DT 1/364 AN
english version

Guide for the Fitting of Bodywork for the MASCOTT Series

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IMPORTANT

Reading the "Guide for the Fitting of Bodywork for the MASCOTT Series".

The "Guide for the Fitting of Bodywork for the MASCOTT Series" launches a new type of presentation for bodywork fitting guides.

This new presentation sets out in one single document all those details which are necessary for the body-builder and equipment manufacturer to have available.

The data given in the "Guide for the Fitting of Bodywork" ref. (DT 6/354) has been included in the present document under the "General" Section at the beginning.

You, therefore, no longer have to refer separately to the "Guide for the Fitting of Bodywork" ref. (DT 6/354) in order to use and understand this document.

The present document consists of two sections:
- "General" - This describes the relevant general principles and basic rules applicable for the conversion and fitting of vehicles in most cases, and for the majority of applications.
- "Specific Features of the MASCOTT Vehicle": This deals in greater detail with specific points and those particular values which apply to the MASCOTT vehicle itself (i.e. power supplies available, routing of the electrical wiring harnesses, power take-offs (PTOs), sub-frames, attachment of the body, position of the brackets, etc.)

You may need, when looking for information on a specific point, to consult both the "General" and the "Specific Features of the MASCOTT" sections, so as to ensure that you have obtained all the relevant details necessary.

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SPECIFIC FEATURES OF THE MASCOTT VEHICLE

1. GENERAL

1.1 Scope of responsibility

Vehicles manufactured by RENAULT V.I. are only sold after successful completion of full technical design study analysis, and proving trials which are carried out bearing in mind the various legislations, regulations, and standards, etc., which are in force.

Any modifications of a RENAULT V.I. vehicle for the fitting of bodies and equipment must be carried out in compliance with the rules and recommendations laid down in this Fitting Guide and require technical approval to be obtained from the Product Applications Department of RENAULT V.I.

Guarantee and responsibility

Anybody who makes a contribution to the final product is responsible for the service he has rendered, as far as responsibility under warranty is concerned, including for any damage caused by his actions and/or by the equipment installed on the vehicle or the basic product itself.

Under the circumstances that RENAULT V.I. (or its dealer network) should be the general contractor for its equipment (with regard to the final customer), the warranty is deemed to be at the very least the same as that offered by RENAULT V.I. itself to its own customers.

Without notification to the contrary, that has been clearly defined at the time of placing the order, the warranty covering the equipment shall be negotiated directly between the end customer and the equipment manufacturer.

The fact of acting in accordance with the recommendations contained in the present document shall not under any circumstances be considered as a discharge of responsibility on the part of the equipment manufacturer, but only simply as compliance with the basic rules and the state of the art in the trade in question.

Any failure to comply with these recommendations must be considered as a breach of the said rules and shall discharge RENAULT V.I. from its responsibility in the circumstances of any damage arising which may be connected directly or indirectly with this failure to comply satisfactorily.

Any equipment supplied shall be deemed to be in conformity with these recommendations, and shall not require a handover inspection at the time of delivery for the verification of its compliance.

RENAULT V.I. shall guarantee the original equipment parts and components in the non-modified condition.

Any actions, modifications, adaptations or mounting carried out by any person making a contribution to the project shall commit his responsibility, even if such actions, modifications, adaptations or mounting have been officially authorised (refer to Appendix II of the conversion).

Any such modifications must not cause any deterioration whatsoever in the quality of the components fitted to the vehicle, (whether these components are affected directly or not by the action taken).

Any modification or change of position of parts or components making up the vehicle must be the subject of technical approval officially issued by the Product Applications Department of RENAULT V.I.

TO OBTAIN ANY INFORMATION OR APPROVAL OF MOUNTING, PLEASE CONTACT:

For France:
SERVICE TECHNICO-COMMERCIAL
RENAULT V.I.
BP 310
69802 ST PRIEST CEDEX
Tel.: (+33) (0)4 72 96 68 14
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Boscombe Road,
Dunstable
Bedfordshire LU5 4LX
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Fax (Marketing): (+44) (0)1582 479 146

1.2 Regulations

Any person making a contribution to the project must comply with:

- All the various laws, European regulations and/or those of the country of destination which govern the handling and construction of vehicles,
- The instructions set out in the Highway Code and its various amendments and appendices,
- The various Road Traffic Regulations and Standards governing road traffic which are in force in the country of destination.

This scope of this compliance must cover:

- Lighting and signalling,
- Weight and dimensions,
- The field of vision and rear view,
- The regulation protection devices (e.g. sideguars, anti-spray, run-under bar),
- The coupling and towing systems, (compliance with standards and regulations),
- Specific clauses concerning the transport of dangerous goods (ADR, COSHH etc.),
- Sunroofs,
- Pollution control standards,
- Electromagnetic Compatibility Standards for electronic equipment.

1.3 Safety

All components having an influence on:

- The control of the driver of the trajectory and the ability to stop the vehicle and its trailer,
- The load distribution on the front or the rear, the left or the right,
- The risk of fire,
- and any other risk for the vehicle and its surrounding environment.

Among the components, we would mention, among others:

- The cab tilt mechanism,
- The wheels (tightening of the bolts),
- Seats and seat belts (the anchorage points),
- The attachment of bodywork or equipment to be in conformity with the technical instruction document in force, (i.e. the Guide for the Fitting of Bodywork),
- The coupling and towing systems, (i.e. anchorages),
- Electrical systems (protection of circuitry, the electrical rating, attachment, conformity of the connections with the technical instruction document, (i.e. the Guide for the Fitting of Bodywork),
- Warning systems and driver information systems, (i.e. no interference with the information given by the instrument panel on the dashboard),
- Information for use affixed by the manufacturer to the vehicle (i.e. decals for tilting of the cab, drilling points, welding points, batteries, etc.)
- Extension and reduction of the length of the wheelbase and the rear overhang.
- Relocation or replacement of the cross-members.
- Circuits for ancillary equipment.

In order to guarantee the safety and the satisfactory operation of the vehicle, modification of the following components is strictly forbidden:

- Brakes: circuits, controls and anchorages,
- Steering: circuits, controls, anchorages and geometry,
- Axle and axle housing assemblies,
- The air-bag system and pretensioning systems on the seat belts,
- The electronics.

1.4 Quality assurance

Our permanent objective is to give satisfaction to our customers and we must achieve this in full on the final product consisting of a chassis, bodywork and/or an item of equipment.

