Repairing the Ignition Switch

Rolls-Royce devoted much care to the design and development of the ignition switch for the instrument boards of their 40/50hp and 20hp chassis, but then, Sir Henry started his career as an electrical engineer. Two internal RR memos referring to the design of the switchbox are reproduced in **Appendix 3**.

Today after 90-odd years of faithful service some switches are becoming unreliable. Light switches have been reported to fail, but the problem is mainly confined to the "charge" switch. The particular problem with the charge switch is that it passes quite a high current, typically around 10 amps. When charging is switched off, sparking can occur and this will gradually erode the contacts. The symptoms are; unreliable charging, having to flick the switch hard up, ammeter trembling but not indicating a charging current when charge switched on.

Restoring the charging switch is a relatively straightforward job for the amateur but one that requires patience and care. Inside the switchbox each switch has two contacts and a bridging wedge slides between them to establish a current from one contact to the other. Each double contact is made up of a complex stack of ten flexible blades, with many washers, spacers and insulating layers; these are exceedingly difficult to put back together again if they are taken apart. The 20hp book of parts lists a barely credible 189 separate components which go into the switchbox assembly. These are not available as spares so careless dismantling by an amateur can result in having to scrap the switchbox!

How to undertake the task:

- Remove the switchbox from the instrument panel
- Remove four nuts holding the rear aluminium cover in place, push cover away from switchbox and up the helical conduit (**1**), exposing all the wires leading to the switchbox, **Figure 1**

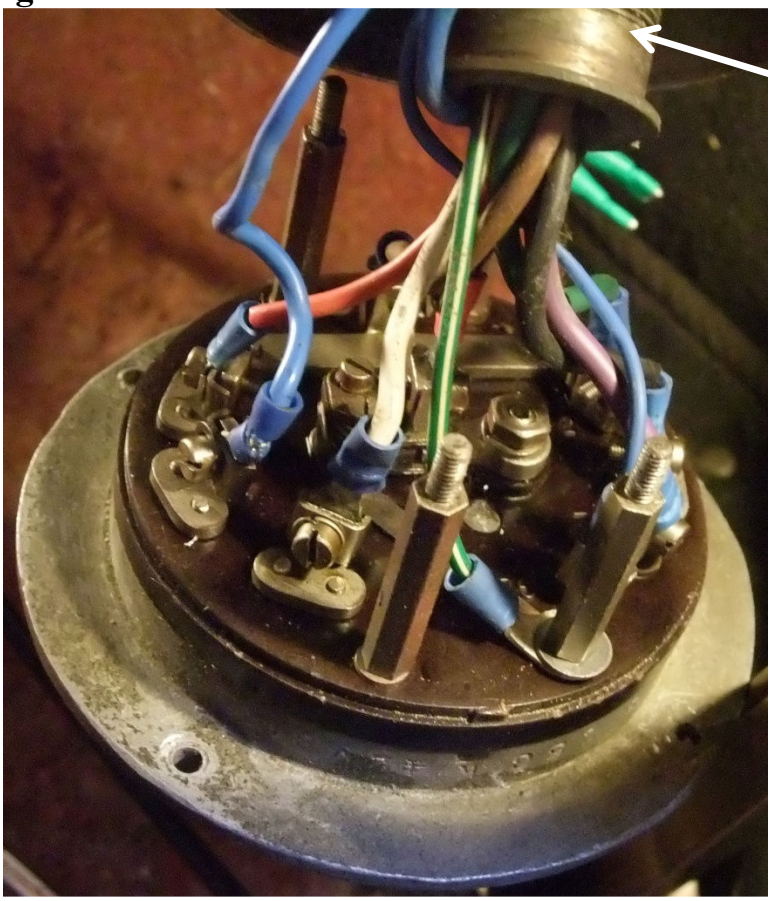

Figure 1

- Label each wire and note which terminal each wire is attached to
- Release all wires and take the switch box to the work bench, or the kitchen table (much warmer)
- Remove the two switch handles (but not the instrument light switch. Remove the remaining long spacer nuts which hold the Bakelite base to the aluminium front face. Note that one spacer nut is shorter than the rest
- Separate the Bakelite base from the front face. This is a tight fit, and it might be difficult to start the separation. Gently tap a Stanley knife blade into the joint around the circumference until it starts to open up a crack
- Revealed: the beautiful, solidly-built switch box mechanism, probably covered with a layer of dark brown oily stuff, **Figure 2**

