

## **Section 6**

### **Frame**

### **Radiator and**

### **Exhaust**

*Velocette*

## FRAME, RADIATOR AND EXHAUST

### FRAME REMOVAL

It is easy to be put off attempting to remove, or replace the frame onto the engine/transmission unit on one's own. This is often because of the advice given in the Service Manual -"assistance is necessary when performing this operation". This is a task that can be done single handedly, though there are one or two "dodges" that may be of interest:

1) Make sure there is a method of holding the frame at the rear - trying to hold it by the edge of the rear mudguard is a recipe for disaster, and cannot be done without removing the panniers. A loop of rope threaded through and underneath the pillion pad frame makes a suitable carrying handle.

2) Another "safety first" tip is to tie the handlebars in the straight ahead position. A sudden swing of the handlebars will not only ruin all the alignment when re-assembling, but is likely to cause you to overbalance or something equally nasty. Anchoring the 'bars with string through the front seat mounting bracket works well, although with the Vogue another method will need to be found.

3) If you are concerned about the paintwork, protect the LE oil filter body with a thick cardboard. This is important as the bottom of the frame tube assembly can make a nasty mess of it as the frame is lowered into place.

4) There is nothing worse when trying to remove the frame than finding it will not free because something which should have been removed or disconnected is still in place - for example it is easy to forget the speedo. cable. In the case of Lucas equipped machines, no relevant procedure appears in the Manual, so make sure you have disconnected the electrics at the following points:-

- a) multi-connector adjacent to the right hand side of the radiator
- b) four Lucas connectors on the H.T. coils
- c) connecting tag, with red leads bolted to the H.T. coil bracket
- d) stop lamp switch.

5) It is much better to remove the legshields completely. 'Springing' them over the frame tube assembly - like the Manual suggests - is a bit awkward, and likely to result in damage to paintwork.

6) Similarly, remove the rear spring units. They can much more easily be refitted later on, rather than attempting to fit their ends through the slots in the frame whilst lowering it into place.

7) Make up two  $\frac{1}{4}$ in. tommy bars, with pointed ends. Place them somewhere handy and use them to secure the frame onto the cross member. Once the frame holes, hinge pins and frame cross member have been aligned (the tommy bars can be used to assist with this) they can be fitted in place of the 5/16in. hinge pin bolts while alignment is checked.

8) When wheeling the frame back over the engine/transmission unit, it is very important to line it up accurately between the lugs on the bottom frame tube assembly and the bottom cross tube - this is when para. 2 (above) is so vital. Any movement of the handlebars will throw this critical alignment out. Once everything has been checked, the tommy bars can be removed one at a time, to be replaced by the hinge pin bolts and their 'C' shaped nut plates.

### COOLING SYSTEM

Antifreeze in the cooling system is more than just an aid to prevent it from freezing during winter months. Just as important, it acts as a corrosion inhibitor. In the case of the LE (in view of the fact that cylinders are presumably irreplaceable) it does seem worthwhile keeping full strength antifreeze in the cooling system all year round. How long can it be left in before changing? Keeping in mind that inhibitors degrade with time, an annual coolant change before winter does not seem unreasonable.

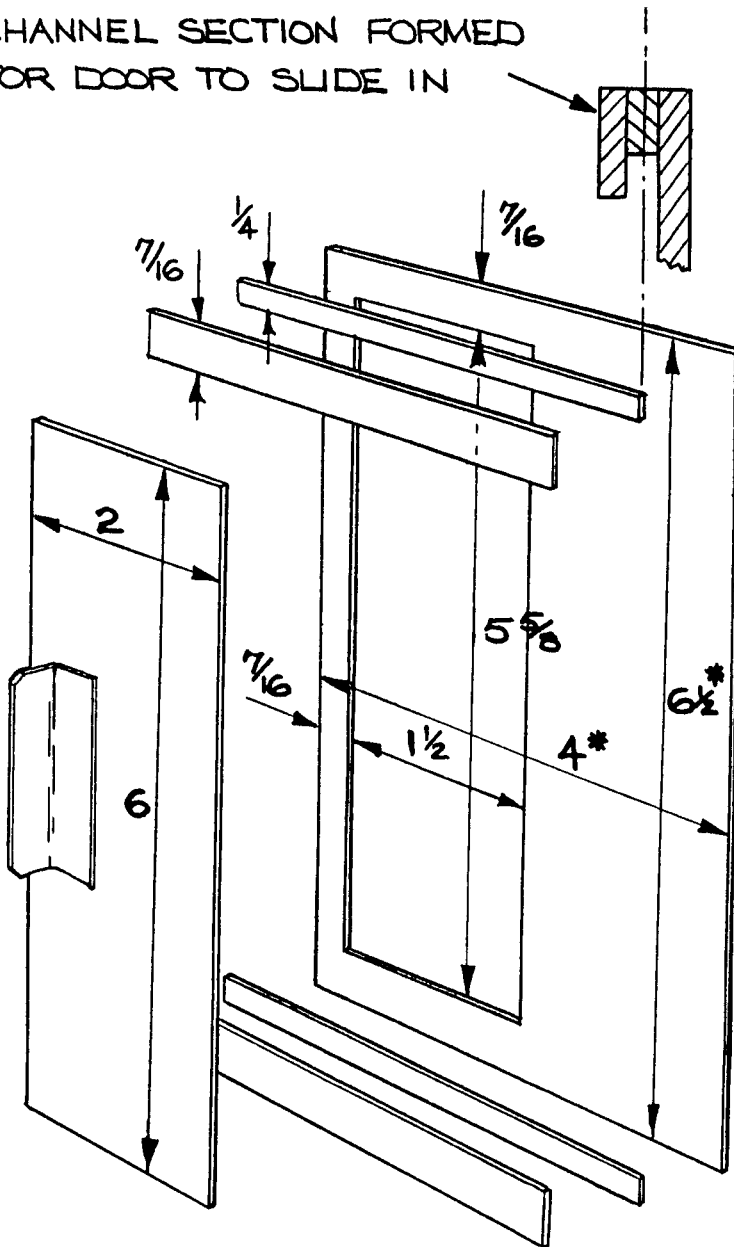
There is a theory that it is the addition of rust to the scale that tends to form in the radiator, which renders it immune to descaling chemicals; though Veloce did stress the importance of using soft water in the radiator.