In order to achieve this objective, RENAULT V.I. expects from all those co-operating with it in the field of mounting bodywork and equipment supply to implement a Quality Assurance System.

RENAULT V.I. can demand proof for the execution of all bodywork, the fitting of equipment or modification of a basic truck, in accordance with Standard ISO 9000, of:

- The conformity with all legislation, EC Directives and national regulations,
- The compliance with the manufacturers' directions,
- The control of quality of the execution of the work.

This is done with the knowledge that, on the face of it, the vehicle is considered as complying with the whole of the regulations.

1.5 Documentation

In all cases involving equipment, the installer is obliged to supply a manual covering the use, service, maintenance and safety of his installation.

1.6 General instructions

When building and fitting a body (including such equipment as rear run-under guards), a certain number of requirements and a certain number of vital requirements specific to each type of vehicle must be taken into consideration. These various points relate to maintenance, accessibility and the circulation of fluids.

Examples:

- Ease of access to the various maintenance and lubrication points, to the fuel tank and fuel gauge, to the batteries and the various electrical terminal boxes.
- The ability to dismantle easily the various component parts of the transmission and the suspension.
- Access to the circuits for air-intake, exhaust, and fuel supply.
- Taking into account the wheel movement detailed on the bodywork drawing (i.e. take care to allow for snow chains; extra clearance must be provided).
- Ventilation of the brake drums and discs and the battery compartment.
- The radiator inlet and outlet areas, which must not be modified.
- Complete compliance with the dimensions and weights specified in our technical documents. Under all circumstances, the bodybuilder must ensure free movement and safe operation of all the moving component parts of the chassis (i.e. springs, prop shaft, etc.)
- The addition of a body must not affect the vehicle running and driving safety. Take care to ensure that a balanced distribution of the loads on the right and the left hand sides of the vehicle is obtained.
- For any bodywork installation, a calculation of load distribution must be made for each axle, in order to check that the weight imbalance between the right and the left hand side is below 4%.
- **The flow of the coolant must be maintained at all times. It is, therefore, not allowed to blank off, even partially, the air intakes provided (on the radiator grille or the front end). Orange ADR or similar "Hazardous Substances" plates should be affixed to solid surfaces (i.e. without vent holes).**

On the arrival of a vehicle in your workshop for body fitting, we recommend that you should check one hour after the arrival of the vehicle, the state of charge of the batteries**.**

Voltage at the battery terminals		Specific gravity of the electrolyte	State of Charge
6 Volt battery	**12 Volt battery**		
6.3 Volts	12.7 Volts	1.27	100 %
6.2 Volts	12.5 Volts	1.24	80 %

During the period for the fitting of the bodywork, you should particularly check that:

- The vehicle is not run without a battery.
- Do not move the vehicle on the starter motor.
- Do not use a booster starter.
- Ensure that the tyre pressure is checked and tyres inflated to the correct value where necessary.
- Protect body components or items of trim against all damage.
- Refit the original batteries, where these have been taken off.

IMPORTANT

- **Whatever work you are doing on the vehicle, you must switch off the electrical circuit at the master switch or by disconnecting the batteries in order to avoid any risk of electric shock during work.**
- **When a vehicle is laid up (i.e. at a standstill for longer than 10 days), disconnect the electrical circuit by removing the fuse or by the circuit breaker so as to avoid discharge of the batteries through the tachograph.**

The information contained in this manual is only applicable to bodywork in steel.
For aluminium bodies, refer to the Product Applications Department of RENAULT V.I.

It is forbidden to weld, grind, cut up, drill or heat the sidemembers or cross-members unless the contrary is clearly stated. These operations may only be carried out in conformity with the recommendations laid down in the present document.

Any special case, any bodywork fasteners and fittings not described in this manual must be submitted for our approval prior to use.

Before commencing the fitting of any bodywork, you must consult:
- The Vehicle Technical Data Sheet,
- The bodybuilders drawing and the relevant calculation sheets which relate to the body to be fitted,
- The vehicle driving and maintenance handbook.

If you do not have these items available, you should obtain them from RENAULT V.I. Dealers or the Product Applications Department.

In the technical manual and on the bodywork drawing is stated the permitted maximum and minimum length of body, we would strongly advise you to stay within these limits.

Furthermore, it should be noted that the moving of a component such as the spare wheel, tank, etc., the modification of a chassis without uniform weight distribution or the fitting of an over-cab extension, causes a modification of the load distribution of a fully equipped chassis in every single case.

Modification to load distribution must be compensated for by an alteration in the permitted length for bodywork. It then becomes necessary to calculate the new position of the centre of gravity of the bodywork.

The weights specified in our technical data sheets refer to standard vehicles, ready for the road, without optional extras.

Furthermore, the weight of chassis cab is given with a tolerance of plus or minus 4%.

Optional equipment such as reinforced springs, power take-offs, different tyre fitments, will cause an increase in weight for the basic chassis.

For these reasons, when weighing the chassis cab, bodybuilders should weigh:
- The front axle(s),
- The rear axle(s),
- The complete vehicle,

without driver, without passenger, but with full fuel tanks and with vehicle on-board tool kit.

For the preparation and attachment of the various types of bodywork, it is preferable not to take off the wheels, unless absolutely necessary.

Nevertheless, you must take the precautions set out below:
- It is forbidden to paint the bearing surfaces of the wheel rim hubs and the seating for the wheelnuts.
- During fitting, make certain that the parts are perfectly clean prior to fitting.
- Tighten the wheelnuts to the torque recommended (c.f. the vehicle driving and maintenance handbook)

Installation fitted with keys: the section of such keys must be very different to that used for the vehicle keys. Indeed, these keys should not be able to be put into the vehicle locks by mistake, thus avoiding any risk of damage to the barrels of the locks.

1.7 Safety on tilt cabs

After the conversion of standard cabs by the bodybuilders, (i.e. extension, bunk adaptation, over-cab extension, etc.) because the weight distribution has changed, the tilt system may no longer meet the requirements of the safety standards.

Under these circumstances, and without prior agreement from the manufacturer, the full and entire responsibility rests with the bodybuilder.

1.8 Chassis markings

The identification number of the vehicle is on the sidemember (refer to the vehicle driving and maintenance handbook).

The identity markings of the vehicle must remain visible and accessible without having to remove any part of the body.

