

KEVIN DOWLING
PENNY LANE

LEHMAN POWER

Owners Manual and Parts Identification

**Engine models SP90, SP135
SP185, SP225 & SP275**

Lehman Power Corporation

Pencader Corporate Center, 250 Corporate Boulevard, Suite E,
Newark, Delaware 19702, USA.

Telephone (302) 454 7300. Telex 6853185 Lehmm UW.

Lehman Power Limited

1 Fison Way, Thetford, Norfolk, IP24 1HT, England.

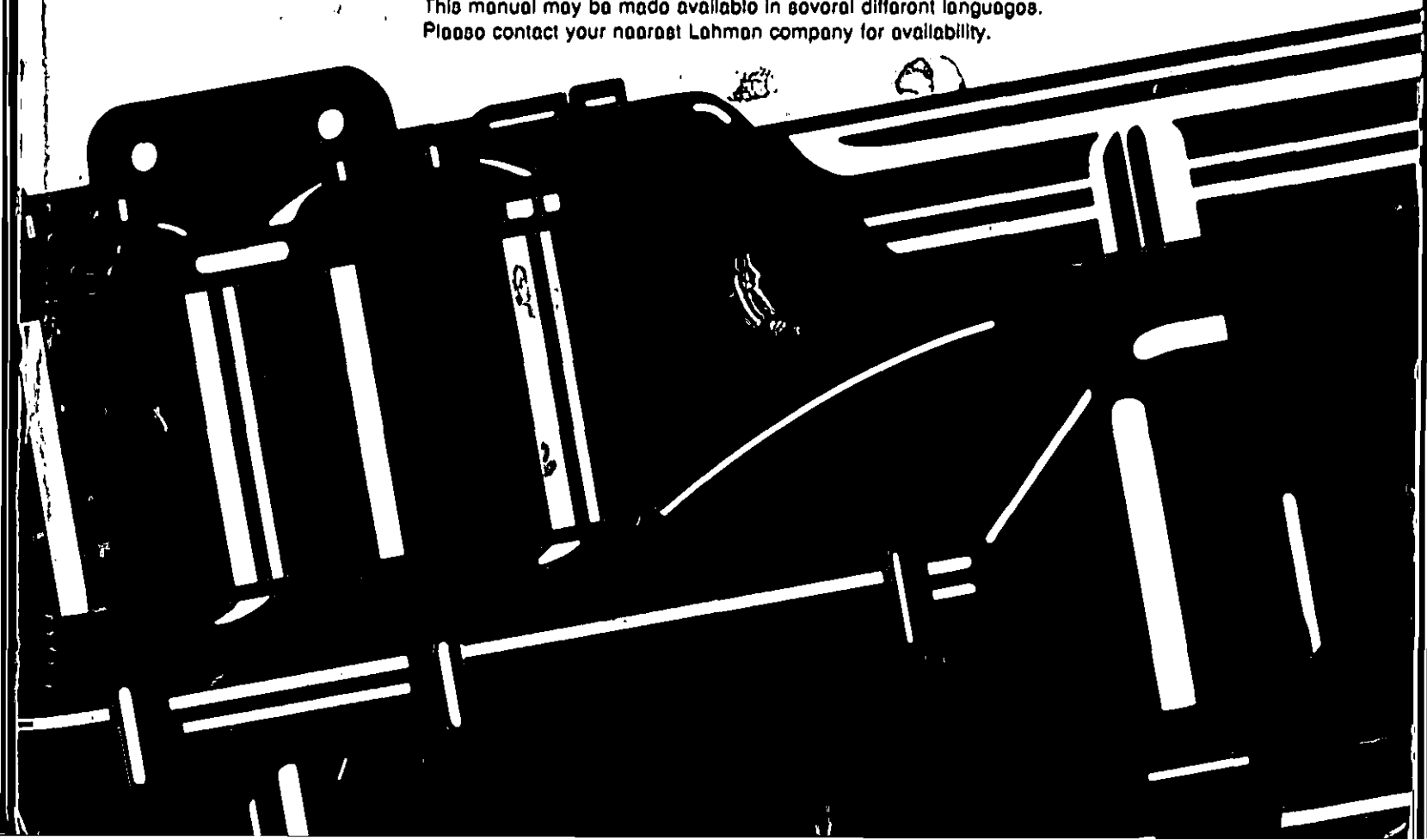
Telephone (0842) 65566/7. Telex 617180 Lehman G.

Lehman Power Taiwan Liaison Office

29-9 Wu Shan Tou, Pa Li Hsiang, Taipei Hsien, Taiwan R.O.C.

Telephone (0)2 610 2885. Telex 34194 Yamel.

This manual may be made available in several different languages.
Please contact your nearest Lehman company for availability.



Dear Lehman Owner:

Welcome to the growing family of Lehman Power Marine diesel engine users. You'll be happy to know that you have chosen an engine which is heartily endorsed by leading boat builders for its quality, performance, fuel economy and long life. Your engine is simple but highly efficient. Its power, stamina and fuel economy will delight you — especially if you've previously operated gasoline power.

To obtain the best performance and the longest life from any machine, it must be serviced properly and regularly. Filters should be changed, coolant checked, oil changed at specified times, etc. Follow the suggested schedule shown herein — it will add to your boating safety, economy and enjoyment.

Perhaps the most important single recommendation I can make to the new engine owner is "do not tinker"! If the unit is running well — leave it alone! Adjustments and repairs should be performed only by a competent diesel mechanic who has the proper knowledge and tools. Many times we are requested to assist an owner who has attempted his own repairs. Unless you know what you're doing, please "hands off"!

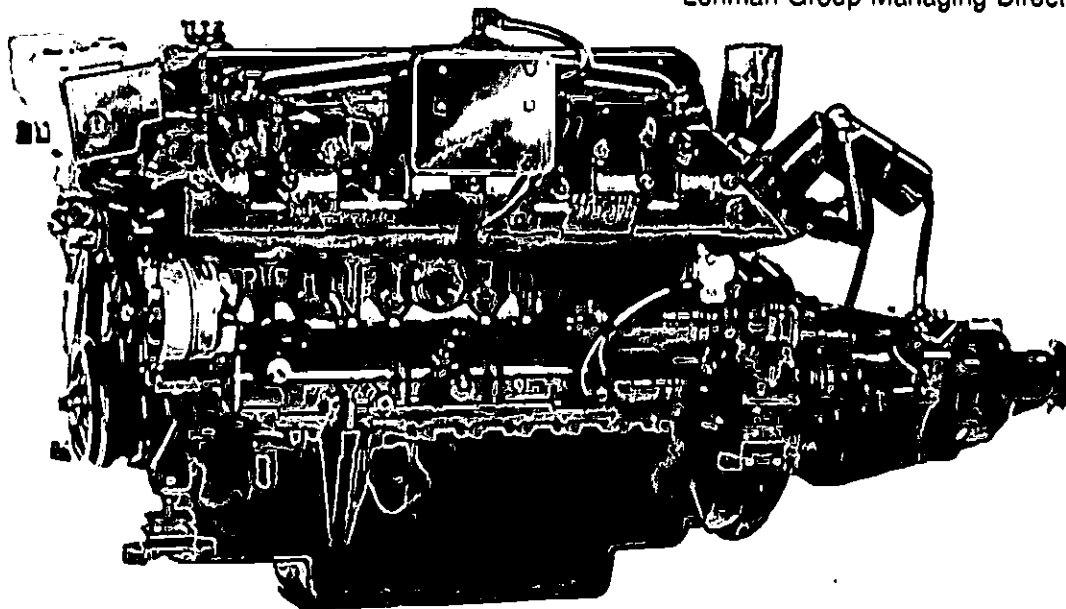
Lehman has a world-wide Service Network of Distributors and Dealers. Get to know your local one through the Lehman Start Up Program and they will be on hand to help you, should you need it.

Finally, always insist on genuine Lehman Parts. There are many examples of good boating days ruined by the use of spurious engine and cooling circuit parts. Always specify Lehman parts. If you have difficulty in obtaining them, please contact Lehman.

With proper care your Lehman Power engine will provide many hours of carefree boating. Thanks for the confidence you have shown in our Company by selecting our equipment. You will not be disappointed.

Alan Howell

Lehman Group Managing Director





Genuine Parts

Lehman Replacement Parts

Lehman owners increasingly realise that using genuine Lehman parts, supplied by a Lehman dealer can help ensure the maximum pleasure for the pleasure boat owner and the maximum profit for the commercial user.

Recognition

Lehman are increasingly packaging parts in distinctive Lehman packaging and ensuring that many engine replacement parts, where practical are painted red before sale. All cooling equipment supplied by Lehman is now painted and packaged, a key area.

Any difficulty in obtaining genuine Lehman parts should be reported to your nearest Lehman location either USA or UK.

A Lehman publication 4C300 is available to guide you through the extensive Lehman service network around the world – please ask for it.

Cruise Kits

The most convenient method of obtaining many Lehman parts is by purchasing our specially formulated Cruise Kits.

The wise boatman has always carried a selection of replacement parts on his vessel. Lehman recognises this excellent habit and has put 55 years of experience into the right collection of parts for most needs.

A. COASTAL WATER KITS

A series of kits formulated for the commercial fisherman, the pilot boat operator and the inshore cruising yachtsman.

ENGINE	KIT #	ENGINE	KIT #
SP90	207	SP225	211
SP135	208	SP275	211
SP185	211A		

The kits are packed in sturdy wooden boxes with carrying handles and contain:-

Lehman selection of gaskets · A set of vee belts · Oil filters · Lehman's selection of hoses · Zincs (Sacrificial anodes) · Raw water pump service kit · Fuel filters · Lift pump repair kit · Thermostat · Selections of hardware and washers · Plus another owners manual – let you keep this one at home.

Note:- During 1987 Lehman are introducing a new larger capacity oil filter 2N53 on the SP90 and SP135. This is not interchangeable with the old 2N50 please ensure when buying a cruise kit that the correct filter for your engine is included. Your dealer can make the change in the kit at the time of purchase.

B. BLUEWATER EXTENSION KITS

To cut the cost of cruising and distant water work Lehman produces kits that "add to" the coastal kits thus providing a cost effective method of upgrading the basic kit.

The Blue Water extension kit is made for the long distance man, the man who likes to go "foreign" and also the hard working commercial operator.

ENGINE	KIT #	ENGINE	KIT #
SP90	208	SP225	212
SP135	210	SP275	212
SP185	212A		

The kits are boxed, in wood, and contain:-

Air filter · Oil cooler · Solenoid · Oil and Fuel Filters · Hydraulic and fuel hoses · Engine coolant pump · Complete lift pump assembly · Base engine gaskets · Complete injection lines · Manual and Distributor listing · Special tools etc.

So, for secure cruising whether in Long Island Sound or the Malacca Strait, take a Lehman Cruise Kit.

NOTE:- IF YOU OR A FRIEND HAVE A NON CURRENT LEHMAN ENGINE – CONTACT YOUR DEALER – WE HAVE KITS FOR MOST LEHMAN ENGINES MADE.

"MAKE IT EASY" ATTACHMENTS

Lehman has a wide selection of engine attachments to make your boating life easier.

Some examples are:-

Sump/oil pan pumps to take the mess out of changing oil, low cost, simple to operate and designed for your engine.

Bilge pump/deck washing pumps that mount on the front of the engine, simple manual clutches to allow you to wash down the boat wherever you are or clean the bilges in an approved area.

Remote mounted filters to make it easier to change them — particularly on the Turbo range.

Call your Lehman dealer for the full range, in case of difficulty consult Lehman Power Corporation in the USA or Lehman Power Limited in the UK.

WE ARE HERE TO HELP YOU ENJOY YOUR LEHMAN ENGINE.

Your Owners Manual

This book contains operating and maintenance instructions for the complete range of engines listed on the inside front cover.

The life of your engine unit and the delivery of the high performance built into it will depend on the care it receives throughout its life. It is the owners' responsibility to ensure that the engine is correctly operated and that the maintenance operations outlined in this book are carried out regularly after the specified hours of operation have been reached. We consider it in your best interests to enlist the aid of the authorised Lehman Power Distributor in your area not only when repairs are required, but also for regular maintenance with genuine Lehman parts. This regular maintenance will result in minimal operating and repair costs.

Where the terms left and right appear in this book, they refer to the respective sides of the engine when **viewed from the rear (flywheel end)**. Pistons and valves are numbered from the front or timing cover end of the engine, commencing with number 1 cylinder.

You may find that your engine assembly includes optional equipment not specifically covered in this manual. If you have any questions, contact your local Lehman Distributor.

Before Operation

Before operating a new engine it should be thoroughly inspected for damage likely to affect its subsequent operation that may have occurred during shipment or during installation in the boat. Controls should be inspected to assure they perform and, of course, the operator should be familiar with all controls, instruments and proper engine operation, as well as, insuring that all fluids are at their proper capacities.

Start Up Program

With this new range of engines, Lehman Power is initiating an "engine start" up program in many areas. This program consists of an installation inspection and we ask that owners follow the recommendations of the local Lehman distributors to ensure the maximum efficiency and pleasure is obtained from your Lehman diesel. Neither Lehman Power nor its distributors and dealers will be responsible for any travel and transporting costs associated with this program. These costs would be paid by the owners. Please contact your local Lehman Power distributors for more details concerning this subsidized program in your area. If this program is not yet available in your area, we suggest the engine not be started until the operator has read this manual thoroughly and familiarized himself with the manner of checking the engine oil level, coolant level, transmission oil level, etc. The chapters on "maintenance" and "running in" should be particularly noted.

NOTE: BEFORE STARTING TURBOCHARGED OR TURBO/INTERCOOLED ENGINES, REFER TO "LUBRICATION" SECTION FOR INFORMATION REGARDING PRIMING OF THE TURBO UNIT WITH OIL.

Running In:

DO NOT OPERATE YOUR NEW ENGINE AT HIGH SPEEDS IMMEDIATELY: EXCESSIVE WEAR OR DAMAGE MAY RESULT.

NOTE:- BEFORE STARTING ENGINES FITTED WITH THERMOSTATS REFER TO "ARTIC STARTING" INSTRUCTIONS WITH ENGINE.

Long and dependable service may be expected if proper care is taken during the "break-in" period. The following speed limitations are recommended;

Running Time	RPM
15 min	Idle (no load)*
15 min	800
30 min	1000
30 min	1200
4 hours	1500

Then follow the daily and other maintenance instructions page A27.

*TURBO AND TURBO INTERCOOLED ENGINES WILL PRODUCE SOME WHITE SMOKE DURING THIS PHASE. IT IS NORMAL, PARTICULARLY ON A NEW ENGINE, AND WILL DISAPPEAR WHEN THE ENGINE STARTS TO WORK AND GETS WARM.

Do not operate your engine for excessive periods at low power — your engine wants to work — let it!

MODEL IDENTIFICATION AND SERIAL NUMBERS

The model and serial number of your engine is easily located by reference to the following drawing. **The Lohman Power serial number**, necessary for warranty authorization, and control, will be stamped on a raised pad on the expansion tank, also on the front right hand side of the timing gear housing. A date code will be stamped on a pad located behind the injection pump. The cubic inch displacement of the unit is stamped on a similar pad at the rear, starboard side of the cylinder block.

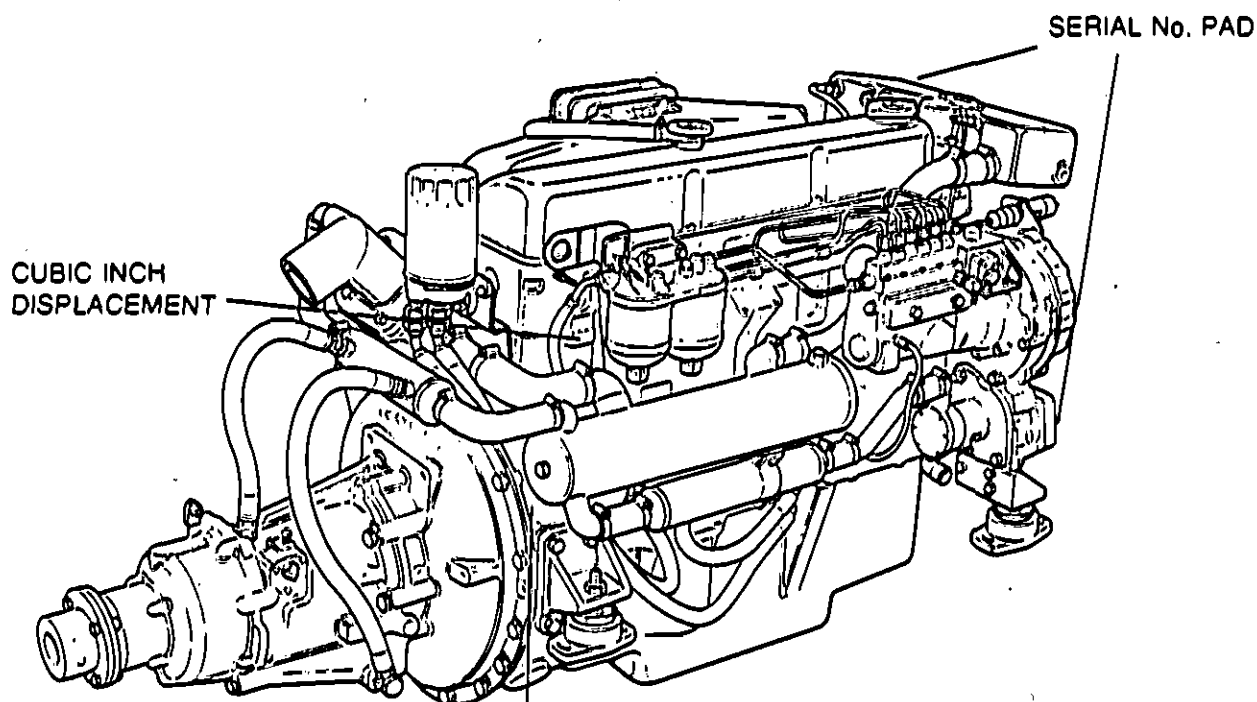
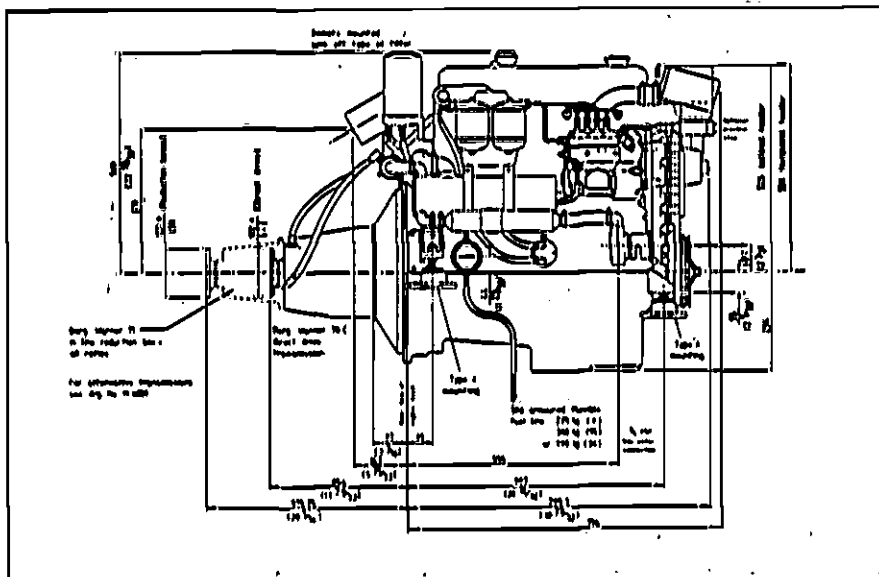
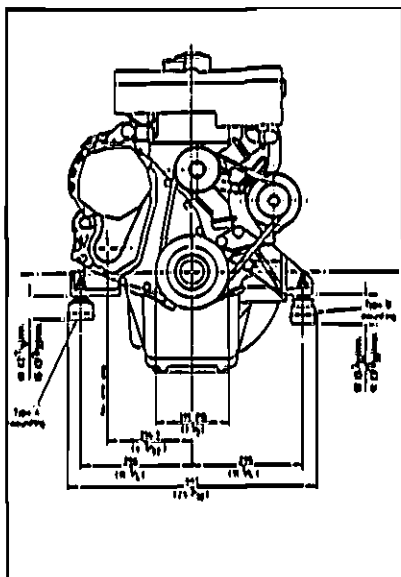
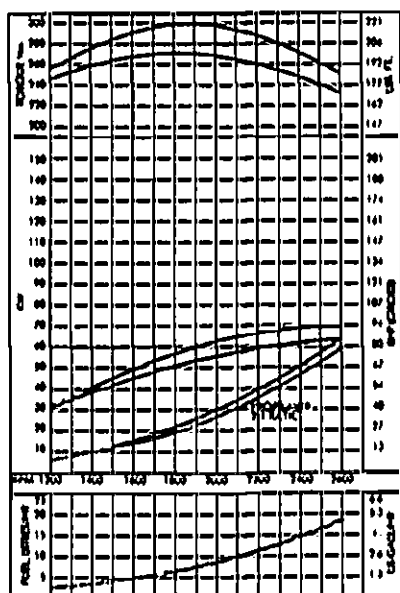


PLATE INDICATES ORIGINAL CRANKSHAFT JOURNAL SIZES

Installation drawings and power curves



**Supor 90 SAEJ270/DIN 6270
Power Curve**



— to SAE J270
 — to DIN 6270
 — indicator curve
 The above curves represent the average test results.
 The actual results may vary by 10% of the values.
 The curves are valid to 10% of the values.

Fuel consumption for typical Hull

Spoolfloatation Lohman Supor 90

TYPE — 4 cylinders in line, 4 cycle overhead valve naturally aspirated diesel engine.

BORE/STROKE — 4.22 ins x 4.524 ins: 107 x 115mm.

DISPLACEMENT — 254 cu ins: 4.150 liters.

GROSS POWER — 90 bhp at 2600 rpm.

COMPRESSION RATIO — 16.1:1

FUEL — ASTM D975 Class 2D or BS2869 Class A1.

OIL CAPACITY — 11.2 US quarts, 10.6 liters (initial fill)

OIL FILTER — full flow, disposable cartridge, spin on.

FUEL SYSTEM — in line fuel injection pump, engine oil lubricated, with mechanical governor, and flexible braided fuel supply line.

ELECTRICAL SYSTEM — 12 volt negative ground with stop solenoid, 24 volt negative ground and insulated return 12 or 24 volt are also available at extra cost.

STARTING MOTOR — 12 volt electrical solenoid, 24 volt, also available at extra cost.

ALTERNATOR — 70 amp with voltage regulator.

RAW WATER COOLING SYSTEM — tubular copper or cupro-nickel heat exchanger with zinc anti-corrosion pencil; optional 80% or 100% keel cooling.

RAW WATER PUMP — gear driven high flow rubber impeller type.

FRESH WATER COOLING SYSTEM — pressurized fresh water circuit for engine and exhaust manifold.

FRESH WATER CAPACITY — 15.84 US quarts: 15 liters.

ENGINE MOUNTINGS — in line or stepped or transmission mounted, adjustable anti-vibration mounts — see price list.

MAXIMUM INSTALLATION ANGLE — 15° rear down.

DRY WEIGHT LESS TRANSMISSION — 1080 lbs; 490kg.

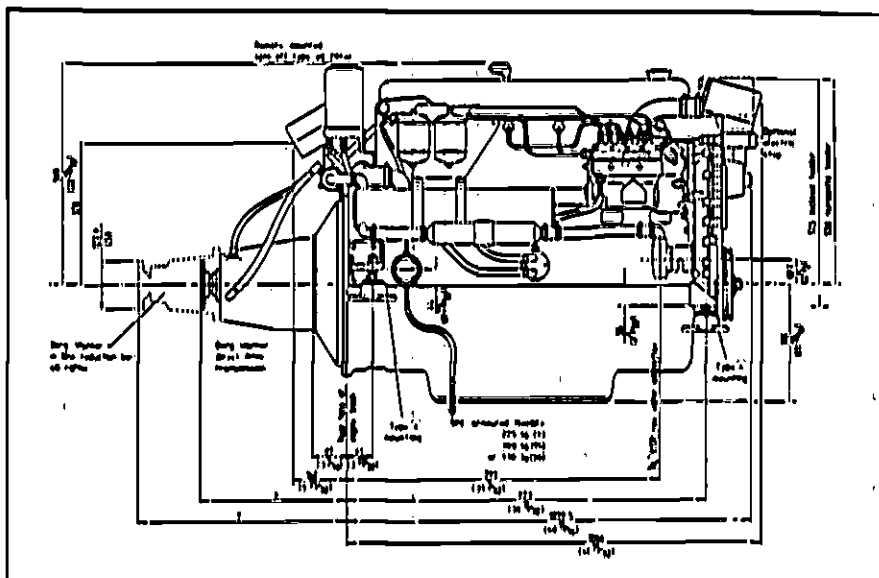
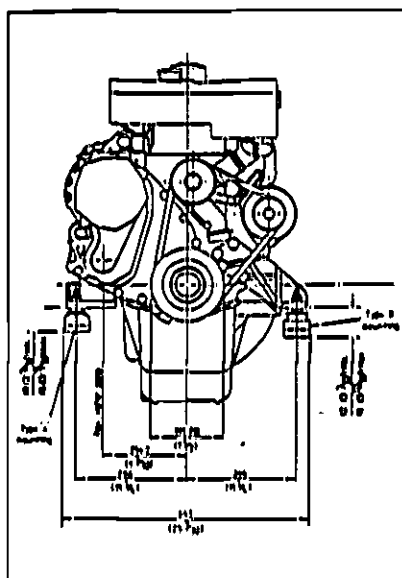
EXHAUST OUTLET — 30° water cooled exhaust elbow, or straight dry exhaust flange.

TRANSMISSIONS — Borg Warner, Newage PRM, — others available on request.

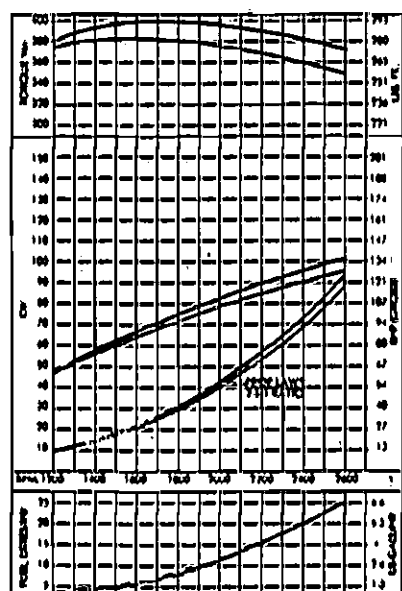
FINISH — Lohman Red with chrome rocker box, air filter and filler caps

APPROVAL STANDARDS — Lloyds, RINA, DNV, ABS with others available. (Japan small craft Inspectorate pending).

Installation drawings and power curves



**Super 138 DIN 6270/
SAEJ270 Power curve**



Legend:
 — HP
 — Torque
 — Fuel Consumption (GPH)
 — Specific Fuel Consumption (GPH/HP)

Fuel consumption for typical Hull

Specification Lohman Super 138

TYPE — 6 cylinders in line, 4 cycle overhead valve naturally aspirated diesel engine.

BORE/STROKE — 4.22 ins x 4.524 ins: 107 x 115mm.

DISPLACEMENT — 380 cu ins; 6.22 liters.

GROSS POWER — 135 bhp at 2600 rpm.

COMPRESSION RATIO — 16.1:1

FUEL — ASTM D975 Class 2D or BS2869 Class A1.

OIL CAPACITY — 19.76 US quarts, 18.7 liters (initial fill)

OIL FILTER — full flow, disposable cartridge, spin on.

FUEL SYSTEM — in line fuel injection pump, engine oil lubricated, with mechanical governor, and flexible braided fuel supply line.

ELECTRICAL SYSTEM — 12 volt negative ground with stop solenoid, 24 volt negative ground and insulated return 12 or 24 volt, are also available at extra cost.

STARTING MOTOR — 12 volt electrical solenoid, 24 volt also available at extra cost.

ALTERNATOR — 70 amp with voltage regulator.

RAW WATER COOLING SYSTEM — tubular copper or cupro-nickel heat exchanger with zinc anode-corrosion pencil; optional 60% or 100% keel cooling.

RAW WATER PUMP — gear driven high flow rubber impeller type.

FRESH WATER COOLING SYSTEM — pressurized fresh water circuit for engine and exhaust manifold.

FRESH WATER CAPACITY — 19 US quarts; 18 liters.

ENGINE MOUNTINGS — in line or stepped or transmission mounted, adjustable anti-vibration mounts — see price list.

MAXIMUM INSTALLATION ANGLE — 15° rear down.

DRY WEIGHT LESS TRANSMISSION — 1374 lbs; 623 kg.

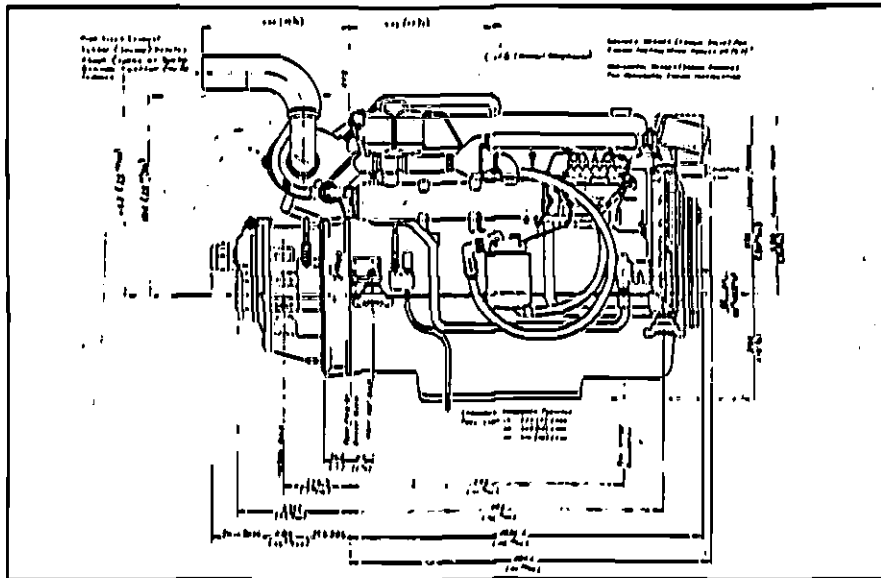
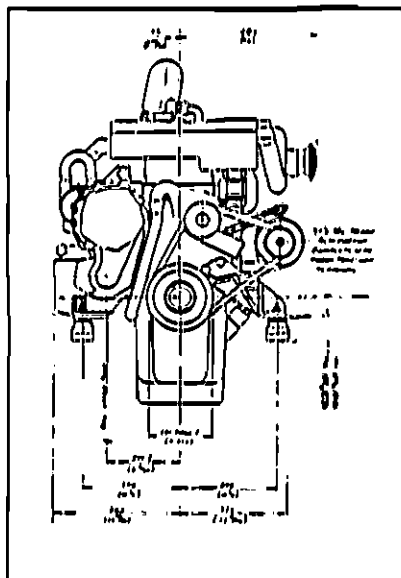
EXHAUST OUTLET — 30° water cooled exhaust elbow, or straight dry exhaust flange.

TRANSMISSIONS — Borg Warner, Hurth, Newage PRM, Twin Disc — others available on request.

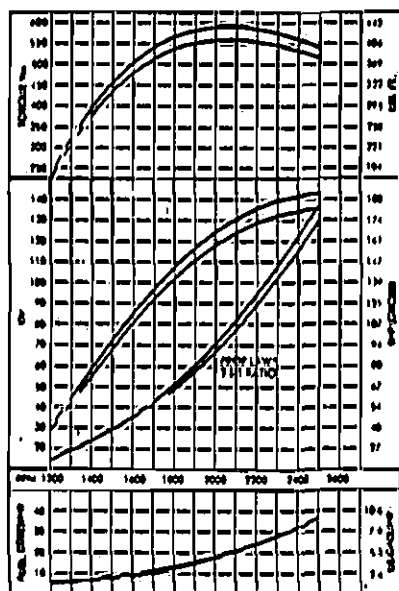
FINISH — Lehman Red with chrome rocker box, air filter and filler caps

APPROVAL STANDARDS — Lloyds, RINA, DNV, ABS and others available. (Japan small craft inspectorate pending).

Installation drawings and power curves



Super 185 8AEJ270
Super 185 DIN 8270



to 1500 RPM
to 1800 RPM
The above curves represent the power output at the specified RPM. The maximum rating is 10% of the above.
The above curves represent the power output at the specified RPM.

Fuel consumption for typical Hull

Specification Lehman Super 185

TYPE — 6 cylinders in line, 4 cycle overhead valve diesel engine. Turbo charged.

BORE/STROKE — 4.125 ins x 4.524 ins: 105 x 115mm.

DISPLACEMENT — 363 cu ins: 5.95 liters.

GROSS POWER — Super 185 — 185 bhp at 2500 rpm.

COMPRESSION RATIO — 14.7:1

FUEL — ASTM D975 Class 2D or BS2869 Class A1.

OIL CAPACITY — 23.5 US quarts. 22.0 liters (Initial fill)

OIL FILTER — full flow, disposable cartridge, spin on.

FUEL SYSTEM — In line fuel injection pump, engine oil lubricated, with mechanical governor, and flexible braided fuel supply line.

ELECTRICAL SYSTEM — 12 volt negative ground with stop solenoid, 24 volt negative ground and insulated return 12 or 24 volt, are also available at extra cost.

STARTING MOTOR — 12 volt electrical solenoid, 24 volt also available at extra cost.

ALTERNATOR — 70 amp with voltage regulator.

RAW WATER COOLING SYSTEM — A cupro-nickel heat exchanger with zinc anti-corrosion pencil.

RAW WATER PUMP — gear driven high flow rubber impeller type.

FRESH WATER COOLING SYSTEM — pressurized fresh water circuit for engine & exhaust manifold.

FRESH WATER CAPACITY — 24.3 US quarts; 23.0 liters.

ENGINE MOUNTINGS — In line, adjustable high grade anti-vibration mounts — see price list.

MAXIMUM INSTALLATION ANGLE — 15° rear down, 4° front down.

DRY WEIGHT LESS TRANSMISSION 1524 lbs; 891 kg.

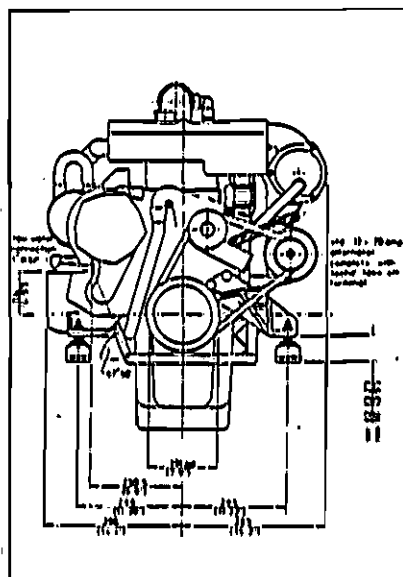
EXHAUST OUTLET — 4 inch water cooled exhaust elbow.

TRANSMISSIONS — Twin Disc, PRM — others available on request.

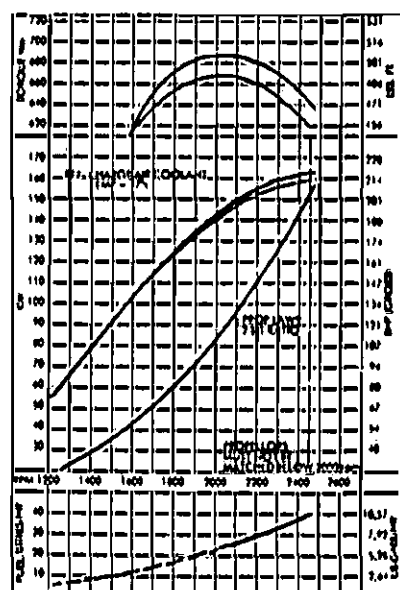
FINISH — Lehman Red with chrome rocker box, and filler caps

APPROVAL STANDARDS — Lloyds, RINA, DNV, ABS, JCI and others are available.

Installation drawings and power curves

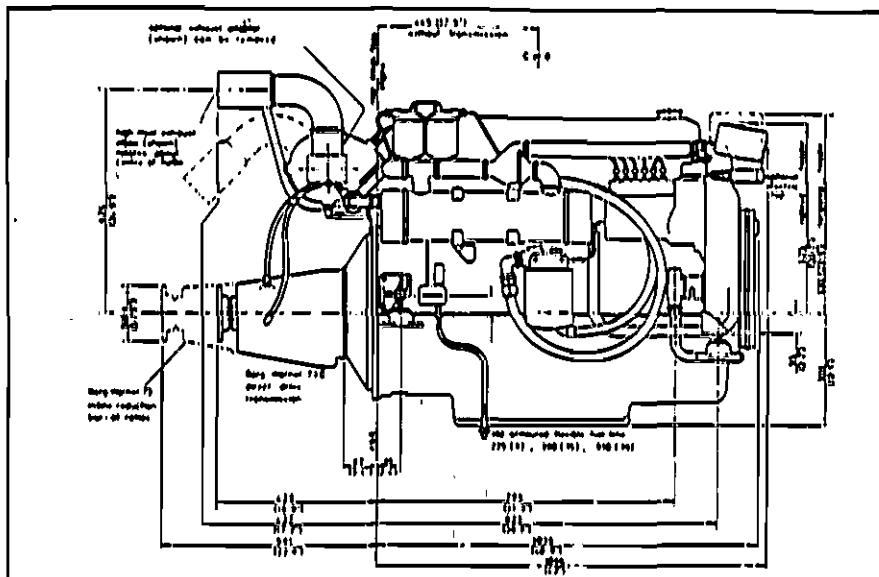


Supor 225 DIN 6270
Supor 225 SAEJ270



— to 1000 ft
— to 2000 ft
— to 3000 ft
— to 4000 ft
— to 5000 ft
— to 6000 ft
— to 7000 ft
— to 8000 ft
— to 9000 ft
— to 10000 ft

Fuel consumption for typical Hull



Specification Lehman Supor 225

TYPE – 8 cylinders in line, 4 cycle overhead valve diesel engine turbo charged and intercooled.

BORE/STROKE – 4.125 ins x 4.524 ins: 105 x 115mm.

DISPLACEMENT – 363 cu ins: 5.95 liters.

GROSS POWER – 225 bhp at 2450 rpm.

COMPRESSION RATIO – 14.7:1

FUEL – ASTM D975 Class 2D or BS2669 Class A1.

OIL CAPACITY – 23.5 US quarts: 22.0 liters (initial fill)

OIL FILTER – full flow, disposable cartridge, spin on.

FUEL SYSTEM – in line fuel injection pump, engine oil lubricated, with mechanical governor, and flexible braided fuel supply line.

ELECTRICAL SYSTEM – 12 volt negative ground with stop solenoid, 24 volt negative ground and insulated return 12 or 24 volt, are also available at extra cost.

STARTING MOTOR – 12 volt electrical solenoid, 24 volt also available at extra cost.

ALTERNATOR – 70 amp with voltage regulator.

RAW WATER COOLING SYSTEM – tubular cupro-nickel heat exchanger with zinc anti-corrosion panels.

RAW WATER PUMP – gear driven high flow rubber impeller type.

FRESH WATER COOLING SYSTEM – pressurized fresh water circuit for engine & exhaust manifold.

FRESH WATER CAPACITY – 21.6 US quarts: 23 liters.

ENGINE MOUNTINGS – in line or stepped or transmission mounted, adjustable anti-vibration mounts – see price list.

MAXIMUM INSTALLATION ANGLE – 15° rear down.

DRY WEIGHT LESS TRANSMISSION – 1574 lbs: 714 kg.

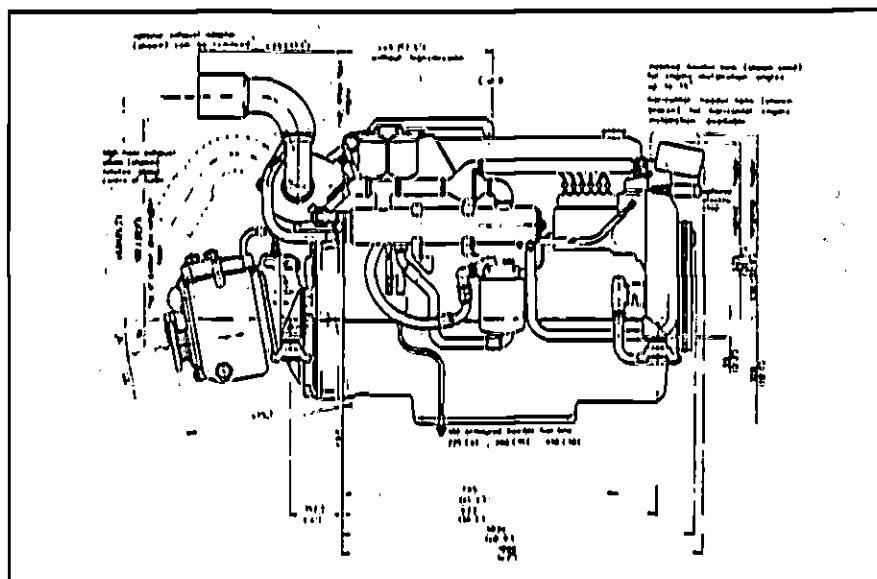
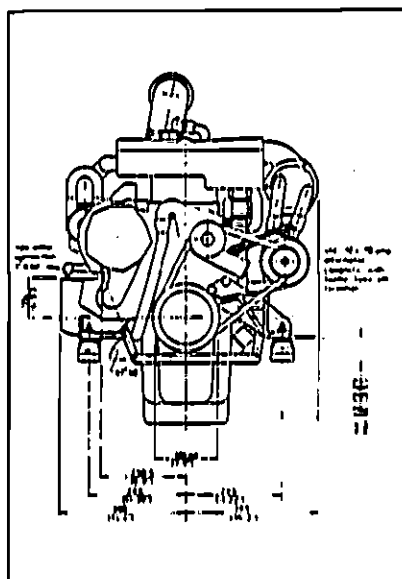
EXHAUST OUTLET – 5 inch water cooled exhaust elbow.

TRANSMISSIONS – Borg Warner, Twin Disc, PRM – others available on request.

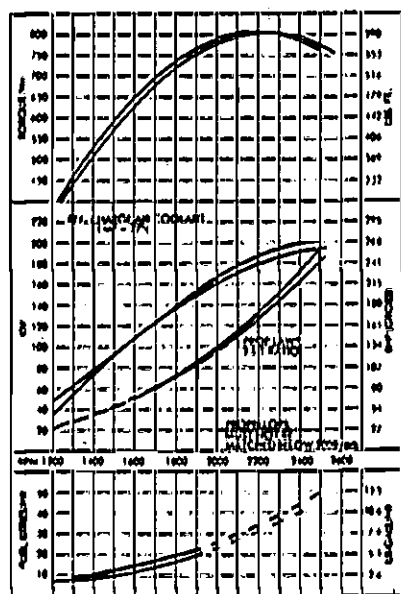
FINISH – Lehman Red with chrome rocker box and filler caps

APPROVAL STANDARDS – Lloyds, RINA, DNV, ABS, JCI with others available.

Installation drawings and power curves



Super 275 DIN 6270
Super 275 SAEJ270



— 100% throttle
— 75% throttle
— 50% throttle
— 25% throttle
The above curves represent the maximum power output.
The above curves represent the maximum power output.
The above curves represent the maximum power output.

Fuel consumption for typical Hull

Specification Lohman Super 275

TYPE — 6 cylinder, 4 cycle overhead valve diesel engine. Turbo charged and twin flow intercooled.

BORE/STROKE — 4.125 ins x 4.524 ins; 105 x 115mm.

DISPLACEMENT — 363 cu ins; 5.95 liters.

GROSS POWER — 275 bhp at 2500 rpm.

COMPRESSION RATIO — 14.7:1

FUEL — ASTM D975 Class 2D or BS2689 Class A1.

OIL CAPACITY — 24 US quarts; 22.5 liters (initial fill)

OIL FILTER — full flow, disposable cartridge, spin on.

FUEL SYSTEM — in line fuel injection pump, engine oil lubricated, with mechanical governor, and flexible braided fuel supply line.

ELECTRICAL SYSTEM — 12 volt negative ground with stop solenoid, 24 volt negative ground and insulated return 12 or 24 volt, are also available at extra cost.

STARTING MOTOR — 12 volt electrical solenoid, 24 volt also available at extra cost.

ALTERNATOR — 70 amp with voltage regulator.

RAW WATER-COOLING SYSTEM — cupro-nickel heat exchanger with zinc anti-corrosion pencil.

RAW WATER PUMP — gear driven high flow rubber impeller type.

FRESH WATER COOLING SYSTEM — pressurized fresh water circuit for engine and exhaust manifold.

FRESH WATER CAPACITY — 24.3 US quarts; 23.0 liters.

ENGINE MOUNTINGS — in line, adjustable high grade anti-vibration mounts — see price list.

MAXIMUM INSTALLATION ANGLE — 15° rear down. 4° front down.

DRY WEIGHT LESS TRANSMISSION — 1574 lbs; 714 kg.

EXHAUST OUTLET — 5 inch water cooled exhaust elbow.

TRANSMISSIONS — Twin Disc, PRM — others available on request.

FINISH — Lohman Red, with chrome rocker box, and filler caps

APPROVAL STANDARDS — Lloyds, RINA, DNV, ABS, JCI and others available.

Specifications

TYPE	254 cu/in. 4 Cyl.	380 cu/in. 8 Cyl.	383 cu/in 8 Cyl. Turbo. and 6 Cyl. Turbo/Int.
MODEL	4 CYCLE, OVERHEAD VALVE, DIRECT INJECTION		
MODEL (LEHMAN)	2722E SP90	2725E SP135	2726E SP185 2728E SP225/SP275
COMPRESSION PRESSURE MIN	300lbs per sq. in Inl at 215 rpm $\pm$ 80 PSI between Cyl		
FIRING ORDER	1-2-4-3	1-5-3-8-2-4	1-5-3-8-2-4
CRANKSHAFT ROTATION	C.C.W. facing flywheel		
GOVERNED SPEED (Max) NO LOAD	2850	2850	2800
UNDER LOAD	2600	2600	2500
IDLING SPEED	825 to 875		
EXHAUST SIZE	3.5" ID HOSE	4" ID HOSE	5" ID HOSE
EXHAUST BACK PRESSURE (Max)	1 1/2 lb/sq.in. (3.0" Mercury)		
COLD START	Auto Excess fuel device		
VALVES	Free turn type		
VALVE CLEARANCE (hot/cold)	Inlet & Exhaust 0.015" In & Exh. - .018"		
PISTONS	Aluminium alloy, tin plated		
COMBUSTION CHAMBER	Machined in piston crown		
PISTON RINGS	2 Compression; 1 Oil control; 3 compression - + 1 oil control		
CAMSHAFT	Cast Iron alloy; Gear driven		
CRANKSHAFT	Steel forging		
MAIN BEARINGS	5	7	7
LUBE SYSTEM:			
MIN OIL PRESSURE	41 PSI at 1800 RPM & 47 at 2000 RPM		
OIL TEMPERATURE (range)	185 - 230°F		
LUBRICANT			
Above 90°F ambient	SAE 30		
20 to 90°F ambient	SAE 20W/20		
Below 30°F ambient	SAE 10W		
OIL COOLER	Shell and tube type heat exchanger		
TIMING	22° BTDC No. 1 piston	22° BTDC No. 1 piston	24° BTDC No. 1 piston*
INJECTORS	4 hole type		
PRESSURE	SP275 - Test Pressure 265/275 Bar. - others 208/218 bar		
FUEL LIFT PUMP	Diaphragm with hand priming lever Piston type		
OPERATING TEMP.	82° - 94°C		
MAXIMUM TEMP.	99°C		
CIRCULATION	159 liters/min	180 liters/min	
SUGGESTED BATTERY	120 AMP/HR		
LOCK TORQUE	37.5 ft/lbs., 1240 amp. draw Max		
RUNNING TORQUE	15ft/lbs 690 amp Draw Max		
HEAT EXCHANGER	Shell and tube type, 2 pass		
RAW WATER PUMP	Bronze, single impeller type, gear driven		
MANIFOLD, EXHAUST	Gray Iron, fresh water, cooled		
MANIFOLD, INTAKE	Integral with exhaust		
AIR FILTER ELEMENT	Polyurethane, 40 pore, replaceable; Wire Mesh		
ENGINE MOUNTINGS	Rubber compound, adjustable		
FUEL LINE	3/8" Recommended. Reduce to 5/16" at engine		
TACHOMETER ADAPTOR	Turns C.C.W. at 1/2 engine speed. Adapts to 7/8" - 18 ferrule		
FAN BELT TENSION	1/2" free movement		

*May be adjusted in certain conditions to 20° BTDC No. 1 Piston

LEHMAN POWER WARRANTY (LIMITED)

Lehman Power Corporation and Lehman Power Limited (hereinafter called "the Company") grant the following Limited Warranty to the first retail purchaser of Lehman Marine Engines in respect of which this Warranty is issued.

