From Philip Dingle:

Some observations concerning the Jowett Javelin/Jupiter front suspension:

The document “Technical Information for the Javelin” issued by the Jowett Car Club in 2001 provides a lot of fundamental information on the Javelin and the Jupiter, and I have extracted here the technical data as it applies to the front suspension:

Front Suspension-

Unequal arm. Transverse link type. Length top link: 7 3/4”.
Length bottom link:14 15/16”.
King pin inclination: 10°
King pin offset: 13/16”.
Total wheel movement: 6 3/8”, (4 1/2”) ((4 1/2”)). [Javelin, (Jupiter), ((R4))]
Normal load to rebound: 1 7/8”, (1 5/8”), ((1 5/8”)).
Normal load to bump: 4 1/2”. (2 7/8”), ((2 7/8”)).
Normal wheel camber: 0°.
Castor angle: 1 1/4°**.**
Torsion bar spring: 0.880” dia. x 36” long ((0.852” dia. x 36”)).
Working load: 846 lbs.
Effective length: 36 1/4”
Material: silicon manganese spring steel.
Normal load on spring arm: 652 lbs. (525 lbs.). ((Not known)).
Stress in torsion bar at this load: 30.96 tons p.s.i. (25.97) ((Not known)).
Stress at full bump: 52.24 tons p.s.i. (33.70) ((Not known)).
Spring periodicity at normal load: 69 cycles/min. (77). ((Not known)).
Effective rate of spring: 116 lb/in. (96 lb/in.) ((70 lb/in.)).
Mainframe members inclined in plane: 8° to the C/L of car.
Swivel pin link pivot centres: 10 3/4”.

From this information, I was able to schematically draw the general layout of the front suspension to scale in Figure 1. That is to say, the upper and lower links plus the swivel pin [aka the king pin] are drawn in the nominal position with the links parallel to the ground. Also, the king-pin offset (centerline of where the road wheel contacts the ground and the intersection of the ground with an imaginary line extended through the king-pin) is shown.

On this base layout, I then superimposed the information given for suspension travel for both the Javelin and the Jupiter with the bump and rebound travels applied around the nominal position. This information is given in Figure 2 which also shows the maximum angle of motion for the upper and lower links around their pivot points. The point of relevance concerning this angular motion is that this is the range over which the Metalastik bushes in the rubber suspension must operate.

For many years now, the generally stated preference in the motoring world at large has been to specify polyurethane bushes for the suspension joints in preference to the OE (Original Equipment) rubber bushes where they were fitted, on the basis of lower off-axis deflection and thus improved chassis control, along with low wear, and therefore longer life. This is in contrast to the assumed higher lateral deflection and lower durability of the rubber bushed suspensions that all later Javelin and Jupiters have. An obvious question arises as to whether it is possible and beneficial to adapt the Jowett suspension to utilise these new polymer bushes that were not available back in the day.

To look into this in a little more detail, I downloaded the patent on the Metalastik bushes, GB622514 (the Patent number is stamped on the steel thimble) available here: http://worldwide.espacenet.com/?locale=en_EP From this document, the design objectives can be deduced and it would seem that the flanged and bonded rubber bush that Jowett (presumably Roy Lunn) chose (Figure 3, Figure 4) is functionally superior to some of the other concepts disclosed. An important aspect to note is that with this type of bush, the rubber is bonded to the metal sleeve or thimble which is in turn clamped against its opposing bush and thus not free to rotate relative to its associated suspension component. Likewise the bush outside diameter is clamped into the opposing tapers of the mating suspension part such that the rubber grips the tapered bore. In operation, all articulation or angular motion between the suspension parts is entirely carried by torsion within the rubber. For this reason it is important to tighten the suspension clamping bolts only when the suspension arms are at, or close to mid position so that the torsional stress in the rubber is equally shared between bump and rebound.

