Making Light Work

I am the happy owner of a 1951 Slough-built Light 15. Indeed, I have owned it for some 13years now ~ which is a record for me. Although it gets a frequent outing, I have always hesitated to take it through the city, as its steering is very heavy, it has a large turning-circle and one does not simply do a quick reverse park when driving around looking for a spot. In fact, city driving is just plain unpleasant. At one stage, I toyed with the idea of fitting conventional hydraulic power steering [ex. Torana gear with a pump from Repco], but finding the room and drive for the pump was a problem, so it never got advanced.

And then we learn that the Dutch have developed the EZ Electric Power Steering unit, which can be fitted to most old cars, and there was a kit for the Traction. The system involves a computer-controlled electric motor which, through a sophisticated sensing system, provides assistance to turn the steering shaft in the direction dictated by micro-movement of the steering wheel. It is just plain clever. The level of assistance can be dialled up with a controller mounted on the dashboard.

So I entered e-correspondence with EZ's Roger Reijngoud which led to my acquiring their power steering kit for the Traction. [It cost around $2,000 landed and was ordered noting that my car was Slough-built, RHD and converted to 12v negative earth].

I mentioned what I was buying to a friend of mine who is into model railways and builds his own kit locomotives etc. He said simply that on his experience, if it was Dutch design and manufacture, it will be well engineered and it will work. He was quite right on both counts.

The unit came complete with all necessary bits and pieces, [including a new steering-wheel nut and Woodruff-style key. I had opted for the upper steering column tube to be in polished stainless steel as a replacement for the old chrome-plated tube] and according to the Company's 5page installation manual, it was a straightforward installation. Certainly, fitting the EZ unit is not technically difficult ~ well within the capacity of most do-it-yourselfers ~ but it did prove to be a bit fiddly and sometimes frustrating. Not quite as straightforward as the manual suggested ~ although if my car was the French model as featured in the manual, with a simple little instrument cluster ~ things would have been easier, as there would have been a bit more room and less congested wiring behind the dash.

No special equipment is necessary, but I would advise those thinking of installing the EZ unit, to ensure they have a good set of mid-range metric spanners [including ring and tube] and sockets, with extension bars and a fine-movement ratchet. A power drill with a range of bits says 4mm up to 12mm diameter. An extension lead and work-light. A small arc-welder is also needed, [preferably a TIG unit], as well as a hacksaw and a good stock of various nuts, set-screws, washers and split-pins [as invariably you lose some and/or you decide to replace some]. You should also have a set of metric taps and die-nuts for cleaning-up threads to make them finger-run, covering the sizes: 6mm x 1.0, 7mm x 1.0, 8mm x 1.25, 10mm x 1.5 and 12mm x 1.75 [for the track-rod ball-joint stems]. You will also need a ball-joint separator [lever-and-screw type works well], Allen keys and a large Torx key to match the Torx set-screws on the motor unit.

It is important not to get anxious about setting a deadline for completing the project. Just take your time and work through it task by task, setting a daily goal. As I recall, I tackled the project in the following sequence and it went well.

DAY 1

- Put the front wheels up on garage ramps [as per local auto shop], ensuring the wheels were 'straight ahead'
- Remove battery
- Remove steering-wheel
- Remove headlight switch unit, noting wiring [suggest unit be slid off the steering column rather than prise the clamp open and risk it cracking through the rivets]
- Remove wiring to indicator switch, [noting what goes where]
- Remove dash-board and instrument cluster [note wiring and don't forget to free up the choke cable and ignition advance cable [I have a 123 distributor but have kept the advance cable as 'heritage' even though it serves no function].

This will do for Day 1.

As I was not happy about cutting and welding the old steering-shaft in-situ, [awkward, overhead positional welding is not the best option, as the integrity of the weld can be compromised] and I wanted to check the steering rack and renew the rubber gaiters anyway, I decided to remove the steering gear completely. It is not difficult, but a bit demanding for just one person, as the rack is a bit heavy and cumbersome.