1.9 Adjustments to the vehicle settings

Under no circumstance may bodybuilder or converters make any alteration to the original settings of RENAULT V.I. vehicles.

1.10 Cleaning

1.10.1 Bodywork

So as not to cause any damage to the condition of the paintwork and the seals:

- Avoid using a high temperature jet of steam.
- Restrict the use of brushes. They must be in good condition and well maintained.
- We advise against the use of brushes, during the first month of vehicle use.
- If you are using a high pressure jet wash unit, limit the pressure to 80 bars maximum.
- Keep the lance well away from the bodywork; do not spray fluidtight joints.
- Use neutral soap based products.
- In order to remove grease spots, use cleaning fluid (not petrol).
- Parts in aluminium must be cleaned with water to which a non-alkaline washing product has been added, and rinsed with clean water.
- Spread a coat of Vaseline or talcum powder over the seals.

1.10.2 Chassis/Underbodies

Use a high pressure unit. Limit the pressure of the jet to 80 bars maximum and the time of use to the strict minimum necessary.

In order to prevent any risk of a problem, do not spray:

- Electronic or electrical boxes,
- The seals of link rods,
- Connecting rods,
- Air inlets for the heater, the engine air intake and air filter,
- Pneumatic and electrical apparatus,
- Absorbent materials and soundproofing screens,
- The fuel gauge.

1.10.3 Cleaning of the cab

Spray lightly or use a cloth dipped in a cleaning agent (i.e. soapy water, methylated spirits, etc.).
Products with a petroleum and trichlorethylene base are not to be used.

Spread talcum powder lightly onto the door seals and the windows, as well as any link rods.

1.10.4 Cleaning of the instrument panel

Only use soapy water. Any other product is not allowed.

1.11 Safety and protection of components

Before any operation of grinding, drilling, or welding, ensure that the following are effectively protected or taken off:

- Plastic pipework and tubes,
- Electrical harnesses,
- Suspension springs (particularly for the protection against corrosion),
- The bags for the air suspension,
- The soundproofing screens,
- Any other component sensitive to heat, to the discharge of incandescent matter, to ultraviolet rays (i.e. electronic control units, electronic components, items in plastic material, flexible anti-vibration mountings, painted items, etc.)
- For welding work, comply with the other recommendations described in the chapter entitled “Protection of electrical and mechanical components”.

1.12 Summary of definitions

Maximum body length (Dimension W on technical data sheets and bodywork drawings).
This is the bracket of lengths for bodies (not including fittings and accessories) worked out in relation to the extreme positions of a given centre of gravity for a load which is taken to be evenly distributed and taking into account the space which must be left to the aft of the cab, laid down by the manufacturer, and the maximum permitted loads per axle on a chassis cab without options.

Body entrance (Dimension B on technical data sheets)
Minimum distance between the front axle centre-line and the front end plane of the body.

Load distribution calculations
Comply with the statutory constraints for each country and the load limits given per axle for each model by **RENAULT V.I.**
We remind you that these values are given for uniformly distributed loads.

The lateral unbalance of the loads should not exceed a maximum of 4% between the LH and RH roadwheel of each axle.

Chassis rear overhang (Dimension N on technical data sheets)
Horizontal distance between the centre-line of the rear roadwheels and the rear extremity of the body (excluding fittings and accessories).
In the case of vehicles with 3 or 4 axles: distance between the centre-line of the rearmost axle and the extremity of the chassis.

Body rear overhang (Dimension X on technical data sheets)
Horizontal distance between the centre-line of the rear roadwheels and the rear extremity of the body (excluding fittings and accessories).
In the case of vehicles with 3 or 4 axles: distance between the technical centre-line of the tandem and the rear extremity of the body.

Wheelbase (Dimension F or F' on technical data sheets).
Distance between the centre-lines of the front and rear roadwheels (vehicle laden).
In the case of vehicles with 3 or 4 axles: distance between the centre-line of the front roadwheels and the centre-line of the foremost rear axle - for calculations take dimension F' (technical wheelbase).

Tandem
Solely in the case of vehicles with 3 or 4 axles: the 2 rear axles taken together, regardless of whether they are driving axles or trailing axles.

Maximum axle weight
Carrying weights are stipulated on each axle for each type of vehicle. These values are indicated on the technical data sheets and on the VIN plate and must be complied with on all vehicles fitted with bodies when laden and when empty.

Driver and cab passengers weight
The weight of the driver and passenger (passengers) in the cab is applied to the front axle in the case of a forward control cab.
For cabs of the semi-forward control type, 2/3 of the weight should be applied to the front axle and 1/3 to the rear axle.
Weight of driver or each passenger: 75 kg (calculated on the basis of the cab seating capacity), unless stipulated otherwise: i.e. Export, Army, Fire Brigade, etc.
For cabs with a seating capacity of more than 3 persons, calculate the weight distribution of the persons on the basis of the seats layout.
For equipment intended for the Army or for Civil Administrations, take the specific specifications into account.

1.13 Certificate of approval of the conversion of a vehicle

1.13.1 Application for approval

1. If the body or the equipment fitted do not modify the weight and dimensional characteristics of the chassis entered in the descriptive sheet, the vehicle can be submitted to the Type Approval Department without any action by **RENAULT V.I.** being necessary (within the permitted limits in force).

2. The maximum rear overhang is equal to 60% of the wheelbase. However, for special cases, we can grant higher percentages - for this, consult us.

3. If the layout requires modification to the wheelbase, it is essential to consult the Product Applications Department. Each case has to be covered by a specific design.

5. For more accuracy in your calculations, we recommend you to introduce into the data the weighed weight of the chassis cab to be equipped (capable of varying according to manufacturing tolerances and the various options available). The same applies to equipment for which the manufacturers can accurately define the weight and the position of the centre of gravity.

1.13.2 The Body Mounting Certificate

This defines the installation of the equipment on the chassis cab and the unladen weight imposed on the axles and then the weight when fully laden.

It must be attached to all applications relating to the equipment which do not comply with any of the dimensions set out in the descriptive sheet.

1.13.3 Responsibility for Installation

The building and fitting of a body on a vehicle is the sole responsibility of the bodybuilder, who must comply with the recommendations in the present document.

He must ensure that the installation of the body does not affect the functions or the reliability of the components or the road behaviour of the vehicle.

