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SERVICE

Provisional Workshop Manual 1968

Body, Type 2

Frame

This section describes the replacement of the front side members with and without reinforcement plates and the replacement of the rear part of the frame which is made up of the rear side members and cross tube. At the rear, the outriggers can be replaced but not the individual parts of the frame.

Contents:

General

Basic dimensions

The basic dimensions for frame repairs were obtained in a series of measurements made with a 78 in. (2 meters) long caliper gauge and an internal measuring rod with a 10 mm diameter ball end.

The tolerance is ±.08 in. (2 mm).

Other instruments with the same degree of accuracy can naturally be used when checking the dimensions in workshops.

Repair work

The instructions on the replacement of individual frame parts are intended to serve as a guide for the sequence of operations and a good knowledge of body repair is assumed. The repairs should only be carried out by a skilled man with ample experience of this type of work.

As opposed to body repair, the frame parts must frequently be butt welded together and this work calls for great care when fitting the parts. In order to ensure that the weld is satisfactory, the joint must be uniformly wide over the whole length. This also prevents the creation of stresses in the sheet metal which are very difficult to eliminate.

All electric welding should be done with dipped electrodes 2.5 mm in diameter.

Before cutting out parts of the frame it is essential to plan the individual cuts to be made. The point at which the various parts have to be cut are given in the various sections.

If a front side member is replaced with the vehicle raised on a lift, the work must be done very carefully to ensure that the vehicle does not slip off. To replace the rear part of the frame complete with cross tube, the vehicle must be laid on its side.

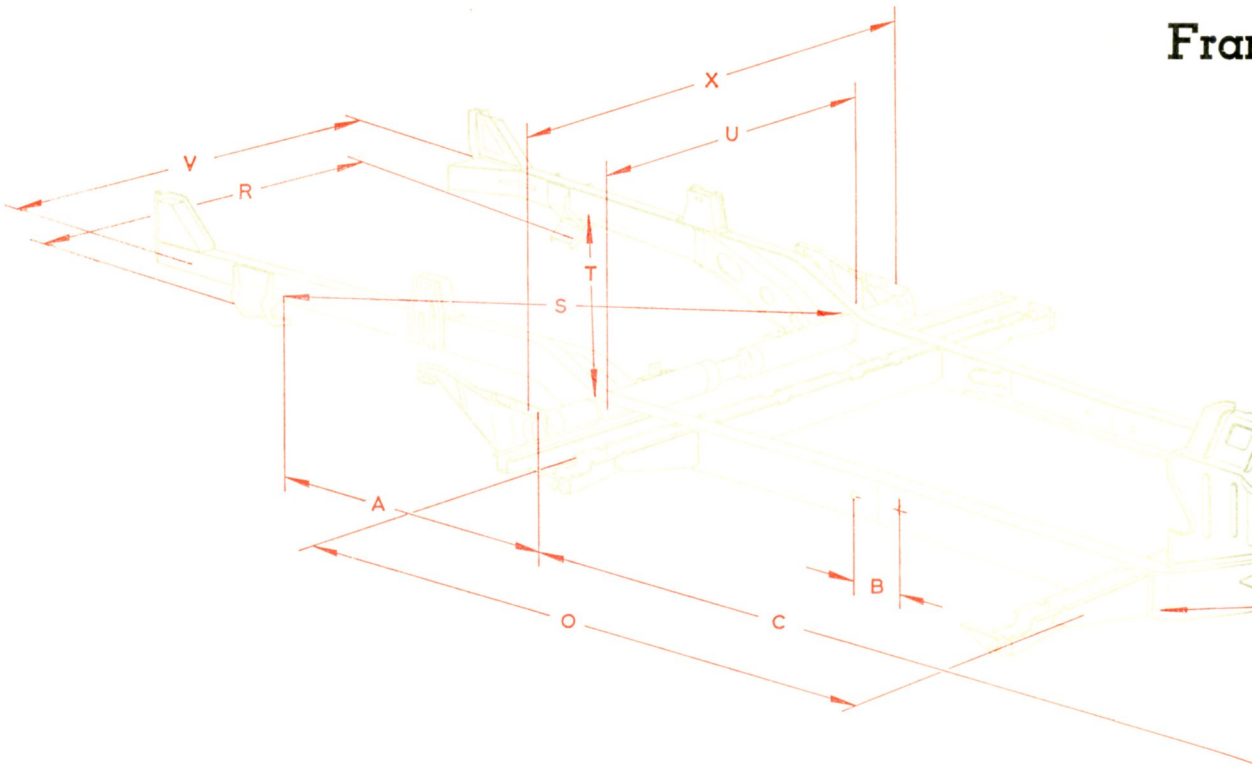
Important
Protective gloves must be worn when removing and installing sheet metal parts.

Painting and anti-corrosion treatment

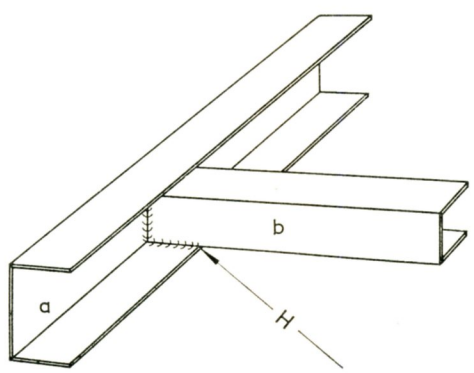
All newly installed parts must naturally be painted to stop them from rusting. Before painting, remove all scale and slag with a wire brush and wipe off any traces of grease with thinner and blow off area with compressed air.

All parts of floor and frame which are not accessible for painting after welding should be treated with cold zinc paint before assembly.

Synthetic resin primer, synthetic resin finishing paint or normal frame paint can be used for this purpose. Do not, under any circumstances, forget to apply a wax-based undersealer to all surfaces including the inside of hollow parts such as cross members and brackets. To give the best results inside hollow parts use a spray gun which gives a solid concentrated jet of material with very little air.

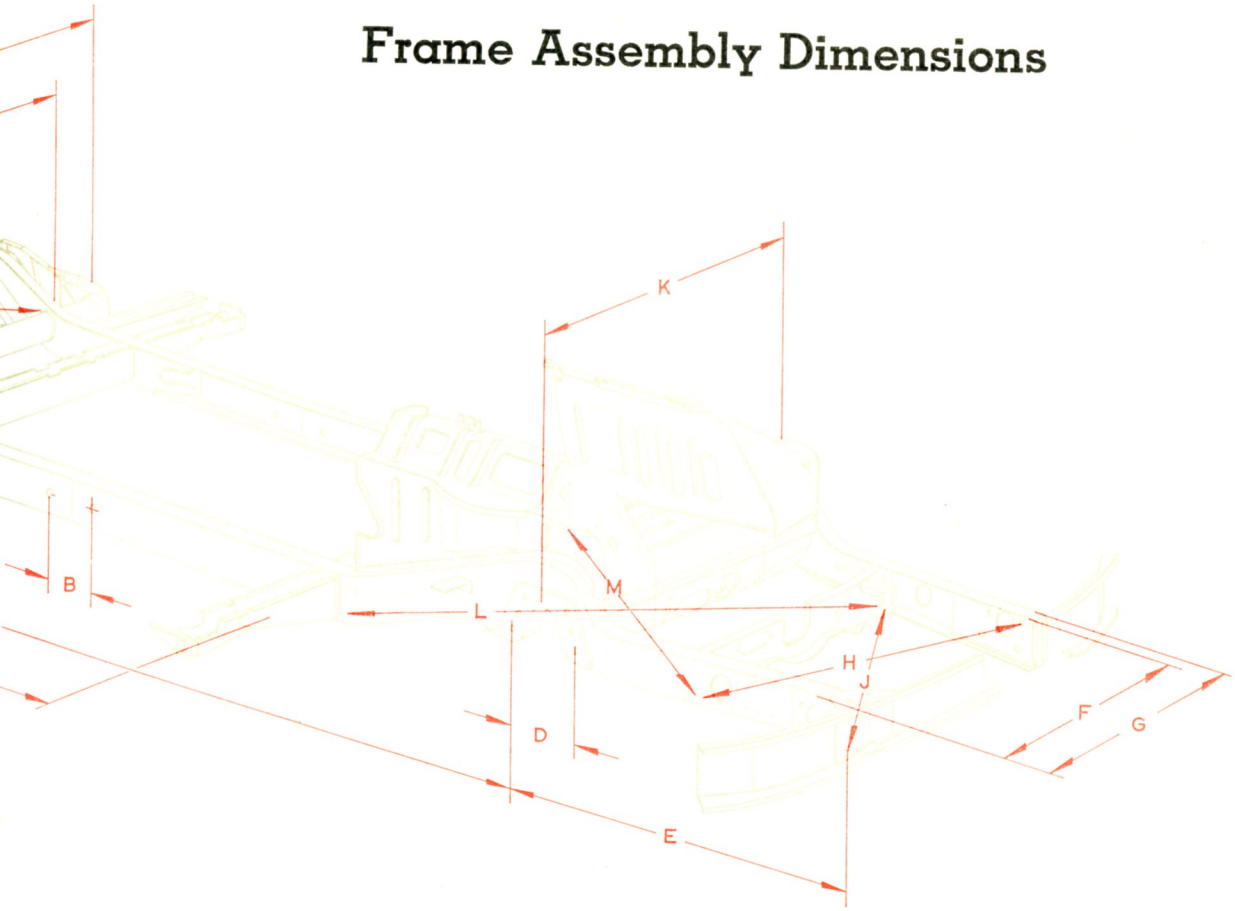


Dimension	Location	mm	Remarks
A	From hole for bumper attachment to cross tube flange (front, upper tapped hole)	942	measured to center of hole (not diagonally)
B	Distance between holes in front and rear side members	123	the first hole in each of the front and rear side members (measured to center of hole)
C	From cross tube flange (upper, front tapped hole) to lower, rear tapped hole for front axle in side member	2045	measured to center of hole
D	Distance between lower tapped holes for front axle	163	measured to center of hole
E	From rear, lower tapped hole for front axle to bumper attachment hole (front hole)	825.5	measured to center of hole
F	Distance between front side member and steering gear support	565	measured from outside of side member to inside of steering gear support
G	Distance of both front side members from each other	600	measured from outside
H	Corner of front side member/front cross member to steering gear support (to center of front, upper hole)	655	diagonal dimension a – front side member b – front cross member
J	Corner of side member/front cross member to front side member (front hole for bumper attachment)	675	diagonal dimension

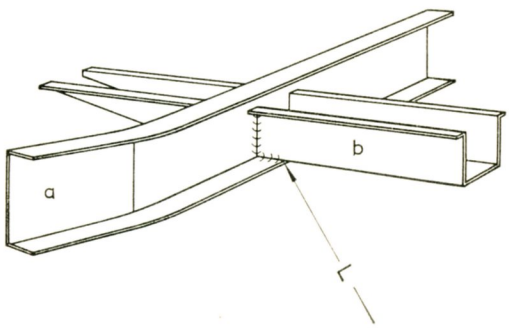


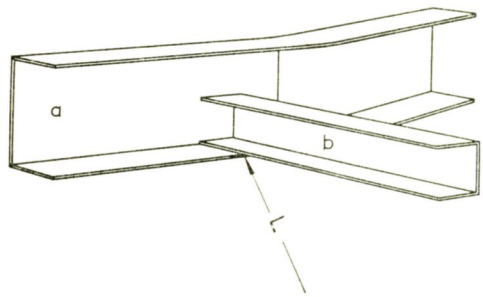
Dimension	
K	Dis the
L/M L M	Co cor a – b –
O	Fro
R	Dis bra
S/T	Co me
U	Dis
V	Dis
X	Dis

Frame Assembly Dimensions



Remarks	Dimension	Location	mm	Remarks
asured to center of hole t diagonally)	K	Distance of front side members from each other, near the holes for securing front axle	745.5	measured from outside
first hole in each of the front rear side members (measured enter of hole)	L/M	Corner of side member/front intermediate brace to corner of side member/front cross member		diagonal dimensions
sured to center of hole	L M	a – right side member b – intermediate brace	1093 1097	a – left side member b – front cross member
sured to center of hole				
sured to center of hole				
sured from outside of side nber to inside of steering gear port				
sured from outside				
onal dimension ront side member ront cross member				
	O	From front outrigger to center outrigger	1276.5	measured from outside
	R	Distance between securing holes in engine mounting brackets	928	measured inside
	S/T	Corner of cross tube reinforcement ring/rear side member insert to tapped hole for bumper (front hole)	1251	diagonal dimension taken at center of hole
	U	Distance between side members (center of cross tube)	920	measured from outside
	V	Distance between rear side members	1014	measured from outside
onal dimension	X	Distance of cross tube flanges from each other	1170	measured from outside





Replacing a front side member

The repair of a right-hand side member is described here but the procedure for the left-hand side is the same.

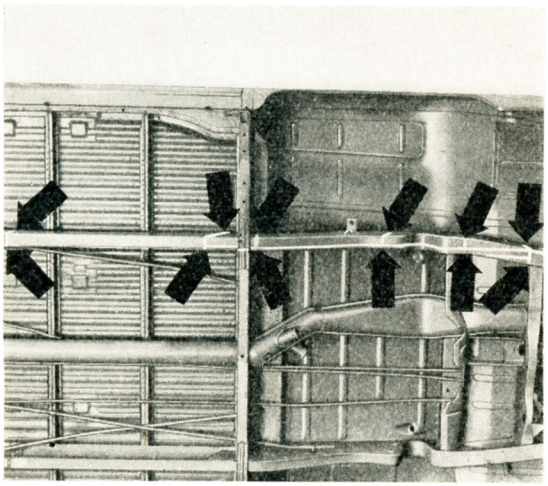
Preparation:

Remove the following parts:

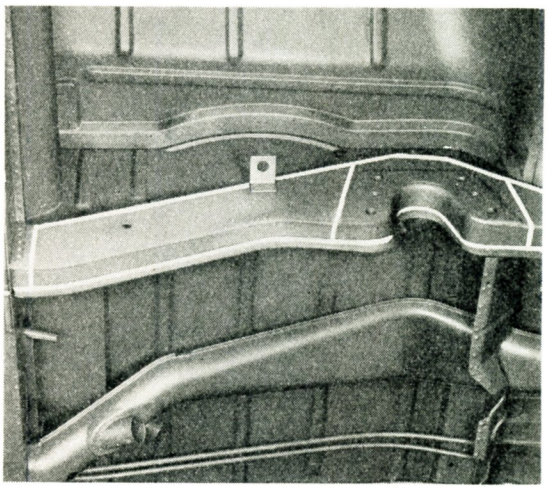
1 – Front axle and brake lines.
2 – Seats in the cab.
3 – Front floor covering.

Cutting side member out – Cutting lines

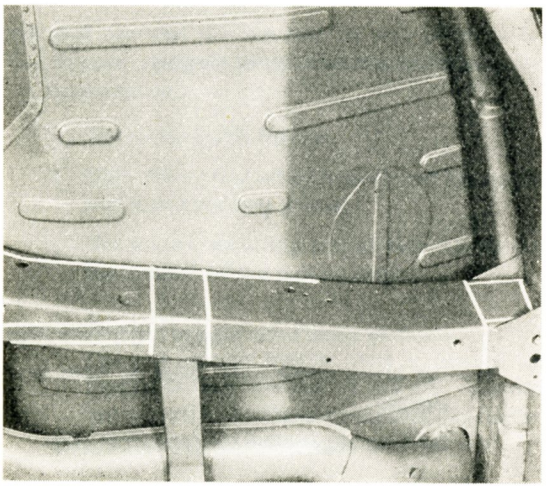
General view:



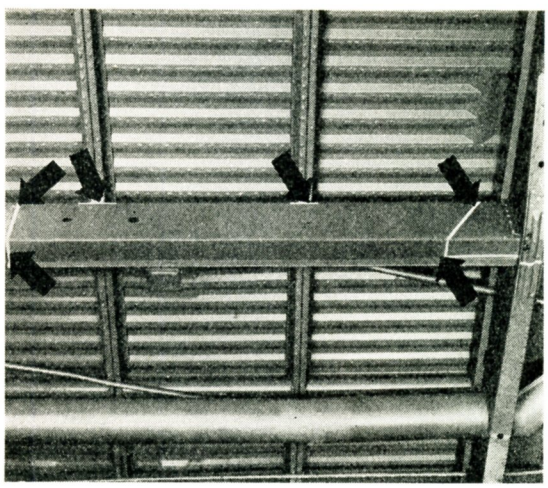
Center:

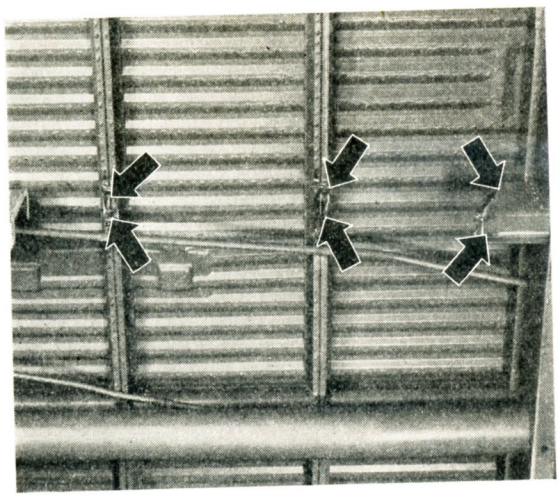


Front:



Rear:





1 – Parting cuts on side member between the butt welded seam and the front cross brace:

a – Cut near the butt welded seam

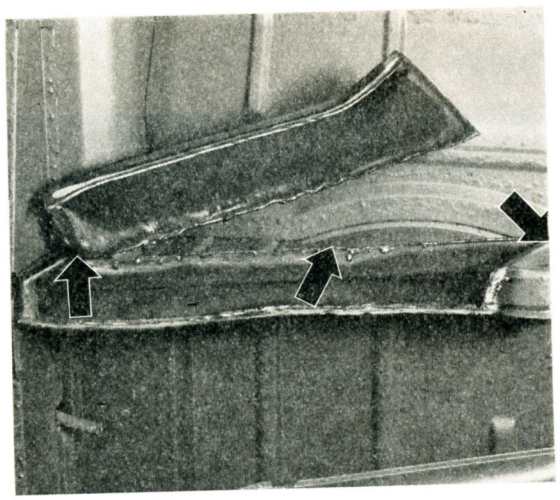
Note:
The cut should be made on the front part of the side member.

b – Part the welded seam of side member/front body support member.

c – Cut near the cross member in front of side member reinforcement plate.

d – Burn the remaining pieces of side member off the cross member.

Important
When doing this, the front side member reinforcement plate must not be damaged.



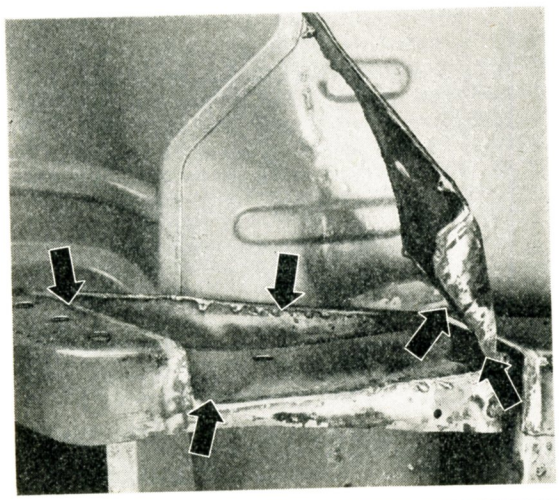
2 – Parting cuts on side member between front axle mounting and intermediate brace:

a – Cut from upper edge to lower edge inside.

b – Cut from lower inner edge to joint of reinforcement plate / side member.

c – Cut from upper edge to lower edge inside.

d – Cut along the upper edge.



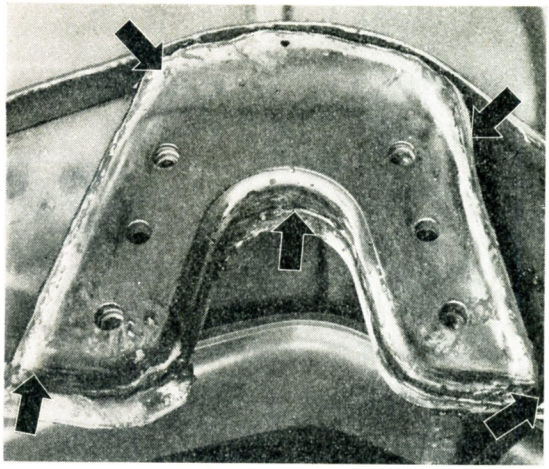
3 – Parting cuts on side member between front axle mounting and front cross member:

a – Cut from upper outer edge to lower inner edge.

b – Cut along upper outer edge to front cross member.

c – Cut from upper edge to lower inner edge.

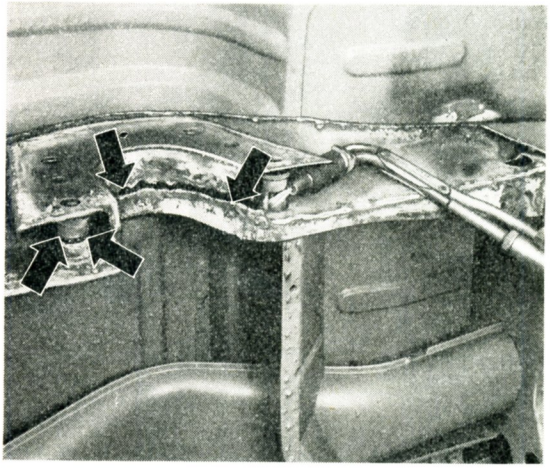
4 – Parting cuts round the reinforcement for front axle mounting:



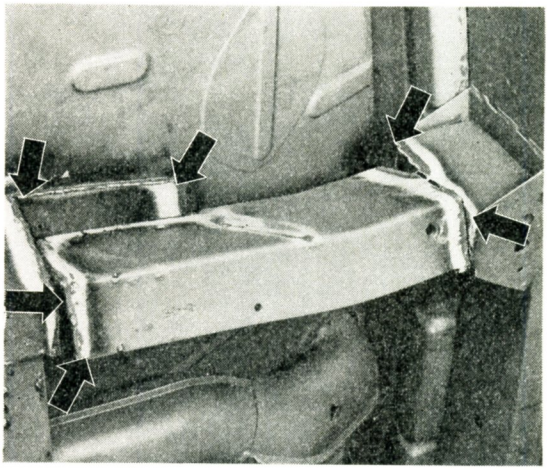
a – Cut on upper outer edge.

b – Cut above the side member reinforcement plate.

c – Cut the four threaded bushes.



5 – Parting cuts on side member between front cross member and front support:

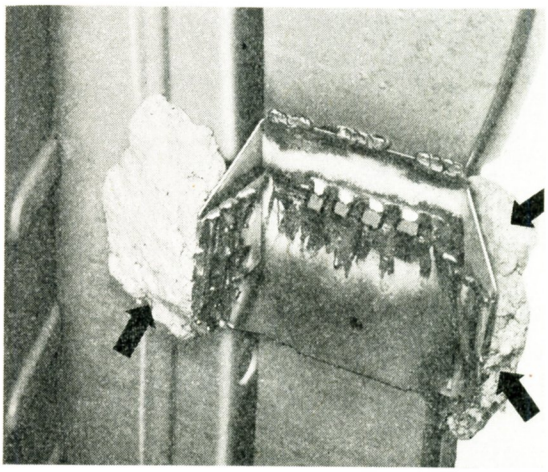


a – Cut from upper outer edge to lower inner edge.

b – Cut about 130 mm along upper outer edge. Then extend cut to upper inner edge.

c – Cut just behind side member securing bracket on front support.

6 – Remove end part of side member in bracket on front support:

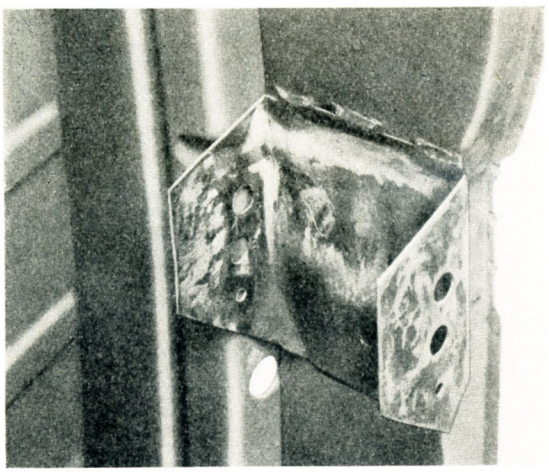


a – Cut round inside bracket.

b – Blow front weld off with torch and cut upper and lower welding seams.

c – Cut up the remaining part of side member in the bracket with a cutting torch.

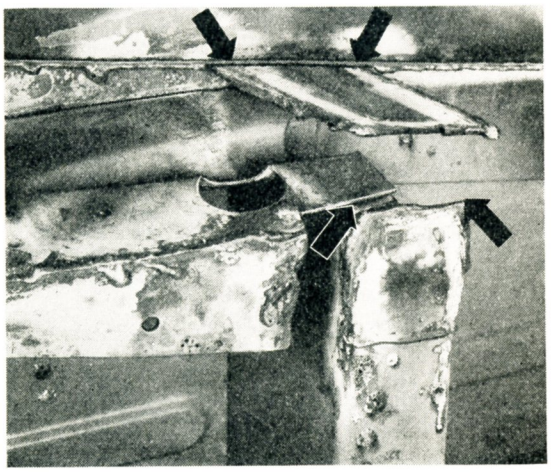
Note:
The side member bracket must be opened up slightly so that the rest of the side member can be cut up. To prevent heat distortion cover the area with wet asbestos powder.



