| 44 | Ball Bearing 45 mm. x 100 mm. x 25 mm. | X99/2677 | 1 | 1 |
| 45 | Double Purpose Bearing $2\frac{1}{4}$" x 5" x $1\frac{1}{4}$" | X99/3984 | 1 | 1 |
| 46 | Stud $\frac{1}{2}$" Whit. x $6\frac{1}{2}$" | 27-1950 | 4 | 4 |
| 47 | Nut $\frac{1}{2}$" Whit. | 27-4 | 2 | 2 |
| 48 | Cap Nut $\frac{1}{2}$" Whit. | 27-567 | 2 | 2 |
| | Spring Washer | 27-394 | 2 | 2 |
| 51 | Packing Shim | G/4828 | 2 | 2 |

# 2 : 1 REDUCTION GEAR



# 3 : 1 Reduction Gear

| Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|
| Gear Case | 294-3748 | 1 | 1 |
| Gear Case End Cover | 294-3749 | 1 | 1 |
| Gear Case Assembly : comprising above | 294-3747 | 1 | 1 |
| Paper Joint | X87/11820 | 2 | 2 |
| Pinion | 294-3756 | 1 | 1 |
| Roller Bearing 1½" x 3¼" x 15/16" | 294-3758 | 1 | 1 |
| Ball Bearing 1½" x 3¼" x 15/16" | X99/4027 | 1 | 1 |
| Paper Joint | 294-3759 | 1 | 1 |
| Bearing Housing Cap | 294-3760 | 1 | 1 |
| Roller Bearing 2" x 4½" x 4 1/16" | 294-3763 | 1 | 1 |
| Secondary Shaft | 294-3750 | 1 | 1 |
| Seeger Circlip (4½") | 294-3764 | 1 | 1 |
| Gear Wheel | 294-3754 | 1 | 1 |
| Gear Wheel Key | X99/3884 | 1 | 1 |
| Secondary Shaft Nut | 294-3766 | 1 | 1 |
| Thrust Bearing 60 mm. x 150 mm. x 35 mm. | X99/4113 | 1 | 1 |
| Oil Seal | X99/4129 | 2 | 2 |
| Secondary Shaft end cover | 294-3753 | 1 | 1 |
| Oil Drain Plug | X87/10180 | 1 | 1 |
| Oil Drain Plug Joint | 291-3063 | 1 | 1 |
| Water Drain Plug | X99/5844 | 2 | 2 |
| Water Drain Plug Joint | 13-22-350 | 2 | 2 |
| Water Jacket Cover | X87/10190 | 2 | 2 |
| Joint | X99/2214 | 2 | 2 |
| Dipstick | 294-3762 | 1 | 1 |
| Dipstick Knob | X87/10260 | 1 | 1 |
| Stud (Gear Case to Rev. Gear) | 27-4449 | 2 | 2 |
| Stud (Gear Casing) | X99/2042 | 5 | 5 |
| Stud (Secondary Shaft End Cover) | X99/1752 | 6 | 6 |
| Setscrew for bearing cap | X99/3224 | 4 | 4 |
| Stud for water flange | X99/1850 | 4 | 4 |
| Cap Nut ⅜" B.S.F. | X99/2195 | 11 | 11 |
| Cap Nut 5/16" B.S.F. | X99/2194 | 8 | 8 |
| Joint Ring | 12-15-483 | 1 | 1 |
| Dowel Pin | 291-2586 | 2 | 2 |
| Water Flange | X87/10280 | 2 | 2 |
| Water Flange Joint | X87/10290 | 2 | 2 |
| Stud (for Water Jacket Cover) 5/16" | X99/1884 | 4 | 4 |
| Number Plate | X87/10310 | 1 | 1 |
| Breather Pipe | X87/10320 | 1 | 1 |
| Breather Pipe Socket | X99/1376 | 1 | 1 |
| Breather Pipe Plug | X99/5843 | 1 | 1 |
| Breather Pipe Plug Joint | 13-21-778 | 1 | 1 |
| Packing Shim | G4828 | 2 | 2 |
| Number Plate Drive Pin | X99/1612 | 2 | 2 |
| Half Coupling | X87/19340 | 1 | 1 |
| Half Coupling Bolt | X87/19330 | 6 | 6 |
| Half Coupling Nut | X99/5358 | 6 | 6 |
| Split Pin Secondary Shaft Nut ⅛" | 27-4040 | 1 | 1 |
| Stud ½" Whit. x 6½" | 27-1950 | 2 | 2 |
| Cap Nut | 27-567 | 2 | 2 |
| Plain Nut | 27-4 | 2 | 2 |
| Spring Washer | 27-394 | 2 | 2 |
| Cap Nut ½" B.S.F. | X99/2197 | 2 | 2 |
| Water Pipe—Red. Gear to Pump | 12-13-946 | 1 | 1 |
| Water Pipe—Inlet to Red. Gear | 11-13-947 | 1 | 1 |

# Temperature Control Valve (Diaphragm Type)

| Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|
| Temperature Control Valve Complete Assy. | 571-10180 | 1 | 1 |
| Valve Cover | 291-40560 | 1 | 1 |
| Valve Body | 291-40570 | 1 | 1 |
| Valve Cover Screws | 270-463 | 6 | 6 |
| Valve Cover Washers | 616-1601 | 6 | 6 |
| Valve Diaphragm | 291-40580 | 3 | 3 |
| Valve Diaphragm Clamping Plate | 291-40650 | 1 | 1 |
| Valve Diaphragm Clamping Plate Nut | 270-14 | 1 | 1 |
| Valve Stem | 291-40590 | 1 | 1 |
| Valve Lifting Knob | 291-40600 | 1 | 1 |
| Valve Plate | 291-3483 | 1 | 1 |
| Valve Spindle | 291-40610 | 1 | 1 |
| Valve Plate Screws | 64-3552/5 | 2 | 2 |
| Valve Spindle Packing | 520-7517 | 1 | 1 |
| Valve Spindle Gland Nut | 520-7605 | 1 | 1 |
| Washer for Clamping Plate | 64-6618/8 | 1 | 1 |
| Valve Spring | 291-40620 | 1 | 1 |
| Valve Control Door | 291-3497 | 1 | 1 |
| Valve Control Door Pin | 201-11730 | 1 | 1 |
| Valve Control Door Pin Stop | 291-3484 | 1 | 1 |
| Valve Indicator Plate | 291-40710 | 1 | 1 |
| Valve Indicator Plate Dowels | 27-707 | 2 | 2 |
| Packing Washer | 291-40630 | As req. | |
| ½" BSP Plug ) for Engines without Joint ) W. C. Manifold | | | |