1.14 Painting

1.14.1 Precautions

- Protect the **RENAULT V.I.** equipment (i.e. by using screens, self-adhesive tape, cab cover etc.)
- Never put vehicles into drying ovens at a temperature of **more than 80° C.**
- **The chassis of the vehicle must be electrically earthed to allow static electricity to run away to earth (protection of electronic boxes).**
- The vehicle must be protected against corrosion by paints compatible with those used by our Company and conforming to **RENAULT V.I.** Specification N° 4702 441 (protection of bodywork and equipment adapted to **RENAULT V.I.** vehicles) available from the Product Applications Department.
- Thinner solvents must never be used on cables and electrical sheaths.
- Protect the identification marking of electrical wires and compressed air pipes.

Never paint bearing surfaces of brake drums and disc wheels, or with twin tyre fitment, the assembly surfaces between the disc wheels. As a general rule, do not repaint the support surfaces of original fitment nut and bolt hardware and comply with the specification.

NOTE

Our Product Applications Department holds the reference numbers for paint colour shades for chassis and cabs at your disposal. These paint colours can be procured as “spare parts” and can be ordered from our dealers.

The cab colour shade is indicated on the front end of the cab.

Since 1994, chassis and accessories are no longer sprayed with the customer’s shade of paint at the time of original fitment.

To preserve the aspect and original quality, it is essential to observe the following methods after fitting equipment, body, sub-frames and various adaptations to major units or chassis frame:

1.14.2 **Major units** (gearboxes, drive axles, engines, axles, etc.)

Works paint: GLYCEROLPHTHALIC

Retouch (after fitting PTO, charge indicator, etc.)

Retouch method

- Clean with a universal cleaner or using a high-pressure cleaner.
- Wipe down, then apply a primer.
- Let the product cure until mat (about 15 minutes at 20° C), then apply the corresponding polyurethane lacquer.

1.14.3 **Chassis frame and accessories** (sidemembers, cross-members, fittings, lockers, etc.)

Works paint: POLYURETHANE or POLYESTER powder.

Retouch method:

Superficial scratches (the metal is not affected).

- Clean with a universal cleaning product.
- Wipe down, then apply the corresponding undiluted but catalysed polyurethane lacquer, using a small brush.

Deep and fine scratches (down to the bare metal).

- Clean with a universal cleaning product.
- Wipe down, then apply the primer, using a small brush.
- Let the product cure (about 15 minutes at 20° C), then apply the corresponding undiluted but catalysed polyurethane lacquer.

Deep and wide scratches (down to the bare metal, drilling of sidemembers for attaching tail lifts and accessories) due to drilling.

- Rub down.
- Clean with a universal cleaning product.
- Let the product cure until mat (about 15 minutes at 20° C), then apply the corresponding polyurethane lacquer.

Making good after conversion (after converting wheelbase and overhang).

- Grind, rub down; prepare the area in question (burnt paint, welding scale, etc.).
- Clean with a universal cleaning product or using a high-pressure cleaner.
- Mask with tape (electrical wiring harnesses, air and fuel pipes, labels, etc.)
- Wipe down, then apply the primer.
- Let the product cure until mat (about 15 minutes at 20° C), then apply the corresponding polyurethane lacquer.
- After drying, put back the electrical wiring harnesses, air and fuel pipes and accessories.

Spraying chassis and accessories (with customers colour shade).

- The bodybuilder undertakes to preserve the aspect and quality of the original fitment vehicle (except for nut and bolt hardware).
- Clean with a universal cleaning product or using a high-pressure cleaner.
- Mask with tape (electrical wiring harnesses, air and fuel pipes, labels, etc.)
- Wipe down, then apply the primer.
- Let the product cure until mat (about 15 minutes at 20° C), then apply the corresponding polyurethane lacquer.
- After drying, put back the electrical wiring harnesses, air and fuel pipes and accessories.

NOTE

All spray gun operations are to be carried out in a painting booth.

1.14.4 Recommended products

Manual cleaning
Universal cleaning product or equivalent solvent

Products recommended by RENAULT V.I.

Supplier	Commercial name	Ref. RENAULT V.I.	Supplier Ref.
BASF/STANDOX	PK 900	50 01 259 985	FA 9312002
ICI AUTOCOLOR	Slow Spirit Wipe	56 89 330 553	P850–1402

High-pressure cleaning
Degreaser, Degreaser Phosphater

Preparation
Products recommended by RENAULT V.I.

Supplier	Commercial name	Ref. RENAULT V.I.	Supplier Ref.
BASF/STANDOX	resin “EPOXY” hardener “EPOXY” solvent “EPOXY” slow speed solvent “EPOXY” solvent “EPOXY”	50 01 826 019 50 01 825 990 50 01 826 005 50 01 829 256 50 01 825 992	FA 931 5203 FA 931 5204 FA 931 5205 FA 931 5213 FA 020 7810
ICI AUTOCOLOR	resin “EPOXY” hardener “EPOXY” solvent	50 01 829 477 50 01 829 480 50 01 829 481	P580–2100 P210—833 P850–3091

NOTE
It is absolutely forbidden to use methyl ethyl ketone “MEK”.
Since EPOXY resins have a strong tendency to flouriness, it is essential to use them only as primer and apply a finishing coat with a thickness at least equal to the covering capacity of the lacquer used.

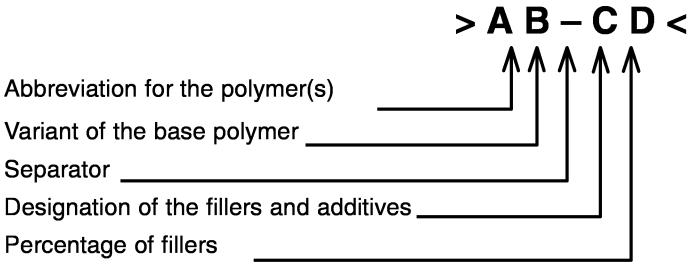
Finish paint
Two-component polyurethane paint and corresponding thinner.

1.14.5 Tooling
- Grinder
- High-pressure cleaner
- Small brush
- Paint spray gun.

1.14.6 Marking of polymer components (recycling of plastics)

Plastic parts are marked so as to simplify their sorting during recycling at the time when the vehicle is scrapped at the end of its life.

Marking of the plastic parts is done by placing abbreviated terms for the polymer components between the symbols “>“ and “<“. The parts are marked on a face which the customers cannot see and when it is possible the marking is indelible. Marking is done in the following manner:



Marking of single component products

The abbreviated term for the material is enclosed in symbols “>“ and “<“.