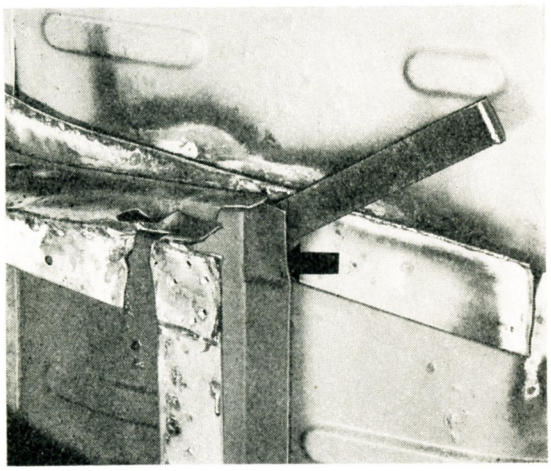
d – Grind spot welds off and chisel remaining pieces of metal off or twist them off with a pair of pliers.

e – Straighten bracket again and grind it clean.

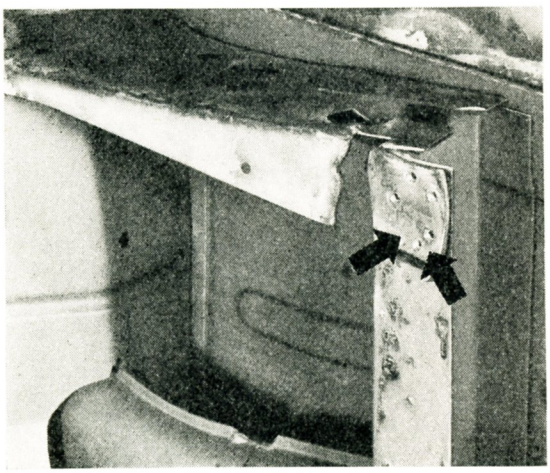
7 – Remove pieces of side member at front cross member:



a – Cut at top and bottom of cross member.

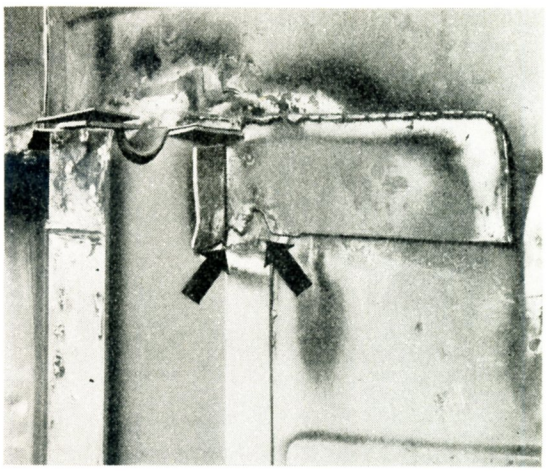


b – Chisel cross member away from side member at top.



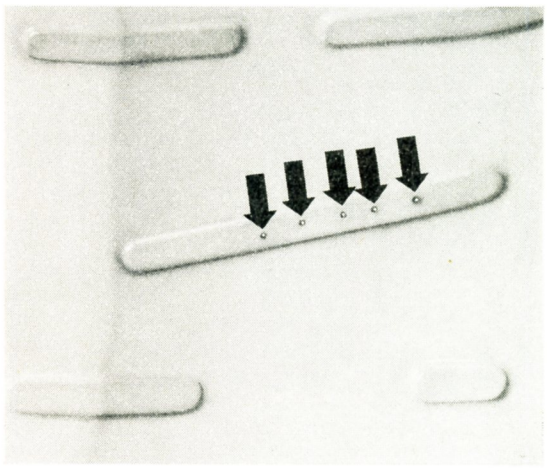
c – Detach side member from cross member at bottom (drill, grind, chisel).

d – Chisel into cross member at top, "blow" welding seam away with cutting torch.

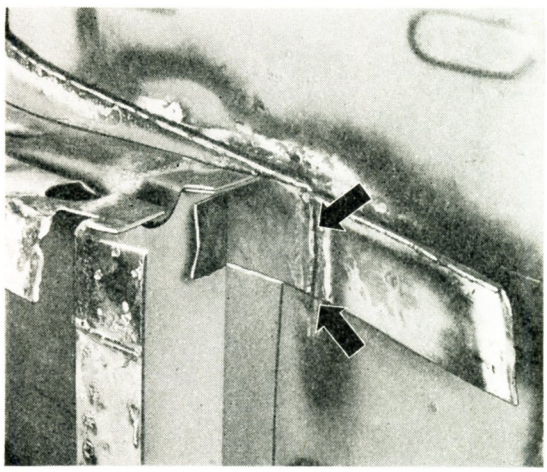


8 – Remove pieces of side member from cab-floor:

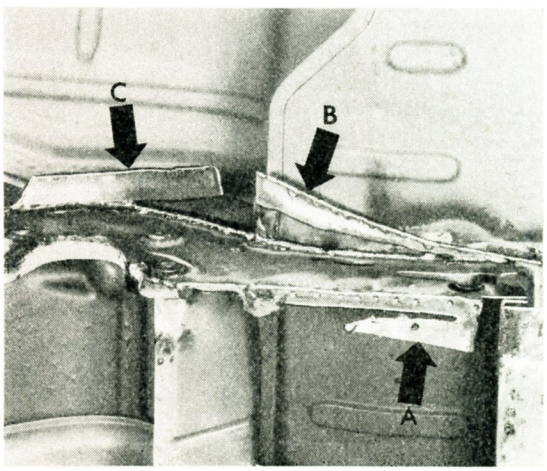
a – Drill spot welds through floor plate.

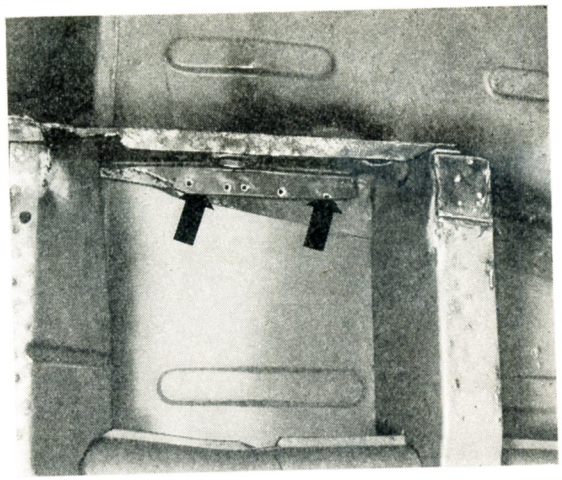


b – Burn the side member off floor plate.



9 – Remove pieces of side member from reinforcement plate in the sequence A – B – C.

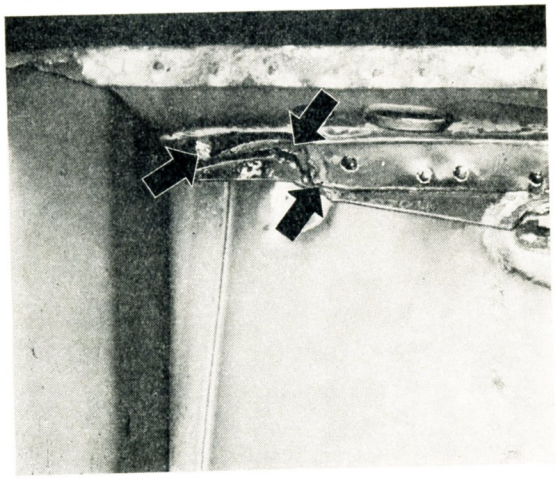




10 – Part reinforcement plate from remains of side member:

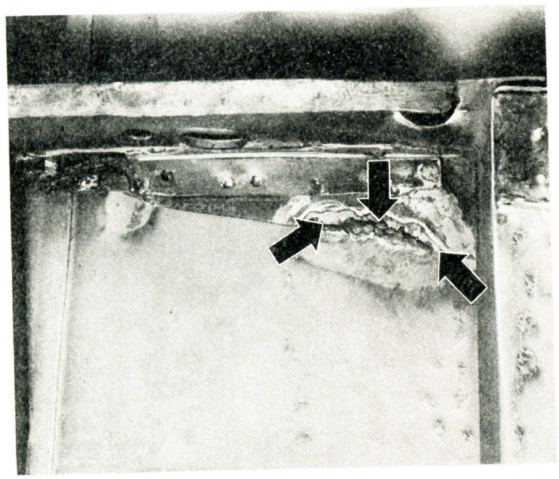
a – Center punch and drill the spot welds.

b – Chisel side member away from reinforcement plate.



c – Chisel through reinforcement plate upper edge.

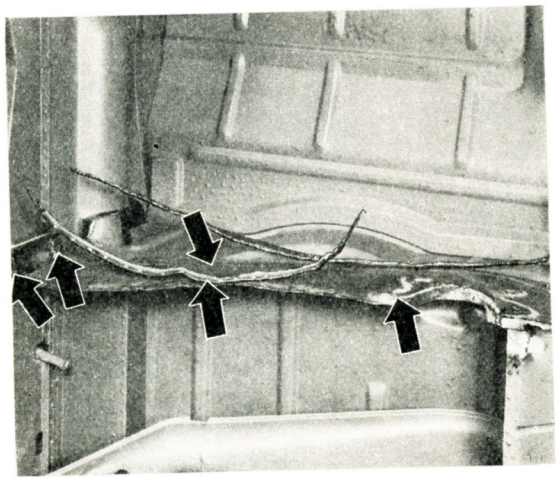
d – Then make parting cut on welding flange of reinforcement plate (cutting torch 1–2 mm).



11 – Part pieces of side member from cab floor:

a – "Blow" welding seam off with torch.

b – Remove remaining pieces.



12 – Remove side member pieces from reinforcement plate at top and bottom:

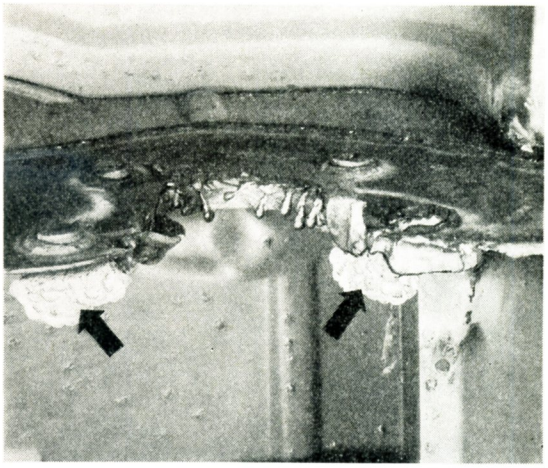
a – Center punch and drill spot welds or grind them off.

b – Grind welding seam off at side member/reinforcement plate joint near front axle mounting.

c – Chisel off remaining scraps of metal.

13 – Remove side member from the front axle mounting:

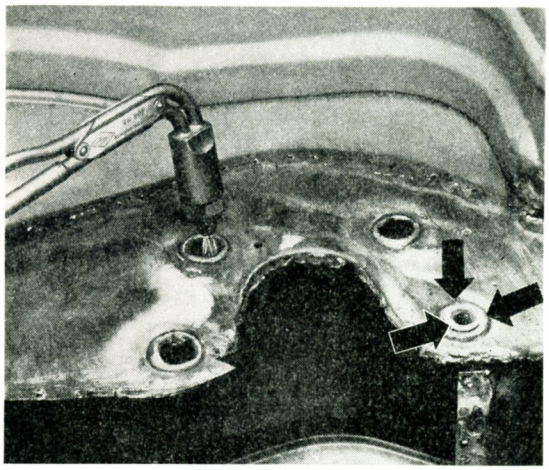
a – Chop up the remaining part and cut inner welding seam with the torch.



Important
Cover axle mounting with wet asbestos.

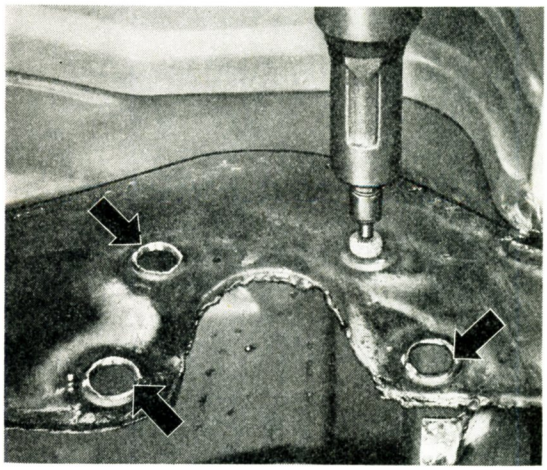
b – Bend pieces off with pliers as far as possible, "blow" rest off with torch.

14 – Remove threaded bushes from reinforcement plate:

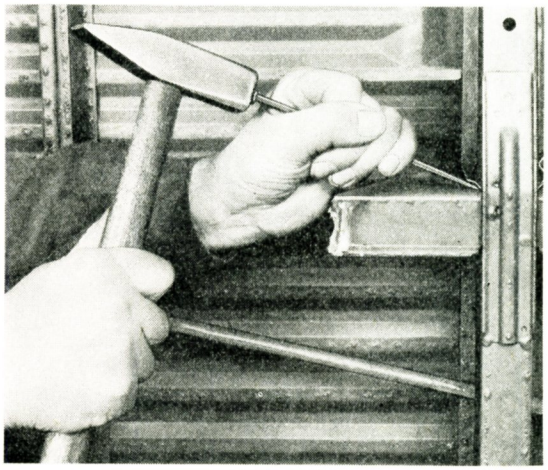


a – Grind bushes **down to the collar.**

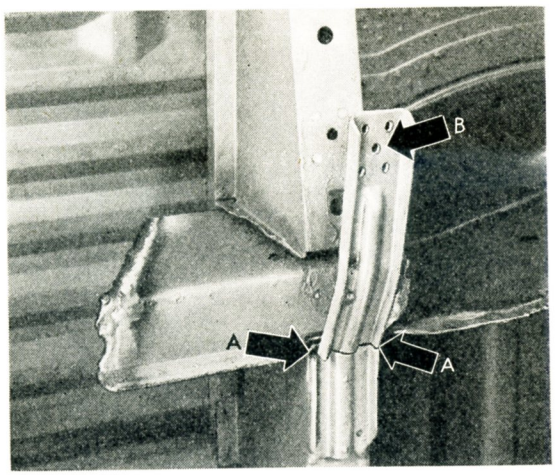
b – Burn the bushes **out of the collar.**



c – Grind the collar out with a cylindrical stone about 22.5 mm dia.



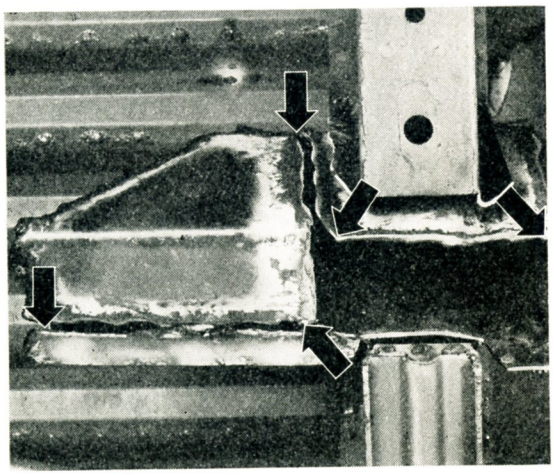
15 – Chisel front outrigger away from remaining piece of side member.



16 – Remove retainer from outrigger:

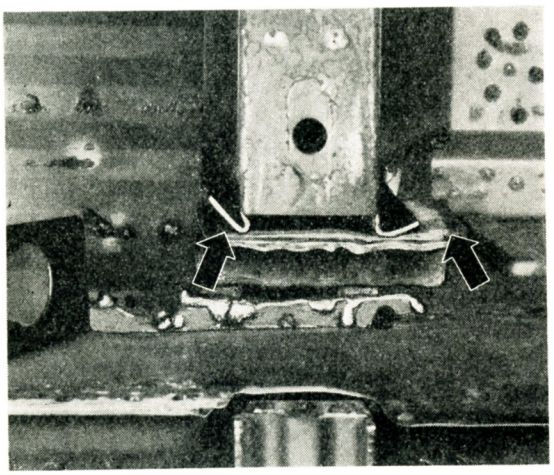
a – Drill 5 spot welds – arrow "B".

b – Cut with hacksaw below side member reinforcement plate – arrow "A".

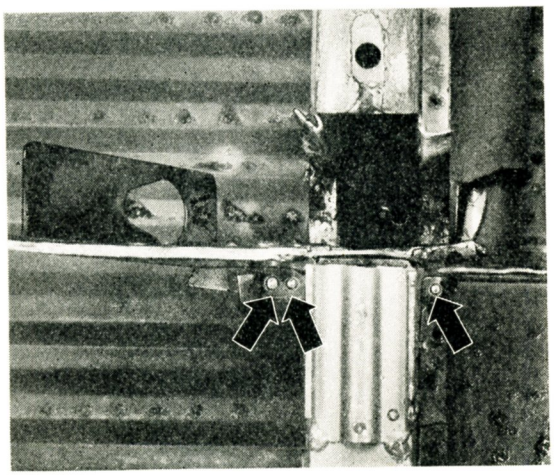


17 – Remove piece of side member near the cross brace:

a – Cut on side member.

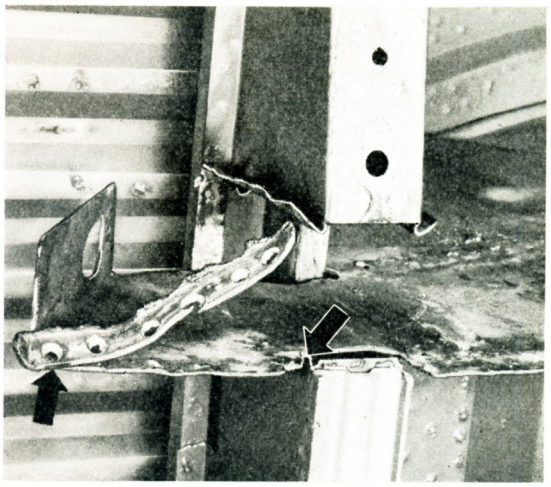


b – Cut on top of side member along the reinforcement plate.



c – On side member between front cross member and cross brace, drill spot welds and chisel remaining parts off.

d – Center punch and drill the spot welds joining the side member, welding flange and reinforcement plate and pull pieces off with pliers.

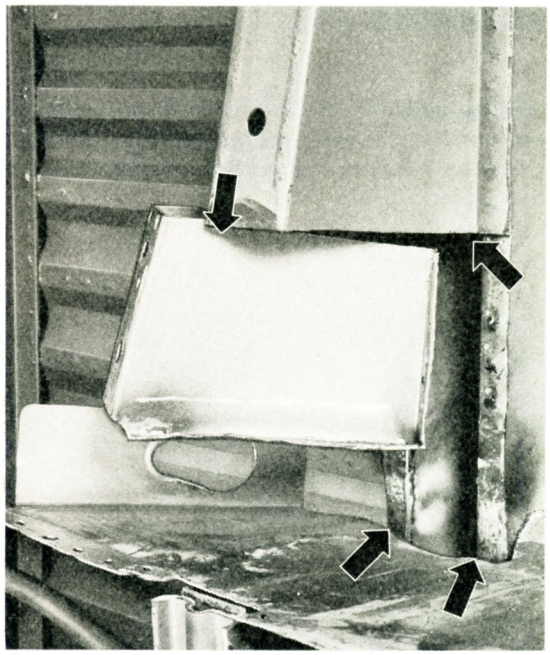


18 – Remove part of front right outrigger: This is necessary in order to ensure that the new side member can be fitted without difficulty.

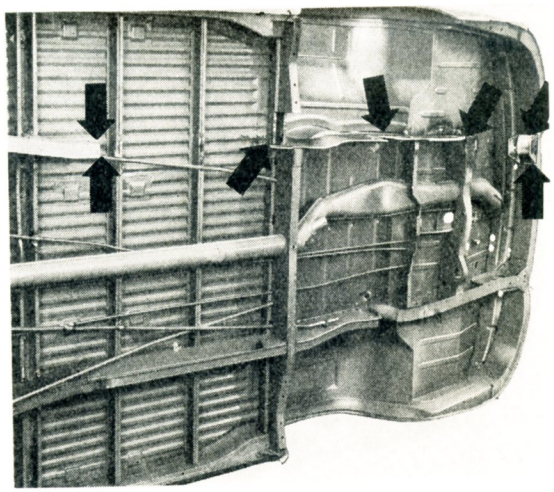
a – Mark off cut about 70 mm away from flange of cross member.

b – Drill spot welds and chisel spot welding flange away from front body cross member.

c – Cut outrigger with hacksaw.



Preparing to weld in the new part



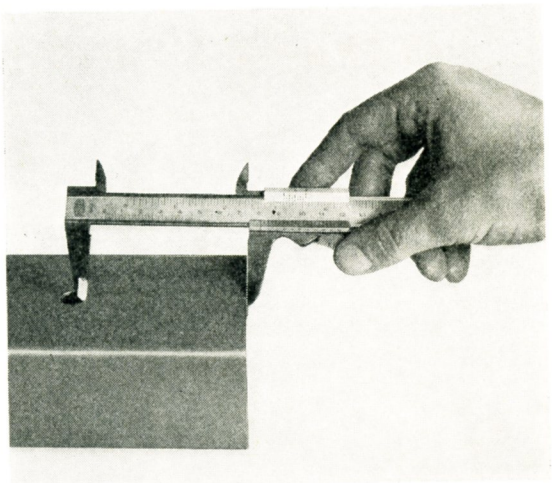
1 – Clean and straighten all connecting surfaces for the new part.

2 – Grind end of right rear side member back to the center of the old welding seam and chamfer edge.

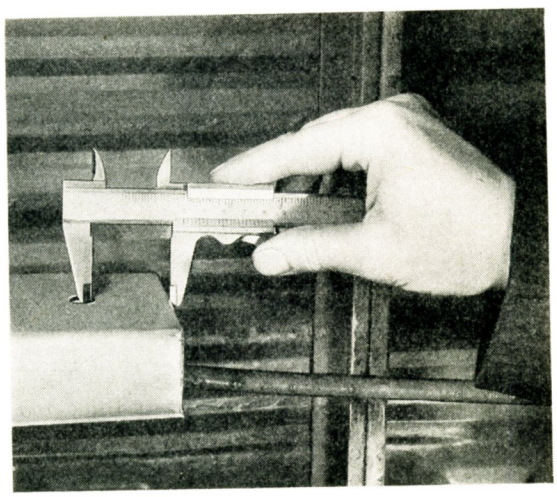
3 – Determine length of side member:

The dimension to be obtained is 112^{+1} mm which was determined in a series of measurements. The measurement is taken between the two holes near the end of the side members with a caliper gauge. As the new parts has a welding allowance, it is always necessary to cut a certain amount off. The amount to be cut off can be determined by a simple calculation.

Example:



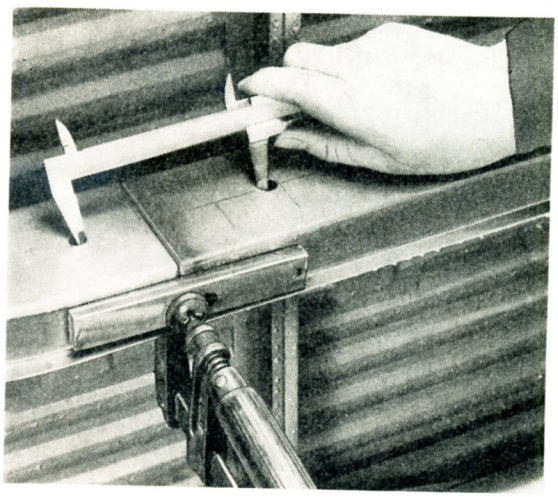
a – Dimension from hole to end of side member on new part = 79.5 mm.



b – Dimension from hole to end of side member on part still on body = 38.7 mm.

c – Actual dimension:

79.5 mm
+ 38.7 mm
118.2 mm



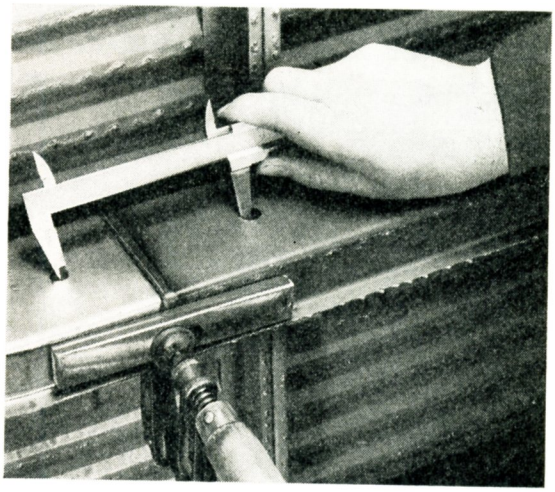
d – Determining length of excess material (gives fitting length):

118.2 mm (actual dimension)
—112.0 mm (nominal dimension)
6.2 mm

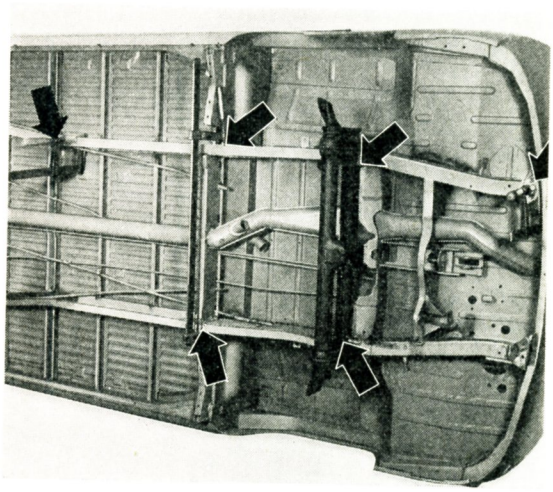
6.2 mm is thus the amount to be cut off the new part of side member. Make cut at an angle so as to give a chamfer.