- 1 The Company warrants each new assembly or component part of our manufacture to be free from defects in material and workmanship for a period of one year from the date of purchase by the first retail purchaser or first charter date if not retailed, the period during which the one year may be claimed will extend to a maximum of 30 months from the ex-Lehman factory date, providing the engine has been properly stored. This Warranty is only initiated upon receipt by the Company of the completed Warranty Card, supplied with each new unit. Warranty service is obtainable from any authorised Lehman Power Distributor or Dealer. The Company reserves the right to repair or replace at our sole option any defective item.
- 2 In the event of any defect appearing in any part or parts in the list below within 12 months from the time when they are delivered new to the first retail purchaser thereof and the part or parts alleged to be defective are returned promptly to any authorised Lehman Distributor or Dealer the Company undertakes to have it or them examined, and should any defect due to faulty materials or workmanship be found on such examination to have it or them repaired or to have a replacement part or parts supplied Free of Charge. An allowance will be made for the labour normally involved in the removal of defective parts and the repair or replacement of these items, but this allowance will not include any additional work then required by reason of the type of equipment, the place or manner in which the engines are housed or installed. The allowance will be based on the direct labour times allowed by the Company to authorised Lehman Distributors or Dealers.
- 3 Parts repaired or replaced under terms of this Warranty are covered for the remaining part of the Warranty period, provided that they are Genuine Lehman supplied parts.
- 4 This Warranty will not apply:
 - (a) If the defect is in any way due to the use of parts not made or approved by the Company.
 - (b) If the defect is in any way due to misuse, wrong application or neglect including poor servicing or bad storage when out of service.
 - (c) The articles are covered by a separate Warranty.
 - (d) If any identification numbers are altered or removed.
 - (e) If the goods are altered, modified or used in such a manner as to subject them to abnormal wear or strain.
 - (f) To engines which have been repaired or altered in a manner which in the Company's sole judgement may affect this performance or reliability.
 - (g) Failure resulting from improper installation of the engine and transmission.
- 5 Parts submitted for inspection will be scrapped upon completion of the claim unless prior arrangements were made to have them returned to the customer by the Lehman Distributor or Dealer.
- 6 Persons dealing with the Company's products are not the agents of the Company and have no authority to assume any obligations on its behalf.
- 7 For the purpose of this Warranty 'owner' includes a person renting or leasing the goods for his own use under a lease purchase agreement.
- 8 The parts to which this Warranty applies are:
 - (a) Fresh water expansion tank
 - (b) Inlet and exhaust manifold
 - (c) Air filter
 - (d) Sea water pump
 - (e) Sea water/fresh water heat exchanger
 - (f) Sea water/transmission oil cooler if supplied by the Company.
 - (g) Sea water/engine oil cooler
 - (h) Bell housing if supplied by Company.
 - (i) Sea water pipes between the sea water pump output and the sea water outlet point
 - (k) Fresh water pipes for the engine cooling circuit, excluding any pipework feeding heating appliances fitted to the vessel and any defect arising there from which may affect the normal performance of the engine and its marinization

- (l) Engine oil feed pipes and oil filter block
 - (m) Transmission oil feed pipes if supplied by the Company
 - (n) Engine stop solenoid if supplied by the Company
 - (o) Engine mounting brackets
 - (p) Engine flexible mountings if supplied by the Company
 - (q) Other parts such as instruments controls, etc., which may have been supplied by the Company at the request of the boatbuilders, but which do not habitually form part of the Company's contract with the boatbuilder and which therefore cannot be itemised herein
 - (r) Other parts which may be supplied by the Company from time to time.
 - (s) The Ford base engine
- 9 The transmission is covered by its manufacturer's Warranty
- 10 The Starter motor and Injection equipment is covered by CAV/Lucas Warranty
- 11 The Peugeot base engine is covered by the Warranty from Peugeot Motors Societe De Moteur C.L.M. through LPC/LPL.
- 12 The following services, expenses and conditions are not covered by Lehman Power Warranty
- (a) Damaged or loss related to shipping and handling
 - (b) Towing charges, dockage, storage fees, telephone calls, fuel, loss of revenue, transportation charges (other than mileage and the mechanic's travel time) overtime pay, loss of or damage to any personal property and cost of lubricants and transmission fluids except when replacement or replenishment of fluids is required following a warranty repair
 - (c) Preparation costs related to warranty such as, moving furniture, bulk heads, deck plates, carpet, or any other equipment causing engine inaccessibility.
 - (d) Failure caused by use of improper lubricant, overheating or failure to follow recommended maintenance schedules as spelled out in the Lehman Power Manuals.
 - (e) Cost of repairs due to misuse, accidents, neglect racing and installation defects, as well as, shaft misalignment
 - (f) Any consequential losses arising from failure of components under warranty
- 13 All claims under the Warranty should be addressed to the nearest Lehman Distributor or Dealer. In the event that there is not a local authorised Distributor or Dealer, claims may be sent to:
- 14 All warranty claims must be submitted within 30 days of the work being completed, or warranty may be invalidated.

Lehman Power Corporation

Pencader Corporate Center, 250 Corporate Boulevard,
Suite E, Newark, Delaware 19702, USA.
Telephone (302) 454 7300. Telex 6853185 Lehmm G.

Lehman Power Limited

1 Fison Way, Thetford, Norfolk, IP24 1HT, England.
Telephone (0842) 65566/7. Telex 817180 Lehman G.

Lehman Power Taiwan Liaison Office

29-9 Wu Shan Tou, Pa Li Hsiang, Taipei Hsien, Taiwan R.O.C.
Telephone (0)2 610 2885. Telex 34194 Yamei.

LEHMAN WARRANTY – Continued

Every complete Lehman Marine Engine is provided with this "Owners manual" which explains all warranty terms in detail. Pages A11 and A12.

SPECIAL NOTE:

Warranty does not cover any loss of operating time while engine may be out of service, or damage to boat in which the engine may be installed.

A reasonable amount of time (as set forth in the Flat Rate Manual) is authorised to accomplish warranty service. It is assumed that engine and associated equipment is readily accessible for such service or removal, if required. We cannot be responsible for servicing or removing inaccessible units.

Finally It is most important that your Lehman Warranty be mailed prior to start-up. Claims for warranty will not be honoured unless the attached form has been pre-registered.

Fill out the Card, and retain the details below for your own record.

.....

Engine model _____ Serial No. _____ Date _____

Transmission Model _____ Serial No. _____ Ratio _____

Owners Name/Address _____

Phone () _____ Boat Name _____ Hull No. _____

Boat Home Port/Address _____

Boat Mfgr. _____ Model _____ Length _____

Engine Purchased From _____

Address _____

HOW TO USE THIS MANUAL

This manual is divided into sections as follows:

SECTION A — Pages Nos. A1/on — General data, specifications, installations, adjustments, maintenance, etc.
See index below.

SECTION B — Page Nos. B1/on — Parts identification of Ford base engines. See index on page B-1.

SECTION C — Page Nos. C1/on — Parts identification of Lehman Marine parts. See index page C-1.

In order to provide a simple method of identification, all models included herein have been assigned a "code", letter as follows:—

ENGINE CODE	CU/IN	NO. CYLS.	YEARS	ENGINE CODE	CU/IN	NO. CYLS.	YEARS
M-Super 90	254	4	8/82—	S-Super SP185	363	6	8/82—
N-Super 135	380	6	8/82—	P-Super SP225	363	6	8/82—
				T-Super SP275	363	6	8/82—

Instructions for Ordering Parts

Parts listed in this manual may be ordered through any Lehman distributor or dealer or, in areas not served by a distributor/dealer, direct from the Lehman companies. Prices will be quoted upon request. In order to prevent errors, please order any required items by exact part number and name of part. When ordering parts, please advise model number and serial number of the engine.

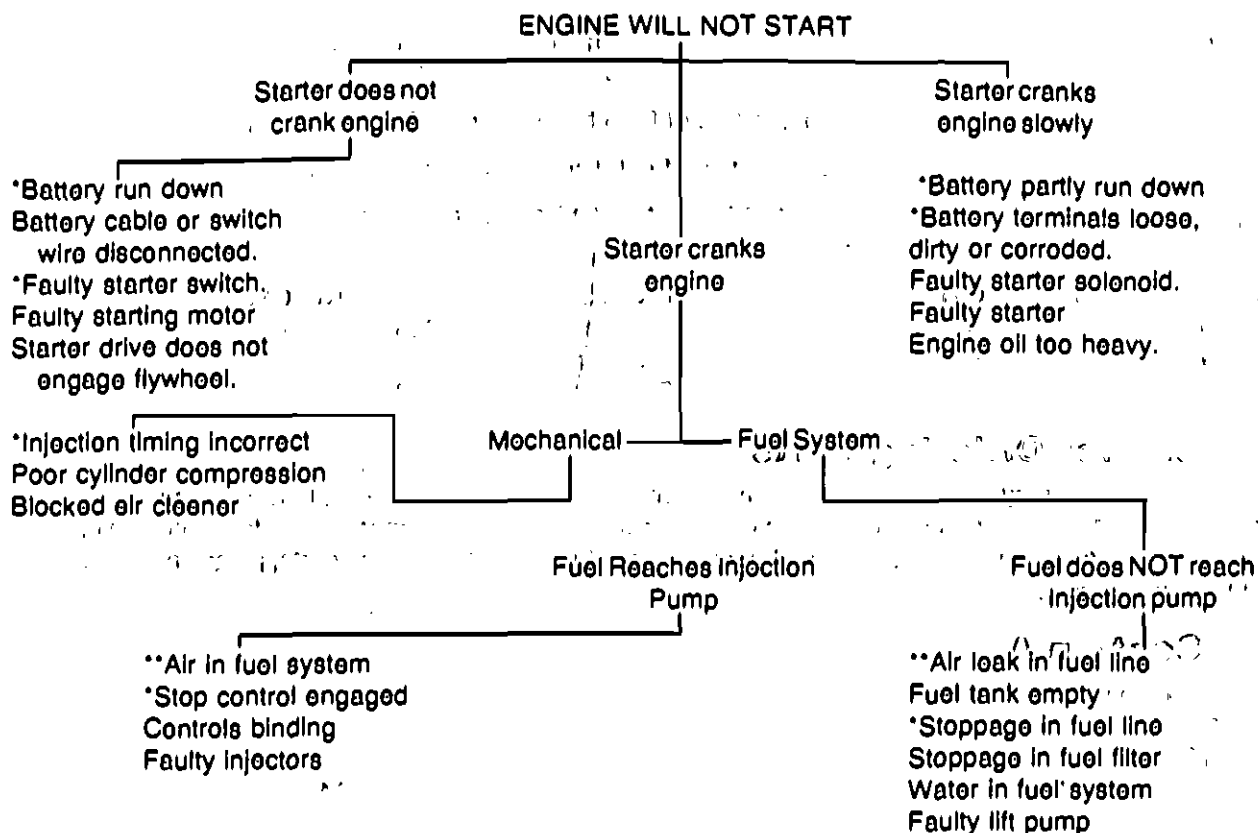
Index — Section A

Air bleeding the fuel system	A18
Before operation	A3
Bleeding the fuel system	A18
Break-in	A4
Controls	A18
Cooling system	A19,A20,A21
Dimensions, engine	A5,A6,A7,A8,A9
Draining engine	A21,A29
Electrics	A22,A23
Fault-finding guide	A15
Filters, fuel & air	A19,A27
Fuel system	A17,A18,A19
Identification of models	A4,A14
Idling adjustment	A29
Lift pump	A18,A19
Lubrication system	A23,A24,A25
Maintenance	A27,A28,A29
Minor repairs	A27,A28
Nameplate data	A4
Oil recommendations	A24,A25
Power charts	A5,A6,A7,A8,A9
Running-in	A4
Specifications	A5,A6,A7,A8,A9,A10
Starting, stopping engine	A3,A16,A17
Tachometer take-off	A22
Timing the injection pump	A19
Transmission	A25,A28
Trouble-shooting chart	A15
Valve adjustments	A10,A27
Vee belt	A28
Warranty	A11,A12,A13
Water heater connection	A30
Winterizing	A21,A29
Wiring diagram	A23

(copyright 1983— LEHMAN POWER CORPORATION Newark, Delaware)

LEHMAN DIESEL OWNER'S FAULT-FINDING GUIDE

† Particular attention should be directed to the most common trouble-spots mark by an asterisk



ENGINE STARTS

ENGINE RUNS INTERMITTENTLY

Idle Adjustment too low
*Air - Leaking fuel system
Fuel (lift) pump diaphragm worn
Fuel filter (s) clogged
Sticking valves
Fuel Tank near empty

ROUGH IDLING

*Air in fuel system
*Idle adjustment set too low
Dirty or faulty injectors
Injector pipes loose, cracked or broken
Incorrect injection timing
Restricted fuel filter
Faulty lift pump
Sticking valves
Broken valve springs

ENGINE MISFIRES

*Injector pipe loose, broken or cracked
Injectors dirty
*Air leaking in fuel system
Sticking valve or rocker arm
Sticking piston rings
Engine needs top overhaul

ENGINE KNOCKS

*Air in fuel system
Oil level (pressure) low, worn bearings
Incorrect grade fuel oil
Incorrect injection timing
Faulty injector
Sticking valve or rocker arm
Piston slap

ENGINE NOT DELIVERING FULL POWER

**Air fuel system
Engine overheated
Injection timing incorrect
Incorrect valve clearances
Dirty air cleaner(s)
Faulty injectors
Faulty injection pump
Stop control partly engaged
Sticking valves
Worn piston rings, or bores
Faulty lift pump
Restricted fuel filters

ENGINE OVERHEATS

*Insufficient water supply
Fresh water not circulating

a) Loose or broken vee belt
b) Hoses clogged or collapsing while running at high speed
c) Faulty thermostat
d) *Clogged heat exchanger
e) Clogged bleed hole in thermostat
Raw water flow insufficient
a) *Clogged sea water strainer
b) Water intake scoop damaged or lost
c) Sea cock closed
d) Water pump impeller damaged
e) *Heat exchanger or oil coolers clogged.
Low crankcase oil level
Incorrect injection timing
Engine needs top overhaul

ENGINE EXHAUST SMOKES

Fuel, poor grade (black smoke)
Crankcase overfilled (blue smoke)
Cold engine temperature (white or lite blue)
*Propeller too large (black smoke)
Max. speed stop screw set too high for load (black smoke).
Propeller too small (white smoke)
Incorrect injection timing
Faulty boost control unit

Controls, Starting & Stopping Engine

No amount of engineering ingenuity or care in manufacture can substitute for the need of knowledge on the operation and avoidance of mis-use by the operator. It is important to be familiar with all controls so as to know how to properly operate your engine.

Refer Fig. 1. To stop engine, the stop lever should be moved as far as it will travel towards the front of the engine and held until engine is fully stopped. This lever cuts off the supply of fuel to the injection pump. (NOTE before shutting down engine it should always be allowed to idle for about two minutes, particularly after extended periods of cruising - This is particularly important with Turbo and Turbo Intercooled engines).

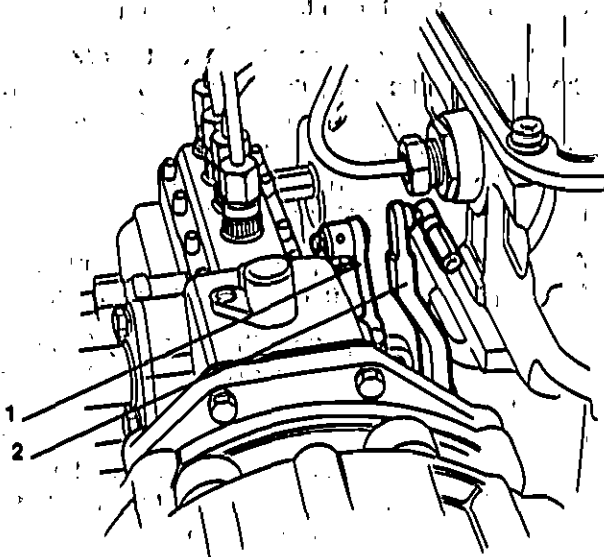
Engine speed control is the longer lever at side of injection pump (Fig. 2.) Moving toward front of engine increases engine speed.

An excess fuel device permits additional fuel to be supplied by the injection pump to assist in starting the engine from cold. This device is fully automatic in operation.

NOTE: All engines are equipped with an electric shut down solenoid. To stop press stop button until engine stops running, then release button.

Injection Pump Controls

1. Stop Lever
2. Speed Control Lever



Starting all Naturally Aspirated Engines

To start engine when cold - make certain that transmission is in neutral position and that all boat accessory equipment (bilge pump, extra alternator or generator, hydraulic pump, winch, etc.) is disengaged. Check that engine stop lever is fully towards rear (flywheel end) of engine. Set throttle lever to 1/4 open position. Press starting button to operate starter. As soon as engine starts, release starting button to operate speed control lever to warm-up (idling) speed of 700 - 800 RPM. If engine fails to start within 5 seconds, release starting button. Try again after allowing sufficient time for all moving parts to stop. Once engine has started, it should be allowed to reach 170°F before full load is applied.

To restart engine when warm, same procedure as above except set speed control lever to approximately mid-point of its travel.

Starting all Turbocharged Engines

Serious damage to the turbocharger bearing can result from inadequate lubrication if the following recommendations are not observed.

Prior to the first start after a turbocharger has been newly installed or if for any reason the oil supply to the turbocharger has been disconnected, you should insure that the turbocharger housing is filled with engine oil before reconnecting the oil feed pipe. In these circumstances, or in cases where the engine is being started for the first time after an oil change or after a period of 4 weeks or more without use, the following procedure must be used:

- 1) Engage either manual or electric stop control
- 2) Crank the engine with the starter motor for 15 seconds
- 3) Disengage stop control
- 4) Start engine in normal fashion and allow to idle for 30 seconds minimum before applying load

This ensures an adequate oil supply to the turbocharger bearing. The engine should be allowed to idle, without load, for 2 minutes prior to shut down to enable the oil to dissipate the heat from the turbocharger bearing.

Stopping all Engines

The engine should be allowed to slow idle for approximately 2 minutes before stopping, especially after extended periods of full load and full speed operation. This is particularly important in the case of turbocharged engines.

Fuel System

CAUTION: Your injection pump is a very accurately machined piece of equipment and requires careful handling and adjustment. No repairs other than shown herein should be entrusted to other than a diesel repair facility having the required tools, knowledge and test/calibration equipment.

CAUTION: Never bend the injection pipes (which connect injection pump to injectors) as this may unbalance the volume of fuel delivered to each cylinder.

CAUTION: Do not use a galvanized fuel tank as the zinc coating reacts with the fuel oil and forms undesirable compounds which can foul the injection system.

The fuel injection equipment is made to very accurate limits and therefore, even the smallest particle of dirt entering the system will destroy its efficiency by causing blockage or scoring or premature wear on highly finished parts. A clean fuel system is absolutely essential. Insure scrupulous cleanliness when handling fuel or fuel system components. At all times make certain that water is not allowed to contaminate the fuel oil. Try to make a practice of refueling out of the rain. Use a fine gauze filter funnel and always wipe the fuel tank around the filter cap before and after filling and immediately replace the cap.

An efficient, large size primary fuel filter and water separator (coalescer) is deemed a necessity in order to prevent foreign particles reaching the injection equipment on your engine.

Your engine is equipped with secondary fuel filters which filter out contaminants that may find their way through the primary filter. These filters (see Fig. 3/4/5) located towards rear of engine block, right side, have elements which should be replaced once each season or at least each 200 hours (which ever comes first) under normal conditions. (When replacing filters, use new gaskets or sealing rings to prevent air leaks.) Following filter replacement, bleed air from fuel system as later described under "bleeding the fuel system". Excess fuel delivered to the injectors by the injection pump is collected by a tube located under the rocker arm cover (see A, Fig. 2) and delivered to fitting C, Fig. 4 located at rear, right side of cylinder head. This fitting should be connected to top of fuel tank by $\frac{1}{4}$ " (min.) fuel line. It is recommended that the Boat Builders install a short section of flexible tubing in this line to prevent breakage due to engine vibration.

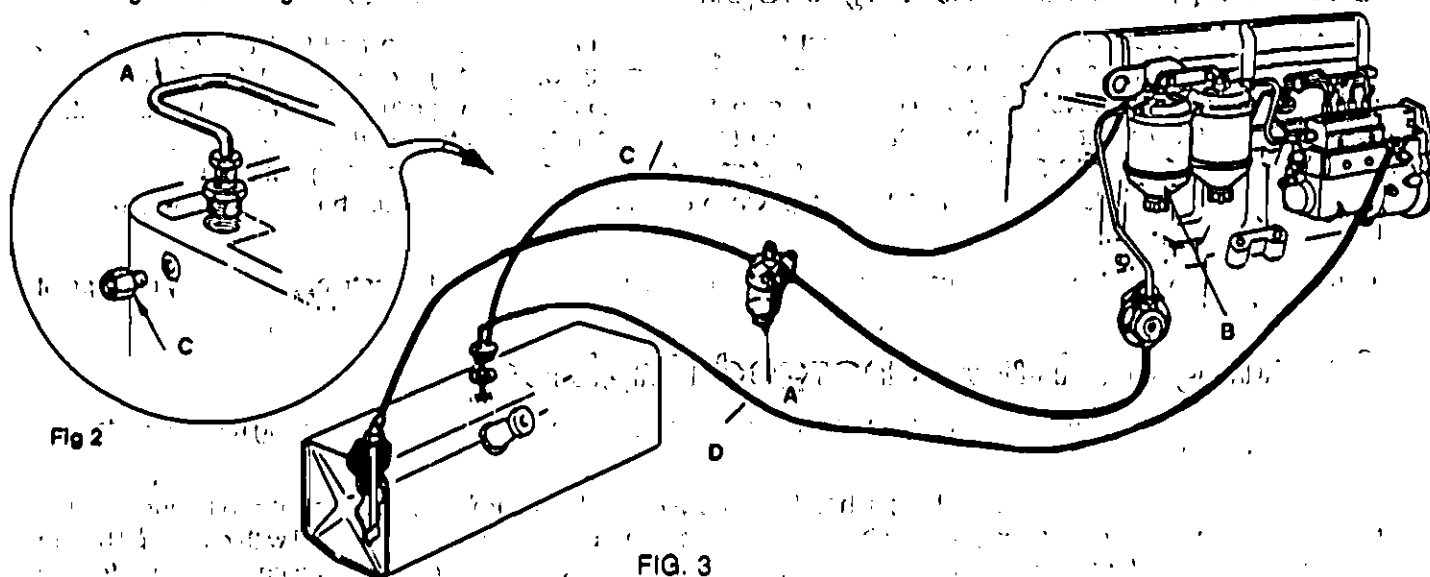


FIG. 3

TYPICAL FUEL SYSTEM, NATURALLY ASPIRATED ENGINES

A - Primary fuel filter water separator

B - Secondary fuel filter

C - Excess fuel return tube

D - Injection pump return tube

NOTE: All N/A Engines are fitted with a common fuel return line C D.

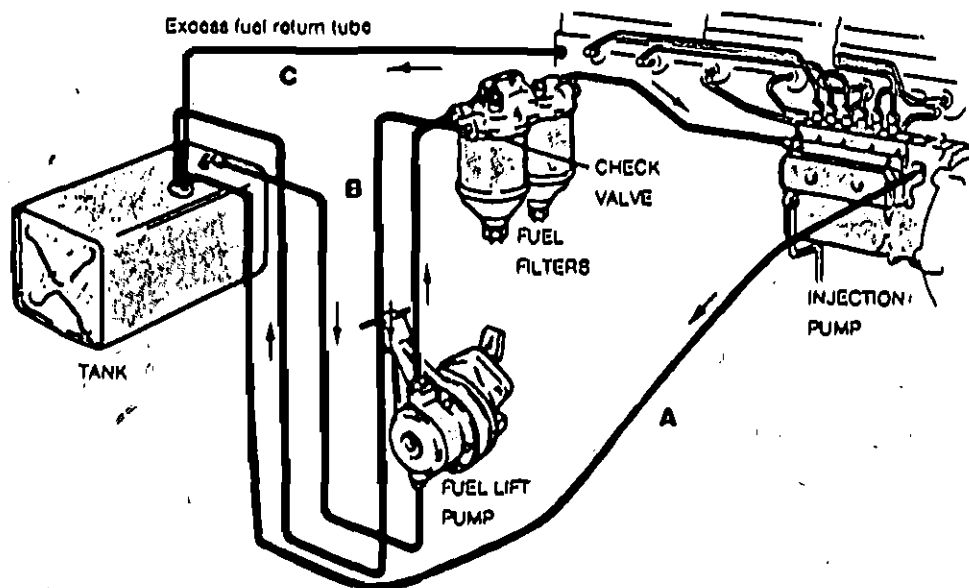


FIG. 4.
TYPICAL FUEL SYSTEM, TURBO ENGINES

- A – Injection pump return tube
B – Filter Press Relief Line
C – Injector Leak Off Line

*NOTE: "ON ENGINES MADE IN LATE 1985 ONWARDS – FUEL RETURN LINES MAY BE INTERCONNECTED TO SIMPLIFY PIPING" (Return line to tank must be 10mm bore min.)

Bleeding the Fuel System

Bleeding air from the fuel system may well be one of the important procedures to be learned by the operator. Air in the injection system may cause erratic engine performance, "missing" on one or more cylinders, reduced power, stop fuel from reaching engine and prevent or cause hard engine starting.

It must be remembered that the lift pump draws fuel from the tank, so any accumulation of air in the fuel system makes all connections, filters, etc. between fuel lift pump and tank suspect. In any new installation one must "bleed" the system of air for, obviously, air will be in the new fuel lines, filters, etc. If the fuel tank should run dry, bleeding will be needed when the boat is refueled. Bleeding will also be required after changing fuel filter elements. (Time and effort may be saved if filter is charged with fuel by removing the bleed plugs on top and slowly pouring fuel into the filter until it overflows.) Occasionally, after an extended run, an engine may slow down, or "miss", or lose RPM or stop. Although there may be other causes, air in the fuel system should not be overlooked. Many times a tiny leak in a fuel line fitting may allow air to enter the system and accumulate until there is sufficient to cause the above mentioned symptoms.

To bleed system, follow this procedure:

1. Ascertain that there is sufficient fuel in tank, (Note: low fuel level may result in intake pipe being exposed due to "sloshing" of fuel, thus drawing air into system – try to keep your tanks topped up.)
2. Make certain that fuel shut-off valve is turned on.
3. Loosen the bleed screw on the inlet side of the fuel filter (Fig. 6 & 7) about two or three turns.
4. Operate the priming lever at the side of the fuel lift pump on naturally aspirated unit (Fig. 7.) or the pump plunger (Fig. 6.) on turbocharged engines until a flow of fuel, free of air, is expelled. Then close screw.

No bleeding of the injection pump is required as these are fitted with a self purge device.

NOTE: On Turbo Charged engines a third fuel return line from the pressure relief valve or the secondary filters must be connected direct to the fuel tank. This is obligatory unless a factory fitted common return is present.

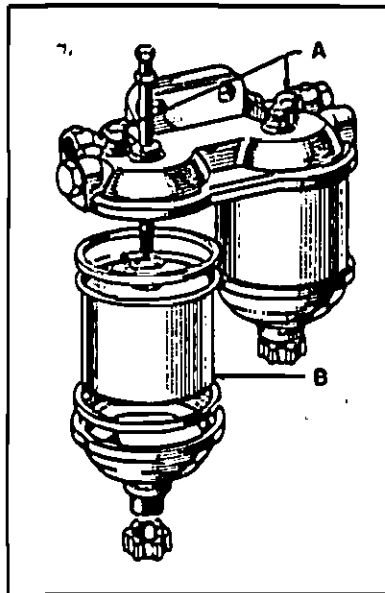


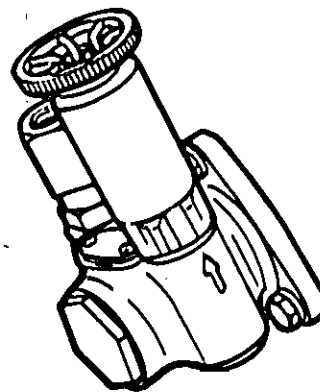
FIG. 5.

FUEL FILTER

A - Bleed screws

B - Replacable element

FIG. 8.



HIGH PRESSURE LIFT PUMP (ALL TURBO ENGINES)

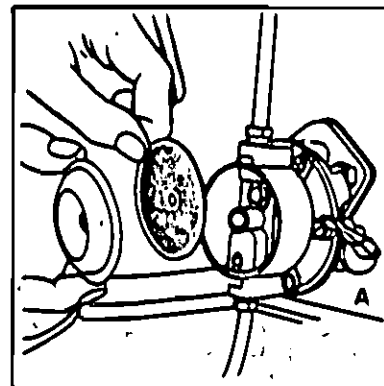


FIG. 7.

FUEL LIFT PUMP - (ALL N.A. ENGINES)

A - Priming lever

Timing and Maintaining the Fuel Injection Pump

The injection pump delivers an accurately metered quantity of fuel to each cylinder to suit any engines speed and load conditions. The pump is a very accurately machined piece of equipment and requires careful handling and maintenance, which is beyond the scope of normal owner servicing. Since this pump should not require retiming except when being removed and reinstalled, and this is beyond the scope of normal owner servicing, the procedure will not be covered in this manual. Please contact your authorized Lehman Power distributor for this service. Warranty claims resulting from owner mishandling of the fuel injection pump will not normally be considered.

Cooling System

Your engine is cooled by the circulation of fresh water (contained in the system) through the water jackets surrounding the cylinders, cylinder head and exhaust manifold. The heated water flows by thermo-syphonic action, assisted by a pump at the front of cylinder block around the tubes of a "heat exchanger" located above the fuel lift pump on the starboard side of the engine. Raw water from outside the boat flows through the heat exchanger tubes, and the heat from the fresh water is thus transferred to the raw water which is expelled overboard. Please see Figures 8 and 9. A Thermostat located in the cylinder head under the expansion tank on naturally aspirated units and in a separate unit on the starboard side of the turbo charged units promotes rapid warm up and maintains constant engine temperatures.

The fresh water system is filled through a cap atop the expansion tank at front of engine. Water level should be checked daily and maintained to the top of the aluminium pillar. These engines are fitted with a cooling system de-aeration service and no bleeding of the manifold is required during system filling.

When filling cooling system, fill to top of aluminium pillar, then run engine for several minutes to insure system is completely filled. Add coolant as necessary.

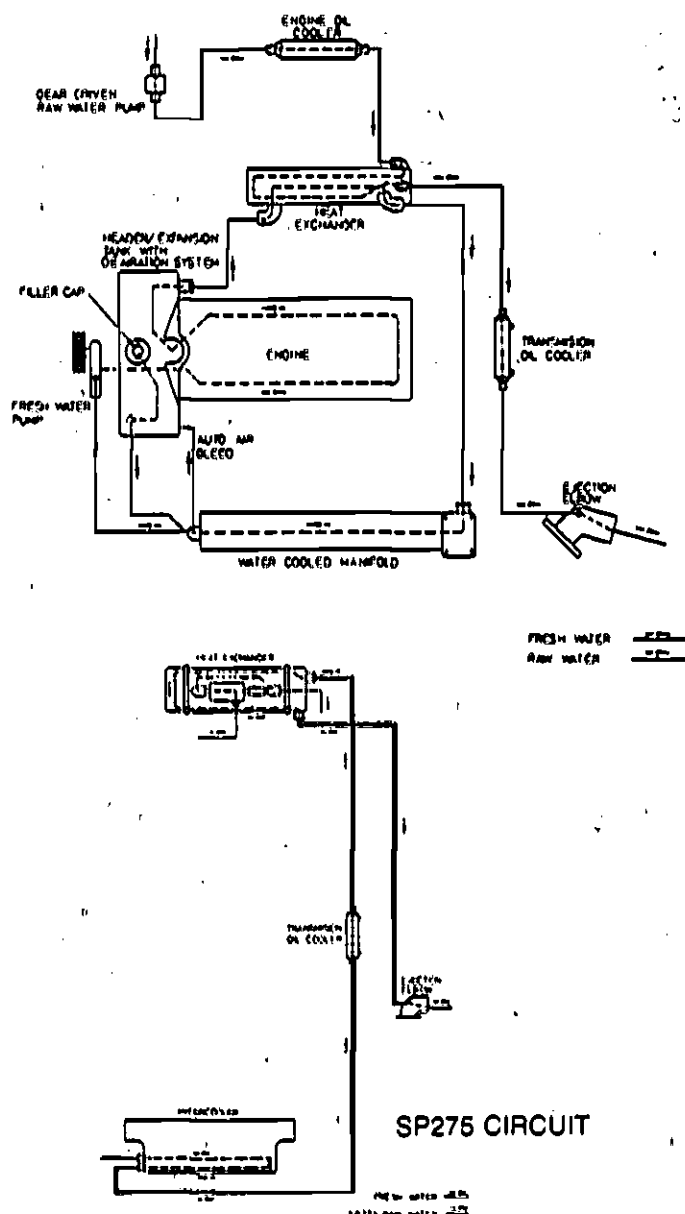
The Fresh water system is pressurized by the cap atop expansion tank. When proper pressure is reached, excess water is expelled through the overflow tube under tank. Extreme care should be taken in removing cap while engine is hot. While engine is hot, if there is liquid in tank, the system may be refilled with safety. If not, allow engine to cool before refilling. Lehman Power recommends the use of anti-freeze at all times used in accordance with the manufacturer's recommendations. Ethylene Glycol based solutions are preferred, most of which includes various rust inhibitors. The use of "stop leak" type anti-freeze, which may still be available in some areas, is discouraged. If, for some reason anti-freeze solution is not being used in freezing temperatures, it is essential that the water systems be drained while engine stands idle and refilled before engine is restarted. Check water supply daily. Maintain level to approximately one-half inch below top of tank - The small "pillar" in the tank should just touch the water surface.

To assist in corrosion control, a zinc pencil is installed in your heat exchanger. This zinc pencil is sacrificial... that is, the raw water will attack and "eat away" the zinc before attacking metal of the heat exchanger. It is suggested that the plug accommodating this pencil be removed each week while engine is in service in order to inspect zinc. Replace zinc element when required. Failure to install zincs when needed may cause serious damage to entire cooling circuit.

It will be noted that your heat exchanger has removable end caps to facilitate cleaning. Removing caps will allow access to end of the tube "bundle". To clean tubes use a 3/16" diameter wood dowel, with a "twisting" action rather than a hammering action. A small caliber firearms cleaning kit or similar small brush may be used. Do not use a metal rod which may rupture the copper tubings.

LEHMAN NATURALLY ASPIRATED ENGINES

FRESH & RAW WATER CIRCUITS



LEHMAN TURBO INTERCOOLED FRESH & RAW WATER CIRCUITS (TURBO - SIMILAR MINUS INTERCOOLER)

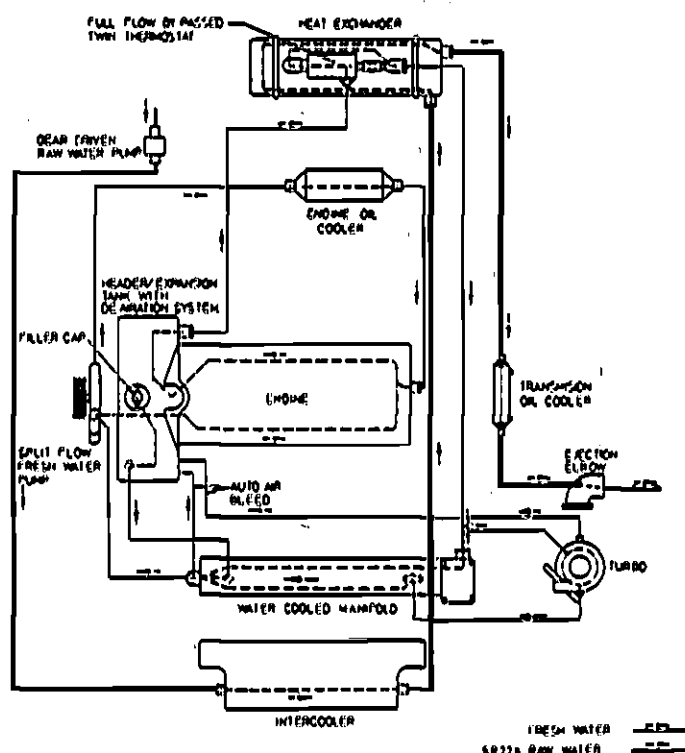


FIG. 9. - RAW WATER CIRCULATION SYSTEM

- A - Intake scoop of standard marine design, minimum 1" NPT should be used for raw water inlet. Reduce to $\frac{3}{4}$ " NPT at pump. Recommended scoop has bars across opening to prevent entry of large pieces of foreign matter - Lehman part NO. EW-3 is preferred.
- B - Sea-cock should be 1" NPT minimum size, "gate" type opens fully to allow full, unrestricted flow of water - Lehman part NO. EW-22 preferred.
- C - The use of an efficient, full-flow raw water strainer is strongly recommended to prevent clogging of pump and exchangers by weeds, etc. Lehman part NO. EW-102 preferred.
- D - If hose is employed for intake, same should be reinforced type of extra heavy construction to prevent collapse under powerful suction of raw water pump - Lehman can provide such hose if required.

Winterization of Cooling System

Inboard type heat exchangers must be drained of raw water when exposed to freezing temperatures. Raw water, pump, water inlet piping and intake strainer should likewise be drained when subjected to extreme cold.

If however, the vessel is being permanently laid up for the duration of the cold weather, we recommend mixing an anti-freeze solution and running this solution through the sea water system with the engine idling until discharged from the exhaust. This insures the sea strainer, coolers, heat exchanger, even the muffler and exhaust system will be protected.

Drain points for the fresh water system will be found on the port side of each engine block, on the aft end of the exhaust manifolds and on the heat exchanger.

Raw water drains are found on both engine and transmission coolers, as well as, the heat exchanger. To drain raw water pump, loosen rear cover.

"Keel Cooling" Systems

In some cases the installation of a "keel cooling" system may be preferred to the standard "heat exchanger" previously discussed. This system employs a series of tubes mounted on the underside of the hull through which the engine cooling water is circulated. Such a system is beneficial when the boat is to operate in muddy or silt-laden areas, however, the cooling element does produce additional hull "drag" which could affect performance in faster boats and creates a potential hazard if tubes fracture or are struck by driftwood, etc.

Piping engine to keel cooler is quite simple. As shown in Fig. 10, the connection on underside (starboard) of expansion tank deliver hot water from engine to keel cooler. Cooled water from keel cooler returns to engine via connection on aft end of exhaust manifold. The use of $1\frac{3}{4}$ " I.D. hose will simplify connections, however hose must be reinforced type to prevent collapsing under suction and care must be exercised when installing to avoid "kinks" or the possibility of chafing.

Installations using a "wet" exhaust will required raw water systems as shown in Fig. 9., but omitting heat exchanger.

When dry exhaust is employed, it is possible to eliminate use of raw water pump. Upon special order, lube and transmission oil coolers of large size may be incorporated in the engine fresh water system. The addition of such coolers is shown in Fig. 11.

FIG. 10. FRESH WATER CIRCULATION SYSTEM (Keel Cooler Type)

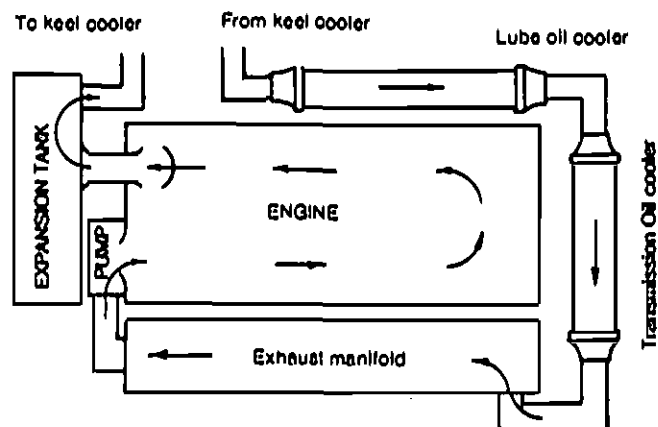
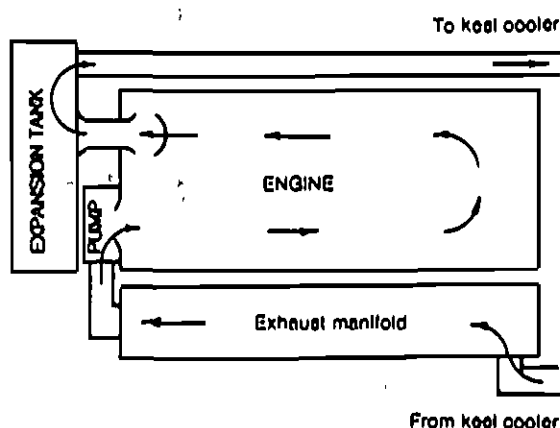


FIG. 11. WATER CIRCULATION SYSTEM (Keel Cooler Type) WITH LUBE AND TRANSMISSION OIL COOLERS IN FRESH WATER FLOW.

Tachometer Adapter

A tachometer "take-off" is provided on the starboard side of all naturally aspirated engines as an extra cost option. There is no provision for mechanical tachometer hook-up on turbocharged engines. This adapter accommodates a standard marine tachometer cable with 7/8" - 18 adaptor nut. Tip of cable core should be .187" diameter. Cable turns on-half engine speed in counter-clockwise direction.

If mechanical tachometer is not used or if cable is disconnected with engine to be operated for any lengthy period, the take-off should be capped to prevent oil leakage. Suitable cap (or plug to close aperture if take-off assembly is removed) is listed in the parts section of this manual.

It is recommended that a mechanical type tachometer be used only if located relatively close to engine. If cable length exceeds 12 to 14 feet or if many bends are required, an electrical tachometer system should be considered as much less strain is placed upon the take-off assembly. Installations requiring two tachometers should always use electric instruments.

Electrics

The standard electrical system for Lehman engines is 12 volt, **NEGATIVE GROUND**. Under no circumstances should polarity be reversed even for an instant for serious damage to alternator may result.

For special applications, optional electrical systems are available in 12 volt insulated return, 24 volt negative ground and 24 volt insulated return configurations.

A vee belt drives the alternator from crankshaft pulley. (Note: maintain belt at proper tension see "minor Repairs, Maintenance and Adjustments"). Alternator has been corrosion-treated and has built-in silicon rectifier and enclosed slip-ring design for safe, sparkless, trouble-free operation. Transistor type, sealed voltage regulator has no moving parts and requires no adjustments. Alternator is lubricant packed for life at time of assembly and therefore requires no external lubrication. All alternators are equipped with a tapping for connection to operate a matching electric tachometer. (see Fig. 13)

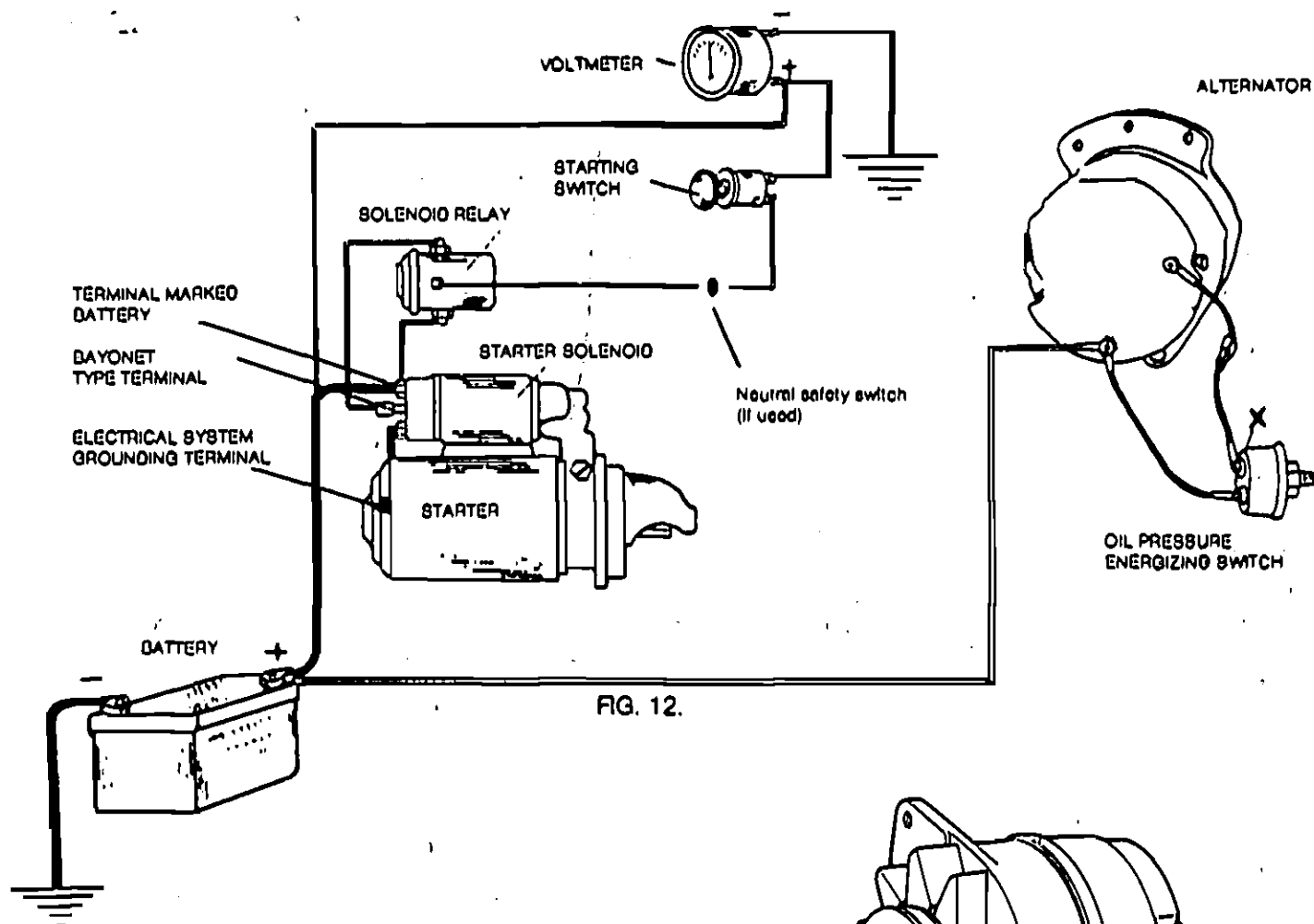
A special actuating switch located on side of engine block behind alternator automatically energizes the alternator from the battery when engine is started and oil pressure reaches 7 lbs. Battery is disconnected by this switch when the engine is stopped. This switch initiates operation of the alternator system without the need of a separate switch and precludes the possibility of the operator neglecting to turn the charging system on or off. If desired, electrical instruments such as oil gauge, temperature gauge, etc. may be wired to be automatically energized when engine is started.

The starter motor is located on the left side (rear) of engine and requires no attention beyond, maintaining the electric cable connections clean and tight, the commutator clean and brushes renewed when necessary.

The standard solenoid mounted on the starting motor is a heavy-duty type. It must mechanically engage the starter pinion with the ring gear on flywheel then it must actuate an electric switch to energize the starting motor. As the solenoid is normally energized by a simple push-button located at some distance from the starter, relatively heavy gauge wire is required to transmit the needed amperage. Using small gauge wire can result in insufficient current reaching the starter solenoid, overheating of wires, insufficient travel of starter pinion and failure of engine to start.

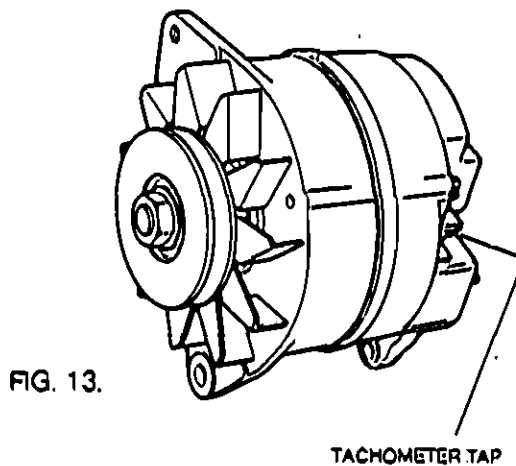
To assure adequate amperage reaching starter solenoid a "piggy-back" solenoid is provided with short, heavy-gauge wires connecting the two solenoids. The new solenoid requires comparatively little amperage so smaller gauge wiring is required for connection to pushbutton.

The accompanying diagram indicates basic wiring requirements. Make certain that all connections are clean and tight. Locate battery as close as practical to the starter. Gauge of battery cables will be dependent upon length, but should be NO. 0 minimum. Use No. 12 gauge or heavier wire for balance of system. Electrical gauges which require low current draw may be wired to oil pressure energizing switch indicated by "X" on the diagram.



WIRING DIAGRAM

NOTE: Wiring diagrams of all standard applications are available from Lehman on request.



Lubrication System

The engine lubricating system is of the forced feed type, the oil being circulated by an oil pump mounted with the crankcase. The pump draws oil from the sump through a metal gauze screen and through an oil gallery on the port (left) side of engine which is tapped for installation of oil pressure gauge, low oil pressure alarm, or other such devices. Constant oil pressure is maintained by means of a relief valve situated in the pump. Oil under pressure passes through the oil filter where it is cleaned prior to being circulated inside the engine. The filter is a full-flow, disposable "spin-on" type. It should be replaced at each oil change, and is readily available from your Lehman dealer.

All marine installations should include an oil pressure gauge to register the lube system pressure and such gauge should be frequently checked to insure that system is functioning correctly. Normally the registered pressure should remain constant for a given engine speed. If pressure reading suddenly varies or fluctuates, the reason should be determined at once, otherwise severe damage may occur. As it is difficult to maintain a constant watch on engine gauges, the use of an audible warning system to sound a buzzer in case of low oil pressure (or high engine temperature) is strongly recommended — Lehman has kits EK31 and EK31A available now fitted as STD in Lehman panels, — contact your dealer for further details.

When engine is first installed, provide the proper quantity of oil as indicated under "specifications" section. The oil cap is located on top of engine rocker cover. After pouring in oil, it will be necessary to wait several minutes before the oil level is checked in order to allow time for oil to flow to sump. Another fill cap which leads directly to sump is located on sump near front of engine. Run engine for several moments, shut down and check level on dipstick (see Fig. 14.) If oil level measurement is different from the "full" mark on dipstick, a new mark should be scratched or filed at the correct level. Another method is to measure the distance between the new full level and the factory full mark on the dip stick, remove the dipstick tube from the sump, and cut that distance off the tube. After deburring and reinstalling the tube the dipstick will be lowered into the oil, thereby retaining the factory markings. Of course, the above procedure applies only to 6 cylinder N.A. and turbo units with dipstick at front of sump. Four cylinder models with stick at rear of sump, require scratching the appropriate marks. These procedures are necessitated by differing installation angles.

When measuring oil level in regular usage in all naturally aspirated engines it is preferable to check after the engine has stopped for a period of time, such as overnight. This allows the oil in the overhead valve system to drain back to the oil sump, permitting a more accurate measurement.

On all turbocharged engines the oil should be checked prior to starting. After several minutes, shut engine down, wait for oil to drain back for several minutes, then check and add as required.

Add engine oil of the type and viscosity as follows. Oil should meet Ford specification 2M-2C-1017A, API classification CC or equivalent.

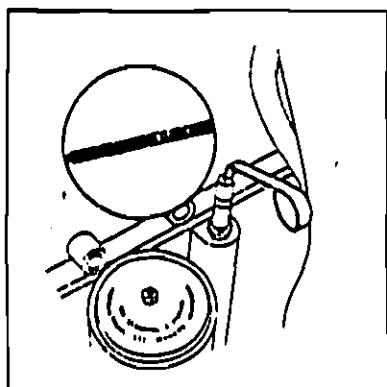


FIG. 14.
ENGINE OIL DIPSTICK

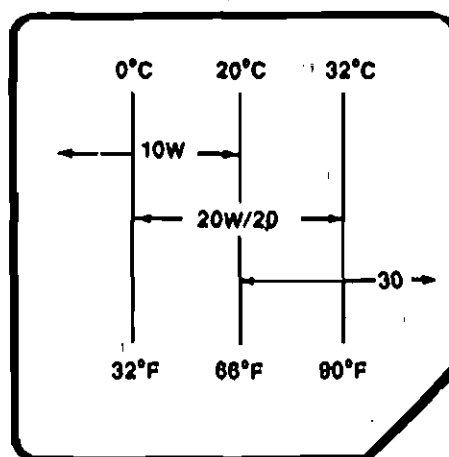


FIG. 15.
OIL VISCOSITY CHART

TURBO ENGINES: API classification CD oils only must be used in turbocharged engines. Use of other oil result in reduced engine life and invalidate engine warranty.

Serious damage to turbocharger may result from inadequate lubrication. Upon starting, engine should be allowed to idle (1000 rpm maximum) for 30 seconds or more before applying load. Also allow engine to idle for at least two minutes before shut-down to dissipate heat from turbocharger bearings.