For example: “>PP<“ or “PP” indicates polypropylene.

Marking of copolymers

The abbreviated terms for the polymers are separated by a “/”.

For example: “>P/E<” indicates the copolymer propylene ethylene.

Marking of mixtures or blends of polymers

The abbreviated terms are separated by a “+” (heterogeneous structure).

For example: “>PP + EPDM<“ stands for a blend of polypropylene and EPDM.

Marking of polymers with fillers (additives)

The abbreviated term for the polymer is separated from that for the filler by a dash “-”.

The number following the abbreviated term for the filler relates to its percentage in the mixture.

For example: “>PA66 - (GF25 + MD15)<“ indicates polyamide 66 with 25% filler and 15% reinforcement with mineral fillers (in decreasing order of percentage).

Marking of multicomponent products

The abbreviated terms for the components are separated by commas, in order of appearance (firstly the surface material).

For example: “>PVC, PUR, ABS<“ indicates skin surface PVC on PUR foam with an ABS insert.

Marking of special features

Abbreviated terms for the polymers can be added up to 4 symbols, in order to indicate a modification.

The symbols are put in after the abbreviated terms.

For example: “>PE - C<“ indicates chlorinated polyethylene, “>PE - LLD” stands for linear low density polyethylene.

- For the fitting of all bodywork, a calculation of the weight distribution has to be made so as to check that the lateral unbalance of the loads should not exceed a maximum of 4% between the LH and RH roadwheel of each axle.

Table of the principal polymers

Abbreviated term	Variant	Materials
A.B.S		Acrylonitrile/butadiene/styrene
A.S.A		Acrylonitrile/styrene/acrylate
E/P		Ethylene/propylene
E.P.D.M		Copolymer ethylene/propylene/diene
P.A		Polyamide
P.A	6	Polyamide 6
P.A	66	Polyamide 66
P.C		Polycarbonate
P/E		Propylene/ethylene
P.E		Polyethylene
P.E	- HD	High density polyethylene
P.E	- LD	Low density polyethylene
P.E	- LLD	Linear low density polyethylene
P.E	- X	Cross-linked polyethylene
P.M.M.A		Poly(methacrylate of methyl)
P.O.M		Polyoxomethylene
P.P		Polypropylene
P.P.E		Poly(phenylene ether)
P.P.O.X		Poly(oxide of propylene)
P.S		Polystyrene
P.S	- HI	Impact polystyrene
P.T.F.E		Poly(tetrafluoroethylene)
P.U.R		Polyurethane
P.V.C		Polyvinyl chloride
P.V.C	- C	Polyvinyl chloride
P.V.C	- P	Polyvinyl chloride

1.15 Electrical equipment

1.15.1 General

- Any mounting of a specific item of equipment on a commercial vehicle must be in conformity with the recommendations of RENAULT V.I. and the legislation in force. Its execution remains the entire responsibility of the bodybuilder, both with regard to the suitability for the vehicle being equipped and any possible electromagnetic interference.
- For reference to wiring diagrams, consult the electrical equipment workshop manual for the vehicle (available from the Spare Parts Department of RENAULT V.I.).
- Check that the electrical consumption of this equipment is appropriate for the capacity of the batteries and also the charging current rate of the alternator (if not, refer to the recommendations of the manufacturer CIC 1081). For the fitting of any particular equipment, consult the Product Applications Department of RENAULT V.I.
- A Block Wiring Diagram should be submitted for the approval of RENAULT V.I., when raising any specific question.
- A wiring diagram for the bodybuilder's or equipment manufacturer's installation must be incorporated into the vehicle driving and maintenance handbook of the vehicle. The electrical connection points for the equipment being supplied should be clearly and precisely indicated on this wiring diagram (even after the agreement of RENAULT V.I. has been obtained).
- Follow the electrical protection recommendations of RENAULT V.I.; it is forbidden to change the rating of fuses.
- In order to harmonise vehicle equipment, you should use in preference such items as are identical to those fitted in the basic vehicle (i.e. indicator lights, controls, relays, etc.).
- Assembly of a protective shield on the electric retarder is compulsory for RTMD and ADR (Transport of Hazardous Substances) vehicles (refer to regulations in force).
- **It is compulsory for the supply voltage for the equipment installed to be equal to the rated voltage of the vehicle.** The installation of equipment with a 12 volt power rating on our vehicles (24 volt rated voltage) is not permitted unless a voltage dropper is added.
- Under the circumstances that additional lights are fitted, the installation must not damage the fluidtight sealing of the junction boxes.

- **Operating without a battery is forbidden.**

1.15.2 Wiring Harnesses

- Use to the full the wiring runs already set up by the manufacturer (i.e. conduits, tubes, sleeves, etc.) and comply with the limit of their capacity.
- Any wiring harness added by the bodybuilder must be protected by a sealed sheath (smooth and thick or ringed) and can be routed along with the original wiring runs for the vehicle provided that it does not adversely affect the mechanical mountings for the original harnesses. For vehicles for the transport of hazardous goods, use the protective equipment authorised by the regulations covering the transport of hazardous goods.
- If you are obliged to route wires close to a source of heat (i.e. engine, exhaust system, etc.), the minimum clearance to be complied with is 200 mm.
- Never route a wiring harness over projecting angles.
- Never attach a wiring harness to moving parts (even slight movement).
- The section of the cables being used must be suitable for the use in question. Their cross-section should be selected in accordance with the maximum current on-line (5 amperes per mm^2).
- The length of the wiring harnesses should be long enough to allow the electrical apparatus which is connected to be taken off (i.e. main display unit, tachograph, etc.).
- The numbering of the wires must be in accordance with the manufacturer's standard.
- The link between the sheath and the connector must be fluidtight.

