JACKALL JACKING SYSTEM

MAINTENANCE AND SERVICE

By DENYS H. SESSIONS

OF the several types of jack and jacking system fitted both as standard and as optional equipment to the car of to-day, it may generally be said that in the event of trouble the simplest and wisest course for the repairman is to return the faulty unit under the respective manufacturer's scheme for advance service. This is not so, however, in the case of the Jackall inbuilt jacking system, and the following remarks are intended to serve as a guide to the repairman who is presented with the problem of a quick cure and who receives little more by way of assistance from the customer than the somewhat vague statement : " My jacks won't work ! "

The System Explained

In the first place an understanding of the system is essential. Operated on the hydraulic principle, the Jackall system consists of three main components : the Fluid reservoir, the Distributor and Pump, and the jacks. Connecting these there is a system of piping, and by virtue of the fact that part of the system is mounted on the frame and coachwork and part on the axles, some form of flexible connection must form a part of the piping arrangements.

Operation of the pump by means of the operating handle has the effect of transferring fluid from the fluid reservoir to the jacks under pressure. The jacks are thereby extended, and being rigidly attached to the car axles they have the effect of lifting the car upwards until the full extent of their travel is reached.

By means of the distributor it is possible to transfer fluid to all the jacks or to only front or rear, as may be desired.

To lower the car it is necessary only to open a release valve which allows the fluid to escape from the jacks back into the fluid reservoir. When the weight of the car is off the jacks these continue to retract owing to the internal return springs fitted.

Operation

To operate the Jackall system, it is necessary first to procure the handle, which may be clipped to the bulkhead beneath the bonnet, under the fascia, or in the tool-box. The pump and distributor unit may

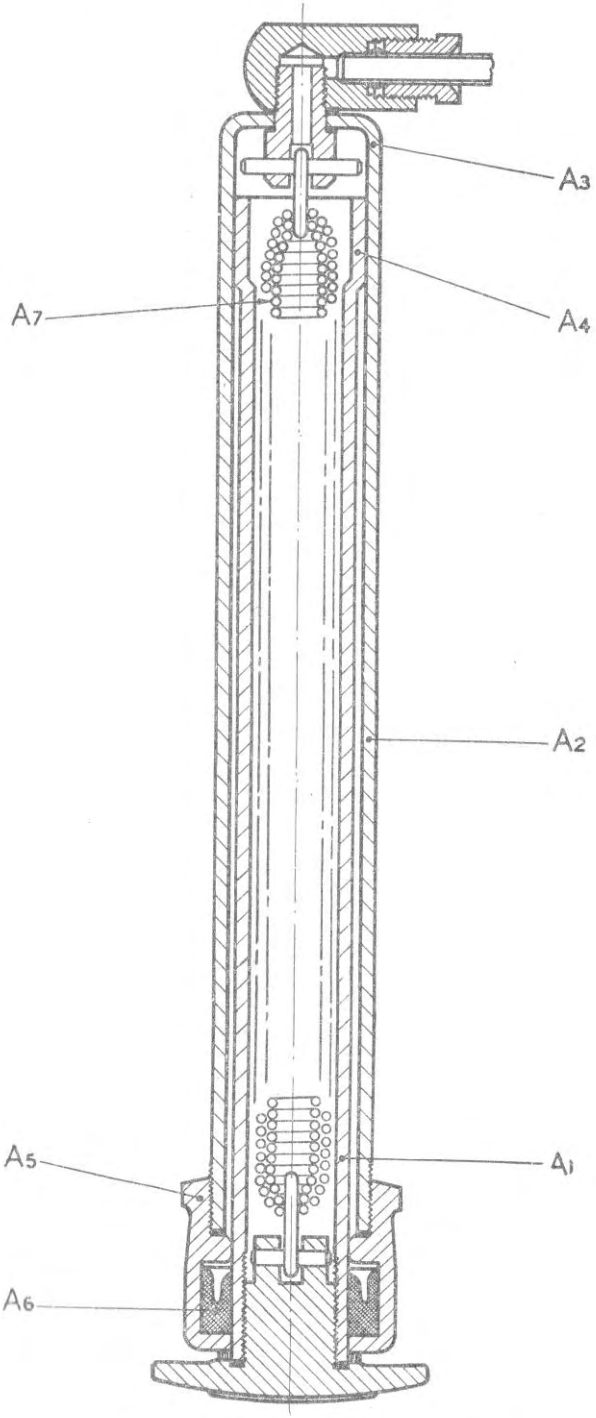

Fig. 1.—SECTION THROUGH THE JACK
(*Smith's Jacking Systems, Ltd.*)