DAY 2

- Remove split pins and nuts and disengage track-rod ball joints [temporarily jack up and remove adjacent road wheel in turn, to improve

access]. Note that the ball-joint extractor will likely damage the old grease cups. Don't worry, they are not all that good anyway, and a steering specialist will have better, rubber grease boots as replacements]. Swing the track rods up out of the way and tie them to the rack, using string or large cable ties.

- Undo the four bolts that secure the steering rack to the chassis and ease the unit down and forward. A trolley jack under the rack can help control the lowering and withdrawal. [A second pair of hands would be useful]. Note that you may have to jack up the RH wheel again ~ about 75mm ~ just to allow the steering-shaft to withdraw fully. Place the steering gear on some timbers, ready for cleaning and checking-over.

This will do for Day 2.

Day 3

- Clean the scunge off the rack, give it a hand paint and do what work you had planned [eg. fit new gaiters, check condition of gear ~ especially the base of each rack ball-joint stem, as the old metal grease-retainers can cut into the stem and weaken it. Re-lubricate and re-assemble]. Working on the steering gear is not especially daunting, and special 'Citroën' tools are not really necessary, given today's plethora of hand tools, although a good strap wrench is handy.

This will do for Day 3.

Day 4

- Sittherack up on a couple of wood horses, [one supporting the shaft], so that you can measure and cut the steering-shaft more easily
- Unpack the EZ unit on the bench and temporarily fit the splined coupling to the motor output
- Measure the distance from the threaded end of the new steering-shaft down to the bottom-end end of the coupling, and then subtract 70mm [to allow for the old shaft to go up into the coupling]. This dimension is the length to cut off the old shaft. Mark the old shaft accordingly.
- Also mark the position of the steering-wheel keyway with a line, using a felt-tipped pen, to later check the position of the steering wheel.
- Summoning all your courage, cut the old shaft. The steel is surprisingly soft and the cut-off is easily done with a hand hacksaw. [You will then find the shaft is hollow ~ which I never knew]
- Go inside and have a brandy to calm the nerves.
- With a file, give the old shaft a clean-up in the area that is to be welded, bringing up shiny metal for the weld.
- It is likely that you will have to renew the weather seal where the shaft goes up into the bodywork, as well as the pinion bearing weather seal at the bottom of the shaft. Using a template, cut a new body weather seal from rubber sheet and if you need to renew the bearing weather seal, make one using an old-style, solid rubber house door-stop from the local hardware shop [eg. Bunnings], drill it 20mm and fit a piece of 38mm rubber hose over it with about 5mm projection. Use a non-hardening adhesive and cable tie and bingo; you have a new dust seal.

This will do for Day 4.

Day 5

- Undo the bolts that hold the two-piece clamp for the rubber bush at the bottom of the steering tube. This is fiddly, as the clutch-pedal mechanism is in the way, but it can be done. The nuts are accessed down next to the brake master-cylinder. [It is very likely that the rubber bush has fused itself on to the old tube and simply loosening the clamp will not allow the tube to be withdrawn].
- Undo the nuts holding the upper tube bracket to the dash frame and withdraw the whole steering tube with clamp, bracket and bushes.
- Slide the new pinion-bearing weather seal down the shortened shaft to the pinion box, and then the [new?] body weather seal. Remove the shaft bush from inside the bottom of the old steering tube and slide it down the shaft also, all in that order. Use some tape to hold these items away from the weld site.
- Remove the new, splined coupling from the power unit kit.
- It is important to determine whether-or-not the shaft and the new coupling are of different steels [mine were]. A simple spark test will help. Just lightly touch each respective weld surface with an angle-grinder and observe the colour of the sparks. If different, then strategic welding is required.
- It is critical that the new coupling and the steering shaft be perfectly aligned axially and as the coupling counter-bore has about 1mm slop over the shaft, the shaft end should be neatly wrapped with a shim [steel or brass], such that the coupling is a tap-on fit. The shim needs to be for almost the full depth of the hole in the coupling [70mm]. When it is clear that the alignment

is good, welding can proceed. This will do for Day 5.