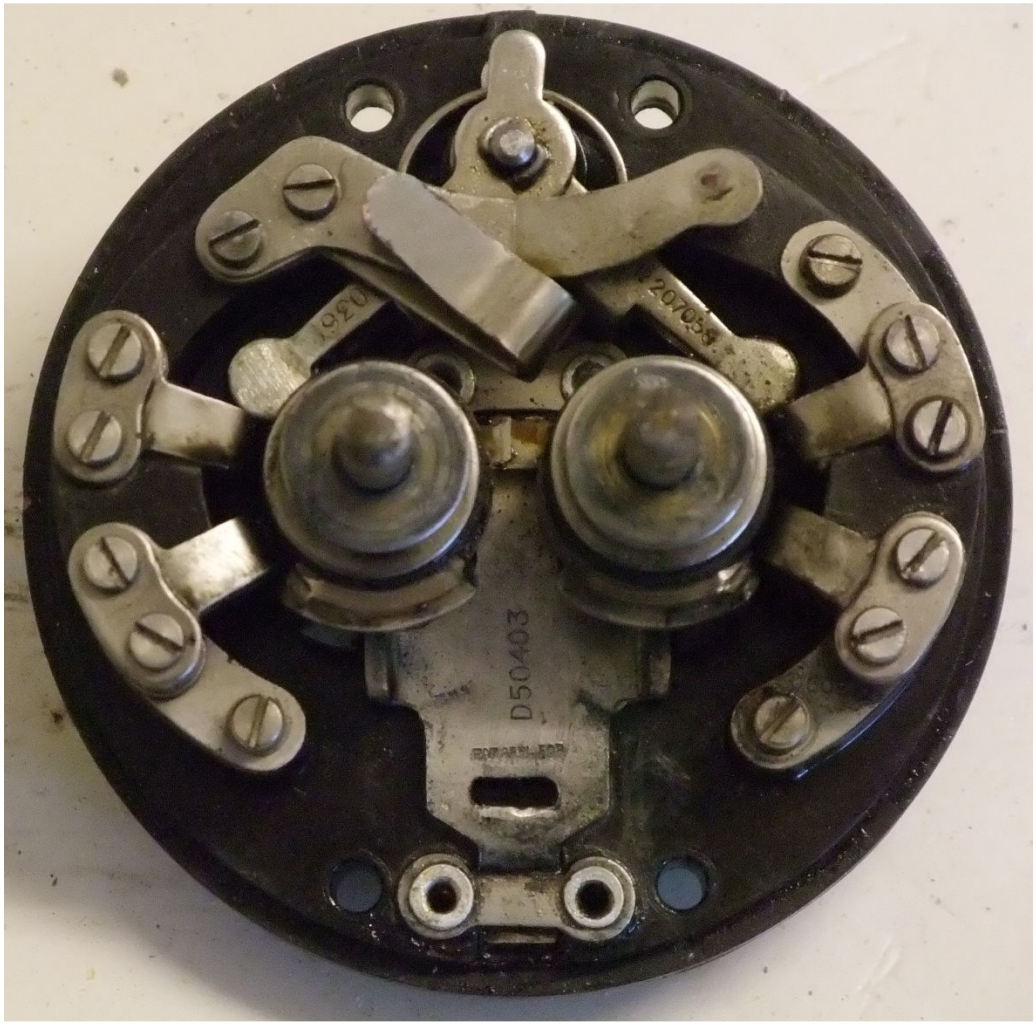

Figure 2

- Clean everything thoroughly with electrical cleaner, **Figure 3**. Small clean paint brushes are useful. Note the badly eroded bridging wedge (**2**) between the sets of charge switch contacts (**3**)**.** The contacts themselves are also eroded; there is a ball of molten metal on one charge contact. The other three contacts (ignition, side and headlights **4,5,6**) were in good order - after 86 years!