Fitting the new parts

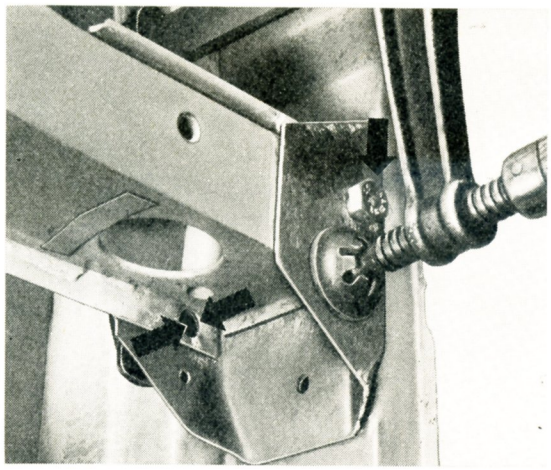
1 – Aligning the side member:



a – Check the dimension (112^{+1} mm) again with side member in position and rectify if necessary. Then clamp side member firmly.

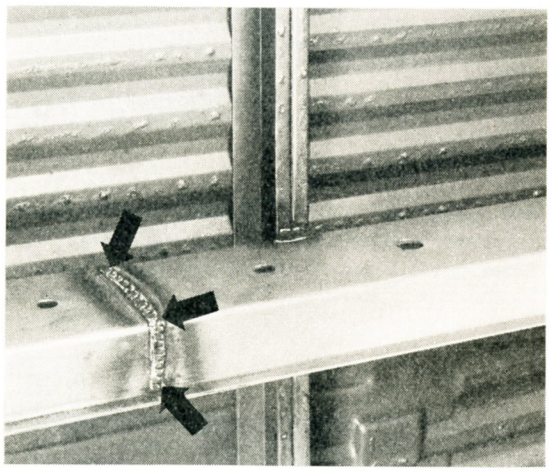


b – Bolt a good front axle beam to the side members.

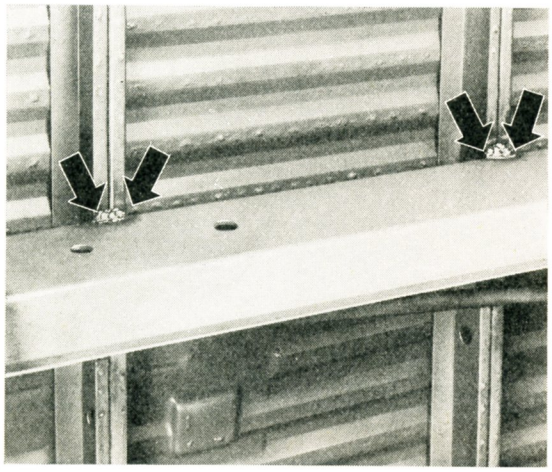


c – Position side member in front bracket so that holes in side member and bracket are correctly aligned. Then secure side member with a clamp.

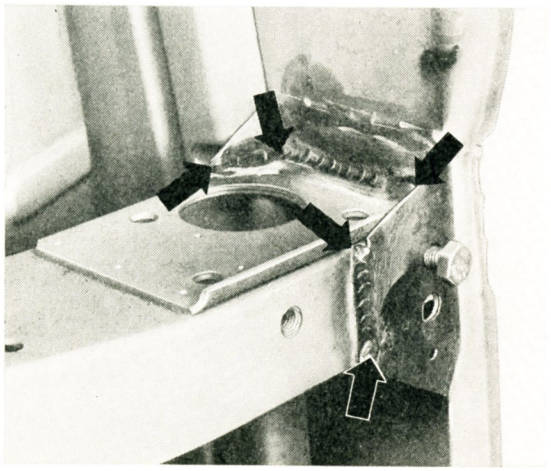
Note:
A hexagon head bolt should be screwed into the nut in the side member.



2 – Butt weld the side member parts electrically.



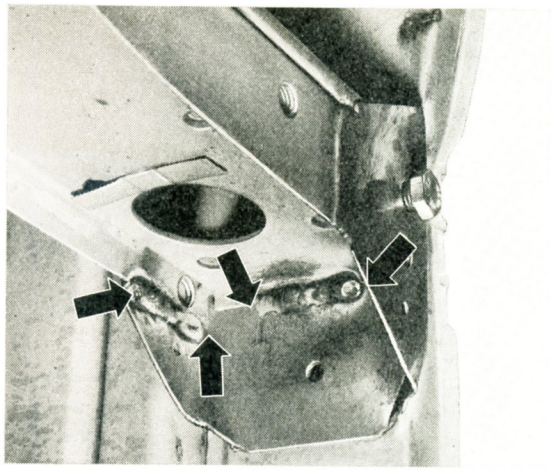
3 – Electric weld body cross members to side member inside and out.



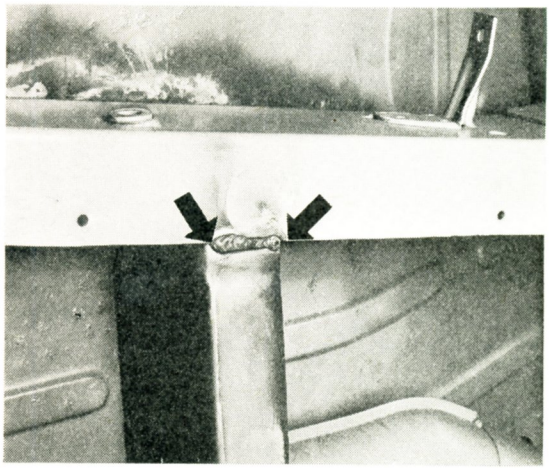
4 – Electric weld side member to bracket at front:

a – Welding seam at top and bottom.

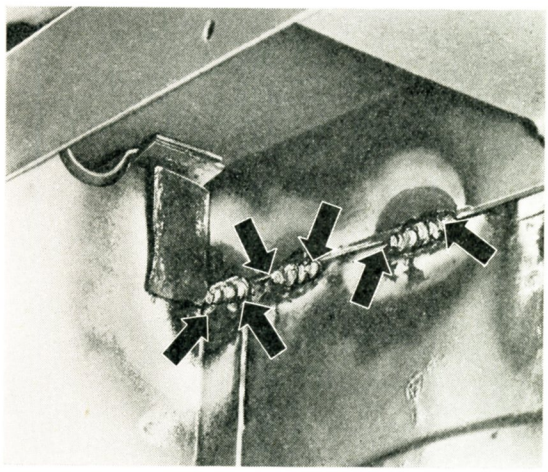
b – Welding seam inside.



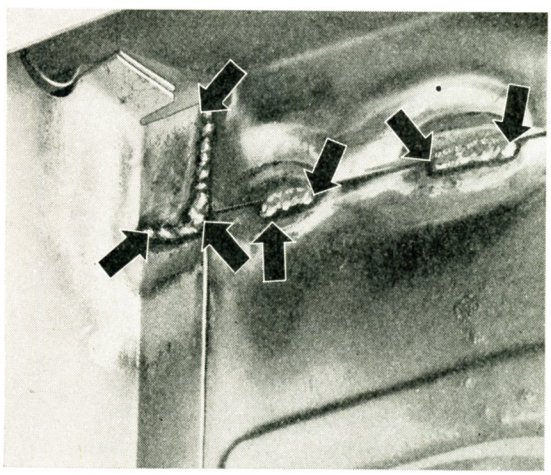
5 – Electric weld side member and front cross member.

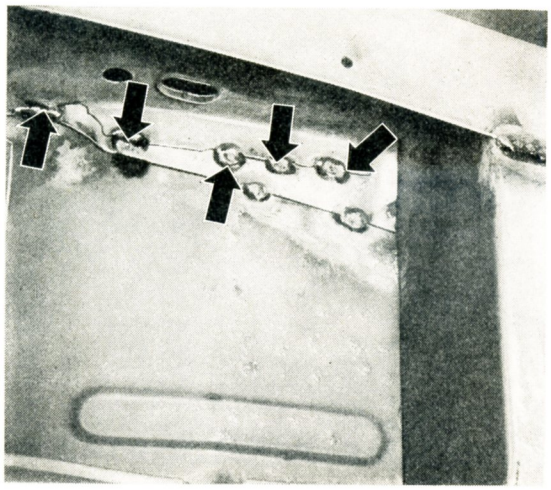


6 – Gas weld inner flange of side member to front cross member and floor plate.



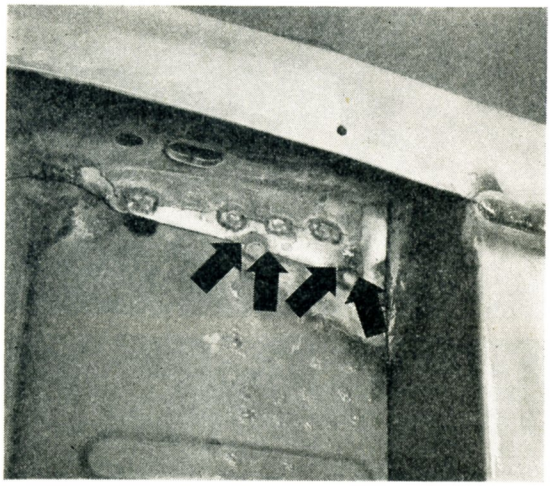
7 – Bend down small tab on cross member and electric weld it.



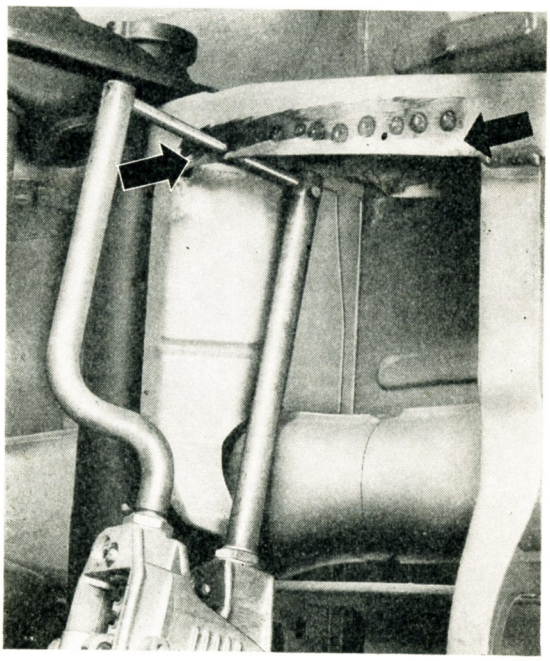


8 – Electric weld:

a – Side member to reinforcement plate.



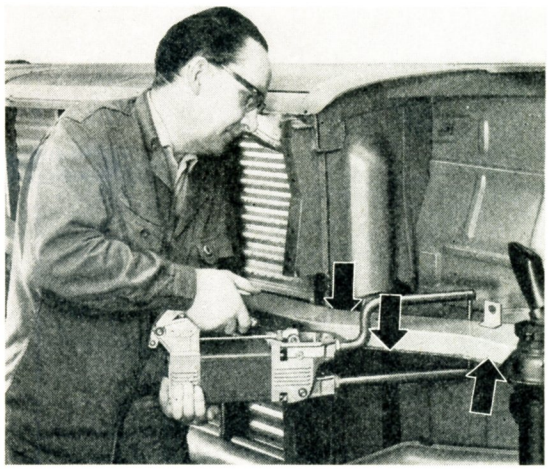
b – Side member to floor plate.

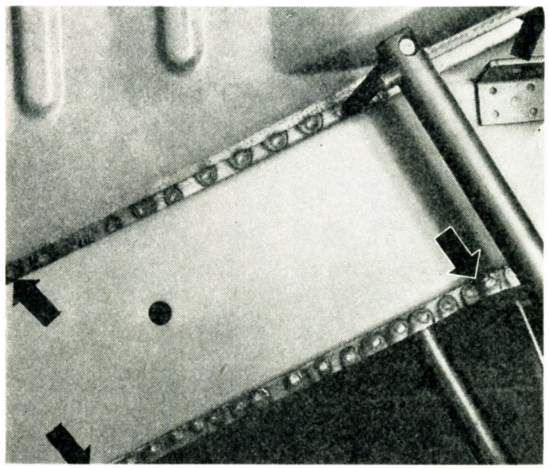


9 – Spot weld side member and reinforcement plate:

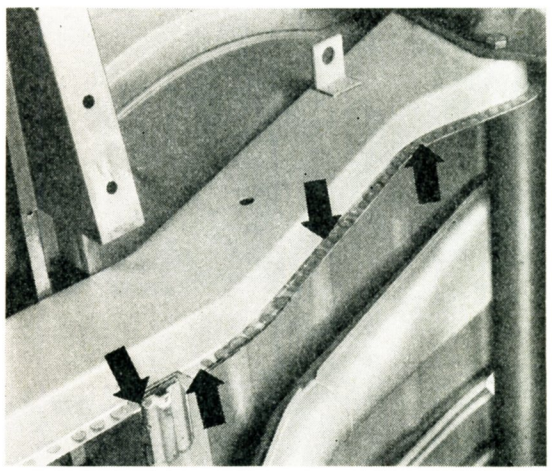
a – Behind cross member.

b – At top:
From body cross member towards the front axle mounting as far as can be reached with the spot welding tongs. The other parts to be welded should be welded electrically.

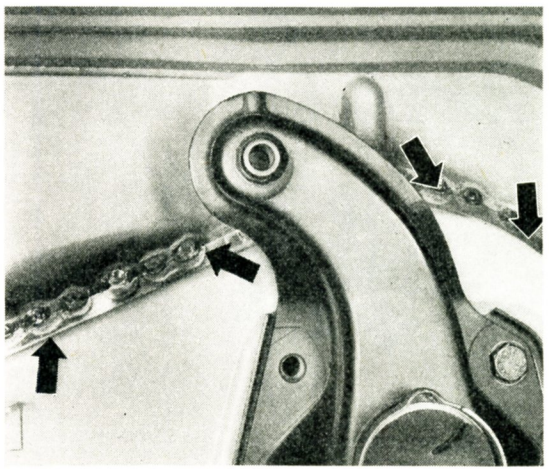




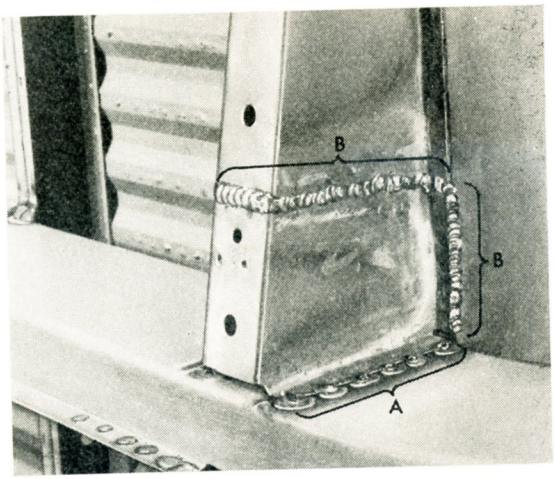
c – At bottom from front cross member to front axle mounting.



10 – Electric weld side member and reinforcement plate (if necessary, straighten welding flange).



Take front axle beam off and finish welding of side member to reinforcement plate.



11 – Weld the piece of front outrigger back on again:

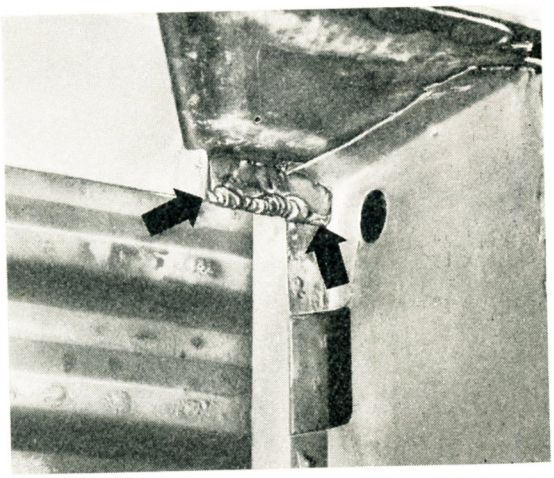
A = Electric weld B = Gas weld

a – Tack at cut with gas weld.

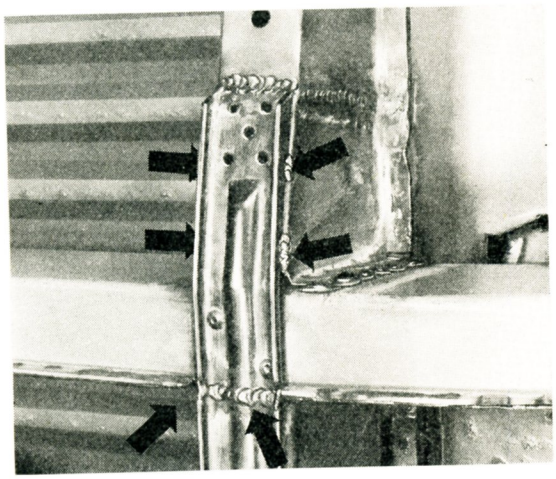
b – Gas weld the welding flange on outrigger to cross member.

c – Gas weld at cut.

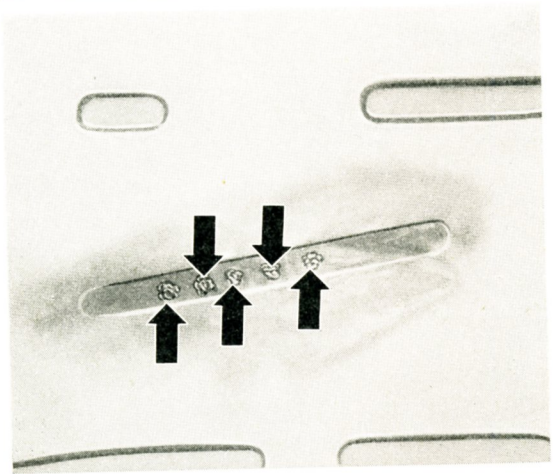
d – Electric weld outrigger to side member.



12 – Gas weld cross brace, reinforcement plate, side member and cross member, in front of and behind cross brace.



13 – Gas weld the piece of retainer back on again.



14 – Gas weld holes in floor plate.

15 – Electric weld the threaded bushes and front axle mounting to side member reinforcement plate.

Replacing a front side member and reinforcement plate

The repair of a left-hand side member and reinforcement plate is described here but the procedure for the right-hand side is the same.

Preparation:

Remove the following:

1 – Front axle and brake lines

2 – Seats in cab.

3 – Front floor covering.

4 – Sound damping for left wheel housing.

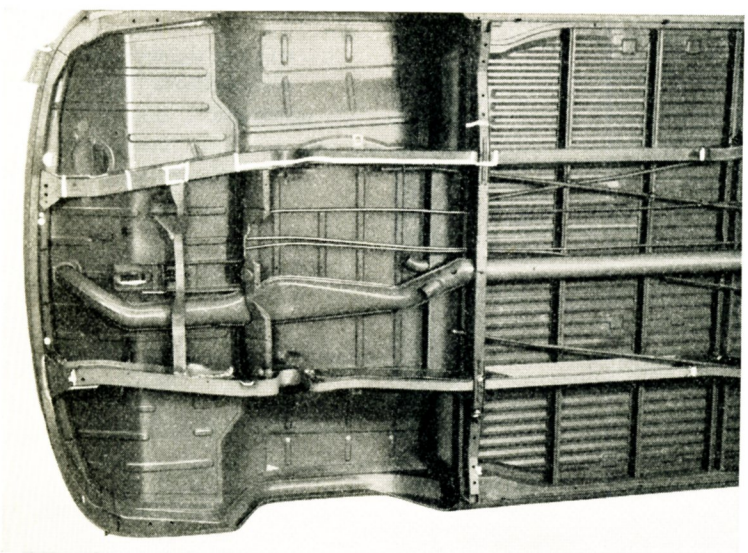
5 – Parts of side rear lining for left seat box.

Note:

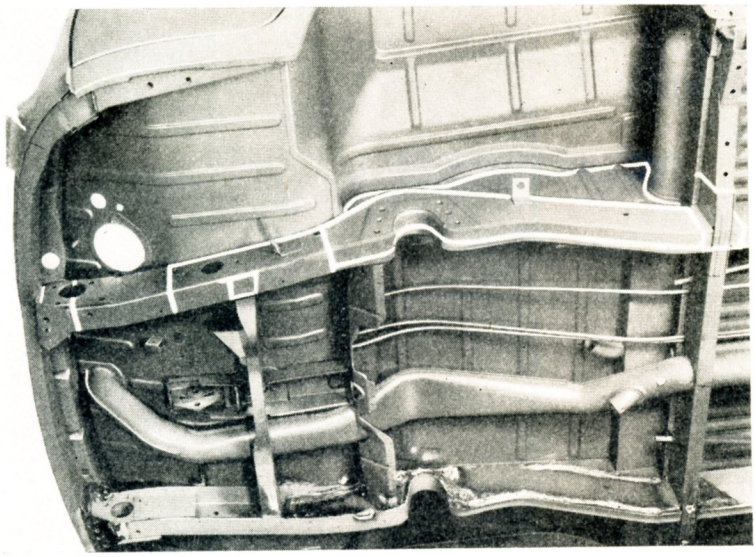
If an Eberspächer heater is fitted, remove cable and keep an eye on cable guide tube when cutting.

Cutting out side member and reinforcement plate

Cutting lines:



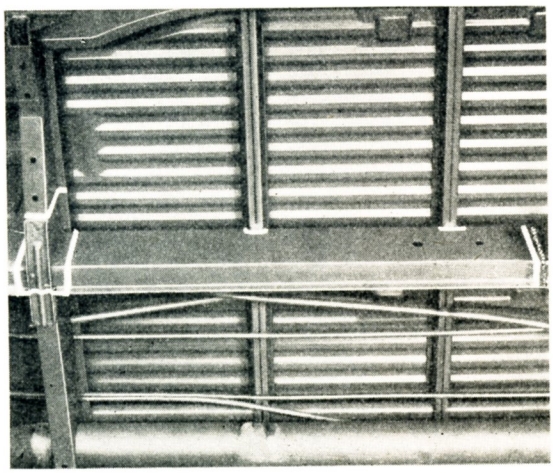
General view

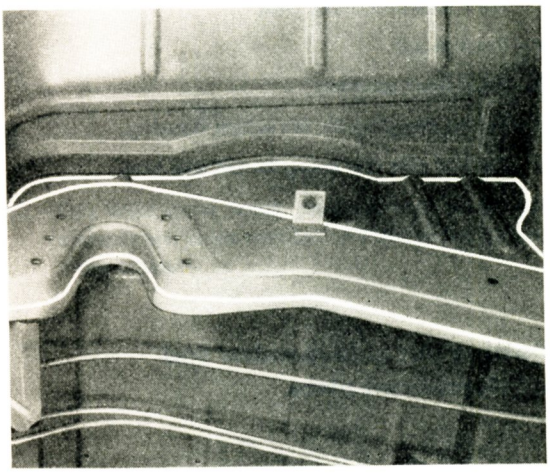


front – from top

rear

reinforcement plate

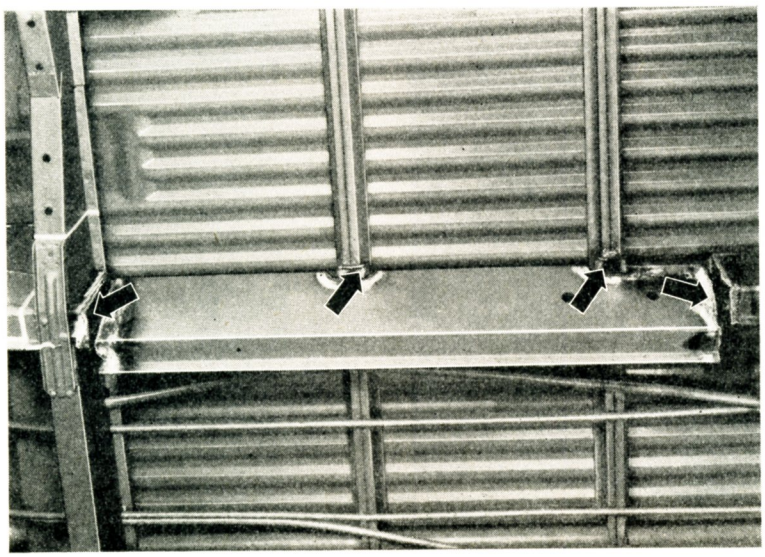




1 – Parting cuts on side member between the butt welded seam and the front cross brace:

a – Cut near the butt welded seam.

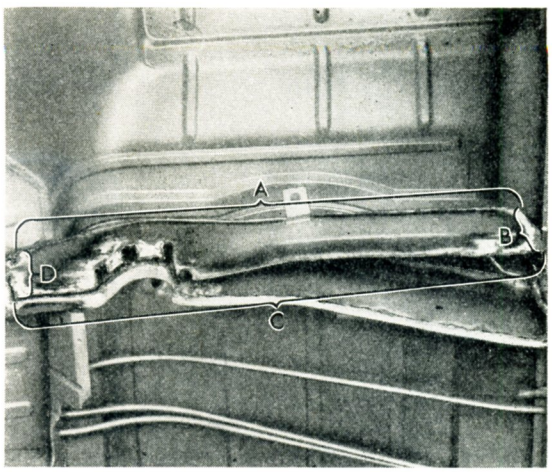
Note:
The cut should be made on the front part of the side member.



b – Part the welded seam of side member / front body support member.

c – Cut in front of cross brace.

2 – Parting cuts on side member between cross brace and insert between side member reinforcement plate in the sequence:
A – B – C – D



Important
The four threaded bushes in the front axle mounting should be cut through with cut "C".