Do not forget to give the radiator a good flush-out inside before re-filling. Similarly on the outside, a general clean off - dead flies, etc. and straightening of the finning must all be worthwhile. Do bear in mind that radiator hoses do not last for ever. The best way to check them is to take them off and inspect for cracking. In particular look near the hose clips as this is where the worst splits will always occur. Generally, LE hoses seem to last about 3-4 years, but oil spillage or burning on the exhaust pipes will obviously shorten their life. I added to my knowledge of this subject not so long ago since, mindful of the perils of the bottom radiator hoses getting burnt on the exhaust pipes, I gave them a good twist away from the exhaust, in fact fairly hard up against the sides of the crankcase/flywheel housing. Some while later when, for other reasons I had to remove these hoses, I noticed that they had nearly fretted through on the sharp joint between the crankcase and flywheel housing. One tends to forget the LE engine is flexibly mounted, so the ideal is evidently to try and equi-space the bottom hoses twixt exhaust pipe and crankcase.

It appears that for an LE in good condition and ridden sensibly, the normal coolant temperature is only 50 - 60 degrees centigrade (other than on very hot days), which is neither good for the engine, nor helpful for economical running. Certainly the advice given by Veloce in the handbook, "to blank off all but 1½in. either side of the radiator during the winter", seems to be pretty cautious; presumably to allow for flat-out running or a sudden warm spell. From experience it is possible to blank off all but ¾in. either side during cooler months, reducing to under ½in. during the really cold weather. This last little bit seems surprisingly critical; a fraction too much and the engine boils, a fraction too little and it is still running cold. The ideal then is to have adjustable doors (see sketch). The material used is 40 thou. "Plasticard" which is sold by all

good model shops. This material is both very light and is not, like cardboard, susceptible to curling up due to the effects of rain and heat. There is a special glue available for sticking it, though normal polystyrene cement does seem quite good enough. Attaching the doors to the radiator is perhaps the only tricky bit if the job is to look right. 15 amp fuse wire attached to the radiator tubes themselves is very effective. Being only very soft, it does not seem to damage them, though elastic bands might also be a possibility. Naturally, a water temperature gauge would be an asset, although just squeezing the radiator hoses is surprisingly effective. A few boil-ups and one soon gets quite an expert!

