



# OVERHAULING FRONT SHOCK ABSORBERS

MKVI, Silver Wraith, R-Type and Dawn

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Before reading these instructions it is wise to study the workshop manual and learn how the shock absorbers work. It is particularly important to know which is the bump and which is the rebound valve as they are on the front on one side of the car and the rear, the other.

Typically the nearside shock absorber will have worn valves and the off side one will be in better condition. It is best to replace the valve seats, valves, springs and shims if they differ from the recommendations set out below. Both sides of the car should be done together. Modern oil seals can also be fitted instead of the originals. Just phone a bearing stockist and give him the size of the shaft, the housing and its width. It will help if you have both metric and imperial dimensions.

There is a relationship between the front axle kerb weight, the front spring poundage and the shock absorber settings. You will find the shim sizes quoted (0.108 / 0.112 inch) suit a late (after June 1950) standard car with a front axle weight of 1950lbs, which will have front springs rated at about 1680lbs. If the front axle weight is say 1960lbs the springs will be about 1700lbs and the shims can be increased by 0.010". These settings are appropriate to radial tyres.

Correct identification of the parts is particularly important as various alterations took place over the years and because some of the part numbers in the manuals are incorrect. The measurements given below have been taken from new components and not from engineering drawings; I have omitted some of the finer points to keep the descriptions as simple as possible.

## BODY AND LEVERS

The basic body assembly of the shock absorber did not change throughout production although later cars after chassis B1 GT have the angle of the upper triangle levers reduced. Therefore the levers are NOT interchangeable between early and late chassis, however it is possible to change the main body part number RF 7958A. The later part remaining under the same part number throughout.

## PISTON REPLENISHING VALVES

These valves are fitted into the piston head. The earlier valve type was fitted throughout the production of the MKV1 and changed on later R Types. The bulletin outlining both the production and service change was issued as BB 199 on 11th November 1954.

The earlier valve was made up of three components (1) the replenishing valve, a three-legged star shape with a rivet through the centre (2) a dished washer, and (3) a spring retaining ring.

The later valve was made up of four components. Three as described for the earlier valve but with the addition of the fourth component, a plain washer that was riveted to the centre of the replenishing valve. Note that both earlier and later replenishing valves had riveted centres; only the late valve has the plain washer clamped by the rivet. Identification is therefore easily distinguishable, without stripping the piston valve assemblies.

The later valve had stronger components to prevent intermittent knocking which was transmitted up the steering column in the form of metallic clicking or tapping. Many of the earlier chassis have been retrofitted with the later valves. The part number of the later valve assembly is RF 10311 SA, which consists of all four components. None of the earlier and later individual components are interchangeable except for the rivet.



## VALVE SPRINGS, VALVE SEATS, VALVES AND VALVE CAPS

The rebound valve assembly is contained under a cap positioned adjacent to the top triangle lever that is “clamped” to the main rocker shaft.

The bump valve assembly is contained under a cap positioned adjacent to the top triangle lever that is “fixed” or “splined” to the main rocker shaft.

Very early chassis prior to approximately 1948 had valve seats pressed into the main case, later valve seats were screwed. The later screwed type can be identified by their hexagon heads, which can be seen at the bottom of the valve ports, when the valve components are removed. Otherwise the screwed valve seat part number RF 4861 is common to all chassis and to both rebound and bump valves. The very early chassis, prior to 1948, also had valve springs that were subsequently modified initially to the “early” type described below. For the purpose of simplicity these chassis are included in the early valve assembly description as it is very unlikely that any original valve springs will be encountered. If any very early springs are however discovered they can be eliminated as not conforming to the spring descriptions in the text below.

Valve spring and Valve Cap assemblies can be divided into two distinct types. For the purposes of easier understanding they will be described as “early” and “late” types.

It is absolutely imperative that it is clearly understood that early type caps should only be used with early type springs and late caps with late springs. Mixing the two types will result in either actual valve breakage or extremely low pressures dependant upon the incorrect mix of parts. In this relationship it is also important to realise the incorrect listing and transposition of the spring part numbers between the early and late springs in some R-R parts manuals.