be fitted under the bonnet or, as in most cases, under the floorboards beneath or in front of the passenger's seat, in which event the floor covering should be rolled back to expose the trapdoor covering the unit. The handle should be applied to the spigot identified with a *D* on Fig. 2, and worked to and fro. Before the pump is effective, however, it is necessary first to close the release valve by screwing down the bakelite knob (*P*) and to select "front," "rear," or "all" jacks by moving the selector (*Q*) to the required position.

The operator will know that the respective valves are closed correctly as soon as he starts to oscillate the pump handle. If everything is correctly set, a slight resistance will be felt on the handle, which will slightly increase as the jacks make contact with the ground, and a very greatly increased resistance will be felt when full extension of the jacks has been reached.

At this stage, of course, there is no further object in continuing to pump, but a pressure-relief valve is incorporated in the system so that no harm can result if the operator should for any reason endeavour to continue pumping after this stage. To lower the car, it is necessary only to unscrew the bakelite release-valve knob (*P*) one complete turn, when the car will drop to the ground and the jacks will automatically return into their housings. The suddenness with which the car is lowered depends, of course, on the sudden or gradual unscrewing of the release valve.

Important

When the system is out of use make sure that the release valve is open (i.e. unscrewed in an anti-clockwise direction at least one turn). When

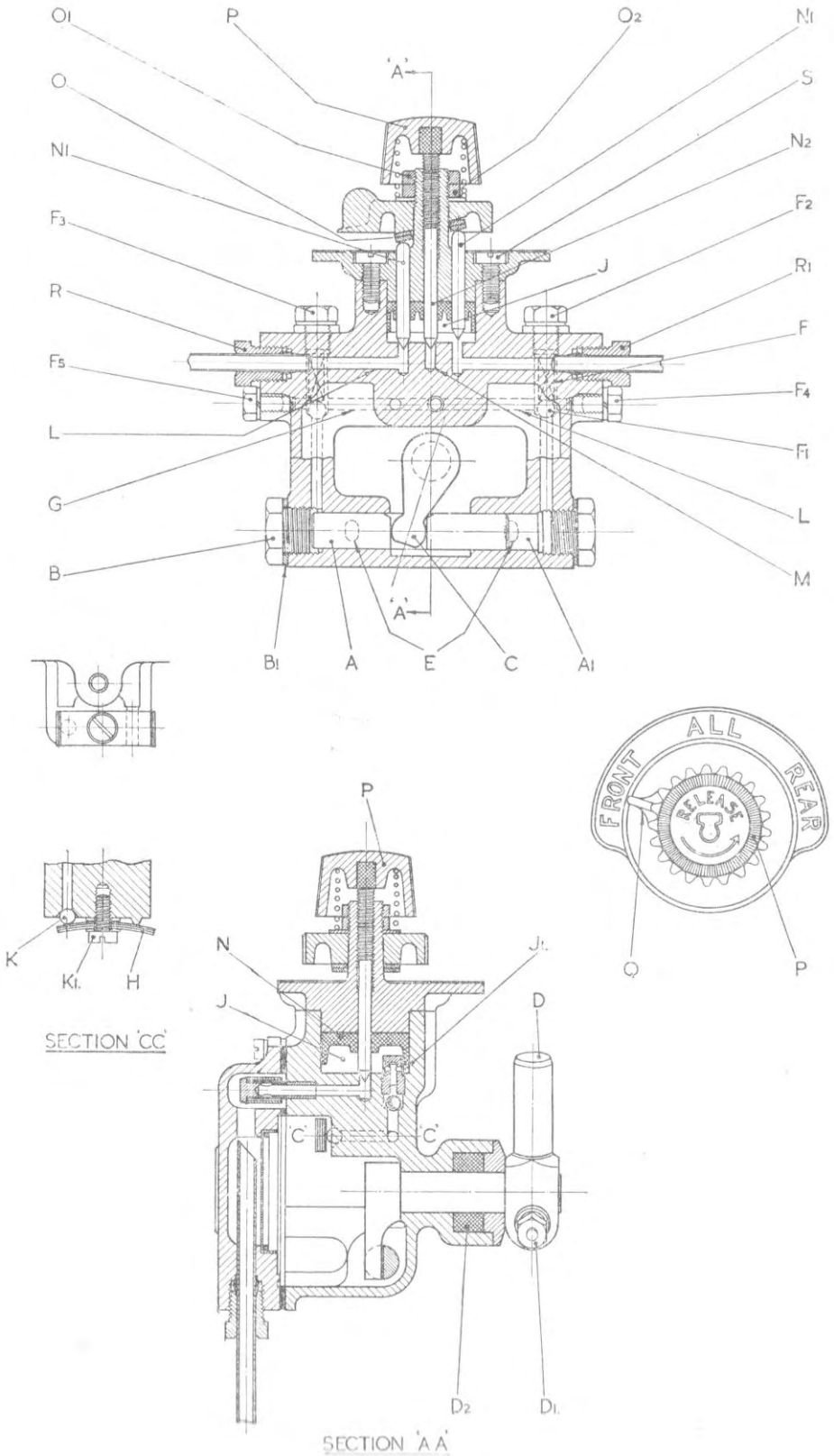

Fig. 2.—DISTRIBUTOR AND PUMP UNIT

" topping up " the fluid reservoir make sure that all the jacks are fully retracted, and fill up only to the mark on the reservoir.

Use only Jackall Fluid

This is imperative, as almost any other fluid will have disastrous effects on the rubber parts of the system and a complete strip down will be necessary. In addition, the use of any other fluid automatically cancels the manufacturer's guarantee.