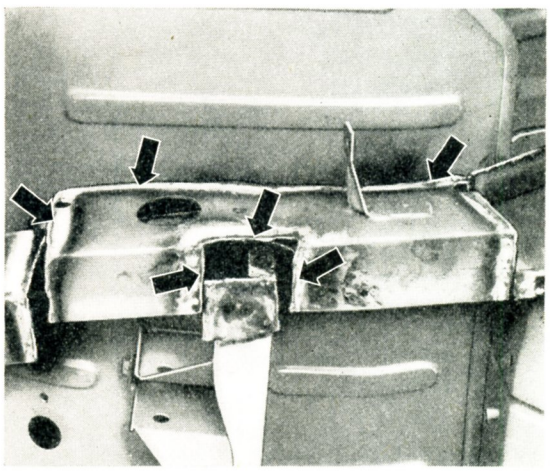
3 – Parting cuts on side member near the front cross member:

a – Cut side member and reinforcement plate.

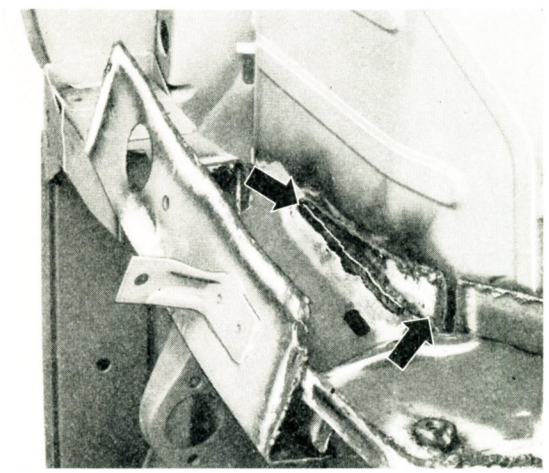
b – Cut upper edge of side member along the floor plate.

c – Cut side member.

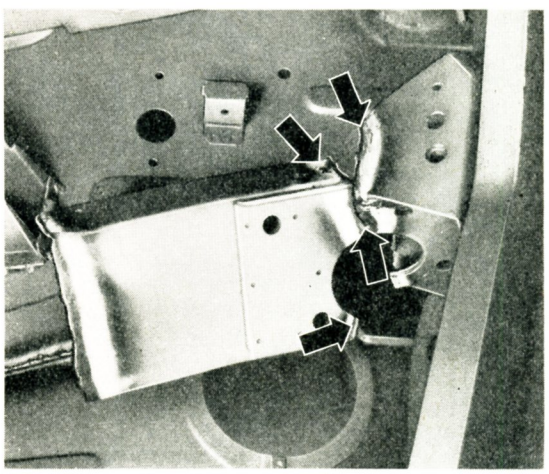
d – Part side member from cross member.



e – Bend side member then cut reinforcement plate.



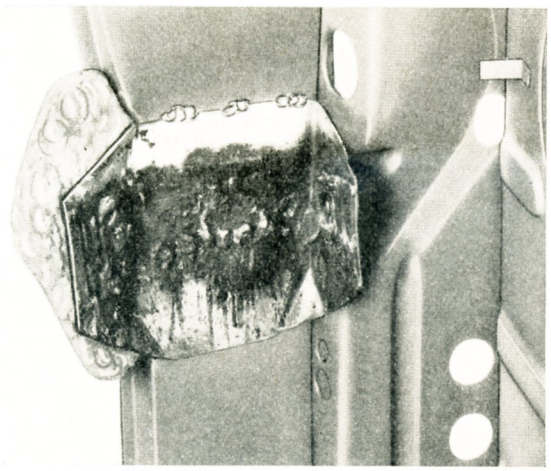
4 – Cut through side member and reinforcement for steering box in front of side member bracket on front cross member.



5 – Remove end part of side member in bracket on front support:

a – Cut round inside bracket.

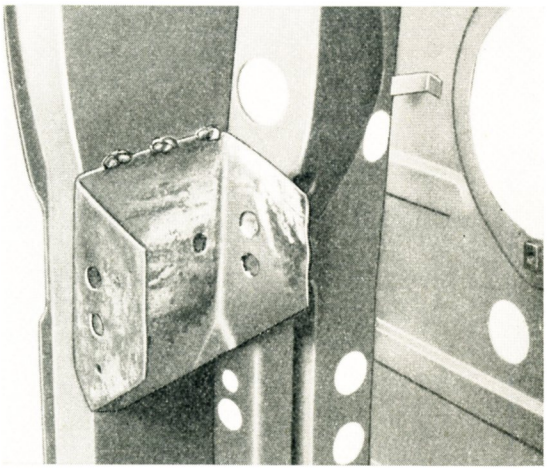
b – Blow upper and lower front welds and inner weld off with torch.



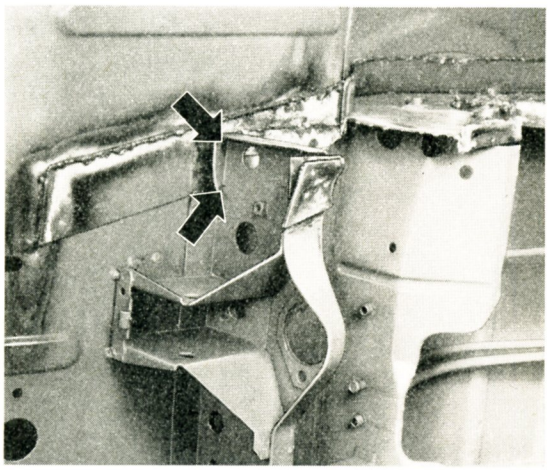
c – Cut up the remaining part of side member in the bracket with a cutting torch.

Note:
The side member bracket must be opened up slightly so that the rest of the side member in the lower part can be cut up. To prevent heat distortion cover the area with wet asbestos powder.

d – Grind spot welds off and chisel remaining pieces of metal off or twist them off with a pair of pliers.



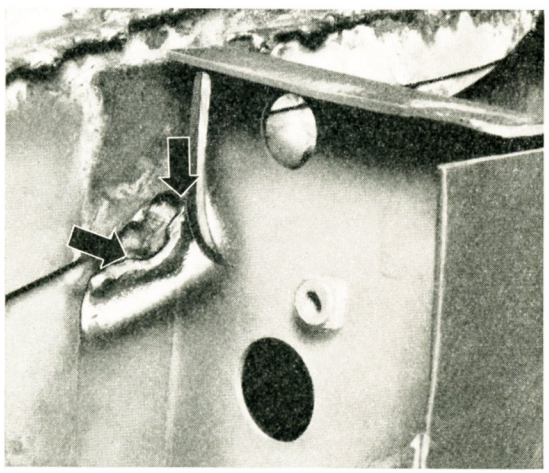
e – Straighten bracket again and grind it clean.



6 – Remove pieces of side member at front cross member:

a – Chisel side member away from cross member at top and cut over weld seam with chisel.

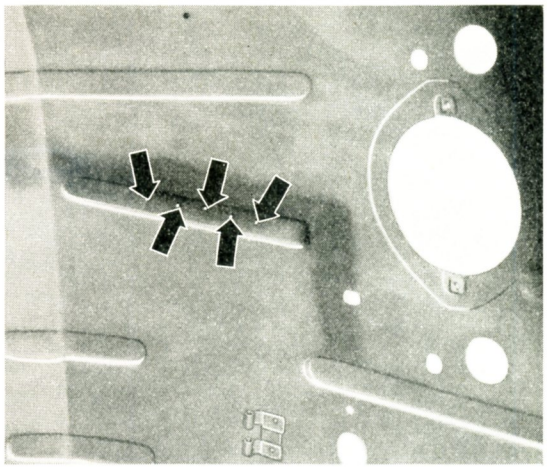
b – Detach side member from cross member at bottom (drill, grind, chisel).



c – Blow weld seam on cross member/side member away with torch.

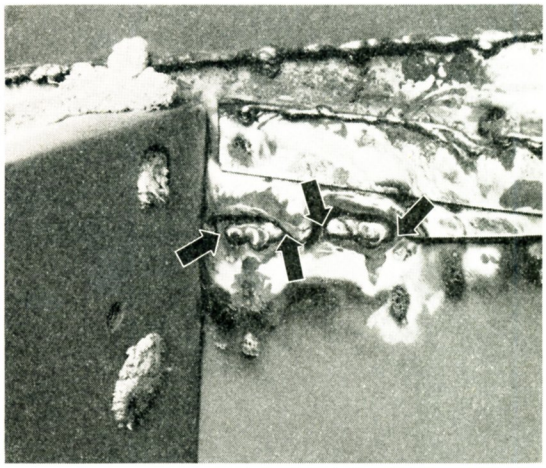
Note:
To prevent heat distortion, pack floor plates with wet asbestos powder inside.

7 – Remove pieces of side member from cab floor:



a – Drill spot welds through floor plate.

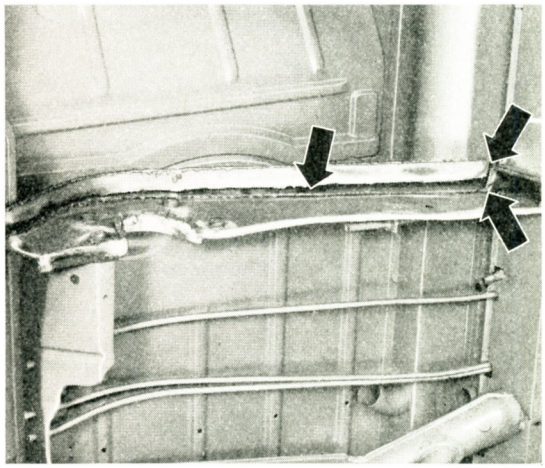
b – Blow welds between floor plate and remains of side member off with torch.



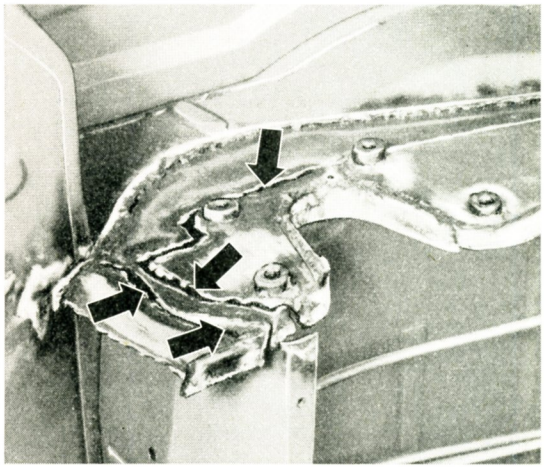
Note:
Cover floor plate with wet asbestos powder to prevent heat distortion.

c – Knock remaining pieces off with hammer.

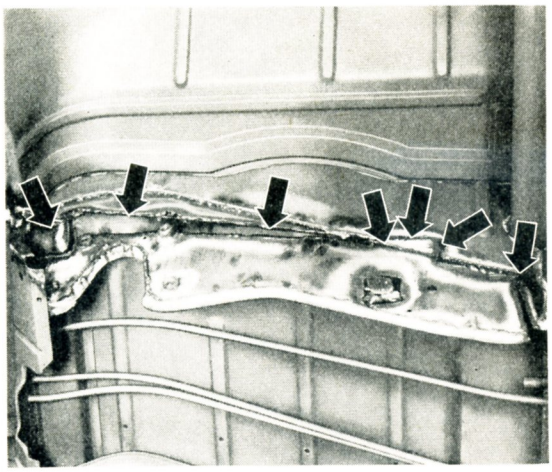
8 – Cut rest of side member away from reinforcement plate.



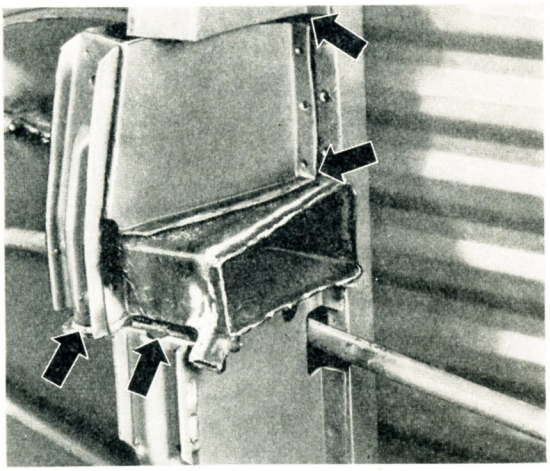
9 – Cuts on the reinforcement plate:



a – Near the reinforcement between side member and cross brace.



b – Cut along the reinforcement between side members at front.

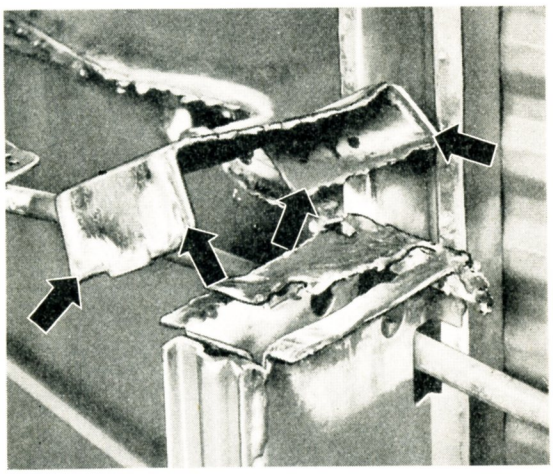


10 – Remove a piece of the left front outrigger and the retainer attached to it:

Note:
This is necessary in order to ensure that the new side member can be fitted without difficult.

a – Chisel the welding flange of outrigger away from side member.

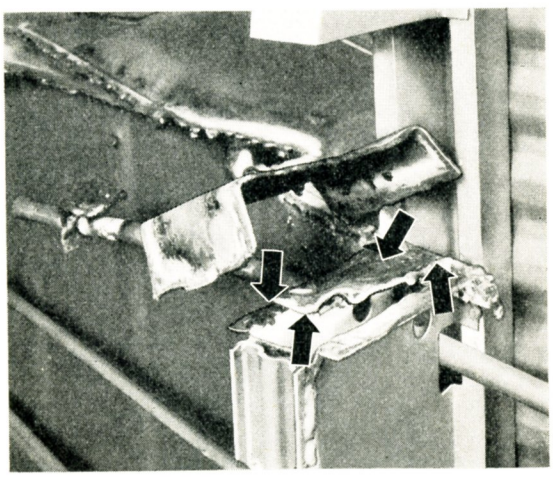
b – Center punch, drill and chisel away the spot welds on the welding flange outrigger / body cross member.



c – Cut outrigger above retainer and retainer below the side member reinforcement plate (metal saw).

11 – Remove remains of side member and reinforcement plate near the front cross brace:

a – Cut side member lower inner edge, bend side member away and cut upper inner edge.



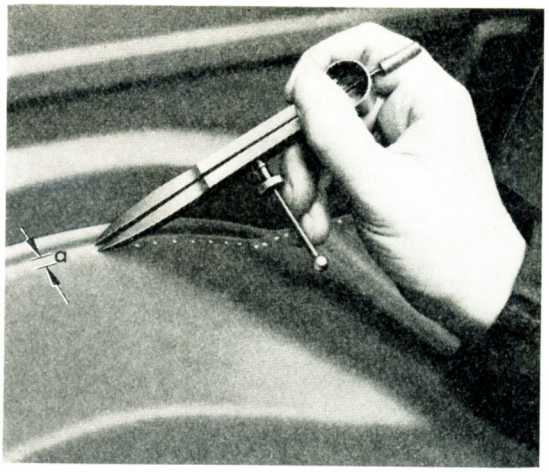
b – Cut the reinforcement plate inside the cross brace.

Important
Do not allow metal to drop into the cross brace as this will cause rattling noises.

c – Grind remaining pieces on the cross brace welding flanges and twist pieces off with pliers.

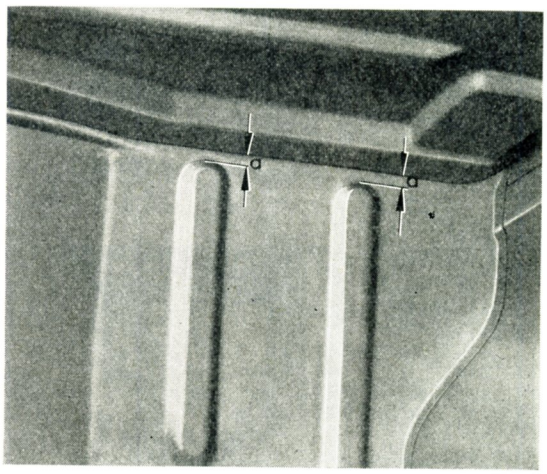
12 – Mark off the cutting lines on the reinforcement plate in the wheel housing. Proceed as follows:

Set dividers to dimension "a", mark off cutting line parallel to wheel housing and center punch along line.



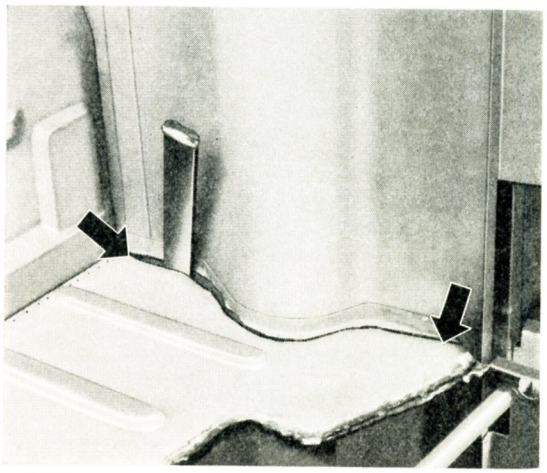
Important
In the center of the side member reinforcement plate the line runs at distance "a" below the longitudinal rib.

Note:
Dimension "a" corresponds to the distance from vertical rib to wheel housing.

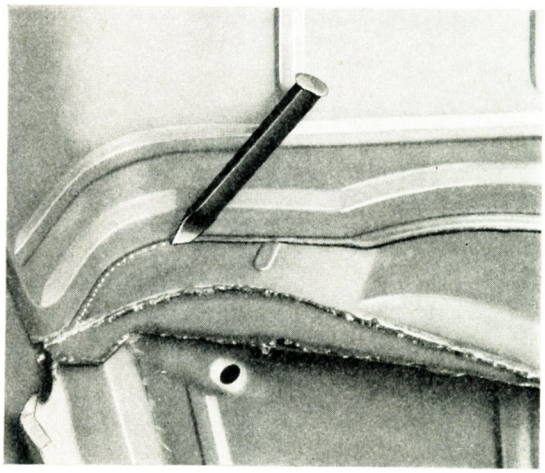


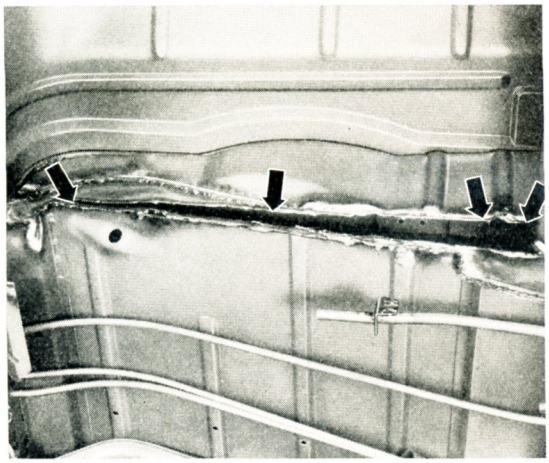
13 – Remove the reinforcement plate near wheel housing / reinforcement between front side members:

a – Cut along partition with chisel.



b – Cut along line parallel to wheel housing with sheet metal chisel.

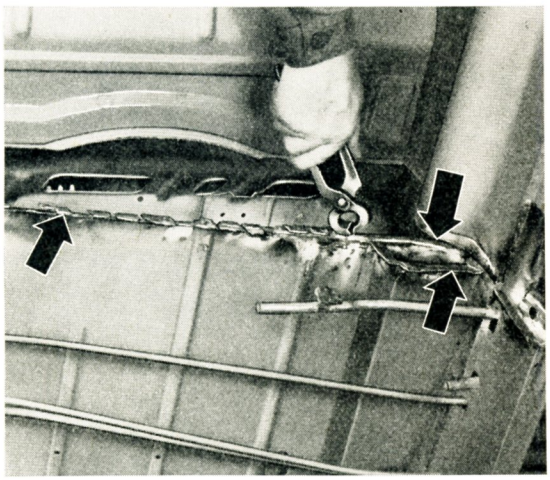




c – Cut with torch along the reinforcement between side member and cross brace.

14 – Remove remaining scraps of reinforcement plate from cross brace and reinforcement between side members:

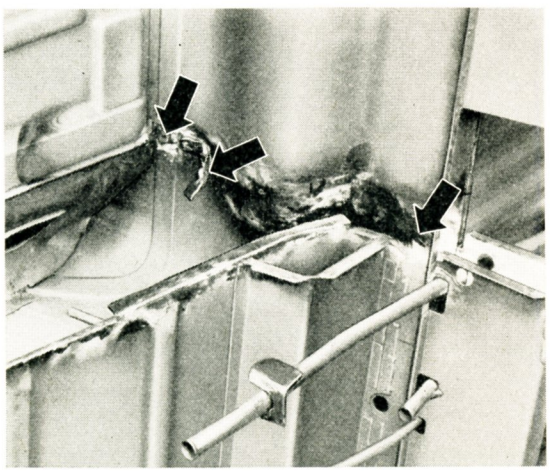
a – Cut inside the metal angle of reinforcement between side members and inside the cross brace.



Important
In order to prevent rattling noises, it is essential to ensure that no pieces of metal fall into the cross brace and into the corner piece of the reinforcement between side members when cutting.

b – Cut up the reinforcement plate on the welding flange which is angled outwards. Pull pieces off with pliers. The remains of the reinforcement plate on the welding flange which is angled inwards must be ground and pulled off with pliers.

15 – Remove the welding flange of the reinforcement plate from the left side of partition:



a – Center punch and drill spot welds.

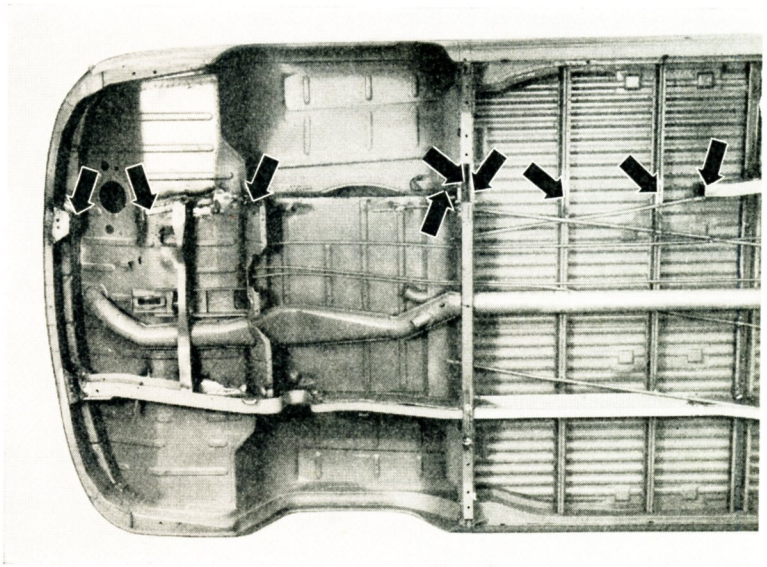
b – Warm welding flange with torch and pull off with pliers.

Note:
Cover partition with wet asbestos powder inside.

c – Grind remaining scraps of metal off.

Preparing to weld in the new part

1 – Clean and straighten all connecting surfaces for the new part.

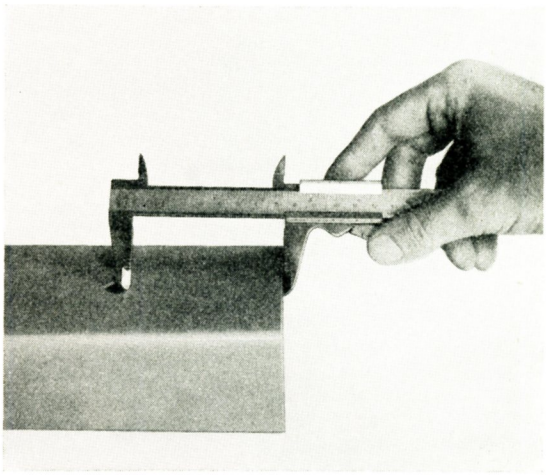


2 – Grind end of left rear side member back to the center of the old welding seam and chamfer edge.

3 – Determine length of side member:

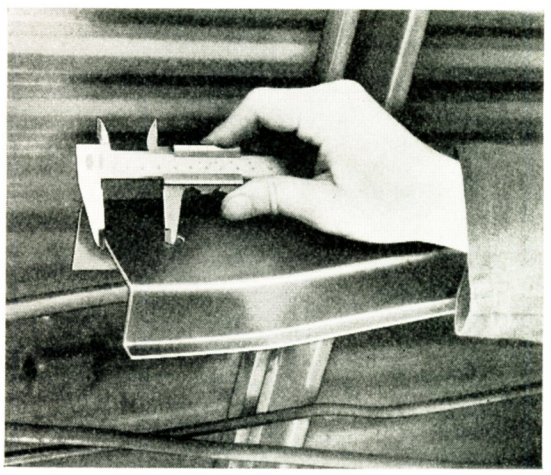
a – The dimension to be obtained is 112^{+1} mm which was determined in a series of measurements. The measurement is taken between the two holes near the end of the side members.

As the new part has a welding allowance, it is always necessary to cut a certain amount off. The amount to be cut off can be determined by by a simple calculation.



