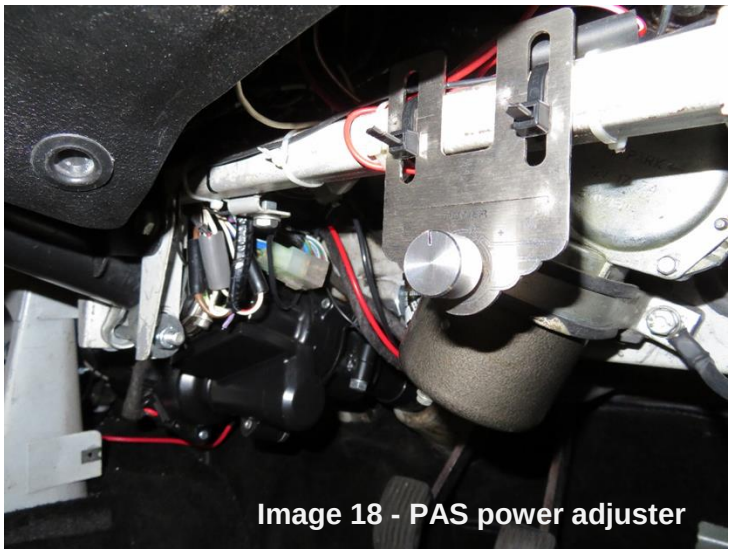

Image 18 - PAS power adjuster

Fitting power steering to an MGBGTV8

Jim Livingstone acquired his MGBGTV8 (Glacier White 1810) from Dr Chris Ward who had had the car restored by a specialist in Northumberland. Jim has since carried out several modifications and here he sets out a detailed note on his choice and then the installation of a power steering upgrade on the car.

Introduction

At the time of the MGB's conception there was no satisfactory economical resolution to the conflict between positive steering response at high speed and low effort at manoeuvring speeds. The conventional answer for a sports car was to prioritise the former and specify steering gear with a low (numerical) ratio while higher (numerical) ratios were specified for heavyweight saloons. In spite of this and before the almost universal adoption of power assisted steering (PAS) there remained little difference between the effort to change direction in an MGB and its contemporaries. But all that changed with the introduction of affordable PAS systems.

By way of demonstration, I remember an occasion in the late 1980s when, for the purposes of tyre testing, I'd deliberately chosen a non PAS car from the pool to take to MIRA. With the exception of PAS this car was practically identical to my daily driver so imagine my surprise when, momentarily forgetting the swap, I arrived at the first sharp corner only to find what for a split second felt like terminal understeer but on reflection was no steer at all. Though this is unlikely to happen in an MGB and especially to a driver familiar with the breed, I was reminded of this sensation of high effort/low gain every time I drove the MG until the PAS was fitted. If further justification is needed and you are of my generation and anticipating increasing physical frailty, a PAS fitment presents the prospect of prolonged years of driving enjoyment.

Technical and Market Considerations

In the case of the author's MGBGT V8 the situation was possibly exacerbated by the fitment of a Moto-Lita 13" steering wheel and wider than standard wheels and tyres by a previous owner. The root cause, however, is more fundamental and lies in the basic steering geometry of the MGB. Needle roller thrust bearings are available to reduce swivel axle friction and caster reducing kits to lessen jacking effect but, in the end, it was decided that the car needed more than a marginal improvement and power assistance was called for.

There are three options, namely:

1. A hydraulic system with an engine driven pump,
2. A hybrid electro-hydraulic system with an electric motor driven pump, and
3. An all-electric system with either an electric motor driven rack **or** an electric motor driven steering column.

The author has experienced all three over the years in various cars and after initial scepticism about the all-electric system (EPAS) concluded that concerns over its suitability have been largely resolved in the latest systems. Moreover, as the MGB V8's engine compartment is overcrowded and hot, a hydraulic pump with its associated plumbing would just add to the problem.