Turbocharger must be oil-primed under any one of the following conditions:

After an oil change.

If oil supply tube to turbocharger has been disconnected.

If either the engine or turbocharger is newly installed.

If no oil pressure registers on gauge after a "dead crank" (cranking with stop control in operation) for 15 seconds.

This test must be performed if engine has not been started for 4 weeks or more.

To oil-prime turbocharger;

- Check for sufficient oil in the engine sump but do not top-up at this time.
- Remove plug on top of turbo oil feed block, inject ¼ pint of oil and replace plug.
- Using suitable syringe, inject about 4 pints of oil (as used in engine sump) into oil gauge connection for engine. Refit oil gauge.
- Start engine, allowing 1 minute to idle before increasing speed.
- Stop engine and check sump oil level. Top-off if needed or drain off any surplus.

Engine oil should be changed after the initial 15 hours of operation and at each 200 hours of operation thereafter. Run the engine until normal operating temperature is reached. Shut down engine and allow oil to return to sump for five to ten minutes. In most installations it will not be possible to drain sump by removing plug which is located at bottom of oil pan, for clearance to bilge of hull will be limited. A low-cost, suction type, hand operated sump pump is required. Available as an extra cost option is a Lehman approved, permanently mounted hand pump. This can be connected to the sump lug - installation permitting or . . . Remove the dip-stick tube and insert suction hose of pump, working same towards lower portion of sump. (Some operators find it advantageous to use a length of copper tubing to assure reaching low section of sump. Pump oil into container and dispose of same ashore. Replace vent cap on sump. Refill crankcase to "full" mark on dipstick. Run engine for several minutes, shut down and recheck oil level. If required, add sufficient oil to bring up to full mark.

Lube oil filter element should be replaced at each oil change. the disposable element is simply unscrewed from its base by turning counter-clockwise on naturally aspirated engines it is possible to rotate the oil filter, or remove it from its bracket, thus minimizing the risk of oil spillage. Position a one-quart or larger container under filter before removal to catch oil from spilling into bilge. A new element is simply screwed onto the base with medium hand tightness. Under no circumstances should a wrench or excess pressure be used. When next starting engine, check filter for possible leaks or seepage, and tighten only sufficiently to prevent same.

Transmission

As there is such a wide variety of transmissions available with Lehman diesels, it is not practical to cover all installations in this manual. However, due to the popularity of the Borg Warner, PRM/Newage and Twin Disc transmissions, the following information is offered for those models.

BORG WARNER

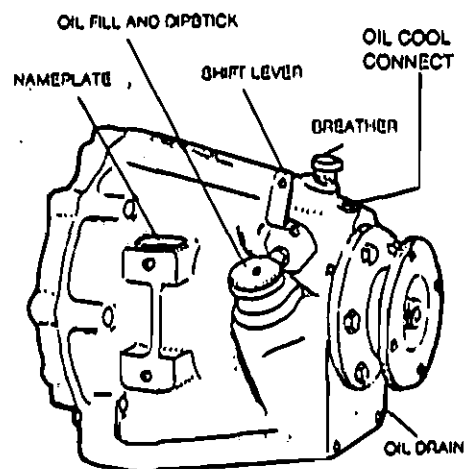
No attempt is made herein to instruct in the installation of engine in the boat. The prudent boat owner or operator will, before initially starting engine, check engine/shaft alignment, operate clutch control to make certain that lever fully travels to the full ahead or full reverse positions, that neutral position may easily and quickly be found and of course check oil level.

The transmission is a self-contained, sealed unit with independent lubrication system. No external adjustments of any kind are required. A built-in oil pump supplies the required hydraulic pressure to provide effortless shifting and assures an adequate supply of lubricant to all moving parts. An oil cooler is provided in order to maintain proper oil temperature which should not exceed 190 °F.

Automatic transmission fluid type A, suffix A is recommended for lubrication*. Or, if desired, "Dexron" type fluid maybe used. Before starting engine fill transmission to the full mark on the dipstick. Run engine for a minute or two at low speed (in order to fill oil lines, cooler, etc.) Then shut off engine and check oil level. Add sufficient oil to bring up to full mark. Transmission oil level should be checked each time the oil level in engine is checked. Change oil every 200 hours of operation or at least once each season under normal conditions however, number of hours may vary depending upon severity and conditions of service WARNER drain plug is a large "hex" plug located near bottom right side. Removal of this plug and a small plug on the bottom of the reduction housing will completely drain the transmission. On some models the cooler return hose may be fed into the plug at the bottom of the transmission. In these instances, remove the hose and rotate the brass elbow as required for draining.

*WARNER WILL NOW ALLOW USE OF SAE 30 OIL.
ENSURE YOU CHECK THE STICKER ON THE
COOLER WHICH INFORMS ON TYPE OF INITIAL FILL.

FIG. 16.



WARNING: Once again we repeat ... control cable or other mechanism for shifting transmission must have sufficient "throw" to shift the operating lever fully into both forward or reverse position. Unless shift lever is positively in forward, neutral or reverse, considerable damage may result. Transmission warranty is void if control lever is changed in any manner, or repositioned or if linkage to remote control does not have sufficient travel in both directions.

When ordering parts for your transmission be sure to specify both model and serial numbers as shown on identification tag.

PRM/NEWAGE Operation

First time usage

Before starting the engine fill the gearbox with one of the recommended lubricants (SAE30W) to the maximum level indicated on the dipstick.

Ensure that the gearbox is in neutral, it is recommended that the optional neutral safety start switch (if fitted) should be wired in to the starter circuit to avoid uncontrolled boat movement on starting-up. Start up and run the engine and gearbox for a few minutes to allow the oil to circulate through the cooling circuit (and angle drive if fitted). Stop the engine, allow to settle, check the oil level and 'top-up' to the maximum level shown on the dipstick.

Operating temperature

Normal operating temperature should be between 50°C – 70°C with a maximum of 80°C. The oil coolers supplied for fitting to Newage PRM gearboxes have adequate capacity to ensure correct operating temperature under all conditions.

Gear shifting

Newage PRM marine gearboxes have been designed and tested to ensure rapid shifts from ahead and astern and vice versa can be operated at full horsepower ratings and speeds, and the transmission will respond rapidly in these circumstances. Full power shifts, however, do place abnormal, even if short lived, loads on the gearbox, and the operating life will be increased if they are reserved for emergency use only.

Trailing (free-wheeling) the propeller.

The bearings used in Newage PRM gearboxes have been carefully selected to ensure that prolonged trailing (free-wheeling) of the propeller will not have any detrimental effect on the transmission. This allows the propeller to turn freely with the engine shut down and makes Newage PRM gearboxes particularly suited for use in auxiliary sailboats, motor sailers, or multi-engine installations where the boat may be operated with one or more engines shut down.

Emergency operation

Included as standard in every Newage PRM marine gearbox is a 'Get-You-Home' device, allowing the gearbox to be mechanically locked in 'ahead' drive, in the unlikely event of hydraulic failure.

ROUTINE MAINTENANCE

After 25 hours running

Drain all oil from the gearbox and refill with one of the recommended lubricants. Operate the engine and gearbox, allowing the oil to circulate, then stop the engine and allow the oil to settle. Re-check the oil level and top up if necessary to the maximum mark on the dipstick.

Daily

Check oil level and make visual check for oil leaks especially at the output shaft oil seal and at gasket sealing surfaces.

Annually

Check oil cooler hoses and connections

Check propeller shaft alignment

Ensure that remote control operating linkage is adjusted to give the correct travel on the gearbox operating lever.

TWIN DISC MARINE TRANSMISSION

All moving parts of the transmission are lubricated by the oil within the sump as it travels throughout the hydraulic system. The oil used should be of the same quality and type recommended for use in the engine. Use SAE30 HD when the inlet water temperature to the heat exchanger is above 80°F, and SAE20 HD when this temperature is below 85°F.

Oil level in the transmission should be checked daily with the engine at idle speed and the marine transmission in "neutral". Oil level must be maintained at the "full" mark on the dipstick. The period between oil changes is 1000 hours of operation or 6 months, whichever occurs first. At each oil change the filter screen, installed at the bottom of the rear cover and extending into the sump, should be removed and cleaned. It should be re-installed using pipe sealant or pipe thread compound on the threads. The breather cap should also be removed and flushed in clean diesel fuel. Next, disconnect the heat exchanger hoses and drain all the oil from the heat exchanger. Finally, if an oil filter is used in the hydraulic system, drain the filter and connecting hoses, and replace the filter element.

To drain the transmission, remove the Hex-Head plug from the bottom of the main housing. When re-filling, use 1.2 US gallons (4.456 lts) of oil. Pour the oil into the breather cap opening. After filling, start the engine and shift the unit from "forward" to "reverse" several times to fill the oil lube lines, heat exchanger etc. with oil. Set the engine at idle speed and the transmission in "neutral". The oil level must be to the "full" mark on the dipstick. Re-install the breather cap when the correct level has been reached and run the transmission until the oil temperature has been raised to its operating range. Re-check the oil level and top up if necessary.

Periodically inspect hoses for signs of leak, damage or sponginess, replacing where necessary. Pressure and temperature gauges should be regularly inspected and replaced if found to be damaged or of suspect accuracy.

If information on any other transmission is required, please contact Lehman and such information will be forwarded to you.

Maintenance

The importance of correct lubrication, periodic inspection and adjustment cannot be over-emphasized. On it will depend, to a very large extent, the service which your engine will deliver.

The heat exchanger of your engine is protected by a "zinc pencil" which should be inspected and replaced periodically as required. As the rate of electrolysis varies greatly in different areas, only experience will dictate how often inspections should be made.

For convenience lubrication and maintenance work has been divided into the following periods;

- | | |
|-----------------------------------|-----------------------------------|
| A Daily | E After every 1500 hours running. |
| B After every 50 hours running. | F After every 3000 hours running. |
| C After every 200 hours running. | G After every 3600 hours running. |
| D After every 1200 hours running. | |

Summary of Regular Maintenance

Daily	Check engine and transmission oil levels. Check cooling water level. Check belt tension and adjust if required.
After first 50 hours of operation	Change Engine Oil and filter. Check (exchanger) zinc pencil.* Check for fuel, lube oil or coolant leaks. Check all wiring connections, cables, etc. Check valve clearances, adjust if required.
Every 200 hours of operation	Change Engine Oil & Filter. And Transmission Oil. Check idling speed, adjust if required. Check exhaust components for leaks. Check condition of all coolant and oil hoses. Check all engine mount bolts. Replace raw water pump impeller.
Every 1200 hours of operation	Flush cooling system. Replace anti-freeze.
Every 1500 hours of operation	Check end play of turbocharger rotating assembly.
Every 3000 hours of operation	Remove and dismantle turbocharger — repair as required.
Every 3600 hours of operation	Replace thermostats.

*Zinc pencil should be checked every 2 weeks, regardless of number of operating hours until owner determines how often zinc element must be replaced. Replace after 50% deterioration.

Injectors need not be serviced at regular intervals but rather, should be serviced after problem such as smoke, loss of power, hard starting, etc. develops and has been diagnosed.

Minor Repairs, Maintenance and Adjustments

DUE TO REVISED HEAD GASKET, HEAD GASKET AND HEAD BOLT DESIGN RETORQUING OF CYLINDER HEAD IS NOT REQUIRED. AND MUST NOT BE ATTEMPTED.

TO ADJUST VALVE CLEARANCES: (Note . . . Adjustments should be made while engine is at normal operating temperature). Following removal of rocker arm cover and tightening cylinder head bolts as described above, actuate the engine stop control lever so engine will not start and revolve crankshaft pulley, until numbers 1 and 6 valves (on 4 cylinder, see specification section) or number 1 and 4 (on 6 cylinder, see specification section) are opened by their respective rocker arms.

Insert the correct thickness feeler gauge (as shown in the following table) between the valve stem cap and rocker arm of No. 3 inlet valve (on 4 cylinder) or No 9 exhaust valve (on 6 cylinder) as shown in figure 25. Turn the valve clearance adjusting screw Fig. 18 until the feeler blade is lightly caught between the rocker arm and valve stem cap, but so that the blade can still be removed with light resistance.

Select the appropriate feeler blade and repeat the procedure for No. 8 exhaust valve (on 4 cylinder) or No. 12 exhaust valve (on 6 cylinder) models.

Rotate the engine and following the sequence in the following table, adjust each of the remaining valves. Replace rocker cover, making certain that gasket is unbroken and correctly positioned. After running engine for a short while, check rocker arm cover gasket for possible oil leaks.

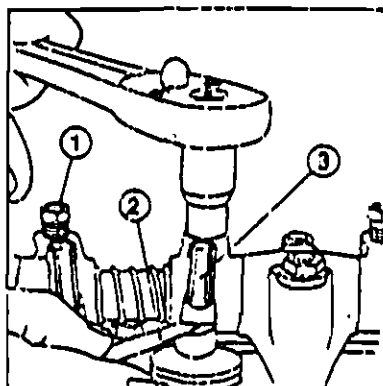


FIG. 18.

ADJUSTING VALVE CLEARANCE

1. Adjusting screw
2. Feeler blade
3. Rocker arm

4 Cylinder engines

Valves Fully Open

1 and 6
2 and 4
3 and 5
5 and 7

Valves to Adjust

3 and 6
5 and 7
1 and 5
2 and 4

6 Cylinder engines

Valves Fully Open

1 and 4
5 and 10
2 and 6
9 and 12
3 and 5
7 and 11

Valves to Adjust

9 and 12
3 and 5
7 and 1
1 and 4
8 and 10
2 and 6

TO ADJUST VEE BELT TENSION: Loosen alternator mounting and adjusting strap bolts as per figure 19. Move alternator to adjust belt tension. Tension is correct when your thumb pressure on belt at a point between alternator or and water pump pulleys does not exceed $\frac{1}{2}$ ". Tighten alternator mounting and adjustment strap bolts.

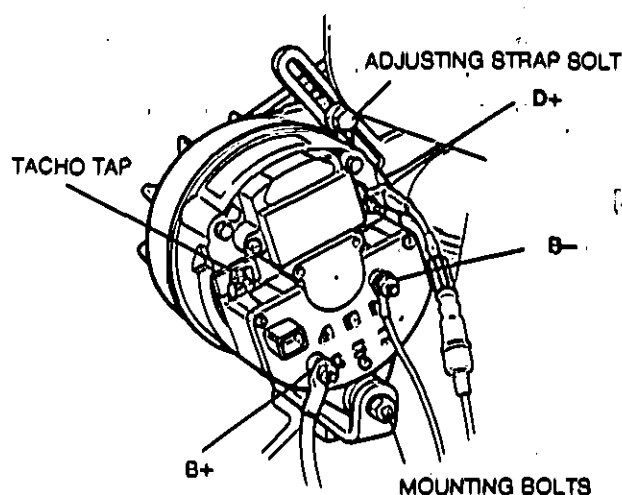


FIG. 19.

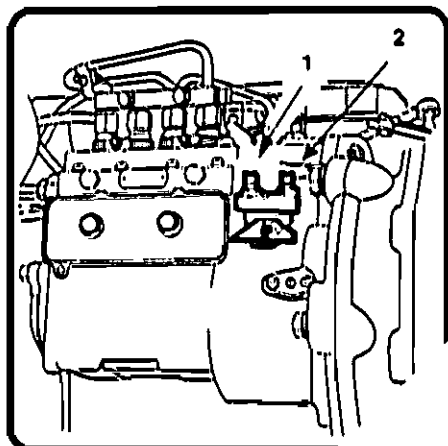
BELT ADJUSTMENT

INTAKE AIR FILTER: The air filtering element(s) on all naturally aspirated engines is polyurethane foam which traps and holds dust and foreign matter which could be drawn into the engine and cause severe damage. Turbo Charged and Turbo Intercooled engines only use a Mesh Screen.

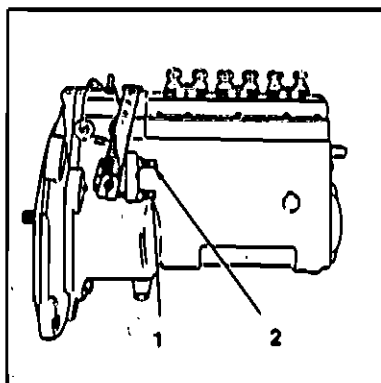
By reason of the efficiency of the filter in trapping contaminants it is difficult to effectively clean the element. It is usually best to replace this low-cost item as occasion demands. Simply slide old element off its retaining screen and carefully stretch a new element into position. If cleaning is desired, wash in a mild detergent mixed in clear, sweet water. DO NOT wash in mineral spirits, varsol, gasoline, or any petroleum product.

FIG. 20

INJECTION PUMP (All N.A. ENGINES)



INJECTION PUMP (TURBO ENGINES)



1. Max speed stop screw
2. Idling stop screw & locknut

TO ADJUST IDLING SPEED: When properly serviced and after the initial "break-in" period, your engine should idle as indicated on spec sheet.

Engine must be at normal operating temperature when making adjustments. With engine running, loosen the idle screw locknut which is on side of fuel injection pump. Adjust the idle speed screw until engine is idling at correct speed and then tighten locknut. Operate the throttle lever to make certain that same returns to same setting.

Note: If engine is new or cold, it may idle unevenly. Do not increase the idle speed setting to compensate. **ON NO ACCOUNT SHOULD THE MAXIMUM SPEED STOP BE CHANGED.**

TO CLEAN FUEL LIFT PUMP Turn off fuel supply valve. Holding receptacle under pump to prevent spilling of fuel into bilge of boat, loosen the center bolt and remove cover and pulsator. Clean pump thoroughly and wash cover and pulsator in fuel oil. Replace parts carefully. It will be necessary to bleed fuel system. Check for possible leaks after starting engine.

TO CHANGE SECONDARY FUEL FILTERS (note—making certain that the filter element(s) you will use is an EXACT replacement for the element you will remove, otherwise, air leaks into the fuel system may result. Unscrew the securing bolts on top of filter housing and remove filter bowls and elements. Discard elements and upper and lower sealing rings. Wash out the bowls and clean fuel oil but do not use a cloth for remaining lint may clog the fuel system. Carefully fit new sealing rings to the filter heads and bowls, assemble to the filter heads and replace and tighten securing bolts. It will now be necessary to bleed the fuel system of air as described in separate section. After running engine for a short time, check filters for possible fuel leaks.

Winterizing

In preparation for freezing temperatures, anti-freeze should be provided in the fresh water system of your engine. Due to the high temperature of operation a high boiling point anti-freeze is demanded. Do not attempt to use alcohol or other non-permanent types and do not use any liquids containing "sealants". Zerex (produced by DuPont) is highly recommended. Consult the specification freeze to bring within the limits of expected temperatures. Inboard type heat exchangers and oil coolers must be drained of raw (sea) water when exposed to freezing temperatures. Drain plugs will be found on bottom of heat exchanger and oil coolers and should be removed until all water has been drained. Raw water pump may be drained by loosening screws holding rear cover in position. Please refer to "cooling system" section of this manual for alternate winterizing method.

If boat is to remain in water while draining engine, of course, the intake water seacock must be closed prior to draining. Do not neglect to open sea-cock prior to starting engine.

NOTE: TO DRAIN FRESH WATER, REMOVE WATER FILLER CAP FROM TOP OF EXPANSION TANK ON FRONT OF ENGINE. DRAIN BLOCK BY OPENING PETCOCK ON PORT (LEFT) SIDE OF ENGINE IN CENTER, LOWER SECTION. REMOVE PLUG ON UNDERSIDE OF HEAT EXCHANGER (THE ONE NEAREST CENTER OF EXCHANGER) TO DRAIN WATER FROM EXCHANGER, EXPANSION TANK AND EXHAUST MAINFOLD. REPLACE FILL CAP ON TANK AFTER CLOSING PETLOCK AND INSTALLING PLUG IN HEAT EXCHANGER.

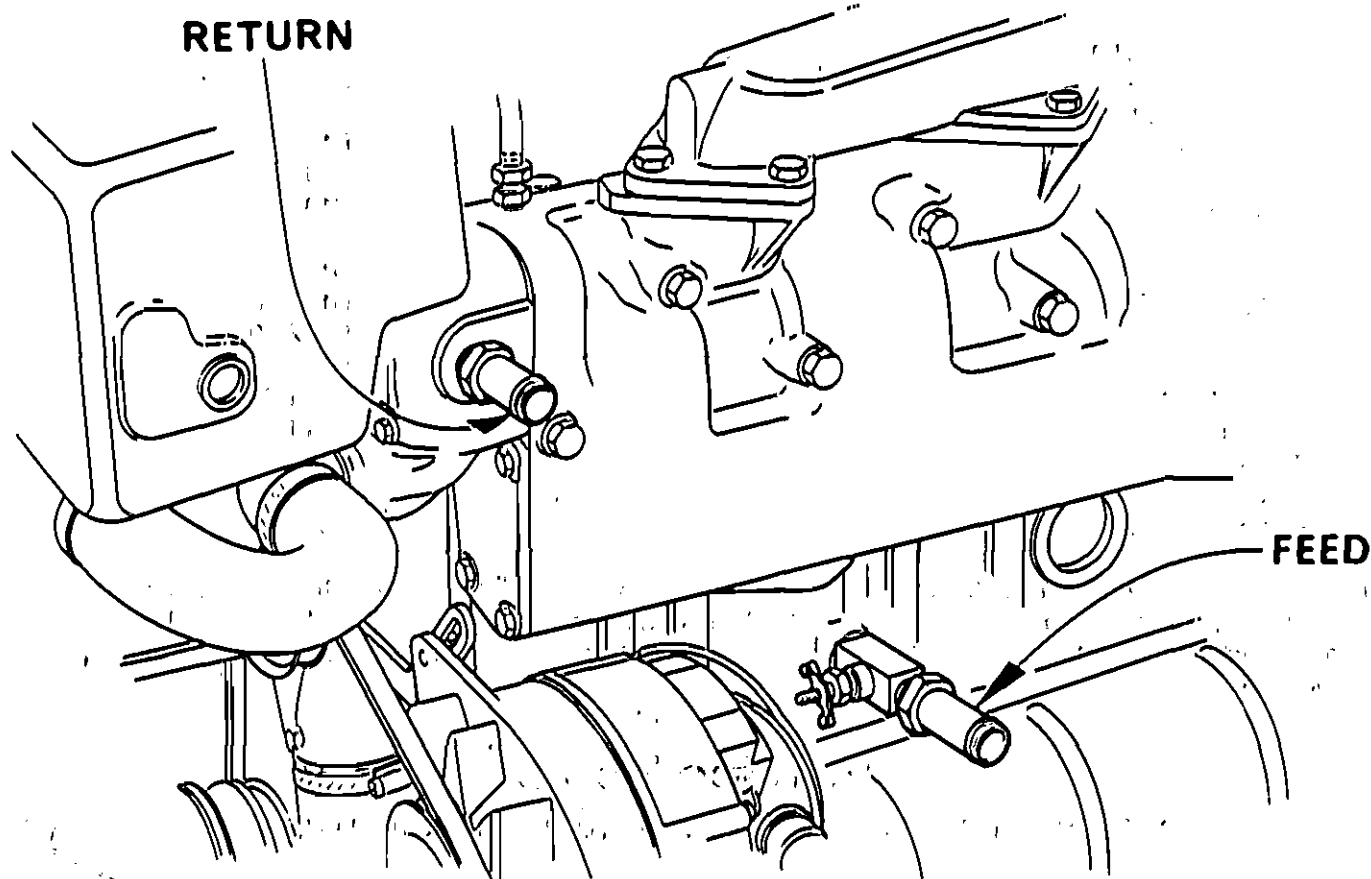
Remove air filter(s) and cover openings in manifold with plastic film held in place with masking tape. Seal off all other openings . . . air vent on top of rocker arm cover, vent on front end of sump and overflow and vent hole on injection pump. Plug exhaust pipe to prevent entrance of moisture.

Make certain that all engine exterior surfaces are clean, dry and free of oil or grease; then spray complete engine with any good rust preventative compound.

Before restarting engine, remove all plastic seals, covers, exhaust plug, etc., and refit air filter(s) in place. Do not neglect to replace all drain plugs, tighten rear cover of raw water pump, and turn on seacock.

Galley Hot Water Connections

It is common marine practice to utilize engine coolant passed through a hot water heater to provide domestic hot water. Connection to engine is made with Lehman Kit D1496. A coolant feed to the heater is made from the engine drain plug on the portside of block while the coolant return hose is attached to the forward, port side of the exhaust manifold. Always ensure that the max. height of the cooling hot water coil is 1" lower than the top angle of the expansion tank.



SECTION B

PARTS IDENTIFICATION — BASE ENGINE

In order to provide a simple method of identification, all models herein have been assigned a "code" letter as follows.

ENGINE CODE	CU/IN	NO. CYLS.	YEARS	ENGINE CODE	CU/IN	NO. CYLS.	YEARS
M-Super 90	254	4	8/82—	S-Super SP165	363	6	9/85—
N-Super 135	360	6	8/82—	P-Super 225	363	6	8/82—
				T-Super SP275	363	6	9/85—

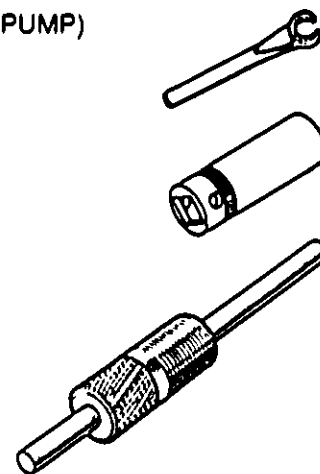
For ease in locating part numbers, turn to the applicable page:

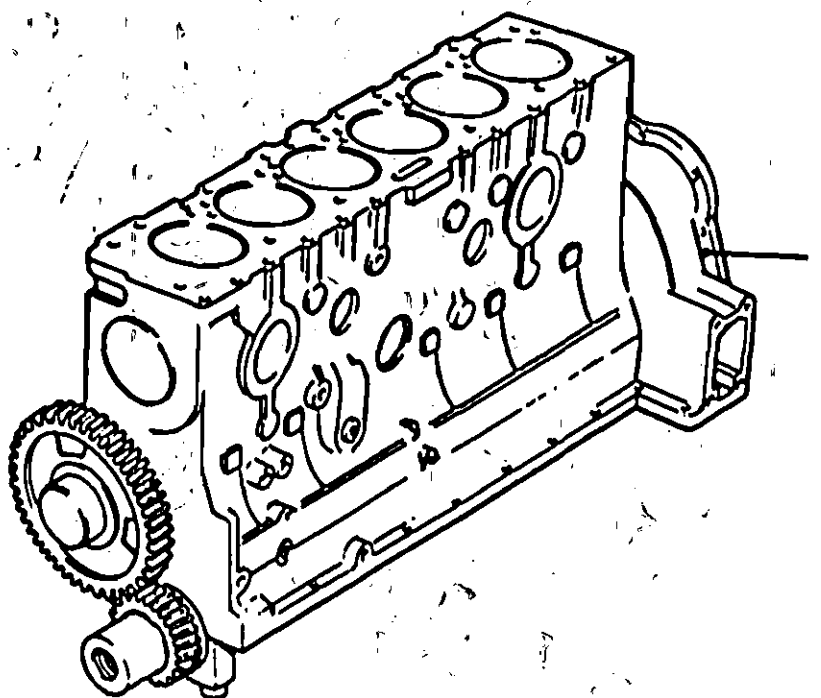
Bearings, main and rod	B4,B5,B6
Block, engine	B2,B3
Camshaft	B7
Crankshaft	B4,B5,B6
Damper, crankshaft	B12
Filter, fuel	B17
Flywheel	Sect Sect C
Gasket kit, engine	B2
Head, cylinder	B6
Injection equipment:	
Injectors	B14
Pipes	B14
Pump	B13
Pistons	B5,B6
Pulleys, crankshaft	B12
Pump, fuel (lift)	B15,B16
Pump, oil	B16,B19
Pump, water	B23
Starting motor	B24,B25
Sump (oil pan)	B21,B22
Tools	B1
Turbocharger	See Sect C
Valves	B9

By reference to the drawings on the applicable page, select the required part and note the "key" number assigned to it. The key number will be repeated in the first column of a following page. The second column will indicate the engine to which the part applies per the engine code letters shown above. The third column shows the required per engine.

Service Tools

- | | |
|-----|---|
| 6A1 | WRENCH FOR FUEL INJECTION PIPE NUTS (TOP OF INJECTION PUMP) |
| 6A2 | SOCKET TOOL — DELIVERY VALVE HOLDER |
| 6A6 | TAPPET WRENCH-FLEX FUEL LINE to LIFT PUMP (NOT SHOWN) |
| 6A7 | TIMING TOOL (23-507) |

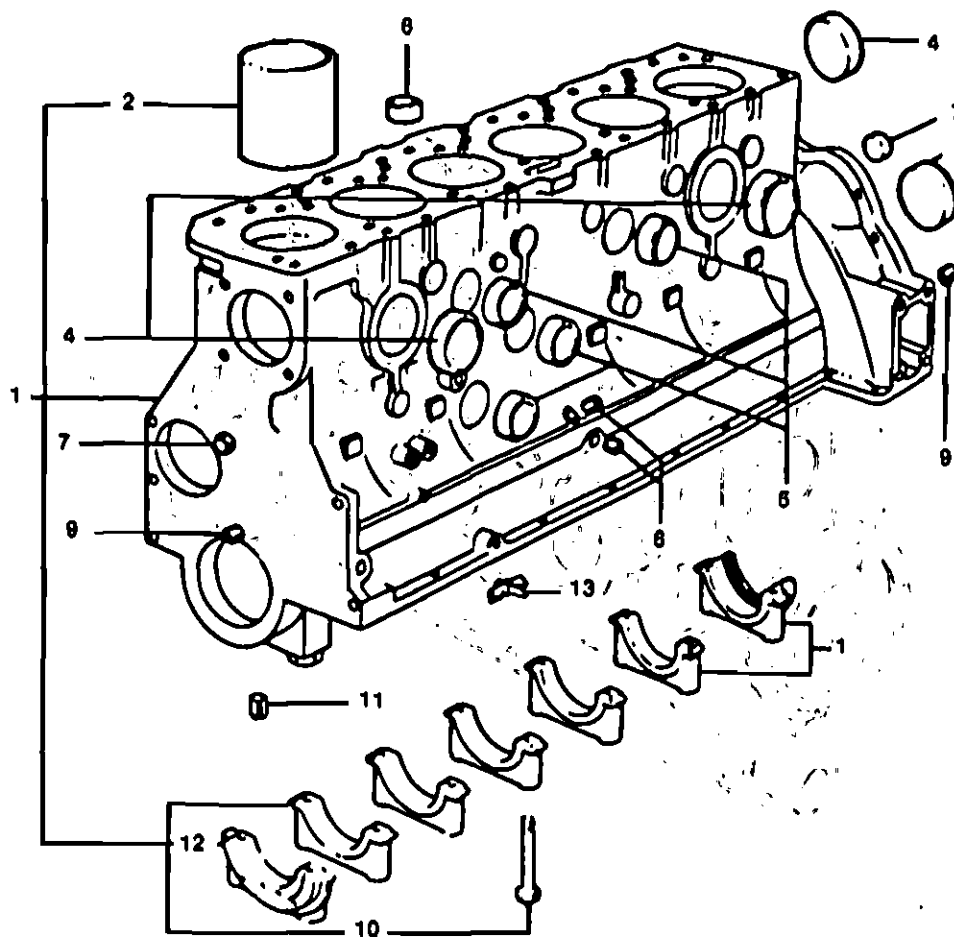




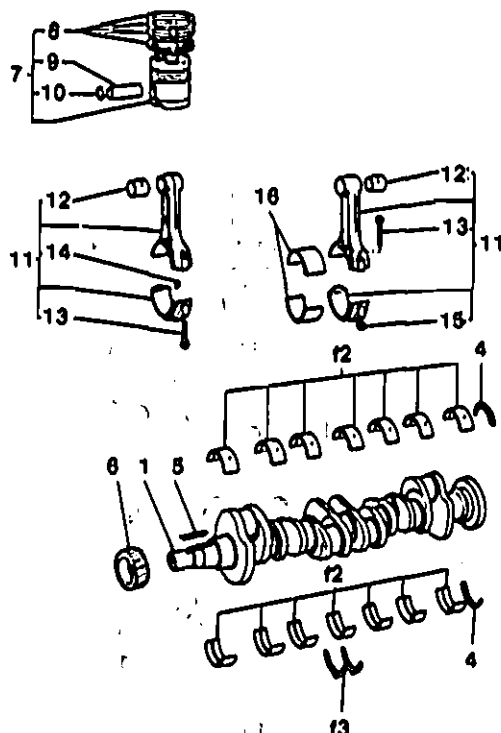
KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M	1	8082059	BLOCK ASSEMBLY	
	N	1	8088780	BLOCK ASSEMBLY	
	P/S/T	1	8079407	BLOCK ASSEMBLY	
2	M	1	8134949	GASKET KIT (OVERHAUL)	(B)
	N	1	8134954	GASKET KIT (OVERHAUL)	(B)
			8134959		
			8103812		
	P/S/T	1	8134987	GASKET KIT (OVERHAUL)	(B)
			8134980		
			1820148		
3	M	1	8134958	GASKET KIT (ENGINE DE-CARBONISING)	(A)
	P/S/T	1	8134980	GASKET KIT (ENGINE DE-CARBONISING)	(A)
4	M	1	8134952	GASKET KIT (OIL PAN & FRONT COVER)	(A)
	N	1	8134954	GASKET KIT (OIL PAN & FRONT COVER)	(A)
	P/S/T	1	8134953	GASKET KIT (OIL PAN & FRONT COVER)	(A)
5	M	1	8104238	GASKET KIT (OIL PAN)	(A)
	N	1	8104238	GASKET KIT (OIL PAN)	(A)
	P/S/T	1	8104237	GASKET KIT (OIL PAN)	(A)

(A) HEAD GASKET NOT INCLUDED MUST BE ORDERED SEPARATELY.

(B) NOT SHOWN.

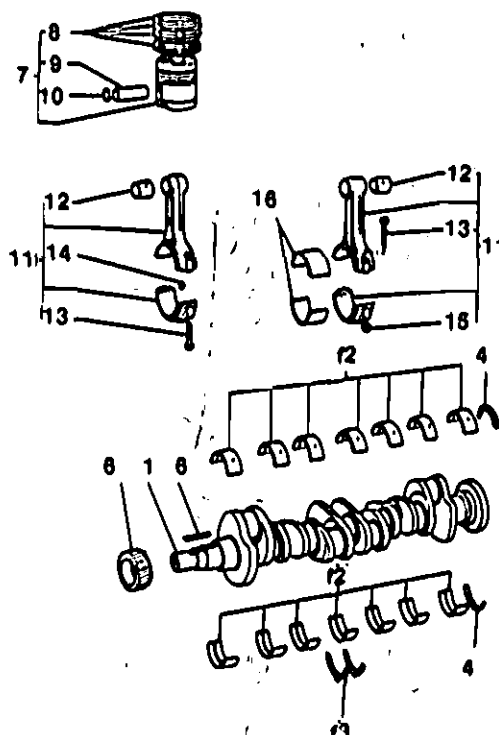


KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M	1	6086757	CYL BLOCK	
	N	1	6088760	CYL BLOCK	
	P/S/T	1	8086760	CYL BLOCK	
2	P/S/T	6	6077156	CYL LINER 4.289" 4.290"	REFER TO 10/61-11/82
		6	6128842	CYL LINER 4.291" 4.292"	TECH BULLETIN 10/61-11/82
	P/S/T	8	6139765	CYL LINER 4.269" 4.290"	66/03 11/82
	P/S/T	6	6139766	CYL LINER 4.290" 4.291"	11/82
	P/S/T	6	6139768	CYL LINER 4.291" 4.292"	BLOCK CODES 11/62
3	ALL	1	1788928	CAM BEARING 2.33-2.31	
	ALL	1	1788931	CAM BEARING 2.35-2.33	
4	ALL	3	6046528	FREEZE PLUG - 2.16"	
		3	6046527	FREEZE PLUG - 2.20"	
5	ALL	A/R	6102931	FREEZE PLUG - 1.660"	
6	ALL	1	6107196	DISTRIBUTOR APERTURE	
7	ALL	1	1786927	TAPPET OIL GALLERY	
8	ALL	1	1503090	OIL GALLERY PLUG	
9	ALL	2	1551172	OIL GALLERY PLUG	
10	M	10/14	1786352	CRANK SHAFT BEARING CAP BOLT	
	N	10/4	1786352	CRANK SHAFT BEARING CAP BOLT	
	P/S/T	10/14	1786352	CRANK SHAFT BEARING CAP BOLT	
11	ALL	2	6149422	PIN	
12	ALL		6086763	PART OF BLOCK ASSEMBLY	
13	ALL	1	1485471	WATER DRAIN FAUCET	



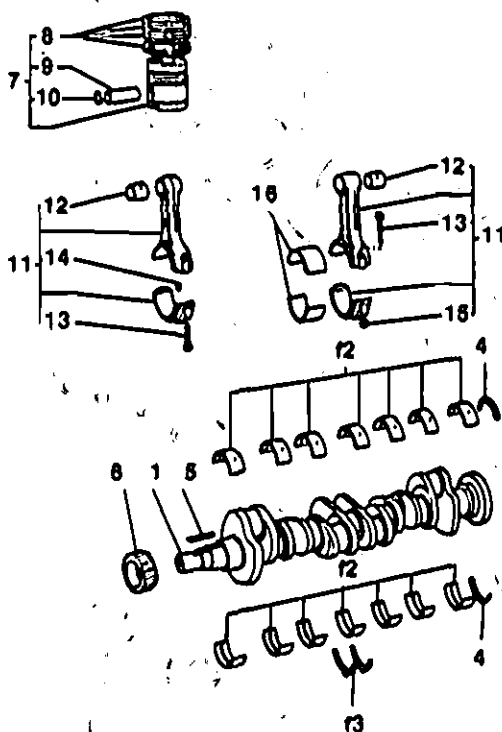
KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M	1	6077423	CRANKSHAFT	(A)
	M	1	1808855	CRANKSHAFT	(B)
	N	1	6077425	CRANKSHAFT	(A)
	N	1	8119349	CRANKSHAFT	(B)
	P/S/T	1	1808158	CRANKSHAFT	
2	M	1	6108301	CRANKSHAFT MAIN BEARING SET	
	N/P/S/T	1	6108302	CRANKSHAFT MAIN BEARING SET	STD
	M	1	6108222	CRANKSHAFT MAIN BEARING SET	-.010
	N/P/S/T	1	6108225	CRANKSHAFT MAIN BEARING SET	-.010
	M	1	6108228	CRANKSHAFT MAIN BEARING SET	-.020
	N/P/S/T	1	6108232	CRANKSHAFT MAIN BEARING SET	-.020
	M	1	6108305	CRANKSHAFT MAIN BEARING SET	-.030
	N/P/S/T	1	6108308	CRANKSHAFT MAIN BEARING SET	-.030
	M	1	6108311	CRANKSHAFT MAIN BEARING SET	-.040
	N/P/S/T	1	6108314	CRANKSHAFT MAIN BEARING SET	-.040
3	ALL	1	6108285	CRANKSHAFT THRUST WASHER	STD
			6108288		
	ALL	1	6108287	CRANKSHAFT THRUST WASHER	+.0025
			6108288		
	ALL	1	6108289	CRANKSHAFT THRUST WASHER	+.005
			6108290		
	ALL	1	6108291	CRANKSHAFT THRUST WASHER	+.0075
			6108292		
	ALL	1	6108293	CRANKSHAFT THRUST WASHER	+.010
			6108294		
	ALL	1	6108295	CRANKSHAFT THRUST WASHER	+.015
			6108296		

For footnotes turn to page B6



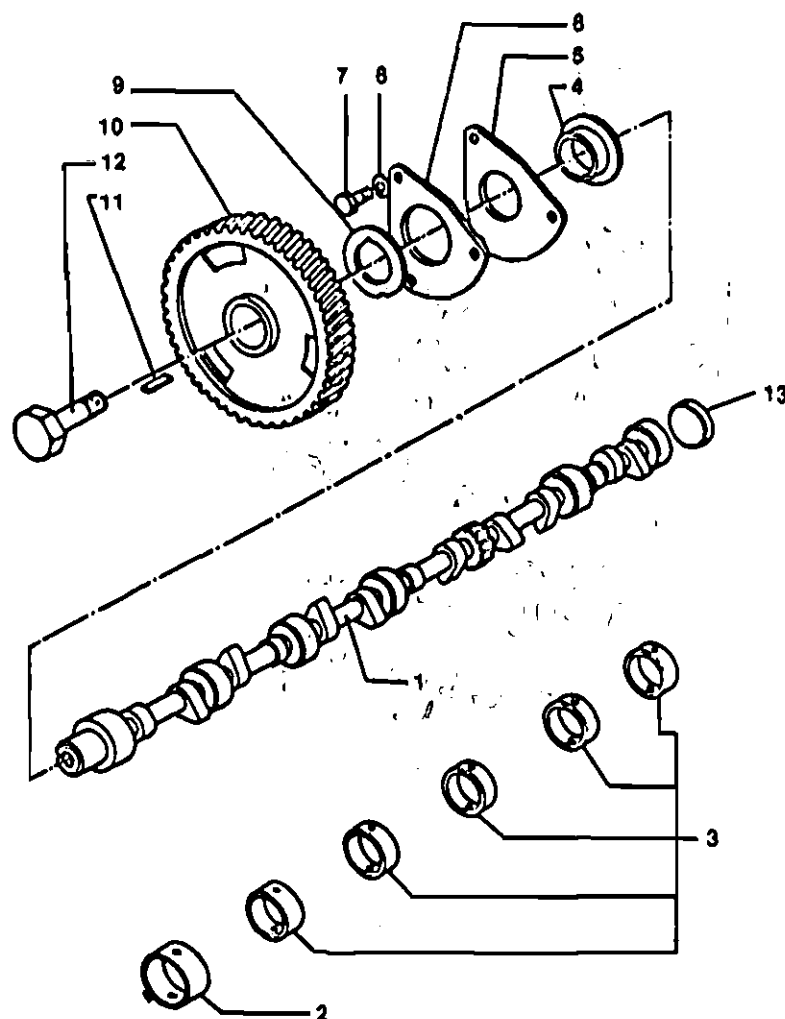
KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
3	ALL	1	6108297 6108298	CRANKSHAFT THRUST WASHER	+ .020
4	ALL	1	8153760	CRANKSHAFT OIL SEAL	
5	ALL	1	8090885	WOODRUFF KEY	
6	ALL	1	1599715 1599714 1599713	CRANKSHAFT GEAR CRANKSHAFT GEAR CRANKSHAFT GEAR	(C) BLUE (D) YEL. (E) RED
7	M	4	8143195	PISTON, PIN, RING ASSEMBLY	STD.
	N	6	8143195	PISTON, PIN, RING ASSEMBLY	STD.
	P/S/T	6	8100051	PISTON, PIN, RING ASSEMBLY	STD.
	M/N	4/8	8143198	PISTON, PIN, RING ASSEMBLY	+ .015
	M/N	4/8	8143197	PISTON, PIN, RING ASSEMBLY	+ .035
	M/N	4/8	8143198	PISTON, PIN, RING ASSEMBLY	+ .055
8	M/N	4/8	8143211	PISTON RING KIT	STD.
	P/S/T	6	1599879	PISTON RING KIT	STD.
	M/N	4/8	8143212	PISTON RING KIT	+ .015
	M/N	4/8	8143213	PISTON RING KIT	+ .035
	M/N	4/8	8143214	PISTON RING KIT	+ .055
9	M/N	4/8	8077182	PISTON PIN	
	P/S/T	6	8077183	PISTON PIN	
10	M/N	6/12	1415288	SNAP RING	
	P/S/T	12	8077184	SNAP RING	
11	M/N	4/8	8088942	CONNECTING ROD	STD. (AAB)
	M/N	4/8	8088943	CONNECTING ROD	.003 (ABB)
	M/N	4/8	8088944	CONNECTING ROD	.008 (ACB)
	M/N	4/8	8088945	CONNECTING ROD	.009 (ADB)
	P/S/T	6	8088946	CONNECTING ROD	STD. (GAB)
	P/S/T	6	8088947	CONNECTING ROD	.003 (GBB)
	P/S/T	6	8088948	CONNECTING ROD	.008 (GCB)
	P/S/T	6	8088949	CONNECTING ROD	.009 (GDB)

For footnotes turn to page B6

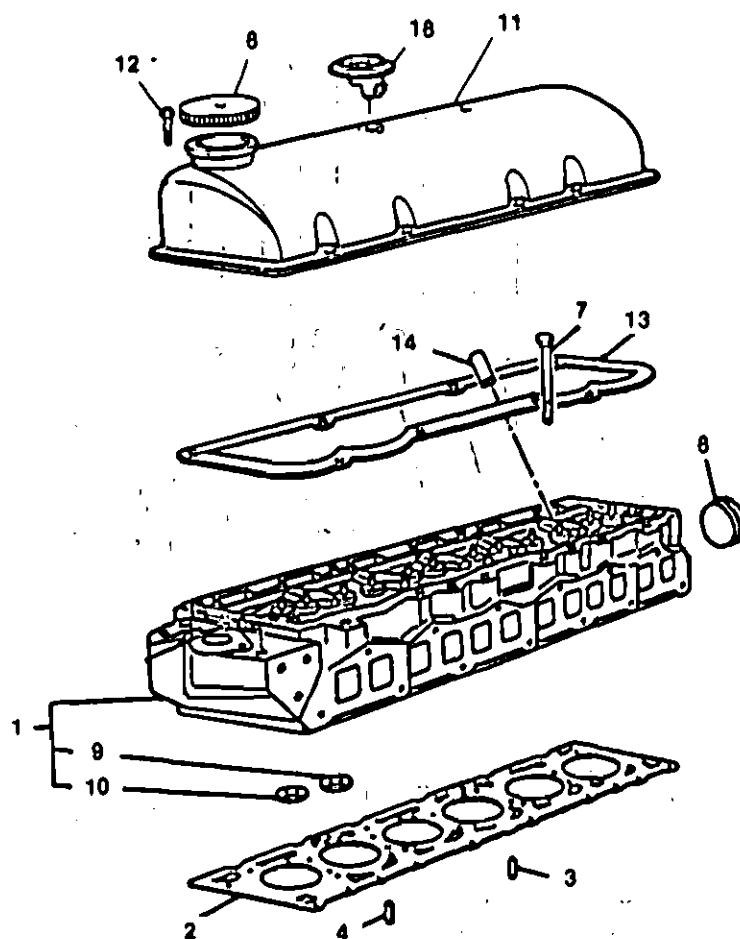


KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
12	M/N	4/8	1497464	CONNECTING ROD	
	P/S/T	6	6078059	BUSHING	
13	ALL	8/12	1447824	BOLTS	
14	ALL	8/12	1428387	PIN	
16	M/N/P/S/T	8/12	6101141	CONNECTING ROD BEARINGS	STD.
	P/S/T	6	6101142	CONNECTING ROD BEARINGS	STD. UPPER
	M/N/P/S/T	8/12	6101143	CONNECTING ROD BEARINGS	-.010
	P/S/T	6	6108203	CONNECTING ROD BEARINGS	-.010 UPPER
	M/N	8/12	6108200	CONNECTING ROD BEARINGS	-.020
	P/S/T	6	6105860	CONNECTING ROD BEARINGS	-.020 UPPER
	P/S/T	6	6105858	CONNECTING ROD BEARINGS	-.020 LOWER
	M/N/P/S/T	8/12	6105857	CONNECTING ROD BEARINGS	-.030
	P/S/T	6	6108205	CONNECTING ROD BEARINGS	-.030 LOWER
	M,N	8/12	6108202	CONNECTING ROD BEARINGS	-.040
	P/S/T	6	6105862	CONNECTING ROD BEARINGS	-.040 LOWER
		6	6108202	CONNECTING ROD BEARINGS	-.040 UPPER
17	ALL	6	1599712	NOZZLE	
18	ALL	6	1541955	SEAL	

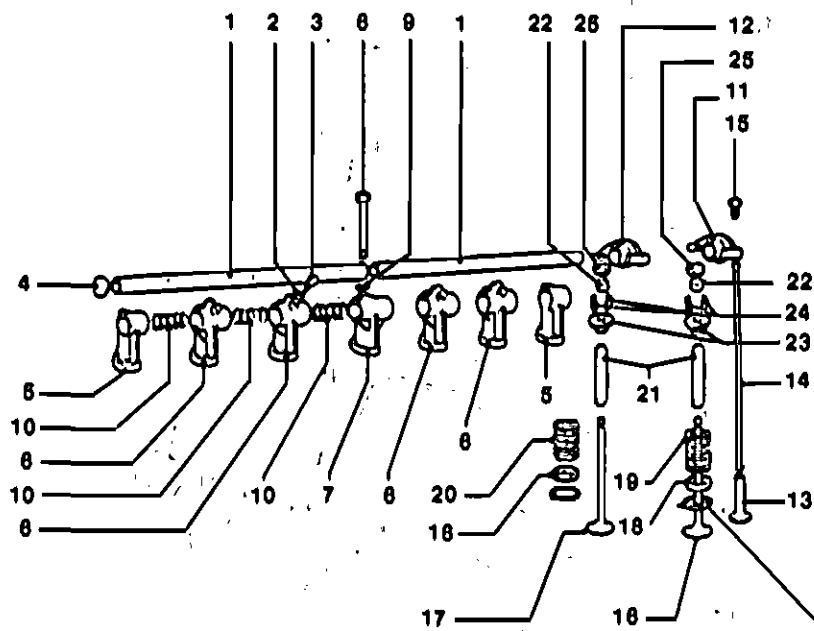
- (A) TO BE USED IN ENGINE WITH GREEN DATA PLATE
 (B) TO BE USED IN ENGINE WITH LIGHT BLUE DATA PLATE
 (C) TO BE USED WITH 6103310 CAMSHAFT GEAR
 (D) TO BE USED WITH 6103311 CAMSHAFT GEAR
 (E) TO BE USED WITH 6103312 CAMSHAFT GEAR



KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M	1	6112042	CAMSHAFT	1081-0982
	M	1	6129243	CAMSHAFT	0982-
	N	1	6112043	CAMSHAFT	1081-0982
	N	1	6129244	CAMSHAFT	0982-
	P/S/T	1	6112044	CAMSHAFT	1081-0982
			6129245	CAMSHAFT	0982
2	ALL	1	1794742	FRONT CAMSHAFT BEARING STD	
	ALL	1	1794743	FRONT CAMSHAFT BEARING +0.020	
3	ALL	3/5	1789333	CAMSHAFT BEARING STD	
	ALL	3/5	1789334	CAMSHAFT BEARING +.020	
4	ALL	1	1427085	CAMSHAFT THRUST WASHER	
5	ALL	1	6141685	PLATE CAMSHAFT THRUST	
6	ALL	1	1702841	LOCKING NUT	
7	ALL	3	1588492	BOLT	
8	ALL	3	1575329	WASHER	
9	ALL	1	1793898	THRUST WASHER	
10	ALL	1	1814698	GEAR CAMSHAFT	BLUE
	ALL	1	6103311	GEAR CAMSHAFT	YELLOW
	ALL	1	6103312	GEAR CAMSHAFT	RED
11	ALL	1	6142815	KEY	
12	ALL	1	1467140	BOLT	
13	ALL	1	1448568	CAP	

