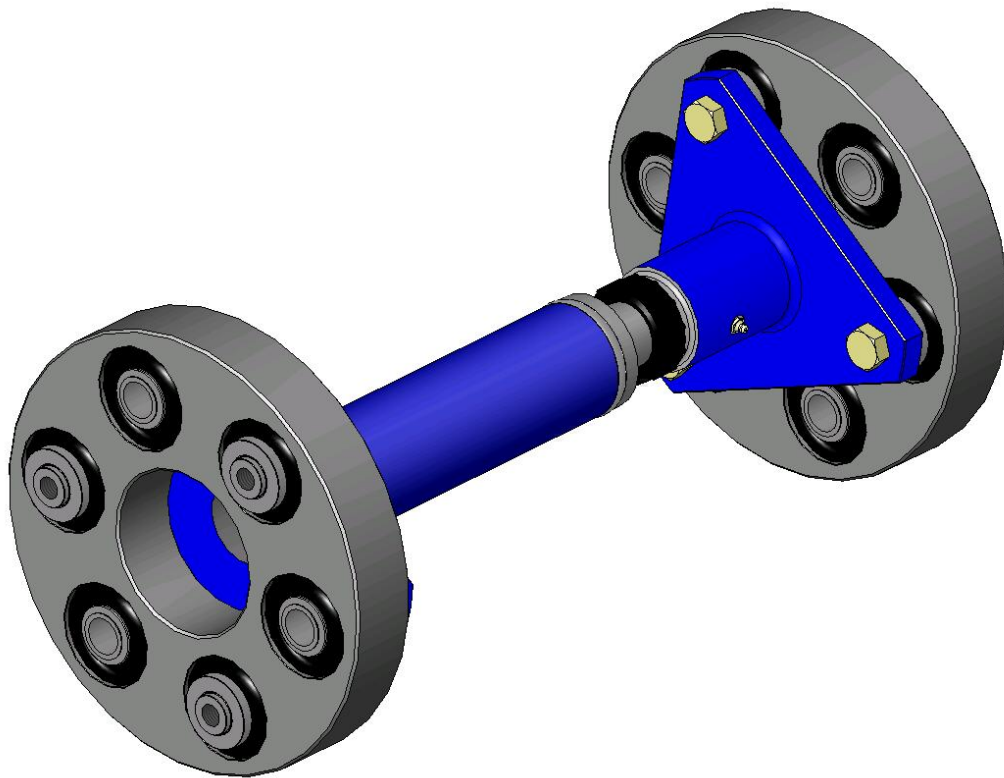




**Assembly and Fitting
Instructions for
Layrub
Telescopic Shafts**

M1378



Layrub Telescopic Shaft Assembly

Introduction

Layrub couplings have been used in the power transmission industry for over 60 years.

Industrial uses are wide and varied. They included Railways, Trams, Buses, Marine Propulsion, Auxiliary Drives, Earth Moving Equipment, Aero Industry, Steel Works, Oil Refineries, Mining, Automotive, Offshore Exploration, Engine Testing, Cooling Towers, Power Generation and Cement Works.

They provide a connection between a driving and driven machine which absorbs shock loads, reduces noise, operates in hostile environments, can accept high levels of misalignment and is very cost effective.

For engine drive applications they provide damping and are particularly suitable for the control of torsional vibration.

Some applications for layrub shafts include, Ball Mill Crushers, Pumps, Fans, Compressors, Generators, Alternators, Turbines, Cranes, Conveyors, Rolling mills, Dynamometers, Mixers, Winches and Lifts.

