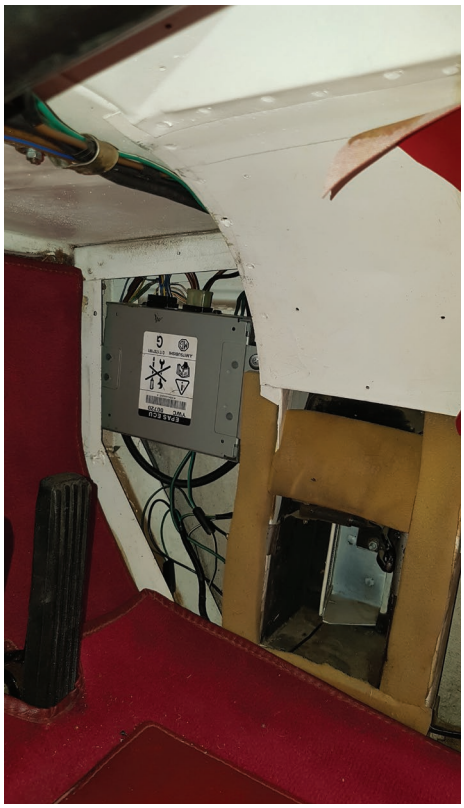
Electric Power Assisted Steering (EPAS) fitted to an XK140 DHC by Peter Goodale.

Peters Attraction with Jaguars.

The Jaguar XK120 first popped up on my radar in the early fifties. As a student just entering University and with little savings, at best, I could afford a second-hand motor bike. At least then I could get myself to Sellicks Beach where in those days motor racing was held before the circuit at Port Wakefield was developed. That is 70 years ago but I can still remember the thrill of watching an XK120 racing on the beach. And when in Adelaide, I could take myself to admire the red XK120 parked in the old SA Fire Brigade HQ in Wakefield Street.

Thirty more years would pass before I felt comfortable purchasing a classic Jaguar, not an XK, but a 1959 Mk II 3.8, and joined the JDCSA.

A couple of years later on an overseas trip to a conference, and while in England a chance encounter with an XK owner led to me agreeing to purchase his 1956 XK 140 FHC. Some 7 years later, and back in SA, fellow club member Peter Holland let it be known that he wished to sell his 140 DHC to finance a domestic project. I had always particularly admired the XK drophead so the upshot was that I now had two XKs.



ECU located in side wing

The drophead was in a totally dismantled state, but I had just retired from an engineering practice where I had spent the greater part of my working life, and saw this as a project to fill in all the spare time I was about to enjoy.

Reality soon dawned: you do not have spare time in retirement, in fact how did I ever find time to go to work? You see, we had chosen to retire to the country and with an old house to renovate and a couple of other car projects already in place it was another 10 years before the restored 140 rolled out of the workshop. In the ensuing years the car has clocked up 25,000 miles almost entirely on rallies and club events.

Time for EPAS

In keeping with many other British cars of the period, and before power assistance, all the XKs had really heavy steering: manageable in my younger days but not now.

Fortunately, there is a solution! Electric Power Assisted Steering (EPAS) where an electric motor imparts a torque to the steering column through a worm and wheel coupling has become universal in car manufacture today and aftermarket manufacturers are providing kits to suit old cars including Jaguar. The only downside is the cost.

From experience I have learned that it is sometimes necessary to make a component to complete a restoration project, so why not design and make a power steering system to fit to the XK. Always one for a challenge, I was encouraged in my thinking by two fellow engineers who had successfully fitted an MGF EPAS to their MGBs.

I acquired, for little cost, an MGF unit to consider how this might be incorporated into a steering column to fit the XK and set for myself a relatively simple design brief.

I. Remove the existing steering column intact and put aside for reinstallation if ever required and with minimum alteration to the body. (In the event a bracket spot welded to the firewall locating the column had to be drilled out, but could always be reinstated with screwed fasteners.)

Column installed in XK140

II. Reuse the existing steering wheel and telescopic adjustment and position the EPAS unit out of obvious sight so that at a glance the car looked original.

It quickly became apparent that the EPAS unit would have to located and fixed hard against the firewall concentric with the existing hole and oriented so as not to impede the proper operation of the clutch or brake pedal. A new 1.6 mm steel bracket attached with three 5/16 UNF bolts at a suitable spacing would provide for the torque reaction in service.

Design and construction of an upper steering column to marry up the EPAS and the original steering wheel became the major task. It just so happens that I am one of those people who never discards anything from past projects and puts them away where most times I can find them again.

Amongst the collection was a complete Mk 2 steering column which I figured could be suitably shortened and rebuilt and the necessary parts machined to accomplish this task. Because the Mk 2 inner column is designed to be introduced into the outer from the top (and cannot be readily altered) some means had to be found on assembly to join the inner shaft to the EPAS inside the outer tube.

This was resolved by drilling two diametrically opposite holes in the outer tube large enough to insert a 6mm roll pin to couple up the inner column as shown on the general arrangement drawing. The photo shows the assembled unit in the car.

The section of shaft in the engine bay connecting the EPAS output shaft to the steering rack was fabricated from 1 inch steel shaft machined to accept a splined connection via a UJ to the rack pinion and a cut down section of the MGF output shaft at the upper end. This section includes a sliding spline connection to facilitate assembly and ensure that no end thrust can be transmitted into the EPAS unit.