The implication of the suspension joint articulation being carried by the rubber in torsion is that this is (to my knowledge at least) quite different from modern suspension bushes where the suspension arm physically rotates on the polyurethane bush. In this situation, the surface finish of the mating bore has to be up to a good standard to minimise wear and abrasion of the bush. This is not the case for the Metalastik rubber bush where a moderately rough finish is required to ensure that the rubber will grip. Thus I think that even if a polyurethane bush were available that was dimensionally similar to the Metalastik original, it would not be a straight swap. To assist others in exploring this potential option, I have provided drawings of the two bushes that Jowett used, specifically the 13/782 (6 per side) and the larger 13/783 (2 per side).

The hardness of the rubber used in a bush of this type is a delicate balance between chassis control including steering feel and precision, and range of joint articulation; a hard rubber will benefit chassis control but will impose a limit on available range of articulation and vice versa. I measured the hardness of a NOS (New Old Stock) 13/873 bush on an appropriate test instrument at work and found it to be close to 70 Shore which is a typical rubber hardness value [see photo].

In Figure 2 where I notated the angular movement of the upper and lower suspension arms, only the data for the inboard pivot point is shown since that is the worst case; the outboard values being slightly lower. I have to assume that the load carrying capacity of the larger bush [13/783] is greater than that of the smaller [13/872] bush, so one of the surprises for me is that the outboard lower arm connection to the king pin is made with the smaller bush and yet the full suspension load at that corner is taken through that joint. The large bush is used at the lightly loaded upper link outboard joint where I would have expected the small bush to be more than adequate. Obviously there is something here that I am missing. If anyone has an explanation for this choice of bush and its location, I would welcome the enlightenment. Certainly, in my experience, the smaller bush in its highly loaded locations has a very much shorter life span than that of the larger one.

Based on some limited research I have made in looking through polyurethane bush suppliers catalogues, I have not found a bush having the same dimensions as our Metalastik items. What this implies is that if we should ever run out of Metalastik bushes and/or someone wanted to explore the potential of improved chassis control through the use of polyurethane bushes, then it seems likely that some machine work would be required on the suspension arms to enable satisfactory fitment of an appropriate modern bush.