The following chassis sequences are taken directly from the parts lists for these chassis.

The “early” type caps and springs were fitted from commencement of production through chassis:

- A to M series,
- all NZ series except B36 NZ
- all coach built cars in series B1 NY to B475 NY
- all standard steel saloons in series B1 NY to B205 NY

These early assemblies were then re-introduced on R Type chassis

- including all RT series
- all RS series except B3 RS, B5 RS and B67 RS
- all chassis B2 SR to B18 SR
- B22 SR to B40 SR
- B44 SR to B48 SR
- B52 SR to B100 SR
- B104 SR to B154 SR
- B158 SR to B210 SR
- B214 SR to B394 SR
- B398 SR
- B402 SR to B428 SR
- B432 SR to B436 SR
- B456 SR to B462 SR
- B470 SR to B488 SR
- B3 SP, B5 SP, B41 SP
- B45 SP to B51 SP



- B57 SP, B59 SP

## VALVE CAPS

The “early” caps part number RF 505 have “domed” ends on their hexagon retaining caps. This feature should be regarded with suspicion as many have been rebuilt incorrectly with wrong springs and in some cases incorrect valves. The dome cap is 1.125” deep inside and has an inside bore of 0.805”. The external protrusion on the end of the hexagon is 0.225” long and can easily distinguished from the later flat cap.

The late type springs and caps were fitted to all chassis not included above, and it should be noted that many early chassis listed have had late type springs, caps and valves springs retrofitted. This late cap flat cap part number RF 8941 is 0.725” deep inside with an internal bore of 0.750”.

The flat head hexagon on the valve assembly cap should identify the late type spring and cap assembly.

## VALVE SPRINGS

The ends of all valve springs are cut off sharply forming a pigtail to prevent valve squawk. The wire of all these springs is 0.105” thick and the coils are wound with an outer diameter of 0.730” to 0.740”.

Identification is easy, each spring having a different number of coils. Due to the compression factor of old springs and incorrect part numbering the number of coils and not only the length should be checked, noting that early type (long) springs must under no circumstances be fitted to late type caps.

- The early type rebound spring part number RF 5021 is 2.140” nominally between the ends of the pigtail. This spring has ten (10) full coils excluding the half coil pigtail at each end.
- The early type bump spring part number RF 5022 is 1.860” nominally between the ends of the pigtail. This spring has eight (8) full coils excluding the half coil pigtail at each end.
- The late type rebound spring part number RF 8942 is 1.592” nominally between the ends of the pigtail. This spring has seven (7) full coils excluding the half coil pigtail at each end.
- The late type bump spring part number RF 8943 is 1.430” nominally between the ends of the pigtail. This spring has five (5) full coils excluding the half coil pigtail at each end.

The lengths of the springs listed above are very nominal dimensions; springs will vary by as much as 0.050” in length. The variation in free length of the same part number spring should be ignored, providing the lengths are within about 0.050”. The dimension data will however enable the owner to distinguish each type of spring.

## VALVE SHIMS

These are of two distinct types to fit the early and late type caps; part numbers vary with thickness the smallest being around 0.050” inch and the largest 0.128”. Part numbers are correct for size in the R Type parts manual but not in the MKVI manual. Do not use excess shim thickness in order to obtain results they will result in the breakage of the valves.

Providing all new parts are fitted as described later, and the assemblies have the later type flat hexagon caps, very good ride characteristics will result from using approximately 0.108” / 0.112” shims under all the valve springs. If the car is used over very poor road surfaces it is preferable to increase the rebound valve shims only to 0.125” / 0.128” thick. In all cases the required thickness of the shim can be made up with multiples of thin shims.

Note that the shim thickness listed in the parts manuals are only nominal, shims are usually under sized to the thickness stated, for example a late type RF 8946 shim listed at 0.064” will be nearer 0.059”.