1.15.3 Electrical connections

- Any additional connection requires protection that is suitable for the use for which it is intended (even if the power supply provided for the customer by RENAULT V.I. is already protected by a fuse).
- Any electrical connection must be properly wired on the power lines supplied by the manufacturer to the bodybuilder's equipment (refer to the servicing and maintenance handbook for the vehicle in question).
- Tapping into the various wiring harnesses supplied by RENAULT V.I. is completely FORBIDDEN (for example vehicle rear lights, external marker lights, contactors, pressure switches, relays, etc.). Reminder: a 12 V tapping at the middle point between the two batteries is strictly FORBIDDEN.
- The electrical connections of the various harnesses of the bodybuilder must be made using a fluidtight junction box or otherwise using sealed connectors. If connections have to be made on circuits hooked-up to electronic equipment:
  - Ensure that you comply with the polarity recommended.
  - No inductance current must pass through the circuits which have been added.
  - All the earths must be connected up to the available "EARTH" points provided and not to the body-work of the vehicle.
- After work on junction boxes, the seal must always be as integrally effective as the original seal.
- Any power supply requiring a direct connection to the batteries must be capable of being isolated by a battery cut-out (for example: tail lifts) and protected by a fuse sited as near as possible to the batteries. Suitable connection terminals should be used.
- The + power supply is taken from the master switch, or failing this, from the battery terminal for vehicles without a master switch, **BUT IN NO CASE FROM THE ALTERNATOR OR STARTER MOTOR TERMINAL.**
- Power supplies to auxiliary equipment: i.e. telephone, fax, etc. The quality of the installation is the responsibility of the installer (i.e. reception, static, interference, etc.)
- Preferably, you should use connectors approved and distributed by RENAULT V.I. (i.e. type, sealing properties, rating, number of channels, etc.)
- Connectors for equipment should be positioned near the bottom, whilst avoiding areas subject to splashing (i.e. wheelarches, etc.).

1.15.4 Available power supplies

All our vehicles are equipped with the available power supply protected by fuses and these are standard supply to bodybuilders and equipment manufacturers.

These power supplies are described in the vehicle driving and maintenance handbook (supplied with every vehicle), in the Workshop Repair Electrical Manual, and in this document (all these documents are available from the RENAULT V.I. dealer network).

1.15.5 Flasher units

Should the flasher unit become inoperative due to failure to comply with the instructions contained in this document, the coverage granted by the warranty will be lost.

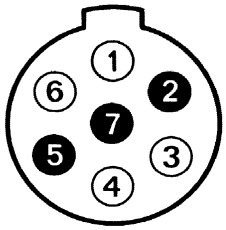
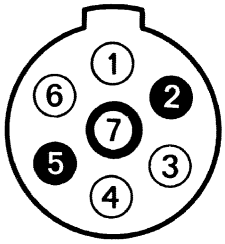
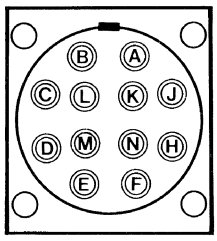
The flasher units are designed for a maximum rating which is marked on the unit.

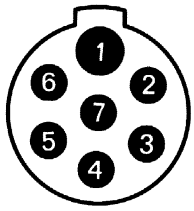
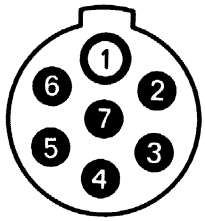
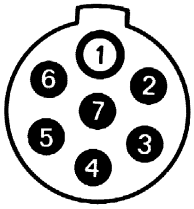
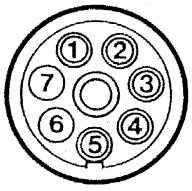
Do not exceed this power rating.

Connection

In order to make the connections correctly, consult either the identification marks which are located close to the terminals, or the wiring diagram on the label which is affixed to the flasher unit cover.

1.15.6 List of standard power sockets

SUPPLY VOLTAGE	DESCRIPTION AND STANDARDS	SOCKET DIAGRAM (front view)
12 Volts	12 N type socket (Standard: - BNA.R.43.407 dated April 1982 - ISO 1724). 1 - LH direction indicator light. 2 - Rear fog light. 3 - Earth. 4 - RH direction indicator light. 5 - RH rear side and marker light and number plate illumination lamp. 6 - Stop light. 7 - LH rear side and marker light and number plate illumination lamp.	 600037
12 Volts	12 S type socket (Standard: - BNA.R.43.410 dated August 1982 - ISO 3732). This is a supplementary socket which is assembled in addition to the 12 N socket. 1 - Reversing light. 2 - Not allocated. 3 - Earth. 4 - Supplementary + power supply. 5 - Earthing monitor. 6 - Positive (+) power supply. 7 - Not allocated.	 600038
24 Volts	12-pin socket (Standard: - BNA.R.43.405 dated March 1961 - DEFA 1457 b. - DCEA 5.556. - NATO). A - LH black-out side light. B - LH direction indicator lights. C - RH black-out side light. D - Earth E - Rear side and marker lights and number plate illumination lamp. F - Black-out stop light. H - Not allocated. J - RH direction indicator lights. K - battery + power supply. L - Earth. M - Stop lights. N - Not allocated	

SUPPLY VOLTAGE	DESCRIPTION AND STANDARDS	SOCKET DIAGRAM (front view)
24 Volts	24 N type socket (Standard: - BNA.R43.406 dated January 1976 - ISO 1185). 1 - Earth. 2 - LH rear side and marker light and number plate illumination lamp. 3 - LH direction indicator lights. 4 - Stop lights. 5 - RH direction indicator lights. 6 - RH rear side and marker lights and number plate illumination lamp. 7 - Trailer braking light. Terminal 7 is scheduled in certain countries for supplying power to regulation trailer brakes. Under no circumstances must it be used as an earth terminal.	 600040
24 Volts	24 S type socket (Standard: - BNA.R43.409 dated April 1982 - ISO 3731). This is a supplementary socket which is assembled in addition to the 24 N socket. 1 - Earth. 2 - Not allocated. 3 - Reversing light. 4 - Power supply. 5 - Earthing monitor. 6 - Supplementary power supply. 7 - Rear fog light.	 600041
24 Volts	24 P (oil tanker) type socket (Standard: - BNA.R.10.120 dated June 1977) This is the socket for RTMD-ADR (Transport of Hazardous Substances) vehicles which is assembled in addition to the 24 N socket. 1 - Earth. 2 - Valve lighting. 3 - Reversing light. 4 - Positive (+) power supply. 5 - Insulated earth. 6 - Not allocated. 7 - Rear fog light.	 600042
24 Volts	ABS specific type socket (Standard: - ISO 7638) 1 - Power (30A). 2 - Control power supply (2A). 3 - Control earth (2A). 4 - Power earth (30A). 5 - Information (2A). 6 - Free. 7 - Free.	 600563

1.15.7 Additional direction indicator lamps

- **On tractors and rigids**

  Should the lamps provided not meet all the requirements of the legislation in force, the bodybuilder may add extra lamps supplied with power by the same circuit as the front lamp or by a special circuit should one be available from the flasher unit. In all cases, comply with the power rating.