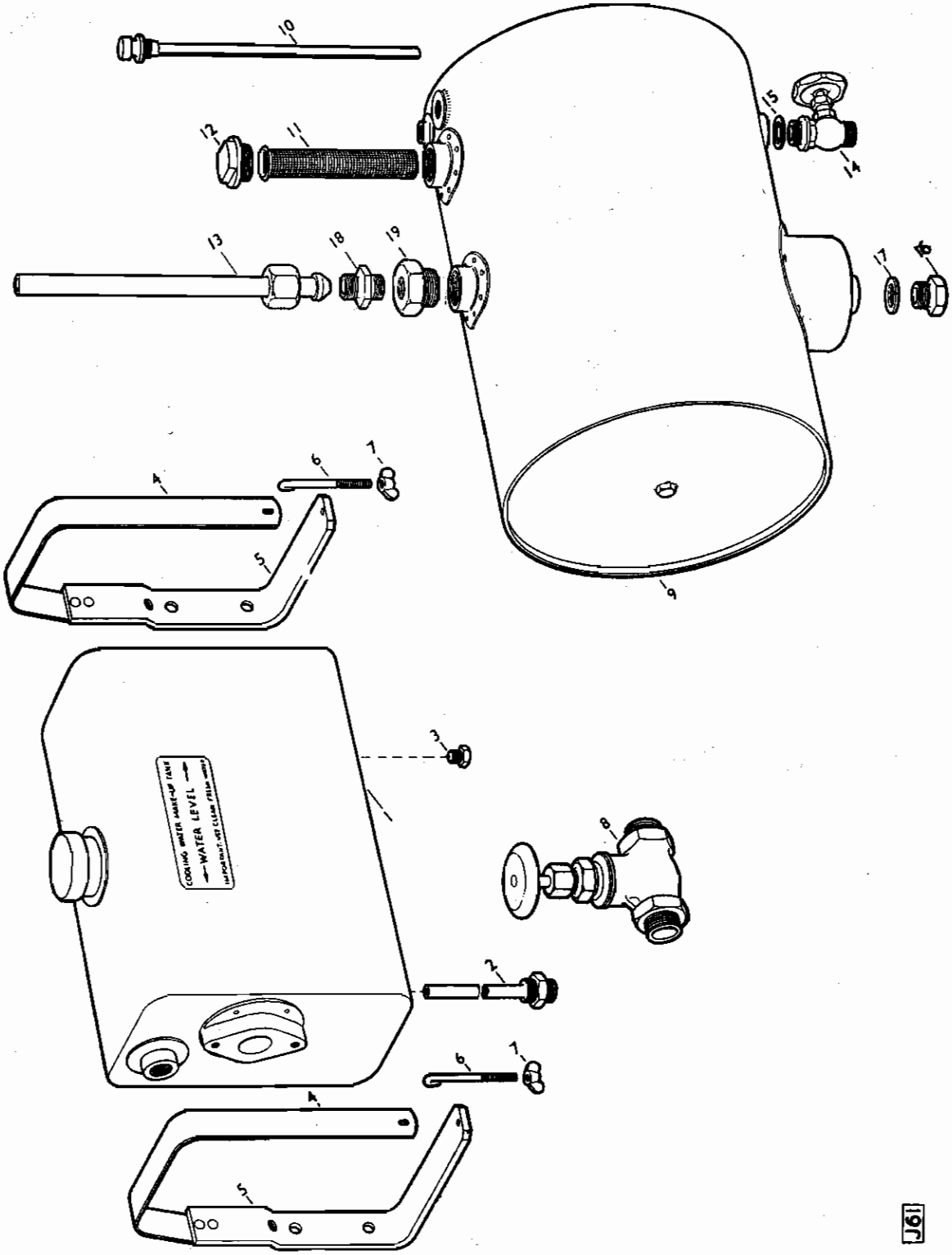
# Temperature Control Valve–JKM Plunger Type

| | | | |
|---|---|---|---|
| Temperature Control Valve comp. | 571-10040 | 1 | 1 |
| Body | 291-38380 | 1 | 1 |
| Plunger | 291-38390 | 1 | 1 |
| Spring | 291-38400 | 1 | 1 |
| Cover | 291-38410 | 1 | 1 |
| Cover Joint | 291-38430 | 1 | 1 |
| Cover Screws | 270-103 | 3 | 3 |
| Spring Washer | 27-717 | 3 | 3 |
| Valve Plate | 291-3483 | 1 | 1 |
| Spindle | 291-3482 | 1 | 1 |
| Packing | 520-7517 | 1 | 1 |
| Gland Nut | 520-7605 | 1 | 1 |
| Control Lever | 291-3497 | 1 | 1 |
| Lever Pin | 201-11730 | 1 | 1 |
| Lever Stop | 291-3484 | 1 | 1 |
| Indicator Plate | 291-3485 | 1 | 1 |
| Dowel | 27-707 | 2 | 2 |
| Plug | 11-13-198 | 1 | 1 |
| Plug Joint | 12406 | 1 | 1 |
| Plate Screws | 64-3552/5 | 2 | 2 |
| Instruction Plate | 291-38420 | 1 | 1 |

# Fresh Water and Fuel Tanks

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 1 | Fresh Water Balance Tank | 616-1520 | 1 | 1 |
| 2 | Overflow and Vent Connection | 616-1522 | 1 | 1 |
| 3 | Drain Plug | 211-540 | 1 | 1 |
| 4 | Strap | 23-4979 | 2 | 2 |
| 5 | Bracket | 23-2154 | 2 | 2 |
| 6 | Hook Bolt | 8-7-103 | 2 | 2 |
| 7 | Wing Nut | 27-907 | 2 | 2 |
| 8 | 1 in. Gate Valve | 12-14-223 | 1 | 1 |
| 9 | Marine Fuel Tank (10 gallons) | 11-13-787 | 1 | 1 |
| 10 | Dipstick | 23-3198 | 1 | 1 |
| 11 | Filling Strainer | 11-13-888 | 1 | 1 |
| 12 | Filler Plug | 10-13-132 | 1 | 1 |
| 13 | Vent Pipe | 11-13-948 | 1 | 1 |
| 14 | Fuel Supply Valve | 10-7-50 | 1 | 1 |
| 15 | Joint | 12406 | 1 | 1 |
| 16 | Drain Plug | 12-21-917 | 1 | 1 |
| 17 | Joint | 12406 | 1 | 1 |
| 18 | Union | 12427 | 1 | 1 |
| 19 | Reducing Plug | 3128 | 1 | 1 |