Research failed to unearth any commercially available electric powered rack conversion so it had to be a powered column. The **product chosen was the EZ EPAS system** which has been available for some years for a variety of classic cars. Their kit comprises a replacement steering column with an integral electric motor. EZ are a Dutch company who specialise in adapting NSK or Koyo based systems to specific European models and have an established track record in this field.

Preparation

As the powered column uses the existing steering rack the first step was to ensure that it was working satisfactorily. As the necessary overhaul of the steering rack was quite extensive it is covered in a separate note. To complete the preparatory work the **universal joint was rebuilt** with a **new spider and bearings and new boots** were fitted to the track rod ends.

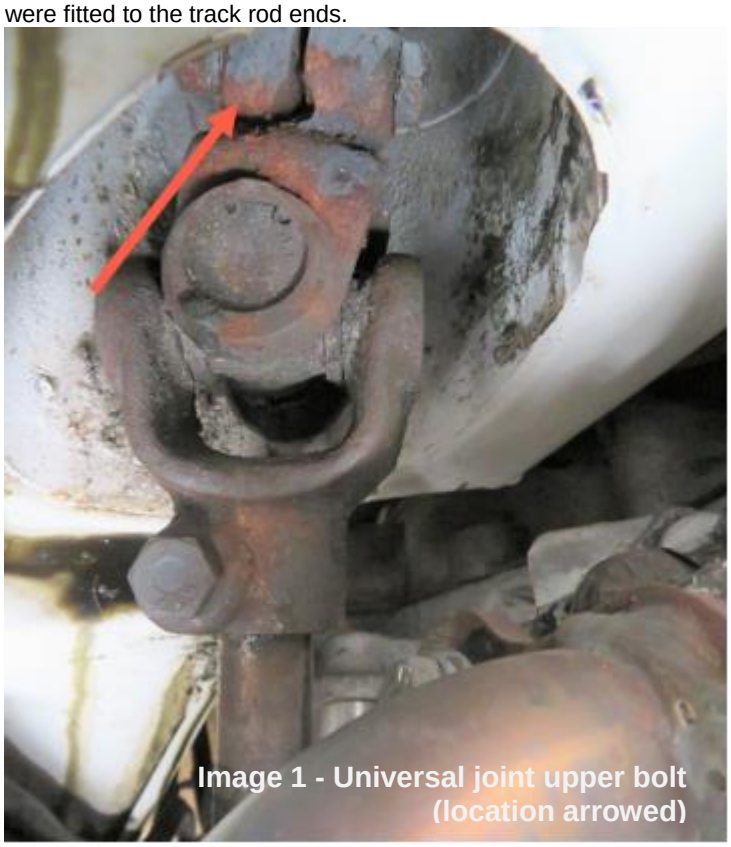

Image 1 - Universal joint upper bolt (location arrowed)

When the new column arrived from EZ in Holland it was examined carefully for interchangeability. There are several versions of the MGB steering column and it is important that the correct EZ kit is ordered. An additional complication which I believe is unique to the MGB V8 is that the upper clamp bolt of the **steering column universal joint is buried deep in the bulkhead tunnel** resulting in difficult access to this critical fastener. See **Image 1**. In the original column the inner shaft is free axially and the bolt can be accessed

once the shaft is freed from the rack input and the steering wheel and turn indicator striker are removed. The EZ inner column is fixed axially to the outer column necessitating a different approach.

Image 2: - Column alignment tool

To facilitate accurate alignment of the upper and lower steering shafts the Moss (www.moss-europe.co.uk) **alignment kit** (part number 453-622) was purchased. The kit comprises two nylon sleeves which replicate the halves of the universal joint and two screws which simulate the clamp bolts. **See Image 2**. When the points on the sleeves are aligned the shafts will articulate about the centre of the universal joint spider resulting in lower stresses in the column and rack.

A **trial assembly** is strongly recommended as modifications in situ are difficult. For example, on the subject installation the EZ supplied lower column bracket required some modification to ensure that the upper and lower steering shafts engaged correctly. The EZ column was also longer than the original but this was accommodated by a shorter bulkhead seal and, finally, the supplied upper column clamp was too wide and a worm drive clip had to be substituted. Because they vary with model no fastener torques are specified here and the reader should refer to the relevant MG Workshop manual for these.