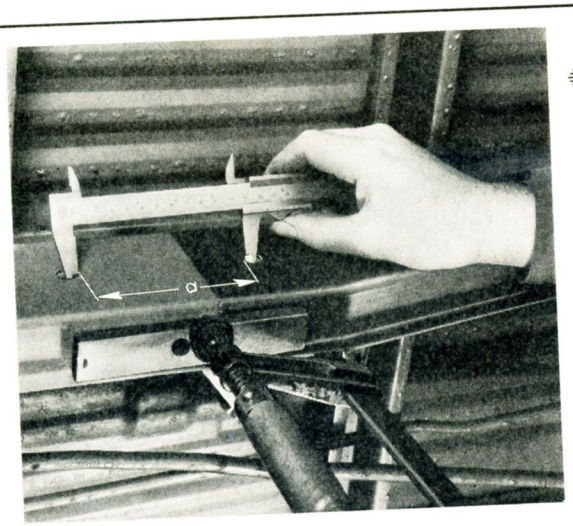
Example:

a – Dimension from hole to end of side member on new part = 79.5 mm.



b – Dimension from hole to end of side member on part still on body 36.6 mm.

c – Actual dimension = 79.5 mm
+ 36.6 mm
116.1 mm



d – Determining length of excess material

(gives fitting length)

116.1 mm (actual dimension)
—112.0 mm (nominal dimension)
4.1 mm

4.1 mm is thus the amount to be cut off the new part of side member. Make cut at an angle so as to give a chamfer.

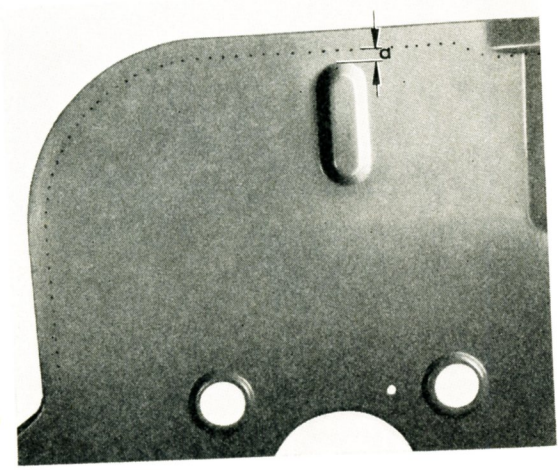
Preparing new parts for welding

1 – Side member, front:

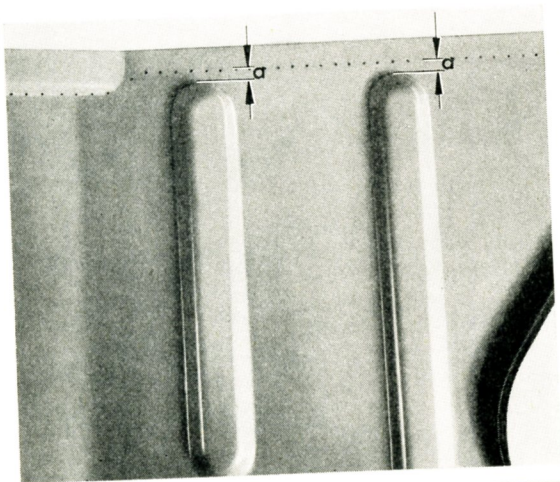
a – Cut off excess material (4.1 mm in our example)

b – Grind clean all connecting surfaces for spot welding.

2 – Side member reinforcement plate:



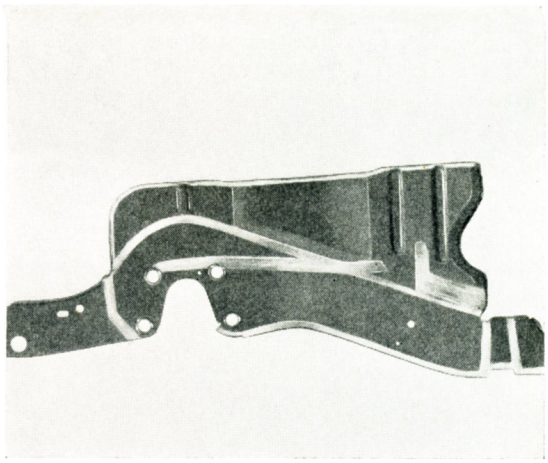
a – Mark off and center punch the cutting line.



Note:
Dimension "a" corresponds again to the distance of the vertical rib from the wheel housing.

b – Cut excess metal off with a pair of metal shears.

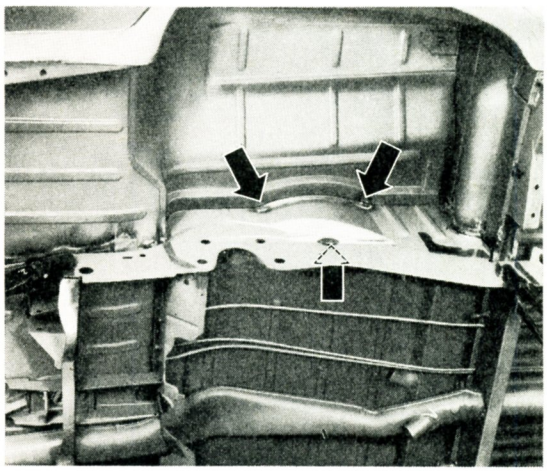
c – Straighten and grind all connecting surfaces clean for spot welding.



Fitting the new parts

A – Fitting the reinforcement plate

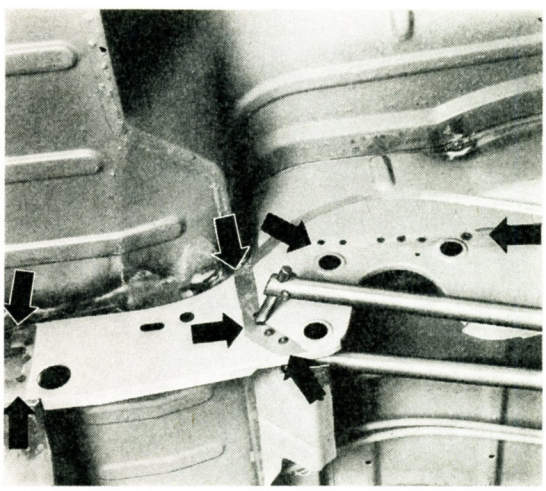
1 – Fitting and gas tacking the reinforcement plate:



a – Align the new part with the connecting surfaces and secure it in position with clamps.

b – Tack the new part to the existing rib of the old reinforcement plate and to the welding flange of the brace between the side members.

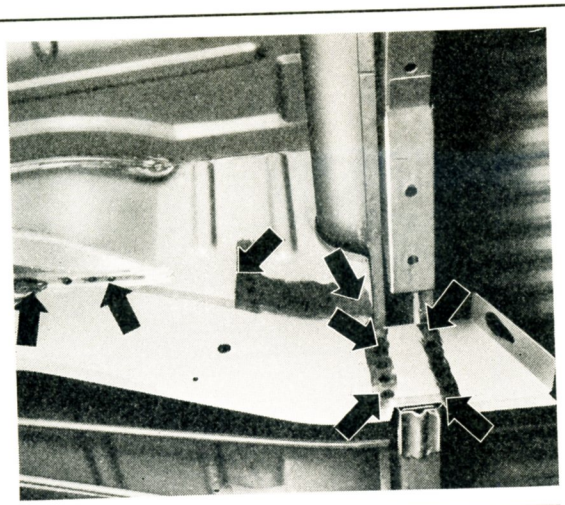
2 – Spot weld the reinforcement plate at the following points:



a – Welding flange on cross member.

b – Welding flange on reinforcement between reinforcement plates.

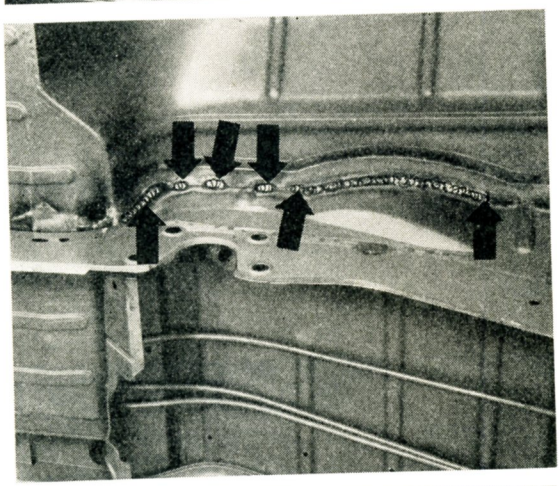
c – Welding flange on reinforcement between side members.



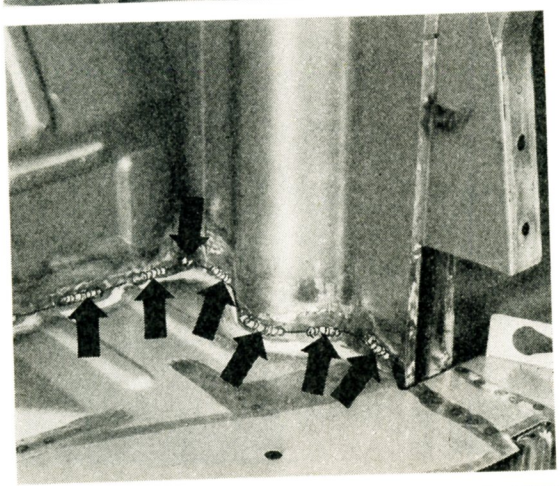
d – Welding flange on cross reinforcement.

e – Welding flange on cross brace.

3 – Gas weld the reinforcement plate:

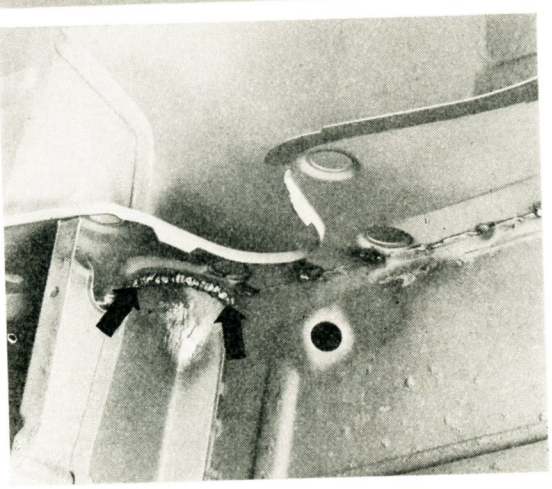


a – On wheel housing and existing rib of old reinforcement plate.



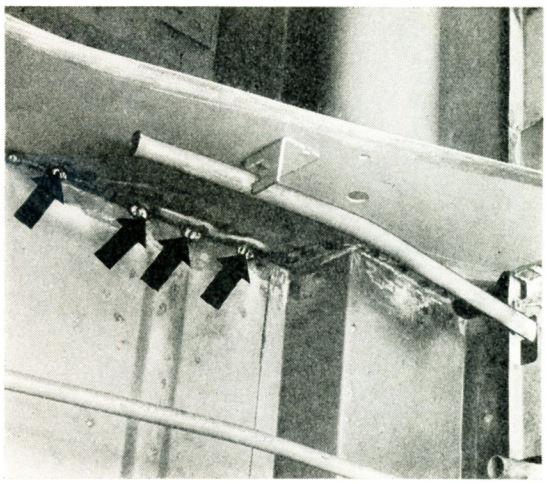
b – Left side of partition.

4 – Electric weld the reinforcement plate:



a – Welding flange on cross reinforcement.

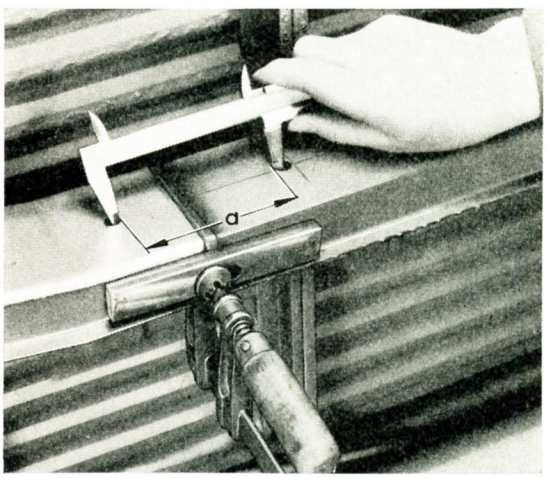
b – Welding flange on reinforcement plate between side members.



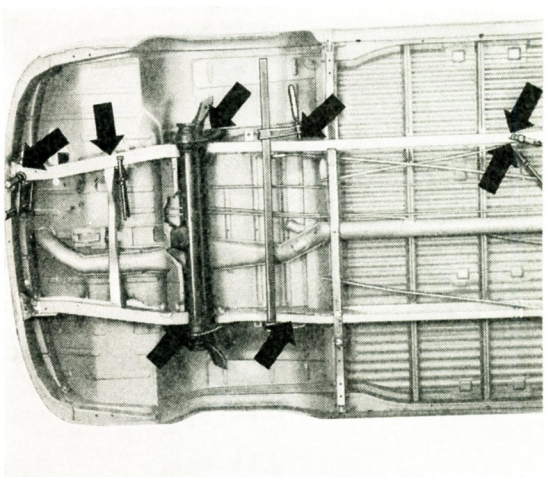
5 – Paint spot welds on reinforcement plate with cold zinc paint to prevent corrosion.

B – Fitting the side member

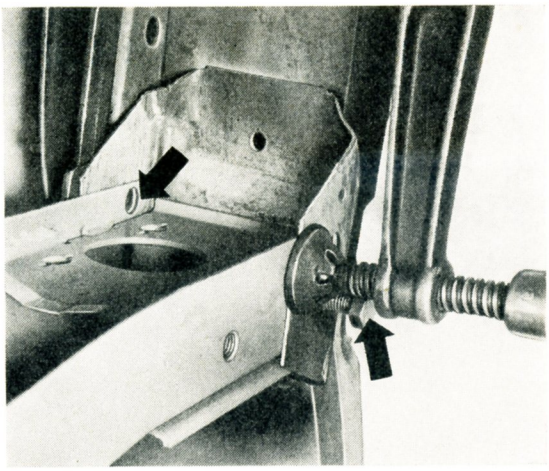
1 – Aligning the side member:



a – Check the dimension (112^{+1} mm) again with side member in position and rectify if necessary. Then clamp side member firmly.



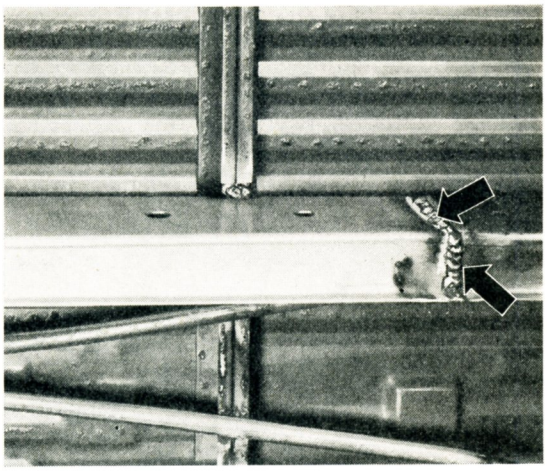
b – Bolt front axle beam to the side members.



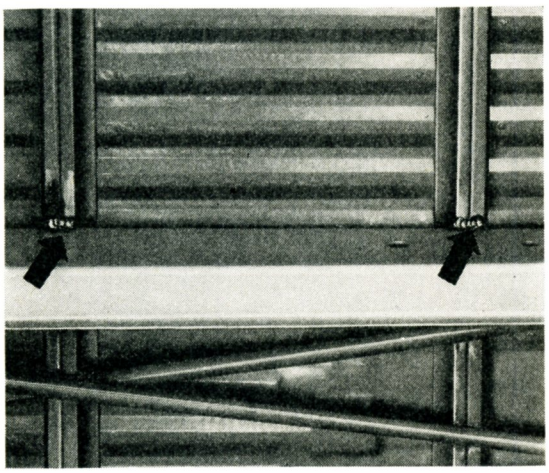
c – Position side member in front bracket so that holes in side member and bracket are correctly aligned.

Note:
A suitable bolt should be screwed into the nut in the side member.

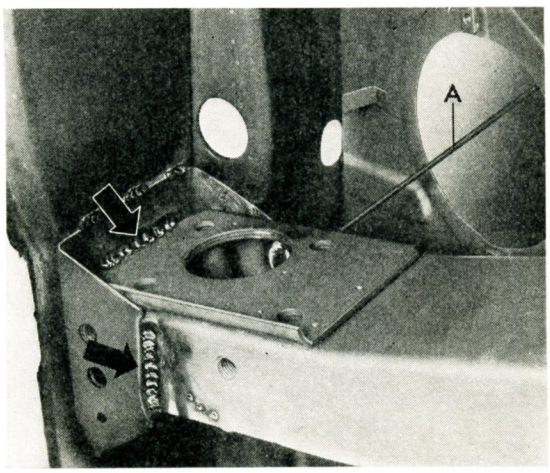
d – Then secure side member with a clamp.



2 – Butt weld the side member parts electrically.



3 – Electric weld body cross members to side member inside and out.

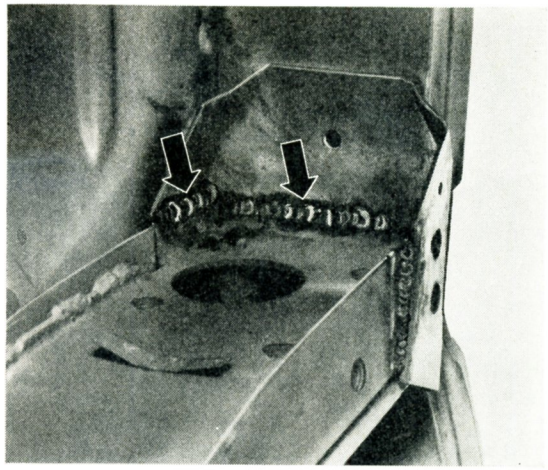


4 – Electric weld side member to bracket at front:

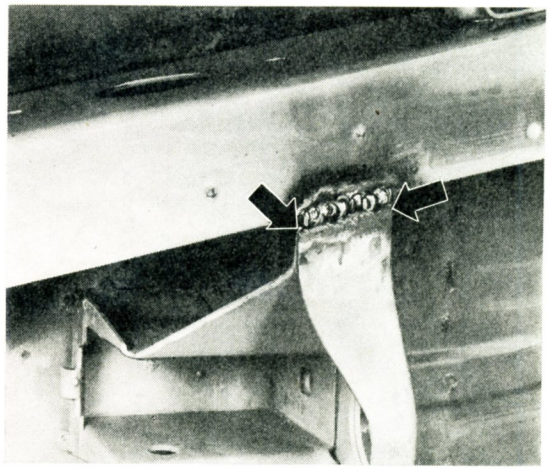
A = Welding electrode.

a – Welding seam at top and bottom.

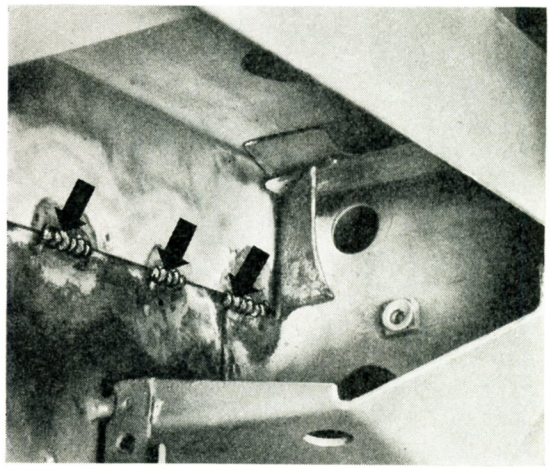
b – Welding seam inside.



5 – Electric weld side member and front cross member.

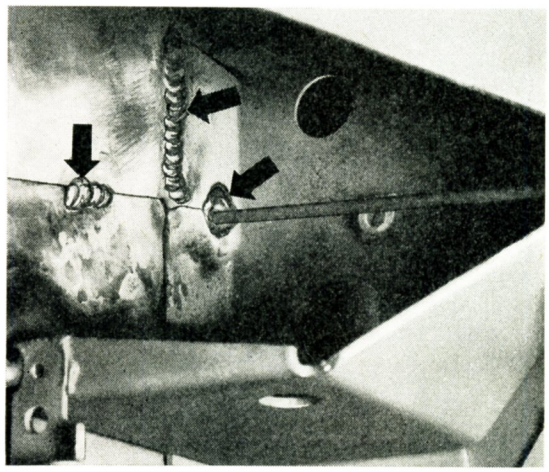


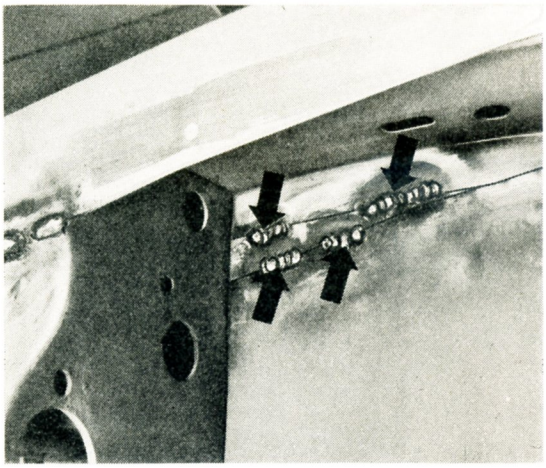
6 – Gas weld inner flange of side member to front cross member and floor plate.



Note:
The lower arrow points to the welding electrode.

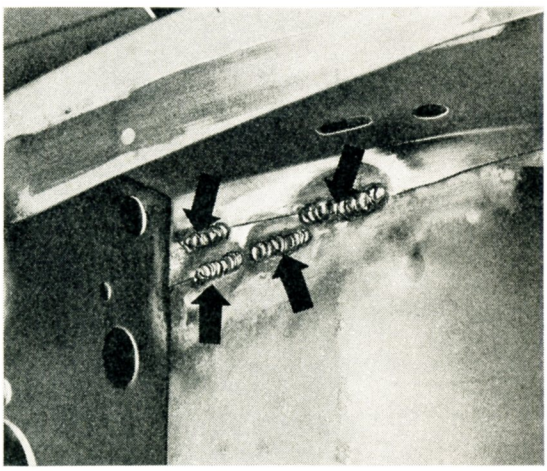
7 – Bend down flap on cross member and electric weld it.



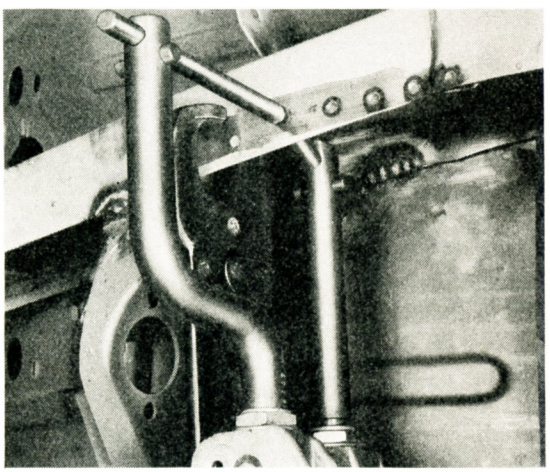


8 – Electric weld:

a – Side member to reinforcement plate. (upper arrow)

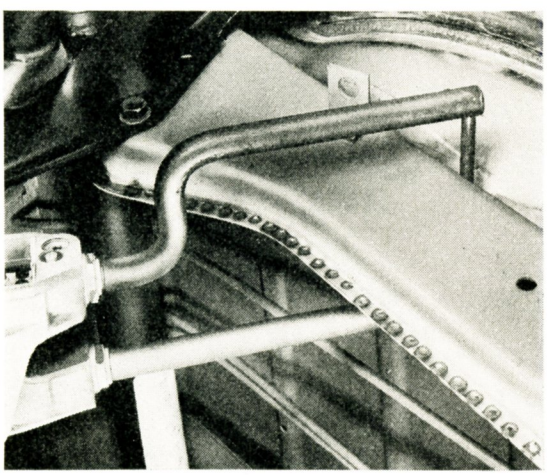


b – Side member to floor plate. (lower arrow)



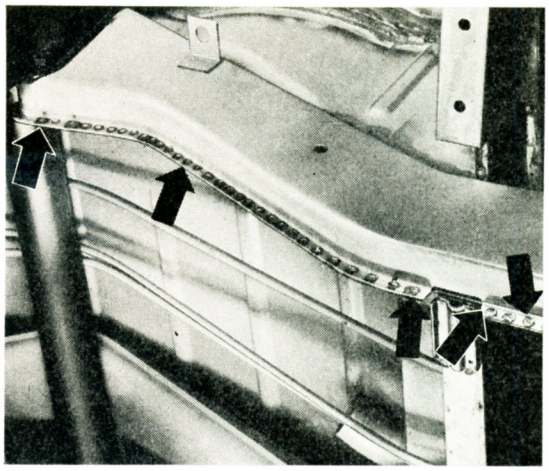
9 – Spot weld side member and reinforcement plate:

a – Behind cross member.

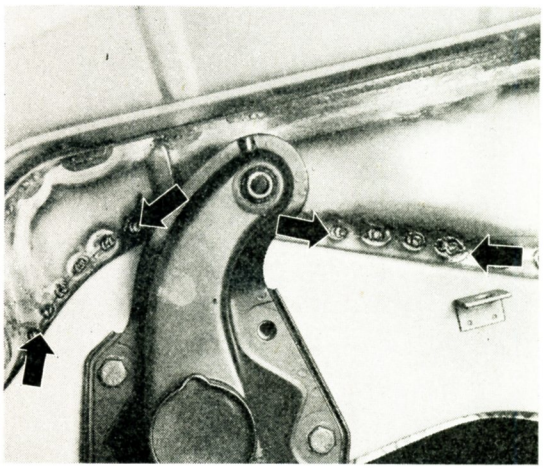


b – From body cross member towards the front axle mounting as far as can be reached with the spot welding tongs. The other parts to be welded should be welded electrically.

c – At bottom from front cross member to front axle mounting.



10 – Electric weld side member and reinforcement plate (if necessary, straighten welding flange).