# FRESH WATER AND FUEL TANKS

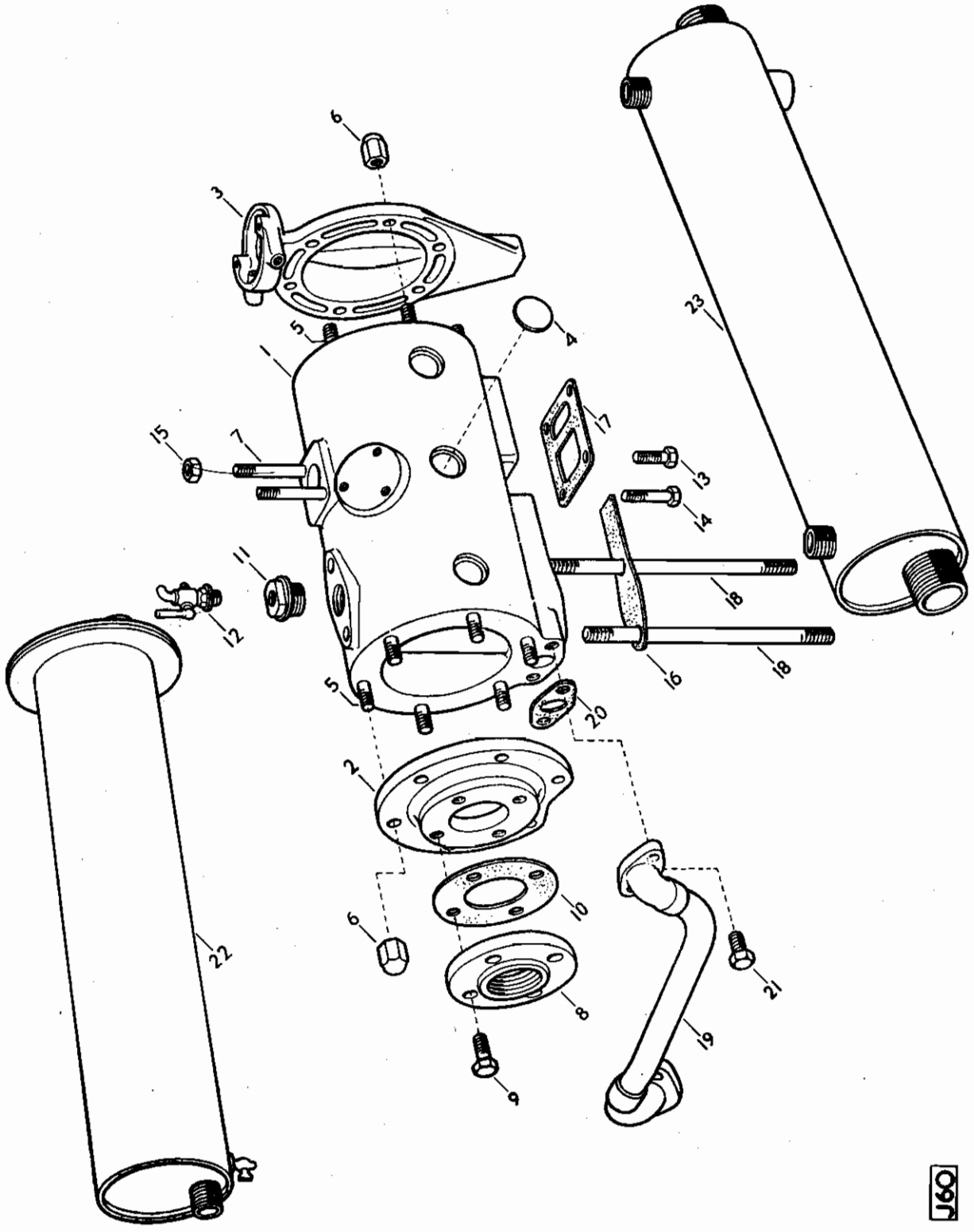



J61

# Silencers

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| | Engine Exhaust Silencer complete, comprising ... ... | 11-13-895c | 1 | 1 |
| 1 | Exhaust Silencer Body ... ... ... ... ... | 11-13-895 | 1 | 1 |
| 2 | Exhaust Silencer Outlet Cover ... ... ... ... | 11-13-148 | 1 | 1 |
| 3 | Exhaust Silencer S/Control Cover ... ... ... | 11-13-369 | 1 | 1 |
| 4 | Expansion Plug for Silencer ... ... ... ... | 27-801 | 8 | 8 |
| 5 | Stud (End Cover to Silencer) ... ... ... ... | 27-45 | 12 | 12 |
| 6 | Dome Nut Cover to Silencer ... ... ... ... | 27-1974 | 12 | 12 |
| 7 | Stud Starting Bracket to Silencer ... ... ... | 27-1362 | 2 | 2 |
| 8 | Silencer Exhaust Pipe Flange ... ... ... | 10-13-158 | 1 | 1 |
| 9 | Screw for ditto ... ... ... ... ... ... | 27-647 | 4 | 4 |
| 10 | Silencer Ex. Flange Joint ... ... ... ... ... | 11-13-422 | 1 | 1 |
| 11 | Plug for Vent Tap ... ... ... ... ... | 11-13-452 | 1 | 1 |
| 12 | Silencer Vent Tap ... ... ... ... ... | 5137 | 1 | 1 |
| 13 | Screw (Silencer to Ex. Manifold) ... ... ... ... | 27-68 | 2 | 2 |
| 14 | Screw (Silencer to Ex. Manifold) ... ... ... ... | 27-38 | 2 | 2 |
| 15 | Nut (Starting Bracket to Silencer) ... ... ... ... | 27-6 | 2 | 2 |
| 16 | Joint (Silencer to Crankcase) ... ... ... ... | 11-13-901 | 1 | 1 |
| 17 | Joint (Silencer to Manifold) ... ... ... ... | 11-13-206 | 1 | 1 |
| 18 | Stud (Silencer to Crankcase) ... ... ... ... ... | 27-1519 | 2 | 2 |
| 19 | Water Outlet Pipe to Crankcase ... ... ... ... | 11-13-900c | 1 | – |
| | Comprising :— | | | |
| | Water Outlet Elbow ... ... ... ... ... | 11-13-897 | 1 | – |
| | Water Outlet Pipe ... ... ... ... ... | 11-13-898 | 1 | – |
| | Water Inlet Elbow ... ... ... ... ... | 11-13-899 | 1 | – |
| | Water Outlet Pipe to Crankcase ... ... ... ... | 12-13-900c | – | 1 |
| | Comprising :— | | | |
| | Water Outlet Elbow ... ... ... ... ... | 11-13-897 | – | 1 |
| | Water Outlet Pipe ... ... ... ... ... | 11-13-898 | – | 1 |
| | Water Inlet Elbow ... ... ... ... ... | 11-13-899 | – | 1 |
| 20 | Joint for Outlet Elbow ... ... ... ... ... ... | 27-2068 | 1 | 1 |
| 21 | Screws for Outlet Elbow ... ... ... ... ... | 27-203 | 2 | 2 |
| 22 | Secondary Dry Silencer ... ... ... ... ... | 11-21-561 | 1 | 1 |
| 23 | Secondary W/C Silencer ... ... ... ... ... | 11-21-562 | 1 | 1 |