CHANNEL SECTION FORMED FOR DOOR TO SLIDE IN



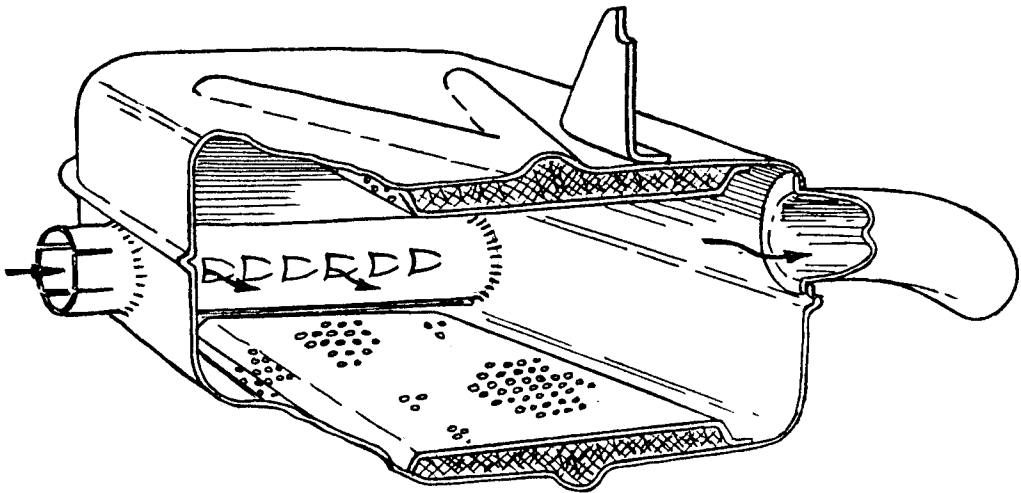
\* APPROX - USE ACTUAL RADIATOR SIZE

## EXHAUST SYSTEM

The efficiency of the L.E. silencer has long been admired, since it does seem to produce a pretty high degree of attenuation within a very small volume. With typical idle curiosity I have long had an ambition to open one up to see what its internal secrets were. Finally, a little while ago a suitably unserviceable specimen entered my hands - by which I mean rusted through. It also had a crack across the back adjacent to the tail pipe, so I was able to spend a few exciting minutes sawing it in half. Now as far as I can tell this was a genuine silencer box from:

- a) louvred inlet pipes rather than just plain holes.
- b) correct dimensions of box - some pattern ones are a little larger.
- c) small drain hole on the bottom half's rear edge.

So imagine my surprise when I found that there is absolutely nothing inside. (See sketch)



LE SILENCER BOX IN SECTION

The exhaust from each cylinder enters the lower half of the box by means of the two louvred tubes which, as has already been stated, are sometimes simple plain holes drilled in the tube. Since the ends of the two tubes are sealed off by the end wall of the silencer box, considerable baffling of the exhaust occurs as it passes through the many separate outlets into the main body of the silencer. Silencing is thus achieved by breaking down the main shock wave that travels along the exhaust pipe into a number of small ones that start from the louvres. They thus expand into the volume of the box with weakening intensity and mutual interference, so that what of the original shock wave finally escapes from the tail pipe is very much weakened or attenuated.

Now I did say earlier that there was nothing inside, but as you can see, this is not exactly true since there is a perforated metal grid welded inside both the top and bottom halves of the box with a packing of what I imagine is a glass fibre or some kind of mineral wool, though the specimen I cut open had in fact lost most of it. The idea behind this is evidently to remove by absorption much of the high frequency end of the exhaust noise spectrum. I also presume that the basic box area was carefully sized, so as to tune out the predominant portion at the low frequency end using the classic principle of a Helmholtz resonator. If you do not know what one of those is, it is the same effect as when you hit the low notes whilst singing in the bath and the whole bathroom resonates with you. As incorporated in an exhaust system this principle, instead of amplifying the noise, tends to cancel it out.

As to the possible detrimental effect of pattern silencers on engine performance it is far from clear that, because one design of silencer has holes instead of louvres, it will be less effective. A hole may seem a bit basic by comparison with a louvre, but I wonder if the difference is not more to do with the cost of manufacture. The holes look as though they were individually drilled in the pattern silencers, whereas louvres can be banged in simply and cheaply, given the necessary tool.

It may even be that louvres are more likely to block up with carbon. From examining other motorcycle silencers where different size holes were being tried, there was an optimum size of about 1/4in, where the holes stayed clear indefinitely. By comparison the louvre depth on the genuine L.E. silencer is quite small.

What is important however, is to check whether the tail pipe has been properly made. On a pattern silencers, not only can the tail pipe be of slightly smaller diameter (and remember, area varies as the diameter squared), but in curving the pipe, the tube can become squeezed down to an elliptical section of certainly less than half the required cross sectional area. Given the noticeable sensitivity of the engine performance to tail pipe blockage (and hence the Owners Handbook emphasises keeping it clean), this must have a serious effect. However, it is often a case of "swings and roundabouts", because one aspect in which pattern silencers can be superior to the genuine Veloce item is that the ends of the intake tubes are sealed off with separate plates, rather than using the back wall of the silencer box, which is thus rapidly attacked by corrosion from both sides. Just to make things worse the metal is also stretched very thinly at this point during the deep pressing operation.

A few useful tips for extending the life of new LE silencers are as follows;

- 1) Look very carefully around the various brazed joints, where the inlet and outlet pipes are attached, and possibly the bracket by which it is hung. If there are lumps under the paintwork, or the job generally looks untidy, scrape the paint off and remove the white lumps of brazing flux which are likely to be found. Left there, they will accelerate corrosion. Remove any rust that has already formed with one of the various proprietary products, and paint with a heat proof paint.

2) If the silencer has not already got a little 1/16in diameter drain hole in the centre of the bottom/back edge, drill one in - and make sure it remains clear when in service. This will allow any internal condensation to drain away.