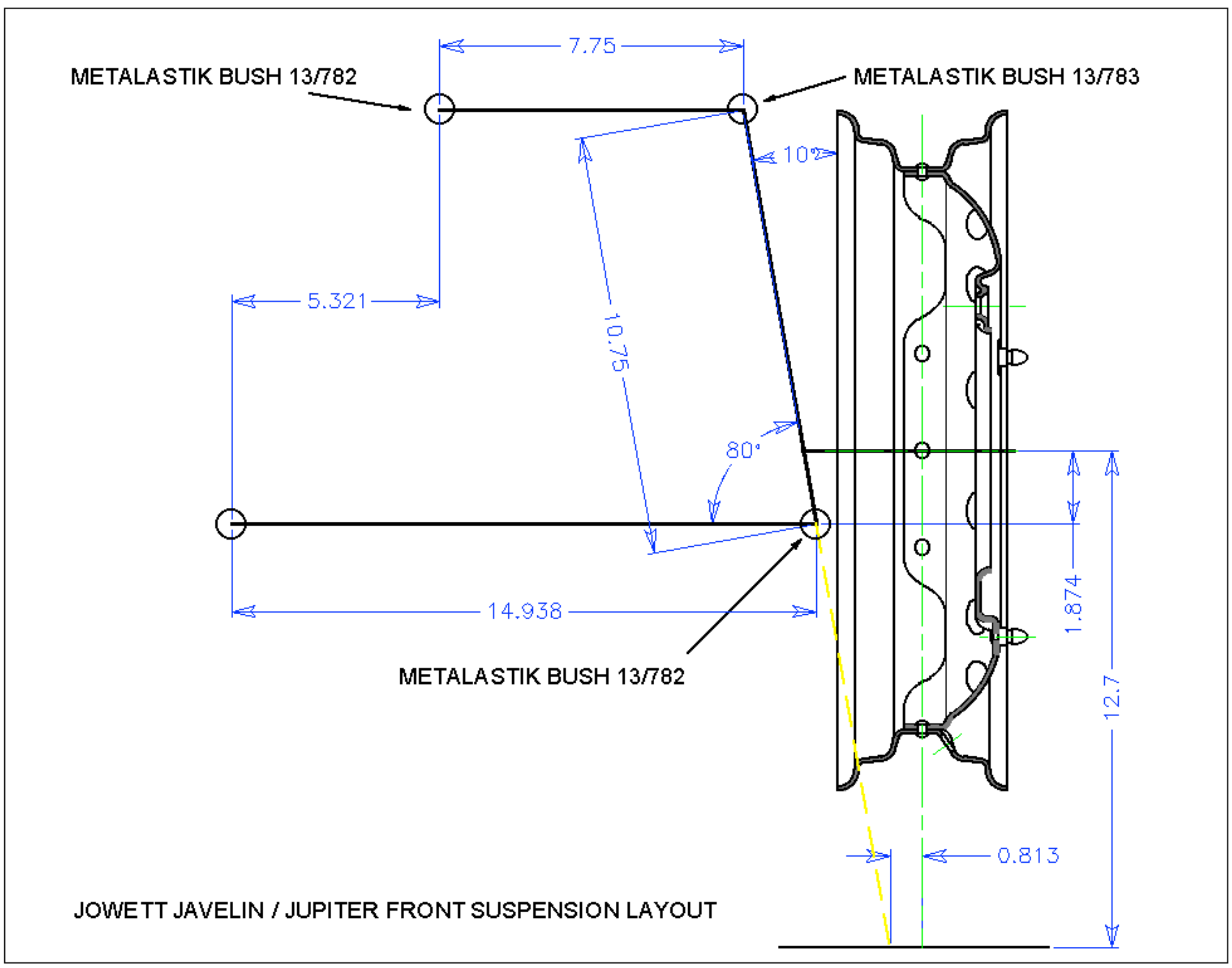

Figure 1

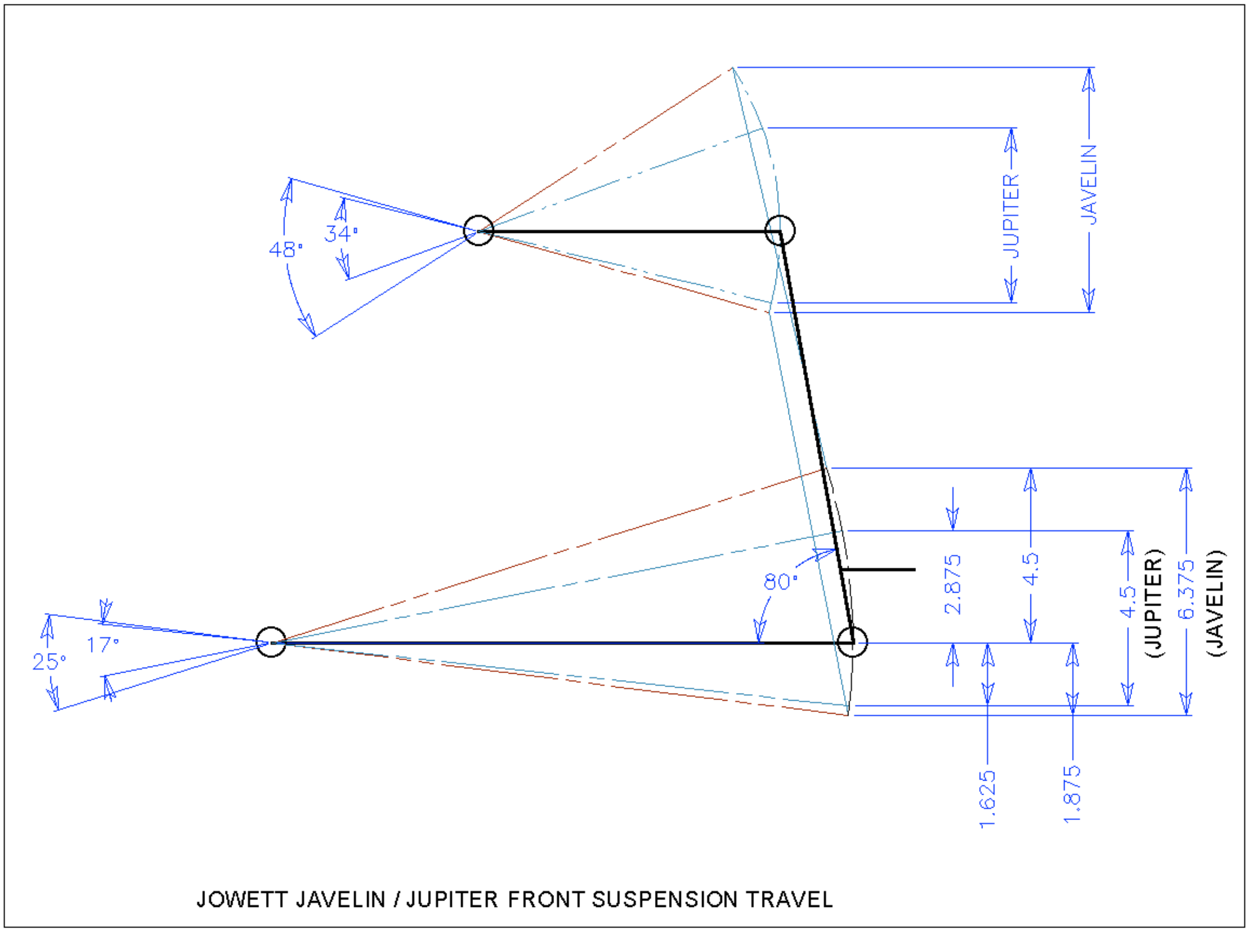