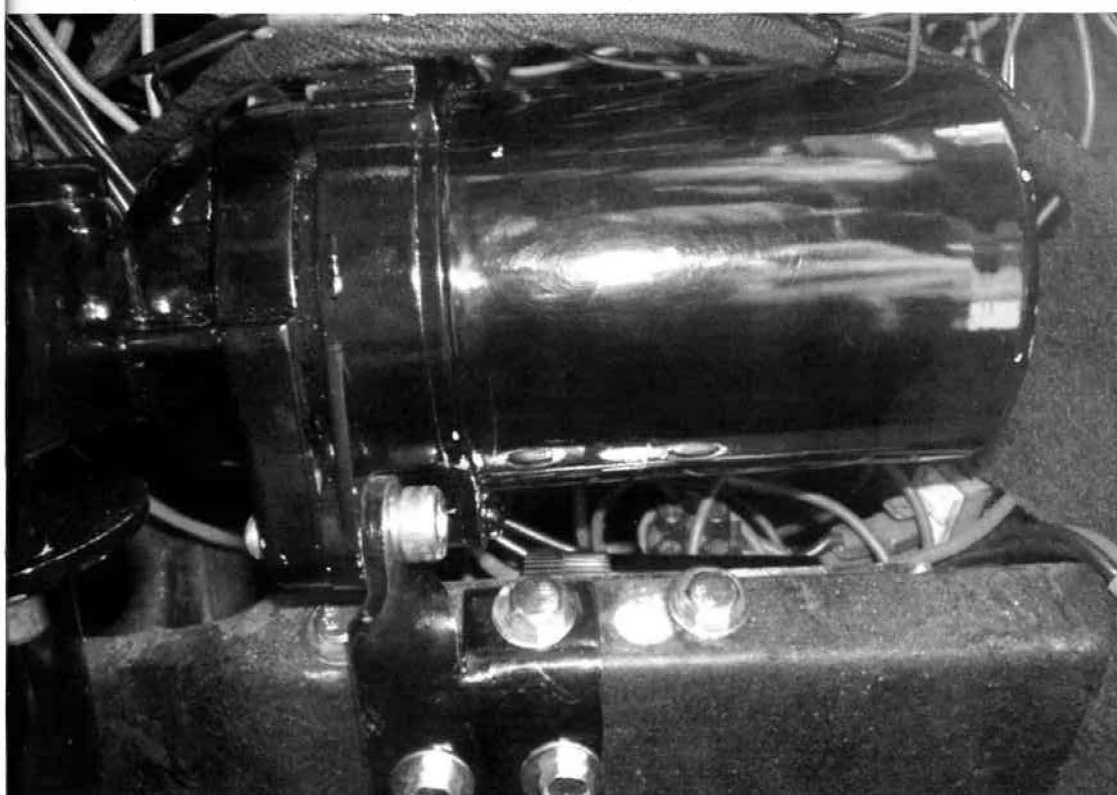
Day 6

- If the old shaft and coupling are of differing steels, care should be taken to use a welding system that prevents the weld from cracking [which is a real risk]. Recommend the use of a TIG welder [Tungsten Inert Gas], using a 309 SS filler rod ~ or similar system. This gives a strong and stable weld of very neat appearance. Ensure there is no undercut to the shaft. Suggest that the rack be held up high with the shaft and coupling resting down on the bench to allow a down-hand weld. Make sure the welder does not earth through the rack body, but directly on to the shaft, otherwise bearings and slide surfaces could be arc-damaged. [An ordinary arc-welder with low-temperature SS electrodes, will also give a good weld].
- Suggest two 4mm roll-pins be added as a belt-and-braces safety measure. Drill two 4mm holes through the coupling at suitable spacing and at 90degrees. Tap in the roll-pins and grind off excess.
- The top and bottom external rubber bushes now need to be removed from the old steering tube. This may prove a trying task, as the rubbers may have stuck to the tube. The lower one can be separated by the insertion of an artist's or chef's spatula and slid off. The top one is more difficult as it is a much tighter fit and tapping the bracket body simply exerts a 'jamming' affect on the rubber. The spatula is employed again, together with a piece of PVC pipe of just the right diameter to match the bracket bezel, and with some olive oil [or similar hi-tech fluid] the bracket may be 'freed' with the spatula and tapped off the tube.

This will do for Day 6.