3) For the fastidious, and particularly on machines which are in regular service, removing the silencer for an annual de-rust and re-paint will make it last for years.

### CENTRE STAND ASSEMBLY

Like all such jobs, servicing the centre stand assembly is not too difficult once you know how to set about it. The first essential is to get the machine properly supported on wooden blocks, under the front of each footboard. This will allow the stand to be sufficiently clear of the ground to swing it up, something that is easier with the old type of stand without the later extensions welded to the feet.

Next, the rear brake cable must be disconnected from the brake pedal. This is made easier if the brake pedal return spring is first removed by unhooking the top from around the brake pedal. By slackening off the cable adjuster, one can then disconnect the front shackle from the brake pedal.

Starting on the brake side, remove the nut and fulcrum bolt, being very careful to catch all the various washers, spacers and bushes as they drop off. The brake pedal can then be manoeuvred clear.

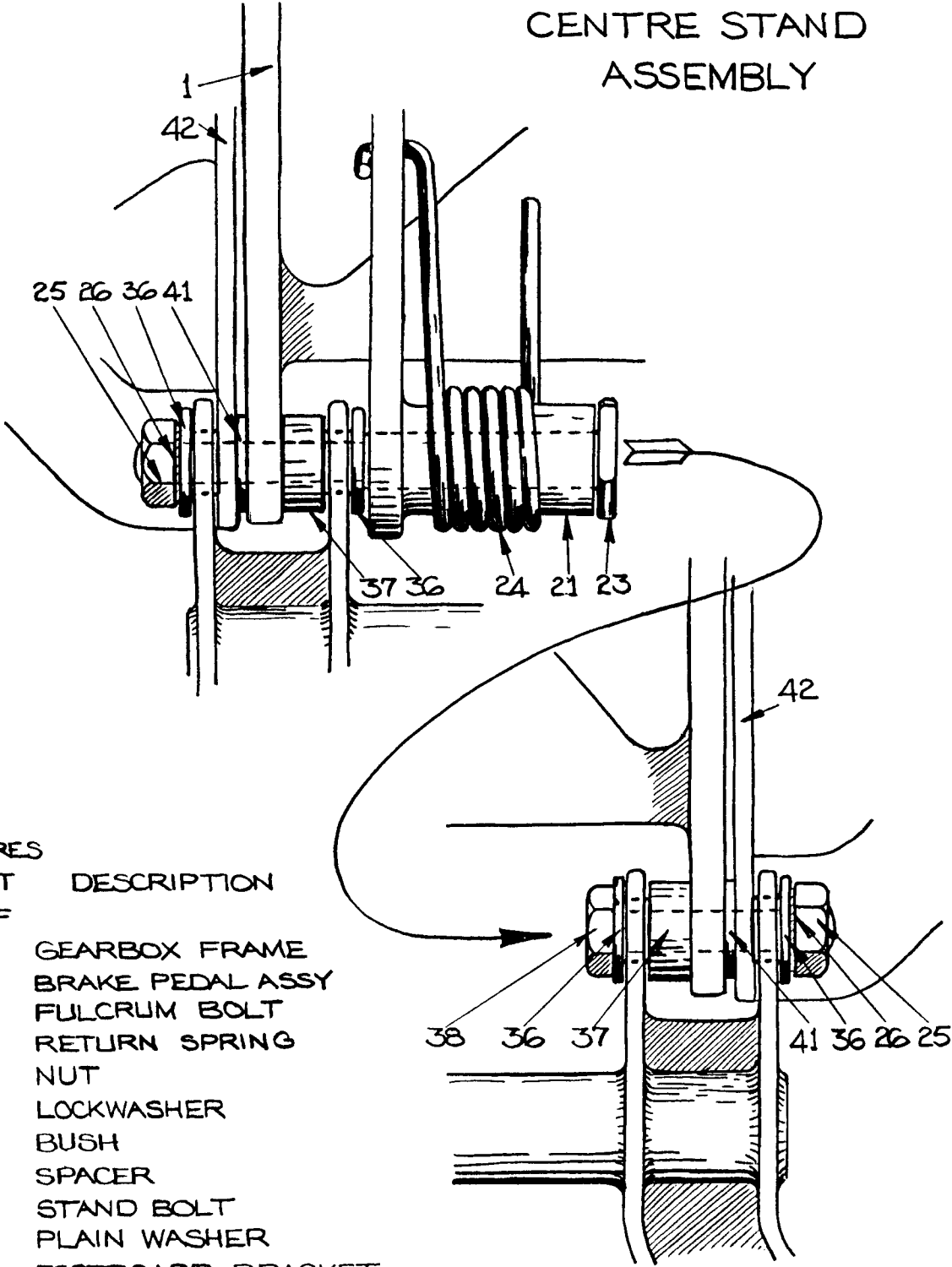
The tricky bit comes when trying to remove the stand return spring - something that has got to be done almost by trial and error. A useful hint is that if the now horizontal stand is pulled rearwards slightly, it becomes possible to get it up a bit higher, and consequently take all the tension out of the spring. It is then possible to unhook the lower end without too much bother. It is easy once you have done it a few times. Do bear this in mind, as it will make re-assembly easier. Meanwhile, everything must be thoroughly cleaned, not forgetting the areas of the frame cross member adjacent to the pivots.