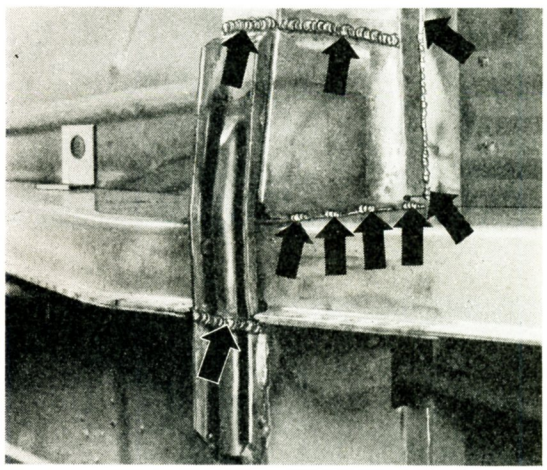


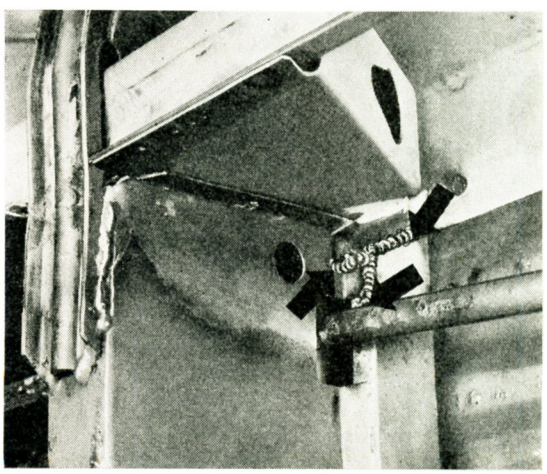
11 – Take front axle beam off and finish welding of side member to reinforcement plate.

12 – Weld the piece of front outrigger and retainer back on again:

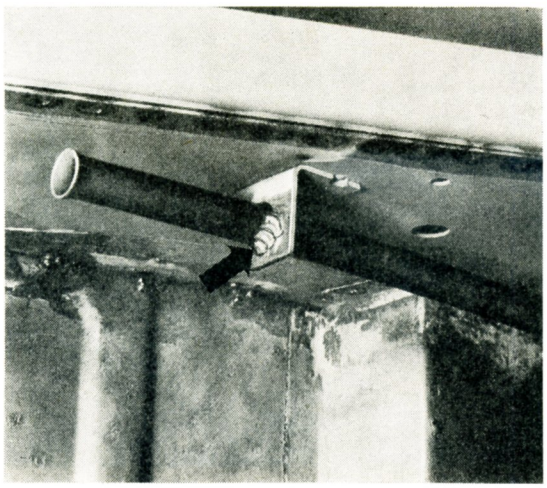
a – Gas weld cut in retainer, cut in outrigger and welding flange of cross member.

b – Electric weld outrigger flange to side member.



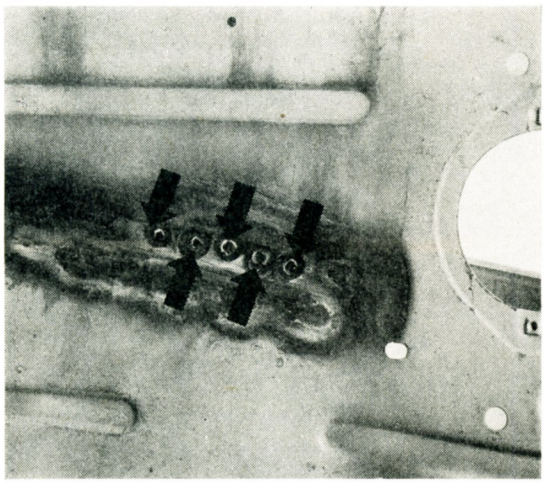


13 – Gas weld cross brace, reinforcement plate, side member and cross member behind cross brace.

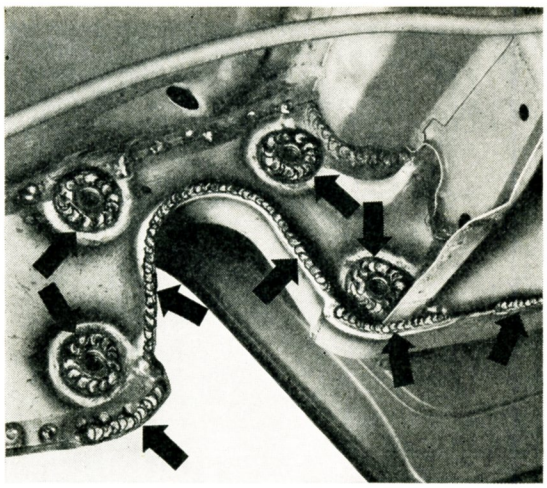


14 – Gas weld clutch cable tube to bracket.

Important
Do not weld through into tube as otherwise cable will chafe through in a very short time.



15 – Gas weld holes in floor plate.

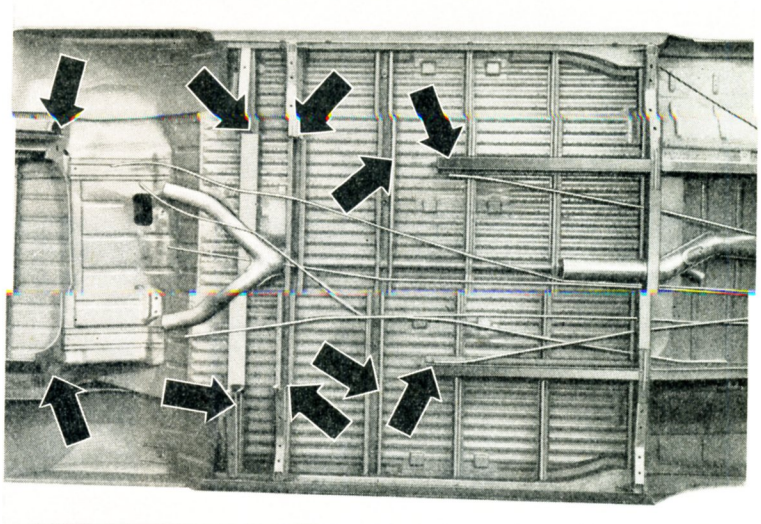


16 – Electric weld the threaded bushes and the front axle mounting to the reinforcement plate.

Replacing Rear Side Members complete with Cross Tube A17

When the rear side members with reinforcement and cross tube are damaged, it is only possible to replace the complete rear end of the frame. The outriggers are the only parts which can be replaced separately.

If the outriggers are not damaged, they should always be left on the floor plates as described here. The outriggers are then cut off at the side members.



Preparation:

1 – Remove the following parts:

a – Engine and rear axle

b – Fuel tank

c – Left cab door

d – Engine compartment lid

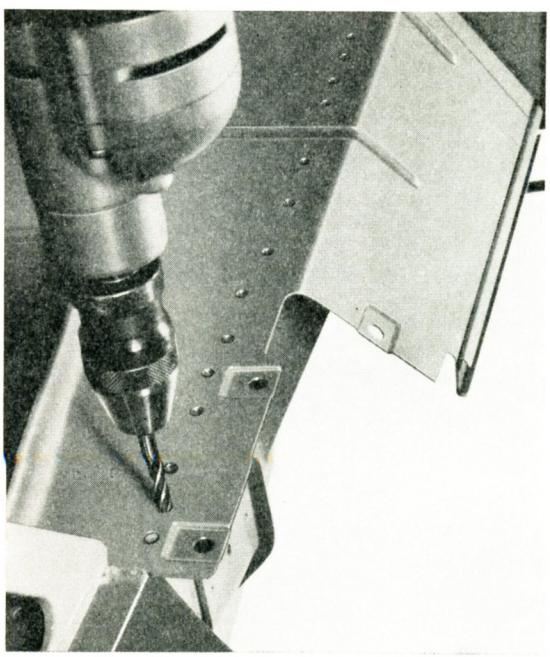
e – Battery

2 – Seal brake fluid reservoir with D14 plastic sealing compound.

3 – Drill spot welds in inner engine cover plates:

a – Left plate – all

b – Right plate – all which can be reached with drill

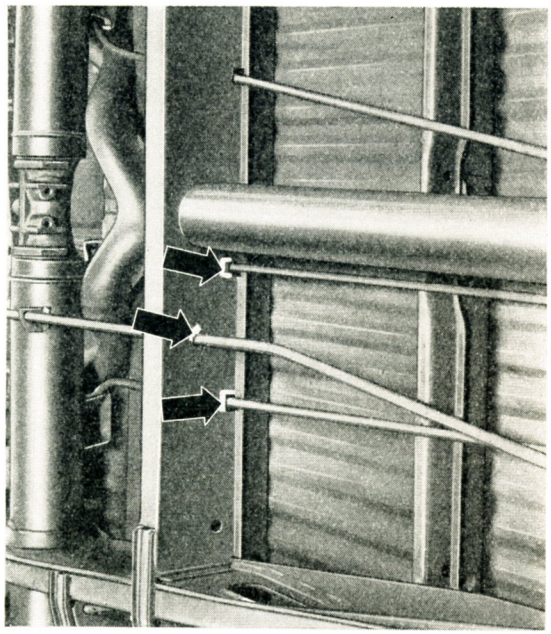


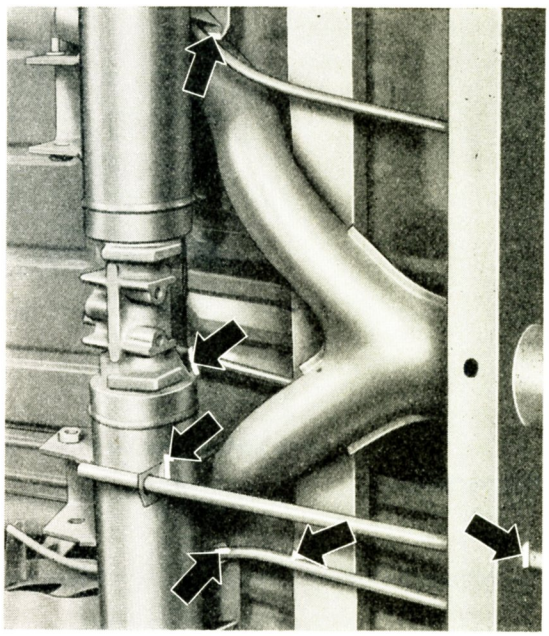
4 – Lay vehicle over on left side.

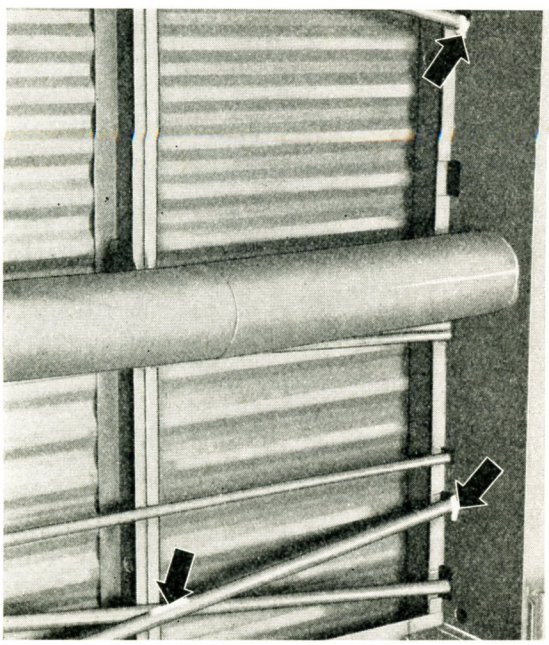
Note:
Suitable sheets should be spread out on the floor to prevent damage to body. An additional amount of padding should be placed under the air intake the corner panel.

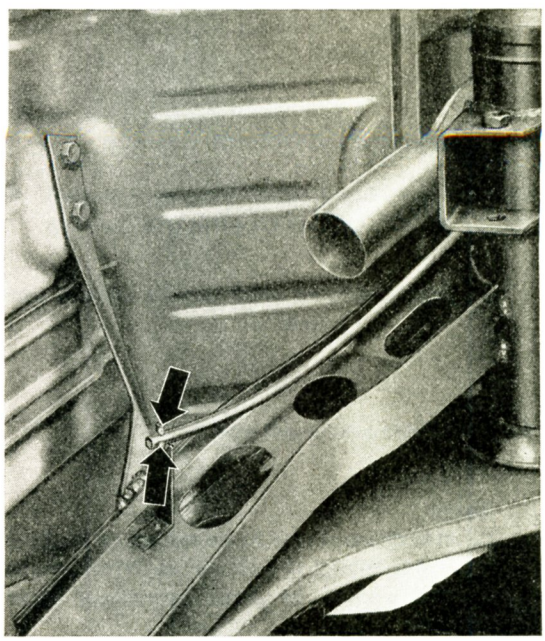
Cutting out the rear side members and cross tube

1 – Detach the four guide tubes at the spot welds shown.

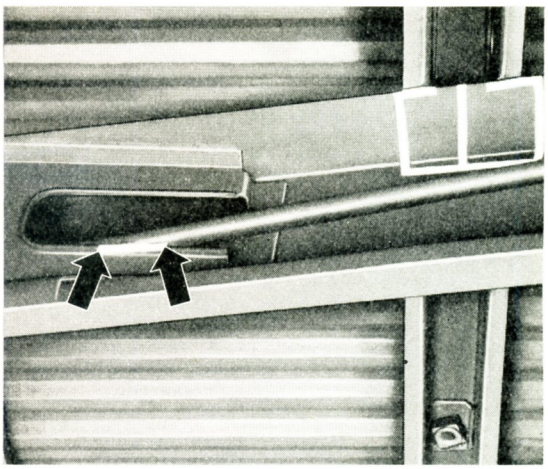




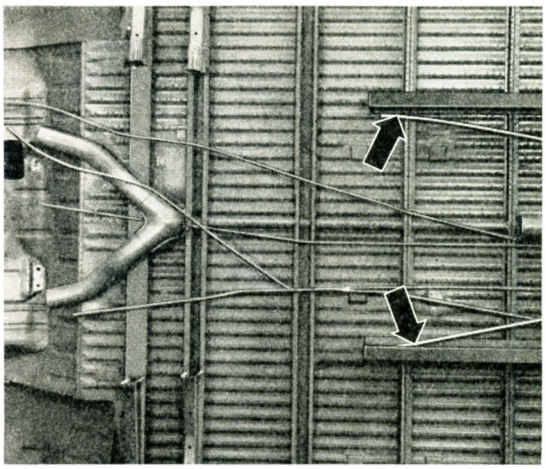




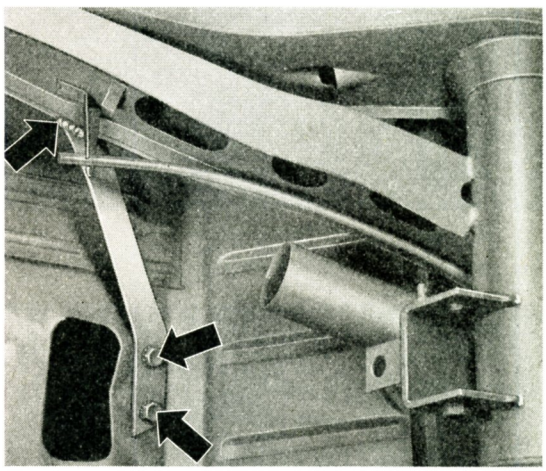
2 – Detach the hand brake cable guide tubes where they are spot welded to the side members.



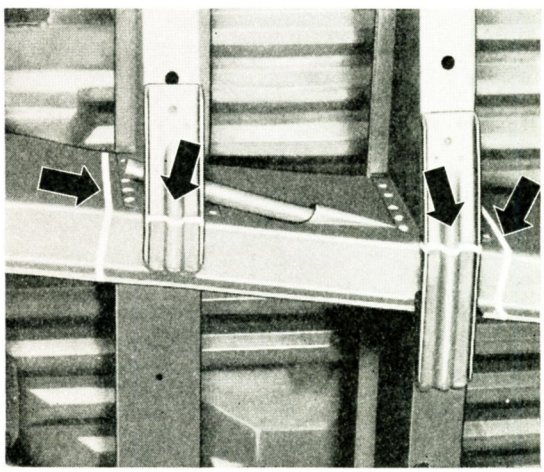
Note:
Then slide tubes towards the front part of side members.



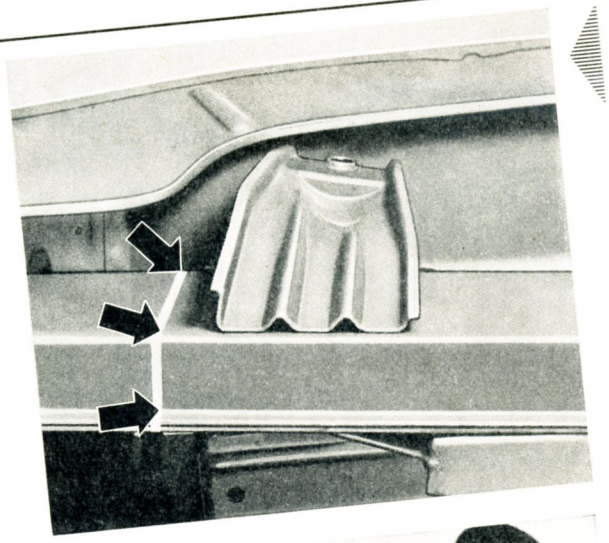
3 – Remove screws holding struts to floor plate and chisel struts away from side member.



4 – Cut side member:

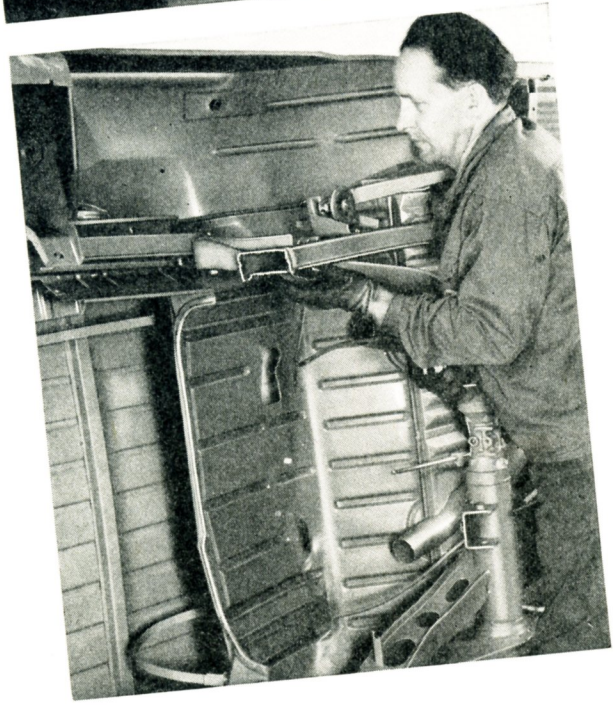


a – At the rear outriggers. If the outriggers are not damaged they should be left attached to the floor plates.

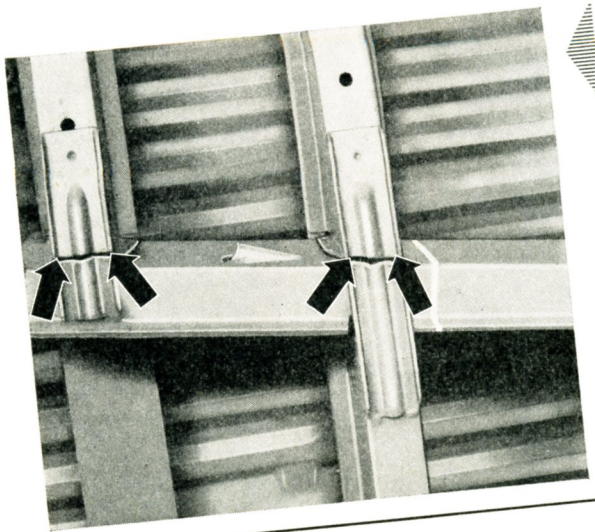


b – At the shock absorber mounting flange.

Note:
The cuts should be made about 15 mm wide to facilitate removal of cross tube.



c – Then take out cross tube complete with parts of side members.

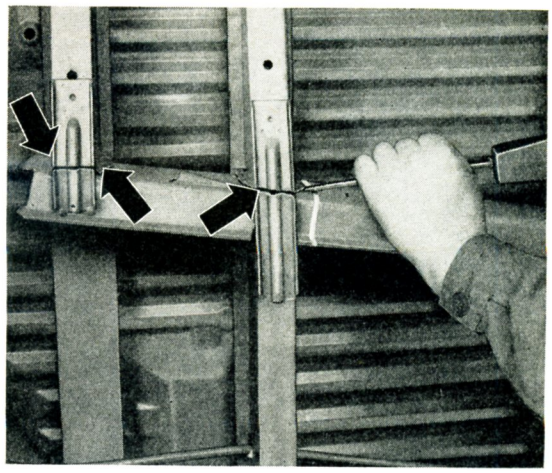


5 – Cut retainer between side members and outriggers (metal saw).

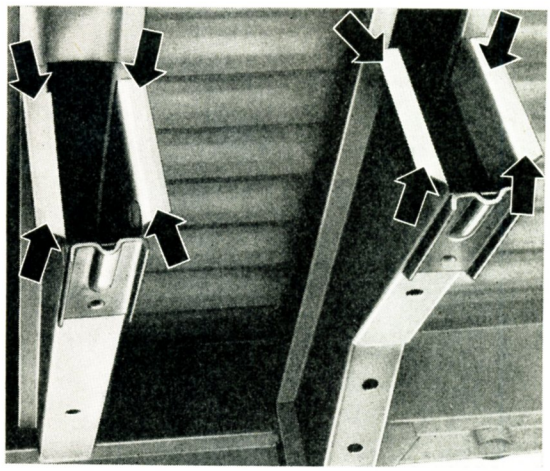
Note:
The floor to side member retaining plates shoul be cut with gas torch.

side members and cross tube – cutting out

6 – Cut rear and center outriggers away from side member at the spot welding flanges (by chiselling or drilling the spot welds).



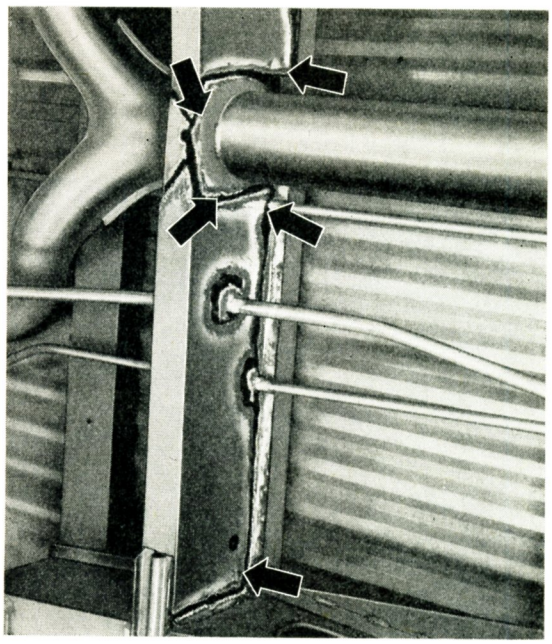
Note:
This must be done without damaging the flanges.

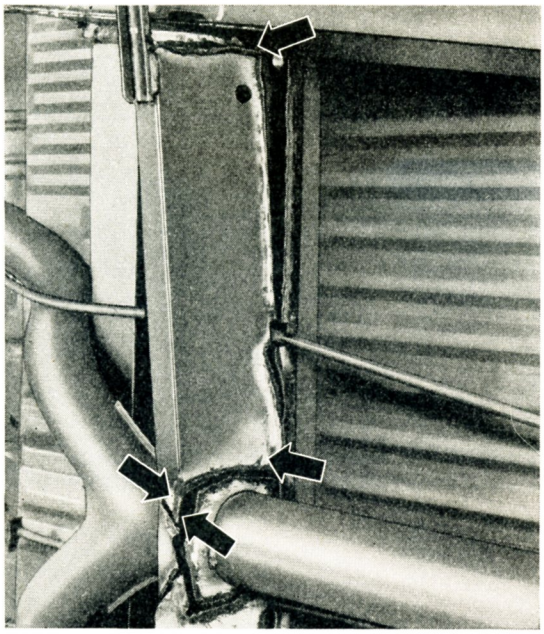


7 – Cut cross brace with gas torch:

a – At spot welding flange cross brace/floor cross member.

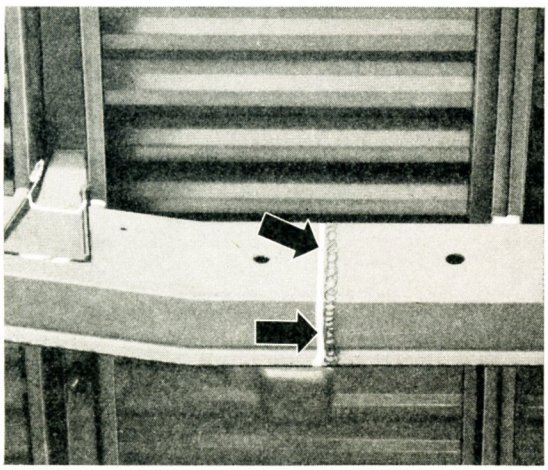
b – At air duct.



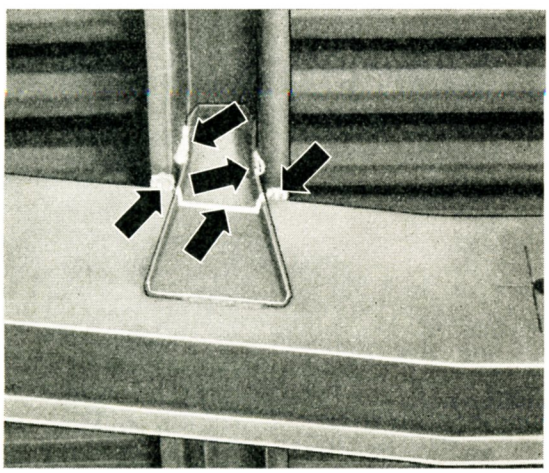


c – At side member reinforcement.