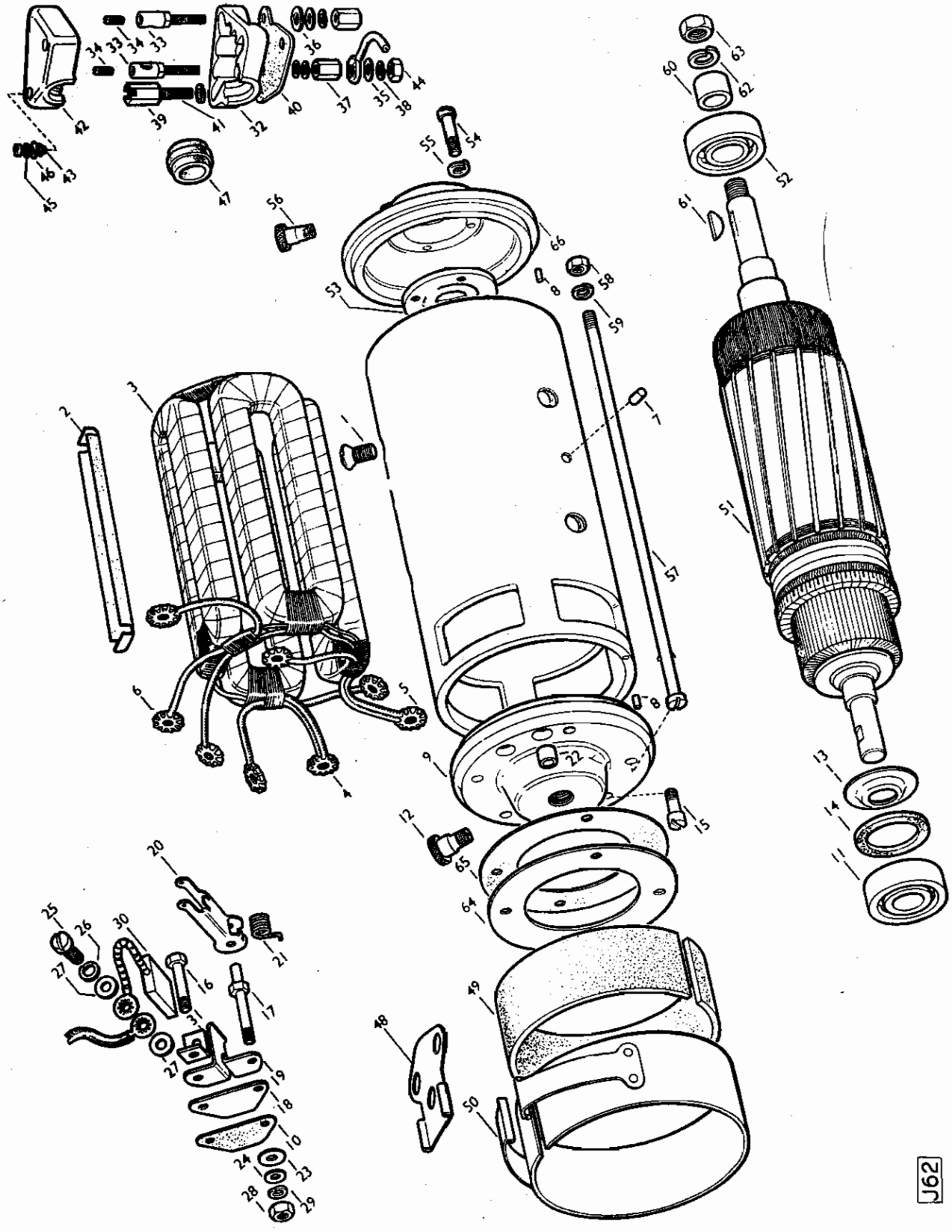
# SILENCERS



# Dynamo–JPM & JKM

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 1 | Screw securing Pole Piece | 5333A-99A | 8 | 8 |
| 2 | Pole Piece Insulator | 5603-62 | 8 | 8 |
| 3 | Field Coil Assembly | F.86 | Set | |
| 4 | Positive Brush Connector | 5603-202 | 1 | 1 |
| 5 | Negative Brush Connector | 5603-202A | 1 | 1 |
| 6 | Terminal, R.C. | 5459-189 | 2 | 2 |
| 7 | Dowel Pin for Yoke | 5314-76 | 1 | 1 |
| 8 | Locating Pin | 5265-11 | 2 | 2 |
| | Commutator End Shield, Assembled with Brushgear | 5603-117H | 1 | 1 |
| 9 | Commutator End Shield | 5603A-108 | 1 | 1 |
| 10 | Brush Holder Insulator | 5603-114 | 4 | 4 |
| 11 | Ballrace, Comm. End | RLS5 | 1 | 1 |
| 12 | Lubricator | 5244-31B | 1 | 1 |
| 13 | Oil Guard | 53/C2A | 1 | 1 |
| 14 | Felt Washer | 53/D2 | 1 | 1 |
| 15 | Cover Fixing Screw | NS16-10Z1 | 4 | 4 |
| 16 | Brush Holder Pillar | 5603-214 | 4 | 4 |
| 17 | Trigger Pillar | 5603A-213 | 4 | 4 |
| 18 | Back Plate | 5603A-113 | 4 | 4 |
| 19 | Brush Holder | 5603A-142A | 2 | 2 |
| 20 | Brush Trigger | 5603A-144 | 4 | 4 |
| 21 | Trigger Spring | 5561-16 | 8 | 8 |
| 22 | Insulating Bush | 5391-21A | 4 | 4 |
| 23 | Insulating Washer | 5137-5A | 8 | 8 |
| 24 | Insulating Washer | 5339-557 | 8 | 8 |
| 25 | Brush Screw | 5335-327 | 4 | 4 |
| 26 | Spring Washer | 5293-57 | 4 | 4 |
| 27 | Plain Washer | 5083A-1 | 4 | 4 |
| 28 | Nut | 5128A-8 | 8 | 8 |
| 29 | Spring Washer | 5001-23 | 8 | 8 |
| 30 | Brush | 5603-128 | 4 | 4 |
| 31 | Bracket | 5603-143A | 2 | 2 |
| 32 | Term. Box Base, Assembly | 5603-45 | 1 | 1 |
| | Term. Box Base, Assembly | 5603-34 | 1 | 1 |
| 33 | Terminals | 5603-37 | 3 | 3 |
| 34 | Terminal Screw | 5548A-43 | 3 | 3 |
| 35 | Plain Washer | 5068A-2 | 4 | 4 |
| 36 | Insulating Washer | 5339-340A | 1 | 1 |
| 37 | Distance Collar | 5339-224 | 2 | 2 |
| 38 | Spring Washer | 5293-57 | 3 | 3 |
| 39 | Terminal Nut | 5603A-43 | 3 | 3 |
| 40 | Packing Piece | 5603A-120 | 1 | 1 |
| 41 | Fixing Screw | 5603-39 | 2 | 2 |
| 42 | Terminal Box Lid | 5603A-183 | 1 | 1 |
| 43 | Lid Fixing Screw | 5337A-50 | 2 | 2 |
| 44 | Nut | 5270A-56 | 3 | 3 |
| 45 | Spring Washer | 5293-57 | 3 | 3 |
| 46 | Plain Washer | 5068A-2 | 3 | 3 |
| 47 | Cable Bush | 5603-44A | 1 | 1 |
| 48 | Cover Clip | 5603-101 | 1 | 1 |
| 49 | Cover Clip Packing | 5603-100 | 1 | 1 |
| 50 | Cover Band | 5603-105 | 1 | 1 |
| 51 | Armature, complete | A.335 | 1 | 1 |
| 52 | Driving End Ballrace | RLS7 | 1 | 1 |

# DYNAMO



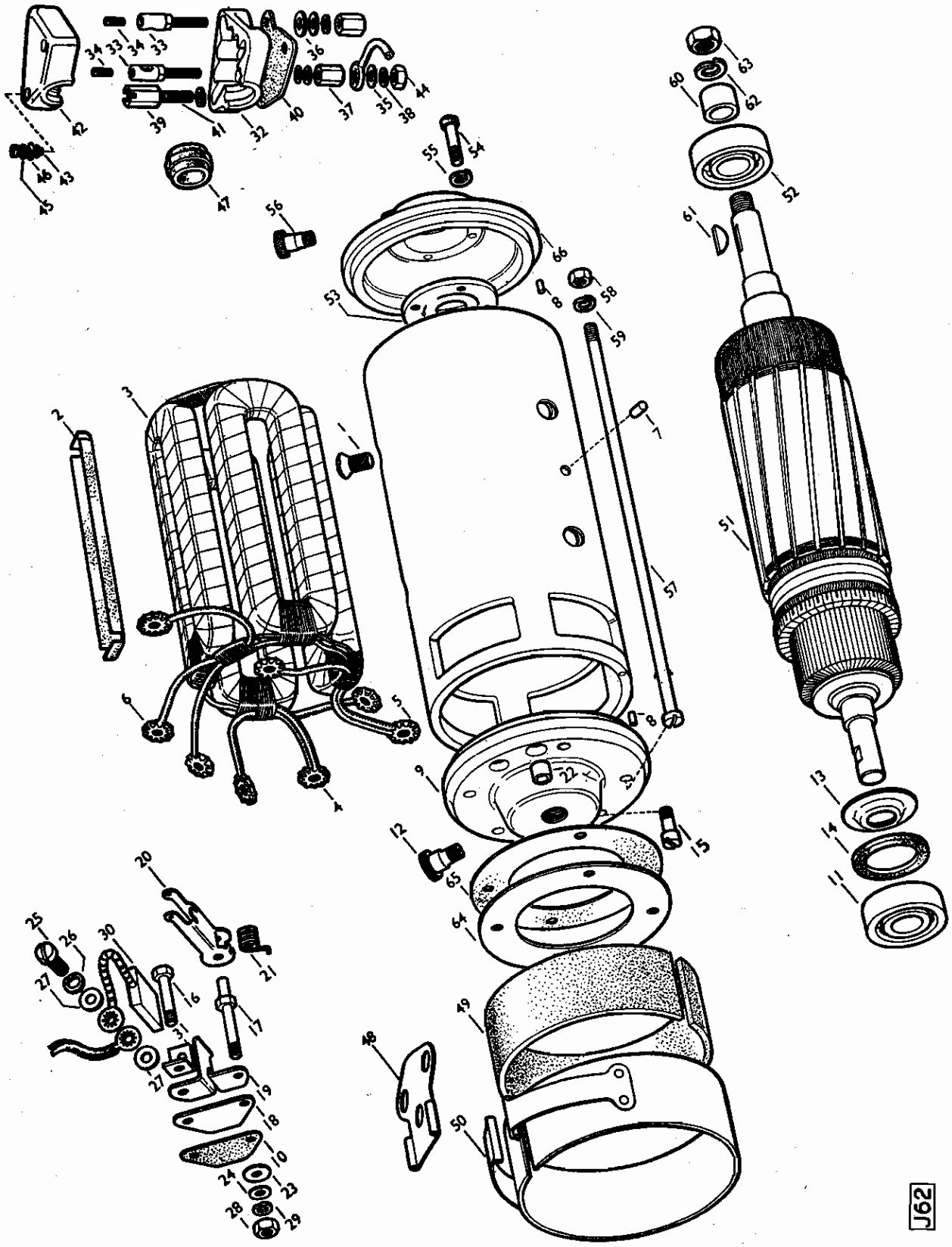
# Dynamo–(Cont.)