Day 7

- Re-fit the steering rack [but do not yet re-connect the tie rods] and slide the new pinion bearing weather seal down against the pinion box and push the old rubber shaft bush [which is probably still in good condition] up the shaft into the column void just below the brake M/C. Push the [new?] sheet-rubber weather seal up the shaft to cover the body hole. Hold it in place with some double-sided tape or adhesive if necessary.
- Lower the new EZ steering tube [with the rubber bush and its two-piece clamp], down over the steering shaft, far enough to leave the new coupling projecting clear, [having fitted the shaft bush in the bottom of the tube flush with the end]. Leave the tube in this position for the moment.
- Re-bolt the bush clamp plates to the floor, but leave loose ~ [hacksaw a slot in the head of the bolt behind the clutch-pedal mechanism, as this will help in holding it when the nut is fitted].
- Slide the steering support bracket down over the new EZ upper tube to about half way [the unit is still on the bench].
- Fit the steering wheel temporarily [wheel-nut not necessary], then offer ~ I love that phrase ~ the new EZ power unit up under the dash, with the motor lying horizontally to the right [away from the handbrake ~ although it can hang in any position for the time being], ensuring the support bracket studs go into their holes under the dash but the splined motor shaft is not yet into the coupling. Do the support bracket nuts up finger tight
- Whilst supporting the power steering motor, turn the



steering wheel to 'straight ahead' and with the motor still in the 'right horizontal' position, push the whole assembly down until the splined shaft from the motor engages the coupling.

- Check that all is well and tighten the coupling bolt

NOTE ~ thoroughly soap inside the two external steering-tube bushes, as this will assist sliding for location and fitting.

This will do for Day 7

DAY 8

- With the track rods tied out of the way, gently turn the steering wheel from side to side, to ensure the tube support bracket 'settles' to a true axial alignment then secure the bracket without moving it.
- Remove the socket-head set-screws on the motor adjacent the coupling and slide the lower steering tube up to the motor, turning it to get the screw-holes in the flange to line up. Replace the set-screws finger-tight [space is tight]
- Ensure the EZ motor is still in the right horizontal position and fit the EZ anchor-bracket [to stop the unit from counter-rotating when in use], noting that this bracket will probably need modification by re-bending to improve line-up and a cleat welded to it for better bolting the anchor to the bulk-head shelf up-turn. Suggest a piece of flat steel be bolted-in behind the up-turn, to provide a strong draw-up for the anchor bolts. Suitable steels are euphemistically sold at Bunnings [and elsewhere] as 'mending bars'. Do the anchor bolts up tight.
- Remove one of the set-screws securing the lower tube [flange] to the motor body, and make a second [special] anchor-bracket to pick up this flange screw and the bulk-head up-turn. This may be a bit fiddly due to lack of space. Fit the bracket and tighten off all set-screws.

NOTE ~ use new set-screws of increased length to make up for the length lost by the thickness of the anchor-brackets. Make sure the anchor brackets 'slide' into position without any gaps or play, such that when tightened, there is no relative draw-up movement of the new power unit.

- Tighten the bolts securing the bush housing plates to the floor.