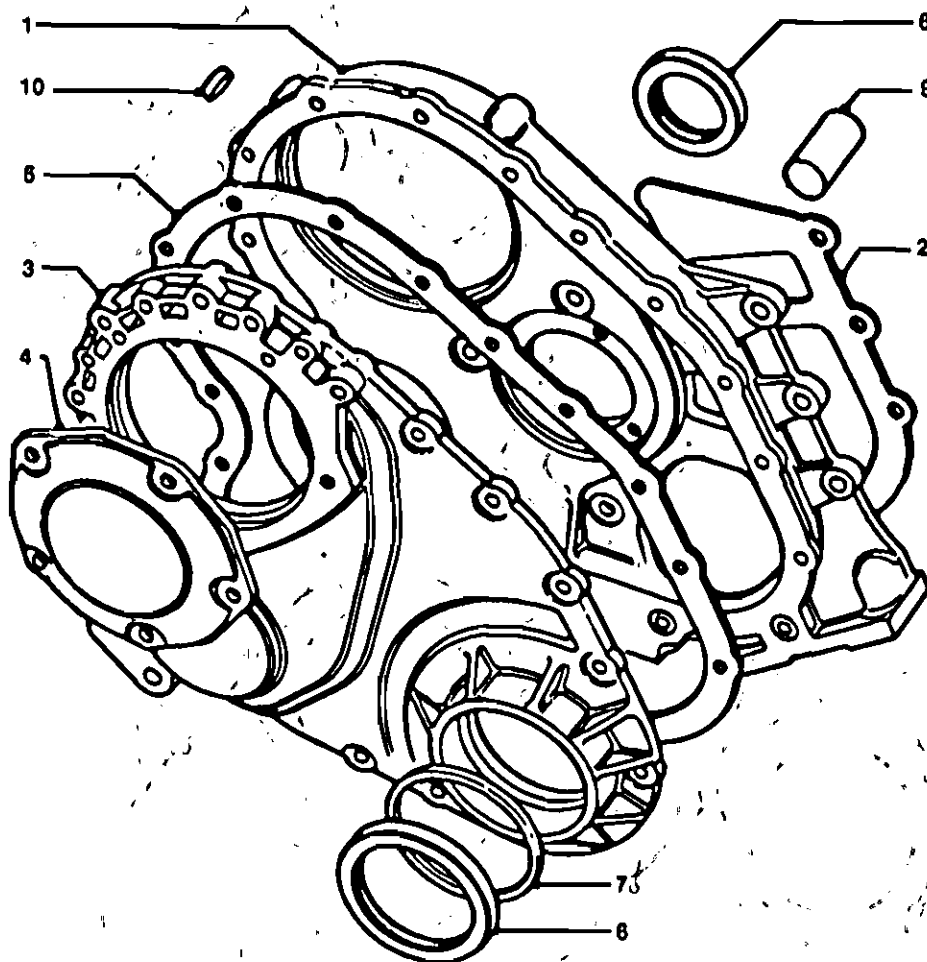


KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M	1	8082577	CYLINDER HEAD	
	N	1	8082578	CYLINDER HEAD	
	P/S/T	1	8082579	CYLINDER HEAD	
2	M	1	6103811	HEAD GASKET	
	N	1	6103813	HEAD GASKET	
	P/S/T	1	8139784	HEAD GASKET	
3	ALL	1	1788821	DOWEL	
4	M/N	1	1790851	DOWEL	
	P/S/T	1	6077317	DOWEL	
8	ALL	1	1448568	PLUG	
7	ALL	17/25	8103719	BOLT	
8	M/N/P/S/T	1	2C311	CAP (CHROMED)	
9	ALL	4/8	1430247	INLET VALVE SEAT STD	
	ALL	4/8	1430248	INLET VALVE SEAT +.010	
10	ALL	4/8	1430249	EXHAUST VALVE SEAT STD	
	ALL	4/8	1430250	EXHAUST VALVE SEAT +.010	
11	P/S/T	1	1F55	VALVE COVER (CHROMED)	
	M	1	1F56	VALVE COVER (CHROMED)	
	N	1	1F58	VALVE COVER (CHROMED)	
12	M/N/P/S/T	8/8	1F57	SCREW (CHROMED)	
13	M	1	8102582	GASKET	
	N/P/S/T	1	8102583	GASKET	
14	ALL	4/8	1798508	SLEEVE	
15	M/N	1	1548074	VALVE	

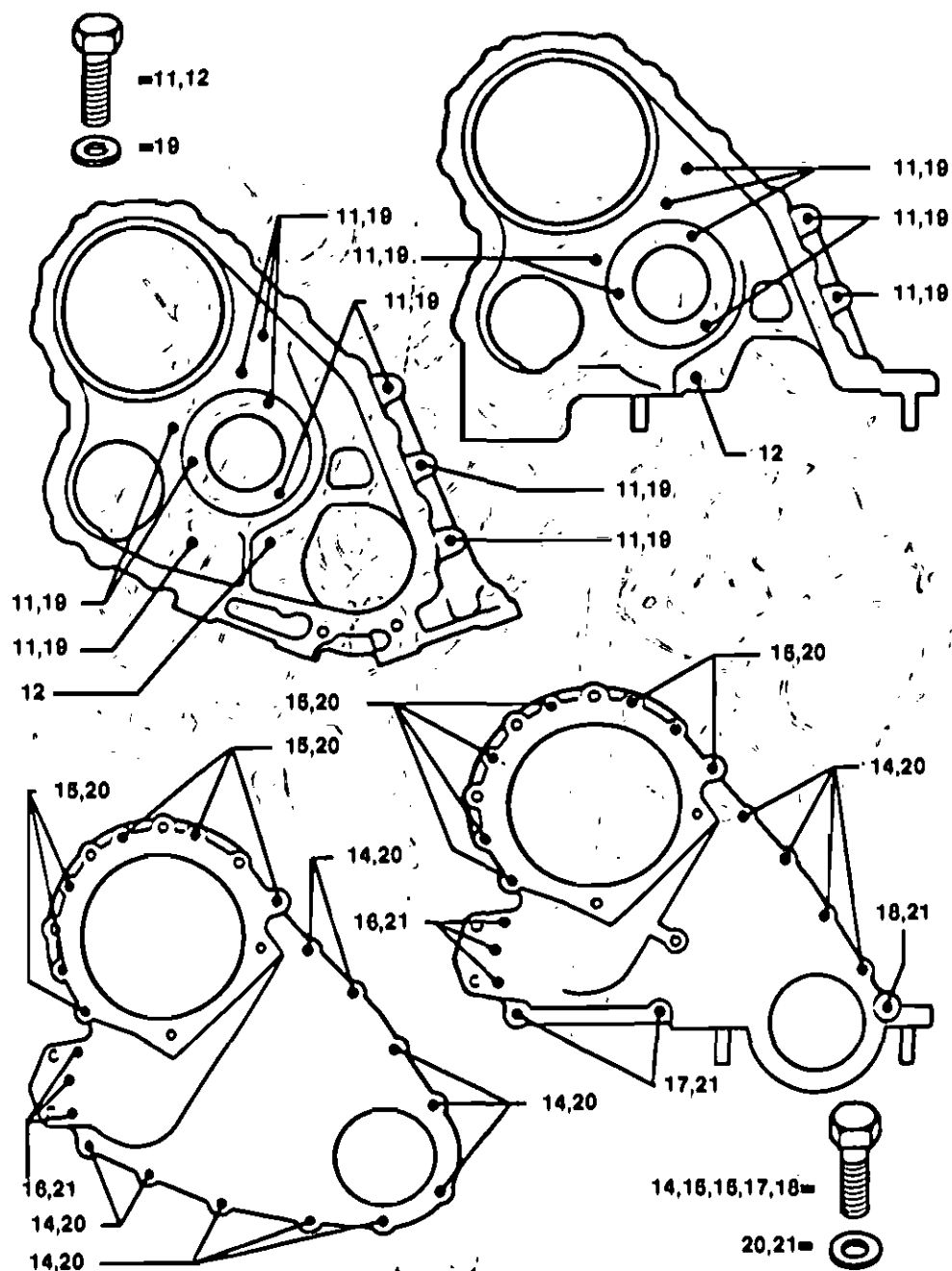


Page B8
Items 9, 10

KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M	1	1788686	ROCKER ARM SHAFT	
	N/P/S/T	2	6085981	ROCKER ARM SHAFT	
2	ALL	2/4	6089082	WASHER	
3	ALL	2/4	1602472	BOLT	
4	ALL	2	3418639	PLUG	
5	ALL	2	8116096	ARM SUPPORT	
6	ALL	2/4	8093816	ARM SUPPORT	
7	ALL	1	6093819	ARM SUPPORT	
8	ALL	5/7	1608753	BOLT	
9	ALL	5/7	1575329	LOCK WASHER	
10	ALL	4/8	1745333	SPRING	
11	ALL	4/8	8084185	LEFT HAND ARM	
12	ALL	4/8	8084186	RIGHT HAND ARM	
13	ALL	8/12	8079714	VALVE TAPPET	10/81-4/82
	ALL	8/12	8118749	VALVE TAPPET	5/82-11/82
	ALL	8/12	8125498	VALVE TAPPET	11/82-
14	ALL	8/12	8086868	ROD	
15	ALL	8/12	1504134	SCREW	
18	ALL	4/8	8093988	VALVE (EX)	10/81-1/83
	ALL	4/8	8133082	VALVE (EX)	1/83-
17	ALL	4/8	8093989	VALVE (IN)	10/81-1/83
	ALL	4/8	8133084	VALVE (IN)	1/83-
18	ALL	8/12	1789728	VALVE SPRING CAP	
19	ALL	4/8	1542862	SPRING EXHAUST	
20	ALL	4/8	1717773	SPRING INLET	
21	ALL	8/12	1710777	VALVE GUIDE STD.	
	ALL	8/12	6089288	VALVE GUIDE O/S	
22	M/N	4/8	8101533	SEAL VALVE STEM (IN)	
	P/S/T	6	1598817	SEAL VALVE STEM (IN)	
	ALL	4/8	1598817	SEAL VALVE STEM (EX)	
23	ALL	16/24	1473015	RETAINER	
24	ALL	8/12	8093972	COLLET	
25	ALL	8/12	1789727	CAP	

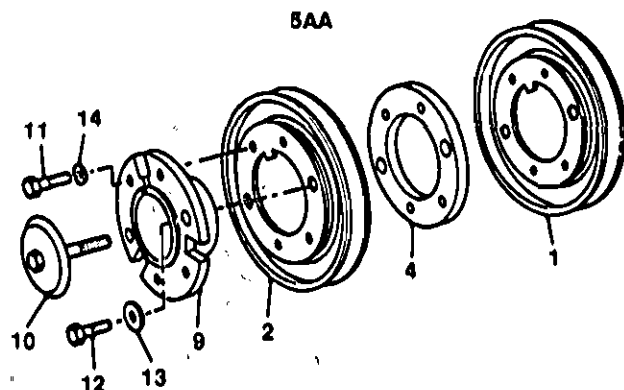


KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M,N	1	8113977	TIMING GEAR HOUSING	
	P/S/T	1	8113978	TIMING GEAR HOUSING	
2	M,N	1	8102580	GASKET	
	P/S/T	1	1599788	GASKET	
3	M,N	1	8105291	COVER	
	P/S/T	1	8105292	COVER	
4	ALL	1	1599717	COVER	
5	M,N	1	8102581	GASKET	
	P/S/T	1	1599789	GASKET	
6	ALL	1	8108640	SEAL	
7	ALL	1	1599790	SPACER	
8	ALL	1	8102559	SEAL	
9	ALL	1	1419959	SLEEVE STD.	
	ALL	1	1419980	SLEEVE .020 O/S	
10	ALL	1	1769541	PLUG	

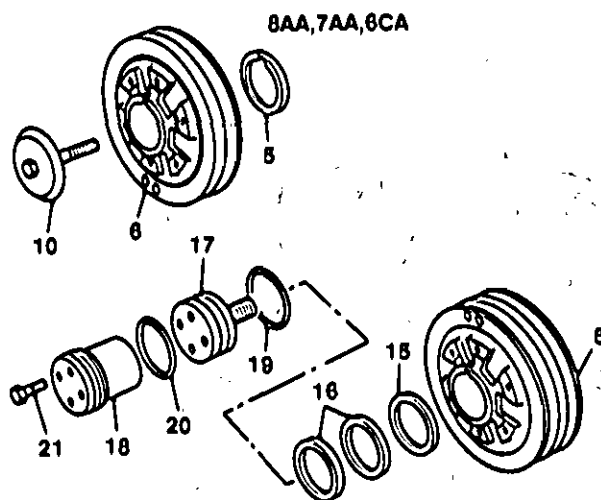


KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
11	ALL	A/R	1506431	BOLT	
12	ALL	A/R	1566867	BOLT	
13	ALL	A/R	0241729	BOLT	
14	ALL	A/R	1571467	BOLT	
15	ALL	A/R	1579207	BOLT	
16	ALL	A/R	1575027	BOLT	
17	ALL	A/R	1584241	BOLT	
18	ALL	A/R	1602500	BOLT	
19	ALL	A/R	1579329	WASHER FLAT	
20	ALL	A/R	1444685	WASHER FLAT	
21	ALL	A/R	1436268	WASHER FLAT	
22	ALL	A/R	1459510	LOCK WASHER	

SUPER 90



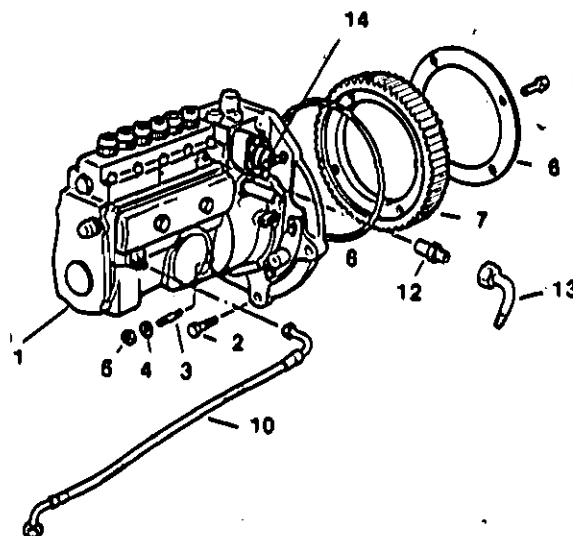
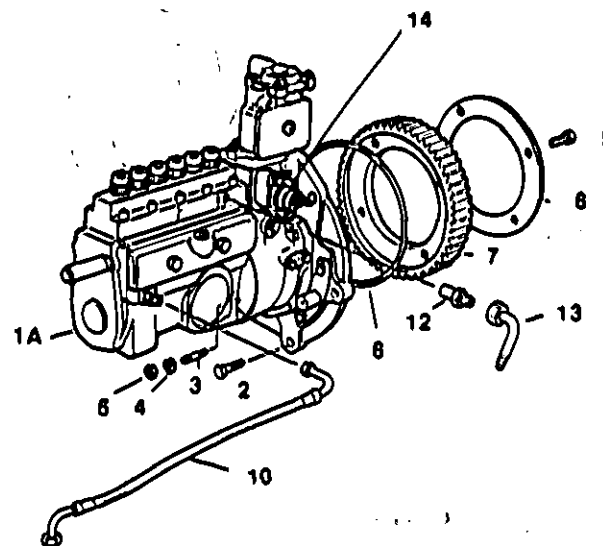
SUPER 135



SUPER 185/225/275

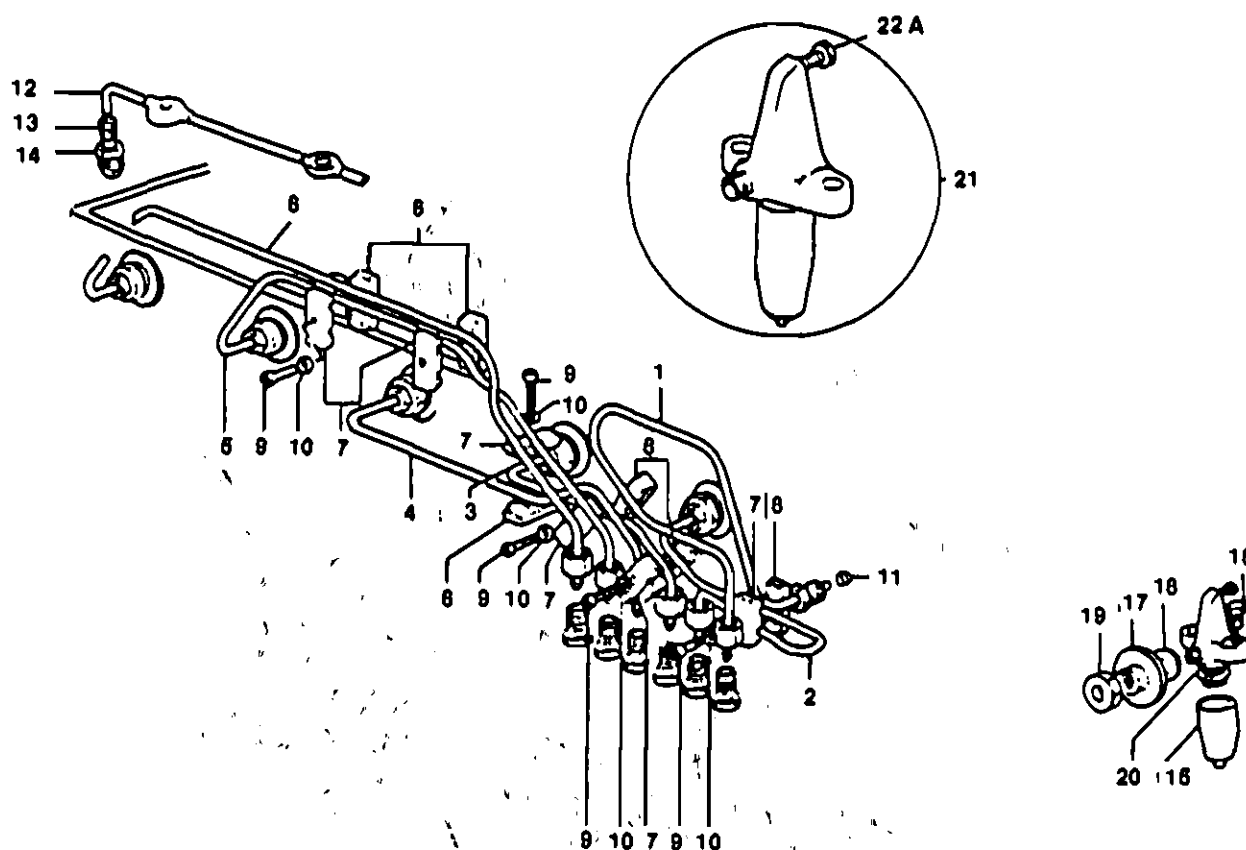
KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M	1	6091907	PULLEY	
2	M	1	6088402	PULLEY	
4	M	1	6091908	SPACER	
5	N	1	1817390	SPACER	
6	N	1	6091908	PULLEY	
8	P/S/T	1	6119026	PULLEY	
9	M	1	1409531	HUB ASSEMBLY	
10	M/N	1	6059090	BOLT ASSEMBLY	
11	M	4	1575330	BOLT	
12	M	2	1588477	BOLT	
13	M	2	1760723	WASHER FLAT	
14	M	4	1444685	WASHER FLAT	
15	P/S/T	1	6090806	WASHER (CRANKSHAFT DAMPER)	
18	P/S/T	1	6090886	WASHER ASSEMBLY (DAMPER LOCKING)	
17	P/S/T	1	6090808	BOLT	
18	P/S/T	1	6090807	HUB (CRANKSHAFT PULLEY)	
19	P/S/T	1	6090883	O RING	
20	P/S/T	1	6090884	O RING	
21	P/S/T	4	1489492	BOLT	

OCCASSIONALLY CUSTOMERS UTILISE VARIATIONS ON PULLEYS – IF IN DOUBT CONSULT YOUR LEHMAN DEALER OR LEHMAN DIRECT.



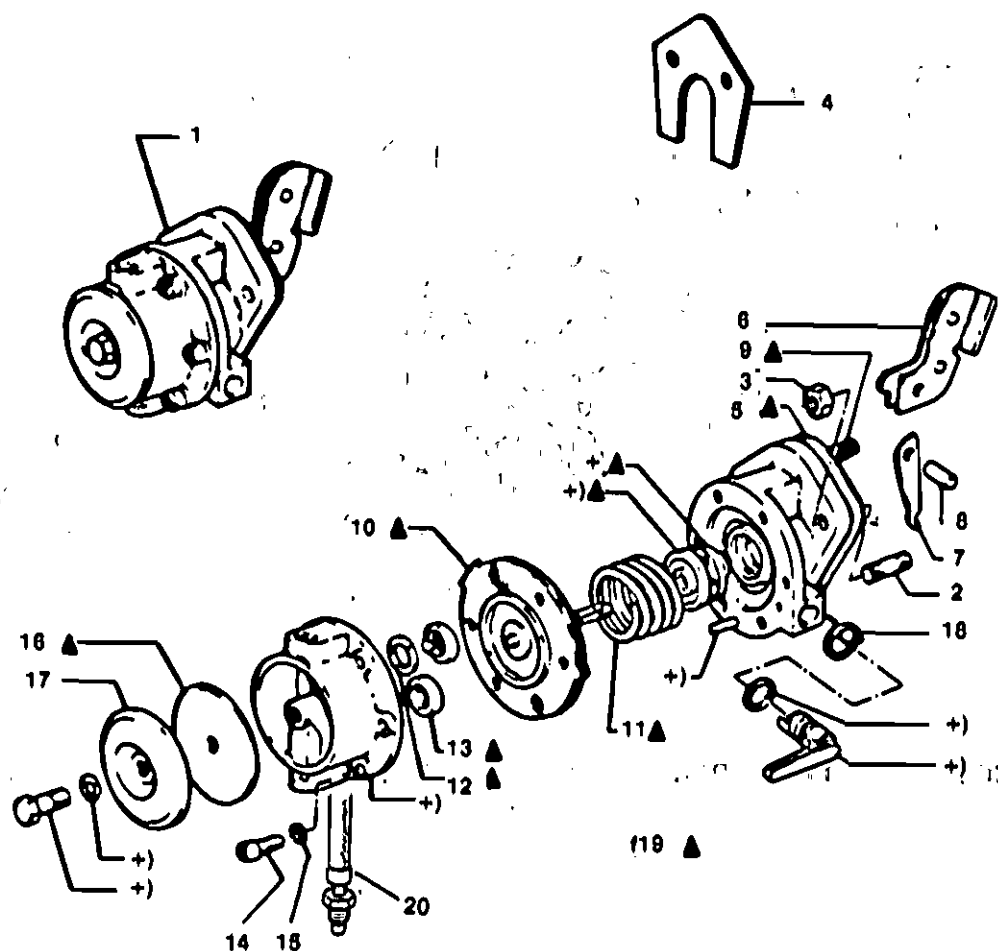
KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M	1	8108557	FUEL INJECTION PUMP	
1	N	1	8108582	FUEL INJECTION PUMP	
1A	T	1	2C500	FUEL INJECTION PUMP	
1A	P/S	1	8108587	FUEL INJECTION PUMP	
2	ALL	4	1575271	BOLT	
3	ALL	1	6082230	STUD	
4	ALL	5	1415884	WASHER	
5	ALL	1	1575009	NUT	
6	ALL	1	1719874	SEAL, RING	
7	M,N,	1	6077521	GEAR	
	P/S/T	1	6114477	GEAR	
8	ALL	1	6077523	PLATE	
9	ALL	4	8057435	BOLT	
10	ALL	1	8108572	OIL TUBE	
12	ALL	1	8104804	BLEED VALVE	
13	ALL	1	8145170	c/w NUT 8068937	
14	ALL	1	2E807	EXCESS FUEL SOLENOID 12v/NEG EARTH	

NOTE:- SP275 ONLY, FUEL INJECTION PUMP IS 2C500/S

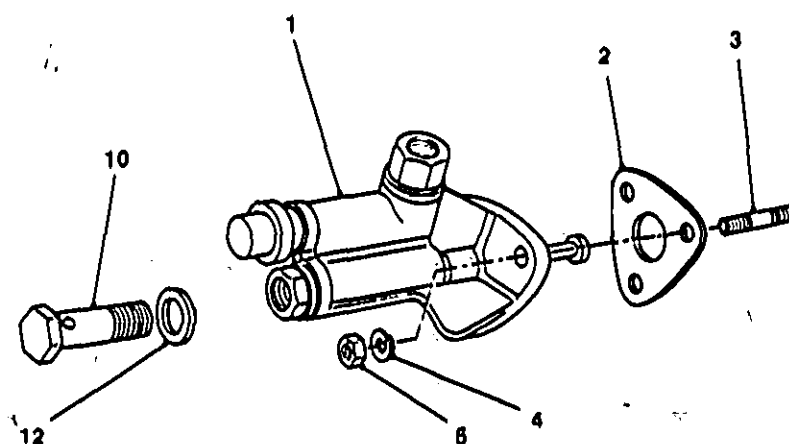


KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M	1	6105606	No. 1 INJECTION LINE	
2	M	1	6105607	No. 2 INJECTION LINE	
3	M	1	6105606	No. 3 INJECTION LINE	
4	M	1	6105609	No. 4 INJECTION LINE	
1	N/P/S/T	1	6097946	No. 1 INJECTION LINE	
2	N/P/S/T	1	6097949	No. 2 INJECTION LINE	
3	N/P/S/T	1	6096076	No. 3 INJECTION LINE	
4	N/P/S/T	1	6097950	No. 4 INJECTION LINE	
5	N/P/S/T	1	6096061	No. 5 INJECTION LINE	
6	N/P/S/T	1	6096062	No. 6 INJECTION LINE	
7	ALL	A/R	1514329	LINE CLAMPS	
8	ALL	A/R	1514330	LINE CLAMPS	
9	ALL	A/R	1572059	SCREW	
10	ALL	A/R	6029099	LOCK WASHER	
11	ALL	A/R	1602234	FERRULE	
12	M	1	6113157	LEAK OFF PIPE	
	N/P/S/T	1	6113156	LEAK OFF PIPE	
13	ALL	1	1461753	CONNECTOR	
14	ALL	1	1514322	CONNECTOR	
15	P/S/T	6	6141344	NOZZLE	
15A	M/N	4/8	6141341	NOZZLE	
16	ALL	A/R	1626161	BOLT	
17	ALL	A/R	6114632	SEAL	
18	ALL	A/R	1805353	SEAL	
19	ALL	A/R	1791101	NUT	
20	ALL	A/R	1707224	WASHER	
21	M/N	4/8	6106589	INJECTOR ASSY	
21A	P/S/T	6	1599947	INJECTOR ASSY	
22A	ALL	1	1626011	BOLT	

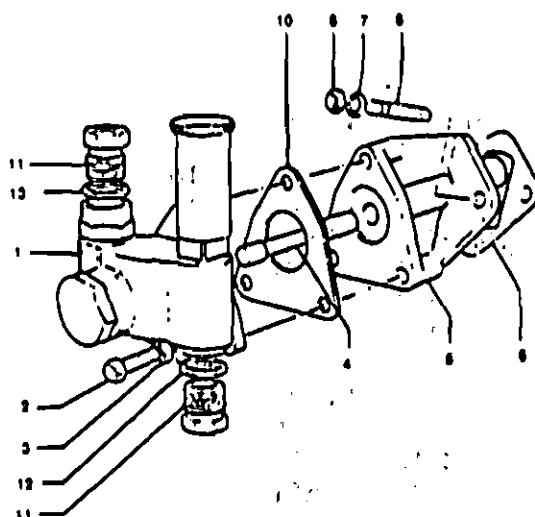
Note: SP275 only for modified injector assy with pre set test pressure call for Lehman Part 2C502/S.



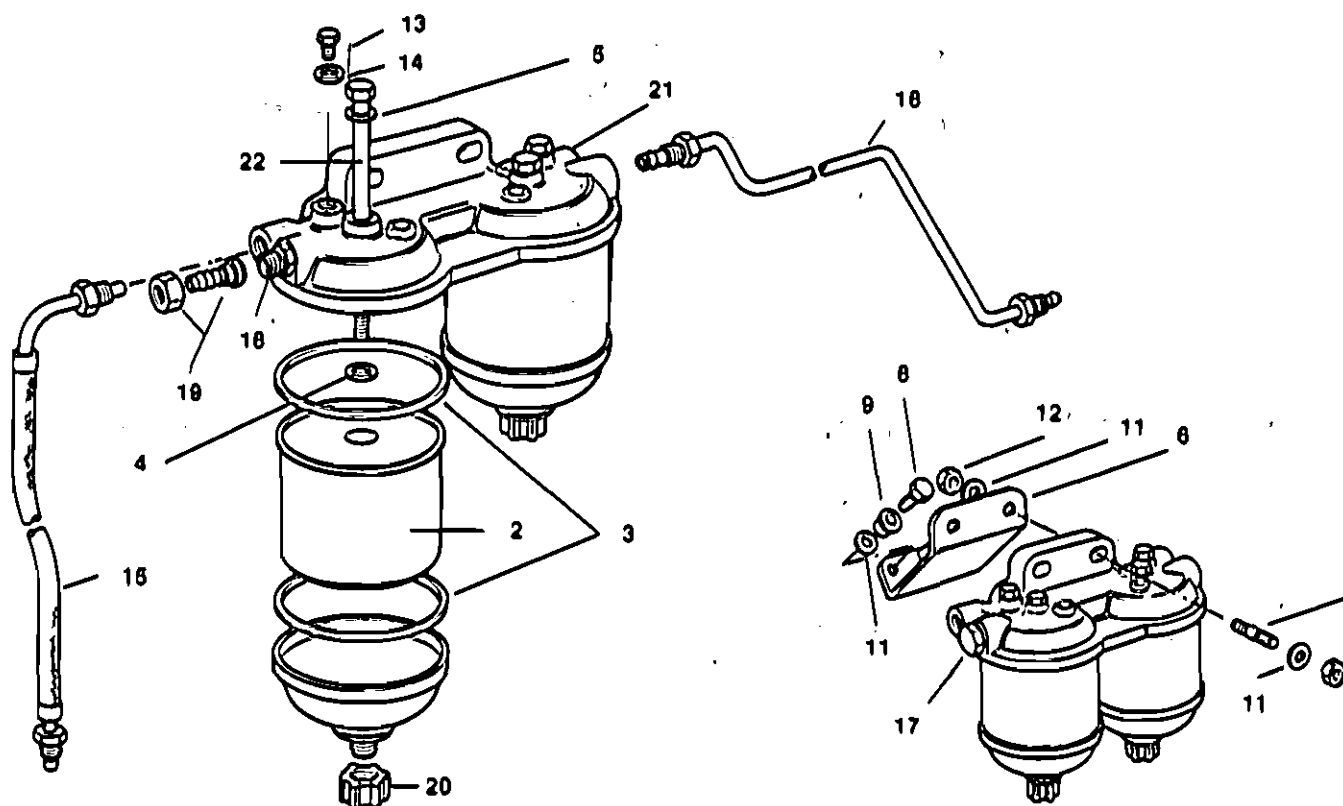
KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M/N	1	8038718	FUEL PUMP	
2	M/N	2	8115328	STUD	
3	M/N	2	1582108	NUT	
4	M/N	1	1459154	PLATE	
5	M/N	1	1789438	GASKET	
6	M/N	1	2703732	ARM	
7	M/N	1	1491104	ARM	
8	M/N	1	1749177	PIN	
9	M/N	1	1749182	SPRING	
10	M/N	1	8039028	DIAPHRAM ASSEMBLY	
11	M/N	1	8039027	SPRING	
12	M/N	2	1749061	GASKET	
13	M/N	2	1706711	VALVE ASSEMBLY	
14	M/N	6	1472222	BOLT	
15	M/N	6	1757975	WASHER	
16	M/N	2	1791854	DIAPRAM	
17	M/N	1	1749047	COVER	
18	M/N	1	1405313	SPRING	
19	M/N	1	1583606	KIT	
20	M/N	1	E18017	FUEL LINE 22"	



KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	P/S/T	1	8144840	PUMP	
2	P/S/T	1	1789438	GASKET	
3	P/S/T	1	8115328	STUD	
4	P/S/T	1	1444885	WASHER	
5	P/S/T	1	1588200	NUT	
10	P/S/T	1	1502538	BANJO BOLT	
12		1	1503682	WASHER	

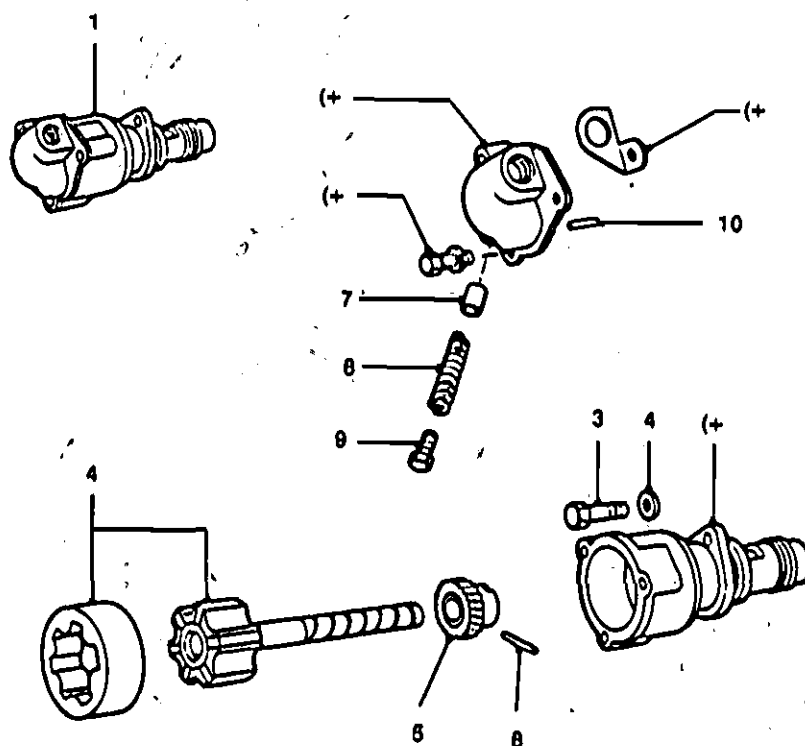


KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	P/S/T	1	1538780	PUMP	FILTER ASSEMBLY PART No. 6035908 For P/S/T only (not shown)
2	P/S/T	2	1472081	BOLT	
3	P/S/T	2	1459510	WASHER	
4	P/S/T	2	1598717	PLUNGER	
5	P/S/T	3	1598719	ADAPTOR	
8	P/S/T	3	8115328	STUD	
7	P/S/T	1	1444888	LOCK WASHER	
8	P/S/T	1	1588200	NUT	
9	P/S/T	1	1789438	GASKET	
10	P/S/T	1	1501898	GASKET	
11	P/S/T	2	1501527	ADAPTOR	
12	P/S/T	3	1503882	WASHER	
13	P/S/T	1	8005925	WASHER	



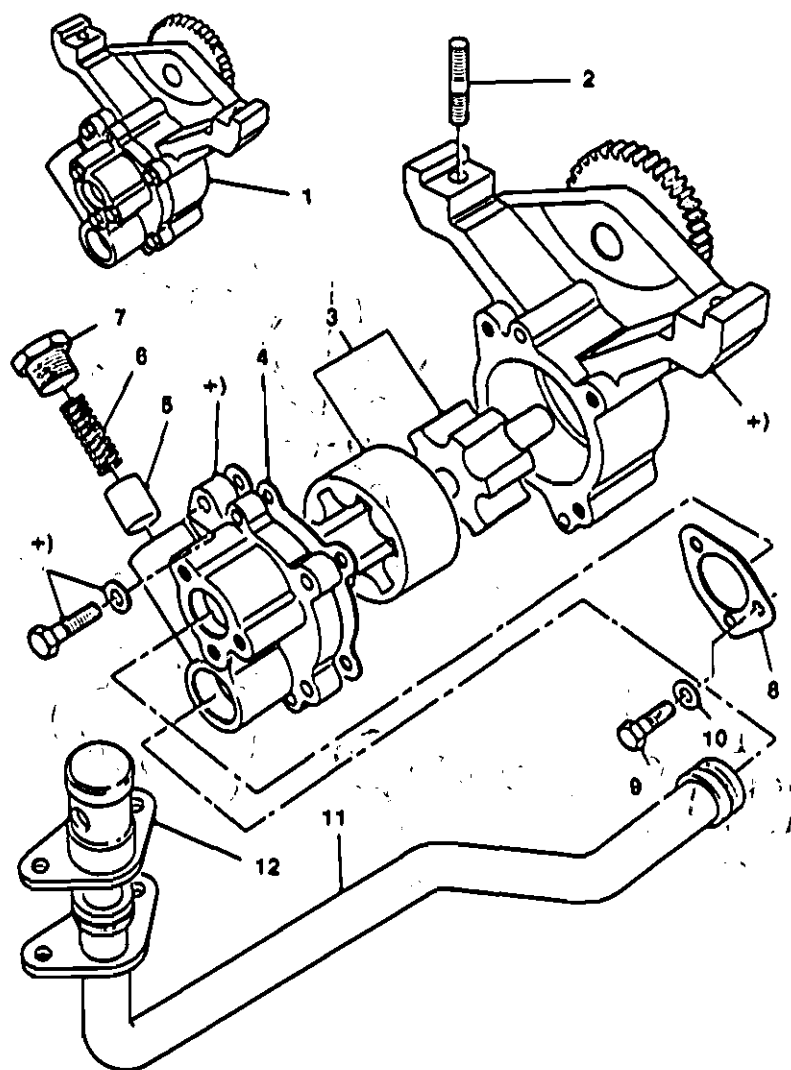
KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	ALL	1	6089149	FUEL FILTER ASSEMBLY	
2	ALL	2	6149717	FUEL FILTER ELEMENTS	
3	ALL	4	1422403	SEAL	
4	ALL	2	1760894	WASHER	
5	ALL	2	3416157	WASHER	
6	ALL	1	6119122	BRACKET	
7	ALL	2	0201029	STUD	
8	ALL	2	1568867	BOLT	
9	ALL	2	6089626	BUSH	
10	ALL	2	6034917	SEAL	
11	ALL	4	1451761	FLAT WASHER	
12	ALL	4	1485503	NUT	
13	ALL	1	1419582	SCREW	
14	ALL	1	1548391	WASHER	
15	M/N	1	3K776	TUBE ASSEMBLY	
	P/S/T	1	3K793	TUBE ASSEMBLY	
16	M	1	6109580	TUBE ASSEMBLY	
	N	1	6109581	TUBE ASSEMBLY	
	P/S/T	1	3K791	TUBE ASSEMBLY	
17	ALL	A/R	6107556	PLUG	
18	P/S/T	1	6104604	VALVE ASSEMBLY	
19	P/S/T	1	6145169	STR HOSE FITTING	
20	ALL	2	1502887	PLUG	
21	ALL	1	FH93	HEADER BRACKET	
22	ALL	1	1579367	BOLT	

10-61/05-02



KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M/N	1	6100762	OIL PUMP	(A)
	M/N	1	6100763	OIL PUMP	(B)
2	M/N	2	1588669	BOLT	
3	M/N	2	1580816	LOCK WASHER	
4	M/N	1	6105323	ROTOR & SHAFT	(A)
	M/N	1	6106324	ROTOR & SHAFT	(B)
5	M/N	1	1793668	GEAR	(A)
	M/N	1	1806369	GEAR	(B)
6	M/N	1	1806367	SPRING PIN	(A)
	M/N	1	1806386	SPRING PIN	(B)
7	M/N	1	1805121	PLUNGER	(A)
	M/N	1	6106331	PLUNGER	(B)
8	M/N	1	6106328	SPRING	(A)
	M/N	1	6106329	SPRING	(B)
9	M/N	1	6106336	CAP	(A)
10	M/N	1	1433211	PIN	(A)

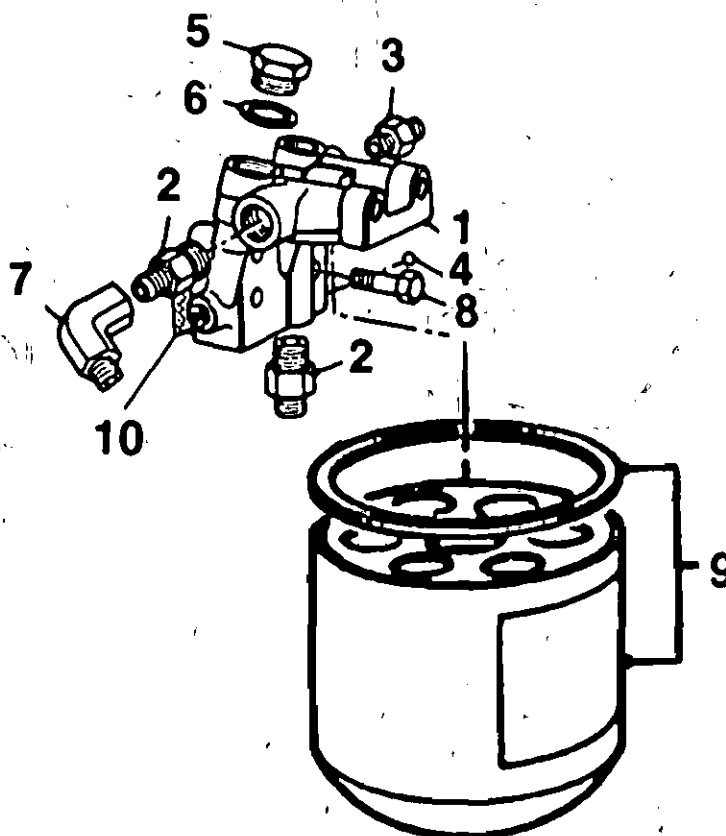
(A) HOLBOURN EATON
(B) WHITEHEAD



KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1		1	(A)6100766	PUMP ASSEMBLY	SP185/225/275
		1	(B)6100767	PUMP ASSEMBLY	SP185/225/275
2		2	1602210	STUD	
3		1	(A)6106325	ROTOR & SHAFT ASSEMBLY	
		1	(B)6106326	ROTOR & SHAFT ASSEMBLY	
4		1	(A)6106327	THRUST PLATE	
5		1	(A)1605121	PLUNGER (RELIEF VALVE)	
		1	(B)6106331	PLUNGER (RELIEF VALVE)	
6		1	(A)6106328	SPRING	
		1	(B)6106330	SPRING	
7		1	(A)6106336	CAP	
		1	(B)6106337	CAP	
8		1	1602162	GASKET	SP185/SP225/SP275
9		3	1569154	BOLT	SP185/SP225/SP275
10		3	1444665	LOCK WASHER	SP185/SP255/SP275
11		1	6103491	TUBE ASSEMBLY	SP185/SP225/SP275
12		1	6069943	FLANGE	

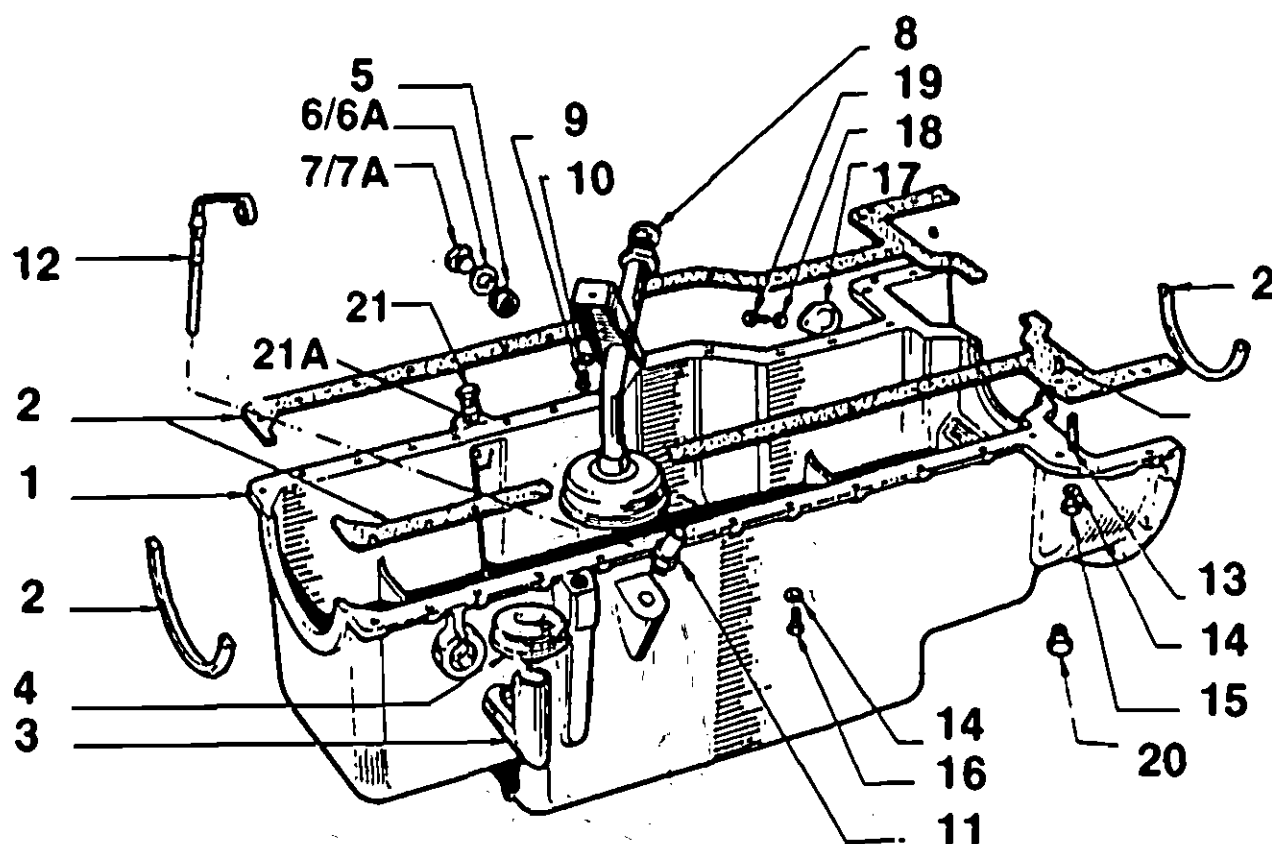
(A) HOLBOURN EATON

(B) WHITEHEAD MOTORIDES



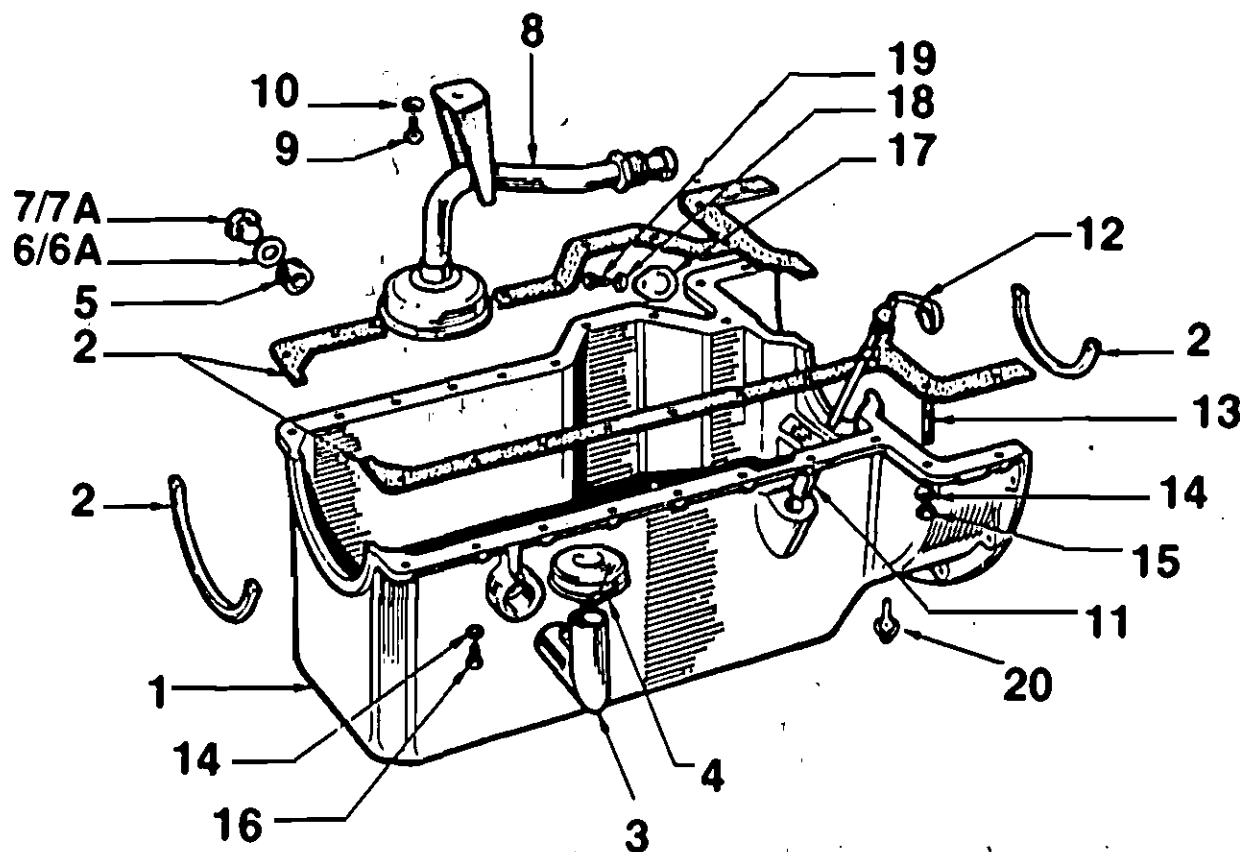
KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	P/S/T	1	6121147	ADAPTOR OIL FILTER	
2	P/S/T	2	6103860	CONNECTOR	
3	P/S/T	1	6108608	CONNECTOR	
4	P/S/T	4	1502540	BALL	
5	P/S/T	1	8103879	PLUG	
6	P/S/T	1	6103620	WASHER	
7	P/S/T	1	8103860	90 ELBOW	
8	P/S/T	3	OE407.5	BOLTS	
9	P/S/T	1	1612468	OIL FILTER	
10	P/S/T	1	8121713	GASKET	

N.B. A REMOTE MOUNTING IS AVAILABLE FOR THIS FILTER ASSEMBLY NUMBER D197R (1 meter) D197R-2 (2 meter) CONTACT YOUR DEALER.



KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	N	1	1403431	OIL PAN	
	P/S/T	1	8108334	OIL PAN	
2	N	1	8104238	GASKET KIT OIL PAN	
	P/S/T	1	8104237	GASKET KIT OIL PAN	
3	ALL	1	1411447	TUBE	STD
	ALL	1	1411448	TUBE	O/S
4	ALL	1	1808307	CAP ASSEMBLY	
5	ALL	1	1708048	INSERT DRAIN PLUG	
8	ALL	1	1710927	WASHER	
8A	ALL	2	OGC50	WASHER*	
7	ALL	1	1595292	PLUG OIL DRAIN	
7A	ALL	1	3E883	BANJO BOLT*	
8	N	1	1508092	OIL PUMP PICK UP TUBE & SCREEN	
	P/S/T	1	8087662	OIL PUMP PICK UP TUBE & SCREEN	
9	ALL	1	1538040	BOLT	
10	ALL	1	1477027	WASHER	
11	N	1	1788795	TUBE SHORT	
	P/S/T	1	8097108	TUBE LONG	
12	N	1	1403432	DIP STICK	
	P/S/T	1	8090988	DIP STICK	
13	ALL	4	1401481	STUD	
14	ALL	A/R	8113951	WASHER LOCK	
15	ALL	4	1575009	NUT	
16	ALL	A/R	1588479	BOLT	
17	ALL	1	1A239	COVER APERTURE	
17A	ALL	1	1C28	COVER APERTURE GASKET	
18	ALL	1	OC31	LOCKWASHER	
19	ALL	1	OE201	BOLT	
20	ALL	1	OE290	PLUG ASSEMBLY	
21	ALL	1	1703791	PLUG HEX	
21A	ALL	1	1759501	WASHER FLAT	

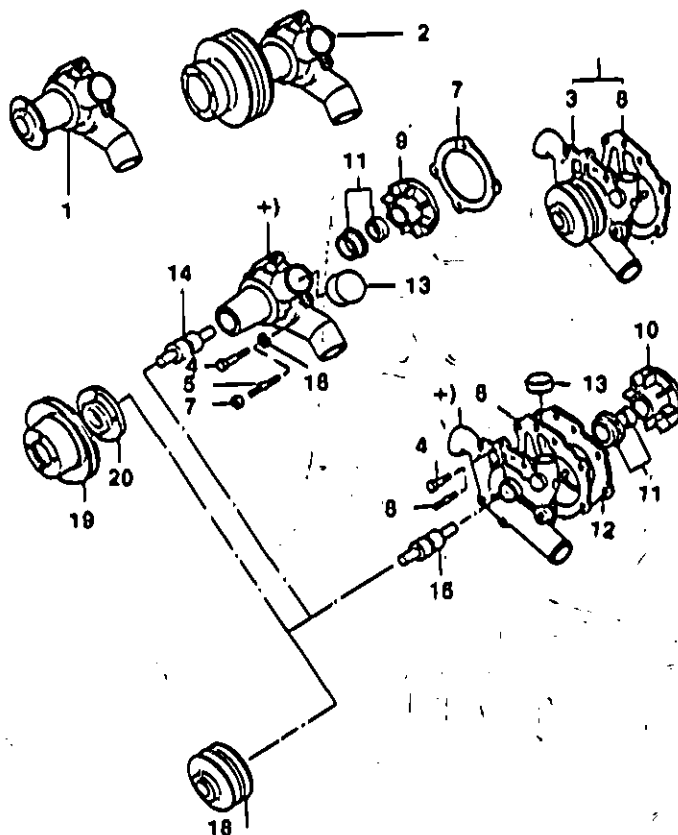
* When pump out kit fitted



KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M	1	1509894	OIL PAN	
2	M	1	8104238	GASKET KIT OIL PAN	
3	ALL	1	1411447	TUBE	Core Plug PP0850577 may be substituted.
	ALL	1	1411448	TUBE	
4	ALL	1	1808307	CAP ASSEMBLY	
5	ALL	1	1708048	INSERT DRAIN PLUG	
6	ALL	1	1710927	WASHER	
6A	ALL	2	OGC50	WASHER*	
7	ALL	1	1595292	PLUG OIL DRAIN	
7A	ALL	1	3E888	BANJO BOLT*	
8	M	1	1508088	OIL PUMP PICK UP TUBE & SCREEN	
9	ALL	1	1538040	BOLT	
10	ALL	1	1580818	WASHER	
11	M	1	1788795	TUBE	
12	M	1	1791938	DIP STICK	
13	ALL	4	1401481	STUD	
14	ALL	A/R	8113951	WASHER, LOCK	
15	ALL	4	1575009	NUT	
18	ALL	A/R	1588479	BOLT	
17	ALL	1	1A239	COVER APERTURE	
17A	ALL	1	1C28	COVER APERTURE GASKET	
18	ALL	1	OC31	LOCKWASHER	
19	ALL	1	OE201	BOLT	
20	ALL	1	OE290	PLUG ASSEMBLY	

* When pump out kit fitted

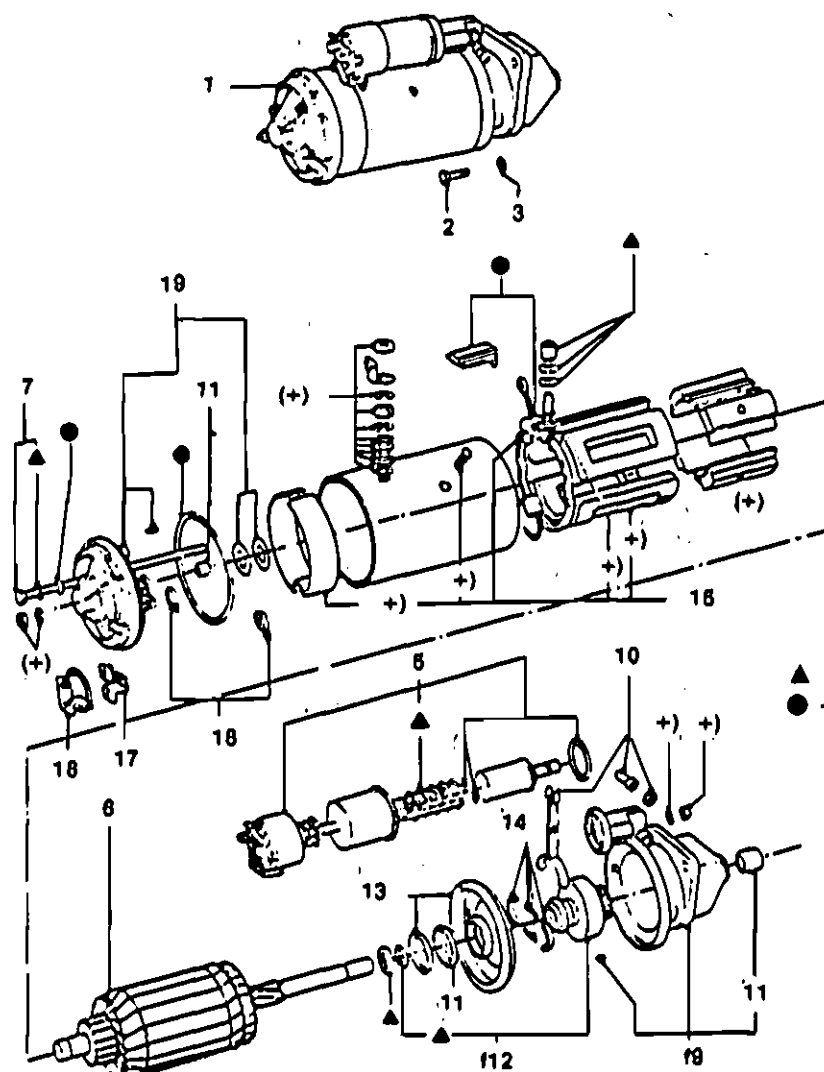
N.B. HIGH LEVEL OIL PAN AVAILABLE ON SP185/225/275. PART No. D900T.



KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M/N	1	1802421	WATER PUMP	
3	P/S/T	1	6089348	WATER PUMP	
4	ALL	A/R	1571487	5/16/.75 BOLT	
	ALL	A/R	1588491	5/16/1.0 BOLT	
	ALL	A/R	1588489	5/16/1.0 BOLT	
	ALL	A/R	1588489	5/16/1.25 BOLT	
	ALL	A/R	1584477	5/16/1.75 BOLT	
	ALL	A/R	1572232	5/16/2.25 BOLT	
	ALL	A/R	1802381	5/16/3.50 BOLT	
	ALL	A/R	1405858	5/16/4.00 BOLT	
5	ALL	2	6118463	5/16/1.77" STUD	
		A/R	6115325	5/16/2.79" STUD	
		1	6102970	5/16/2.83" STUD	
6	ALL	A/R	1575209	NUT	
7	M/N	1	6091842	GASKET WATER	
8	P/S/T	1	6094370	GASKET WATER	
9	M/N	1	1802430	IMPELLER	
10	P/S/T	1	6077199	IMPELLER	
11	ALL	1	6086182	SEAL	
12	P/S/T	1	6077206	BACK PLATE	
13	N/M	1	3K831	CAP	
	P/S/T	1	3K827	CAP	
14	N/M	1	1802434	BEARING & SHAFT	
15	P/S/T	1	6077200	BEARING & SHAFT	
16	ALL	A/R	OC31	LOCK WASHER	
17	P/S/T	1	6089351	DUAL SHEAVE PULLEY	
18	M/N	1	1711744	PULLEY	
20	M/N	1	1802440	HUB	

N.B. M/N 1 Water pump repair kit - Items 7,9,11 & 14.

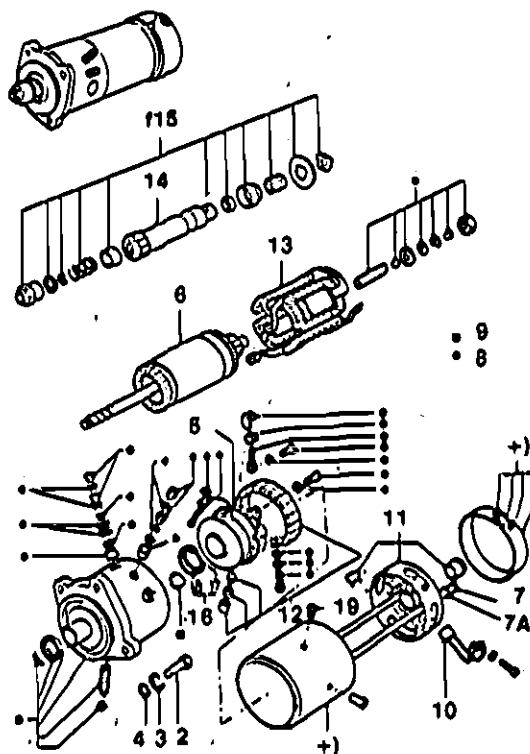
P/S/T 1 water pump repair kit - Items 8,10,11 & 15.



In Lehman Wiring
Harness there is a
small Copper Fuse
Part No. 2E612
Fitted in Line
to Solenoid

▲ - 6 - Hardware Kit
● - 34 - Motor Sealing Kit

KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	M/N	1	6092295	STARTER MOTOR	
2	M/N	3	1805123	BOLT	
3	M/N	3	1451781	FLAT WASHER	
5	M/N	1	1527447	SOLENOID ASSEMBLY	
6	M/N	1	1470620	ARMATURE ASSEMBLY	
7	M/N	1	6104802	BOLT	
8	M/N	1	1517314	HARDWARE (KIT)	
9	M/N	1	1596362	DRIVE HOUSING (KIT)	
10	M/N	1	1517316	SOLENOID LINK (KIT)	
11	M/N	1	1517315	BRUSHES (KIT)	
12	M/N	1	1527241	DRIVE PINION (KIT)	
13	M/N	1	1596361	INTERMEDIATE BRACKET (KIT)	
14	M/N	1	1522092	BRAKE SHOES & SPRINGS (KIT)	
15	M/N	1	1517313	FIELD COIL (KIT)	
16	M/N	1	1527442	BRUSH (KIT)	
17	M/N	1	1517321	BRUSH SUPPORTS (KIT)	
18	M/N	1	1522094	BRUSH SPRINGS (KIT)	
19	M/N	1	1527444	BRUSH END COVER (KIT)	
20	M/N	1	1517318	MOTOR SEALING (KIT)	



KEY	ENGINE	QTY	PART No.	DESCRIPTION	REMARKS
1	P/S/T	1	2E852	STARTER MOTOR	12V
	P/S/T	1	2E854	STARTER MOTOR	24V
2	P/S/T	3	1805123	BOLT	
3	P/S/T	3	157329	LOCK WASHER	
4	P/S/T	3	1451781	FLAT WASHER	
5	P/S/T	1	6104889	SOLENOID	12V
	P/S/T	1	6104813	SOLENOID	24V
6	P/S/T	1	6104881	ARMATURE ASSEMBLY	12V
	P/S/T	1	6104797	ARMATURE ASSEMBLY	24V
7	P/S/T	2	6117388	BOLT	
7A	P/S/T	2	1444886	LOCK WASHER	
8	P/S/T	1	6104291	HARDWARE (KIT)	
9	P/S/T	1	6104867	DRIVE END (KIT)	12V
	P/S/T	1	6104868	DRIVE END (KIT)	24V
10	P/S/T	1	1802404	BRUSHES (KIT)	24V
11	P/S/T	1	6104882	COVER ASSEMBLY	12V
	P/S/T	1	6104799	COVER ASSEMBLY	24V
12	P/S/T	1	6104884	RESISTOR ASSEMBLY	12V
	P/S/T	1	6104883	RESISTOR ASSEMBLY	24V
13	P/S/T	1	6104885	FIELD COIL (KIT)	12V
	P/S/T	1	6104804	FIELD COIL (KIT)	24V
14	P/S/T	1	6104886	PINION ASSEMBLY	12V
	P/S/T	1	6104810	PINION ASSEMBLY	24V
15	P/S/T	1	6104290	PINION ASSEMBLY (KIT)	
16	P/S/T	1	1523048	SEGMENTS & SPRINGS (KIT)	
17	P/S/T	1	1436394	SPRING	
18	P/S/T	4	1436382	SEGMENTS	
19	P/S/T			WITH 13	

SECTION C

INDEX TO LEHMAN MARINE EQUIPMENT

In order to provide a simple method of identification, all models herein have been assigned a "code" letter as follows.

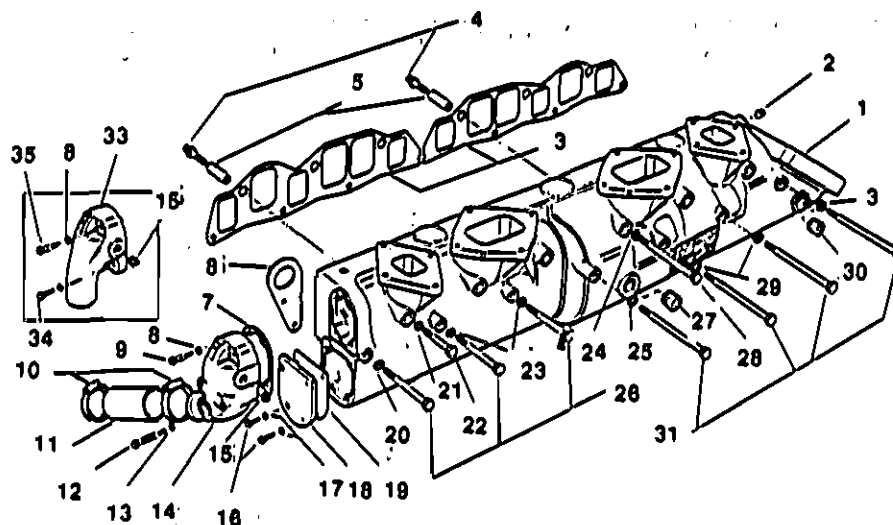
ENGINE CODE	CU/IN	NO. CYLS.	YEARS	ENGINE CODE	CU/IN	NO. CYLS.	YEARS
M-Super 90	254	4	6/82-	S-Super SP185	363	6	9/85-
N-Super 135	360	6	6/82-	P-Super 225	363	6	6/82-
				T-Super SP275	363	6	9/85-

For ease in locating part numbers, turn to the applicable page:

Air filter	C3,C6
Alarm system	C40,C41
Alternator, Motorola 72 AMP	C33,C34,C35
Belt, vee	C33,C34
Cooler, oil	C18,C17,C18,C19,C29,C30,C31
Engine control	C48,C49
Exchanger, heat	C20,C21,C22
Exhaust elbow	C11,C12
Fly Wheel Assembly	C38,C39
Fuel line (flexible)	C40,C41
Instruments	C48,C47
Intercooler	C7,C8
Manifold, 8 cylinder	C2
Manifold, 4 cylinder	C5
Manuals, instruction, shop etc	C49
Miscellaneous	C40,C41
Mountings, engine	C38,C37
Pump, water	C23,C24,C25,C26,C27,C28
Solenoid, starter relay	C33,C34
Stop engine controls	C32,C48,C47
Sump Drain Pump	C43
Tank, expansion	C14,C15
Thermostat Assy	C13
Transmission & Adaption	C38,C39,C44,C45
Turbo Charger	C9,C10
Turbo Exhaust Extensions	C11
Crankcase Gas Scrubber	C42

By reference to the drawings on the applicable page, select the required part and note the "key" number assigned to it. The key number will be repeated in the listing of parts following the drawing. The second column will indicate the engine to which the part applies per the engine code letters shown above. The third column shows the quantity required per engine.

6 Cyl Manifold Assy D1101 Comprising Key 1-35

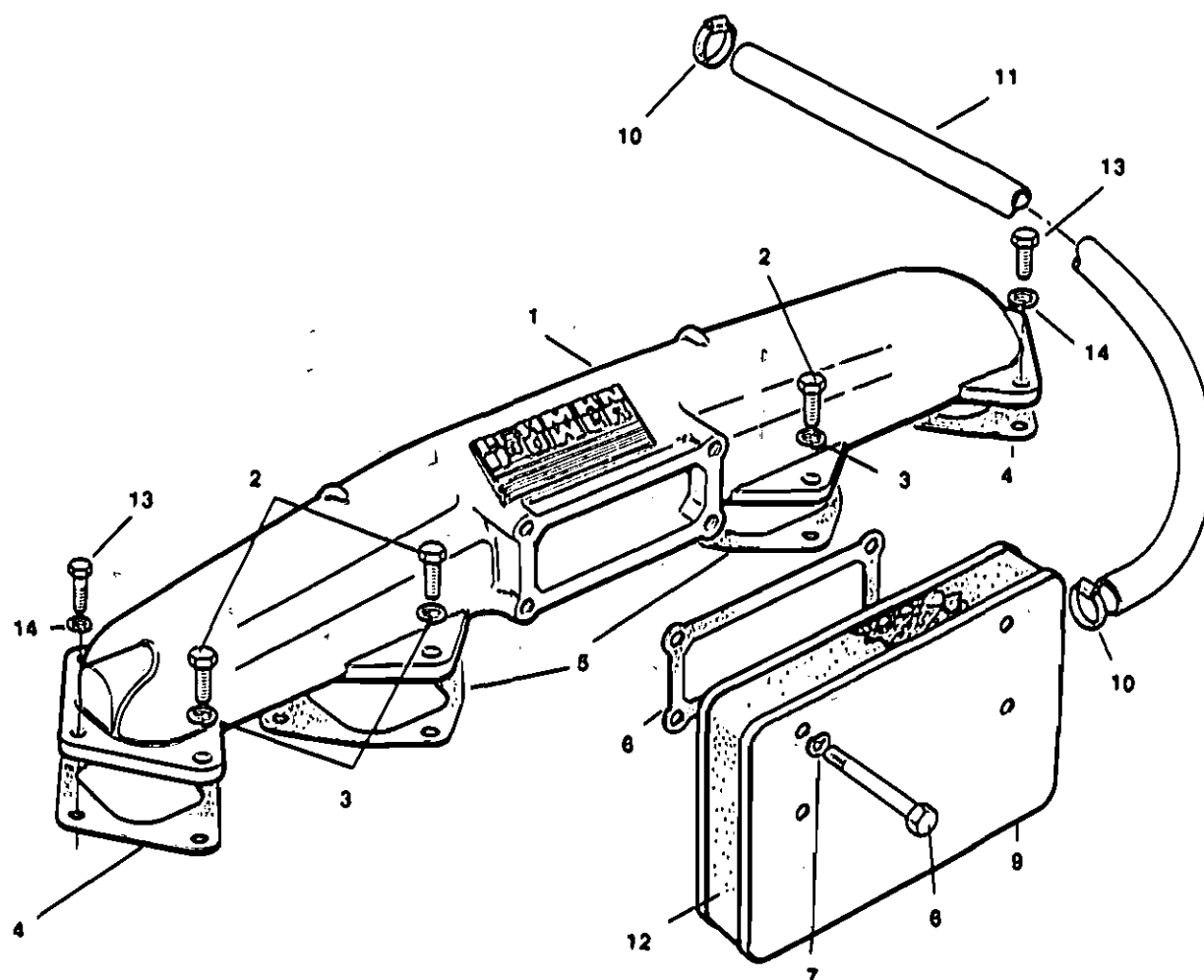


CODE	KEY	QTY	PART No.	DESCRIPTION
	1	1	1A389	MANIFOLD BODY
	2	1	3L14	PLUG 1/4 NPT
	3	2	2D34	MANIFOLD GASKET
	4	6	6087437	MANIFOLD STUD
	5	6	1B59	BUSHING
	6	1	1D55	LIFTING EYE
	7	1	1C42	GASKET, WATER OUTLET
	8	2	OC21	WASHER
M/N	9	2	OC107	BOLT
M/N	10	2	3K4	CLAMP
M/N	11	1	3K2133	HOSE
M/N	12	2	OE111	BOLT
	13	2	OC21	WASHER
M/N	14	1	1A398	WATER OUTLET ADAPTOR
	15	1	3L14	PLUG
	16	4	OE102	BOLT
	17	4	OC21	WASHER
	18	1	1D52	BLANKING PLATE
	19	1	1C38	GASKET
	20	1	OC41	WASHER
	21	3	OC41	WASHER
	22	3	OC306.5	BOLT
	23	2	OC41	WASHER
	24	3	OC41	WASHER
	25	1	OC41	WASHER
	26	3	OE309	BOLT
	27	1	3L40	PLUG
	28	3	OE312	BOLT
	29	3	OC41	WASHER
	30	1	3L40	PLUG
	31	4	OE317	BOLT
P/S/T	33	1	1A411	WATER OUTLET FOR TURBO
P/S/T	34	2	OE104	SET SCREW
P/S/T	35	2	OE107	BOLT

NOTE:- ENG 'D' ASSY CODES AS FOLLOWS

SP90-M SP135-N SP185-S SP225-P SP275-T

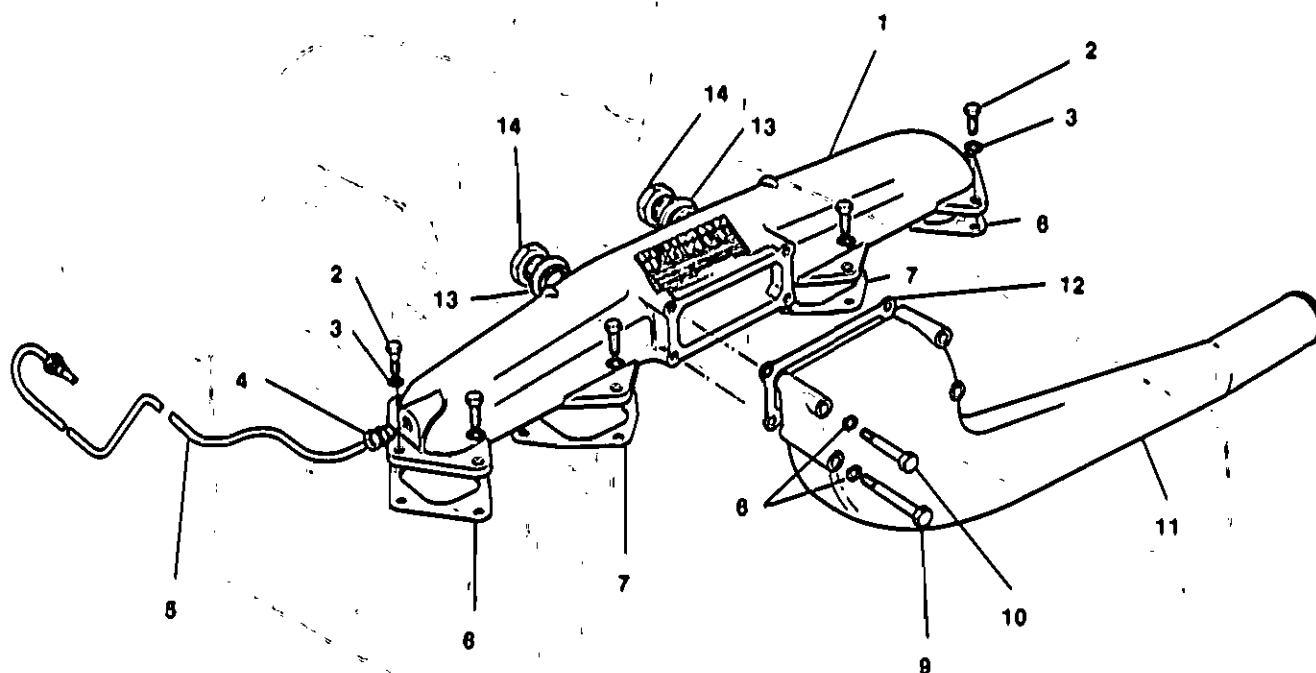
Plenum Chamber / Air Filter Assembly D1125 **Comprising Key 1-14 SP135**



CODE	KEY	QTY	PART No.	DESCRIPTION
N	1	1	1A403	PLENUM CHAMBER
	2	8	OE201	BOLT
	3	8	OC31	WASHER
	4	2	1C39	GASKET
	5	2	1C40	GASKET
	6	1	1C44	GASKET
	7	4	OC31	WASHER
	8	4	OE206	BOLT
N	9	1	2H75	AIR CLEANER, CHROMED
	10	2	3K10	CLAMP
	11	1	3K204A13	HOSE 13"
	12	1	1F7	FOAM ELEMENT
	13	2	OE102	BOLT
	14	2	OC21	WASHER

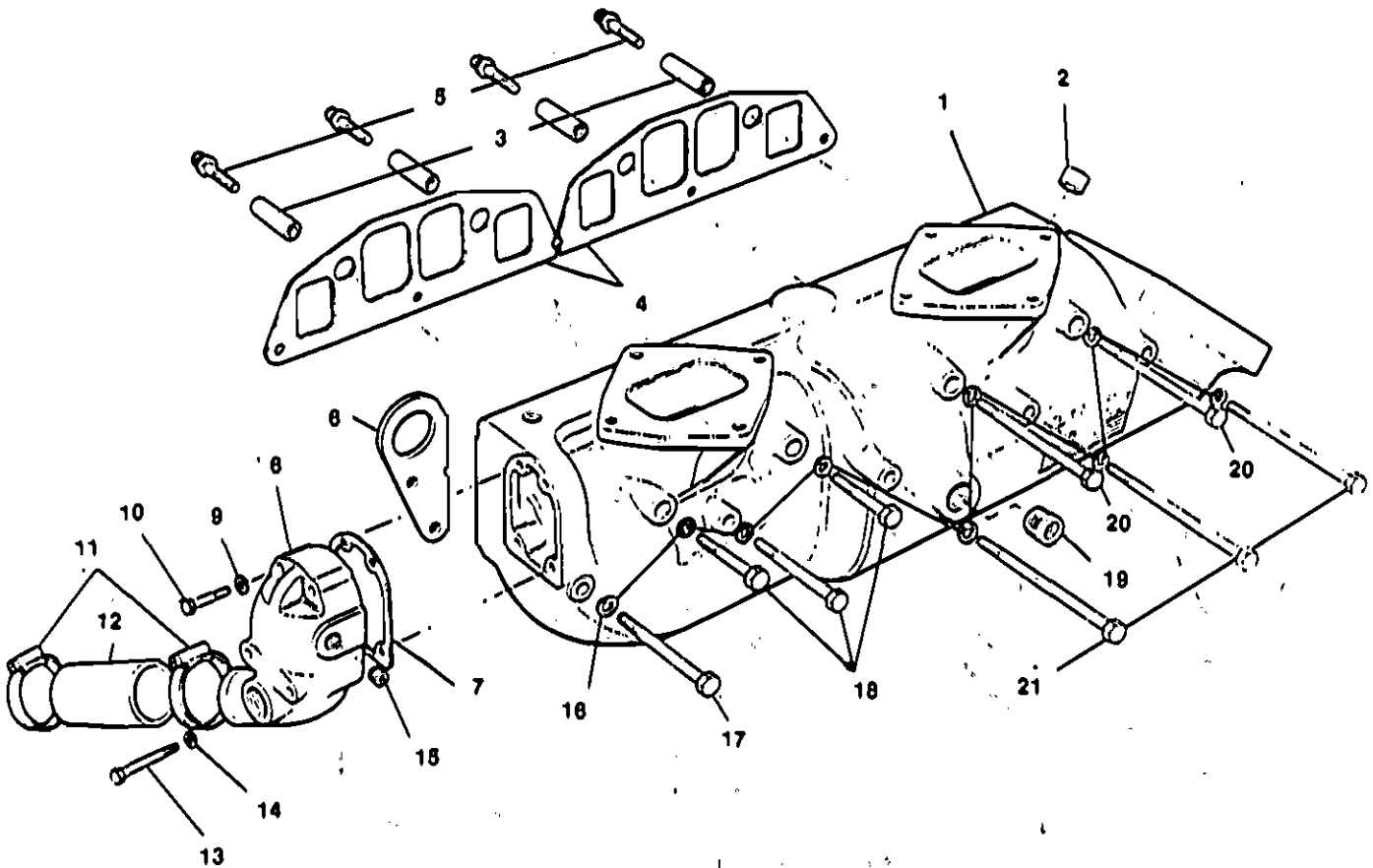
NOTE:- ENG 'D' ASSY CODES AS FOLLOWS
 SP135-N

Plenum Chamber / Induction Pipe Assembly D1126 **Comprising Key 1-14 SP185**



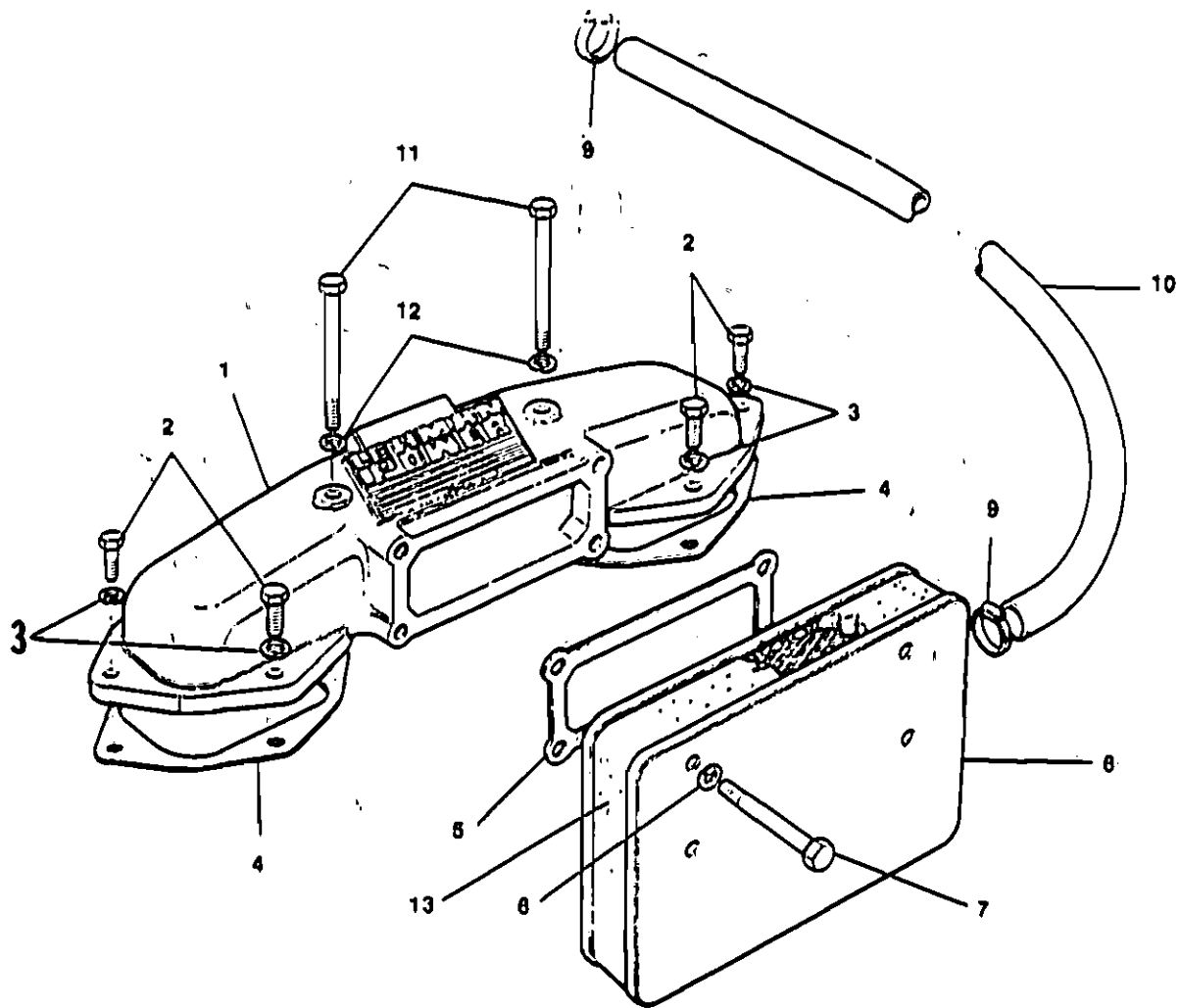
CODE	KEY	QTY	PART No.	DESCRIPTION
S	1	1	1A404	PLENUM CHAMBER
	2	9	OE201	BOLT
	3	9	OC31	LOCK WASHER
	4	1	3L45	FERRULE
	5	1	ID64	TUBE
	6	2	1C39	GASKET
	7	2	1C40	GASKET
	8	4	OC31	LOCK WASHER
	9	2	OE207	BOLT
	10	2	OE206	BOLT
	11	1	1A414	AIR INTAKE
	12	1	1C44	GASKET
	13	2	3E50	WASHER
	14	2	3E40	PLUG

4 Cylinder Manifold Assembly D1103 **Comprising Key 1-21 / SP90**



CODE	KEY	QTY	PART No.	DESCRIPTION
M	1	1	1A390	MANIFOLD BODY
	2	1	3L40	PLUG
	3	4	1B59	BUSHING
	4	2	2D35	GASKET, MANIFOLD
	5	4	6137305	STUD, MANIFOLD
	6	1	1D55	LIFTING EYE
	7	1	1C42	GASKET, WATER OUTLET
	8	1	1A396	WATER OUTLET ADAPTOR MACHINED
	9	2	OC21	WASHER
	10	2	OE107	BOLT
	11	2	3K4	CLAMP
	12	1	3K2133	HOSE
	13	2	OE112	BOLT
	14	2	OC21	WASHER
	15	1	3L14	PLUG
	16	9	OC41	WASHER
	17	1	OE309	BOLT
	18	3	OE306.5	BOLT
	19	1	3L40	PLUG
	20	2	OE312	BOLT
	21	3	OE317	BOLT

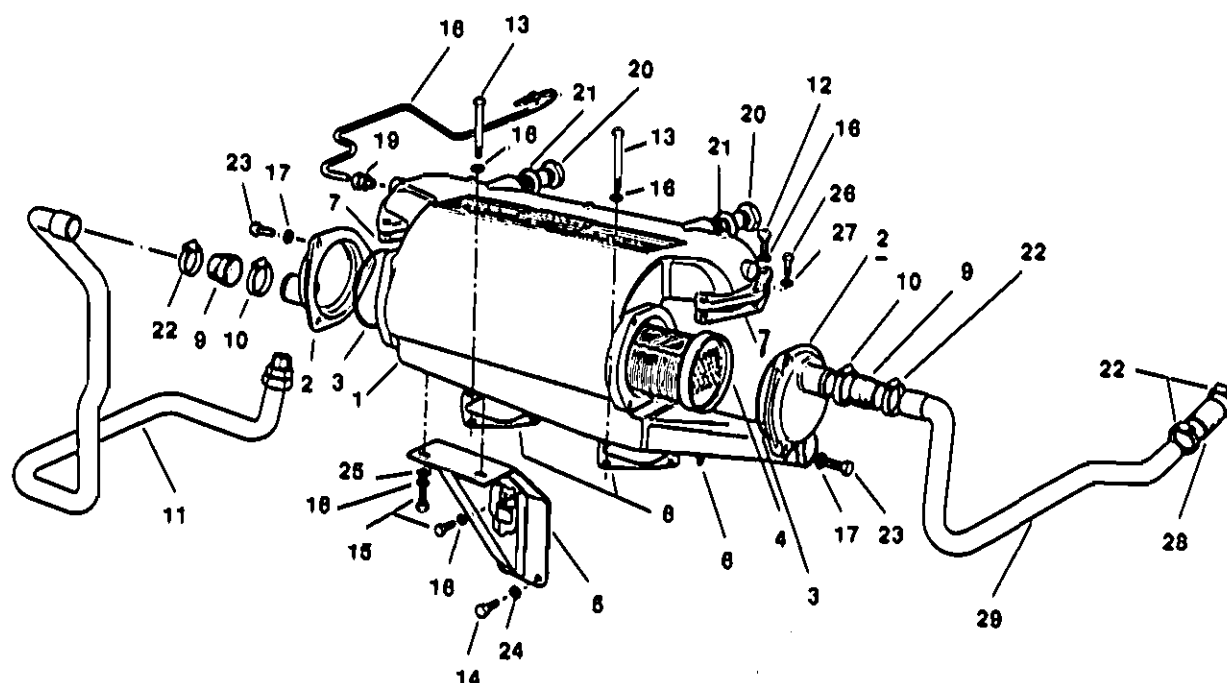
Plenum Chamber / Air Filter Assembly D1127
Comprising Key 1-12 / SP90



CODE	KEY	QTY	PART No.	DESCRIPTION
M	1	1	1A405	PLENUM CHAMBER
	2	6	OE201	BOLT
	3	6	OC21	WASHER
	4	2	1C45	GASKET
	5	1	1C44	GASKET
	6	4	OC21	WASHER
	7	4	OE208	BOLT
	8	1	2H75	AIR CLEANER, CHROMED
	9	1	3K10	CLAMP
	10	1	3K204A13	HOSE 13
		1	3K10	CLAMP
	11	2	OE113	BOLT
	12	2	OC21	WASHER
	13	1	1F7	FOAM ELEMENT

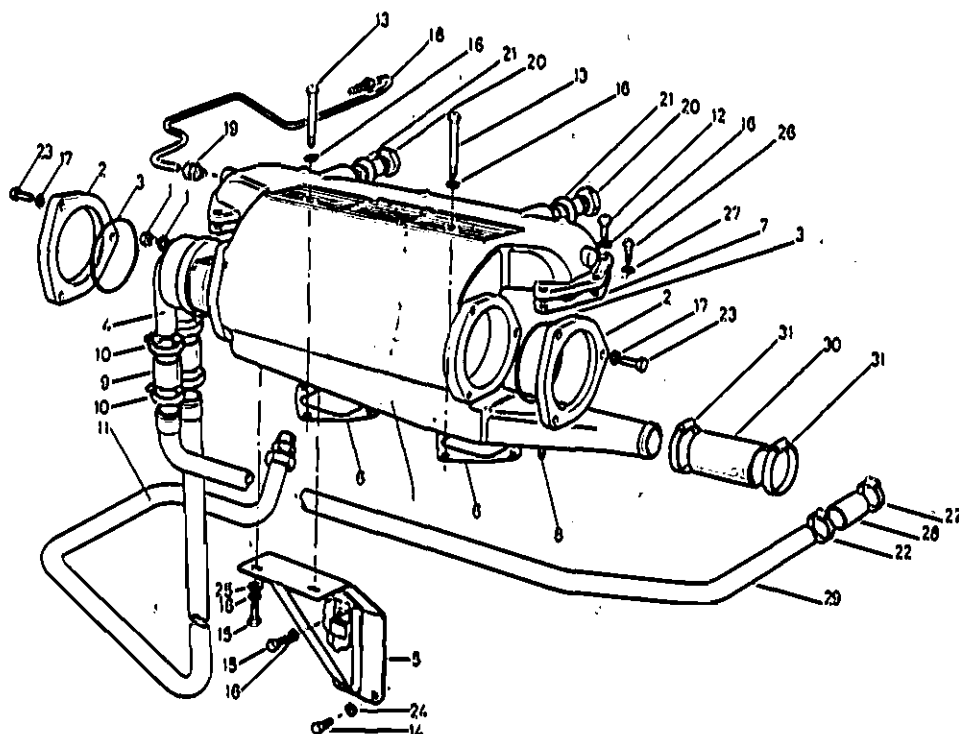
NOTE:- ENGINE 'D' ASSEMBLY CODE AS FOLLOWS
 SP90-M

Intercooler Assembly D1128 **Comprising Key 1-29 SP225**

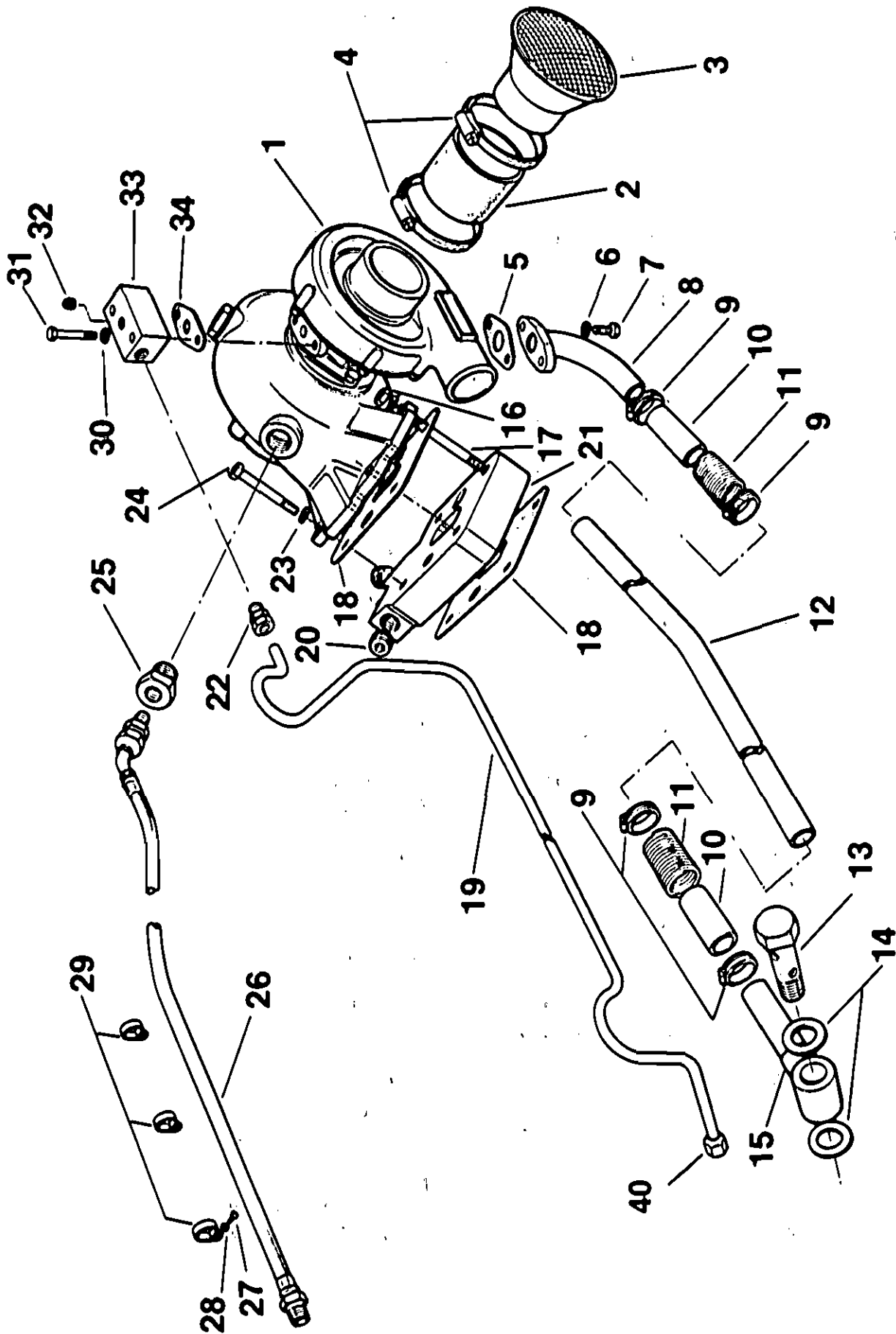


CODE	KEY	QTY	PART No.	DESCRIPTION
P	1	1	2J30	INTERCOOLER BODY
	2	2	2J31	END CAP
	3	2	2J8	"O" RING
	4	1	2J40	INTERCOOLER CORE
	5	1	2J41	SUPPORT
	8	2	1C39	GASKET
	7	2	1C40	GASKET
	8	1	3L1	PLUG
	9	2	3K824	HOSE REDUCING
	10	2	3K3B	HOSE CLIP
	11	1	1D62	PIPE
	12	8	OE202C	BOLT
	13	2	OE208	BOLT
	14	2	OE401	BOLT
	15	3	OE201C	BOLT
	16	11	OC31	LOCK WASHER
	17	6	OC41	LOCK WASHER
	18	1	1D84	PIPE ASSEMBLY
	19	1	3L45	ADAPTOR
	20	2	3L50	PLUG
	21	2	3E40	ADAPTOR
	22	4	3K3	HOSE CLIP
	23	6	OE302	SET SCREW
	24	2	OC51	LOCK WASHER
	25	2	OC30	WASHER
	26	2	OE104	SET SCREW
	27	2	OC21	LOCK WASHER
	28	1	3K220	HOSE
	29	1	1D66	PIPE

Intercooler Assembly D1128T **Comprising Key 1-31 SP275**



CODE	KEY	QTY	PART No.	DESCRIPTION
T	1	1	2J30	INTERCOOLER BODY
	2	2	2J32	END RING
	3	2	2D304	"O" RING
	4	1	2J33	INTERCOOLER CORE
	5	1	2J41	SUPPORT
	6	2	1C39	GASKET
	7	2	1C40	GASKET
	8	1	3L1	PLUG
	9	2	3K210	HOSE
	10	4	3K13	HOSE CLIP
	11	1	1G192	PIPE
	12	6	OE202C	BOLT
	13	2	OE208	BOLT
	14	2	OE401	BOLT
	15	3	OE201C	BOLT
	16	11	OC31	LOCK WASHER
	17	6	OC41	LOCK WASHER
	18	1	1D64	PIPE ASSEMBLY
	19	1	3L45	ADAPTOR
	20	2	3L50	PLUG
	21	2	3E40	ADAPTOR
	22	4	3K13	HOSE CLIP
	23	6	OE302	SET SCREW
	24	2	OC51	LOCK WASHER
	25	2	OC30	WASHER
	26	2	OE104	SET SCREW
	27	2	OC21	LOCK WASHER
	28	1	3K220/10CM	HOSE
	29	1	1G193	PIPE
	30	1	3K215	HOSE
	31	2	3K12	CLAMP



SEE OVER

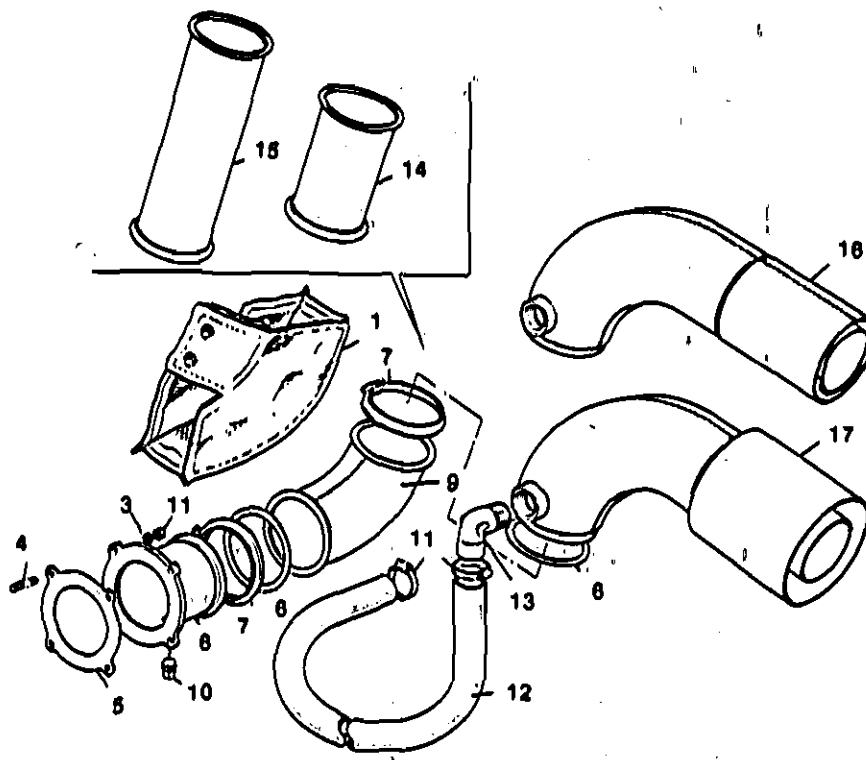
Turbo Charger Assembly D1515
Comprising Key 1-39
SP185/SP225/SP275 Engine

CODE	KEY	QTY	PART No.	DESCRIPTION
P/S/T	1	1	2J45	TURBO CHARGER HOLSET
	2	1	1458828	HOSE
	3	1	1458820	AIR CLEANER - SEE ALSO PAGE C42
	4	2	5007873	CLAMP
	5	1	1C52	OIL RETURN GASKET
	6	4	OC31	WASHER
	7	2	OGE201C	SET SCREW
	8	1	3E901	OIL RETURN ELBOW
	9	4	5009881	CLAMP
	10	2	6099199	HOSE
	11	2	6065031	SLEEVE
	12	1	6087988	TUBE
	13	1	6097079	BANJO BOLT
	14	2	1515362	WASHER
	15	1	6087981	CONNECTOR OIL DRAIN
	16	2	OB45	NUT
	17	2	OD61	STUD
	18	2	1C43	GASKET
	19	1	3E903	OIL FEED PIPE
	20	2	3E905	PLUG
	21	1	3E910	ADAPTOR BLOCK
	22	1	3E230	ADAPTOR
	23	4	OC51	WASHER
	24	2	OE406	BOLT
	25	1	3E915	PLUG
	26	1	3K790	VENT HOSE
	27	2	OA3	SCREW
	28	2	OC5	LOCK WASHER
	29	2	2M6	CLIP
	30	4	OC31	WASHER
	31	2	OGE207	BOLT
	32	1	3L1	PLUG
	33	1	3E912	OIL FEED BLOCK
	34	1	1C53	OIL FEED GASKET
	35	2	6085050	CLIP
	36	1	2M9A	PIPE SUPPORT
	37	1	OB1	NUT
	38	1	OC41	SPRING WASHER
	40	1	1549952	ADAPTOR BLOCK

} Not Shown on Drawing

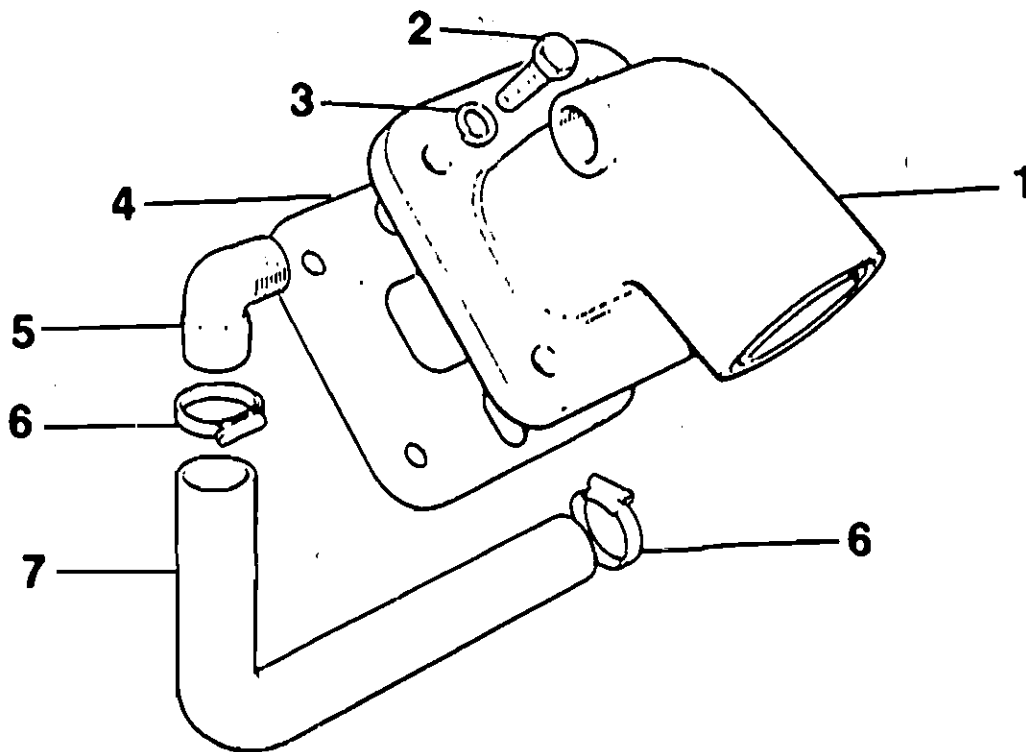
Turbo High Rise Exhaust Assembly
D1510 STD. Comp Key (1-17) Less 14/15
D1511 - 150 EXT. Comp Key (1-17) Less 15
D1512 - 300 EXT. Comp Key (1-17) Less 14
SP185 / SP225 / SP275

NOTE:- ENGINE 'D' ASSEMBLY CODES AS FOLLOWS
 SP185-S SP225-P SP275-T
 USE THE APPROPRIATE SUFFIX WHEN ORDERING ASSEMBLIES.