Re-assembly is often where owners seem to find difficulty - mainly in trying to fathom out which bits go where, or ending up with the stand locking solid when tightening up the pivot bolts. Hopefully, the sketch will come to the rescue in such circumstances, as even the Spare Parts List does not make the order of assembly very clear and, in particular, an important pair of plain washers(41) are drawn "out of sight". If you are just removing the stand for routine maintenance, these washers stay trapped between the footboard bracket(42) and frame cross member(1). They are there to compensate for the width of the footboard flange. If building up from scratch, do not forget to fix these washers in place, with the aid of a spot of grease if need be.

That attended to, the assembly order is simply to reverse the order of disassembling. Use grease to fix the bushes(36) into the stand "eyes" after re-attaching the stand spring - remembering that the stand turns

about their outsides, which is where the bulk of the grease should be deposited. Pass the pivot bolt through the inside bush first. Insert the spacer(37) between the bush and inside of the frame cross member. Then push the pivot bolt right through the frame, washer, footboard bracket, outside bush and loosely screw on nut(25) and shakeproof washer(26).

## CENTRE STAND ASSEMBLY



**SPARES**

LIST REF	DESCRIPTION
1	GEARBOX FRAME
21	BRAKE PEDAL ASSY
23	FULCRUM BOLT
24	RETURN SPRING
25	NUT
26	LOCKWASHER
36	BUSH
37	SPACER
38	STAND BOLT
41	PLAIN WASHER
42	FOOTBOARD BRACKET



Moving on to the outside, once more fit the bushes in place. Manoeuvre the brake pedal into position, and pass the fulcrum bolt through, not forgetting to well lubricate the brake pedal bushes. Fully tighten the nuts on both sides and check to see the stand pivots freely. If not, as has already been mentioned, check for the presence of washers(41). Failing that, one must look for wear taking up all the clearances. Unfortunately, when the stand is allowed to seize solid and all the wrong bits start turning against each other, the hardened steel bushes wear into the spacer or footboard bracket, so that subsequent tightening forces these together and causes binding. The solution can only lie in shims, extra washers, welding, etc. to compensate for the lost metal.

On the subject of grease, do make sure that whatever you use is specified as being waterproof, i.e. Shell Retinax 'A'. These lower regions of the machine are obviously subject to much water wash from the rear tyre. It is not a bad idea to put a big blob of grease over each end of the stand spring eye, to help stop it rotting away. Finally, do not forget to refit the brake cable spring and cable.

The earlier machines have slightly shorter stand legs, so that it is easy to roll the machine on and of its stand or, in the case of the LE as originally designed, to enable the first pull of the starter handle to raise the stand. Though this was obviously a bit of a gimmick at the time, it did have the disadvantage of somebody unfamiliar with the machine accidentally raising the stand, then letting the machine topple over. Consequently Veloce discontinued the feature in October 1952. All that did remain for some years afterwards was the hole in the lug at the bottom of the starting handle, and the quadrant attached to the stand.

As easy as it is to get these earlier machines on and off their stands, the machine does tend to be a bit unstable - especially on adverse cambers or a loose surface. On high mileage machines this problem becomes considerably worse as the stand frets away at the underside of the frame cross member, wearing down the stand 'stops.' Consequently, an effort should be made to ensure that the wear here is made good. This can be achieved by building up with weld, though if this is overdone (so that the stand rests in the near vertical position), only a mere 'puff of wind' may cause the machine to roll off its stand. It is a matter of good practice never to park a L.E. facing down a slope or camber.

With later machines, stand wear is not quite so serious because the 'stops' are strengthened. As a matter of style, it does seem that kick-starting a machine on its centre stand is rather a 'brutish' practice - hammering as it does, both footboards and stand.

So is the practice of letting the stand fly up with a resounding thud - this time hammering away at the back edges of the frame cross member, generally shaking nuts and bolts loose. Get into the habit of catching the stand with your toe - and really impress your friends!