If it is desired to leave the car for some while with the weight off the tyres, it is advisable to jack up and then lower the axles on to suitable props (one or two bricks will do). Do not leave the car jacked up longer than is necessary, as the pipe lines and joints are subject to considerable pressure when the system is in use.

Finally, make sure that the system is operated at least once a month. This will ensure that the fluid is kept in good condition and the parts well lubricated. No further attention should be required other than an occasional " top up " with Jackall fluid.

The Distributor and Pump Unit

The distributor and pump unit (*see* Fig. 2) consists of a special-alloy casting in which a double-acting plunger (*A*) oscillates in the cylinder (*A*1) and is ground to a perfect fit. It should be noted that no packing is used on the plunger. At the extremity of each cylinder there is a cylinder end cap (*B*) sealed with a copper washer (*B*1). A forged crank lever (*C*), which drives the plunger to and fro, is fitted with a lever (*D*) on to which the operating handle fits. This lever is keyed on to the crank spindle by a special chrome-nickel steel cotter, and it should be borne in mind that replacement of this part with an ordinary cycle cotter is not satisfactory.

Oscillation of the pump plunger alternately uncovers the ports (*E*), through which fluid is sucked from the supply tank, and sends it under pressure through the delivery ports.

It will be noted that where low-pressure leakage is possible, i.e. along the crank-lever bearing, an effective seal is made with a moulded composition gland (*D*2). There is no possibility of failure on the inlet side of the pump, provided the ports are not clogged, as there are no spring-loaded or other type of valves to cause trouble.

The delivery valves are simply balls (*F*1) controlled by square-section gravity weights (*F*), which also serve to limit the travel of the ball to $\frac{1}{16}$ in.

After passing the delivery valves the fluid enters the passage (*G*), and into this passage the pressure-relief valve (*K*) is introduced. As will be seen, this takes the form of a spring-loaded $\frac{7}{32}$-in. ball which is automatically set at the correct pressure, provided the screw (*K*1) is tightened securely, and of course comes into use only if excess pressure is generated