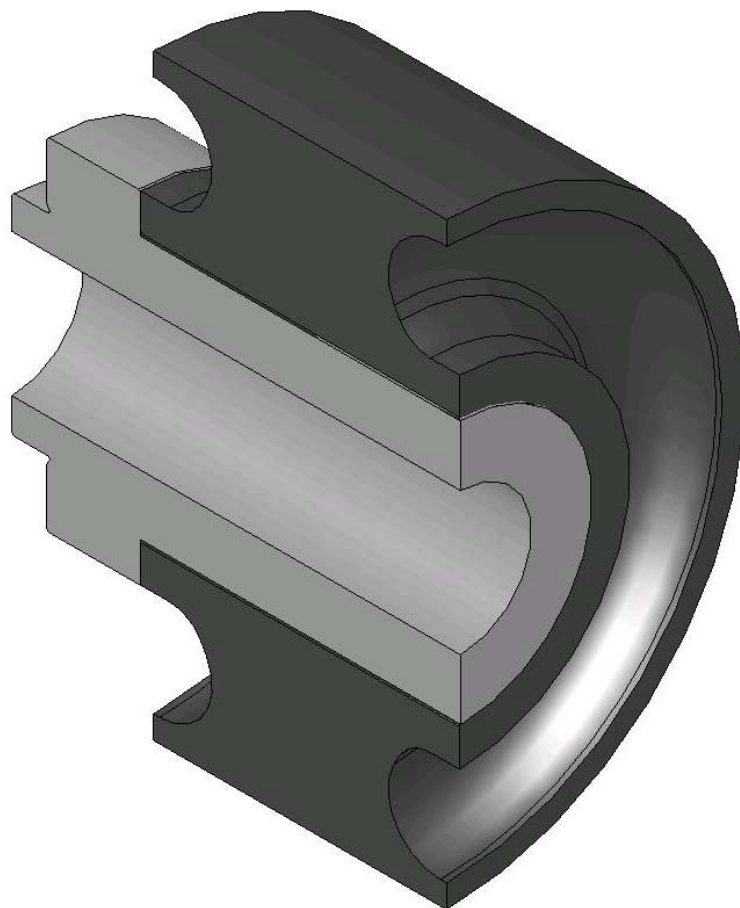
Layrub Principle (The Layrub Block)

The bore of the resilient block is reinforced by a high tensile steel wire screen formed from wire cloth wound tightly round a mandrel and secured by cold soldering. The screen is located in the mould and vulcanised under pressure causing the rubber to penetrate the wire screen and form a secure bond. The canvas bonded to the outside diameter of the resilient block is to preserve dimensional stability only.

The composition of the rubber is of special mix having low heat build up characteristics to cater with the rapid deformations encountered in service.

For attachment to suitable driving flanges, steel sleeves are pressed into the screen of the resilient block. The sleeves are shouldered, with spigots to suit mating counter bores in the flange, and the whole being finally clamped by a bolt and nut.

THE LAYRUB BLOCK



TYPE OF LAYRUB COUPLINGS

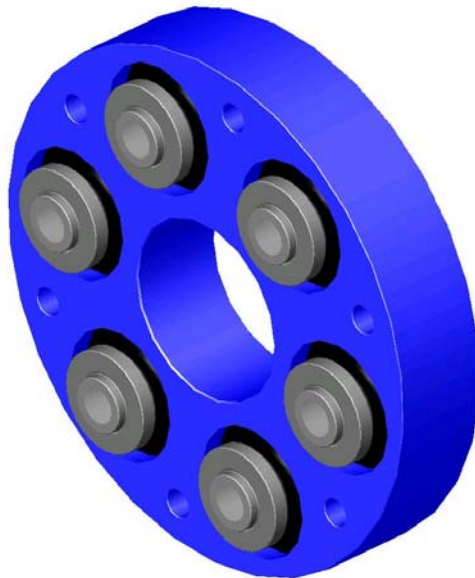
The Layrub coupling is produced in various types and sizes, each type being specially designed to fulfil a particular combination of operating conditions, all the couplings have resilient blocks exactly as previously described.



Two - Four Series



Three - Six Series



Six - Six Series

Installation/Alignment

Note

Before assembly ensure that all components are clean and that all spigot locations are free from burrs.

Bolt Tightness

Due to the torque loading on the coupling the high tensile steel bolt and nut clamping the sleeve to the flange is in tension and the correct tightening of these bolts is essential. Any slackness will result in worn sleeve spigots, or flange counter bores, and possible damage to the rubber blocks.