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 53 | Clamp Plate | 5603A-12 | 1 | 1 |
| 54 | Clamp Plate Screw | NS16-27Z1 | 3 | 3 |
| 55 | Spring Washer | 5244-22 | 9 | 9 |
| 56 | Driving End Lubricator | 5244-31B | 1 | 1 |
| 57 | Main Fixing Bolt | 5603-48 | 2 | 2 |
| 58 | Fixing Bolt Nut | 5072A-1 | 2 | 2 |
| 59 | Spring Washer | 5293-57 | 2 | 2 |
| 60 | Shaft Collar | 5603A-53 | 1 | 1 |
| 61 | Woodruff Key | NK1-8 | 1 | 1 |
| 62 | Spring Washer | 5001-49 | 1 | 1 |
| 63 | Shaft Nut | 5314-51 | 1 | 1 |
| 64 | Shield Cover | 5603A-63 | 1 | 1 |
| 65 | Cover Insulator | 5603-262 | 1 | 1 |
| 66 | Driving End Shield | 5603C-110 | 1 | 1 |

FOR DYNAMO COMPLETE

(See Page 90)

# DYNAMO

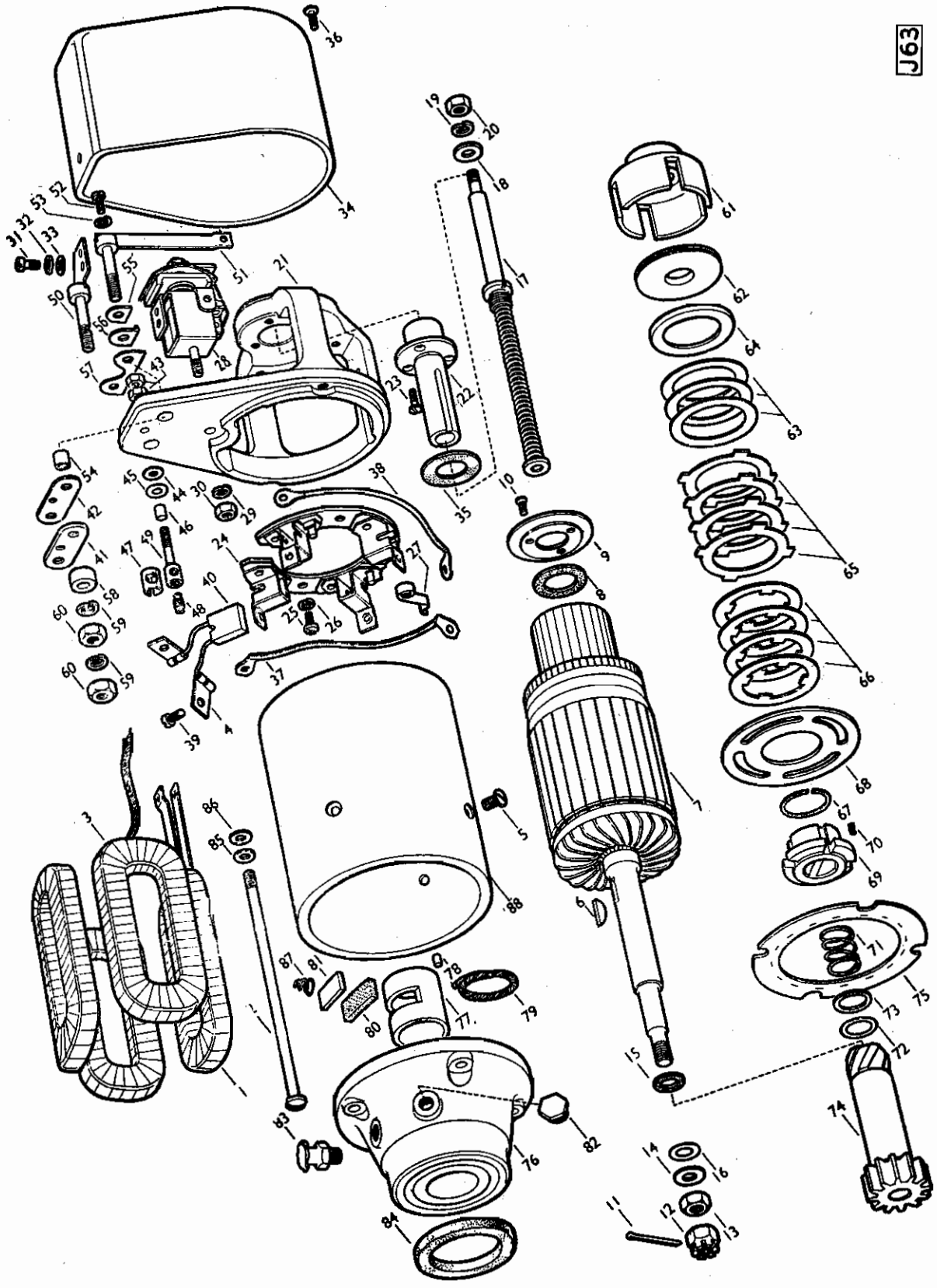


# Starter

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 1 | Main Field Coil | F.206 (set) | 1 | 1 |
| 2 | Main Fixing Bolt | 5333-94 | 4 | 4 |
| 3 | Auxiliary and Shunt Coil | F.211 (set) | 1 | 1 |
| 4 | End Tag | 5459-70 | 4 | 4 |
| 5 | Pole Screw | 5333-95 | 4 | 4 |
| 6 | Clutch Fixing Key | NK1-19 | 1 | 1 |
| 7 | Armature, wound complete | A.158 | 1 | 1 |
| 8 | Felt Packing Washer | 5339-316 | 1 | 1 |
| 9 | Tripping Plate | 5586-68 | 1 | 1 |
| 10 | Tripping Plate Screw | 5333-102 | 3 | 3 |
| 11 | Split Pin | 5549-47 | 1 | 1 |
| 12 | Shaft Locking Nut | 5330A-71 | 1 | 1 |
| 13 | Shaft Nut | 5330A-70 | 1 | 1 |
| 14 | Washer | 5339-139 | 1 | 1 |
| 15 | Felt Washer | 5339-281 | 1 | 1 |
| 16 | Shim | 5339A-312 | 1 | 1 |
| 17 | Armature Plunger | 5586-291 | 1 | 1 |
| 18 | Washer | 5339-72A | 1 | 1 |
| 19 | Spring Washer | 5293-57 | 1 | 1 |
| 20 | Nut | 5330-99A | 1 | 1 |
| | Commutator End Shield Essembly | 5586A-96A | 1 | 1 |
| 21 | Commutator End Shield | 5586A-5 | 1 | 1 |
| 22 | Commutator End Bearing | 5586-207 | 1 | 1 |
| 23 | Screw | 5333-93 | 3 | 3 |
| 24 | Brush Gear Base | 5586-37 | 1 | 1 |
| 25 | Fixing Screw for Base | NS19-12A | 3 | 3 |
| 26 | Spring Washer | 5293-57 | 3 | 3 |
| 27 | Brush Spring | 5586-10 | 4 | 4 |
| 28 | Solenoid Switch | BBNFA-11 | 1 | 1 |
| 29 | Spring Washer | 5001-31 | 1 | 1 |
| 30 | Nut | 5330-114A | 1 | 1 |
| 31 | Setscrew | NS16-10Z1 | 5 | 5 |
| 32 | Spring Washer | 5244-22 | 9 | 9 |
| 33 | Plain Washer | 5298A-10 | 5 | 5 |
| 34 | Commutator End Cover | 5586-83 | 1 | 1 |
| 35 | Thrust Washer | 5586-7 | 1 | 1 |
| 36 | Csk. Headed Screw | NS76-12Y | 2 | 2 |
| 37 | Neg. Brush Connector | 5586-203 | 1 | 1 |
| 38 | Pos. Brush Connector | 5586-266 | 1 | 1 |
| 39 | Fixing Screw | NS16-12Z1 | 4 | 4 |
| 40 | Brush, with Tag | 5586-12A | 4 | 4 |
| 41 | Terminal Plate, thick | 5586-52 | 1 | 1 |
| 42 | Terminal Plate, thin | 5586-51 | 1 | 1 |
| 43 | Nut | 5330A-80 | 2 | 2 |
| 44 | Plain Washer | 5348-90 | 1 | 1 |
| 45 | Insulating Washer | 74-E7 | 1 | 1 |
| 46 | Insulating Bush | 5587-1A | 1 | 1 |
| 47 | Insulating Cover | 5551-144 | 1 | 1 |
| 48 | Terminal Screw | 5549-206 | 1 | 1 |
| 49 | Solenoid Terminal | 5549-198 | 1 | 1 |
| 50 | Pos. Terminal Connector | 5586-45 | 1 | 1 |
| 51 | Neg. Terminal Connector | 5586-47 | 1 | 1 |
| 52 | Solenoid Connector Screw | NS7-6Z1 | 1 | 1 |
| 53 | Spring Washer | 5293-39 | 1 | 1 |