8 – Cut side member at butt welded joint and cut it away from floor cross members:

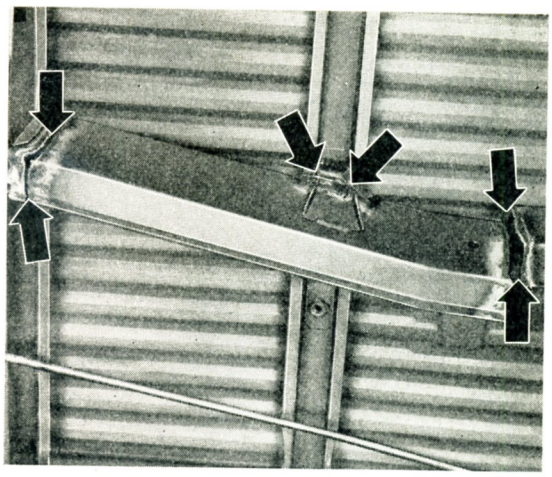


a – Cut at butt weld is made on rear part of side member.

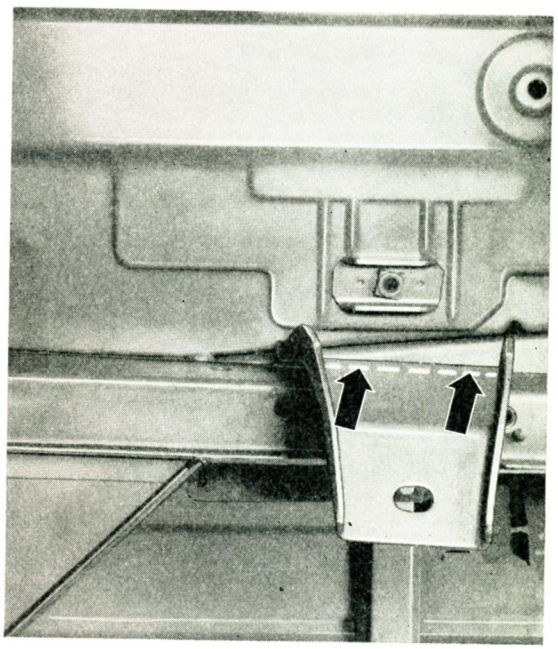


b – Side member/floor cross member at retaining plate.

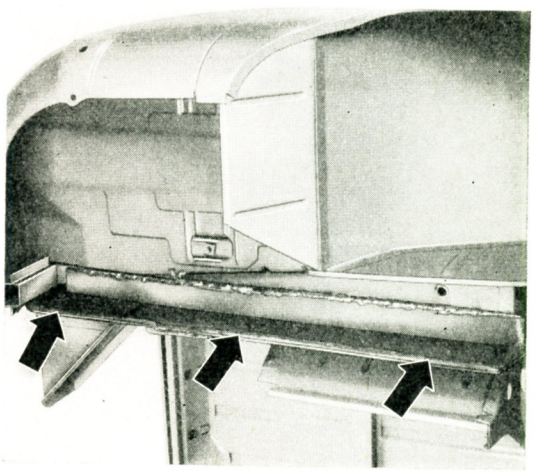
c – Detach piece of side member from floor cross member.



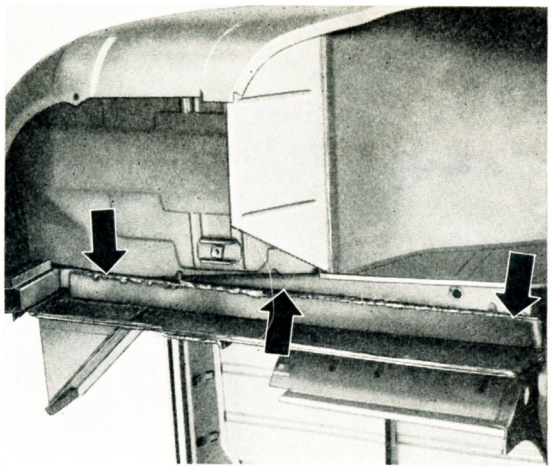
9 – Cut side member end piece and reinforcement:



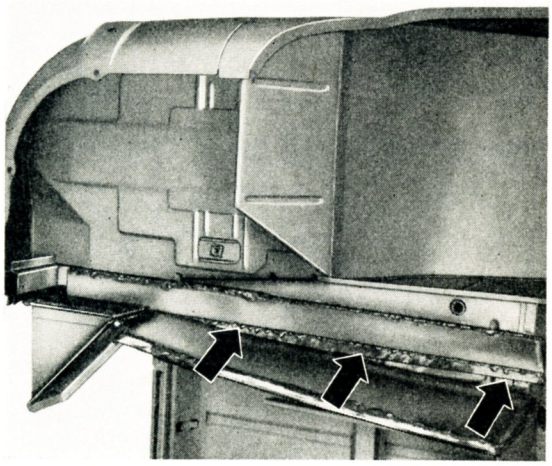
a – Cut engine bracket off with torch.



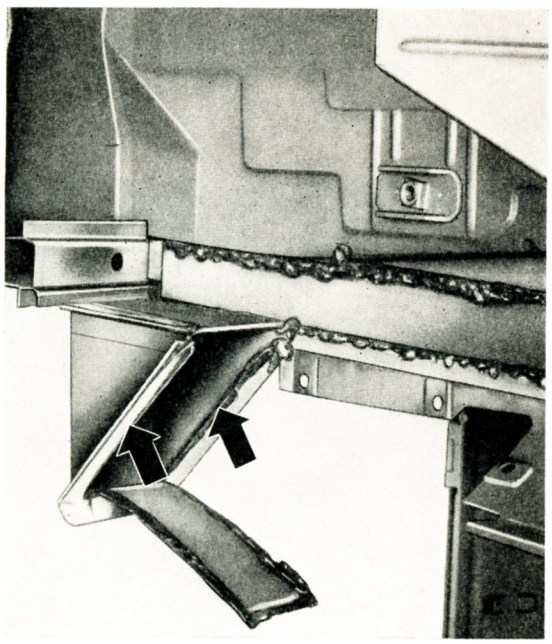
b – Cut inner lower edge of side member/reinforcement/angle plate for rear cross member.



c – Cut upper outer edge of side member.

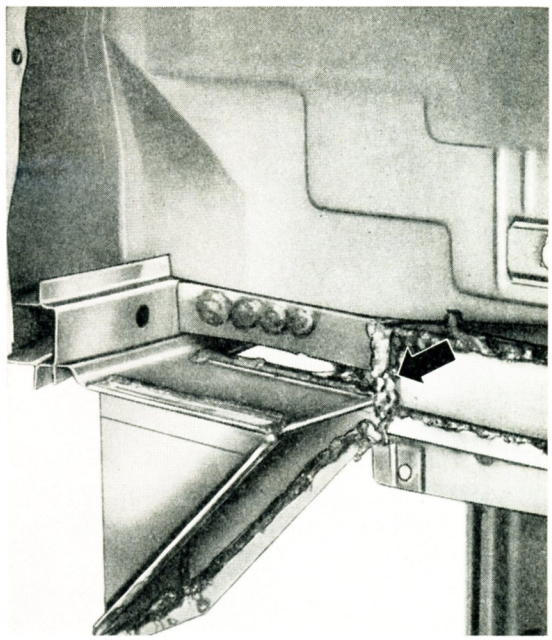


d – Cut inner upper joint of reinforcement/side member.



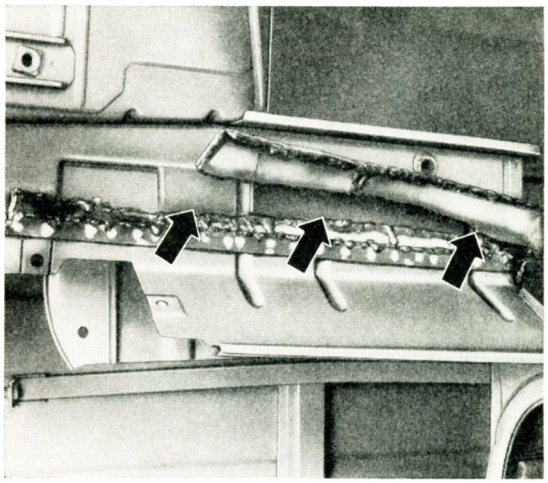
e – Cut angle plate for rear cross member/reinforcement.

f – Cut rest of side member/welding flange from corner plate.



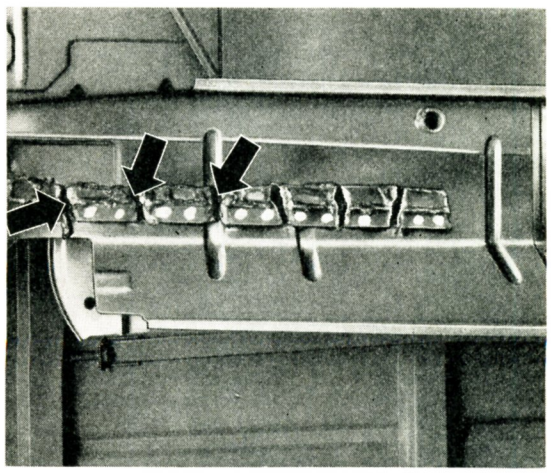
9 – Then remove remaining pieces (grind, chisel or burn.

10 – Burn off rest of side member/reinforcement near the inner engine cover plate:

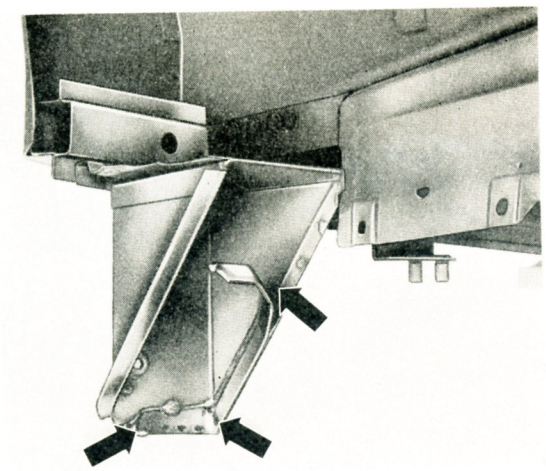


a – Cut center of side member remnants on inside.

b – Cut metal strip into pieces with torch. Then pull pieces off with pliers.

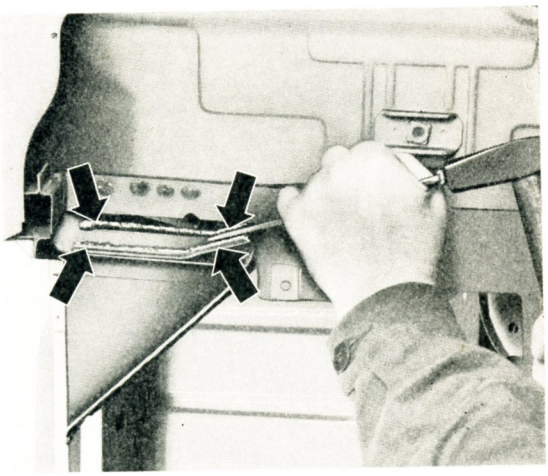


Note:
To prevent heat distortion, pack inside of engine cover plates with wet asbestos.

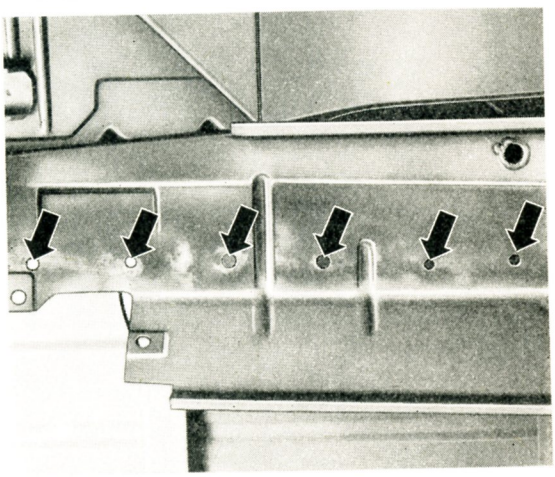


11 – Remove remnants of side member at angle plate for rear cross member.

a – Grind spot welds.

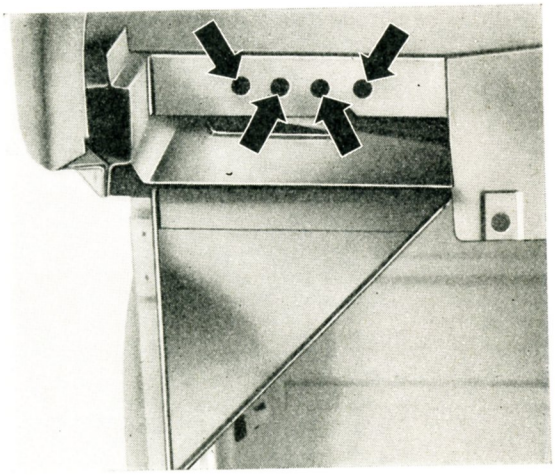


b – Chisel strip of metal off.



12 – Drill 6 mm holes through the spot welds in the engine cover plate which have already been countersunk.

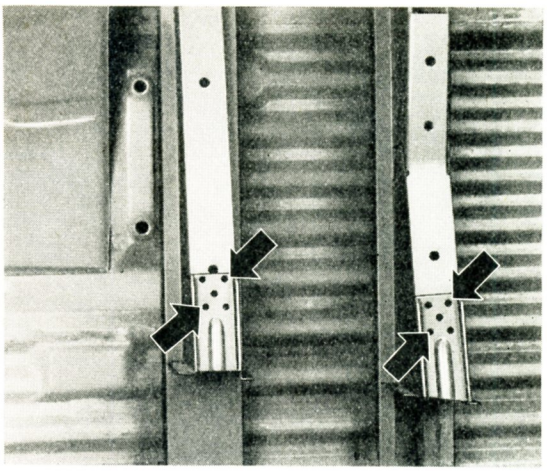
a – Two 10 mm holes must also be drilled through the air cleaner bracket.



Note:
This is absolutely essential in order to ensure proper electric plug welding.

b – Drill four 8 mm holes in the welding flange of the corner plate.

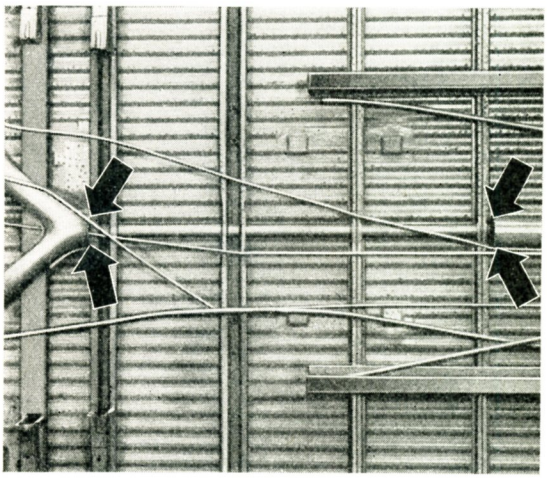
13 – Drill holes in the retainers on the rear and center outriggers.



Note:
On installation, the retainers on the new part are used.

14 – Remove center warm air pipe:

a – Grind off welds on heater branch pipe and front pipe support.



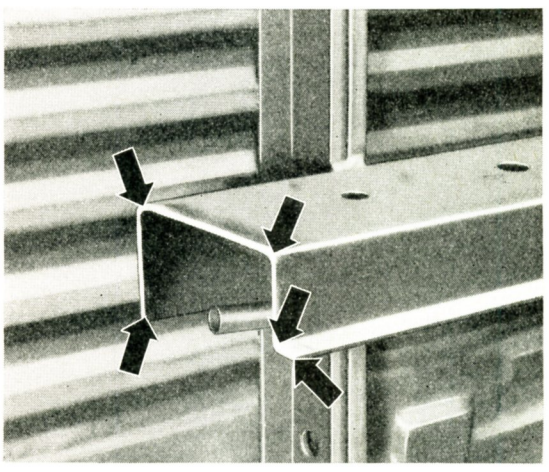
Note:
The upper weld securing the heater branch pipe is difficult to get at. It may be necessary to cut the pipe away with a suitable chisel.

b – Slide the heater pipe into the front part of pipe until the pipe can be taken out of the branch pipe.

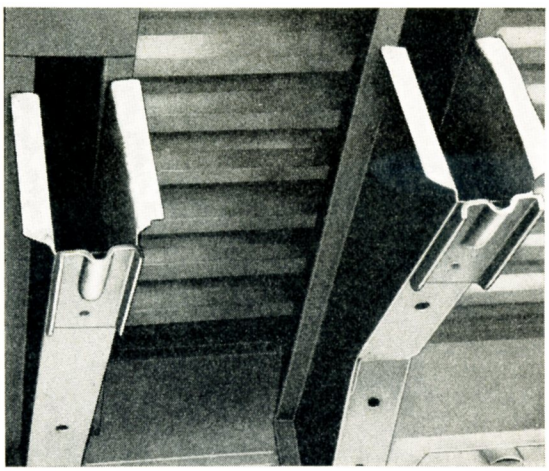
Preparing to weld in the new part

After cleaning up and straightening all connecting surfaces, the fitting length of the new side member must be determined:

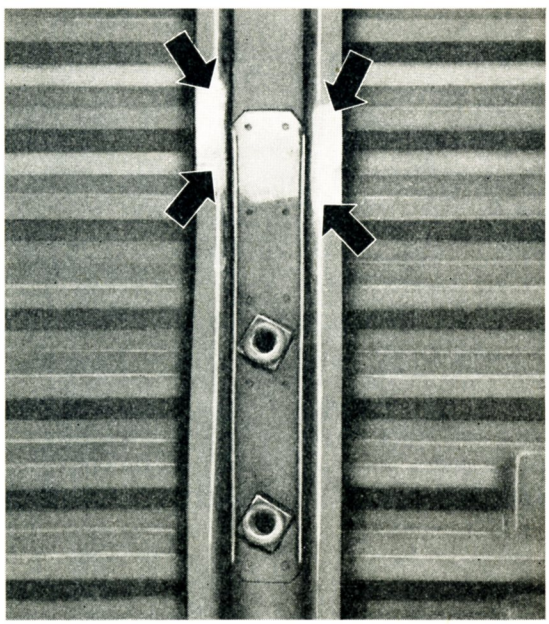
1 – Clean and straighten the connecting surfaces on the parts left on the body.



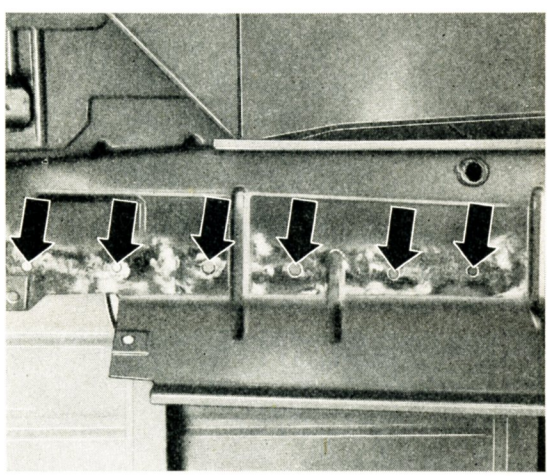
a – Grind the front side member back to the center of the butt weld and chamfer edge.

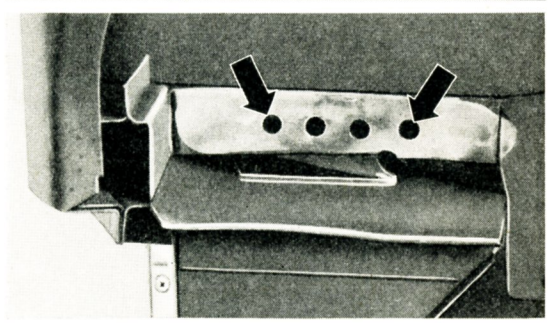


b – Outrigger (spot welding flange).



c – Floor retaining plate (remains of plate which has been cut off).





d – Rear pillar, engine cover plates and corner plate at the side members (spot welding flanges).

e – Guide tubes where they pass through the cross brace.

2 – Determine length of side member:

The dimension to be obtained is 112^{+1} mm which was determined in a series of measurements. The measurement is taken between the two holes near the end of the side members with a caliper gauge.

As the new part has a welding allowance, it is always necessary to cut a certain amount off. The amount to be cut off can be determined by a simple calculation.

Example

a – Dimension from hole to end of side member on new part = 45 mm.

b – Dimension from hole to end of side member on part still on body = 73 mm.

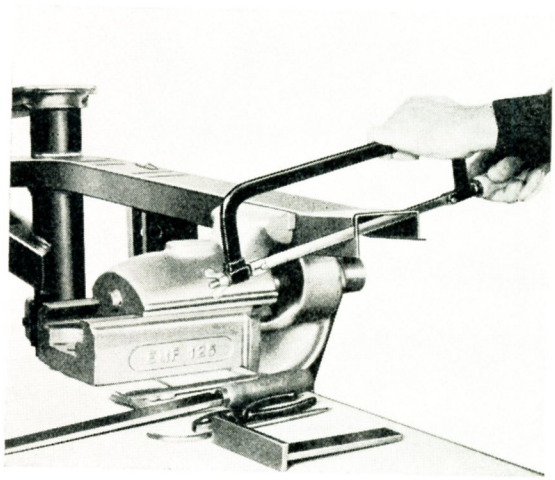
c – Actual dimension =

45 mm
+73 mm
118 mm

d – Determining length of excess material **(gives fitting length)**

118 mm (actual dimension)
—112 mm (nominal dimension)
6 mm

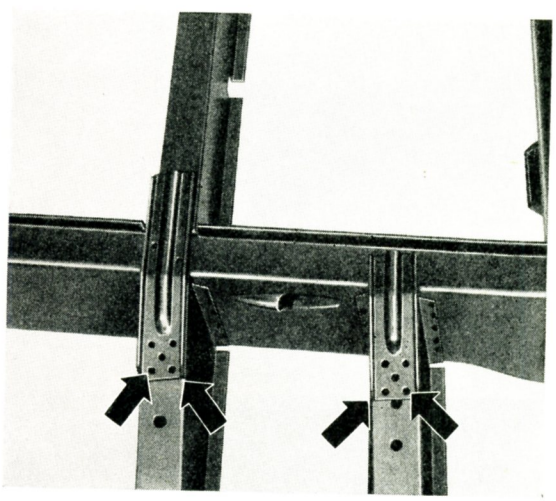
6 mm is thus the amount to be cut off the new part of side member. Make cut at an angle so as to give a chamfer.



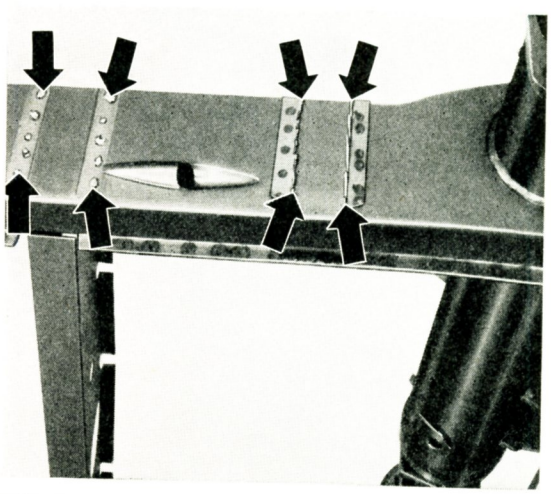
3 – Preparing connecting surfaces of new part for fitting:

a – Drill out spot welds in retainers.

b – Cut outriggers off side members.



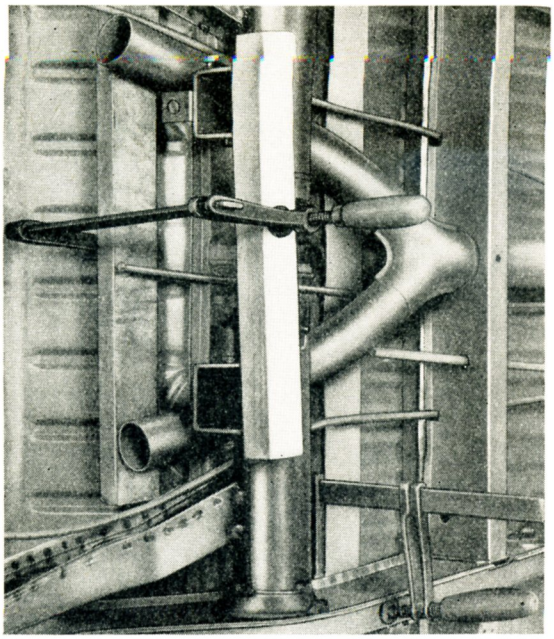
c – Clean up surfaces on side members.



4 – Clean up connecting surfaces on center heater pipe:

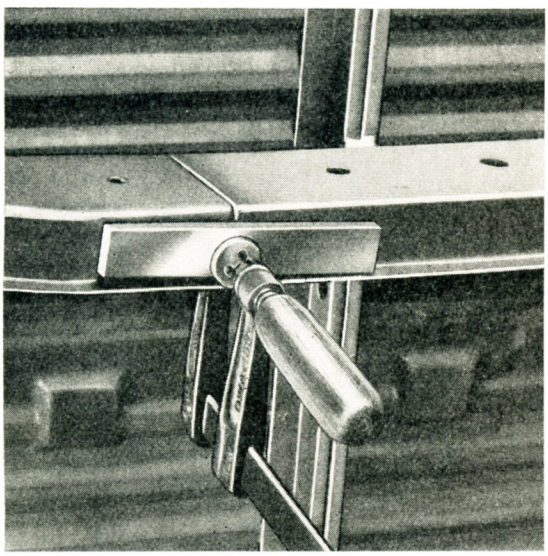
a – Grind pipe ends and branch pipe clean inside and out.

b – Grease pipe ends and branch pipe to facilitate insertion of heater pipes.