Installation procedure

CAUTION: Before proceeding it should be noted that steering components are parts of a critical safety system and their failure could result in a loss of control of the vehicle. EZ maintain that a loss of power to their system would merely result in the steering reverting to its unassisted state. The security of the remainder of the system is the installer's responsibility and if you are not confident that your skill level is adequate for this installation then it should be entrusted to a competent professional.

The step by step procedure is:

1. Disconnect the battery.
2. Chock the rear wheels, raise the front of the car and secure on axle stands.
3. Prize out the horn push and remove the steering wheel by loosening the centre nut and with a suitable puller to break the taper between the wheel and shaft. See **Image 3**.
   Note: Care must be taken to avoid any impact loads on the column during removal and fitting. The original and (potentially reusable) column has a collapsible element and the replacement EZ has sensors either of which would be irreparably damaged by impact. This care should be extended to the removal and fitting of the universal joint.

Image 3 – puller to remove the steering wheel safely

4. Remove the steering column cowl (four screws).
5. Remove the leads from the column and ignition switches and remove the column switches noting their positions and the routing of the leads.
6. Remove the indicator striker.
7. Remove the four bolts securing the rack to the front suspension crossmember. This is necessary to allow the steering shaft to pass through the column. See Preparation for further explanation.
8. Insert the ignition key and release the steering lock.
9. Allow the steering shaft to slide through the column sufficiently far to give access to the upper universal joint nut and bolt.
10. Remove both bolts from the universal joint and release it from the shafts. Overhaul the joint if there are signs of stiffness or wear.

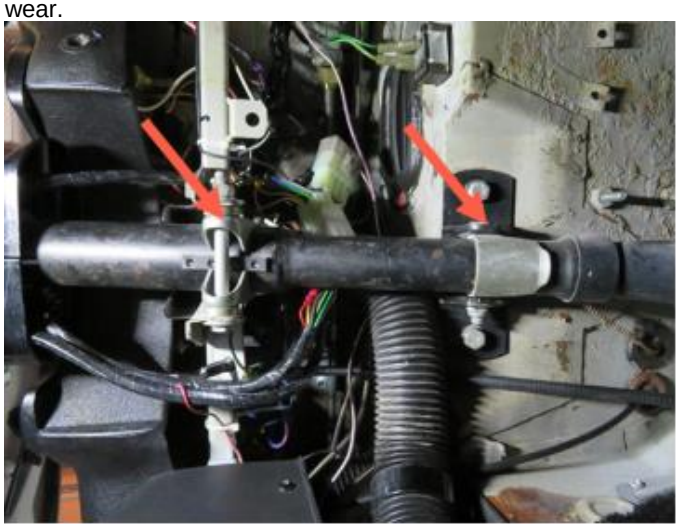

Image 4 – Original column support clamps

11. Remove the nuts and bolts from the two column clamps and remove the column and shaft. See **Image 4**.
12. Remove the lower clamp bracket from the bulkhead (two bolts). This bracket is not required with the EZ column which has a different lower fixing arrangement.

13. Check that the column and shaft lengths and spline dimensions of the new EZ assembly match those of the original assembly.
    Note: The outer column supplied by EZ for this application was 55mm longer than the original part but the shaft length and column diameters were correct. Most importantly the spline fits were satisfactory. A shorter bulkhead seal is available for another model of MGB and I decided to keep the column and use this. If in doubt, insist on the correct part from EZ (this is not a cheap unit).

Image 5 – removing security bolts

14. The combined column lock and ignition switch must now be removed from the original column. It is possible to drill out the bolts but a simpler alternative is to grind screwdriver slots in the protruding stumps using a small (25mm) cutting disc. The bolts are then unscrewed using an impact driver and slotted attachment. See **Image 5**.