# STARTER

J63

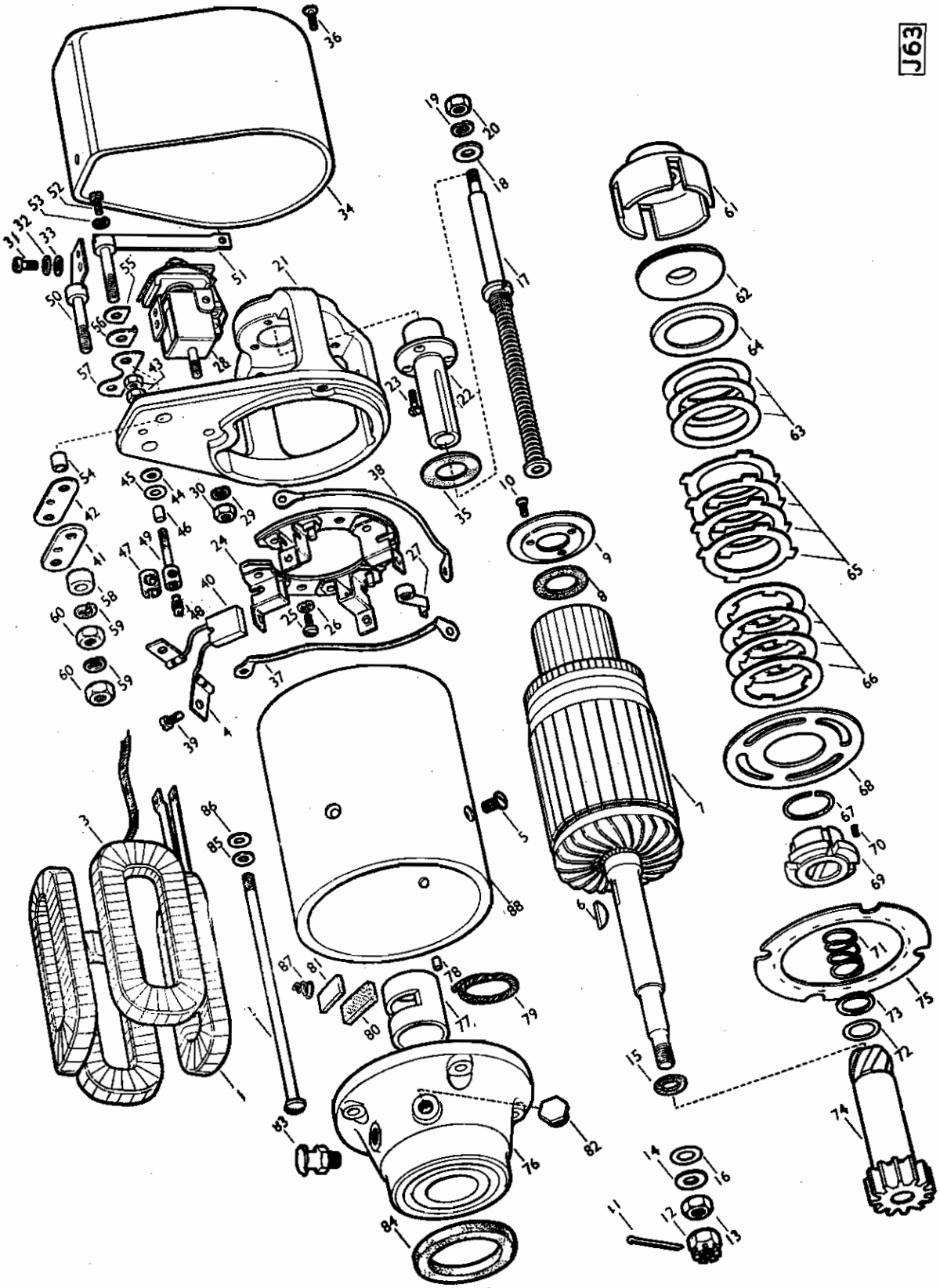


# Starter–(Cont.)

| Item No. | Description | Part No. | Cylinders 2 | 3 |
|---|---|---|---|---|
| 54 | Insulating Bush | 5587-2A | 2 | 2 |
| 55 | Terminal Locking Plate | 5549A-199 | 2 | 2 |
| 56 | Terminal Insulating Plate | 5549-190 | 2 | 2 |
| 57 | Terminal Locking Plate | 5549A-192 | 1 | 1 |
| 58 | Terminal Distance Piece | 5549-191 | 2 | 2 |
| 59 | Spring Washer | 5001-26 | 4 | 4 |
| 60 | Terminal Nut | 5330-79 | 4 | 4 |
| | Clutch Assembly | 5586-123A | 1 | 1 |
| 61 | Clutch Outer Race | 5586A-111 | 1 | 1 |
| 62 | Pressure Plate | 5549-38 | 2 | 2 |
| 63 | Shim Plate | 5549-97/8 | As reqd. | |
| 64 | Back Ring | 5549-36 | 1 | 1 |
| 65 | Clutch Plate | 5549-96 | 4 | 4 |
| 66 | Steel Clutch Plate | 5549-95 | 5 | 5 |
| 67 | Spring Ring | 5586-131 | 1 | 1 |
| 68 | Clutch Plate (large) | 5586-115 | 1 | 1 |
| 69 | Clutch Inner Race | 5586-113E | 1 | 1 |
| 70 | Pressure Spring | 5549-253B | 2 | 2 |
| 71 | Pinion Spring | 5549-99 | 1 | 1 |
| 72 | Pinion Spring Shim | 5339-303 | 1 | 1 |
| 73 | Pinion Sealing Ring | 5855-30N | 1 | 1 |
| 74 | Pinion and Bearing complete | 5549-306E | 1 | 1 |
| 75 | Clutch Supporting Ring | 5586-117 | 1 | 1 |
| | D.E. Shield and Bearing Assembly | 5586-124 | 1 | 1 |
| 76 | Driving End Shield | 5586-120 | 1 | 1 |
| 77 | Driving End Bearing | 5586-121 | 1 | 1 |
| 78 | Locking Pin | 5586-122 | 1 | 1 |
| 79 | Round Cotton Wick | 5549-20 | 1 | 1 |
| 80 | Felt Wick | 5549-108 | 1 | 1 |
| 81 | Wick Retaining Pad | 5586-229 | 1 | 1 |
| 82 | Plug for Spare Lubricator | 5586-149 | 1 | 1 |
| 83 | Lubricator | 5549-261 | 1 | 1 |
| 84 | Oil Seal | 5586-224 | 1 | 1 |
| 85 | Copper Washer | 5339-270A | 4 | 4 |
| 86 | Plain Washer | 5339-4 | 4 | 4 |
| 87 | Lubricator Spring | 5549-129 | 1 | 1 |
| 88 | Starter Body | | | |