Figure 2

Rubber Bush Durometer Test

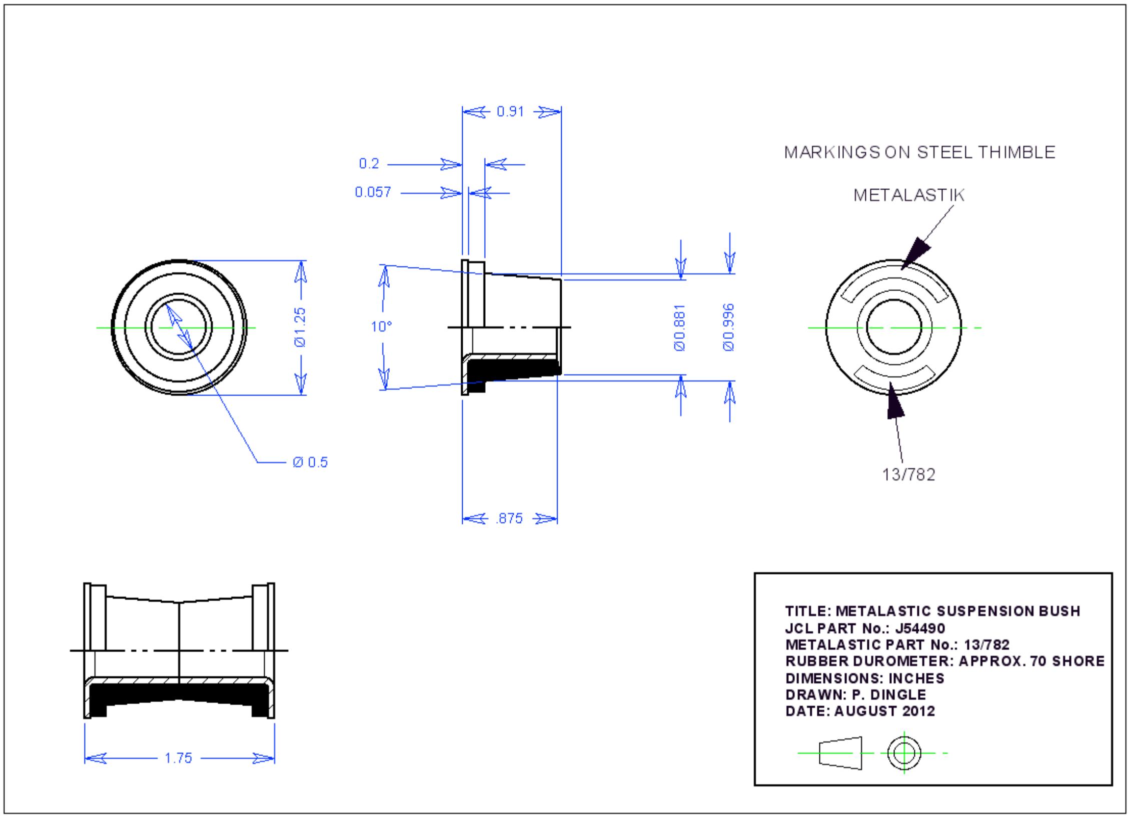