The ECU for the unit is rubber mounted to the bodywork behind the side trim panel of the drivers footwell as shown in the photo. The power and control circuit cables that plug connect the EPAS and ECU can also be seen.

In addition, the ECU has additional cables for the following inputs: -

- 12V+ power supply from the battery via a 35A fuse (Lucas colour code-brown) + Earth(black)
- 12V+control supply via the ignition switch (Lucas colour code-Green)

A square wave voltage from a Hall Effect Transducer to sense road speed. My car was fitted with a Toyota Supra gearbox with speedo cable end modified to suit. Sensor part no C6006 available from New England Instrument Co has the 22mm nut and cable ends to fit in series at the gearbox. This unit provides 8 pulses per revolution which equates to a 160Hz signal at 60 mph. This signal modulates the torque assistance inversely with road speed, i.e., reduced assistance at increasing speeds

Engine speed. As best as I could determine engine speed does affect any output signals but the system would not work without it. A connection to the CB terminal on the coil brought the system to life.

Did the Installation & Performance Meet Expectations?

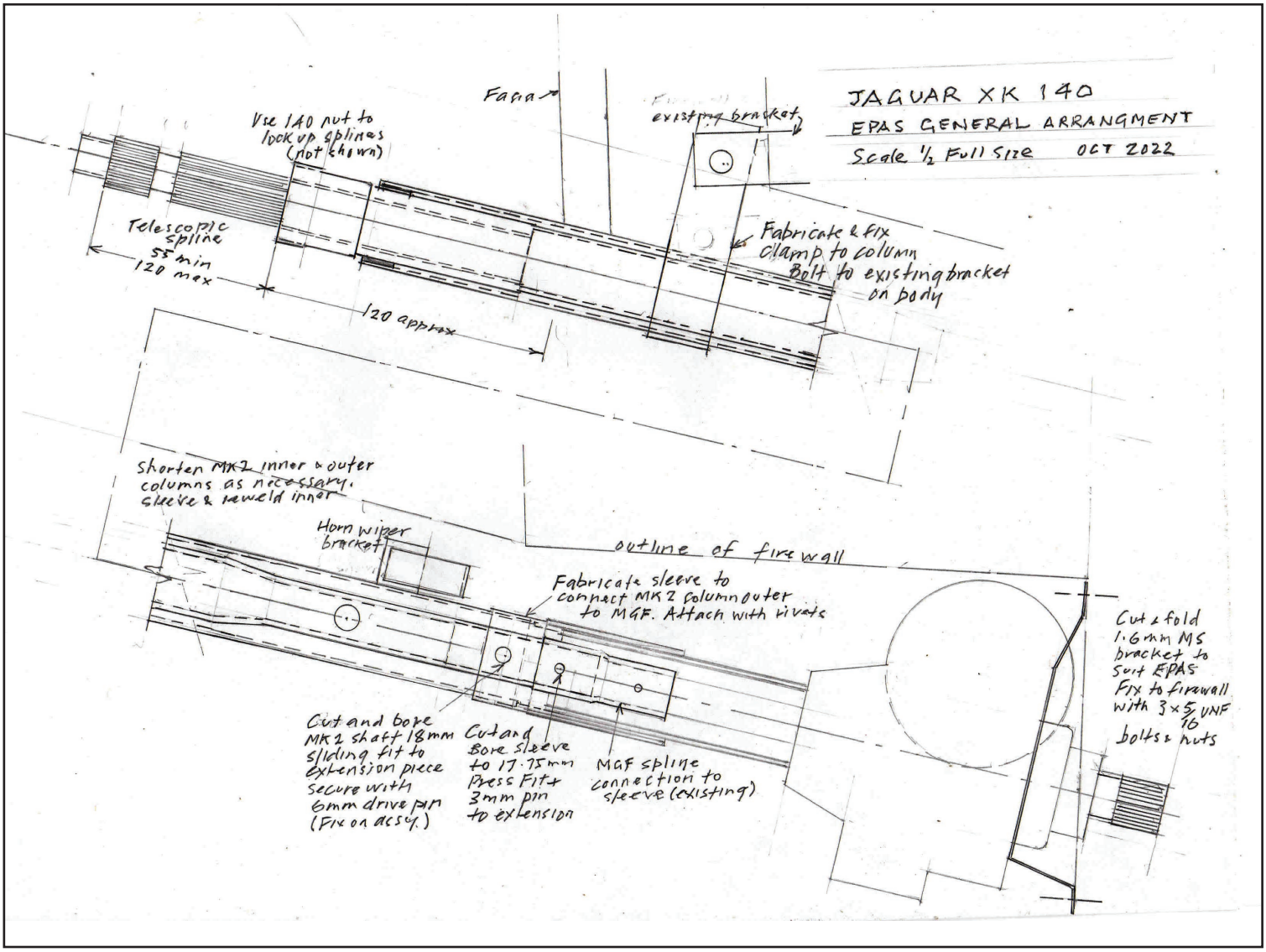
Out of pocket expenses were less than 10% of the cost of an aftermarket kit.

Labour costs (measured by time spent) were through the roof (to be expected on a one-off project).

Driving experience cannot be faulted. The effort required on the wheel is modest at all speeds and there is no sense of intrusion to normal driver input.

Got to be satisfied with that.

Peter Goodale
JDCSA member 1004



EPAS General Arrangement