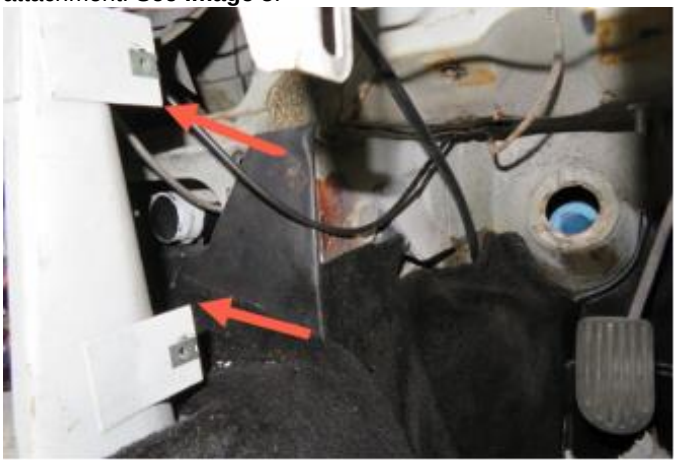

Image 6 – Radio console support brackets

15. Remove the gear lever knob followed by the tunnel and radio consoles. Remove the driver's side demister ducting from the heater.
    Note: The brackets on the radio console support have sharp corners which should be ground to a radius to prevent personal injury and cosmetic damage to the motor unit. See **Image 6**.
16. Fit the bulkhead seal to the bottom end of the new column assembly, thread the shaft through the hole on the bulkhead and manoeuvre the motor unit into position between the brackets on the radio console support. See **Image 7**.

Image 7 – Motor unit in position

17. Refit the demister duct to the heater.
18. Support the column using the original upper clamp and loosely assemble using a free running nut in place of the locknut.

Image 8 – Lower bracket bolts

19. Fit the new lower bracket to the underside of the bulkhead using the two original screws. Do not fully tighten at this stage. See **Image 8**.
    Note: During the trial assembly it was discovered that the lower bracket prevented the column from assuming its correct axial position relative to the rack input shaft (i.e. within the range of the elongated slot in the shaft for the upper universal joint bolt). Rather than weakening the fixing by enlarging the mounting holes further (they are already elongated transversely) the author chose to remove redundant metal from the bracket's rear edge. See **Image 9**. Note that the lower bracket now takes the main torque reaction of the steering force and its fixing is critical.
20. Fit the alignment kit sleeves to the splined ends of the upper and lower shafts and ensure that the screws engage in the spline flat and groove respectively.

Image 9 – Lower bracket modification

21. Support the rack input shaft in reusable ties and adjust the alignment of the shafts until the points on the sleeves coincide. See **Image 10**.

Image 10 – Aligning upper and lower shafts

Image 11 – Steering rack shim

Note: The EZ column can be adjusted both laterally (bracket slots) and vertically (bracket hinge) while the rack input shaft can be adjusted vertically by fitting shims under the crossmember mounting bosses. On the subject vehicle a 1mm washer under each of the rear bosses was sufficient to align the gauge points. See **Image 11**. This, incidentally, also resulted in the rack input shaft now passing centrally through the hole in the engine mount where it had previously contacted one edge. See **Image 12**.

Image 12 – Right side engine mount

Image 13 – Upper universal joint bolt

22. Mark the position of the column supports to aid reassembly and remove the securing bolts. Remove the rack to crossmember bolts and allow the rack to slide down enough to extract the alignment sleeves. Fit the universal joint ensuring that the upper bolt passes through the elongated flat in the column shaft and the lower bolt though the groove in the rack shaft. Fit new self-locking nuts to both universal joint bolts but do not tighten at this stage. See **Image 13**.
23. Refit the shims selected in step 21 and fit and tighten the rack bolts using new self-locking nuts on the lower bolts and thread lock on the upper ones.
24. Realign the column using the marks made in step 22 and tighten the nuts and bolts. Use new self-locking nuts and thread lock as appropriate.
25. Tighten the lower universal joint clamp nut and rotate the shaft to maximise access to the upper clamp. Securing the upper bolt is simplified if a straight 1/2” A/F ratchet spanner is used. **Note**: Because of the restricted access it is not possible to closely inspect or torque check the upper fixing and care is

necessary to ensure that the splines are fully engaged and the bolt is correctly tightened.