# STARTER

J63



# LIST OF ENGINE JOINTS–JP2MG/R & JP3MG/R

| Description | Part No. | 2 Cylinder | 3 Cylinder | Material |
|---|---|---|---|---|
| Combustion Chamber Aux. Joint Ring | 10-3-6* | 2 | 3 | Copper |
| Combustion Chamber Main Joint Ring | 10-3-91* | 2 | 3 | Copper |
| Crankcase Water Drain Plug Joint | 12406 | 2 | 2 | Fibre |
| Crankcase Water Flange Joints | 10-2-59* | 3 | 4 | Fibre |
| Crankcase Drain Plug Joints | 3306 | 2 | 2 | Fibre |
| Crankcase Door Joints (Small) | 10-2-61A | 2 | 3 | Cork |
| Crankcase Door Joints (Large) | 11-2-68 | 1 | – | Fibre |
| Crankcase Door Joints (Large) | 12-2-68 | – | 1 | Fibre |
| Crankcase Door Joints (Gearside) | 12-2-60 | 1 | 1 | Fibre |
| Bevel Wheel End Cover Joint | 10-2-65 | 1 | 1 | Paper |
| Bevel Wheel Housing Joint | 10-2-114 | 1 | 1 | Paper |
| End Cover Joint | 10-2-63 | 1 | 1 | Paper |
| Camshaft Bearing Screw Joint | 10-2-180 | 1 | 1 | C & A |
| Dust Cover Joint | 10-2-64A | 1 | 1 | Paper |
| Main Bearing Gear End Joint | 10-2-62A | 1 | 1 | Paper |
| Cylinder Head Gasket | 10-3-105* | 2 | 3 | C & A |
| Copper Shims | 10-3-179* | 2 | 3 | Copper |
| Inlet and Exhaust Flange Joints | 10-3-57* | 4 | 6 | C & A |
| Joint Silencer—Manifold | 11-13-206* | 1 | 1 | C & A |
| Joint Silencer—Crankcase | 11-13-901 | 1 | 1 | Fibre |
| Joint Exhaust Flange—Silencer | 11-13-422 | 1 | 1 | C & A |
| Joint Silencer Water Outlet Elbow | 27-2068 | 1 | 1 | Fibre |
| Filter Joint for Cover (Single) | 23-2278 | 1 | 1 | Fibre |
| Filter Drain Plug Joint (Single) | 103-91 | 1 | 1 | Copper |
| Filter Swivel Union Joints | 291-2265 | 6 | 6 | Copper |
| Gov. Lever Bracket Joints | 10-6-48A | 1 | 1 | Paper |
| Support Flange Joint | 10-2-67A | 1 | 1 | Paper |
| Oil Pump Cover Joints | 10-2-113 | 2 | 2 | Paper |
| Liner Rubber Rings | 10-2-116 | 4 | 6 | Rubber |
| Pump Joint for Bottom Flange | 10-2-115 | 1 | 1 | Cork |
| Oil Relief Valve Joints | 12406 | 8 | 8 | Fibre |
| Manifold Drain Plug Joints | 5197 | 3 | 3 | Fibre |
| Fuel Injector Joints | 10-3-41* | 2 | 3 | Copper |
| Oil Pump Joint to Crankcase | 10-2-112 | 1 | 1 | Paper |
| Water Pump Joint (Cover to Bracket) | 11-13-315 | 1 | 1 | Paper |
| Joint—Water Pump Valve Cage | 11-13-379 | 2 | 2 | Fibre |
| Joint Washer for Connections | 12419 | 4 | 4 | Fibre |
| Joint for Plugs and Connections | 3306 | 7 | 7 | Fibre |
| Joint for ¼ Gas Drain Plugs | 5197 | 2 | 2 | Fibre |
| Filter Cover Joint (Duplex) | 10-2-328 | 2 | 2 | Fibre |
| Filter Plug Joints (Duplex) | 10-2-338 | 5 | 5 | Fibre |
| Filter Plug Joint (Duplex) | 10-2-339 | 2 | 2 | Fibre |
| Filter Plug Joint (Duplex) | 103-91 | 2 | 2 | Fibre |
| Filter Union Screw Joint (Duplex) | 291-2265 | 4 | 4 | Copper |
| Joint Rev. Gearcase to Crankcase | 614-557 | 1 | 1 | Paper |
| Joint Top to Bottom Gearcase | 614-558 | 2 | 2 | Paper |
| Joint Inspection Cover | 23-3453 | 1 | 1 | Fibre |

* Joints for Decarbonising only.

## EXTRA FOR REDUCTION GEAR

| Description | Part No. | Cylinder 2 | Cylinder 3 | Material |
|---|---|---|---|---|
| Joint for Red. Gear Water Flange (G/R only) ... | X87/10290 | 2 | 2 | Fibre |
| Joint for Red. Gear Water Jacket Cover (G/R only) ... ... ... ... ... | X99/2214 | 1 | 1 | Fibre |
| Joint for Red. Gear (G/R only) ... ... | X99/2215 | 1 | 1 | Paper |
| Joint for Red. Gear (G/R only) ... ... | X87/11820 | 1 | 1 | Paper |

## EXTRA FOR FRESH WATER COOLING

| Description | Part No. | Cylinder 2 | Cylinder 3 | Material |
|---|---|---|---|---|
| **Centrifugal Pump** | | | | |
| Housing Joint ... ... ... ... ... | 13-14-166 | 1 | 1 | Paper |
| Housing Joint ... ... ... ... ... | 614-434 | 1 | 1 | Paper |
| Cover Joint ... ... ... ... ... | 13-14-153 | 1 | 1 | Paper |
| Water Pump Cover Joint ... ... ... | 294-725 | 1 | 1 | Paper |
| Water Flange Joint ... ... ... ... | 3309 | 6 | 6 | Fibre |

## JOINTS FOR JP2MG/R & JP3MG/R

**JP2MG—Mar. List 78**
**JP3MG—Mar. List 79**

## DECARBONISING

| Description | Part No. | Cylinder 2 | Cylinder 3 | Material |
|---|---|---|---|---|
| Combustion Chamber Aux. Joint Ring ... | 10-3-6 | 2 | 3 | Copper |
| Combustion Chamber Main Joint Ring ... | 10-3-91 | 2 | 3 | Copper |
| Crankcase Water Flange Joints ... ... | 10-2-59 | 3 | 3 | Fibre |
| Cyl. Head Gasket ... ... ... ... | 10-3-105 | 2 | 3 | C & A |
| Copper Shims ... ... ... ... ... | 10-3-179 | 2 | 3 | Copper |
| Inlet and Exhaust Flange Joints ... ... | 10-3-57 | 4 | 6 | C & A |
| Joint Silencer—Manifold ... ... ... | 11-13-206 | 1 | 1 | C & A |
| Fuel Injector Joints ... ... ... ... | 10-3-41 | 2 | 3 | Copper |
| Joint Washer for Connections ... ... ... | 12419 | 4 | 4 | Fibre |

# LIST OF ENGINE JOINTS—JK2MG/R & JK3MG/R

| Description | Part No. | Cylinder 2 | Cylinder 3 | Material |
|---|---|---|---|---|
| Combustion Chamber Aux. Joint Ring | 10-3-6* | 2 | 3 | Copper |
| Combustion Chamber Main Joint Ring | 10-3-91* | 2 | 3 | Copper |
| Crankcase Water Drain Plug Joint | 12406 | 2 | 2 | Fibre |
| Crankcase Water Flange Joints | 10-2-59* | 3 | 4 | Fibre |
| Crankcase Drain Plug Joints | 3306 | 2 | 2 | Fibre |
| Crankcase Door Joints (Small) | 10-2-61A | 2 | 3 | Cork |
| Crankcase Door Joints (Large) | 11-2-68 | 1 | – | Fibre |
| Crankcase Door Joints (Large) | 12-2-68 | – | 1 | Fibre |
| Crankcase Door Joints (Gearside) | 11-2-60 | 1 | 1 | Fibre |
| Bevel Wheel End Cover Joint | 10-2-65 | 1 | 1 | Paper |
| Bevel Wheel Housing Joint | 10-2-114 | 1 | 1 | Paper |
| End Cover Joint | 10-2-63 | 1 | 1 | Paper |
| Camshaft Bearing Screw Joint | 10-2-180 | 1 | 1 | C & A |
| Dust Cover Joint | 10-2-64A | 1 | 1 | Paper |
| Main Bearing Gear End Joint | 10-2-62A | 1 | 1 | Paper |
| Cylinder Head Gasket | 10-3-105* | 2 | 3 | C & A |
| Copper Shims | 10-3-179* | 2 | 3 | Copper |
| Inlet and Exhaust Flange Joints | 10-3-57* | 4 | 6 | C & A |
| Joint Silencer—Manifold | 11-13-206* | 1 | 1 | C & A |
| Joint Silencer—Crankcase | 11-13-901 | 1 | 1 | Fibre |
| Joint Exhaust Flange—Silencer | 11-13-422 | 1 | 1 | C & A |
| Joint Silencer Water Outlet Elbow | 27-2068 | 1 | 1 | Fibre |
| Filter Joint for Cover (Single) | 23-2278 | 1 | 1 | Fibre |
| Filter Drain Plug Joint (Single) | 103-91 | 1 | 1 | Copper |
| Filter Swivel Union Joints | 291-2265 | 6 | 6 | Copper |
| Gov. Lever Bracket Joints | 10-6-48A | 1 | 1 | Paper |
| Support Flange Joint | 10-2-67A | 1 | 1 | Paper |
| Oil Pump Cover Joints | 10-2-113 | 2 | 2 | Paper |
| Liner Rubber Rings | 10-2-116 | 4 | 6 | Rubber |
| Pump Joint for Bottom Flange | 10-2-115 | 1 | 1 | Cork |
| Oil Relief Valve Joints | 12406 | 8 | 8 | Fibre |
| Manifold Drain Plug Joints | 5197 | 3 | 3 | Fibre |
| Fuel Injector Joints | 10-3-41* | 2 | 3 | Copper |
| Oil Pump Joint to Crankcase | 10-2-112 | 1 | 1 | Paper |
| Joint for Plugs and Connections | 600-106 | 6 | 8 | Fibre |
| Exhaust Lifting Bracket Joint | 10-2-75 | 2 | 2 | Paper |
| Joint for ¼ Gas Drain Plugs and Oil Connections | 5197 | 4 | 4 | Fibre |
| Filter Cover Joint (Duplex) | 10-2-328 | 2 | 2 | Fibre |
| Filter Plug Joints (Duplex) | 10-2-338 | 5 | 5 | Fibre |
| Filter Plug Joint (Duplex) | 10-2-339 | 2 | 2 | Fibre |
| Filter Plug Joint (Duplex) | 103-91 | 2 | 2 | Fibre |
| Filter Union Screw Joint (Duplex) | 291-2265 | 4 | 4 | Copper |
| Joint Rev. Gearcase to Crankcase | 614-557 | 1 | 1 | Paper |
| Joint Ring for Reverse Gear | 12-15-483 | 1 | 1 | Rubber |
| Joint Top to Bottom Gearcase | 614-558 | 2 | 2 | Paper |
| Joint Inspection Cover | 23-3453 | 1 | 1 | Fibre |
| Cylinder Plug Joint | 12406 | 2 | 3 | Fibre |
| Pipe Connecting Plug Joint | 11-3-296 | 2 | 3 | Fibre |
| Cylinder Head Lower Joint | 11-3-291 | 2 | 3 | Fibre |