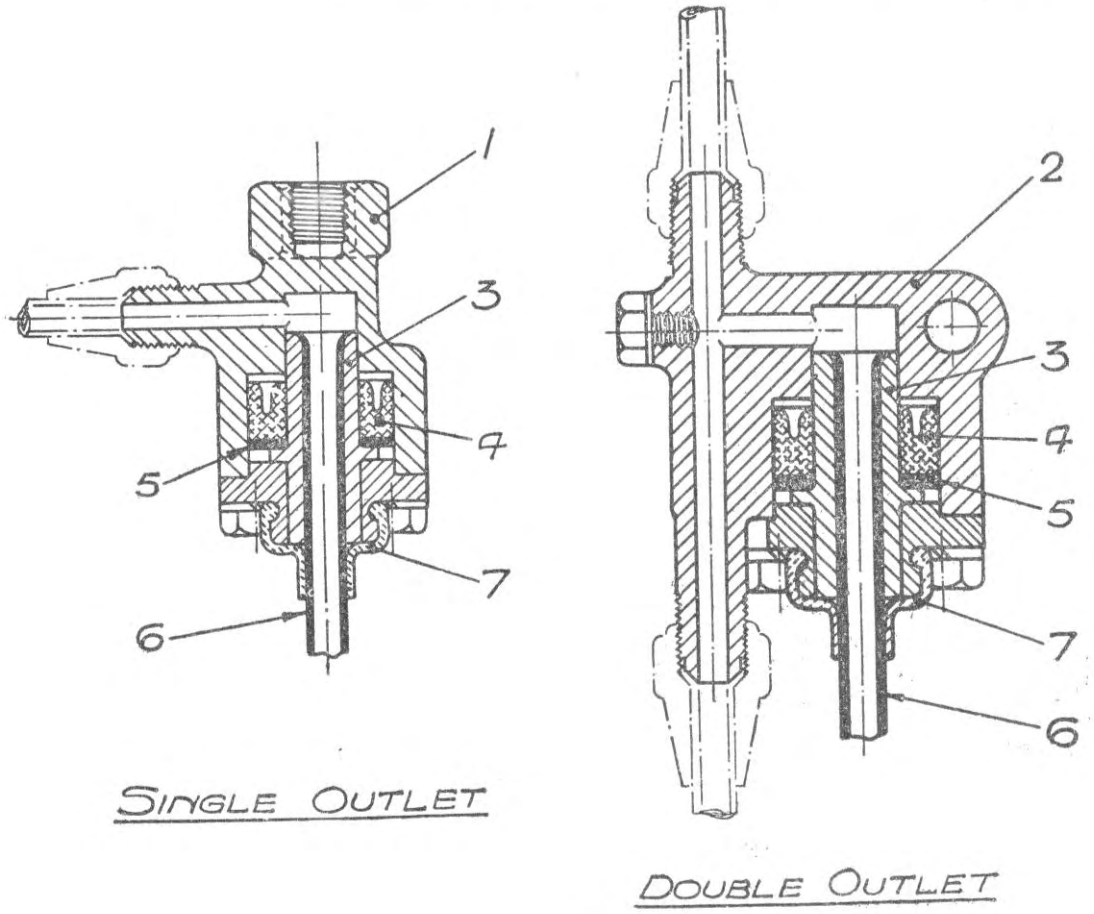

Fig. 3.—JUNCTION BOXES

in the pump. The fluid passes through the master check valve (*J*1) into the chamber (*J*). This valve is provided to ensure no return of fluid to the pump, and relieves the delivery valves and safety valve of any duty other than their normal function.

A filter is provided in the back-cover plate, and the fluid passes through this at each operation.

In the base of the chamber (*J*) there are three openings, two of which (*L*) serve the front and rear jacks, the third (*M*) providing a return for the fluid after use.

The top of the chamber (*J*) is sealed by a moulded rubber bucket valve through which pass three valve spindles, the conical ends of which serve to close the three ports in the base of the chamber.

The centre valve (*N*2), which controls the return of fluid through the unit, is screwed down by turning the bakelite release knob (*P*) which is moulded on to the spindle. The other two valves, (*O*) and (*N*1), controlling flow to the jacks, are depressed by the selector (*Q*), the underside

of which acts as a cam. Thus by turning the selector to the desired position the two valves (*O*) and (*N*1) are pushed down or allowed to rise, as the case may be.

It will be appreciated that before operation the release valve must be closed, otherwise the fluid would simply circulate along the line of least resistance, back to the reservoir.

To prevent turning of the release valve when in the open position, a light coil spring is inserted beneath the bakelite knob (*P*).