  We strongly advise you to refrain from fitting any other lamp not required by the regulations.

- **On trailers and semi-trailers**

  The standards in force concerning trailers require only two circuits for the flasher units: one circuit for the RH side and the other for the LH side. It follows, that in order to comply with “a” of paragraph 3 entitled “Lamp Monitoring”, no additional lamps must be fitted on the trailer or semi-trailer which run from the monitored trailer lamps.

The addition of extra lamps entails the fitting of new wire runs which have to be drawn from the non-monitored lamp terminals in the flasher unit.

Overloading

Under no circumstances must extra lamps be fitted that exceed the power rating on the flasher unit. The main consequences of such overloading are as follows:

- The service life of the flasher unit is shortened, even when it would appear to be operating normally in spite of the overload.
- Operation is adversely affected by intermittent or permanent sticking of the contacts (the lamps remain lit without flashing)
- The appliance may be **off-circuit for the duration of the overload.**

Protection of the flasher unit (depending on the vehicle equipment)

In the event of excess current, the flasher unit will cease to operate. To return it to service:

- Move the flashing lights control switch to the 0 “off” position.
- Find the cause of the overcurrent (lines or lamps) and remedy it.

You will then be able to use the flashing lights again normally.

1.16 Air-operated equipment

Should it be necessary to add auxiliary equipment not provided by the manufacturer, compulsorily it must be connected to the circuit specifically provided for auxiliary equipment on the vehicle.

The compressed air consumption of such auxiliary equipment should under no circumstances compromise the filling times of the brake circuits laid down by the legislation in force.

The RENAULT V.I. Product Applications Department is at your disposal for any further information you may require.

1.16.1 Regulations

It is forbidden to modify officially approved braking circuits which conform with the standards set out by the Highway Code.

Any modification, without prior agreement from **RENAULT V.I.**, is done at the sole responsibility of the author of such a modification.

1.16.2 Polyamide pipes

1 - Identification marking

Before removing any equipment or disconnecting polyamide pipes, mark the pipe in relation to the connection port on the equipment.

Coding system used on polyamide pipes (RENAULT V.I. standard):

Polyamide pipes are identified with a colour code marked with adhesive tape or by elastic rings.

Brakes code:

Main functions	Sub-functions		
	Constant pressure	Delivered pressure	Signalling pressure
Front service brake	Orange	Orange - White	Orange - Yellow
Rear service brake	Blue	Blue - White	Blue - Yellow
Parking brake	Green	Green - White	Green - Yellow
Trailer brake	Red	Red - White	Red - Yellow
Extra brake	Yellow	Yellow - White	Yellow - Yellow

Coding used on pneumatic appliances (DIN standard)

0 - Air intake	5 - Free
1 - Pressurised supply	6 - Free
2 - Delivered pressure	7 - Antifreeze
3 - Air vent	8 - Lubrication. 81 - Inlet. 82 - Outlet
4 - Signalling pressure	9 - Water cooling. 91 - Inlet. 92 - Outlet

When the figure is followed by a second figure, the latter figure indicates the sequence number.
Example: 41, 42, 43: The figure 4 indicates the signalling function, the figures 1, 2, 3 indicate a sequence number in that function.

2 - Replacement of pipes on braking circuits

The entire length of a damaged polyamide pipe should be replaced by a pipe with identical characteristics (length and diameter), and corresponding with the standard in force. (See technical memo 8655 group 53000, part N° 50 20 034 156 available with spare parts). It must also be provided with colour rings which are identical to those of the tube replaced.

Use an original manufacturer's pipe available from the RENAULT V.I. Spare Parts warehouse.

The routing of a polyamide pipe must be carefully executed. Ensure there is no interference with sharp-edged metal parts and there is no routing close to high temperature units. The pipes must be held at regular intervals by plasticised clamps or run in existing ducting. Non-plasticised attachment clamps are absolutely forbidden. Take care to ensure the minimum radius of curvature of polyamide pipes is observed.

Dimension	4 x 6	6 x 8	9 x 12	12 x 16
Radius of curvature	30 mm	50 mm	70 mm	130 mm

Modification to chassis length
Modification to brake pipe lengths requires braking response times to be checked out, in accordance with the legislation in force, and with agreement from the Type Approvals Department.

Connections for ratchet type pneumatic brake pipes type "RILAX 2000"
For the fitting of this type of connector, refer to and comply absolutely with the technical instruction sheet NT 8852 (method and tooling) available from the RENAULT V.I. Spare Parts Department.

2. GENERAL RULES TO BE OBSERVED WHEN FITTING BODYWORK

Before carrying out any work, protect the cab with a cover.
Our vehicles are equipped with plates, U-bolts or brackets. Preparation work may involve extra drilling or welding.
The principles described below must be adhered to.

2.1 General principles of welding

2.1.1 Precautions

Protection of the batteries

A battery at the end of its charge produces a mixture of oxygen and hydrogen gas. The ignition of this gas present dangers of battery explosion in the case of the presence of a source of heat nearby. As a result, during a welding operation near the batteries (i.e. engine compartment, front end of the vehicle), take out the batteries and store them in a well-aired location away from the place where welding is being done. This recommendation applies equally for grinding operations.

Soundproofing screens

In the case of welding or use of a disk sander, either provide effective protection or remove the soundproofing screens, if necessary.

Protection of electrical and mechanical items

The vehicle is equipped with numerous electronic circuits: the alternator, the regulator, flasher units, speed limiter, ABS, etc.

Before any operation involving electric arc welding, make an earth connection by disconnecting the two negative (-) and positive (+) cables from the battery (starting with the earth cable) and connecting them the frame earth. If the vehicle is equipped with a master switch, this should kept engaged (circuit closed). Place the earthing clamp as near as possible to the point of welding, but never on rotating parts (prop shaft, fan hub, etc.) or on a subassembly having moving parts (i.e. air compressor, turbocharger, etc.)

Nearby plastic pipes and electrical cables, springs and air-suspension bags are to be protected or removed. This also applies when grinding or drilling.

When reconnecting the battery, observe the polarities, commencing with the positive (+) terminal. Reversal of polarity may cause irreparable damage to electronic components.