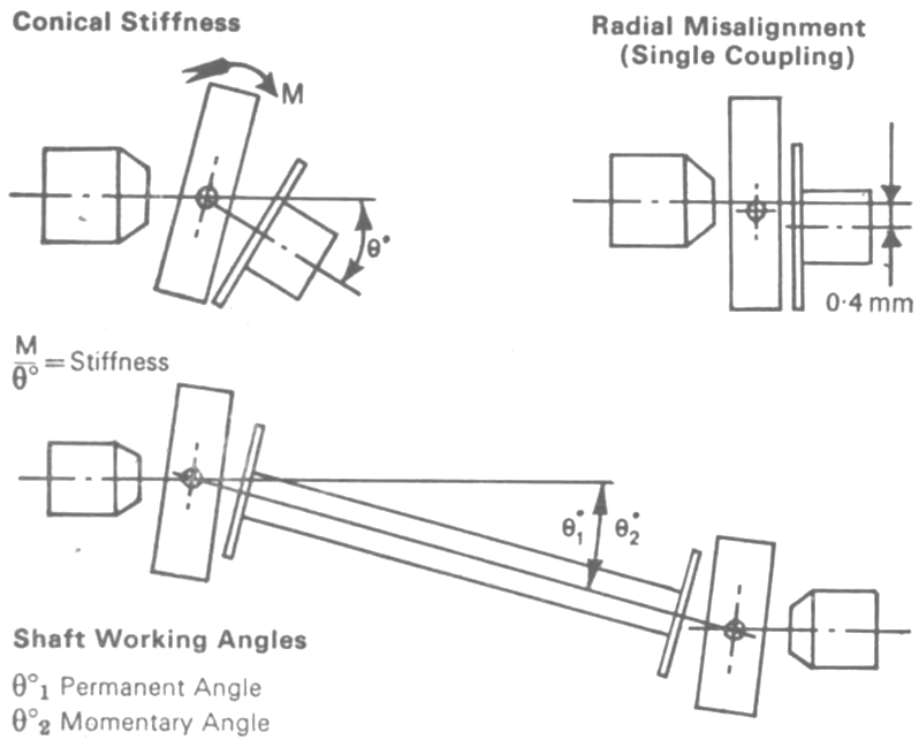
Firstly, however, examine the sleeve faces (which abut the flange) for burrs and remove with flat file. Tightening up with a burred sleeve will result in a loose bolt. The correct tightening procedure is to draw up the nut with a torque spanner and achieve the following torque figures.

Recommended Torques for Layrub Sleeve Bolts and Nuts

Bolt Dia mm	Torque Nm
M5	5.7
M6	9.6
M8	23
M10	46
M12	81
M14	130
M16	200
M18	280
M20	392
M22	540
M24	677
M30	1370
M36	2400

Maximum Misalignment For Layrub Couplings

The recommended limit of angular misalignment is influenced by the maximum speed. It should also be remembered that large misalignments could produce unacceptable bearing loads and vibration.



Two – Four Series					
Size	Angle		Extension or Compression (mm)		Radial Misalignment per coupling (mm)
	Continuous	Momentary	Continuous	Momentary	
40	2°	5°	1.2	3.2	0.3
50	3.5°	8°	1.6	4.0	0.3
60+	3.5°	8°	2.4	6.4	0.4
65	3.5°	8°	2.4	6.4	0.4
70	3.5°	8°	2.4	6.4	0.4
70+	3.5°	8°	2.4	3.2	0.4
80	3.5°	8°	3.2	7.9	0.5
80+	3.5°	8°	3.2	3.9	0.5
90	3.5°	8°	3.2	7.9	0.5
100	3.5°	8°	3.2	7.9	0.6
105	3.5°	8°	4.0	9.5	0.6
120	3.5°	8°	4.0	9.5	0.6

Three - Six Series					
Size	Angle		Extension or Compression (mm)		Radial Misalignment per coupling (mm)
	Continuous	Momentary	Continuous	Momentary	
70	2.5°	6°	2.4	6.4	0.3
80	2.5°	6°	3.2	7.9	0.4
90	2.5°	6°	3.2	7.9	0.4
100	2.0°	5°	3.2	7.9	0.5
120	2.5°	6°	3.2	7.9	0.5
140	2.5°	6°	3.2	7.9	0.6

Six - Six Series					
Size	Angle		Extension or Compression (mm)		Radial Misalignment per coupling (mm)
	Continuous	Momentary	Continuous	Momentary	
40	1°	2°	0.6	1.6	0.13
50	1°	2°	0.8	2.0	0.13
60+	1°	2°	1.2	3.2	0.15
65	1°	2°	1.2	3.2	0.15
70	1°	2°	1.2	3.2	0.15
70+	1°	2°	1.2	3.2	0.15
80	1°	2°	1.6	4.0	0.18
80+	1°	2°	1.6	4.0	0.18
90	1°	2°	1.6	4.0	0.20
100	1°	2°	1.6	4.0	0.25
120	1°	2°	2.0	4.8	0.25
140	1°	2°	2.0	4.8	0.30