#### VALIANT STAND MODIFICATION

Compared with the L.E., the Valiant stand is definitely on the flimsy side. Both however, have poor arrangements for stopping the stand in use. The

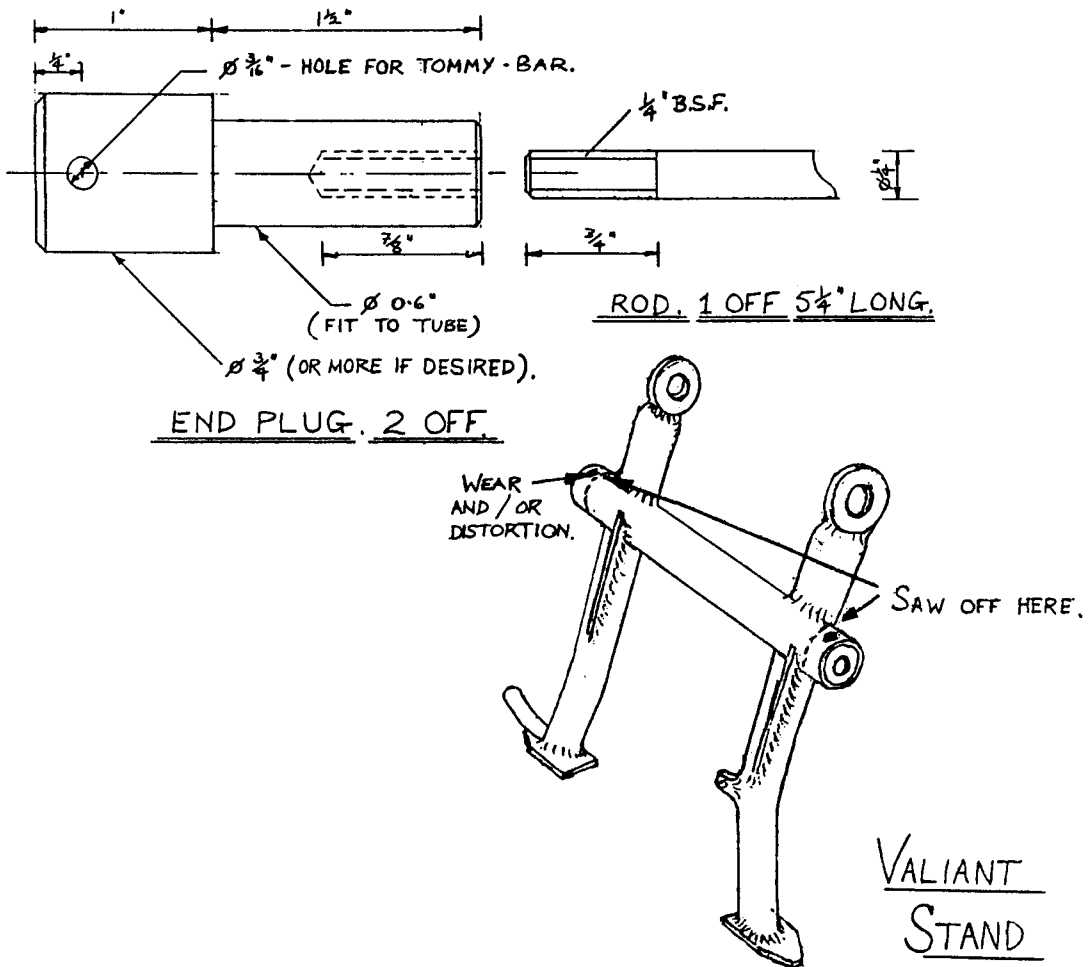
contacting surfaces wear too readily and the machine is then badly supported or falls over, or you have to select the right contour of road on which to park.

The Valiant relies on its duplex frame being contacted by a cross-tube, and once the end discs are lost, there is little hope of the tube remaining round in section. The frame can also wear at this point, but seldom seriously.

Faced with such a stand, it is tempting to braze-in two new end discs. However a modification seems more satisfactory. The cross-tube was sawn up and filed square close to the stand legs. Two plugs were then turned up in mild steel; their form is obvious from the drawings. Less obvious, perhaps are the advantages, viz:

- 1) They can be made oversize compared with the tube if desired.
- 2) Being screwed against each other, they can be rotated to a new position if wear occurs.

It will probably be necessary to straighten the legs of the stand while it is off of the machine. The legs have stiffening ribs, but still bend lower down.