## VALVES

The valves are very similar except for the difference in the lead on the three radial shaft holes on the later bump valve, and that the late rebound valve has no bleed hole. In some cases the shaft end of the valve will be tapered whilst in others the end is cut off squarely.

The early type valve part number RF 4104 has a small hole, about 0.030" in the recessed end communicating with an even smaller hole drilled radial in the shaft about 0.100" below the valve ground seat. At the opposite end of the valve the shaft is drilled 0.128" and this hole communicates with three radial holes of 0.076" diameter. Note that these three holes are cleanly drilled and have no lead at the start of the holes. These larger holes control oil flow via the valve and its seat, as does the fit of the valve in the valve guide. Shaft diameter is 0.238" and overall the valve is some 0.930" long. Clearance between the valve and its guide is not particularly fine. This valve RF 4104 is fitted to both bump and rebound positions.

The late type bump valve RF 8940 is the same as the early valve description with the following exception. The three shaft holes have a discernible lead at the entrance of each hole towards the recessed end and the shaft end of the valve. There is no lead from the holes, in the direction, around the circumference of the valve shaft.

The late type rebound valve RF 507 is the same as RF 8940 except that the recessed end is not drilled and there is no fine hole immediately below the valve seat.

## HOUSING / SEALS / MAIN SHAFT

The large seal housing recess is 1.728" diameter, whilst the small seal recess is 1.625" diameter. If the housing recesses are larger the respective seals have stuck to the shaft and the seal has rotated in the housing during service. Due to high amounts of grit penetration between the seal and housing the wear in the housing recesses may be excessive. The original shaft is 1.125 inch at the large end and 1.0 inch at the smaller end. The seals are a particularly tight fit, any indication of a slip fit points towards the housing being worn.

Providing the housing conforms to the original dimensions modern type oil seals can be fitted. A metric one at the large end of 28 mm x 44mm x 7mm and an imperial one of 1.625 inch x 1.0 inch x 0.37 inch at the other end. Seals of other outer dimensions can be obtained to suit a worn housing. Evostik can be used to retain seals where they are slightly slack.

## OILS

In climates where the ambient temperatures are likely to be over 15° C for most of the time it is preferred that SAE 30 grade engine oil is used to refill the units. In situations when the temperature is less than 15° C a SAE 20 grade oil should be used.

As it can be difficult to obtain mono grade engine oils, Hydraulic oil or Motorcycle fork oil of SAE20 can be obtained from appropriate stockists.

## SUMMARY

The following describes the two types of complete assemblies although there was a difference between the chassis number changes with caps and springs and those when the valves themselves changed. To simplify matters the components have therefore been divided into two distinct assemblies.

It is best that all shock absorbers being rebuilt be fitted new valve seats, valves, springs and caps of the later type. The handling and ride will be very much improved. Use the parts numbers supplied here, not in the manuals to avoid the risks of mixing incompatible parts.



## **EARLY TYPE VALVE ASSEMBLIES**

- RF 505 Valve Cap Domed Hexagon (only use with springs RF 5021 / RF 5022)
- RF 5021 Rebound Valve Spring (next to clamped lever)
- RF 5022 Bump Valve Spring
- RF 4104 Bump and Rebound Valve
- RF 4861 Screwed Valve Seat

## **LATE TYPE VALVE ASSEMBLIES (RECOMMENDED FOR ALL REBUILDS)**

- RF 8941 Valve Cap Flat Hexagon (only use with springs RF 8942 / RF 8943)
- RF 8942 Rebound Valve Spring (next to clamped lever)
- RF 8943 Bump Valve Spring
- RF 507 Rebound Valve (next to clamped lever)
- RF 8940 Bump Valve
- RF 4861 Screwed Valve Seat
- RF 8945 Shim 0.048" thick
- RF 8946 Shim 0.059" thick

On the late type assembly only, one, of each of the above shims, position between the valve cap and spring will provide some 0.108" of shimming. That is a total of eight shims, four of each size, for a pair of shock absorbers.