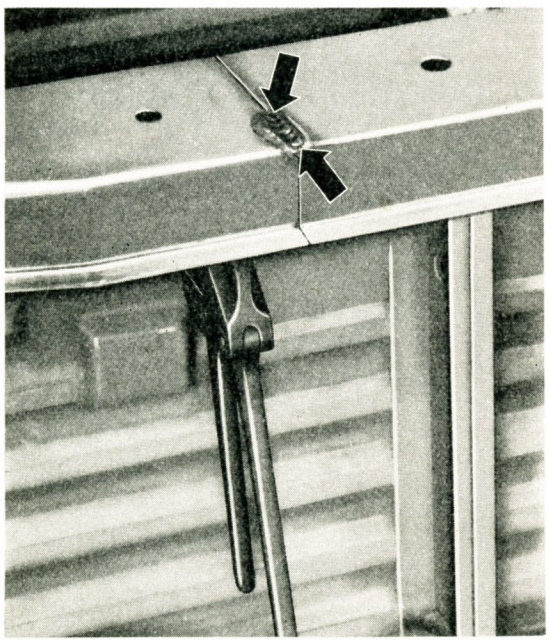
Installing rear end of frame

1 – When installing the frame rear end, push the center heater pipe into the front pipe until the pipe can be passed through the cross brace into the branch pipe. The pipe should be turned 180° to bring the parted weld into a different position. This ensures that the parts seal properly.



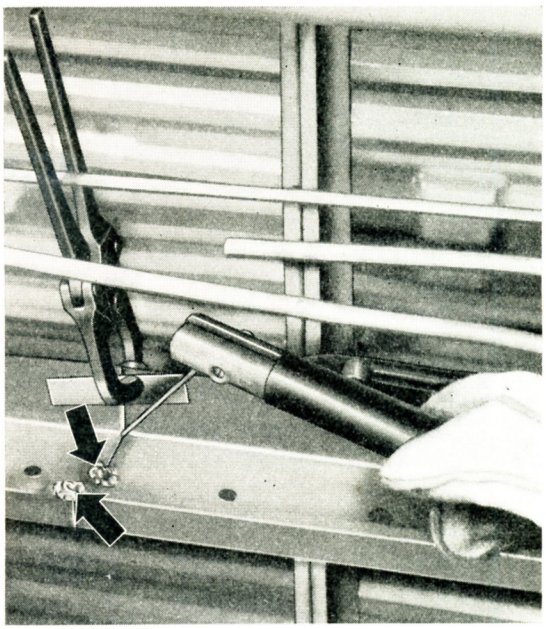
2 – The new part should be secured with clamps until it has been welded.

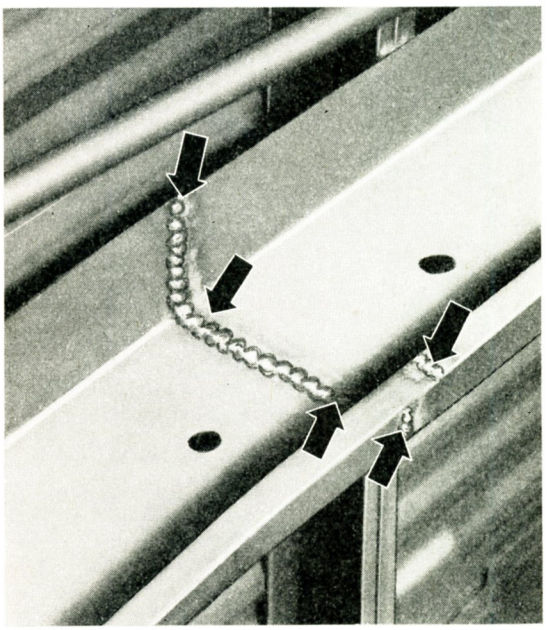
Important
Use a thin coated welding electrode when welding thin sheet metal.



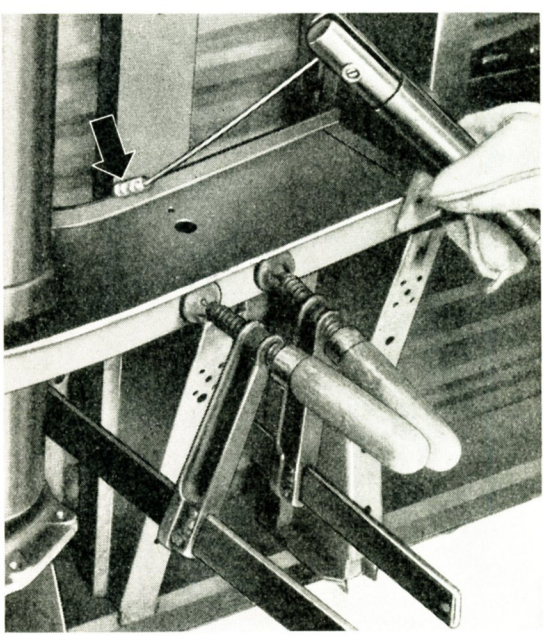
3 – Tack the right side member once, align correctly and complete weld on outside.

4 – Tack the left side member once, align correctly and complete weld on inside.

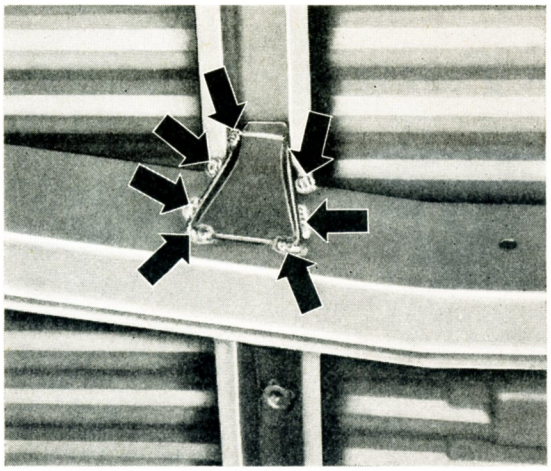




Important
Use a thin coated electrode when electric welding sheet metal.

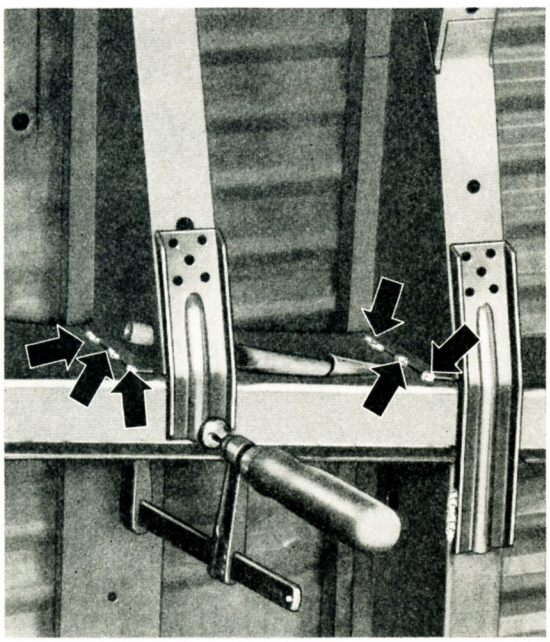


5 – Secure side member to rear floor cross member with two clamps and electric weld it there.

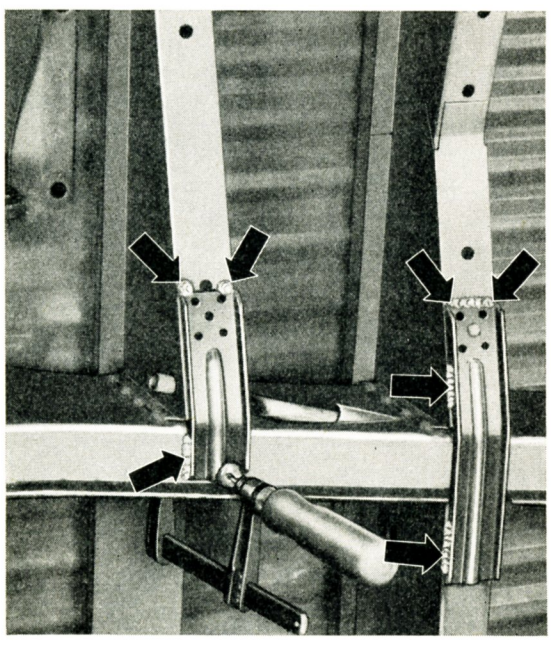


6 – Electric weld side member to rear center floor cross member. Weld retaining plate to side member and cross member.

Note:
If retaining plates are not available, they can be made from 1.5 mm thick sheet metal.

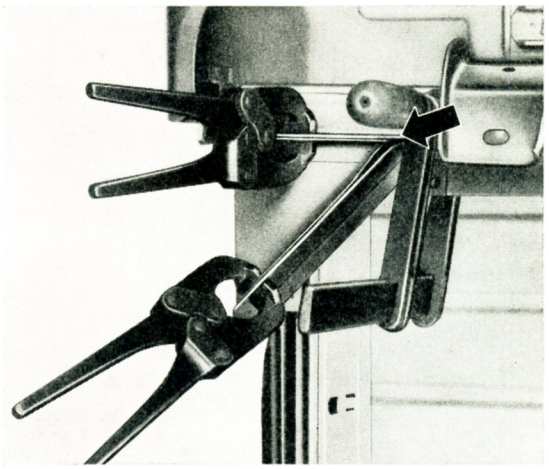


7 – Align welding flanges of rear and center outriggers and electric weld to side member.



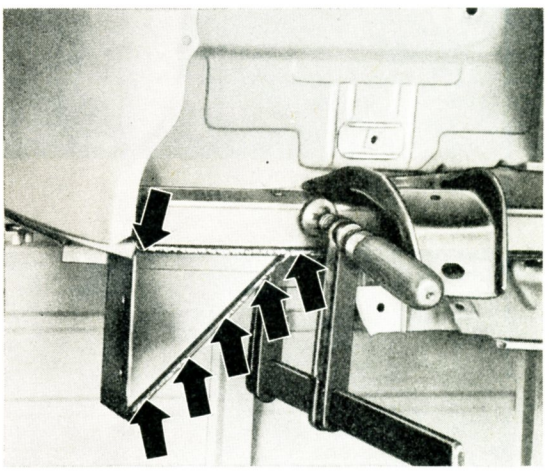
8 – Fit the retainers and electric weld to outriggers and side members.

9 – Gas weld side member and reinforcement to angle plate (for rear cross member).



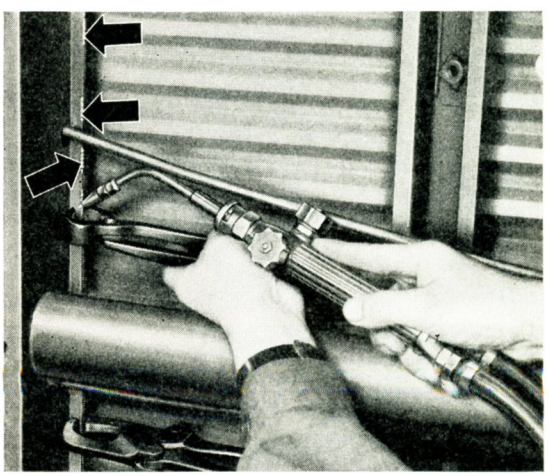
a – Clamp connecting surfaces and tack in corner (arrow).

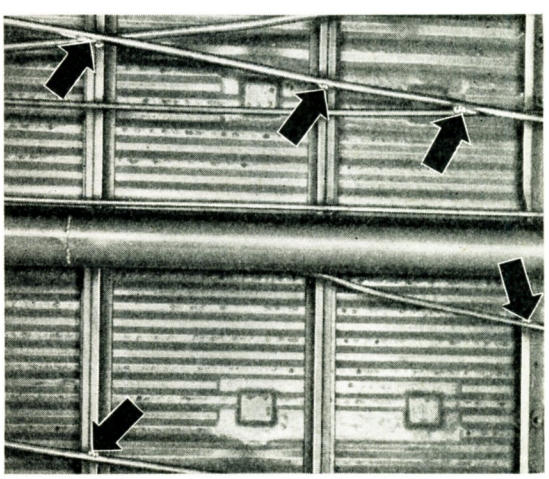
b – Weld angle bracket all round.



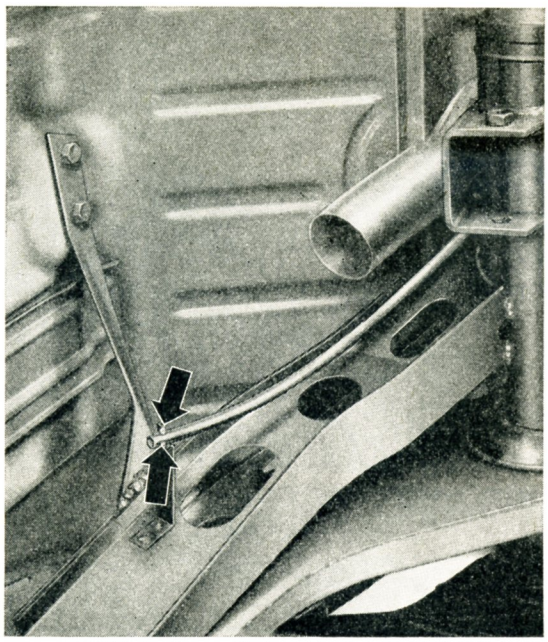
10 – Align cross brace and gas weld it at 30 mm intervals to the floor cross member.

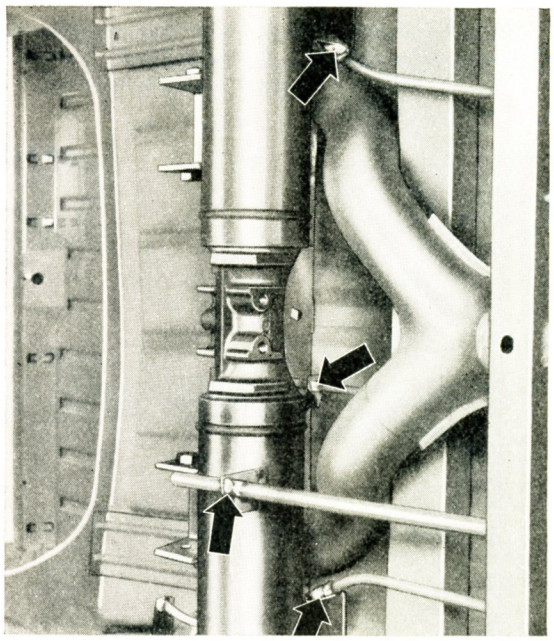
Note:
As welding is done without adding material, the sheet metal must be pressed firmly together with pliers when warming the metal.

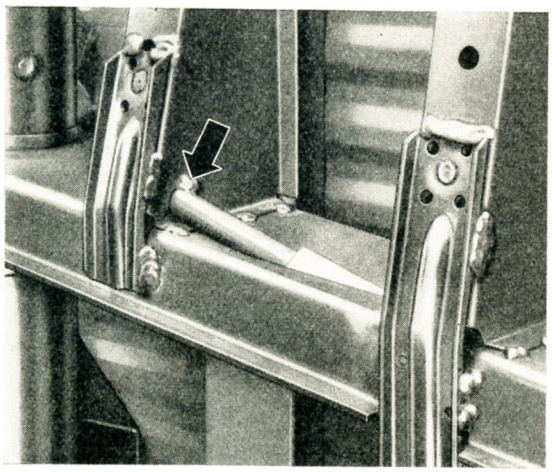




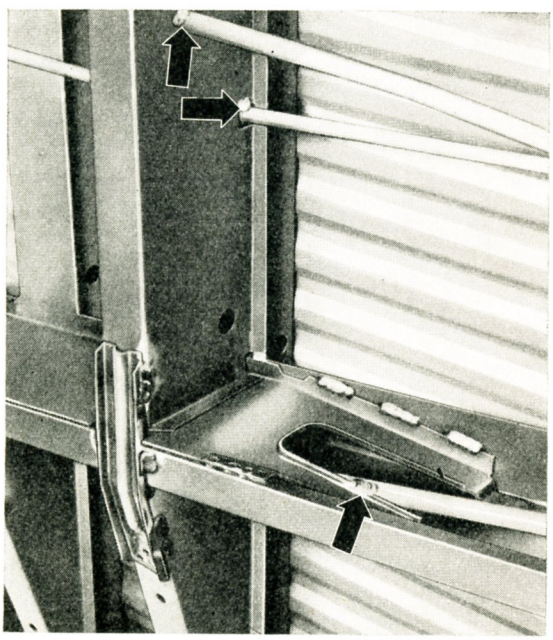
11 – Tack guide tubes electrically.

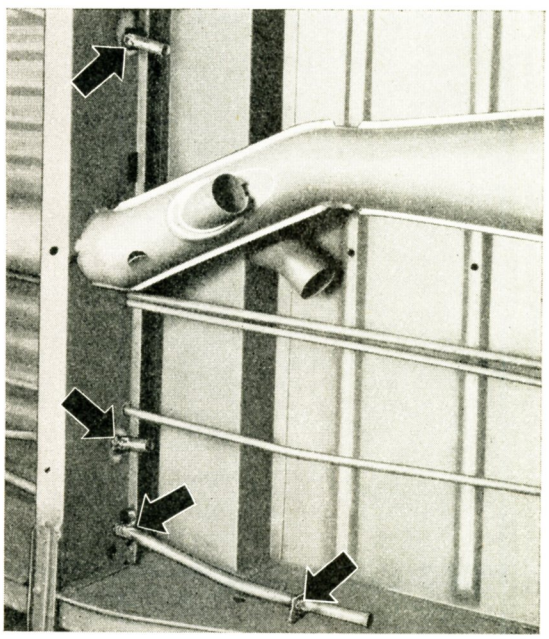




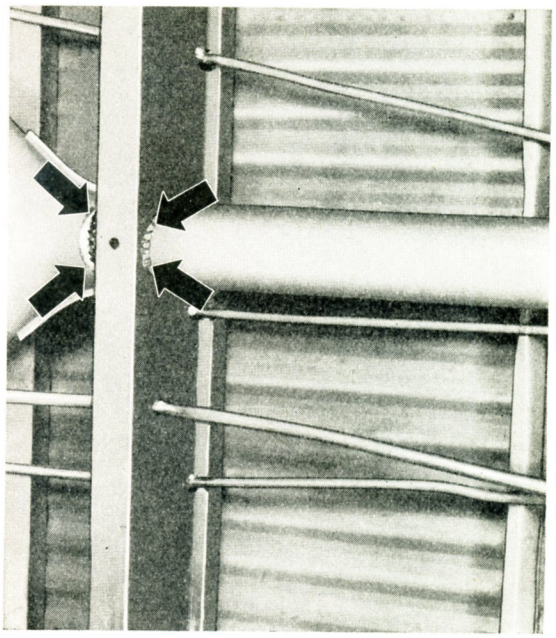


Important
Great care should be taken when tacking the tubes. Any tubes which are burned through must be replaced.

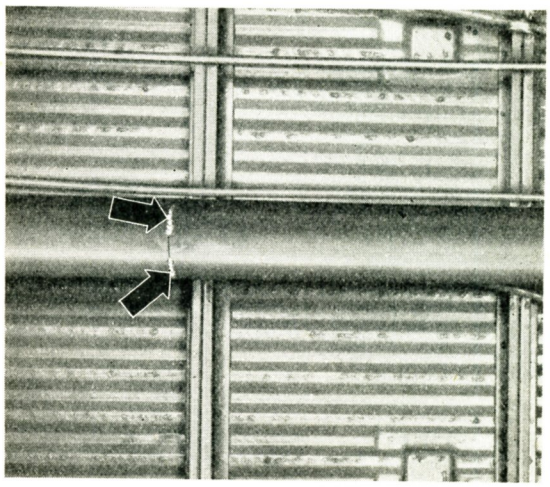




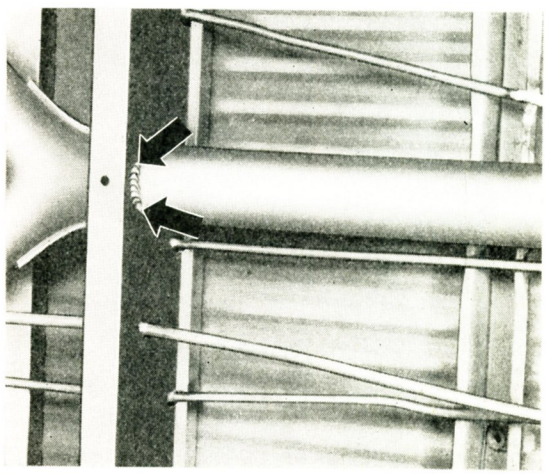
12 – Tack center heater pipe:



a – At branch pipe.

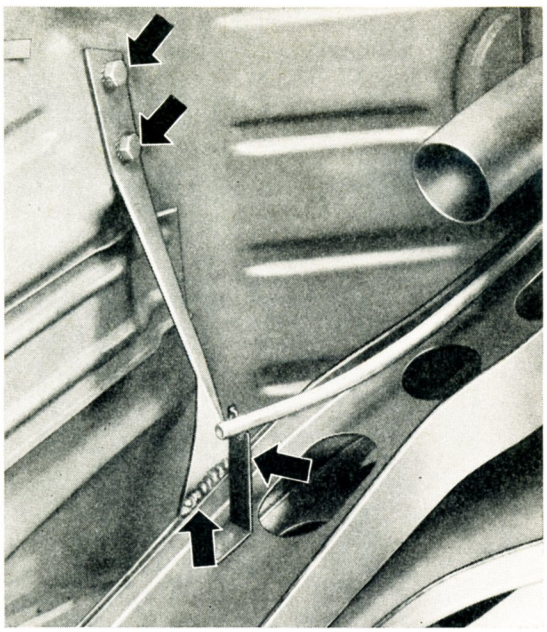


b – At rear pipe joint.



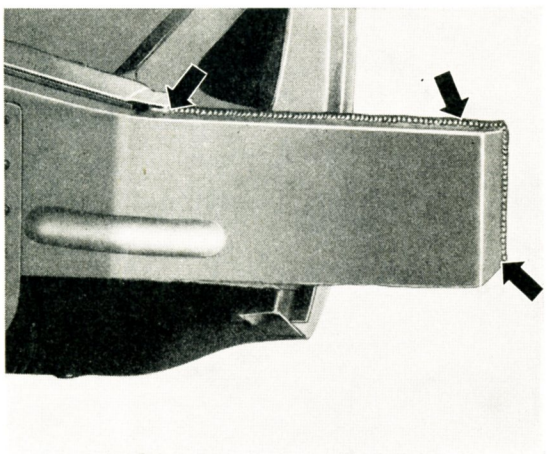
c – At cross brace.

Afterwards, warm branch pipe and pipe joints and align properly.

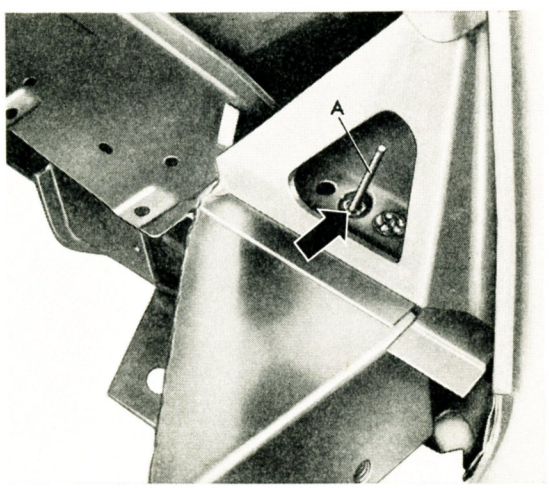


13 – Bolt safety belt reinforcement strut to floor plate, secure other end to side member with clamp and electric weld it.

14 – Turn body back to vertical position.



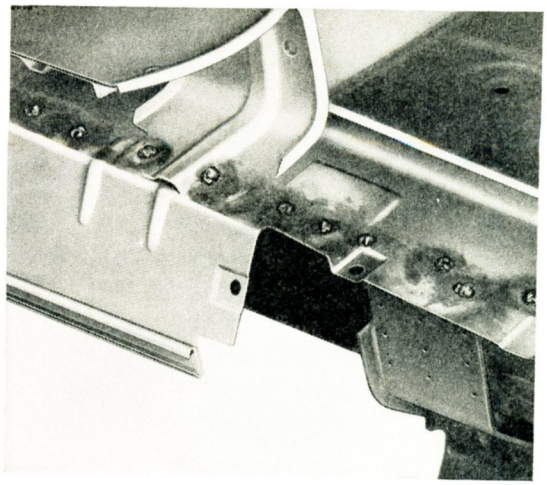
15 – Gas weld side member reinforcement to the angle plate (for rear cross member).



A = Welding electrode.

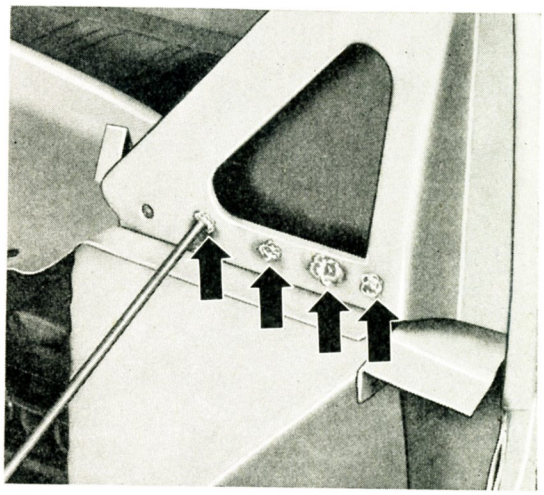
16 – Align corner plate properly and weld it electrically to the side member through the 8 mm holes.

17 – Clamp inner engine cover plate to side member and weld electrically through the 8 mm and 10 mm holes.



18 – Drill five 6 mm holes in corner plate on side member and electric weld to the flanges on the side member.

Note:
The left arrow points to the welding electrode.



19 – Electric weld the welding flanges of left outrigger, the left retaining plate and rear floor cross member to the left side member after turning vehicle back on to wheels.

[redacted]

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Part 6 – Type 2 Frame