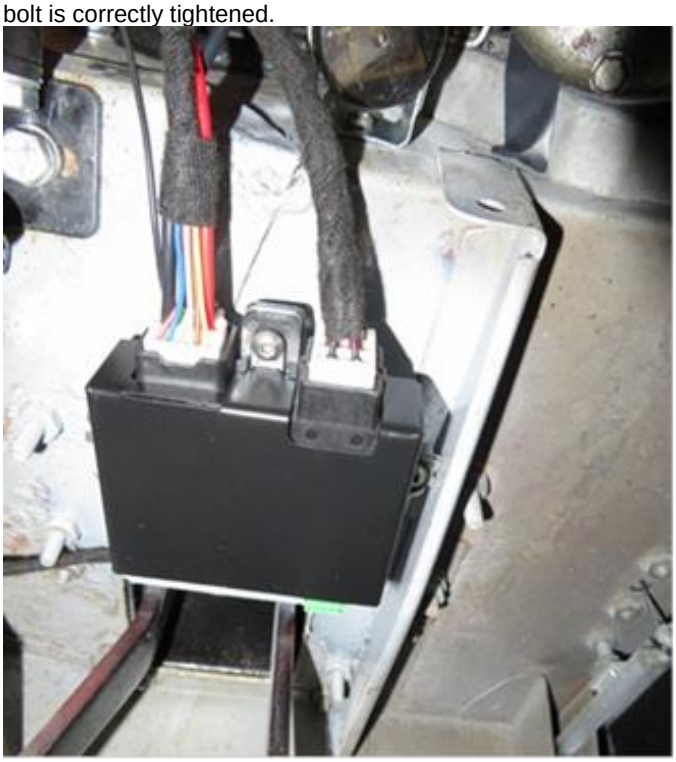

Image 14 – Control unit installation

Image 15 – Power cable routing

26. Select a convenient location for the control unit and fix in position. See **Image 14**.
27. Route the 6 mm 2 power cable to the battery positive terminal and fit the 40 amp line fuse adjacent to the battery terminal. See **Images 15 & 16**.
28. Route the light gauge red wire to an ignition controlled circuit and the black wire to a sound earth point. The white wire from the ignition switch is connected to a four-way bullet connector which if changed to a six-way provides a suitable feed for the red wire. See **Image 17**.
29. Select a convenient position for the power adjustment unit and fix securely. The right end of the steering column support tube (the square tube joining the door hinge panels) provides a suitable location to attach the unit using plastic ties. See **Image 18** (see page 1).
30. Secure all the cable runs with P clips or wire ties and protect vulnerable sections.
31. Refit the column switches and the indicator striker.

Image 16 – power cable fuse

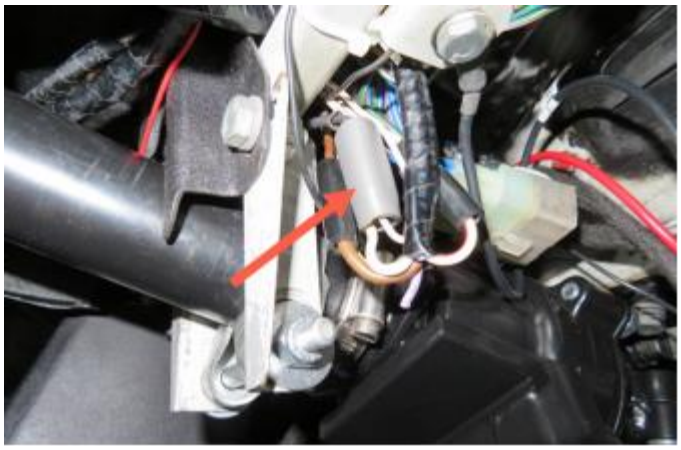

Image 17 – New 6-way bullet connector

Image 19 – Steering lock cap screws

32. Refit the combined steering lock/ignition switch. The author chose to use socket cap screws instead of the shear head screws provided to obviate the need to remove the column should the lock require removal in future. See **Image 19**.
33. Refit the column cowl.