This will do for Day 8

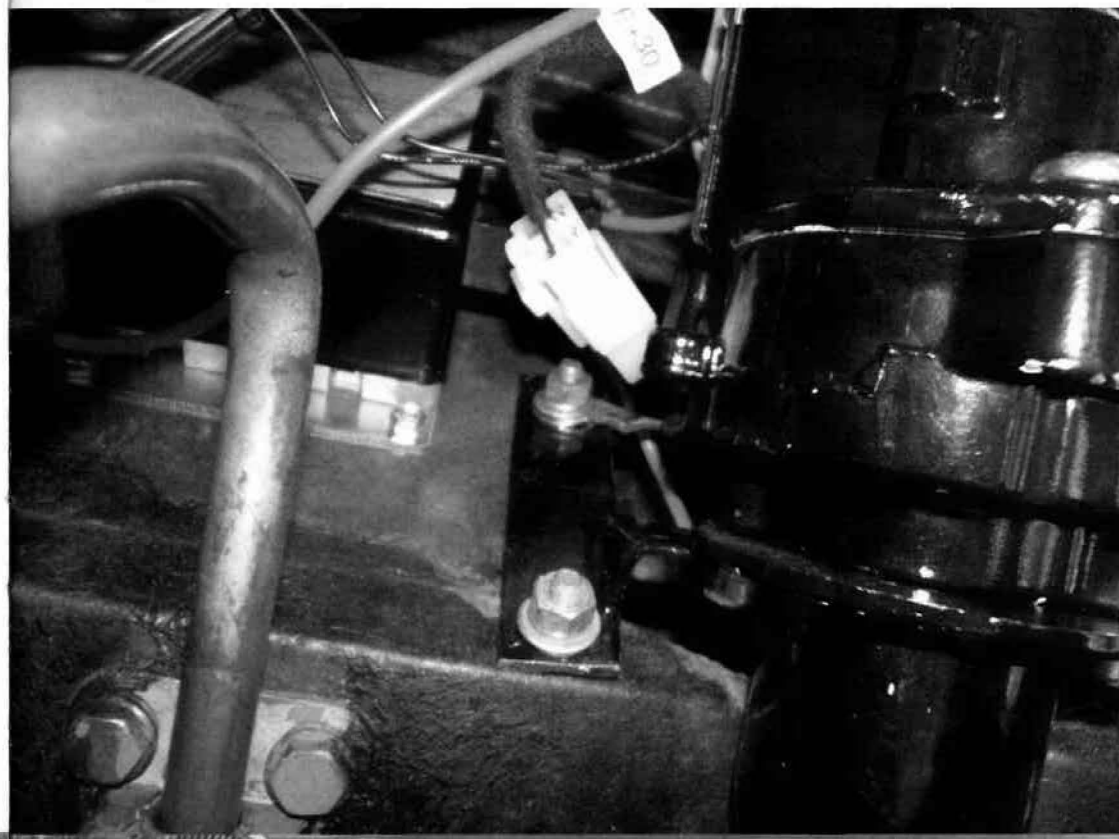
DAY 9

We are now well into the home straight.

- Fit new grease cups to the track-rod ball-joint pegs and refit the track rods, ensuring new split-pins are fitted.
- Mount the EZ computer box in a suitable place [suggest the wall of the battery-compartment under the dash], together with its fuse.
- Install the EZ rheostat controller [suggest under the traffic-indicator switch. The Legs of the controller bracket should be shortened and bent 90o, drilled and bolted-up under the dash frame.

NOTE ~ depending on the lie you wish the controller wiring to take, there is a need to drill a dimple in the back of the controller-plate, to locate the rheostat tag and stop the whole unit from turning with the knob.

- Couple all motor wiring to the computer and rheostat [everything is shape-matched and all wires are colour-coded and tagged, so nothing to worry about], and join the thin red [15amp] activating wire into the ignition switch. Suggest an in-line fuse be included.
- Feed the heavy [red] power wire out though a suitable grommeted hole in the fire-wall and connect it to



the battery positive pole [or other suitable high-amperage power take-off].

This will do for Day 9

Day 10

- Re-install the instrument cluster [don't forget the speedo drive cable] and dashboard.
- Re-fit the steering wheel and, pulling the headlight cables through the steering bracket, re-fit and connect the headlight switch.
- Re-connect the indicator switch.
- Re-install the battery and connect it up, also the choke and advance cables.
- Prime the carburettor, pull out the choke and turn the ignition on ~ a muted 'click' should be heard from the EZ motor. Drive the vehicle back off the ramps
- Have another brandy to calm the nerves from the excitement!
- Drive around the block with a broad grin because PROJECT COMPLETED!

This will certainly do for Day 10!

So was it all worth it?

Absolutely. The steering is light and city driving is much more pleasant. I am even happy to try a kerbside, reverse park! Depending on the level of control dialled up, the effort now required to turn the steering wheel is approximately one-ninth of that required when unpowered. The power unit is totally silent in operation and there is no lag or sense of electro-mechanical when moving the steering wheel. It is just like driving a modern car. The EZ unit is fail-safe. If the motor or electrics should ever fail whilst motoring along, the steering simply reverts to 'heavy'.

I can now say that my treasured car really is a 'Light 15'.

If I can be of any help to those toying with, or installing, the EZ unit ~ just ask.

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