* Joints for Decarbonsing only.

# List of Engine Joints–JK2 & JK3MG/R–(Contd.)

| Description | Part No. | Cylinder 2 | Cylinder 3 | | Material |
|---|---|---|---|---|---|
| Joints for Gear Pump Plate ... ... ... | 291-2516/1 | 6 | 6 | | |
| „ „ Housing ... ... ... ... | 291-2502 | 2 | 2 | | |
| „ „ Cover ... ... ... ... | 291-2885/1 | 2 | 2 | | |
| „ „ Bearing Housing ... ... ... | 11-15-501 | 2 | 2 | | |
| „ „ Blank Cover Plate ... ... ... | 13-14-153 | 1 | 1 | | |
| „ „ Plug ... ... ... ... | 600-106 | 6 | 8 | | |
| „ „ Safety Valve (Pump) ... ... ... | 13-21-778 | 6 | 6 | | |
| „ „ Flange ... ... ... ... | 23-1766 | 2 | 2 | | |
| „ „ Plug ... ... ... ... ... | 13-22-350 | 2 | 2 | | |
| **EXTRA FOR REDUCTION GEAR** | | | | | |
| Joint for Red. Gear Water Flange (G/R only) ... | X87/10290 | 2 | 2 | ... | Fibre |
| Joint for Red. Gear Water Jacket Cover (G/R only) ... ... ... ... ... | X99/2214 | 1 | 1 | ... | Fibre |
| Joint for Red. Gear (G/R only) ... ... ... | X99/2215 | 1 | 1 | ... | Paper |
| Joint for Red. Gear (G/R only) ... ... ... | X87/11820 | 1 | 1 | ... | Paper |
| **EXTRA FOR FRESH WATER COOLING** | | | | | |
| Centrifugal Pump Housing Joint ... ... ... ... ... | 13-14-166 | 1 | 1 | ... | Paper |
| Cover Joint ... ... ... ... ... | 13-14-153 | 1 | 1 | ... | Paper |
| Water Pump Cover Joint ... ... ... | 294-725 | 1 | 1 | ... | Paper |
| Water Flange Joint ... ... ... ... | 3309 | 1 | 1 | ... | Paper |
| Housing Joints ... ... ... ... ... | 11-15-501 | 1 | 1 | ... | Paper |

**JOINTS FOR JK2MG/R & JK3MG/R**

**JK2MG—Mar. List 78**
**JK3MG—Mar. List 79**

## DECARBONISING

| | | | | | |
|---|---|---|---|---|---|
| Combustion Chamber Aux. Joint Ring ... | 10-3-6 | 1 | 1 | ... | Copper (Air Starting |
| Combustion Chamber Main Joint Ring ... | 10-3-91 | 2 | 3 | ... | Copper |
| Crankcase Water Flange Joints ... ... | 10-2-59 | 3 | 3 | ... | Fibre |
| Cyl. Head Gasket ... ... ... ... | 10-3-105 | 2 | 3 | ... | C & A |
| Copper Shims ... ... ... ... ... | 10-3-179 | 2 | 3 | ... | Copper |
| Inlet and Exhaust Flange Joints ... ... | 10-3-57 | 4 | 6 | ... | C & A |
| Joint Silencer—Manifold ... ... ... | 11-13-206 | 1 | 1 | ... | C & A |
| Fuel Injector Joints ... ... ... ... | 10-3-41 | 2 | 3 | ... | Copper |
| Joint Washer for Connections ... ... ... | 12419 | 4 | 4 | ... | Fibre |

# Recommended Tools For Dismantling and Assembling C.A.V. Fuel Injection Pump–Types BPE-B and BPF-B

| Part No. | Qnty. | Description |
|---|---|---|
| ET.025 BPE & BPF ... | 1 | Box Spanner for Delivery Valve Holder |
| ET.099 BPE & BPF ... | 1 | Extractor for Delivery Valve Seating |
| ET.569B. BPE & BPF ... | 1 | Forceps for Extracting Plunger |
| ET.428 BPE & BPF ... | 1 | Forceps for Plunger Guide |
| ET.148 BPE & BPF ... | 1 | Calibrating Outfit Complete (including Baseplate ET106) |
| ET.008 BPE only .... | 1 | Extractor for Coupling |
| ET.011 BPE only ... | 1 | Spanner for Coupling |
| ET.026A. BUE only ... | 1 | Extractor for Inner Ball Race |
| ET.026 BPE only ... | 1 | Extractor for Outer Ball Race |
| ET.102 BPE only ... | 1 | Set of 4 Holders for Tappets |
| ET.104 BPE only ... | 1 | Set of 2 Spanners for Adjusting Tappets |
| ET.105 BPE only ... | 1 | Spanner for closing Plugs. |
| ET.122A. ... ... | | C.A.V. Test Pump Outfit |
| 13-22-662 ... ... | | Service Type Injector Testing Gauge Assembly |
| ET.727 ... ... ... | | C.A.V. Injector Cleaning Kit |

Note.—Calibrating outfit ET148 is supplied fitted with Baseplate ET106 for use with BPE Type Pumps only.
To convert this outfit for use with BPF Type Pumps it is necessary to use Cam Box ET022 in addition to Baseplate ET106.

# SPECIAL TOOLS for SERVICING JPM & JKM–SP.995

| Part No. | | Description |
|---|---|---|
| 317-58 ... | S. | Liner Extractor and Grinding in Tool, with 27/2327 and 27/2457 Plates |
| 13-23-88 ... | S. | Flywheel Extractor—Plate type |
| 27-3866 ... | S. | Setscrews for above |
| 27-2 ... ... | ... | Nuts for above. |
| 10-7-94S ... | S. | Spanner for Flywheel Nut |
| 27-1728 ... | | Valve Spring Decompressor |
| | | 1 - Set of Taper Reamers comprising :— |
| 27-750 ... ... | S. | No. 0 |
| 27-751 ... ... | S. | No. 1 |
| 27-752 ... ... | S. | No. 2 |
| 27-753 ... ... | S. | No. 3 |
| 27-754 ... ... | S. | No. 4 |
| 27-755 ... ... | S. | No. 5 |
| 27-756 ... ... | S. | No. 6 |
| 13-23-89 ... | S. | Driving Bit for Balance weight Studs. |
| 27-2447 ... | | Box Spanner 7/16" |
| 27-3871 ... | S. | Piston Ring Clips |
| 317-53 ... | * | Circlip Pliers |
| 17226 ... | S. | Valve Seat Cutter |
| 25620 ... | S. | Shank |
| 15585 ... | S. | Valve Guide Reamer |
| 43180 ... | S. | Holder |
| 25620A ... | S. | Tommy Bar |
| X87/11690 ... | * | Spanner for Reverse Gear (Long) |
| X87/11930 ... | * | Tommy Bar for above |
| X87/11940 ... | * | Spanner for Rev. Gear (Short) |
| | | Tools for Gear Pump |

* Supplied with Engine.
S. Special Tools.