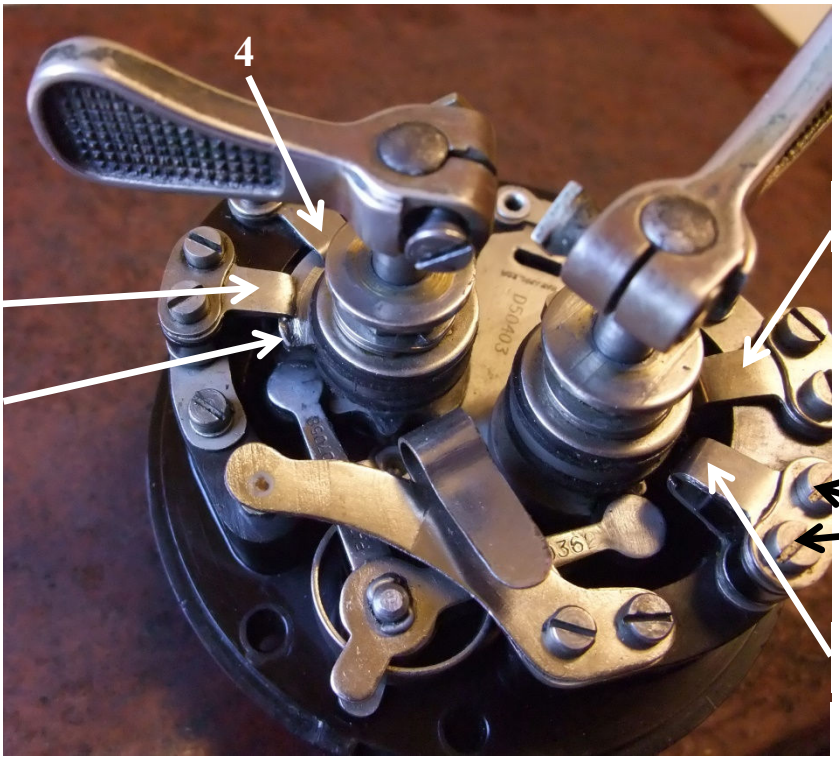

Figure 3

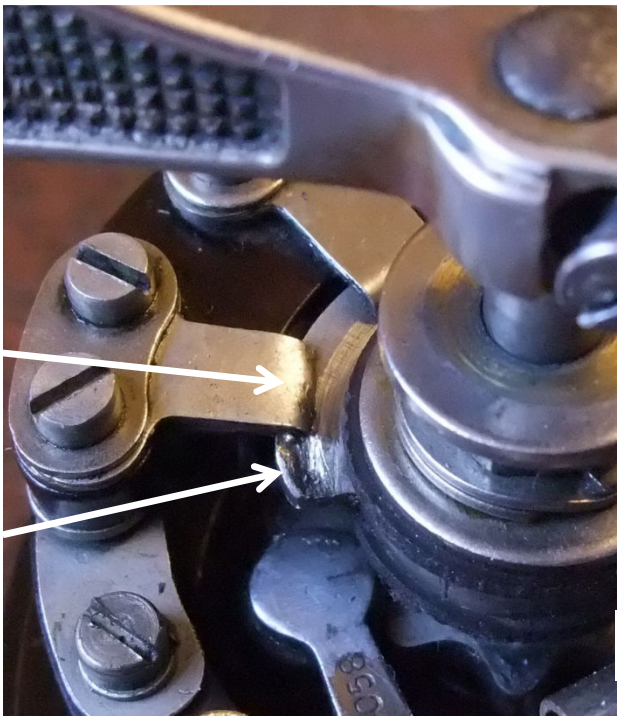

Figure 3a

On no account unscrew any of the long bolts (7) which hold the switch contacts (3,4,5,6) in place; there are two bolts for each of the four contacts. See warning in paragraph 3.

- With the ignition capstan removed, **Figure 4**, squeeze the "charge" contacts together, ie reduce the gap between them, using long-nose pliers. This is the crucial operation because it reconnects both eroded contacts with the bridging wedge