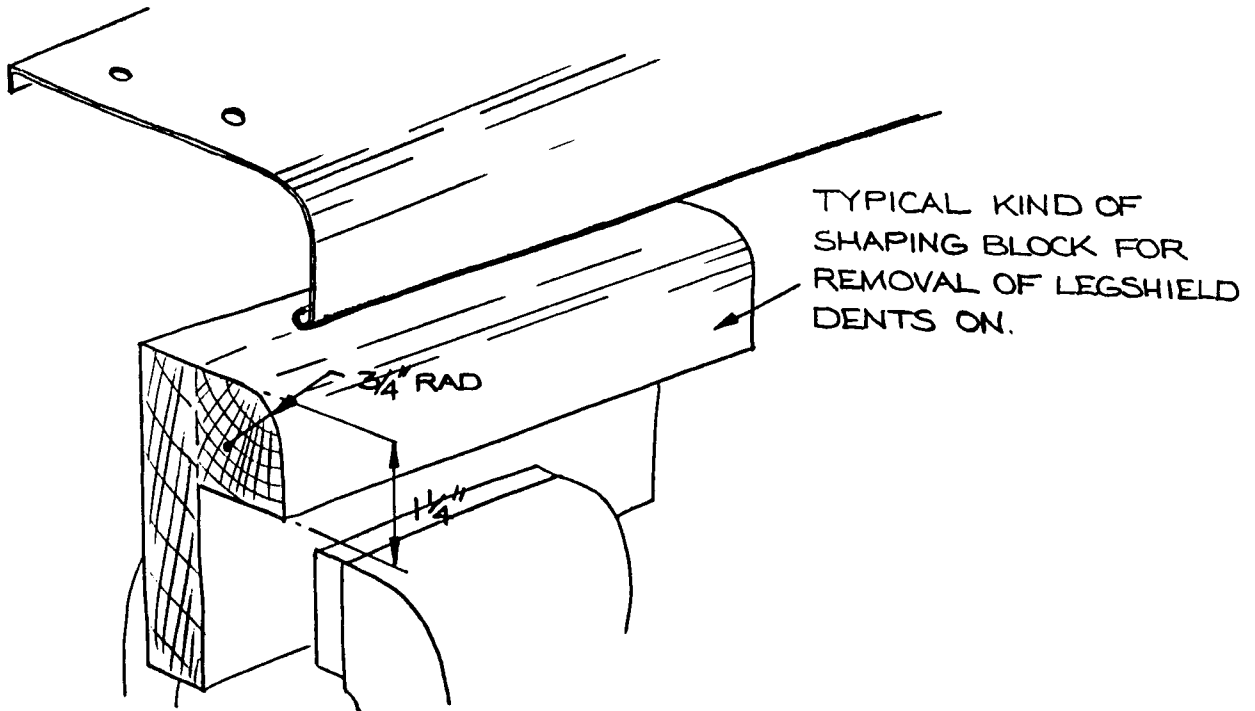


## LEGSHIELD REPAIR

Firstly, it is necessary to clean up the offending legshield - either by stripping off the paint, or if it is an early, unpainted one by cleaning off all the aluminium oxide corrosion. If the metal is badly crumpled, as legshields usually are, it is a difficult job with wet and dry paper. Ordinary domestic scouring powder such as 'Vim' is quite good if applied with a rag. Remove the tyre pump brackets from the right hand legshield by drilling out the rivets.

The key to successful dent removal is the correct annealing of the metal - making it soft enough to work. (Whenever materials such as aluminium are pressed out or beaten, they become what is termed "work hardened"). The procedure is to heat the material and quench it straightaway in cold water. To get the temperature right, the old dodge is to smear marks of soap on the top of the metal, heat the metal gently on the reverse side and keep it moving until the soap turns brown. Then as quickly as possible quench it in either a bucket of water, or under the cold tap. To do a complete legshield you will probably need to anneal it in three or four sections, unless a very large container is available.

A metal or hard wood block is required for beating the metal on, which should be shaped to fit on the inside of the section for repair. The one shown in the sketch is a good basic shape sufficient to get a good blemish-free surface. Do remember that all the blemishes will show up on the finished job. Similarly, it is important that the shaped block is as hard as possible. Otherwise it will simply dent and transfer yet more blemishes to the work in progress.