Multi-Point					
Size	Angle		Extension or Compression (mm)		Radial Misalignment per coupling (mm)
	Continuous	Momentary	Continuous	Momentary	
120 8/8	0.75°	1.5°	2.0	4.75	0.25
140 8/8	1.0°	2.0°	2.0	4.75	0.30
140 9/9	1.0°	2.0°	2.0	4.75	0.30
140 10/10	0.75°	1.5°	2.0	4.75	0.30
140 12/12	0.75 °	1.5°	2.0	4.75	0.30

Fitting Of Shaft

1. Withdraw male splined shaft from female shaft taking care not to damage the rubber seal. Ensure internal and external splines are clean. Coat splines with a liberal quantity of good quality Lithium/Molybdenum based grease. We suggest the use of:-

**CASTROL SPHEEROL LMM
OR
MOLYKOTE LONGTERM 2 PLUS**

2. Re assemble the telescopic shaft, taking care not to damage the rubber seal. Ensure that balancing arrows are in line and that all flange faces are clean. Fully compress shaft assembly and sling on suitable block and tackle.
3. Ensure mating faces on Layrub coupling and companion flange are clean, lift shaft into position. Locate the Layrub coupling in the companion flange, fit the nuts and bolts tighten to torque figures given (see page 4).

Removal

1. Support shaft by block and tackle.
2. Remove the nuts and bolts, which connect the couplings to the flanges. Do not remove the bolts holding the couplings to the intermediate shaft.
3. Remove shaft assembly from flanges by use of a suitable sharp lever between the housing/flanges.
4. Compress shaft and remove.

Inspection

When shutdowns are in progress a routine inspection of the Layrub coupling should be made. Visually examine for signs of bolt slackness but since the block is the only wearing part, inspection of this item is the only essential.

The difference between cracks and creases may at first prove a little difficult to distinguish but a coupling can be condemned prematurely because of a wrong assumption.

The resilient block is fitted into the housing bore under compression and the added torque load further compresses the drive side of the block. In consequence the profile of the rubber creases similar to a fold in the human skin. A crack on the other hand penetrates the body of the rubber and may after further development cause damage to the coupling. With a suspected crack therefore use a blunt tool (e.g. small screwdriver) to probe the area and ascertain the extent of the flaw. Cracks, which penetrate below the surface of the rubber, indicate that the coupling should be replaced. Examine the bonding of the screen to the rubber and if failure at this point is apparent, new block and sleeves should be fitted.

High operating temperatures may cause the rubber profile to develop numerous hairlike cracks giving a crazy surface. This is of no consequence unless the rubber surface has become hard and brittle, in which case the rubbers should be renewed.