CODE	KEY	QTY	PART No.	DESCRIPTION
P/S/T	1	1	2J134	HEAT SHIELD
	2	1	OGB28	NUT
	3	1	OGC31	LOCK WASHER
	4	1	1500785	STUD
	5	1	2J23	GASKET
	6	1	2J20	ADAPTOR
	7	3	2J21	CLAMP) ALSO USED ON TOP OF
	8	3	2J22	STEEL GASKET) RISER EXTENSION
	9	1	2J133	RISER
	10	1	3L2	PLUG 1/8"
	11	1	3K13	CLIP
	12	1	EW84 24"	HOSE
	13	1	3E859	ELBOW
	14	1	2J131	RISER EXT (150mm) - Jacket not shown 2J138
	15	1	2J132	RISER EXT (300mm) - Jacket not shown 2J137
S	16	1	2J129	EXH ELBOW 4" Ø
P/T	17	1	2J130	EXH ELBOW 5" Ø

**Exhaust Assembly D1510
Comprising Key 1-7
SP90 / SP135**



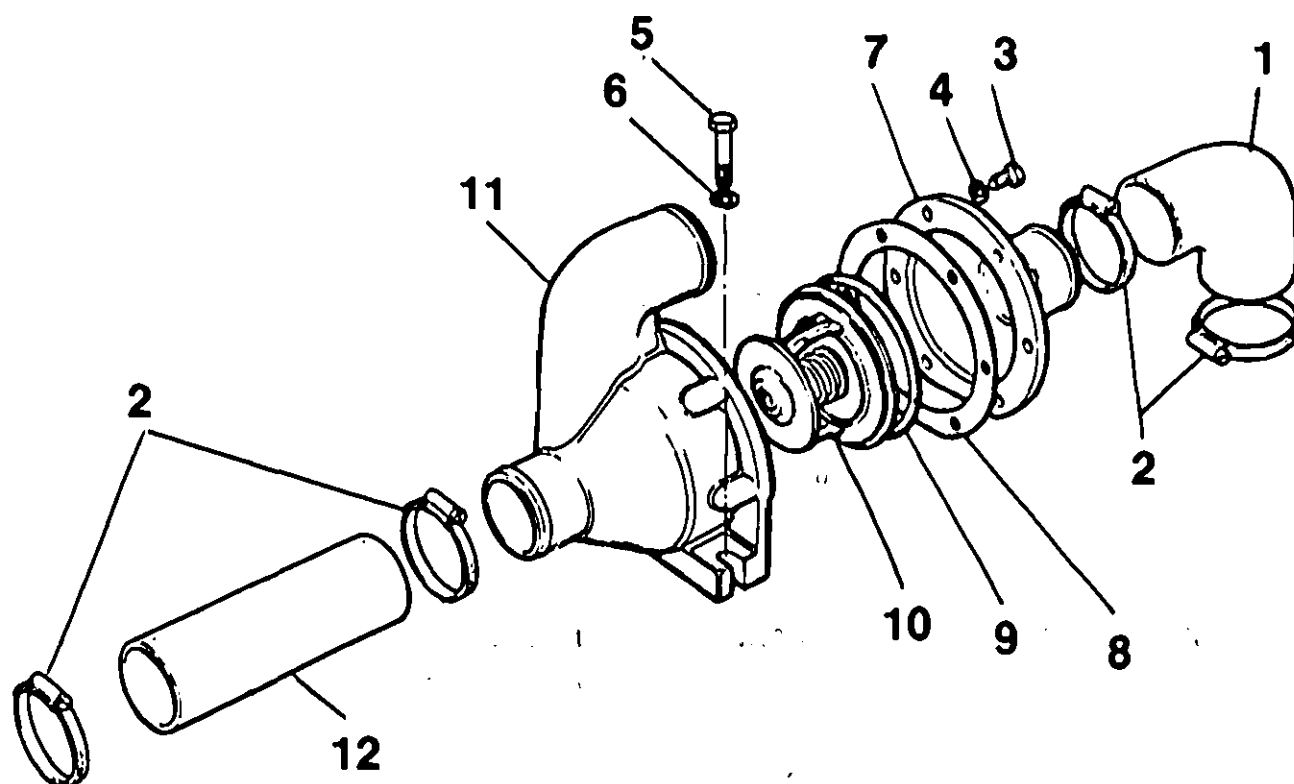
CODE	KEY	QTY	PART No.	DESCRIPTION
M/N	1	1	1A397	EXHAUST OUTLET
	2	4	OE403	BOLT
	3	4	OC51	LOCK WASHER
	4	1	1C43	GASKET
	5	1	3E658	ELBOW
	6	2	3K2	CLAMP
	7	1	3K351	HOSE

NOTE:- WHEN USED WITH PRM 'C' TYPE TRANSMISSION, PART 3E910 IS ADDED PLUS 2 OFF GASKET 1C43 & PLUG 3E905.

**Dry Exhaust Assembly D1520-SP90
Comprising Key 1-9 Less 2
D1521-SP135 Comprising Key 2-9**

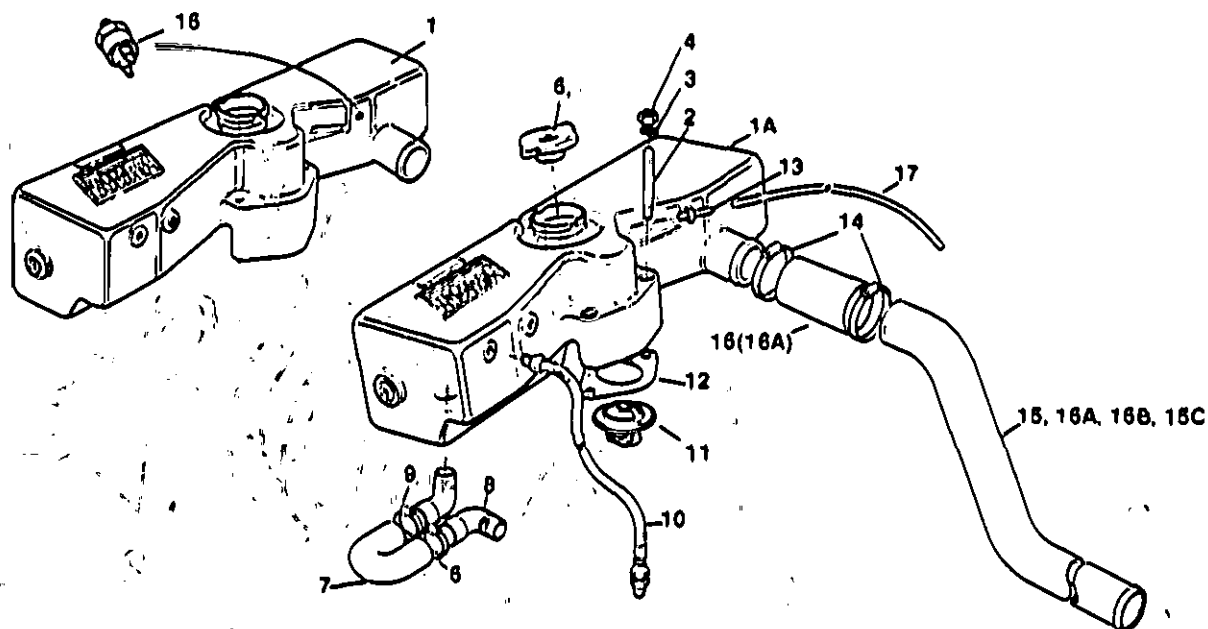
1	1	1A284	ELBOW (547) EXHAUST 2.1/2"
2	1	1A283	ELBOW EXHAUST 3"
3	4	OA500	SCREW
4	4	OB34	NUT
5	4	OC41	WASHER-SPRING
6	1	1C26	GASKET
7	1	1C43	GASKET
8	1	2J125	DRY EXHAUST ELBOW ADAPTOR - FABRICATED
9	1	3L41	(USED 3L40) PLUG SQUARE HEADED 3/4" IRON

Thermostat Assembly D885
Comprising Key 1-12
SP185 / SP225 / SP275



CODE	KEY	QTY	PART No.	DESCRIPTION
P/S/T	1	1	3K511	HOSE
	2	4	3K4	CLAMP
	3	8	OE101	BOLT
	4	8	OC21	LOCK WASHER
	5	2	OE202	BOLT
	8	2	OC21	LOCK WASHER
	7	1	1A409	THERMOSTAT COVER
	8	1	1C47	GASKET
	9	1	1C48	RUBBER SEAL
	10	1	2C250	THERMOSTAT, SP180/225/275
	11	1	1A410	THERMOSTAT HOUSING
	12	1	3K2135	HOSE

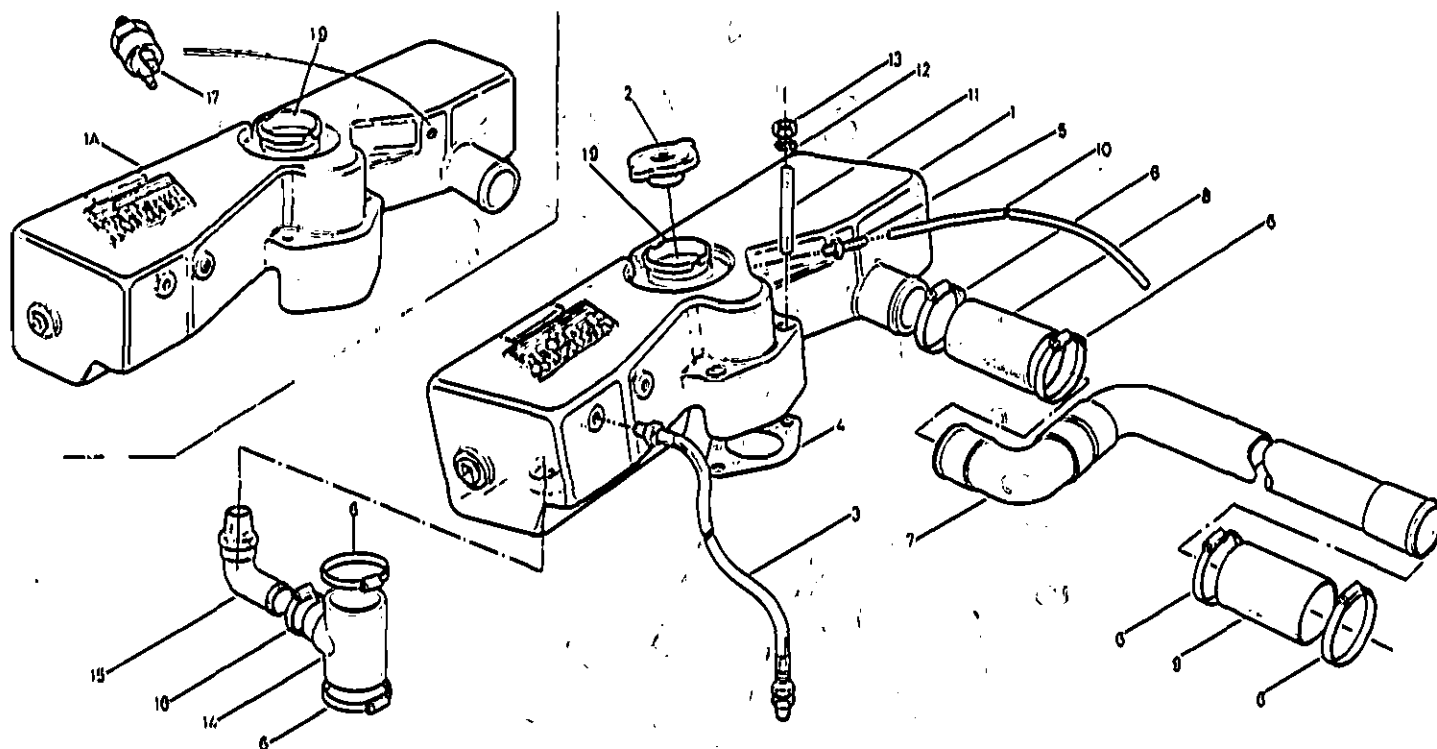
**Header Tank Assembly D800 (Angled STD)
Comp Key 1-18 Less (1/15 BC)
D801 (Horizontal) Comp Key (1-18) Less (15/15a)
SP90 - 135**



CODE	KEY	QTY	PART No.	DESCRIPTION
	1	1	1A485	HEADER TANK (HORIZONTAL)
	1A	1	1A393	HEAD TANK (ANGLED STD)
	2	2	OD71	STUD 2.75 x 5/16
	3	2	OC31	WASHER
	4	2	OB28	NUT
M/N	5	1	2C304	PRESSURE CAP (CHROME)
	6	1	3K2	CLAMP
	7	1	3K823	HOSE
	8	2	3E585	ELBOW
	9	1	3K2	CLAMP
	10	1	3K775	VENT HOSE
	11	1	2C35	THERMOSTAT 8071841 Modified
	12	1	1541317	GASKET
	13	1	3C27	HOSE BARB
	14	2	3K4	CLAMP
M	15	1	1D80	TUBE 4 CYLINDER
N	15A	1	1D50	TUBE 8 CYLINDER
M	15B	1	1G181	TUBE 4 CYLINDER (HORIZONTAL)
N	15C	1	1G177	TUBE 8 CYLINDER (HORIZONTAL)
M	16	1	3K824	REDUCING HOSE 4 CYLINDER
N	16A	1	3K2133	HOSE 8 CYLINDER
	17	1	3K825	OVER FLOW HOSE
	18	1	1808027	COLD START SWITCH
M/N	19	1	IF83	FILLER NECK

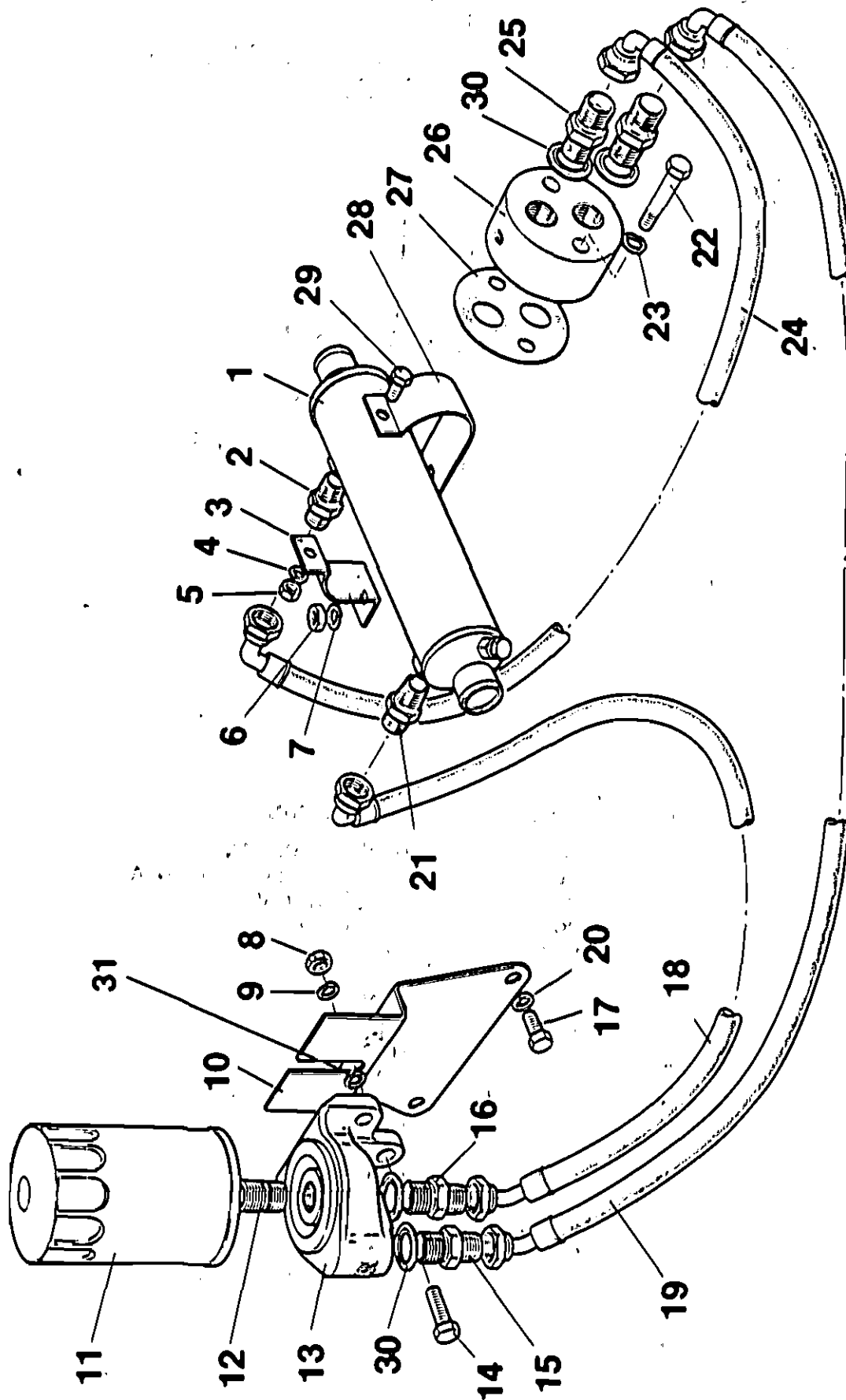
NOTE:- ENGINE 'D' ASSEMBLY KEY CODES AS FOLLOWS
SP90-M SP135-N

**Header Tank Assembly D800 (Angled STD)
Comp Key 1-17 Less (1A)
D801 (Horizontal) Comp Key (1-17) Less (1)
SP185 / SP225 / SP275**



CODE	KEY	QTY	PART No.	DESCRIPTION
P/S/T	1	1	1A393	HEADER TANK (ANGLED)
	1A	1	1A485	HEADER TANK (HORIZONTAL)
	2	1	2C304	PRESSURE CAP
	3	1	3K880	VENT HOSE
	4	1	1541317	GASKET
	5	1	3C27	HOSE BARB
	6	6	3K4	CLAMP
	7	1	1D73	TUBE
	8	1	3K2133	HOSE
	9	1	3K2133	HOSE
	10	1	3K825	HOSE, OVER FLOW
	11	2	OD71	STUD
	12	2	OC31	WASHER
	13	2	OB28	NUT
	14	1	3K828	T-REDUCING HOSE
	15	1	3E880	ELBOW
	16	1	3K2	CLAMP
	17	1	1808027	COLD START SWITCH
	18	1	1F83	FILLER NECK

NOTE:- USE 'P' SUFFIX ON ALL



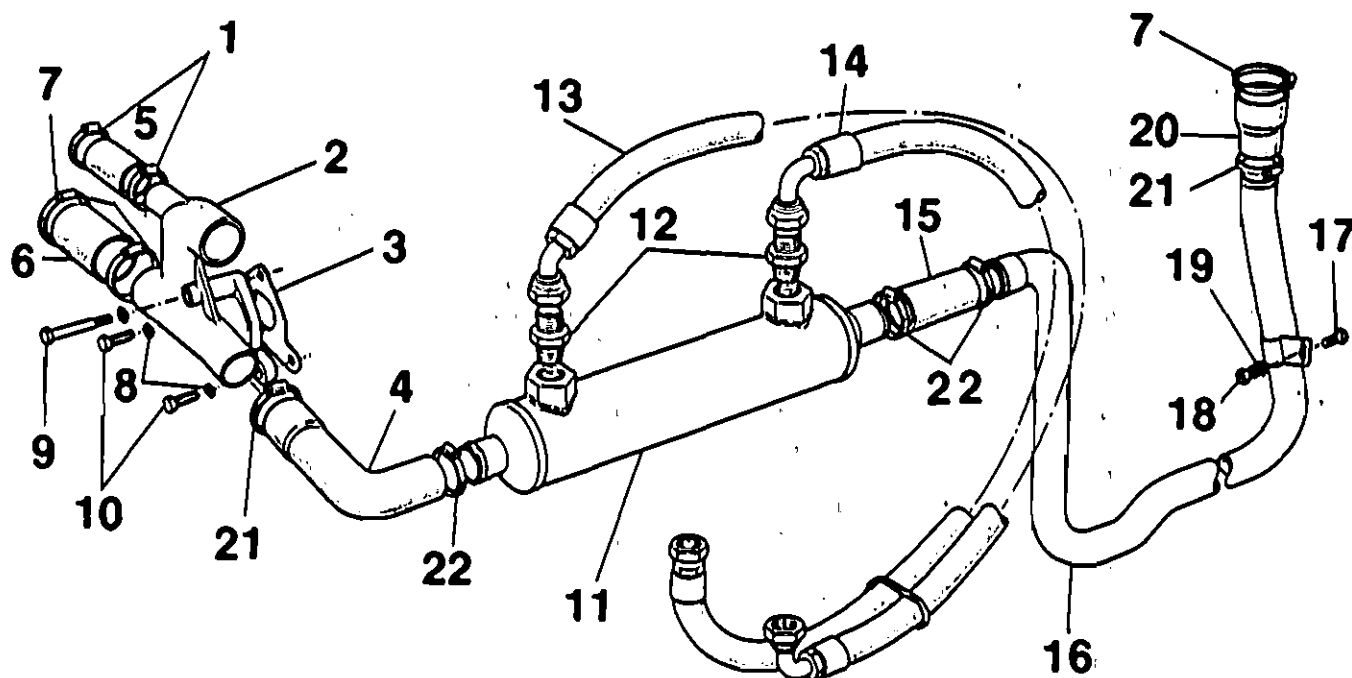
**Engine Oil Cooler Assembly D196 (Cupro) Comp Key 1B-30
D197 (Copper STD) Comp Key 1-30 Less 1B/1C.
SP90 / 135**

CODE	KEY	QTY	PART No.	DESCRIPTION
M	1	1	2C233	OIL COOLER, COPPER
N	1A	1	2C235	OIL COOLER, COPPER
M	1B	1	2C238	OIL COOLER, CUPRO
N	1C	1	2C238	OIL COOLER, CUPRO
	2	1	3G35	ADAPTOR
	3	1	2M3	BRACKET, UPPER
	4	1	OC21	LOCK WASHER
	5	1	OB16	NUT
	6	1	OB34	NUT
	7	1	OC41	LOCK WASHER
	8	1	OB34	NUT
	9	1	OC41	LOCK WASHER
	10	1	1D51	BRACKET
	11	1	2N50	FILTER
	12	1	3C450	NIPPLE
	13	1	1A395	OIL BASE
	14	1	OE353	BOLT
	15	1	3G34	ADAPTOR
	16	1	3G34	ADAPTOR
	17	2	OE300	BOLT
	18	1	3K778	OIL LINE
	19	1	3K779	OIL LINE
	20	2	OC41	LOCK WASHER
	21	1	3G35	ADAPTOR
	22	2	OE406	BOLT
	23	2	OC51	LOCK WASHER
	24	1	3K777	OIL LINE
	25	2	3G34	ADAPTOR
	26	1	1A391	ADAPTOR, OIL FEED
	27	1	2D29	GASKET
	28	1	2M4	BRACKET, LOWER
	29	1	OE101	BOLT
	30	4	OC500	DOWTY SEAL
	31	1	OC40	FLAT WASHER (NOT SHOWN)

NOTE:- ENGINE 'D' KEY CODES AS FOLLOWS
SP90-M SP135-N

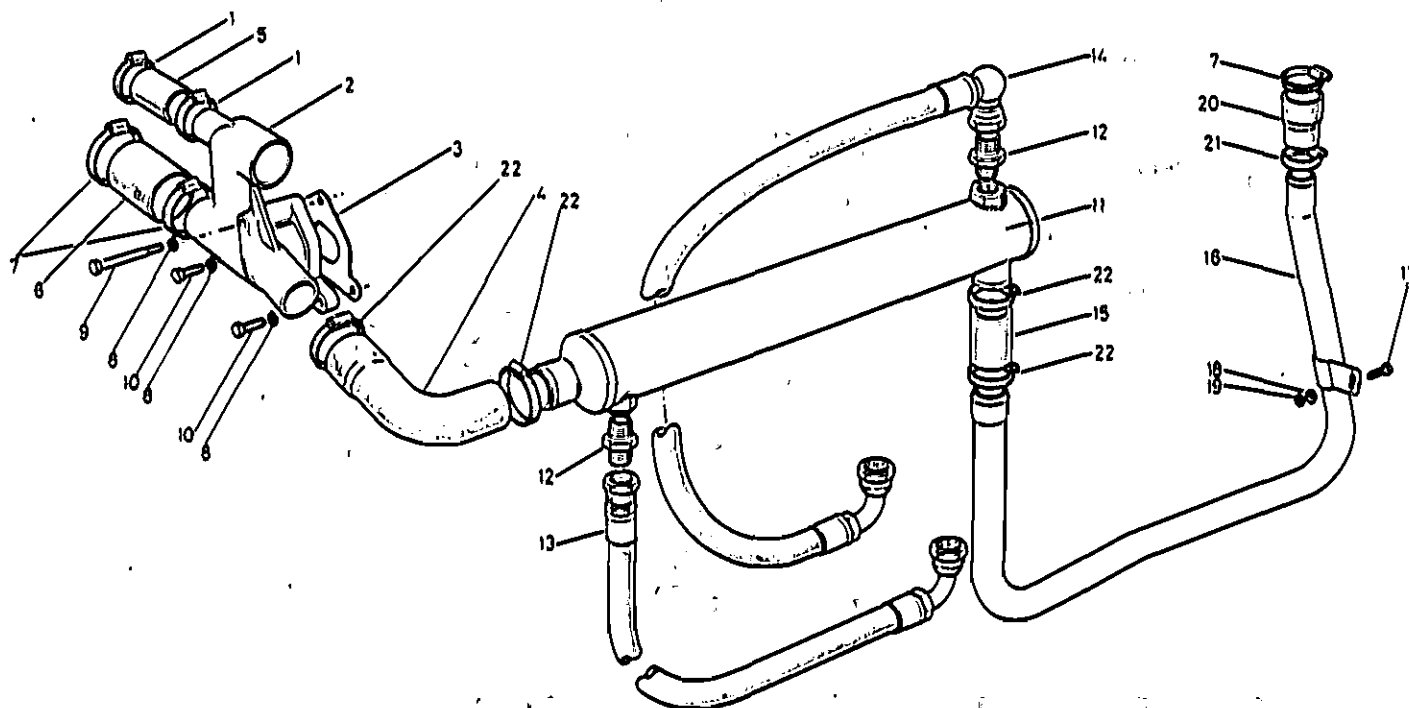
SPECIAL NOTE:- DURING 1987 A NEW OIL FILTER OF LARGER CAPACITY AND REVISED FITMENT WILL BE INTRODUCED. THIS IS PART No. 2N53. LOOK AT THE COVER OF THIS MANUAL - IF YOUR ENGINE USES 2N53 THERE WILL BE A STICKER ON THE COVER TO SAY SO. - IF IN DOUBT ASK YOUR DEALER.

Engine Oil Cooler Assembly D197P
Comprising Key 1-22
SP225 / SP185



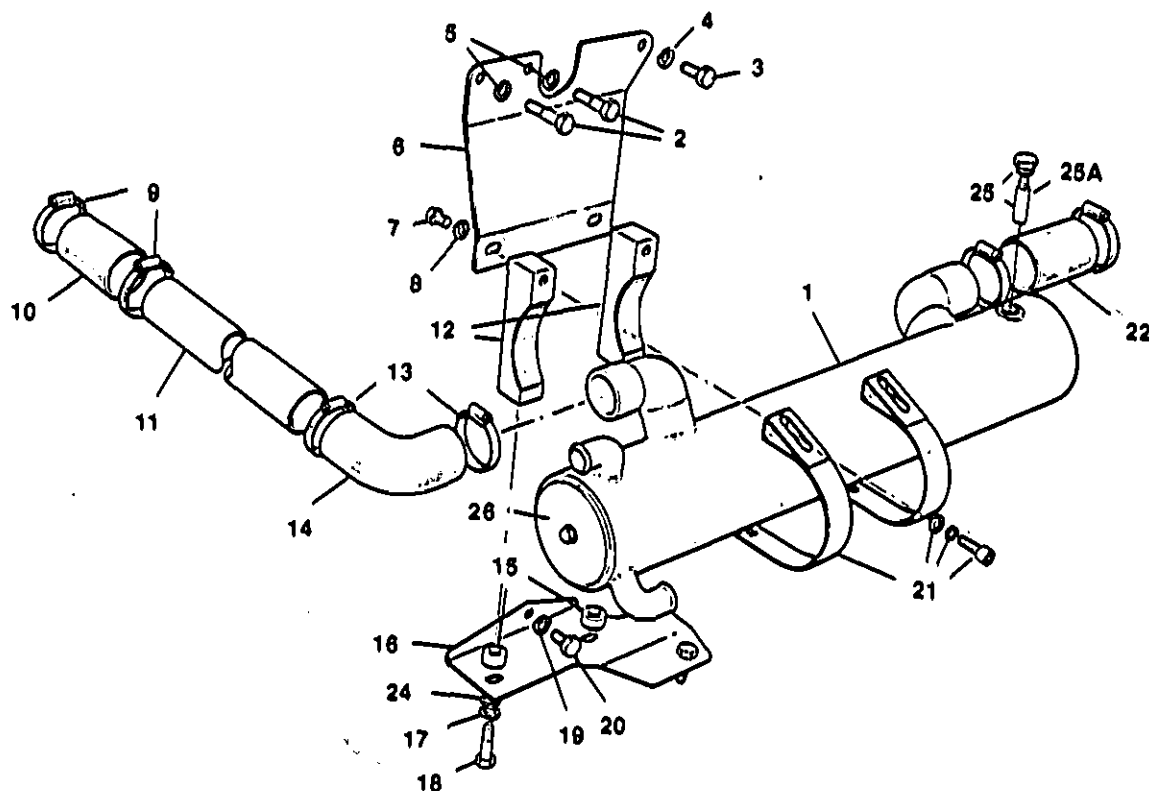
CODE	KEY	QTY	PART No.	DESCRIPTION
P/S	1	2	3K14	HOSE CLIP
	2	1	1A413	SPLIT FLOW RETURN
	3	1	2D36	GASKET
	4	1	3K786	PIPE RUBBER
	5	1	3K353	WATER HOSE
	6	1	3K2133	RADIATOR HOSE
	7	3	3K12	HOSE CLIP
	8	3	OC41	LOCK WASHER
	9	1	OE307.5	SOCKET SCREW
	10	2	OE302	SET SCREW
	11	1	2C245	OIL COOLER ENGINE
	12	2	3G38	ADAPTOR
	13	1	3K764	OIL HOSE ASSEMBLY
	14	1	3K765	OIL HOSE ASSEMBLY
	15	1	3K209-2	PIPE
	16	1	1G148	PIPE
	17	1	OGE201	BOLT
	18	1	OC30	FLAT WASHER
	19	1	OGC32	LOCK WASHER
	20	1	6135863	HOSE
	21	2	3K3A	HOSE CLIP
	22	3	3K3A	HOSE CLAMP

Engine Oil Cooler Assembly D197T
Comprising Key 1-22
SP275



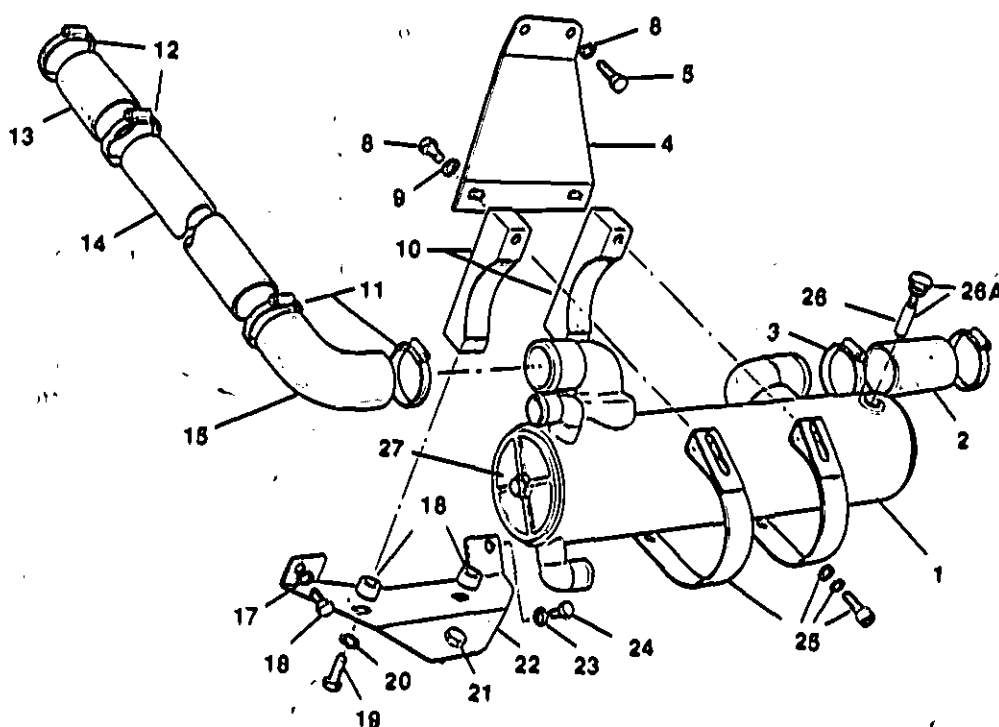
CODE	KEY	QTY	PART No.	DESCRIPTION
T	1	2	3K14	HOSE CLIP
	2	1	1A413	SPLIT FLOW RETURN
	3	1	2D38	GASKET
	4	1	3K766	PIPE RUBBER
	5	1	3K353	WATER HOSE
	6	1	3K2133	RADIATOR HOSE
	7	3	3K12	HOSE CLIP
	8	3	OC41	LOCK WASHER
	9	1	OE307.5	SOCKET SCREW
	10	2	OE302	SET SCREW
	11	1	2C272	OIL COOLER ENGINE
	12	2	3G38	ADAPTOR
	13	1	3K801	OIL HOSE ASSEMBLY
	14	1	3K802	OIL HOSE ASSEMBLY
	15	1	3K209-2	HOSE
	16	1	IG191	PIPE
	17	1	OGE201	BOLT
	18	1	OC30	FLAT WASHER
	19	1	OGC32	LOCK WASHER
	20	1	6135863	HOSE
	21	2	3K3A	HOSE CLIP
	22	4	3K3A	HOSE CLAMP

Heat Exchanger Assembly
D882 (Cupro) – Comp Key (1A-25)
D883 (Copper STD) – Comp Key (1-25) Less 1A
SP135



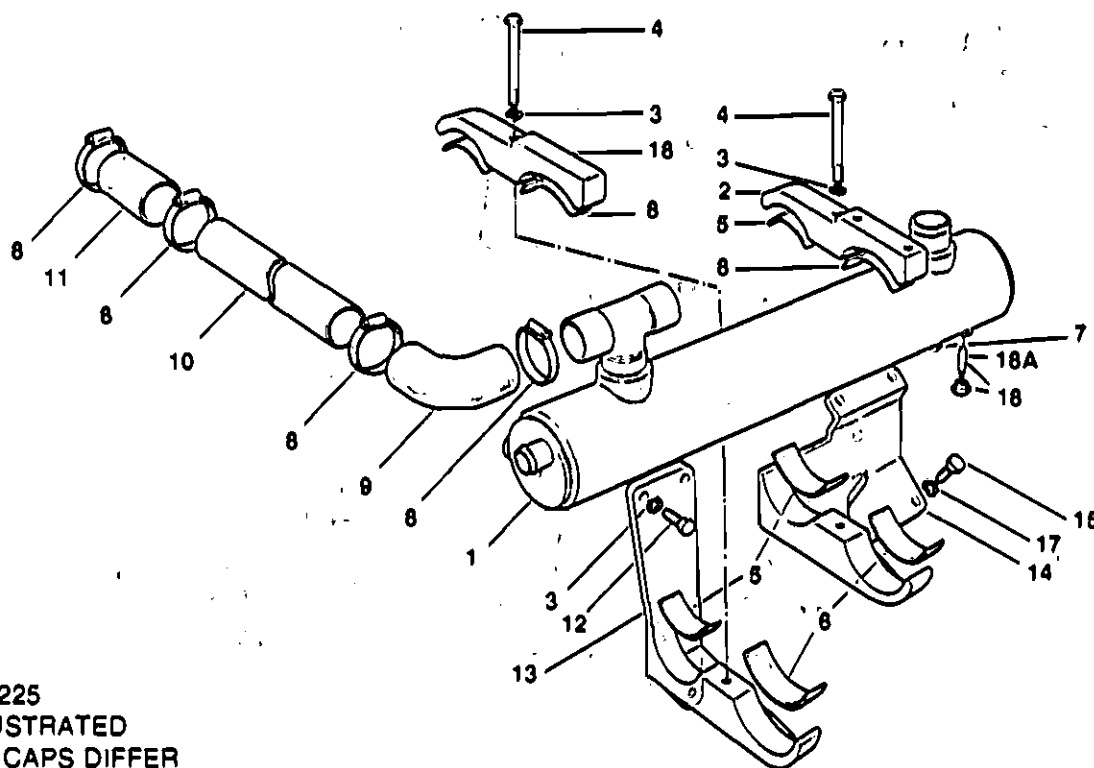
CODE	KEY	QTY	PART No.	DESCRIPTION
N	1	1	2C232	HEAT EXCHANGER (COPPER)
	1A	1	2C239	HEAT EXCHANGER (CUPRO)
	2	2	OE303	BOLT
	3	1	OE302C	BOLT
	4	1	OC41	WASHER
	5	2	OC41	WASHER
	6	1	1E44	BRACKET
	7	2	OE300	BOLT
	8	2	OC41	WASHER
	9	2	3K4	CLAMP
	10	1	3K2133	HOSE
	11	1	1D58/13	PIPE
	12	2	1A486	SADDLE
	13	2	3K4	CLAMP
	14	1	3K503	HOSE
	15	2	1B98	SPACER
	16	1	1E45	BRACKET, LOWER
	17	2	OC41	WASHER
	18	2	OE303	BOLT
	19	6	OC41	WASHER
	20	1	OE370	BOLT
	21	1	ID99	STRAP/BOLT/WASHER ASSEMBLY
	22	1	3K2133	HOSE
	23	2	3K4	CLAMP
	24	4	OC40	FLAT WASHER
	25	1	EM21	ZINC ANODE ASSEMBLY
	25A	1	EM21A	ZINC ANODE
	26	2	2C211A	END PLATE
	27	2	2D25	RUBBER GASKET – Not shown separately

Heat Exchanger Assembly
D882M (Cupro) - Comp Key (1-26) LESS 1A
D883M (Copper STD) - Comp Key 1A-26
SP90



CODE	KEY	QTY	PART No.	DESCRIPTION
M	1	1	2C240 (CUPRO)	HEAT EXCHANGER
	1A	1	2C242 (COPPER)	HEAT EXCHANGER
	2	1	3K2133	HOSE 3"
	3	3	3K4	CLAMP
	4	1	1E48	BRACKET, UPPER
	5	2	OE303	BOLT
	6	2	OC41	WASHER
	6	2	OE300	BOLT
	9	2	OC41	WASHER
	10	2	1A486	SADDLE
	11	2	3K4	CLAMP
	12	2	3K4	CLAMP
	13	1	3K2133	HOSE 3"
	14	1	1D58/13	TUBE
	15	1	3K503	HOSE
	16	2	1B61	SPACER
	17	2	OC41	WASHER
	18	2	OE303	BOLT
	19	2	OE204	BOLT
	20	2	OC41	WASHER
	21	1	OB35	NUT
	22	1	1E47	BRACKET, LOWER
	23	2	OC31	LOCK WASHER
	24	2	OE302	BOLT
	25	2	1D99	STRAP/BOLT/WASHER ASSEMBLY
	26	1	EM21	ZINC ANODE ASSEMBLY
	26A	1	EM21A	ZINC ANODE
	27	2	2C211A	END PLATE
	28	2	2D25	RUBBER GASKET - Not shown separately

Heat Exchanger Assembly
D882 (Cupro) - Comp Key (1A-18)
D883 (Copper STD) - Comp Key 1-18 (LESS 1A)
SP185 / 225 / 275

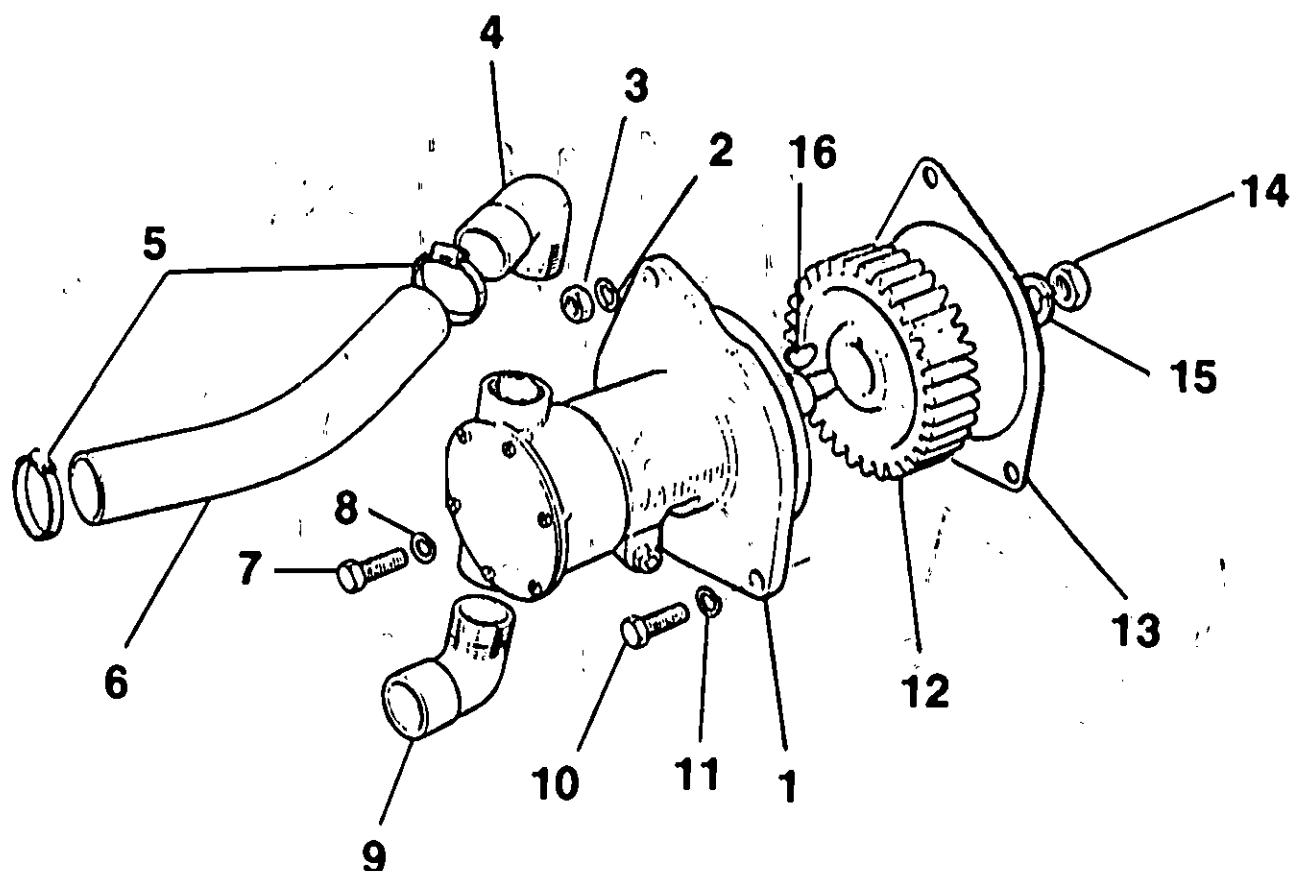


N.B. 185/225
 ARE ILLUSTRATED
 275 END CAPS DIFFER

CODE	KEY	QTY	PART No.	DESCRIPTION
P/S/T	1	1	2C246	HEAT EXCHANGER (COPPER) SP185/225 SPARES ONLY
	1A	1	2C269	HEAT EXCHANGER (CUPRO) SP185/225 ONLY
	1B	1	2C273	HEAT EXCHANGER (CUPRO) SP275 ONLY
	2	1	ID57	CLAMP
	3	5	OC41	LOCK WASHER
	4	2	OE310	BOLT
	5	4	1C54	RUBBER STRIP
	6	2	1C54	RUBBER STRIP
	7	1	3L1	PLUG
	8	4	3K12	HOSE CLIP
	9	1	3K503	RADIATOR HOSE
	10	16	1D56/18	PIPE
	11	1	3K2133	HOSE
	12	2	OE303	SET SCREW
	13	1	1D68	SUPPORT REAR
	14	1	1D58	SUPPORT FRONT
	15	4	OE403	SET SCREW
	16	1	1D67	CLAMP REAR
	17	4	OC51	LOCK WASHER
	18	1	EM21	ZINC ANODE ASSEMBLY
	18A	1	EM21A	ZINC ANODE
			NOT SHOWN SEPARATELY	
		1	2C269A	END PLATE SP185/225
		1	2D28	RUBBER GASKET SP185/225/275
		1	2C273A	END PLATE SP275
		1	2C211A	END PLATE ALL
		1	2D25	GASKET ALL

NOTE:- ENGINE 'D' ASSEMBLY CODES AS FOLLOWS SP185-S SP225-P SP275-T

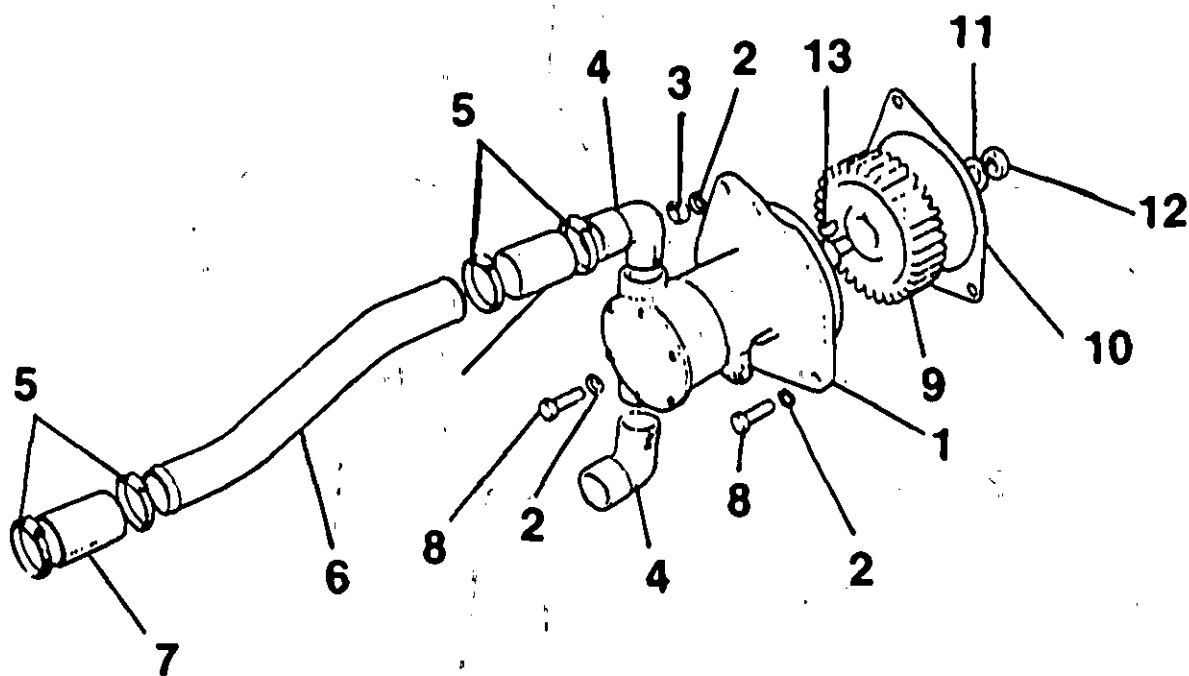
Raw Water Pump Assembly D367M
Comprising Key 1-16
SP90