The Jacks

Each jack is composed of an inner and outer steel tube (*A*1) and (*A*2). The outer unit is domed at one end to form a cap through which there is a hole for the spring anchorage, and threaded externally at the other end to take the gland housing (Fig. 1).

The inner tube is bulged at one end to form a bearing in the outer tube, and threaded internally to take the foot at the other end. Inside the inner tube there is a very strong coil spring, anchored at one end to the foot and at the other to the top anchorage, which is attached to the outer tube. Thus it will be seen that the spring tends to keep the inner tube retracted into the outer tube.

To extend the jack, fluid is forced through the top elbow fitting into the spring compartment, thereby causing the inner tube to move outwards.

In the gland housing which is fitted to the end of the outer tube there is a moulded rubber bucket so designed as to prevent any leakage of fluid whatever down the outside of the inner tube.

Special Flexible Unions

Where it is necessary to convey fluid from the pump or the frame to the jacks on the car's axles there has to be provided some form of flexible coupling.

For this purpose steel pipes are used in place of the normal copper piping, and at each end these are connected to special unions (*see* Fig. 3). On the frame a single outlet union is used, and on the axle a double-outlet union caters for the distribution of fluid to both jacks.

These unions consist of die-cast housings (1) and (2), into which a pipe is fitted with a special bush (3) so shaped as to be gripped by a moulded rubber bucket washer (4), which is so designed that the pressure of the fluid serves to increase the effectiveness of the seal. The thrust is taken by a loose washer (5). On the outer end of each joint there is a rubber cap to prevent ingress of dirt or moisture.

Pipe Connections

There are two types of connection used in the pipe line, these being of the external- and internal-sleeve type.

In the case of the flexible unions it will be seen from the illustration

DIAGNOSIS AND TREATMENT OF FAULTS

PUMP

Faults	*Diagnosis*	*Treatment*
(1) Pump will not operate	No fluid in reservoir. Loose cotter pin, blow-hole in casting, broken safety-valve spring, release valve not seating, airlock, vent holes in reservoir cap choked.	To ensure there is no airlock, slacken off either valve cap (*F*2) or (*F*3) above delivery valve three or four turns, operate pump for at least 60 secs. If no fluid appears, pump must be dismantled and trouble located.
(2) Works on one cylinder only	Travel of operating handle restricted on one side.	In order to allow fluid to enter cylinder it is essential that a full stroke be given to the pump in each direction. It sometimes happens that an adjustable seat, fixed too far forward, or other obstruction, fouls the handle and prevents this.
(3) Will not retain pressure	Defective casting, faulty master-check valve, faulty release valve or valve seat, external leakage in system	Dismantle distributor box, carefully examine all valve seats and valves, removing master valve, retaining ring, and valve (*K*). If no defect is apparent and there is no external leak, casting is faulty and should be replaced.
(4) Will not lower car when release is operated	Foreign matter in release-valve duct, release valve faulty	First of all lower car by unscrewing joints (*R*) or (*R*1) three or four turns, allowing sufficient fluid to escape so as to enable the jacks to return to a fully closed position. Under no circumstances must screws (*S*) on indicator plate be interfered with until the jacks have returned fully home. Remove indicator plate, remove valve unit, fit new valve unit, and reassemble. If trouble persists, pump should be removed, dismantled, and thoroughly cleaned. Care must be taken that all passages and ducts are free. To reset indicator (*O*) adjust nuts (*O*1) and (2) until the pointer is able to move 20° freely on each side of the " all " position and a slight resistance felt when the pointer is turned to (*F*) or (*R*). The indicator should be set so that little effort is required to move it to any desired position.
(5) Jacks return very slowly when release is fully open	Operating pins (*N*2) too tight in cap	Usually caused by corrosion. Remove indicator plate, remove pins, clean and oil thoroughly with castor oil, and replace.