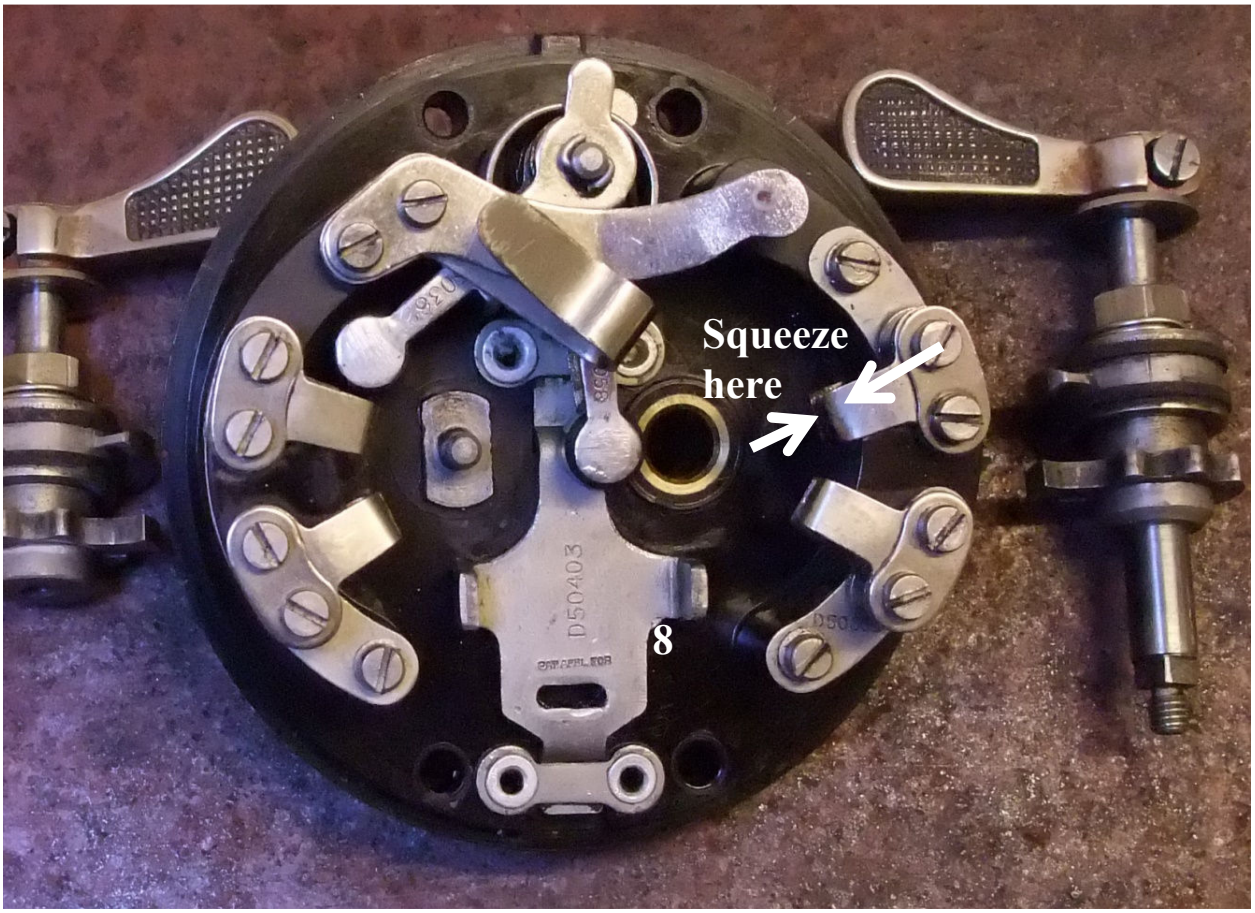

Figure 4: Capstans removed

- Re-assemble the capstans and check that all four switches are operating properly. ***Both upper and lower*** contacts must visibly move as the bridging wedge moves between them. Check with a multi-meter for reassurance
- If you want to overhaul the ignition lock, do it now, see Appendix 1
- If you want to paint the face of the switchbox remove the instrument panel light switch. The bare aluminium face can be primed with aerosol etch primer obtainable from the trade counter of auto factors
- ***Very lightly*** lubricate the moving parts. GT85 aerosol with PTFE, which is a lubricant, penetrator and water displacer is recommended. Do not use WD40 or similar products on delicate items such as locks and switches, as they leave a residual oily film which eventually attracts dust, grease etc. With GT85 the residual film is PTFE which does not attract oil, water or dust
- Reassemble the switchbox, making sure that the spigot on the lock barrel is lined up to enter the slot in the locking plate (**8**) and attach all wires