34. Centralise the steering, refit the steering wheel and tighten the shaft nut. Refit the horn push.
35. Reconnect the battery.
36. Recheck that all fasteners are secure and lower the car.
37. Road test to establish the best setting of the **power adjuster**.

Conclusions
While the EZ installation can hardly be described as a plug-and-play DIY installation, it is within the scope of a competent home mechanic willing to do some fitting. In defence of EZ, tailoring a precision component to as diverse a product as an MGB can be no easy matter.

As far as **driving impressions** are concerned the EZ EPAS system operated as expected with a much welcomed reduction in steering effort when manoeuvring at slow speeds. The strong dynamic self-centring of the MGB's steering was reduced which will possibly disappoint some enthusiasts. This could have been retained (without driver intervention) if a speed sensitive control had been provided. In summary, the EZ EPAS performance benefits will probably appeal most to the mature classic car enthusiast who wishes to continue to enjoy his/her hobby for a few more years.

Footnotes

Caution with handling the steering column – the caution is important because the collapsible column can be damaged by any mishandling. Replacement steering columns are impossible to find and repairing a damaged collapsible column has been a controversial topic. Risk of steering column damage

EZ EPAS kit
The kit supplied by EZ includes a replacement steering column with an integral electric motor. The image above shows both the original column on Jim Livingstone's MGBGTV8 (top) and the EZ column supplied by EZ (below). More

Caster reduction kits do reduce the steering effort at low speeds and are worth considering as a low cost alternative to a PAS option. The use of the convenient caster reduction wedges can result in variable caster reduction because of a crushing effect on the rubber pads. An improved caster reduction kit is available from Brown & Gammons but it requires dismantling to fit the kit whereas the wedges are a far simpler installation. Over the years improved tyre design and rubber compounds of modern tyres have provided better grip and self centreing characteristics which have reduced the original need for caster with the earlier cross plys and early radial tyres available in the mid-1970s. So reducing the caster and thereby reducing the steering effort is a benefit for driving comfort.RV8NOTE231 & V8NOTE340

The **B&G Castor Reduction Kit** (AHH6195 CASTOR) includes comprehensive fitting instructions and detailed diagrams.

Choice of PAS option. When assessing the available PAS alternatives, hydraulic PAS kits need a pump, reservoir and other items which have to be fitted in an already cramped and hot engine bay, but there is an additional point and that is the steering rack has to be removed and a Peugeot rack is used as a replacement which has a different gearing. So a hydraulic PAS upgrade does involve a serious modification to the car whereas an EPAS option is less damaging to originality. Also if a hydraulic PAS fails then the car cannot be driven because the ratio of the replacement rack makes the effort needed to turn the steering wheel impossible for a driver. If an EZ EPAS fails you are back to the original unassisted steering. PAS options review & More

Concern over the connection of the steering rack to the crossmember because the load when turning the steering wheel at slow speeds, or even greater when stationary, can generate heavy forces on the weld between the steering rack and crossmember. Several cases of cracks developing in that weld have been seen, some worryingly serious. Brown & Gammons supply a steering rack mount reinforcement kit. RV8NOTE241

The **Steering Rack Mount Strengthening Gusset** (AHH6195 BRACKET) is available from B&G. They can carry out the inspection for you and if cracks are discovered, supply the gusset and MIG weld it to the mount and crossmember at their Baldock workshops. For details of the new strengthening gusset see V8NOTE339.

Prudent check for cracked steering rack mounts
While you are working in this area on fitting the castor reduction kit, it is well worth checking the condition of the steering rack mounts for any hairline cracks or more serious fractures. You will need a strong light for a thorough inspection. Sightings of cracks have been reported in detail together with the information on the new strengthening gusset supplied by B&G. See V8NOTE338. A routine check on the condition of the mounts should be included in your annual servicing checklist.