CODE	KEY	QTY	PART No.	DESCRIPTION
M	1	1	2C48	JABSCO PUMP (LESS GEAR)
	2	3	OC41	LOCK WASHER
	3	1	OB34	NUT
	4	1	3E585	ELBOW
	5	2	3K2	CLAMP
	6	1	EW62	HOSE
	7	1	OE302	BOLT
	8	1	OC41	LOCK WASHER
	9	1	3E585	ELBOW
	10	1	OE302	BOLT
	11	1	OC41	LOCK WASHER
	12	1	2B102	GEAR
	13	1	1C33	GASKET
	14	1	OB59	NUT
	15	1	OC61	LOCK WASHER
	16	1	SP1401-10	KEY

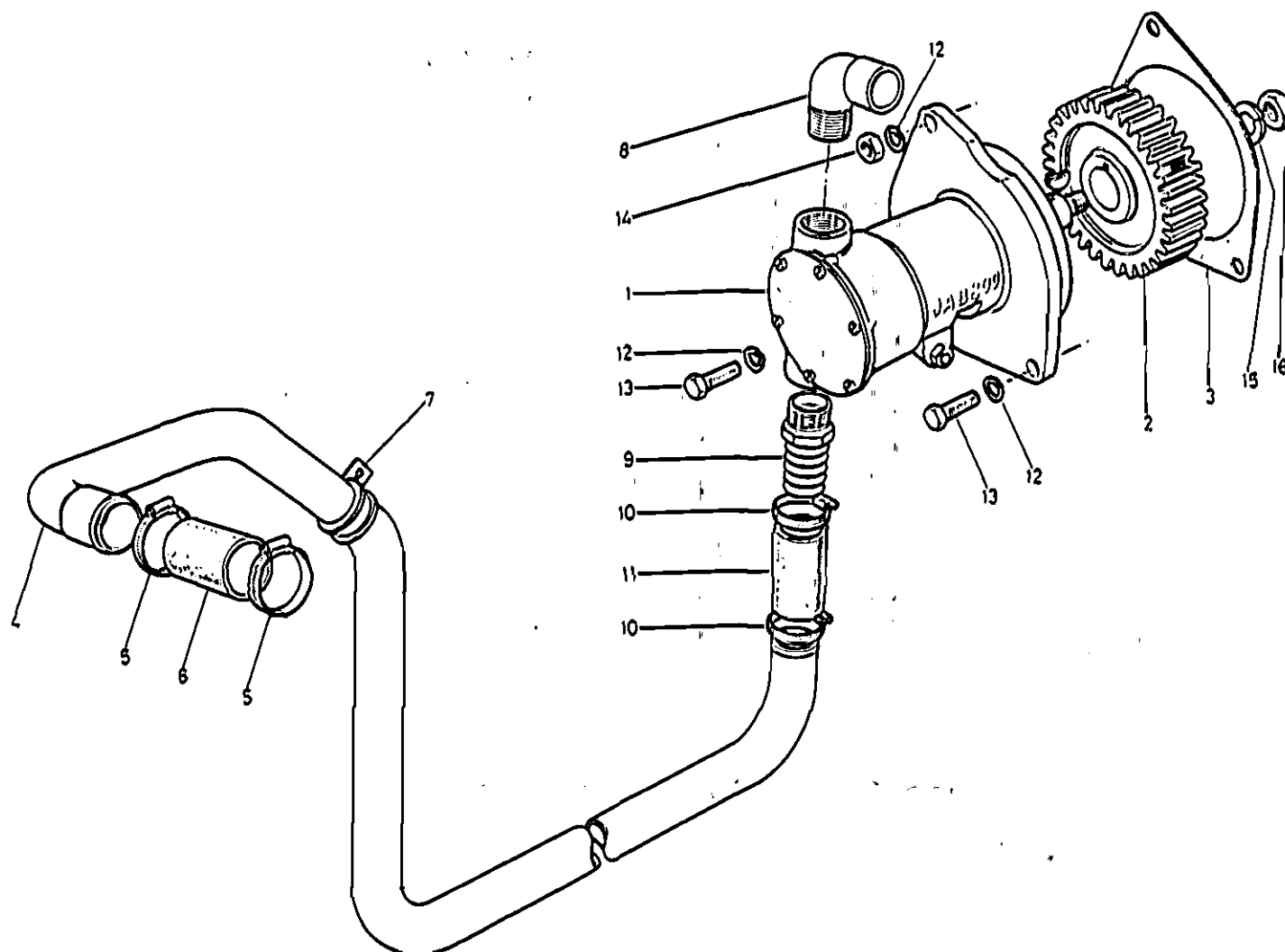
Raw Water Pump Assembly D367 **Comprising Key 1-13** **SP135**

(ALSO CAN BE USED AS SUPERCESSION FOR 6D380 & 4D254
 NOTING, STRAIGHT OR HELICAL GEAR)



CODE	KEY	QTY	PART No.	DESCRIPTION
N	1	1	2C48	JABSCO PUMP (LESS GEAR)
	2	3	OC41	LOCK WASHER
	3	1	OB34	NUT
	4	2	3E585	ELBOW
	5	4	3K2	CLAMP
	6	1	1D59	TUBE
	7	2	3K207A2	HOSE 2"
	8	2	OE302	BOLT
	9	1	2B102	DRIVE GEAR
	10	1	1C33	GASKET
	11	1	OC61	WASHER
	12	1	OB59	NUT
	13	1	SP1401-10	KEY

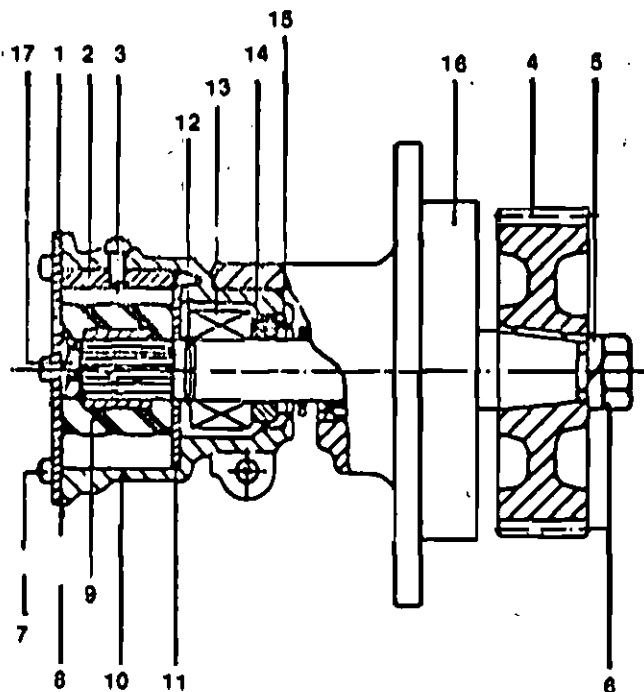
Raw Water Pump Assembly D367S **Comprising Key 1-16** **SP185**



CODE	KEY	QTY	PART No.	DESCRIPTION
S	1	1	2C48	JABSCO PUMP (LESS GEAR)
	2	1	2B102	DRIVE GEAR
	3	1	IC33	GASKET
	4	1	IG194	PIPE
	5	2	3K2	CLAMP
	6	1	3K220/8.5CM	HOSE
	7	1	3K24	'P' CLIP
	8	1	3E585	ELBOW
	9	1	3C408	BARBED ADAPTOR
	10	2	3K2	CLAMP
	11	1	3K207A2.5	HOSE
	12	3	OC41	LOCK WASHER
	13	2	OE302	BOLT
	14	1	OB34	NUT
	15	1	OC61	LOCK WASHER
	16	1	OB59	NUT

Breakdown of 2C48 Pump

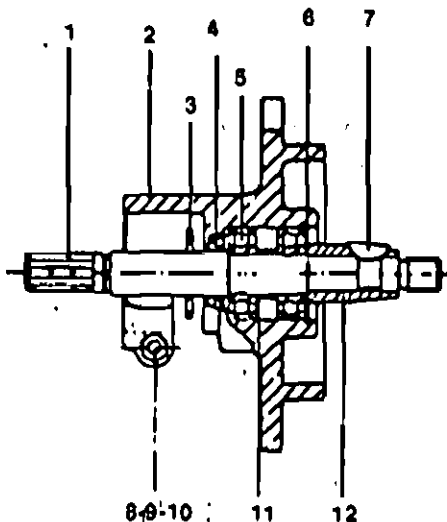
PUMP



KEY	QTY	MODEL	DESCRIPTION
1	1	3992	ENDCOVER BLANK
2	1	490	CAM
3	1	SP1003-01	CAM SCREW
4	1	-	GEAR
5	1	-	WASHER
6	1	-	NUT
7	6	SP1002-02	ENDCOVER SCREW
8	1	3298	GASKET
9	1	1210-0001	IMPELLER
10	1	10054-200	BODY
11	1	7683	WEARPLATE
12	1	SP1700-62	RETAINING RING
13	1	SP6080-07	SEAL
14	1	SP8022-07	SEAL SEAT
15	1	9722	CUP RUBBER
18			BEARING HOUSING ASSEMBLY
17	1	4345	SPLINE SEAL

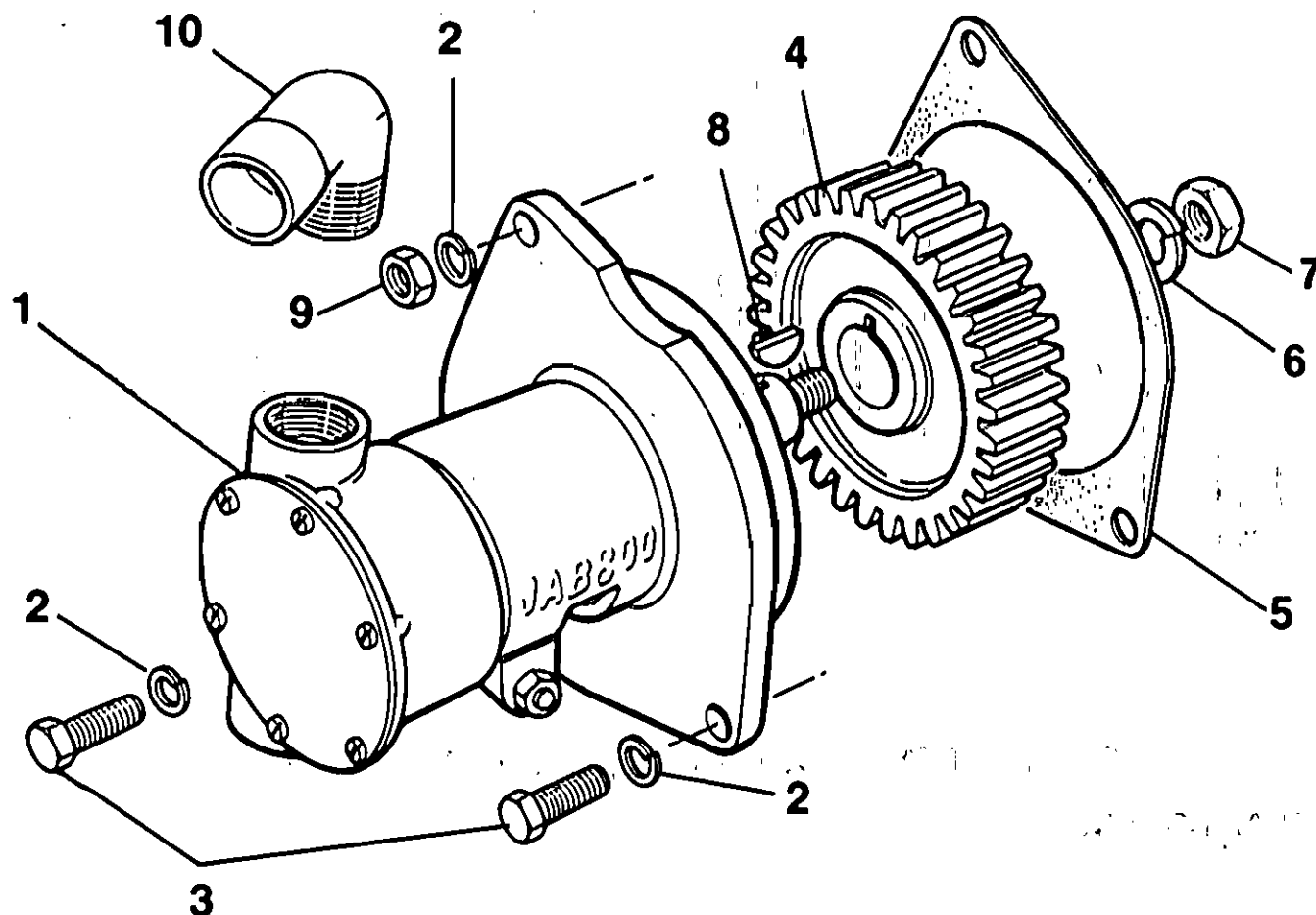
Service Kit SK239 – Comprising Key 7/8/9/17

BEARING HOUSING



KEY	QTY	PART No.	DESCRIPTION
1	1	10957	SHAFT
2	1	10959	BEARING HOUSING
3	1	3288	SLINGER
4	1	SP2703-02	SEAL
5	2	SP2601-39	BEARING
6	1	SP1700-246	RETAINING RING
7	1	SP1401-10	KEY
8	1	SP1095-09	BOLT
9	1	SP1602-08	WASHER
10	1	SP1105-03	NUT
11	1	9998	BEARING SPACER
12	1	10958	SLEEVE

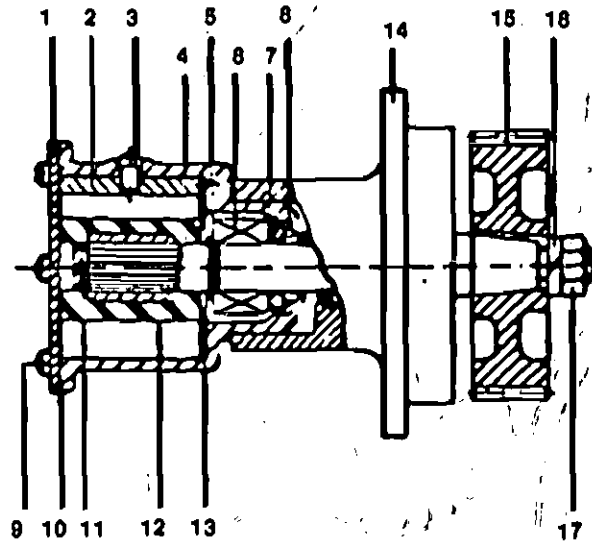
Raw Water Pump Assembly D367P
Comprising Key 1-10
SP225 / SP275



CODE	KEY	QTY	PART No.	DESCRIPTION
P/T	1	1	2C49	JABSCO PUMP (LESS GEAR)
	2	3	OC41	LOCK WASHER
	3	2	OE302	BOLT
	4	1	2B102	GEAR
	5	1	1C33	GASKET
	6	1	OC81	LOCK WASHER
	7	1	OB59	NUT
	8	1	SP1401-10	KEY
	9	1	OB34	NUT
	10	1	3E859	ELBOW

Breakdown of 2C49 Pump

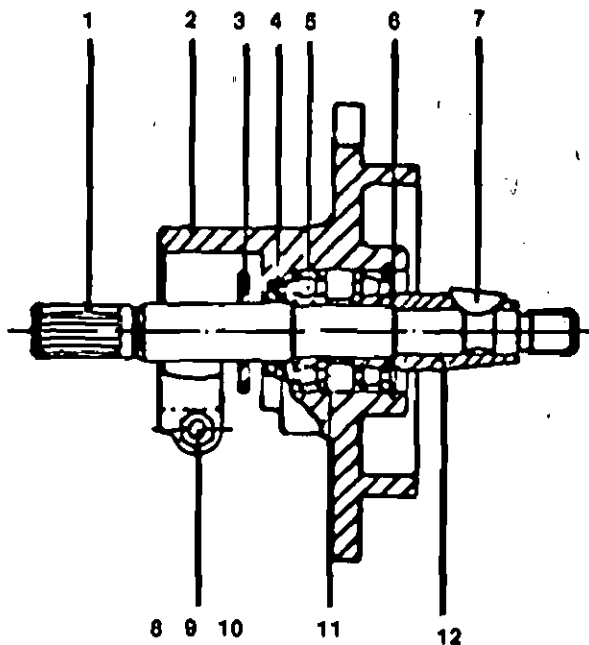
PUMP



KEY	QTY	MODEL	DESCRIPTION
1	1	3993	ENDCOVER BLANK
2	1	934	CAM
3	1	SP1004-09	CAM SCREW
4	1	10329-200	BODY
5	1	SP1700-82	RETAINING RING
6	1	SP6080-07	SEAL
7	1	SP8022-07	SEAL SEAT
8	1	9722	SEAL CUP
9	6	SP1003-09	END COVER SCREW
10	1	890	GASKET
11	1	4345	SPLINE SEAL
12	1	920	IMPELLER
13	1	4156	WEARPLATE
14		"Bearing Housing"	BEARING HOUSING
15	1	11084	see below GEAR
16	1	11085	WASHER
17	1	11086	NUT

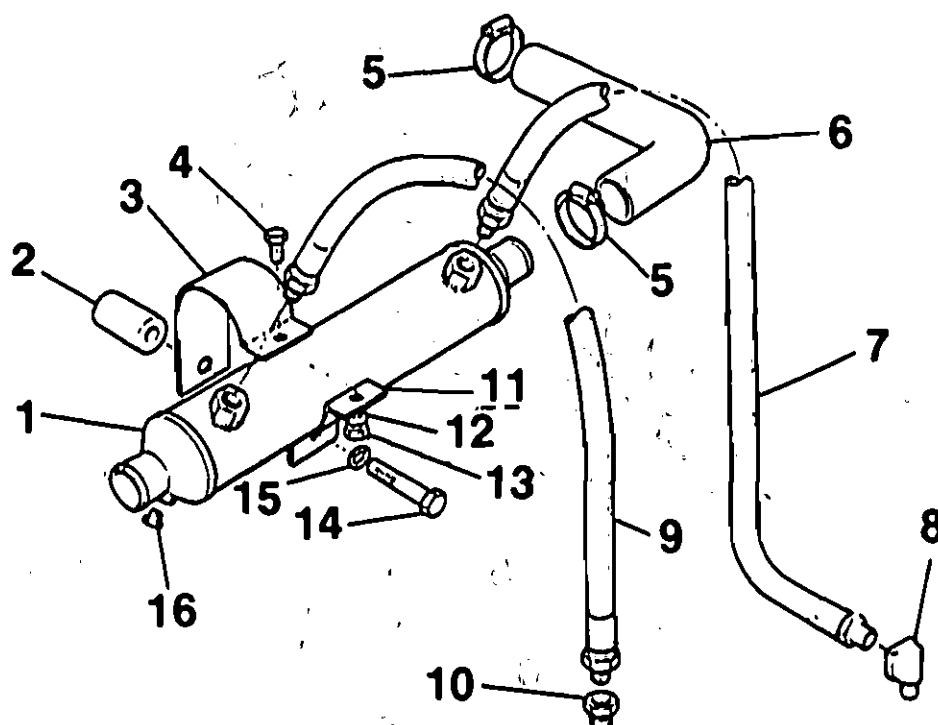
Service Kit SK229 - Comprising Key 9/10/11/12

BEARING HOUSING



KEY	QTY	PART No.	DESCRIPTION
1	1	10957-01	SHAFT
2	1	10959	BEARING HOUSING
3	1	3286	SLINGER
4	1	SP2703-02	SEALER
5	2	SP2601-39	BEARING
6	1	SP1700-248	RETAINING RING
7	1	SP1401-10	KEY
8	1	SP1095-09	BOLT
9	1	SP1602-06	WASHER
10	1	SP1105-03	NUT
11	1	9998	BEARING SPACER
12	1	10958	SLEEVE

Transmission Oil Cooler Assembly
D200 – Cupro Comprising Key 1A-16 Less 1B
D201 – Copper STD Comprising Key 1-16 Less 1A/1B
D202 – Cupro (Twin Disc) Comprising key (1B-16)
SP90 SP135



CODE	KEY	QTY	PART No.	DESCRIPTION
M/N	1	1	2C207A	TRANS OIL COOLER (COPPER)
	1A	1	2C237	TRANS OIL COOLER (CUPRO)
	1B	1	2C243	TRANS OIL COOLER (CUPRO)
	2	1	1B81	SPACER
	3	1	2M3	BRACKET, UPPER
	4	1	OE101	BOLT
	5	2	3K2	CLAMP
	6	1	3K351	HOSE
	7	1	3K772	OIL LINE 22" { on 301/2VR + 401/2VR use 3K772 x 2 on 301/2A + 401/2A use 3K772A x 2 on 301/2C + 401/2C use 3K772 x 2
	8	1	3D24	ELBOW { on 301/2VR + 401/2VR use 2 x 3D24 on 301/2A + 401/2A use 1 x 3D24 on 301/2C + 401/2C use 1 x 3D24
	9	1	3K764	OIL LINE 17"
	10	1	3G25	ADAPTOR BUSHING
	11	1	2M4	BRACKET LOWER
	12	1	OC21	LOCK WASHER
	13	1	OB16	NUT
	14	1	OGE308	BOLT
	15	1	OC41	LOCK WASHER
	16	1	3L1	PLUG DRAIN

NOTE:- When D145 Adaption Kits are ordered separately D200 Kits are included

If D145A Adaption is fitted Key 7 is reqd. Less 8/9/10

D145HA Adaption is fitted Pipe 1G182 is reqd. Less 1/3/4/7/8/9/10

D145BC Adaption is fitted Key 9 is reqd. Less 7/8/10

D145TD Adaption is fitted Hose 3K760 and Adaptor 3G36 is reqd. Less 7/8/9/10

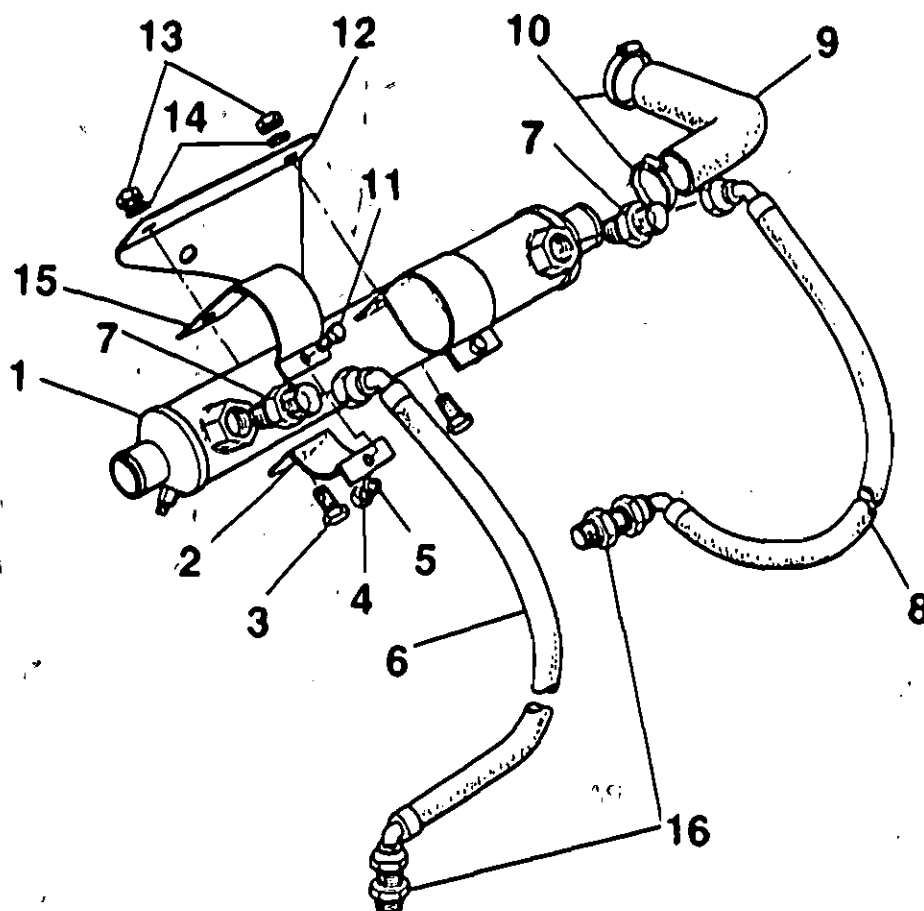
2C212Z is Cupro Cooler fitted with Zinc – used on some Grand Banks Engines.

NOTE:- Ground Line not shown – 2E413.

Transmission Oil Cooler Assembly **D200P – Cupro Comprising Key (1A-16)**

Applicable to PRM 401 + 402 only.

D202P – Cupro (Twin Disc) Comprising Key (1-16) Less 1A **Oil Cooler Transmission SP185 / 225 / 275**



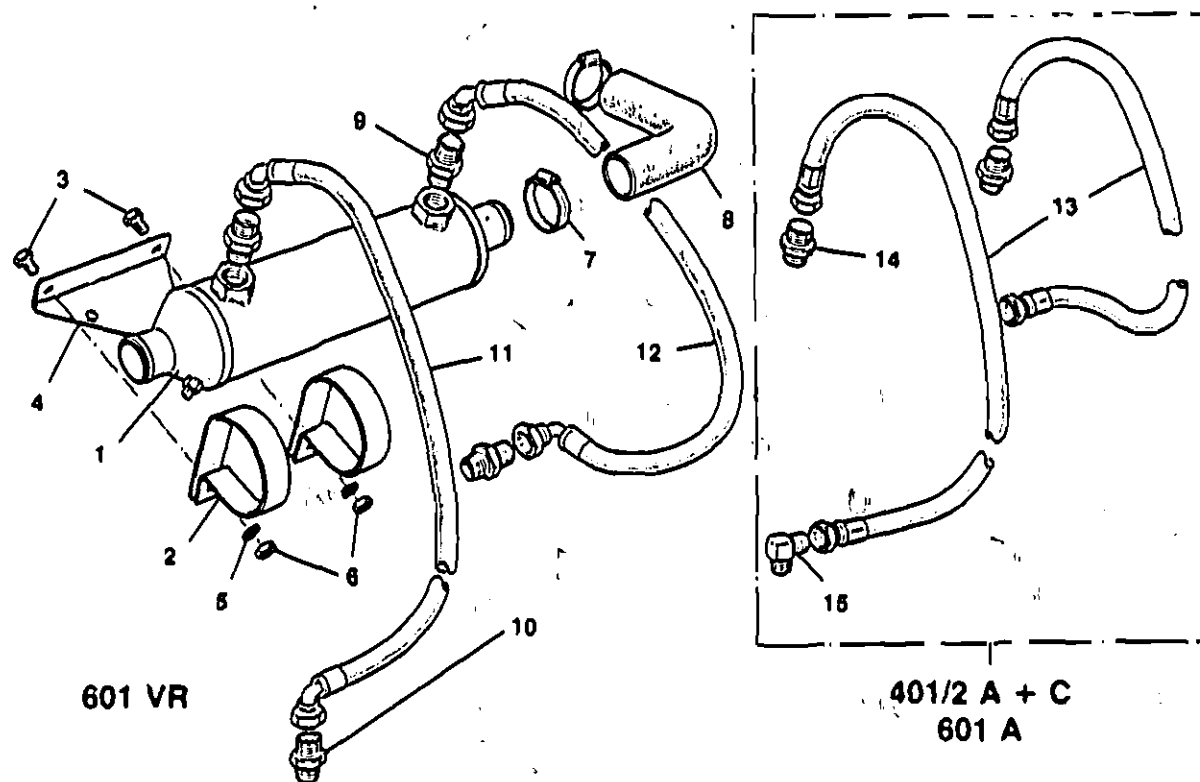
CODE	KEY	QTY	PART No.	DESCRIPTION
P/S/T	1	1	2C244	TRANS OIL COOLER TWIN DISC ONLY (CUPRO)*
	1A	1	2C234	TRANS OIL COOLER (CUPRO)*
	2	2	2M3	OIL COOLER BRACKET LOWER
	3	2	OE301	SET SCREW
	4	2	OB15	PLAIN NUT
	5	2	OC21	LOCK WASHER
	6	1	3K780	HOSE ASSEMBLY 17" (44 cm)
	7	2	3G35	ADAPTOR
	8	1	3K781	HOSE ASSEMBLY 22" (55 cm)
	9	1	3K352	ELBOW
	10	2	3K13	HOSE CLIP
	11	2	OE101	SET SCREW
	12	1	1D71	BRACKET
	13	2	OB35	NUT
	14	2	OC41	LOCK WASHER
	15	2	2M4	OIL COOLER BRACKET UPPER
	16	2	3G36	ADAPTOR

NOTE:- When D145 Adaption Kits are ordered separately D200 kit is included

If D145MAT / D145TDT / D145TDAT Adaptors are fitted Key 6 2off is reqd. Less Key 8.

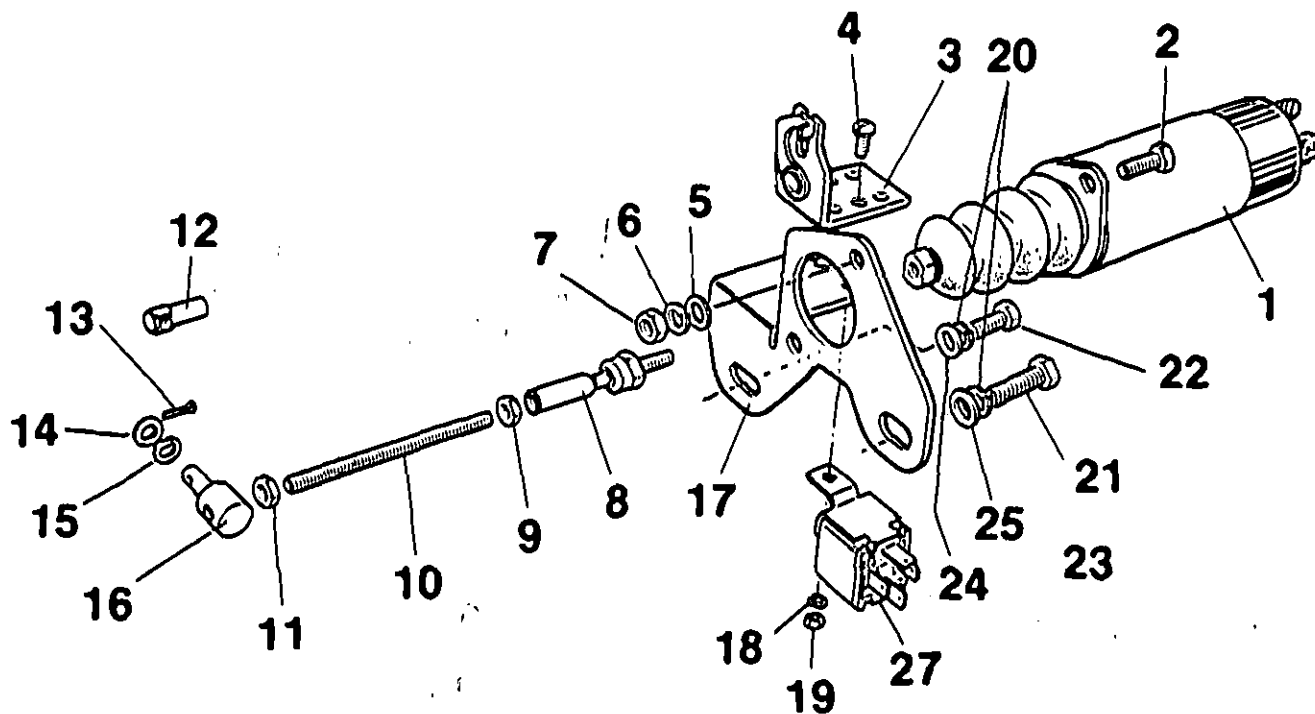
*NOTE:- GROUND LINE FITTED – NOT SHOWN PART 2E413.

Transmission Oil Coolers/Hoses and Fittings
Applicable to SP185/225/275
Fitted with PRM 401/2 A + C and PRM 601 A-VR Transmissions



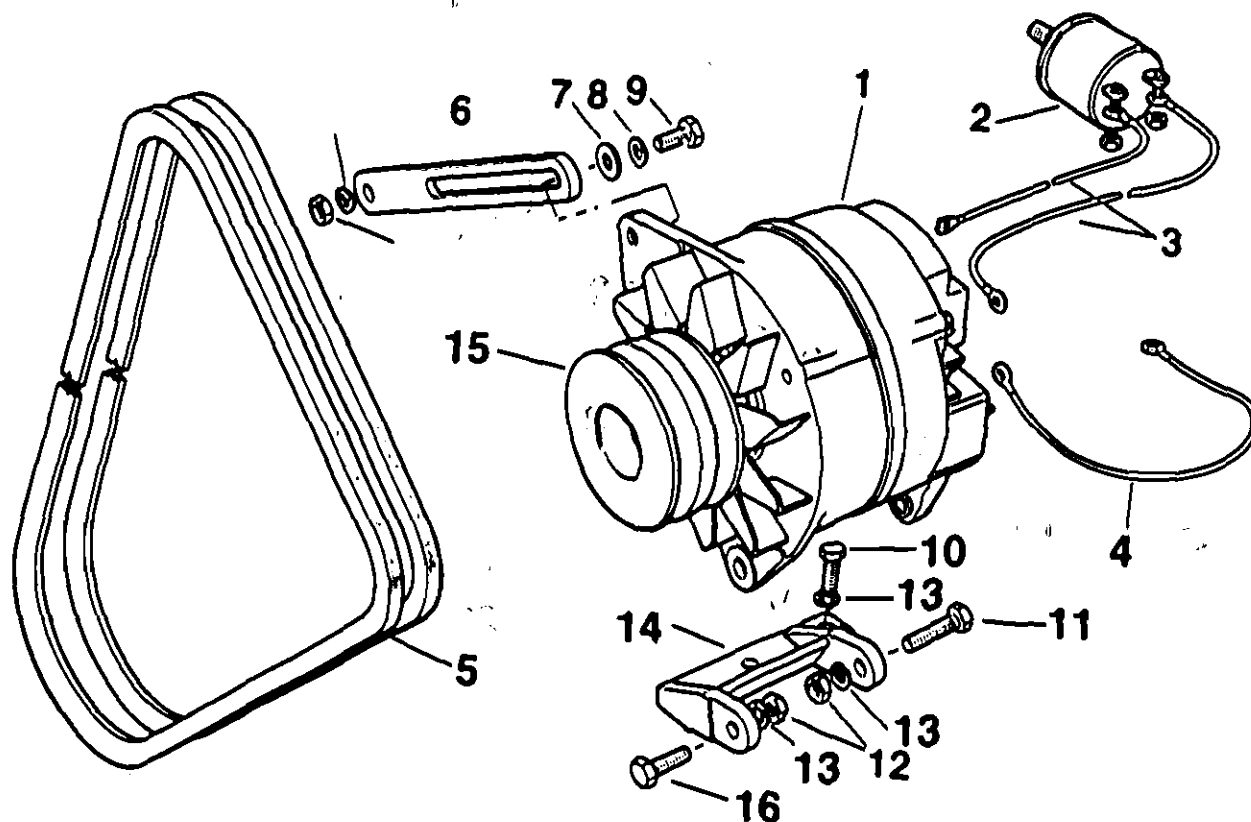
CODE	KEY	QTY	PART No.	DESCRIPTION
P/S/T	1	1	2C274	TRANS OIL COOLER (CUPRO)
	2	2	3K27	OIL COOLER BRACKET
	3	2	0E101	BOLT
	4	1	1D71	BRACKET
	5	2	0C21	WASHER
	6	2	0B18	NUT
	7	2	3K13	HOSE CLAMP
	8	1	3K352	ELBOW
	9	2	3G35	ADAPTOR
	10	2	3G36	ADAPTOR
	11	1	3K780	HOSE
	12	1	3K781	HOSE
	13	2	3K772	HOSE
	14	2	3E504	ADAPTOR
	15	1	2D24	ADAPTOR

Stop Solenoid Assembly D1286 (Single Station)
Comprising Key (1-25)
Dual 1286A (Dual Station) Comprising Key (1-26) Less 3/12.



CODE	KEY	QTY	PART No.	DESCRIPTION
ALL	1	1	2E215	SOLENOID 12V NEGATIVE GROUND
	1A	1	2E613	SOLENOID 12V INSULATED RETURN
	1B	1	2E212	SOLENOID 24V NEGATIVE GROUND OR INSULATED RETURN
	2	2	OE101	BOLT
	3	1	EC104	CABLE CLAMP
	4	2	OA3	BOLT 10/32
	5	2	OC20	FLAT WASHER
	6	2	OC21	LOCK WASHER
	7	2	OB15	NUT
	8	1	3L43	SWIVEL JOINT
	9	1	OB15	NUT
	10	1	1B79	ROD
	11	1	OB15	NUT
	12	1	EC103A	BALL JOINT
	13	1	2K353	COTTER PIN
	14	1	OC23	WAVEY WASHER
	15	1	OC24	FLAT COPPER WASHER
	16	1	EC115	PIVOT
	17	1	1B82	BRACKET
	18	2	OC5	LOCK WASHER
	19	2	OB1	NUT
	20	1	OC21A	LOCK WASHER
	21	1	OGE301	BOLT M10 x 20
	22	1	OE201	CAP SCREW
	23	1	OGC38	LOCK WASHER
	24	1	OC30	FLAT WASHER
	25	1	OC30	FLAT WASHER
	26	1	EC163	DUAL THROTTLE KIT (not illustrated)
	27	1	EI600A	RELAY 12 VOLTS
	27A	1	EI600B	RELAY 24 VOLTS

Alternator Assembly (Twin Pulley) D144P
Comprising Key (1-18)
SP185 / SP225 / SP275.

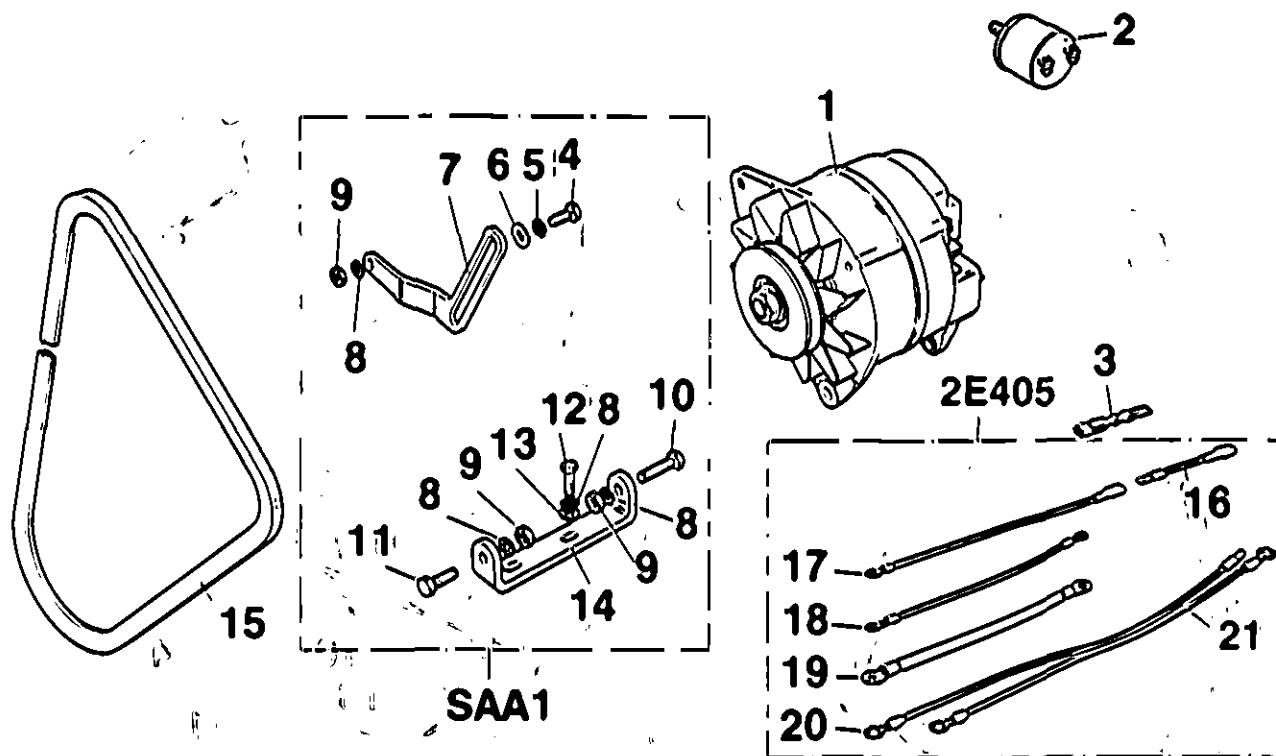


DURING 1987 A NEW CAV ALTERNATOR WILL BE INTRODUCED.
 THE LIST BELOW IDENTIFIES THE COMPONENT TO BE USED,
 COMPLETE ASSEMBLY IS D144LP.

CODE	KEY	QTY	PART No.	DESCRIPTION
P/S/T	1	1	2E7	ALTERNATOR 70 AMP
	2	1	2E206	SWITCH
	3	1	2E447/2E452	LINK WIRE ASSEMBLY
	4	1	2E449	LINK WIRE ASSEMBLY
	5	1	2B240	BELT, MATCHED SET
	6	1	2M40	ADJUSTING ARM
	7	1	OGC31	WASHER
	8	1	OGC32	WASHER
	9	1	OGE202	BOLT
	10	2	OE201	BOLT
	11	1	OE204	BOLT
	12	3	OB26	NUT
	13	5	OC31	LOCK WASHER
	14	1	2M44	PIVOT BRACKET
	15	1	2B25	TWIN PULLEY
	16	1	OE202	BOLT
	17	1	2E450	BLOCKING DIODE (NOT SHOWN)
	18	1	2E448	TAIL WIRE (NOT SHOWN)

Part No.	Description	Qty
OB26	NUT HEX HEAD 5/16 x 1/8 CAD. PLATED	3
OC30	WASHER-FLAT 7/8 x 1/8 CAD. PLATED	3
OC31	WASHER-SPRING RECTANGULAR SECTION 5/16	6
OE201	SETSCREW HEX HEAD 5/16 x 1/8 x 3/4 CAD. PLATED	2
OE202	SETSCREW HEX HEAD 5/16 x 1/8 x 1 CAD. PLATED	1
OE204	BOLT HEX HEAD 5/16 x 1/8 x 1 1/2 CAD. PLATED	1
OGE201C	CAP SCREW DIN 933 8 x 1.25 x 20 (5/16-20 x 3/4)	1
2B240	DRIVE BELT (FENNER - A1200-A48-A0B) ISSUE IN PAIRS	2
2B25	TWIN GROOVE PULLEY - ALTERNATOR (PVC 1A819)	1
2E206	SWITCH - OIL PRESSURE (2904-0330)	1
2E32	ALTERNATOR 70A/12V A127-70MT + PULLEY/SPACER (47020068)	1
2E400	WIRING LOOM (as 8620013 c/w inll wire 8620018)	1
2E462	BLOCKING DIODE - SUIT 2E32 (47130197)	1
2M40	ADJUSTING ARM - ALTERNATOR (36155153)	1
2M44	PIVOT BRACKET - TWIN BELT ALTERNATOR (PVC 1A831)	1

Alternator Assembly D144
Comprising Sub Assembly SAA 1 & 2E405
Plus Key 1/2/3/15



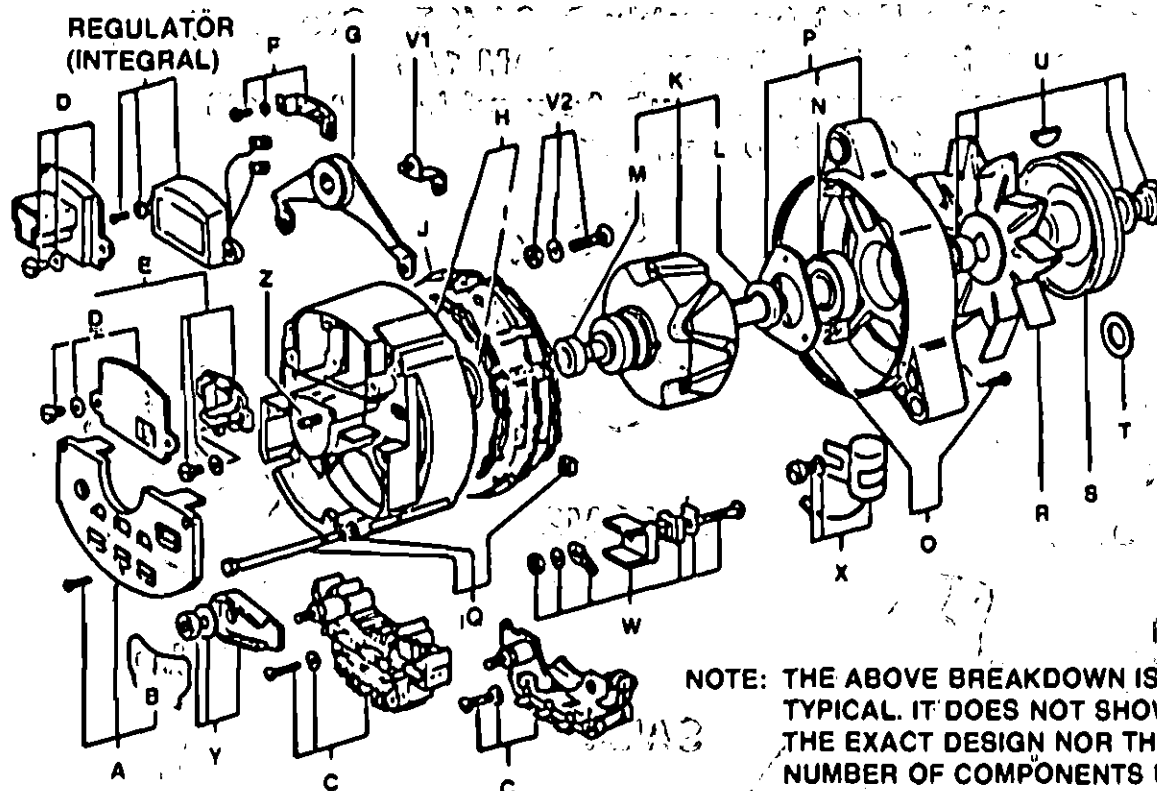
DURING 1987 A NEW CAV ALTERNATOR WILL BE INTRODUCED.
 THE LIST BELOW IDENTIFIES THE COMPONENT TO BE USED,
 COMPLETE ASSEMBLY IS D144L.