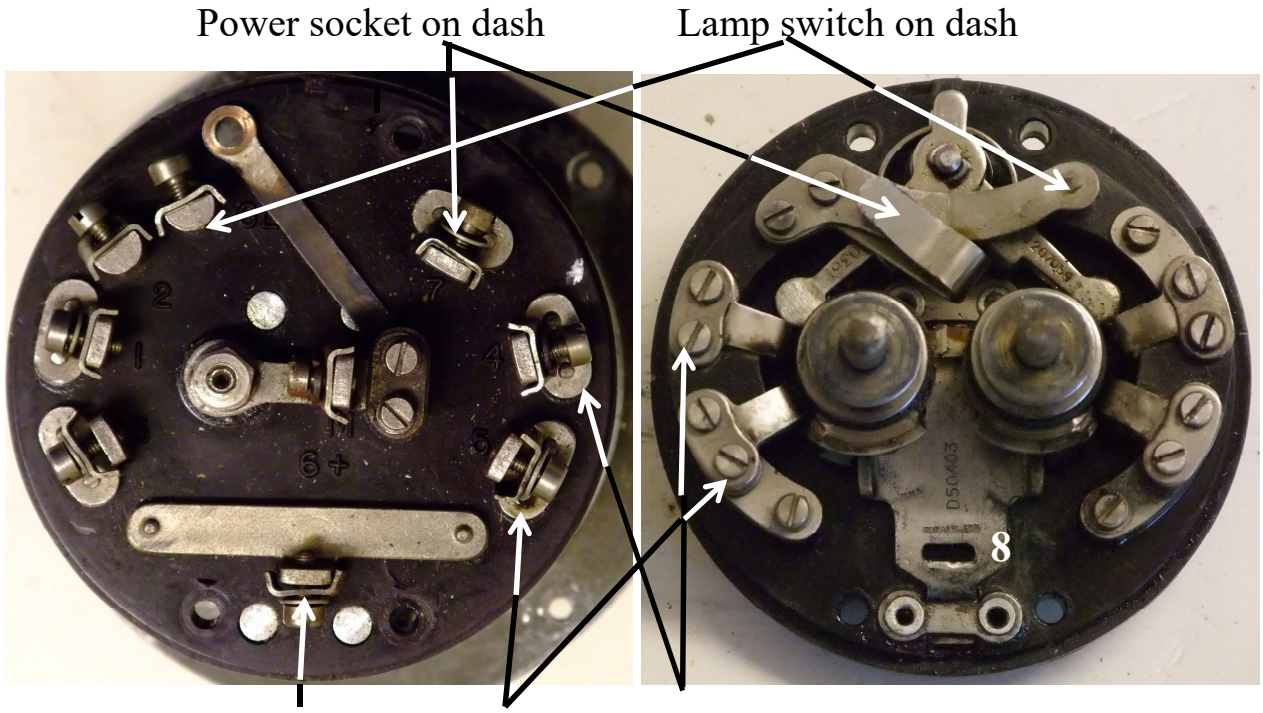

Figure 5: Back and front views of switchbox, after removing covers

(Note that the numbers on each wire attachment correspond to the fuse numbers that the wires leads to.)

- It would be sensible to check the operation of the box at this stage, ie the lights, ignition switch, and especially the charge switch (by running the engine). You might need to adjust the dynamo output, it should be about 10 amps see Appendix 2
- Attach the back cover to the switchbox and bolt the completed box to the instrument panel.

It is preferable, but not obligatory, to switch the charging off when the charging current is low, eg delay switching off until engine is running fast or when it is idling. This is to minimise the chance of arcing across contacts which are already likely to be worn.

Appendix 1: Ignition Lock

The method of overhauling the switchbox Yale-type lock is well described and illustrated by Michael Forrest, Bulletin 279 pages 25-26. In my opinion it would be wise to entrust this job to a professional locksmith, especially if you need to renew any of the tiny springs and tumblers (12 in total) or have to cut a new key.

Appendix 2: Adjusting the Dynamo Output

A high output (more than about 10 amps) will eventually wreck the dynamo, and other components through overheating. Adjusting dynamo output is easy, but could be tedious:

1. Unscrew the dynamo shaft couplings in front (C-spanner) and behind (knurled nut). If desired, retain the magneto timing by marking relative position of teeth in front coupling using paint or correction fluid