DIAGNOSIS AND TREATMENT OF FAULTS—(*continued*)

PUMP

Faults	*Diagnosis*	*Treatment*
(6) Works on one side of indicator but not on other, or "All" position	Defective casting or one faulty valve	Remove valve bucket (*N*) and examine valve seats and valves carefully. Replace bucket if necessary. If fault persists, casting is faulty.
(7) Leaks at indicator plate	Defective casting or faulty valve bucket.	Remove valve bucket (*N*), examine for puncture, replace bucket if necessary. If fault persists, casting is faulty.
(8) Leaks under pressure	Cylinder-end cap (*B*) or other caps loose (*F*2), (*F*3), (*F*4), (*F*5)	Without removing unit from chassis, go over all plugs with spanner to ensure tightness, wipe box thoroughly. If leak persists, a new copper washer will probably effect a cure, wipe thoroughly, then operate all four jacks, pumping ten or twelve strokes against safety valve, then examine the various plugs.
(9) Leaks slow drip	Cover-plate screws loose, or faulty gasket	Remove unit from chassis and tighten screws thoroughly, do not disturb cover plate unless absolutely necessary. If cover plate is removed, a new washer must be used, all faces thoroughly cleaned, and Seccotine, Croid, or similar adhesive used on both sides of washer.

FLEXIBLE HYDRAULIC COUPLING

Faults	*Diagnosis*	*Treatment*
(1) Leak at hydraulic joints	Plug on double outlet loose, or faulty copper washer, fault in casting, faulty rubber buckets, faulty brazing	Tighten plug, fit new copper washer if necessary, examine rubber bucket. If leak appears through rubber dust cap, brazing is faulty.
(2) Leaky pipe	Split or damaged externally	Must be replaced by pipe, complete with end bushes, cover plate, and rubber dust cap.

DIAGNOSIS AND TREATMENT OF FAULTS—(*continued*)

JACKS

Faults	*Diagnosis*	*Treatment*
(1) Failing to return after use	If either pair or all jacks fail to return, fault is due to defective valve in distributor box or choked pipe. If one jack fails to return, broken spring, bent or distorted ram	Remove jack, first turning indicator on distributor box to opposite side. Grip in vice (using shaped hardwood blocks), remove elbow. Remove bottom cap ; ram can then be withdrawn. Remove spring anchor pin, grip ram in vice (again using shaped blocks), remove foot to which spring is attached. Check ram for straightness or distortion, check spring. When reassembling, new copper washers should be used.
(2) Leak at foot	Faulty copper washer or foot loose	Remove jack. Without dismantling, ram can be pulled out and gripped in shaped blocks for retightening.
(3) Leaks at screwed part of bottom	Faulty copper washer or cap loose	Remove jack, grip in blocks, retighten if leak persists, jack should be dismantled and new copper washer fitted. Great care must be taken to prevent cap being distorted by undue force when reassembling.
(4) Leak at elbow	Elbow loose or faulty copper washer	Without removing jack from bracket, remove union nut, remove elbow and examine copper washer and replace if necessary, ease off bracket to enable elbow to be turned into line with pipe, and retighten.
(5) Leak past gland	Faulty rubber bucket. Bottom cap damaged or distorted, " swarf " or other foreign matter lodged between bucket and ram	Dismantle jack, prise out bucket with blunt tool, examine for faults, examine inside of annular groove for dents or distortion. Bucket housing or bucket to be changed if distorted or faulty in any way.

that the delivery ends have a conical face and are threaded externally. In this type of connection the copper pipe must be belled out to go over the conical face and the external sleeve then tightens the copper on to its seating.

The internal type of sleeve as used elsewhere in the system and illustrated in Fig. 1 against letter (*R*) employs an " olive " to grip the pipe. When the sleeve is tightened into its housing the " olive " (a brass ring with double conical face) bites into the copper pipe and effects a perfect seal.

Both types of joint may be used many times without renewing.

DISMANTLING

Distributor and Pump Unit

If the unit is to be removed, disconnect supply pipe from tank and plug or drain into suitable receptacle. See that jacks are fully retracted.

The valve bucket (*O*1) may be removed without loss of fluid, but take care to cover valve chamber so as to prevent entry of dirt.

Carefully filter all fluid reintroduced into the supply tank.

After assembly the system may be " bled " by slacking off one of the jack connections until fluid is forced through.

Jacks

See that jacks are fully retracted and selector pointing to opposite pair of jacks.

Plug pipe ends to prevent entry of dirt. Do not wash jacks with petrol or bring into contact with mineral oil. Methylated spirits may be used for cleaning, after which moving parts should be smeared with Jackall fluid.