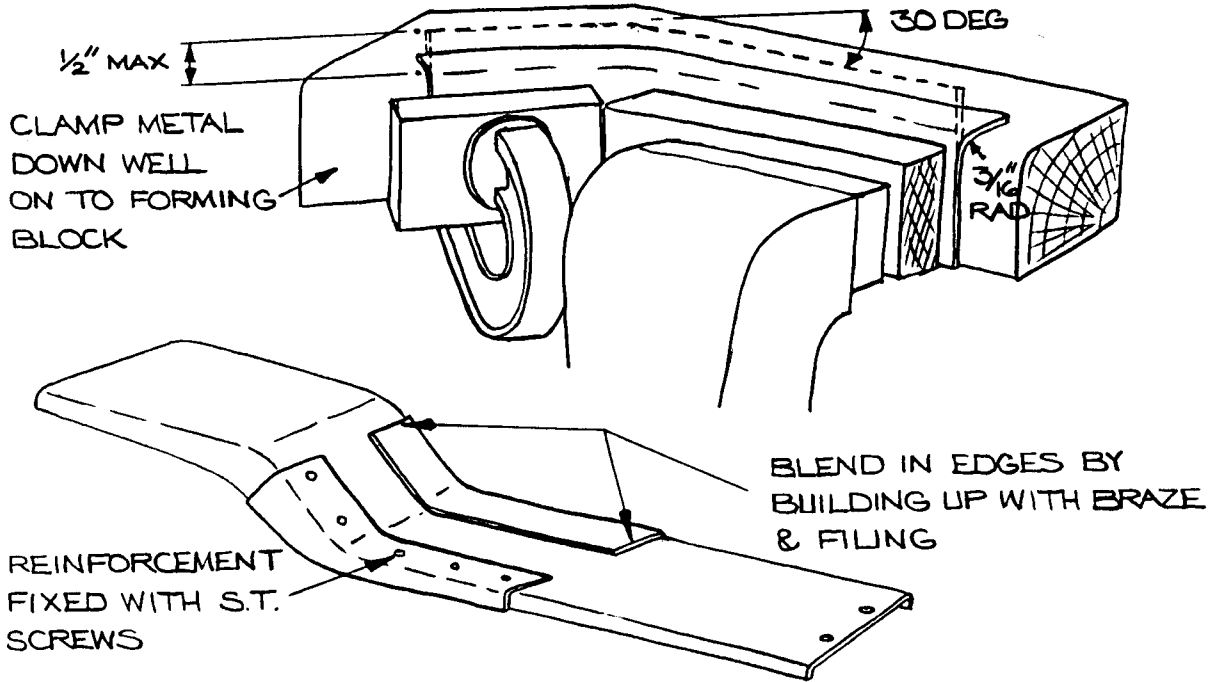
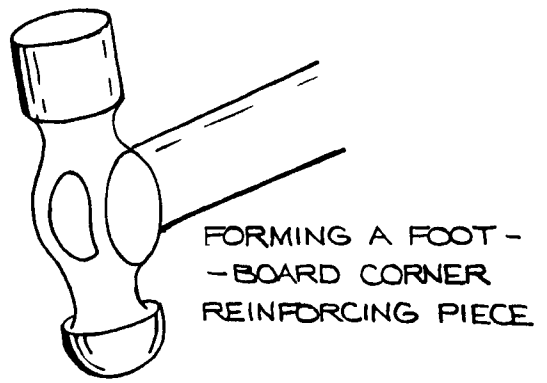
A rubber mallet makes a good panel beating tool in this case because it does not give dents from its edges if the workpiece is not struck exactly square. The "professionals" would probably use a steel hammer with a slightly domed head in the interests of getting a really good finish. Take care with a rubber mallet on any sharp edges, like around the bottom ends, otherwise it is easy to damage the rubber faces. The actual beating out is largely dependent on the operator's own skill, but the golden rule to remember, is to keep on annealing the metal and be patient. In this way, the dents will slowly disappear. It is important to remember, (despite the fact that the metal is being beaten) by pushing a dent out, one's efforts are actually thickening the metal. It is obvious that one will need to aim for a very much better finish with unpainted legshields. If they are to be painted, a little bit of filler will work wonders. Scour all the surfaces with a coarse emery as this will form a key when it is time to prime the metal. A proper aluminium etching primer is available, but with a good key an ordinary primer will do nearly as well.

The only deception that can be worked with unpainted legshields, is to finish them matt, rather than properly polished. This does hide small imperfections very well. Once again, domestic scouring powder is the thing to use, though work it on with an irregular rotary motion to get a nice uniform satin finish. Perfectionists will probably not find this acceptable, in which case it is a matter of more patient effort with the panel beating hammer, followed by work with a polishing mop.

#### FOOTBOARD REPAIR

LE footboards, due to their design and the ravishes of rust, will sooner or later need repair work. Footboards rot through from the inside (which is unpainted) and by the effect of water working its way in. If the footboards are still sound, inject them through the drain holes with a rust inhibitor such as 'Supertrol' or 'Waxoyl'. Otherwise it is likely that the edges of the footboard have split away adjacent to the lower end of the step - as this is the highest stressed point. To make a lasting repair, it will be necessary to fabricate a new reinforcing corner to weld or braze over this point.

Make up a simple former from hard wood or similar to replicate the step in the footboard. Clamp a strip of sheet metal down tight to the former (see sketch) - allowing no more than half an inch to protrude and form the side flange. The original footboards are made from 22 SWG mild steel, so either use this thickness for a repair or perhaps go up to 20 SWG. Use an ordinary ball paean headed hammer to form the side flange. Lots of gentle taps, applied along the edge is the proper method - concentrated on the corner by the footboard step, where the metal must be stretched most. It is easier to make the upper side of the reinforcing piece about an inch and a half wide initially, and then trim it back after forming.



Holding the reinforcing piece in position on the footboard whilst brazing is not easy since the footboard metal just bends out of the way when heat is applied. Fixing the top side in place with small self-tapping screws will overcome this. By using plenty of brazing metal around the edges, it is possible to blend everything in nicely with a file afterwards, possibly making the side flange a trifle deeper than original. While it will still probably look an awful repair, luckily there is a nice piece of rubber matting which will cover all the evidence! If you put a reinforcement on both sides (see sketch) and build up the top of the footboard with filler in between, it should look quite reasonable.