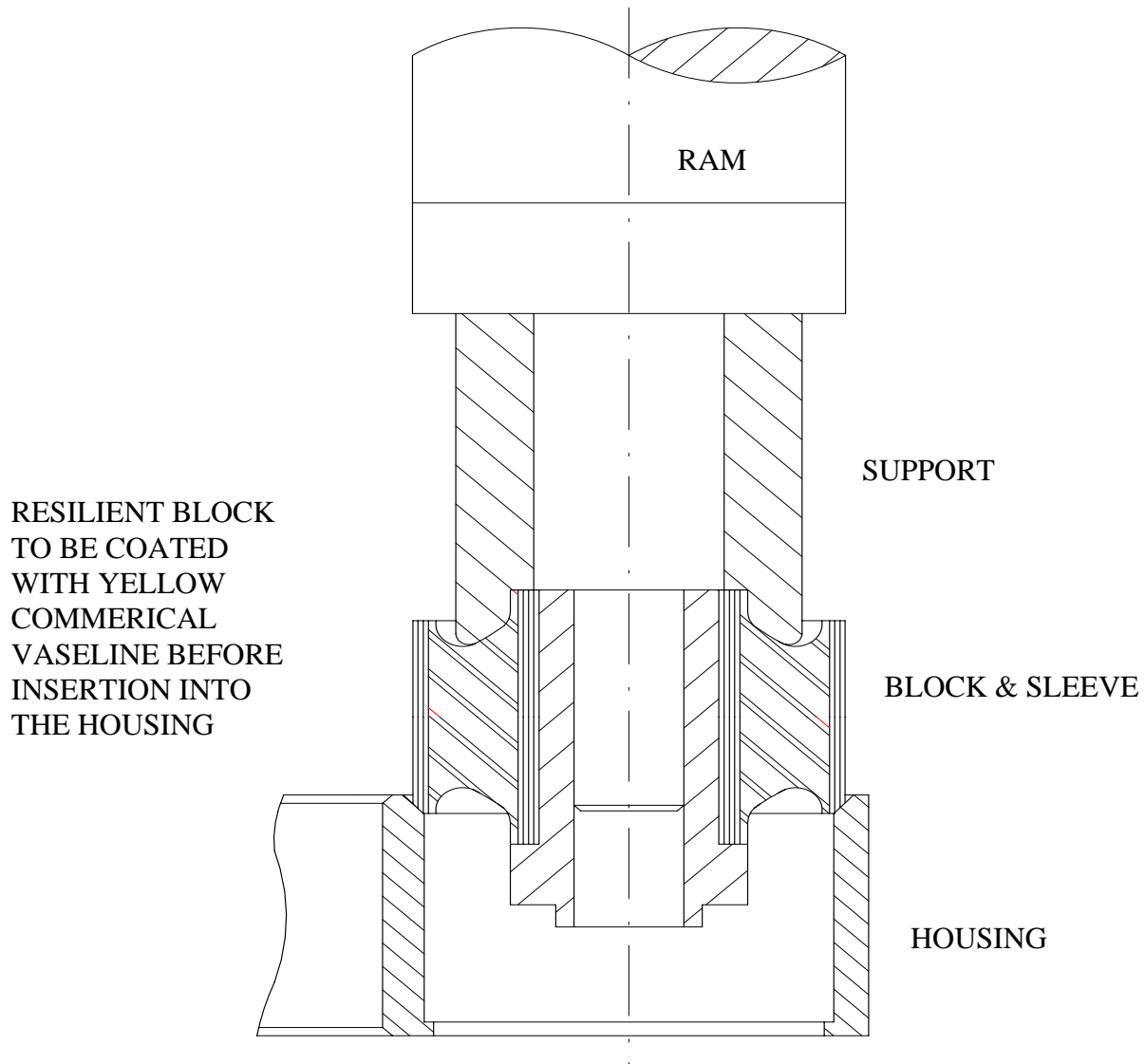
Examination of a coupling on the bench is best carried out by inserting a bar into the sleeve and levering the block slightly off centre to work the profile of the rubber.