2. Remove two bolts under the magneto which secure it to the plinth, move the magneto 3cm backwards, disengage the magneto shaft from the dynamo and move it to one side
3. Remove the dynamo
4. Remove the back cover. Thoroughly clean inside, especially the commutator.
5. While the cover is off, check the condition of the brushes, eg are they worn down, are they dirty or sticking in the brush holders? Replace or thoroughly clean as necessary
6. Double check which of the three brushes connects to the A, B and C contacts respectively using a multimeter (check connection to each brush in turn by sliding a piece of paper between the other two brushes and the commutator)
7. Mark position of the C brush's base plate with a fine tip marker pen, loosen two screws securing the base plate
8. **Move C brush nearer to A brush to reduce output current**, ie gently slide C base plate say 2mm towards A brush. **(***Move C brush nearer B brush to* ***increase*** *output current.)* Tighten the base plate screws
9. Replace the dynamo carefully, making sure that the locating screw at the back of the dynamo is correctly located in the slot in the plinth. Test output current; should be 10 amps maximum
10. If amps too high or too low, repeat 1, 3-7 (the tedious bit!)
11. Reconnect the magneto.

Appendix 3 Two RR 1920 memos referring to the switchbox

To R from EFC EFC1/T5/11/20

X4186 — RR LOCKABLE IGNITION SWITCH

We have examined and tested the first sample of this switch submitted to us for the purpose. We are aware that you already have in hand certain alterations to this at West Wittering. We find the electrical circuits to be OK. There is, however, a connection made by each switch in the position corresponding to one contact just going off and the other just coming on. This causes the battery ignition to be put on momentarily in changing from M to O and the magneto to be put off momentarily in changing from M to M + B. This may not, however, be objectionable.

Would it not be better to split each spring contact into three or perhaps two tongues, each bearing independently on the drum? The ebonite insulation of the drum is rather soft and allows tracking to take place. This, however, we have shown not to allow of any leakage on any ordinary voltage.

Will the copper ferrules through which the flexible to the instrument light has to pass be OK as regards chafing the insulation?

Is the exit for the wires through the case as nearly as possible opposite to the ring through which the wires have to pass?

It would look better on the front to mark the inspection lamp plug socket + and − instead of red and black.

In turning the switch, the diameter of the thimble seems to be a little too small and not sufficiently clear of the push button; also not sufficiently clear of the key, if this latter is left in place. There is a general opinion here and among Sales that the instrument light should be capable of being left switched on for certain purposes, e.g. looking at a map with the car stopped.

EFC

From E to EFC E2/G15/9/20

RE ARRANGEMENT OF DASHBOARD WIRING — N. SCHEME 571

Referring to the above arrangement which shews the Rolls-Royce distribution board and Smith cut-out, would you kindly note the following information which I am sending in accordance with Mr Royce's directions:

1. The cylinders are shewn with the valve chest pointing towards the steering side of the car, which is not in accordance with the present 40/50hp or with the left hand chassis. The extra room obtainable by reversing the cylinders from the position shewn, allows the RR distribution board to be moved nearer to the centre of the chassis. The object of this move is
   a. to clear the outer bolt fixing the top bracket of the steering column.
   b. to prevent the fouling of the flexible metallic tube attachment, and the steering column bracket.

   Referring to item a. Mr Royce would like the distribution board moved in, and the present method of securing the steering column retained. One nut of this latter fixing would then be exposed, and the other would be covered by the distribution board.
2. The nuts and bolts securing the corner castings should be placed on vertical and horizontal centre lines, for the sake of simplicity and good appearance.
3. Where the conductors pass through the dashboard slotted holes should be shewn instead of circular. Mr Royce would like these for the purpose of providing more room for the conductors, so that they will not have to be bent so acutely.
4. The taper pin fixing for preventing the conduits from dropping is considered to be not so good as providing lips on the lower die castings for carrying the weight of the conduits. Furthermore, the ball-mouthing can be carried out on the same lower die castings. It is assumed from an inspection of the arrangement that lips have been provided in the corner castings to prevent the conduits rising.
5. It is not clear what the dotted ovals shewn on the corner castings are intended to illustrate.
6. Mr Royce would like all corners in contact with the conductors to be radiused in the castings, a point in question being the junction of the distribution box with the nearest corner casting.
7. The flexible metallic pipes should be of non-rusting material such as brass. The necessity of being easily able to detach them from the dashboard is appreciated, and Mr Royce would like this done by bolting permanent union nuts to the back of the dash, and making a union joint (as in sketch) sweated to the pipng.

Further to the above, Mr Royce wishes me to say that he is expecting Derby to send him a model of what the final RR distribution board will be like.

R