Part No.	Description	Qty
0B28	NUT HEX HEAD 5/16 x 1/8 CAD. PLATED	3
0C30	WASHER-FLAT T4 5/16 CAD. PLATED	3
0C31	WASHER-SPRING RECTANGULAR SECTION 5/16	6
0E201	SETSCREW HEX HEAD 5/16 x 1/8 x 3/4 CAD. PLATED	2
0E202	SETSCREW HEX HEAD 5/16 x 1/8 x 1 CAD. PLATED	1
0E204	BOLT HEX HEAD 5/16 x 1/8 x 1, 1/2 CAD. PLATED	1
0GE201C	CAP SCREW DIN 933 6 x 1.25 x 20 (5/16-20 x 3/4)	1
1E43	"U" BRACKET - SUIT 2E7 ALTERNATOR	1
2B209	V-BELT (8137-10888) printed "LEHMAN POWER 2B209"	1
2E208	SWITCH - OIL PRESSURE (2904-0330)	1
2E32	ALTERNATOR 70A/12V A127-70MT + PULLEY/SPACER (47020068)	1
2E405	ALTERNATOR LINK WIRE ASSEMBLY (GROUND)	1
2E482	BLOCKING DIODE - SUIT 2E32 (47130187)	1
2M19	ADJUSTING ARM - ALTERNATOR	1

CODE	KEY	QTY	PART No.	DESCRIPTION
M/N	1	1	2E7	ALTERNATOR 70 AMP
	2	1	2E208	OIL PRESSURE SWITCH
	3	1	2E450	BLOCKING DIODE
	4	1	OGE202	BOLT
	5	1	OGC32	LOCK WASHER
	6	1	OGC31	FLAT WASHER
	7	1	2M19	ADJUSTING BRACKET
	8	5	OC31	LOCK WASHER
	9	3	OB28	NUT
	10	1	OE204	BOLT
	11	1	OE202	BOLT
	12	2	OE201	BOLT
	13	2	OC30	FLAT WASHER
	14	1	1E43	PIVOT BRACKET
	15	1	2B209	V BELT
	16	1	2E448	LINE WIRE
	17	1	2E447	LINE WIRE
	18	1	2E452	LINE WIRE
	19	1	2E449	EARTH STRAP
	20	1	2E445	LINE WIRE
	21	1	2E446	LINE WIRE

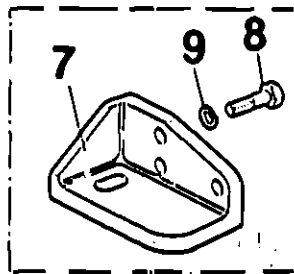
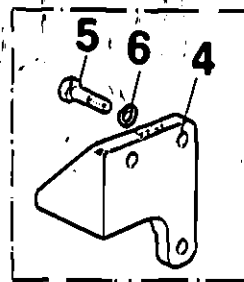
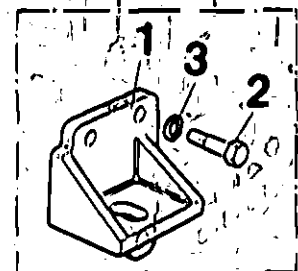
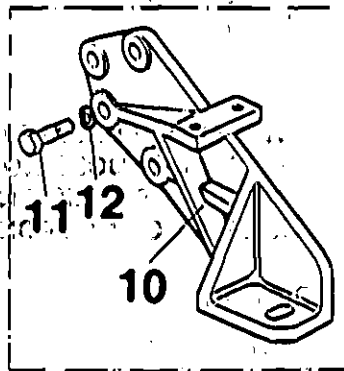
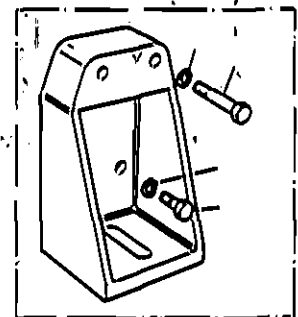
SUB ASSEMBLY SAA 1
 COMPRISING KEY
 4 - 14

SUB ASSEMBLY 2E405
 COMPRISING KEY
 16 - 21



CODE	KEY	PART No.	DESCRIPTION
		510-859	ALTERNATOR
		505-37	VOLTAGE REGULATOR
	A	514-139	REAR COVER
	B	-----	CONNECTOR CLIP
	C	501-43	BRIDGE ASSEMBLY
	D	-----	BRUSH COVER (ONLY)
	E	503-12	BRUSH HOLDER ASSEMBLY
	F	515-7	TERMINAL/BACKET
	G	-----	REAR FOOT
	H	514-212	REAR HOUSING ASSEMBLY
	I	511-4	BEARING RETAINER (ONLY)
	J	513-20	STATOR
	K	512-45	ROTOR ASSEMBLY
	L	NA	SPACER
	M	11-23	REAR BEARING
	N	11-21	FRONT BEARING
	O	511-11	BEARING RETAINER (ONLY)
	P	514-141	FRONT HOUSING ASSEMBLY
	Q	520-92	THROUGH BOLTS (4)
	R	507-55	FAN
	S	507-101	PULLEY
	T	-----	SPACER
	U	520-141	INSTALLATION KIT
	V	-----	GROUND TERMINAL ASSEMBLY
	W	520-100	INS. TERMINAL ASSEMBLY
	X	-----	CAPACITOR
	Y	-----	B+ INSULATOR
	Z	-----	STUD

**Engine Mounting Feet Assembly D661 (STD Stepped)
 Comprising Sub Assembly SAM 1/2/3/4
 D662 (In-Line) Comprising Sub Assembly SAM 3/4/5
 For SP90 and SP135**

**SAM3****SAM2****SAM1****SAM4****SAM5**

Sub Assembly Sam 1 Comprising Key 1-3

KEY	QTY	PART No.	DESCRIPTION
1	1	1B202	SUPPORT (LH) REAR
2	3	OE403	BOLT
3	3	OC51	LOCK WASHER

Sub Assembly Sam 2 Comprising Key 4-6

4	1	1B203	SUPPORT (RH) REAR
5	3	OE403	BOLT
8	3	OC51	LOCK WASHER

Sub Assembly Sam 3 Comprising Key 7-9

7	1	1B201	SUPPORT (RH) FRONT
8	3	OE403	BOLT
9	3	OC51	LOCK WASHER

Sub Assembly Sam 4 Comprising Key 10-12

10	1	1B93	SUPPORT (LH) FRONT
11	4	OE303C	BOLT
12	4	OC41	LOCK WASHER

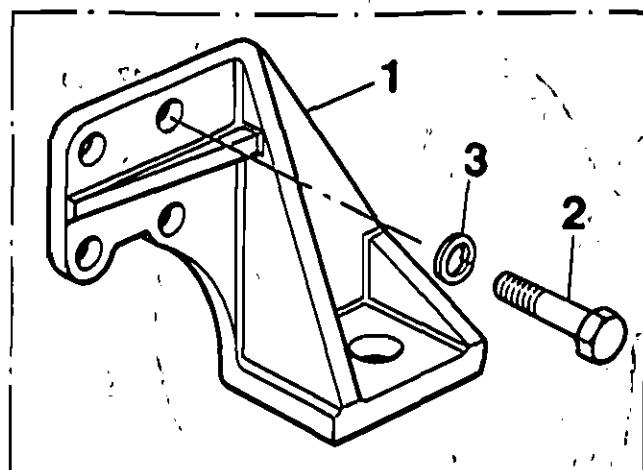
Sub Assembly Sam 5 Comprising Key 13-17

13	1	1B96	SUPPORT (LH) IN-LINE REAR
14	1	1B97	SUPPORT (RH) IN-LINE REAR
15	4	OE403	BOLT
16	4	OE412	BOLT
17	6	OC51	LOCK WASHER

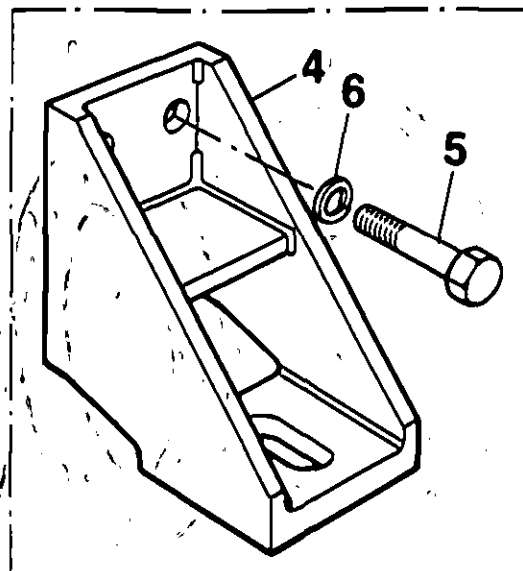
Engine Mounting Feet

For SP185 - 225 - 275

Fitted with



SAM6



SAM7

Sam 3A - See page C36 Illustration Sam 3

For IB201 substitute IB214 with larger slot

Sam 4A - See page C36 Illustration Sam 4

For IB93 substitute IB217 with larger slot

Sam 5A - See page C36 Illustration Sam 5

For IB96 & IB97 substitute IB216 + IB215 with larger slot.

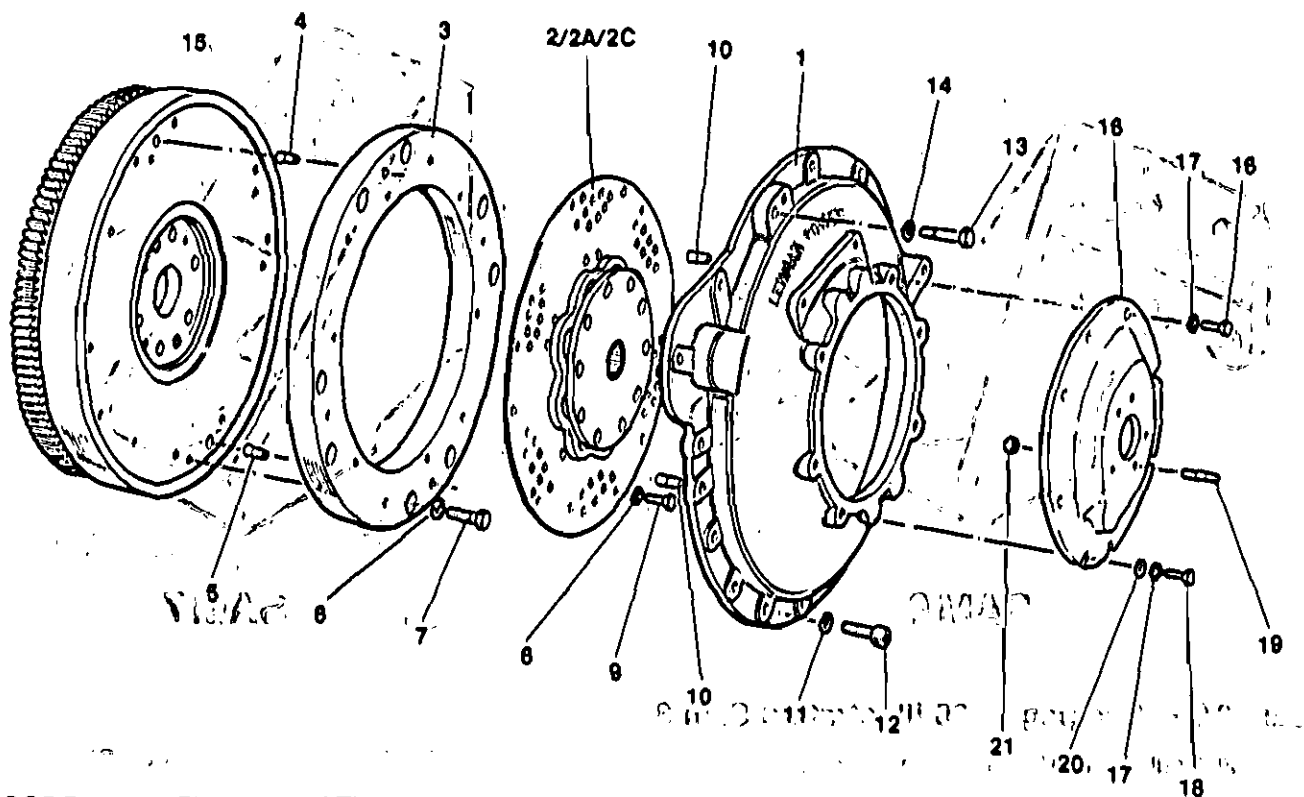
Sub Assembly Sam 6 Comprising Key 1-3

KEY	QTY	PART No.	DESCRIPTION
1	1	1B94/IB95	SUPPORT LH/RH INLINE REAR
2	4	OGE404	BOLT
3	4	OC81	LOCK WASHER

Sub Assembly Sam 7 (Warner 7000 only) comprising Key 4-6

4	1	1B206	SUPPORT
5	4	OE585	SOCKET HEAD CAP SCREW/BOLT
6	4	OC81	LOCK WASHER

Rear P.T.O Adaption Assembly D145W/D145 TD/D145A
Comprising Key 1-15 (Less 2A/2B) for D145W/D145TD
and Key 1-15 (Less 2/2B) for D145A and
Key 1-15 (Less 2/2A) for D145AT



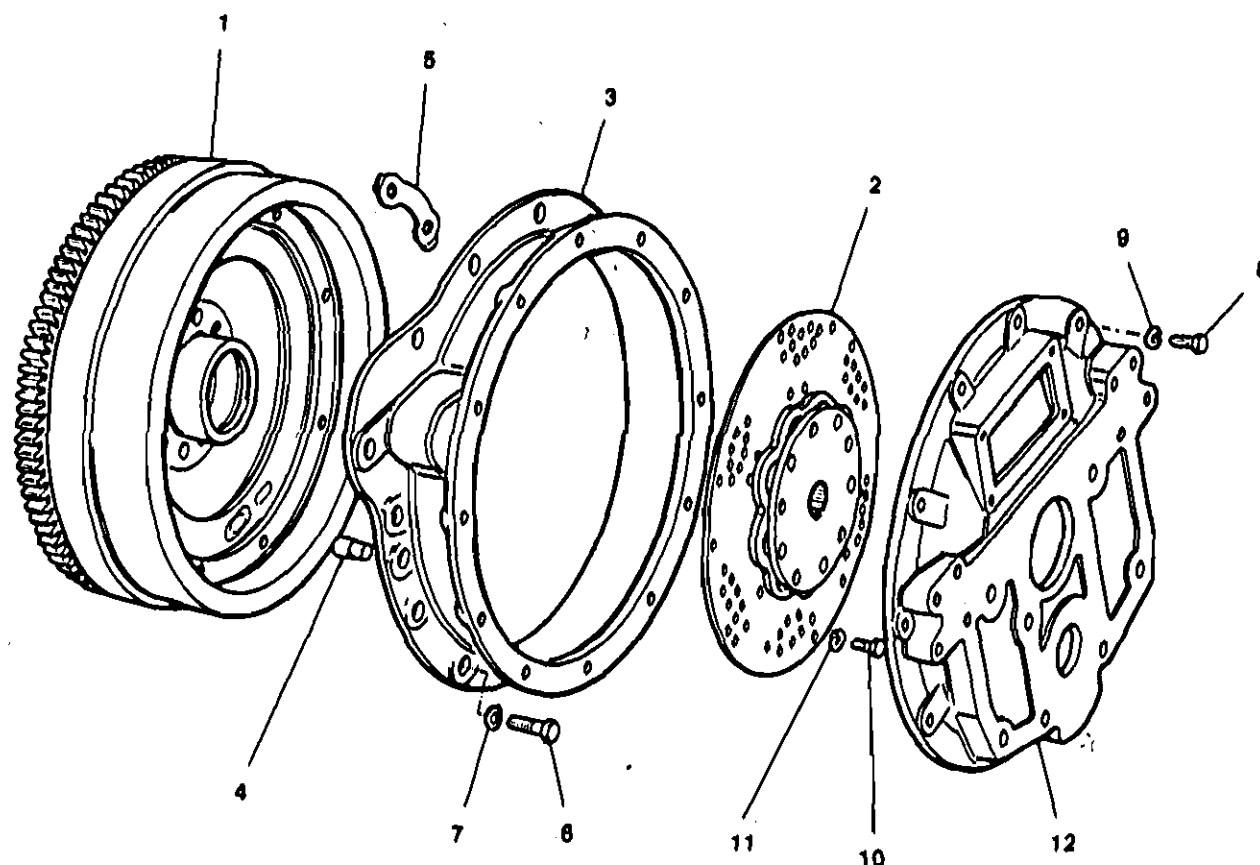
CODE	KEY	QTY	PART No.	DESCRIPTION
	1	1	1A392	FLYWHEEL HOUSING
	2	1	2L7	DAMPER PLATE (Borg Warner/Twin Disc 502)
	2A	1	2L12	DAMPER (PRM 310)
	2B	1	2L11	DAMPER PLATE (PRM 301/2VR/A/C-401/2VR/A)
	2C	1	2L7	DAMPER PLATE 401/2C
	3	1	1A408	FLYWHEEL INERTIA RING
	4	1	FP1484508	DOWEL
	5	1	FP1484507	DOWEL
	6	8	OC41	LOCK WASHER
	7	8	OE303	BOLT
	8	8	OC31	LOCK WASHER
	9	8	OE201C	BOLT
	10	2	2K207	DOWEL
	11	14	OC51	LOCK WASHER
	12	14	OE403	BOLT
	13	1	OE405	BOLT
	14	1	OC51	LOCK WASHER
	15	1	FP1483808	FLYWHEEL
	16	1	1A510	ADAPTOR PRM 401/2 & 301/2
	17	8	OC51	LOCK WASHER
	18	8	OE402	BOLT
	19	5	Part of 1A510 kit	STUD
	20	3	OC50	FLAT WASHER
	21	5	Part of 1A510 kit	NUT

NOTE:- D145W is for Borg Warner D145TD is for Twin Disc 502
D145A is for P.R.M. 310 D145AT is for P.R.M. 401

When Trans. Adaption Kit D145 are ordered, assembly D200 etc. are Included.

For Hurth adaption parts contact your Lehman dealer.

**Rear P.T.O Adaption Assembly D145ATH/D145 ATHD/D145TDAT
Comprising Key 1-12 for D145ATH/D145ATHD and
Key 1 - 14 (Less 2 & 12) for D145TDAT**

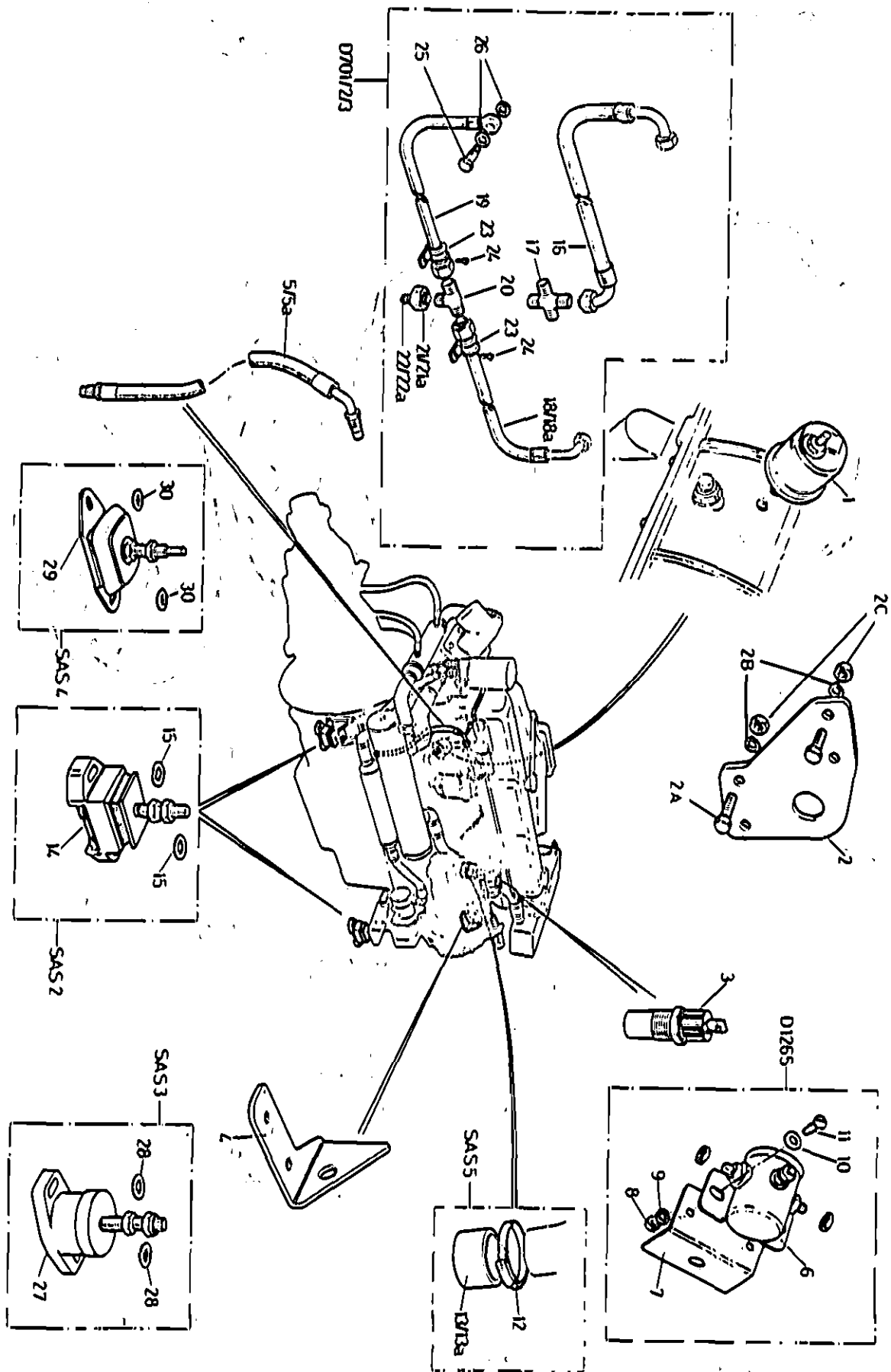


CODE	KEY	QTY	PART No.	DESCRIPTION
	1	1	FP1745234	FLYWHEEL
	2	1	2L13	DAMPER PLATE (PRM 601/601A)
	3	1	FP6129047	FLYWHEEL HOUSING
	4	2	2K207	DOWEL
	5	3	FP1798064	LOCK TABS
	6	15	0E403	BOLT
	7	15	0C51	LOCKWASHER
	8	12	0E302	BOLT
	9	12	0C41	LOCKWASHER
	10	8	0E300	BOLT
	11	8	0C41	LOCKWASHER
	12	1	1A513	APARTOR PLATE
	13	8	0E303	BOLT (not shown)
	14	8	0C41	LOCKWASHER (not shown)

NOTE:- D145ATH is for PRM 601
D145ATHD is for PRM 601A
D145TDAT is for Twin Disc MG508.

When Trans. Adaption Kit D145ATH/D145ATHD are ordered, assembly D200 is included.

When D145TDAT is ordered, assembly D202P is included.



SEE OVER

**Miscellaneous Sub Assembly
Comprising SAS1/SAS2/D700/D165
Plus Key 1/2/3/4/5/5A**

Sub Assembly SAS 1 Comprising Key 1-5A

CODE	KEY	QTY	PART No.	DESCRIPTION
ALL	1	1	EG302	OIL SWITCH
P/S/T	2	1	ID72	LIFTING EYE
	2A	2	0E303	BOLT
	2B	2	0C41	WASHER
	2C	2	0B35	NUT
	2D	2	0E302	BOLT
	3	1	EG403	TEMP SWITCH
	4	1	ID74	THROTTLE ADJUST BRACKET
M/N	5	1	3K776	FUEL HOSE
P/S/T	5A	1	3K791	FUEL HOSE

Sub Assembly D1265 Comprising Key 6-11

6	1	2E202	START SOLENOID
7	1	1D2	SOLENOID BRACKET
8	2	0B1	NUT
9	2	0C5	LOCK WASHER
10	2	0C10	FLAT WASHER
11	2	0A4	SCREW

Sub Assembly SAS 5 Comprising Key 12/13/13A

	12	1	3K12	CLAMP
M/N	13	1	3K831	BLANKING CAP
P/S/T	13A	1	3K827	BLANKING CAP

Sub Assembly SAS 2 Comprising Key 14/15

M/N	14	2/2	2M22 (560 lb) 2M32 (680 lb)	RESILIENT MOUNT
	15	6	0C82	FLAT WASHER
S/P/T	14B	4	2M33	RESILIENT MOUNT FRONT/REAR

Sub Assembly D701-M/D702-N/D703-P/S/T

P/S/T	16	1	3K882	FUEL SPILL HOSE
P/S/T	17	1	3F16	4 WAY TEE
M	18	1	3K884	FUEL SPILL HOSE
N/P/S/T	18A	1	3K883	FUEL SPILL HOSE
	19	1	3K861	FUEL SPILL HOSE
M/N	20	1	3F17	TEE ADAPTOR
M/N	21	1	3E174	COUPLING NUT
P/S/T	21A	1	3E173	COUPLING NUT
M/N	22	1	3C301	BARBED STEM
P/S/T	22A	1	3C300	BARBED STEM
	23	2	2M9	'P' CLIP
	24	2	0A10	SCREW
	25	1	1582134	BANJO BOLT
	28	2	6045558	WASHER

Sub Assembly SAS 3

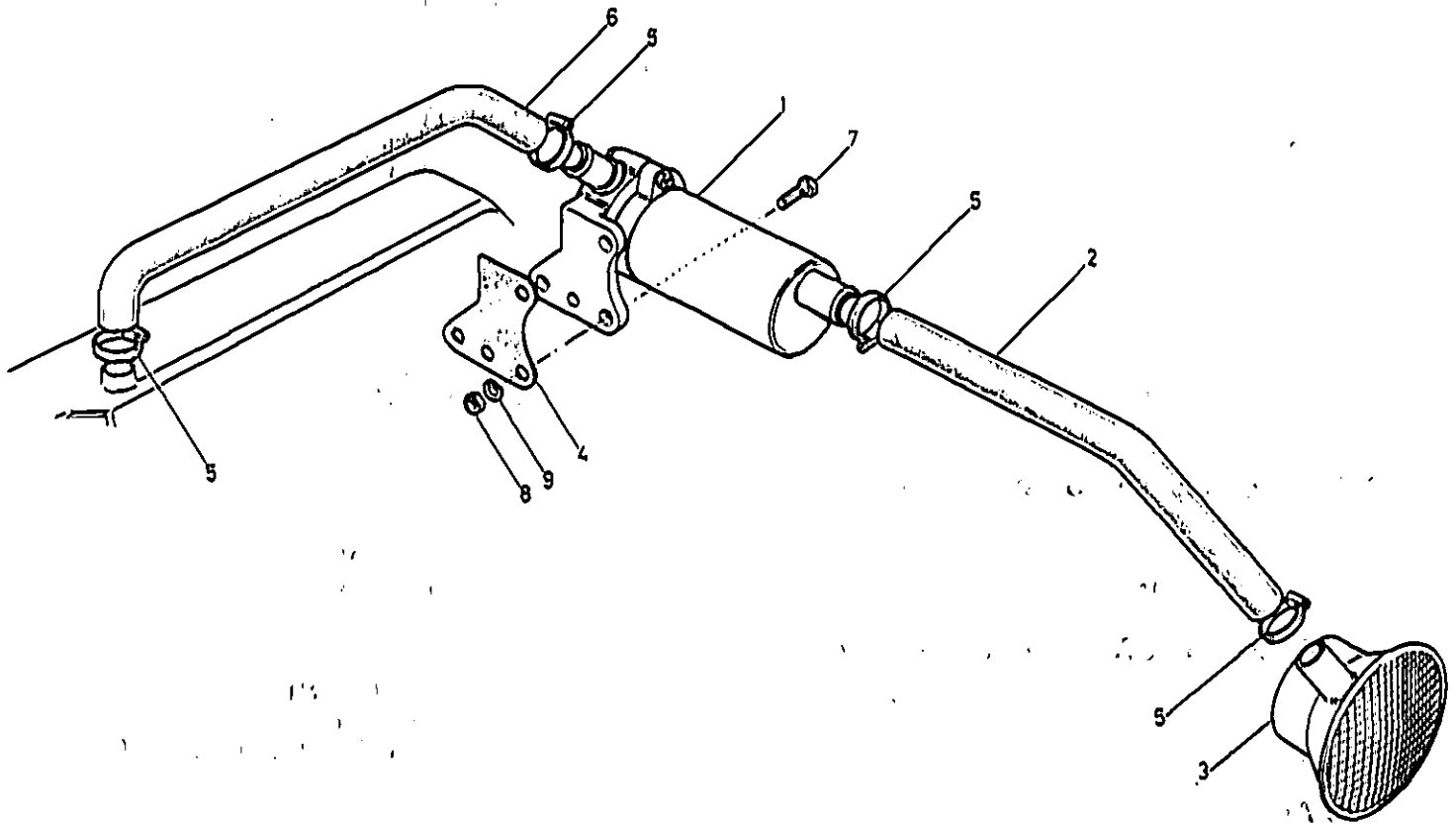
P/S/T	27	1	2M33	RESILIENT MOUNT
	28	2	0C80	WASHER

Sub Assembly SAS 4

SILTALA	29	1	2M35	RESILIENT MOUNT
ONLY	30	2	0C82	WASHER

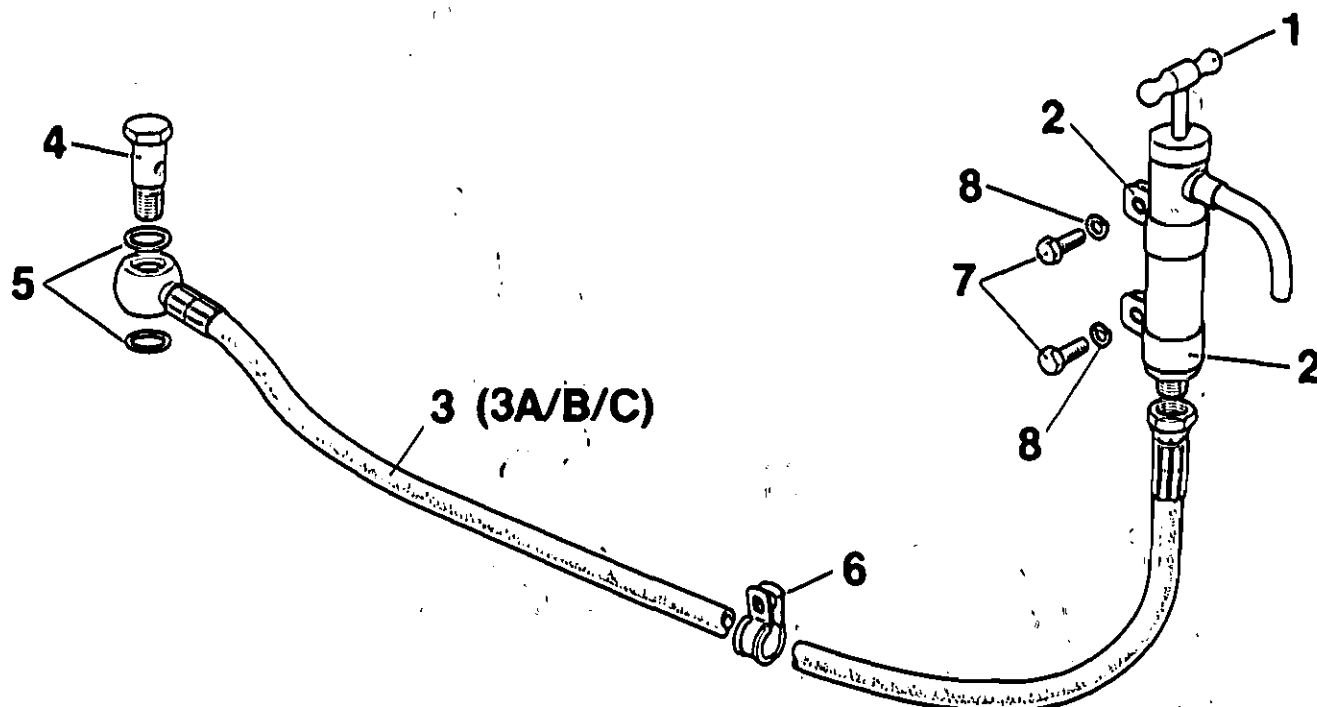
NOTE:- ENGINE 'D' ASSEMBLY CODES AS FOLLOWS SP80-M SP135-N SP185-S SP225-P SP275-T

**Crankcase Gas Scrubber
Assembly D1150
Comprising Key 1-9
SP185 / 225 / 275**



CODE	KEY	QTY	PART No.	DESCRIPTION
P/S/T	1	1	2H79	GAS SCRUBBER
	2	1	3K217	HOSE
	3	1	IF15	AIR HORN
	4	1	IC57	GASKET
	5	4	3K14	CLAMP
	6	1	3K216	HOSE
	7	3	OE202	BOLT
	8	3	OB30	NUT
	9	3	OC31	LOCK WASHER

Sump Drain Pump Assembly D186 Engine Mounted RH/LH Comprising Key 1 - 8



CODE	KEY	QTY	PART No.	DESCRIPTION
	1	1	2C22	HAND PUMP
	2	2	1D97	BRACKET
N/P/S/T	3	1	3K770	HOSE ASSEMBLY (RH) 1.2m.
M/	3A	1	3K771	HOSE ASSEMBLY (RH) .95m.
M/N	3B	1	3K763	HOSE ASSEMBLY (LH) 1.2m
P/S/T	3C	1	3K769	HOSE ASSEMBLY (LH) 1.5m.
	4	1	3E863	BANJO BOLT
	5	2	OGC50	WASHER
	6	1	3K25	CLIP
	7	2	OE300	BOLT
	8	2	OC41	LOCKWASHER

NOTE:- ENGINE ASSEMBLY KEY CODES AS FOLLOWS

D186A - R/H MTD to suit M

D186B - L/H MTD to suit M/N

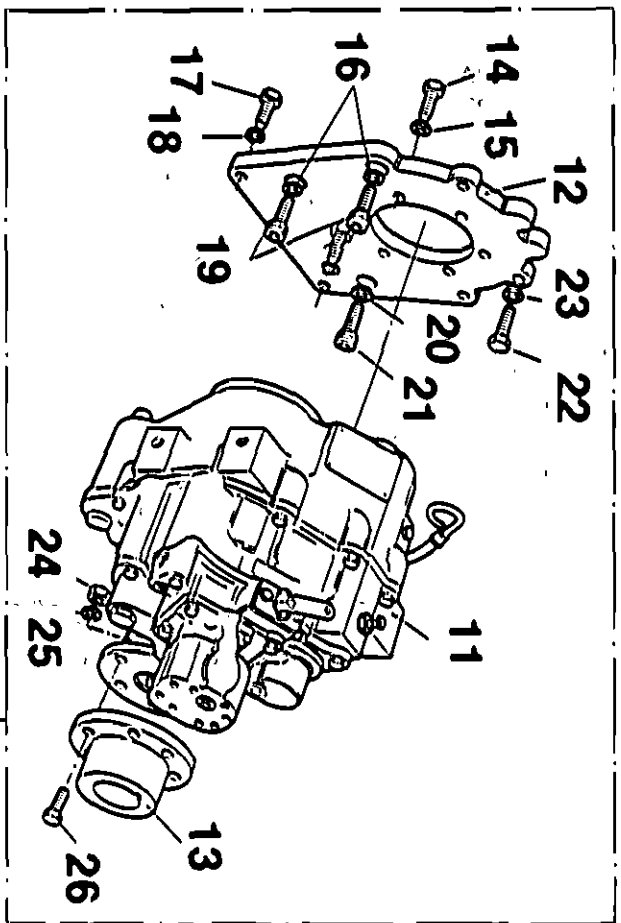
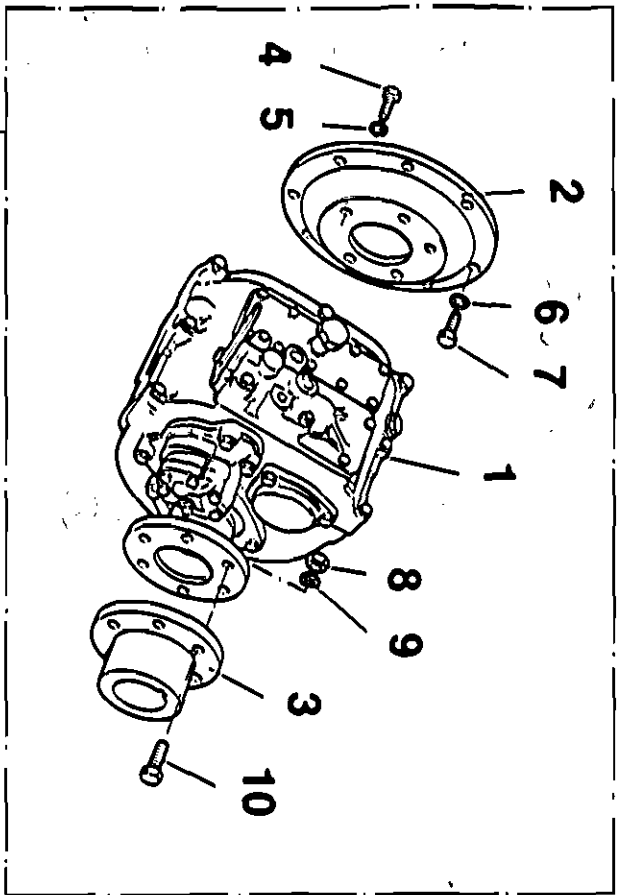
D186C - R/H MTD to suit N/P/S/T

D186D - L/H MTD to suit P/S/T

D187 - SUMP DRAIN PUMP ASSEMBLY + REMOTE MOUNT 6' 6" (2 meters)

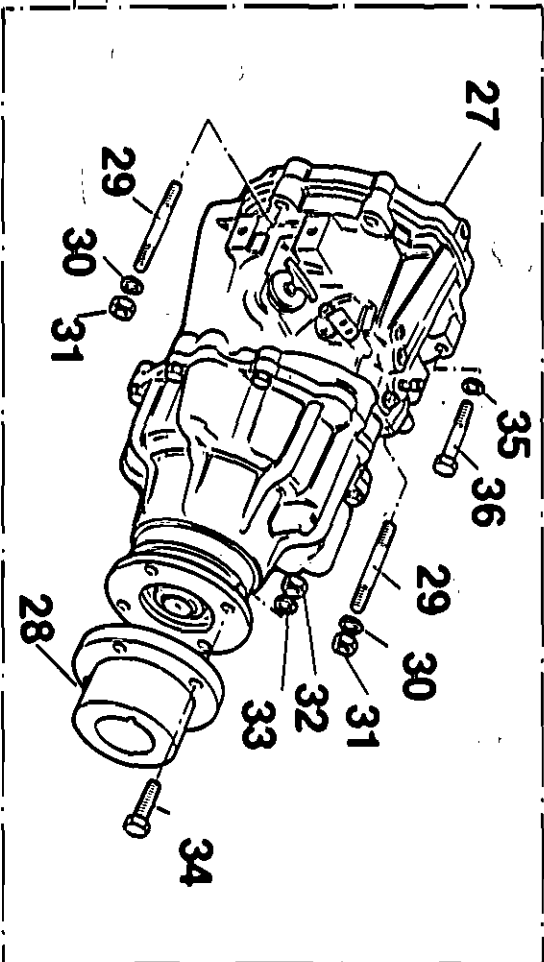
D1496 Water Heater Connection Kit Comprising Key 1-4 All Engines

CODE	KEY	QTY	PART No.	DESCRIPTION
	1	1	D1496.A	WATER HEATER CONNECTION KIT
	2	2	3G24	HOSE BARB
	3	2	3F498	ADAPTOR
	4	2	3F12	TEE
	5	1	3J2	PETCOCK



D173/D174

D72/D162



D502

Typical Transmission Assemblies

1. PRM (401 Shown)

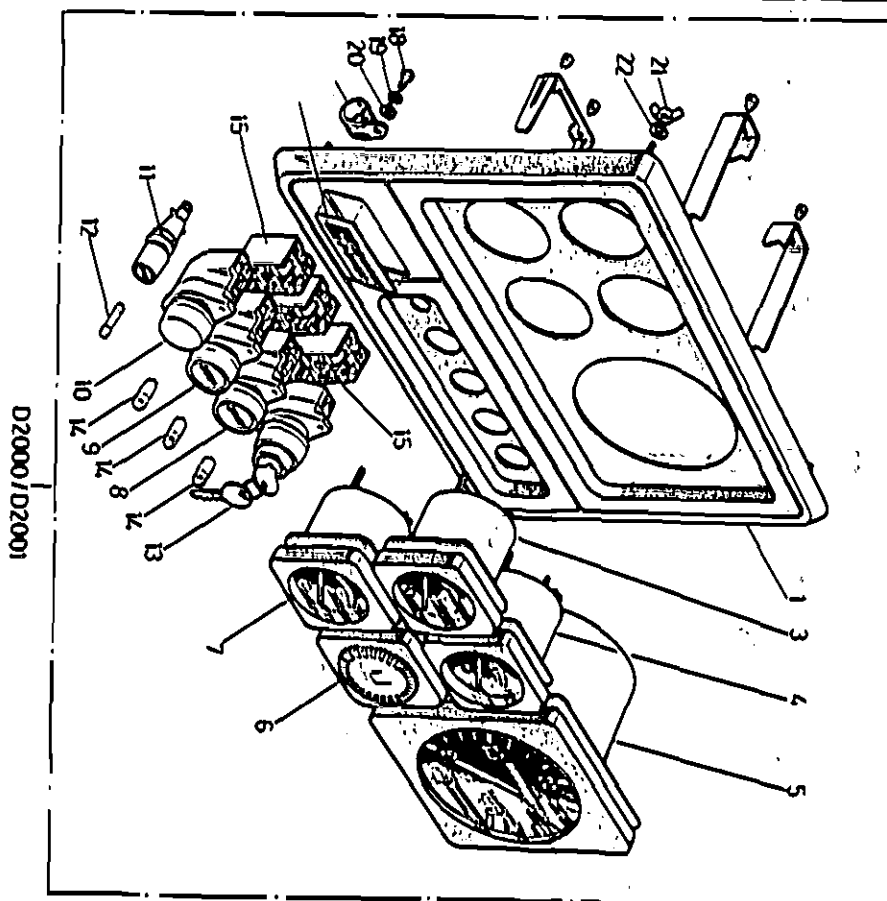
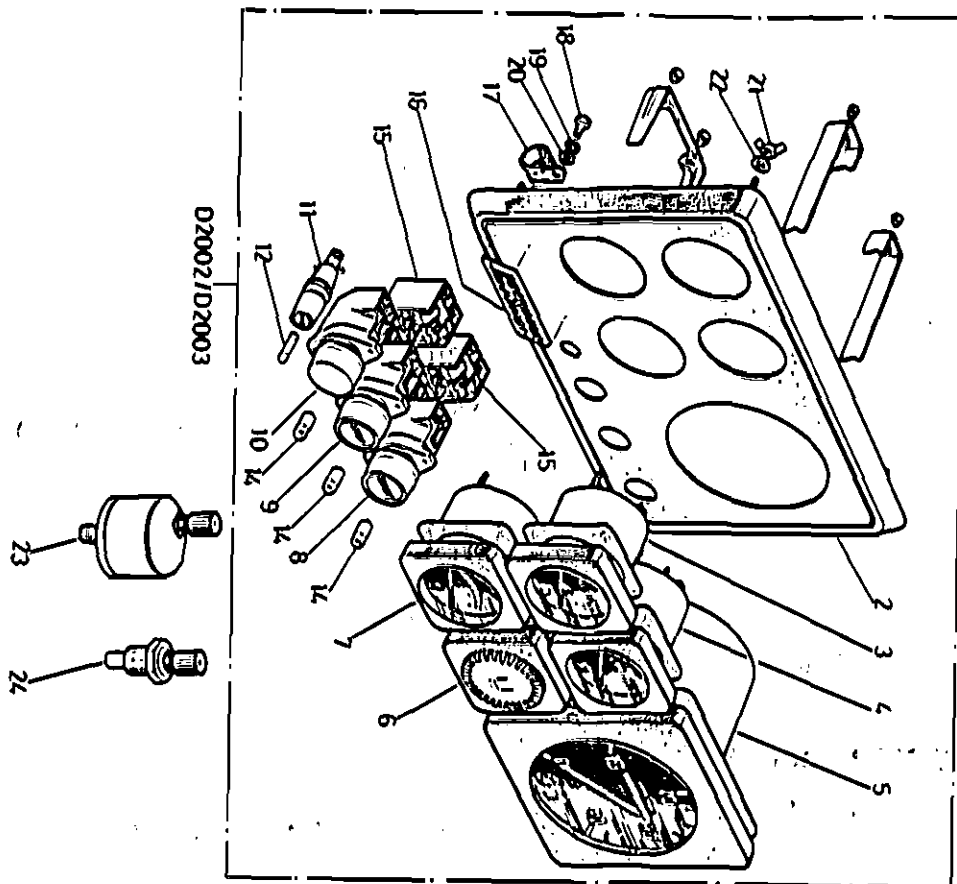
KEY	QTY	PART No.	DESCRIPTION
2	1	1A510	ADAPTOR
3	1	2L69	HALF COUPLING (pilot bore - others available)
4	5	OGE403	BOLT
5	5	OGC43	LOCK WASHER
6	6	OC51	LOCK WASHER
7	8	OE402	BOLT
8	6	OB60	NUT PLAIN
9	8	OC61	LOCK WASHER
10	6	OE505	BOLT

2. TWIN DISC (MG502 Shown)

12	1	1A511	ADAPTOR
13	1	2C752	HALF COUPLING (pilot bore - others available)
14	8	OE404	BOLT
15	6	OC51	LOCK WASHER
16	2	OC51	LOCK WASHER
17	2	OE404	BOLT
18	2	OC51	LOCK WASHER
19	2	OE431	SOCKET CAP SCREW
20	1	OC51	LOCK WASHER
21	1	OE431	SOCKET CAP SCREW
22	3	OE404	BOLT
23	3	OC51	LOCK WASHER
24	6	OB48	NUT
25	6	OC51	LOCK WASHER
26	6	OE404	BOLT

3. BORG WARNER (CR2 Shown)

28	1	4886	HALF COUPLING (pilot bore - others available)
29	2	OD25	STUD
30	2	OC51	LOCK WASHER
31	2	OB45	NUT
32	4	OB46	NUT
33	4	OC51	LOCK WASHER
34	4	OE404	BOLT
35	4	OC51	LOCK WASHER
36	4	OE409	BOLT



Instrument Assembly 12 Volt Comprising Panel Sub Assembly

D2000 BOTTOM STATION (LH)
D2001 BOTTOM STATION (RH)
D2002 TOP STATION (LH)
D2003 TOP STATION (RH)

KEY	QTY	PART No.	DESCRIPTION
1	1	2F15 (AS DRAWN)	PANEL (BOTTOM LH)
1A	1	2F16	PANEL (BOTTOM RH)
2	1	2F17 (AS DRAWN)	PANEL (TOP LH)
2A	1	2F18	PANEL (TOP RH)
3	1	2F407	TEMPERATURE RANGE
4	1	2F428	OIL PRESSURE GAUGE
5	1	2F115	TACHOMETER
6	1	2E503	ALARM BUZZER
7	1	2F445	VOLTMETER
8	1	2E711	START BUTTON
9	1	2E710	STOP BUTTON
10	1	2F802	WARNING LAMP
11	1	2E810	FUSE HOLDER
12	1	2E811	FUSE 10 AMP
13	1	2E712	KEY SWITCH
14	3	2F804	BULB
15	3	2E713	CONTACT BLOCK
16	1	4D15	BADGE
17	1	2M9	'P' CLIP
18	1	OA4	SCREW
19	1	OC5	LOCKWASHER
20	1	OC10	FLATWASHER
21	4	OB18	WING NUT
22	4	OC20	FLATWASHER

Instrument Kit Single Engine / Single Station Comprising D2000 / Key 23/24/25 Single Engine / Dual Station Comprising D2000 / D2002 / Key 23A / 24A / 25

23	1	2F429	SENDER OIL
23A	1	2F435	SENDER OIL
24	1	2F700	SENDER WATER
24A	1	EG488	SENDER WATER
25	1	E1600	RELAY

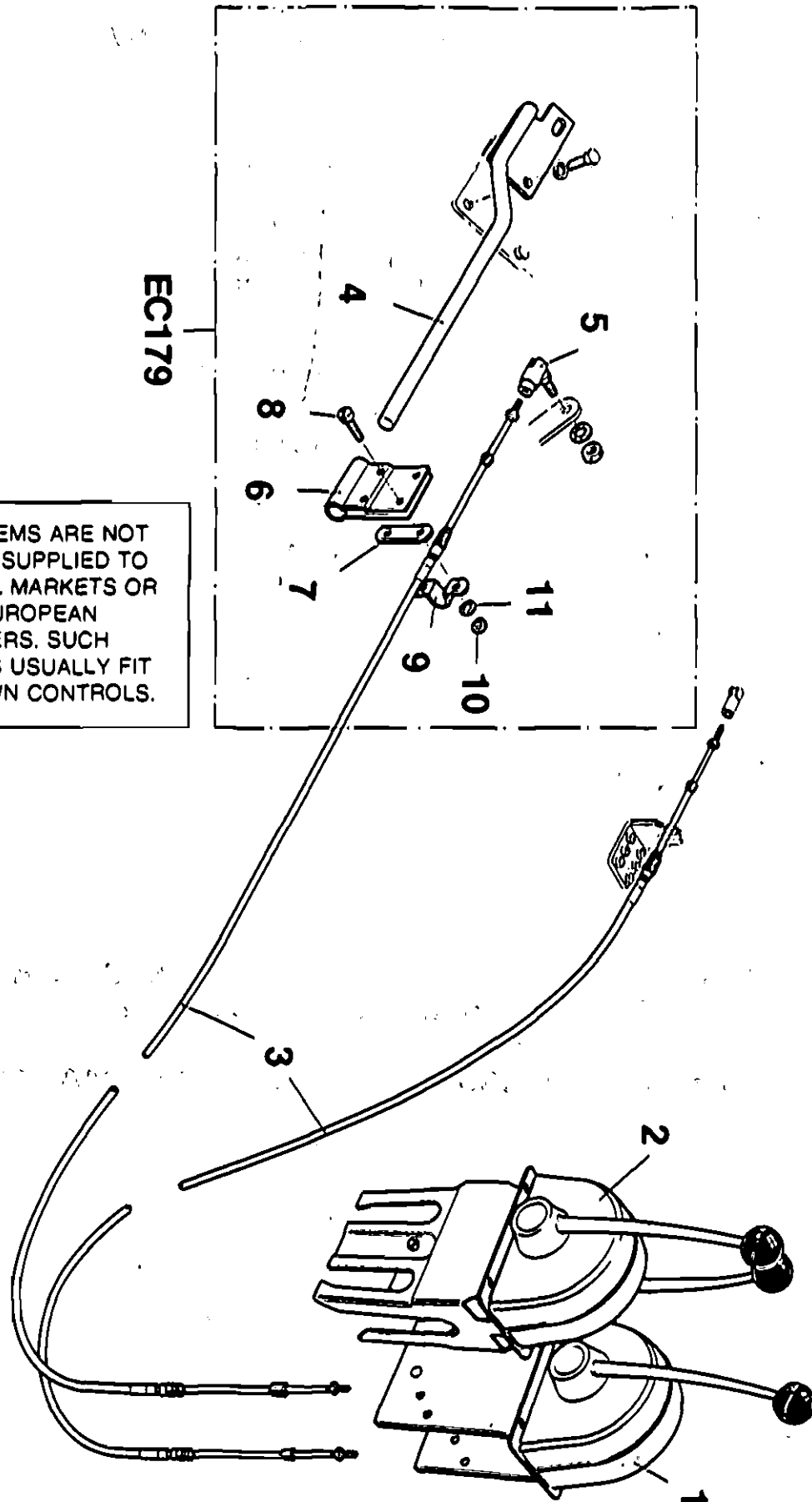
TO SHOW RELATIONSHIP OF INDIVIDUAL PANEL NUMBERS TO GROUPS OF PANELS ON BOATS, THE FOLLOWING TABLE WILL PROVIDE A GUIDE - USING 12 VOLT NUMBERS.

EK100A - SINGLE ENGINE/SINGLE STATION - D2000.
EK120A - TWIN ENGINE/SINGLE STATION - D2000 + D2001.
EK110A - SINGLE ENGINE/DUAL STATION - D2000 + D2002.
EK130A - TWIN ENGINE/DUAL STATION - D2000 + D2001 + D2002 + D2003.

CHANGE IN FINAL DIGIT FROM 0 TO 1 INDICATES 24 VOLT
THUS EK101A IS SINGLE ENGINE/SINGLE STATION 24 VOLT

EC179

N.B. THESE ITEMS ARE NOT
USUALLY SUPPLIED TO
ORIENTAL MARKETS OR
LARGE EUROPEAN
CUSTOMERS. SUCH
BUILDERS USUALLY FIT
THEIR OWN CONTROLS.



**Engine / Transmission Control Assembly
Comprising Sub Assembly EC 171/EC 179/EC 871
Plus Key 1-3**

KEY	QTY	PART No.	DESCRIPTION
1	1	EC23	SINGLE LEVER CONTROL (SINGLE ENGINE)
		EC20	DUAL CONTROL
		EC38	DUAL CONTROL
3	2/4	EC3313	CONTROL CABLE 4 MT
CUSTOMER	2/4	EC3320	CONTROL CABLE 8 MT
SELECTION	2/4	EC3330	CONTROL CABLE 9 MT

Sub Assembly EC 179 (PRM 310/401) Comprising Key 4-11

4	1	207636	BRACKET
5	1	214459	BALL JOINT
6	1	201031	CLAMP BRACKET
7	1	201040	SHIM
8	2	50112-561	SCREW
9	1	201039	CLAMP
10	2	50900-075	NUT
11	2	50803-058	WASHER

NOTE:- Sub Assembly EC 171 (Borg Warner)
and EC 871 (Twion Disc 502)
are not shown but similar parts to EC 179 are used if twin engine installation is called for
1 off Key 2 and 4 off Key 3 required if single engine installation is called for 1 off Key 1 and
2 off Key 3 required

Manuals, Parts Lists, etc

PART No.	DESCRIPTION
4C90	FORD ENGINE REBUILDING (SHOP) MANUAL Volume 1
4C90A	FORD ENGINE MANUAL Volume 2 (Electrical)
4C90B	FORD ENGINE MANUAL Volume 3 (Fuel Injection Equip)
4C70	PARAGON P30 & P40 SERIES (LEHMAN 155 & 156)
4C71	WARNER 71 (LEHMAN 71) TRANSMISSION ONLY
4C73	WARNER 73 (LEHMAN 73) TRANSMISSION (DIRECT DRIVE & REDUCTION)
4C74	WARNER 1.5 REDUCTIONS ONLY
4C75	WARNER 1.9 REDUCTIONS ONLY
4C76	WARNER 2.1 REDUCTIONS ONLY
4C77	WARNER 2.5 & 2.9 REDUCTIONS ONLY
4C78	WARNER VEE DRIVE (ALL RATIOS)
4C79	WARNER DROP CENTER (LEHMAN) 161 & 162) TRANSMISSION & REDUCTIONS
4C80	WARNER GENERAL INSTALLATION MANUAL

OTHER TRANSMISSION MANUALS MAY BE OBTAINED FROM LEHMAN.