Replacement of Block and Sleeve Assemblies

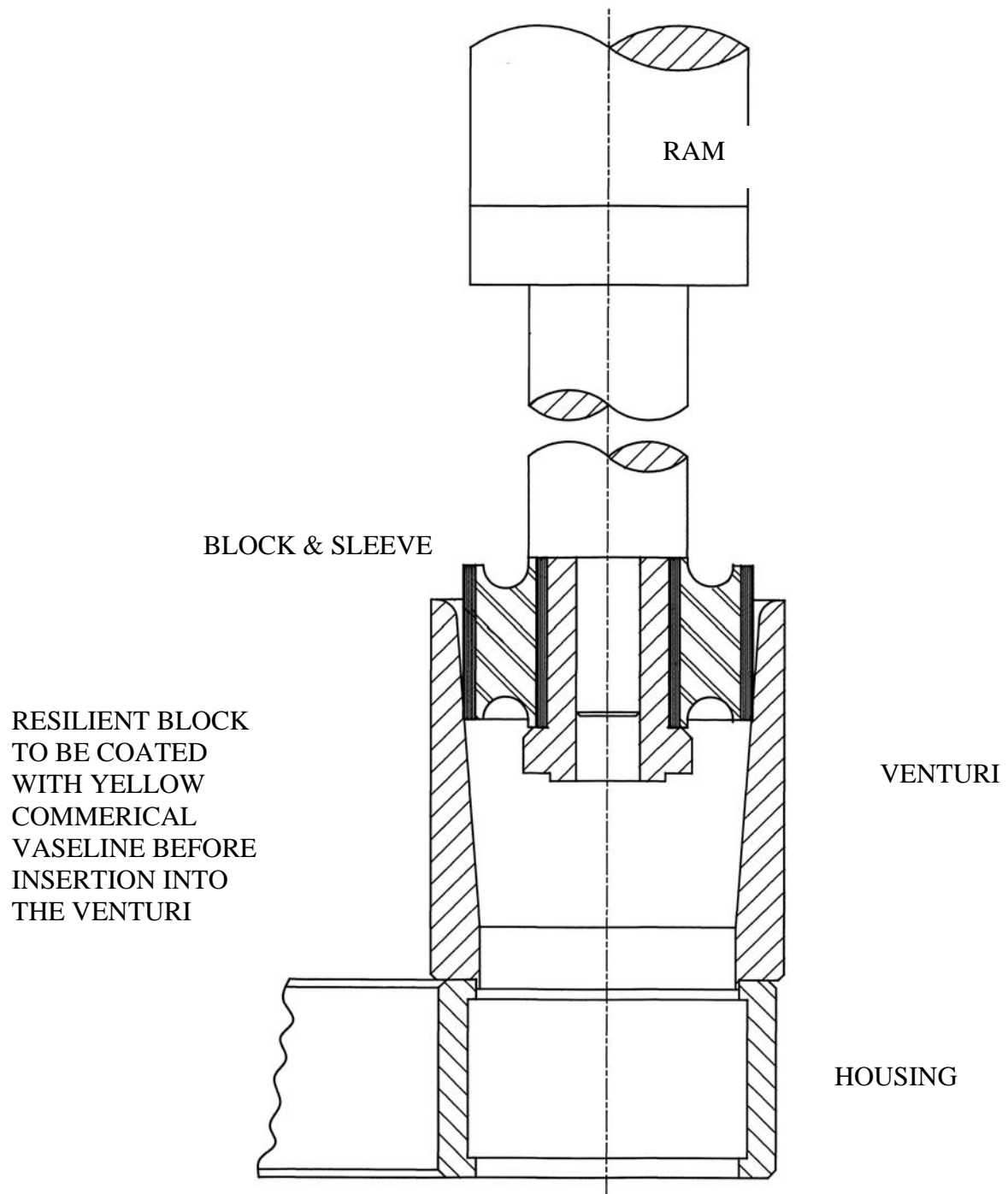
An exchange repair service operates in Great Britain and in some overseas territories but where such a scheme is impracticable, the servicing procedure for Layrub couplings is as follows:-

1. Remove the damaged block and sleeve assemblies from the housing by hand or hydraulic press.
2. Ensure that the housings pockets are thoroughly clean and free from all burrs.
3. Locate the new block and sleeve as shown in the assembly drawing (see sheets 9 & 10) and coat the outer diameter with a liberal quantity of commercial vaseline.

Assembly of Resilient Block and Sleeves Into the 6/6 and Multi-Point Housings



Assembly of Resilient Block and Sleeves Into the 3/6 Housing



Note

ON NO ACCOUNT SHOULD GREASE BE USED AS A MEANS OF LUBRICATION.

4. Ensure that the housing is square to the ram of the press and check that the block and sleeve assembly is square in the housing pocket.
5. Insert block and sleeve assemblies into the housing pockets.
6. After assembly check the squareness of the sleeve relative to the pocket. All sleeve faces should be in line and parallel to each other.

The couplings can be installed immediately after servicing, using the assembly methods already outlined.

Maintenance

1. Every 6 months (or planned maintenance)
 - (a) Check that rubber seal on the Telescopic shaft is in good condition and is not leaking grease.
 - (b) Carry out visual inspection of rubber blocks checking for signs of fatigue.

Note

Providing that good alignment is maintained then the rubber blocks will last for an indefinite period of time. Lubrication of the spline will only be necessary if the seal has become damaged.

On no account should attempts be made to replace individual Layrub blocks. If the blocks fail then they must be replaced as a complete set of block and sleeve assemblies.

Troubleshooting

Vibration.

Check condition of rubbers.

Check alignment.

Check concentricity of companion flanges and engine mounting.

Check holding down bolts on gearbox and engine mounting.

Check wear on spline shaft.

Noise

Check guard rubbing

Check condition of rubbers

Check wear on spline shaft

Rubber Block Failure

Check alignment

Note

Intermediate shafts should be ordered as complete assemblies and not individual items.