Figure 3

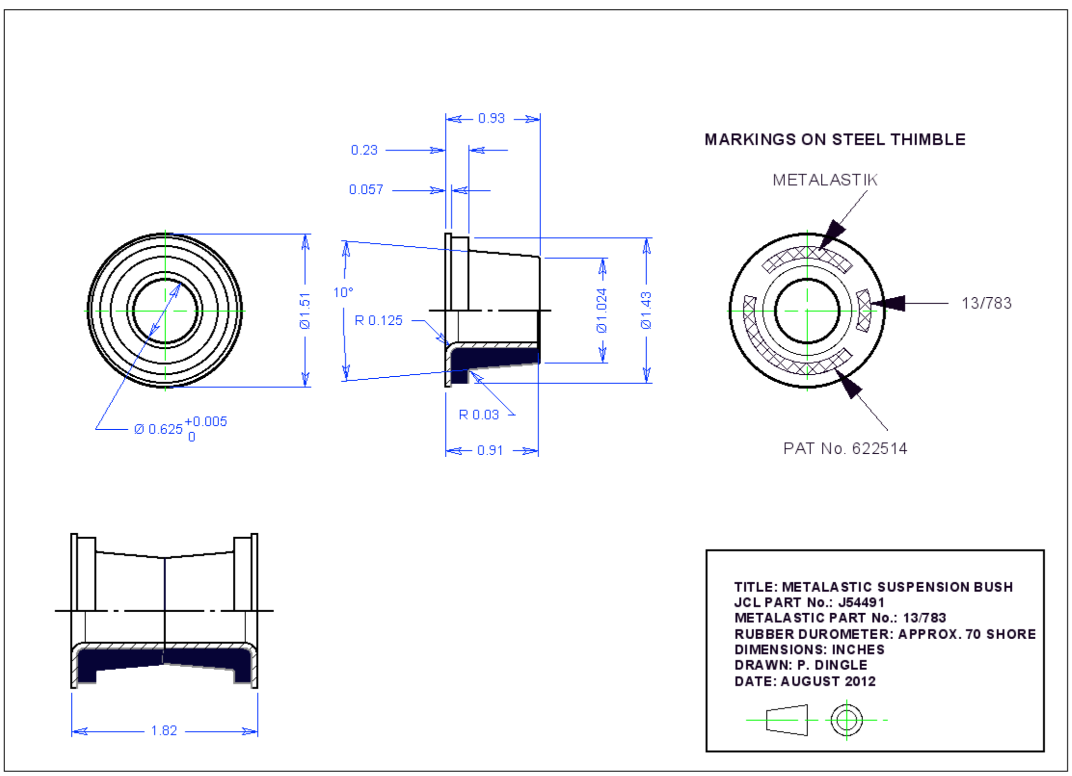

Figure 4