2.1.2 Preparation of parts for welding

Clean the parts, primarily at the location of the weld and at the connection of the earthing wire. This allows:

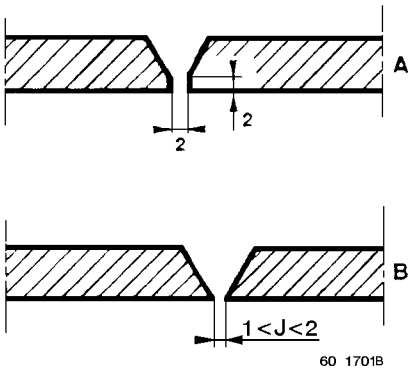
- free and regular electrical current flow (regularity of weld bead),
- avoidance of inclusion of impurities in the molten metal (weld quality),
- avoidance of spatter and emission of smoke (safety for the welder).

For conversions (extensions, reductions and reinforcement gussets), we recommend arc welding with electrode type B. When semi-automatic welding is use, the bodybuilder must be able to guarantee weld quality.

Joint preparation for chassis frames

A - With electric arc welding

B - With weld under gas shield (MAG or MIG)



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Specific weld method for chassis frames

– Preparation of the edges at 45°

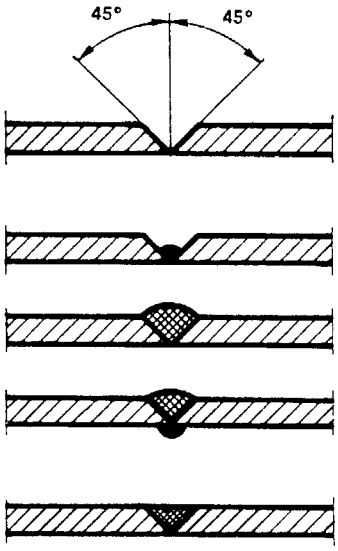
– Tack

– Position slave butts

– Weld on one single side

– Weld on second side

– Welds ground flush on both sides



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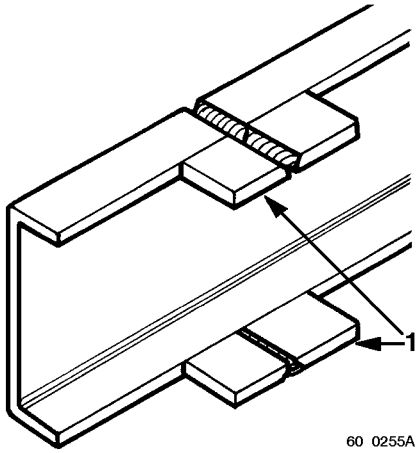
Slave butts

The object of slave butts is to avoid the starting of cracks at the outside edges of the weld joint. Before final welding align butts with plates of the same thickness as the plates to be joined, holding them in position using quick action clamping devices.

They must not under any circumstances be held in position by weld tacks on the plates to be joined.



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2.1.3 Welding process

Static or rotary arc welding set
Welding rod usage table

Electrode diameter (in mm)	2.5	3.15 (*)	4 (*)	5
Average current (in amperes)	80	110	160	200

(*) Most frequently used diameters
RECOMMENDED ELECTRODES: **AFNOR** standard A 81.309 (December 1975)
E 435/4 B 26 BH for steels class: A - B - C - D - E
E 515/5 B26 BH for steel class: F
If steels are mixed, take the best performing steel electrode category.

Equivalent standards

AFNOR A 81.309 (12.1975)	**ISO 2560**	**ASME (SFA 5.1) AWS (AS.1.69)**	**DIN 1913**	**BS 639**
E 435/4 B 26 BH	E 435 B 26 (H)	E 7016	E 453/4 B 10	E 435 B 26 (H)
E 515/5 B 26 BH	E 515 B 26 (H)	E 7018	E 515/5 B 10	E 515/6 B 26 (H)

MIG or MAG semi-automatic set
MIG: Metal Inert Gas (for welding use an inert gas: e.g. Argon)
MAG: Metal Active Gas (for welding use an active gas: 85% Argon + CO_2 mixture).
Solid wires, used in semi-automatic welding are defined by standard **NF EN 440 / DIN 8559**.

Wire diameter (in mm)	**Thickness to be welded (in mm)**
0.8	up to 2
1.0	from 2 to 8

2.1.4 Equivalent steel grades

The four classes relate to hot rolled steel plate with a high yield strength for cold forming, as currently set out in the French and European Standard NF EN 10149-2, which has replaced French Standard NF A 36.231.

High yield strength sheet steel (dispersed carbon)

	RENAULT V.I. Specification 31.09-402			
	Class C	**Class D**	**Class E**	**Class F**
UTS in N/mm² min.	450	500	540	610
YP at 0.2% in N/mm² min.	355	445	490	560
E % min.	23	20	18	15
KCV at - 20° C J/cm² min., longitudinal	35	35	35	37,5
Bending, transversal	1 e	1 e	1,5 e	1,5 e
Grain size	n° 5	–	–	–
= European equivalent French standards	S 355 MC NF EN 10149.2	S 420 MC NF EN 10149.2	S 500 MC NF EN 10149.2	S 550 MC NF EN 10149.2
= German standards equivalent DIN	QStE 380TM SEW 092	QStE 420TM SEW 092	QStE 500TM SEW 092	QStE 550TM SEW 092
= British standards equivalent BS	43 F 35 BS 1449	46 F 40 BS 1449		
= American standards equivalent ASTM	Gr. 50 050 YKL ASTM 607–50	Gr. 60 060 YKL ASTM 607–55	Gr. 70	Gr. 80
= EURONORM standards equivalent 149-80	FeE355 TM	FeE420 TM	FeE490 TM	F e E560 TM

2.2 REINFORCEMENT, EXTENSION, REDUCTION OF SIDEMEMBERS

2.2.1 Bans

It is absolutely forbidden to weld onto sidemembers, except for reinforcement, extension, reduction, and the following instructions must be observed:

- Do not weld on the edges of flanges.
- Do not weld in sidemember bending radii.
- In the case of flat irons: no directly opposing welds on the two faces of the same web - only “alternate” or “plug” welds are authorised.
- No welds which are less than 15 mm from the edge of a hole.

Insofar as possible, we advise you to have modifications of the lengths of sidemembers carried out by **specialists**.

- The general rules for welding in the paragraph **2.1** entitled “General Principles of Welding” must be strictly followed.

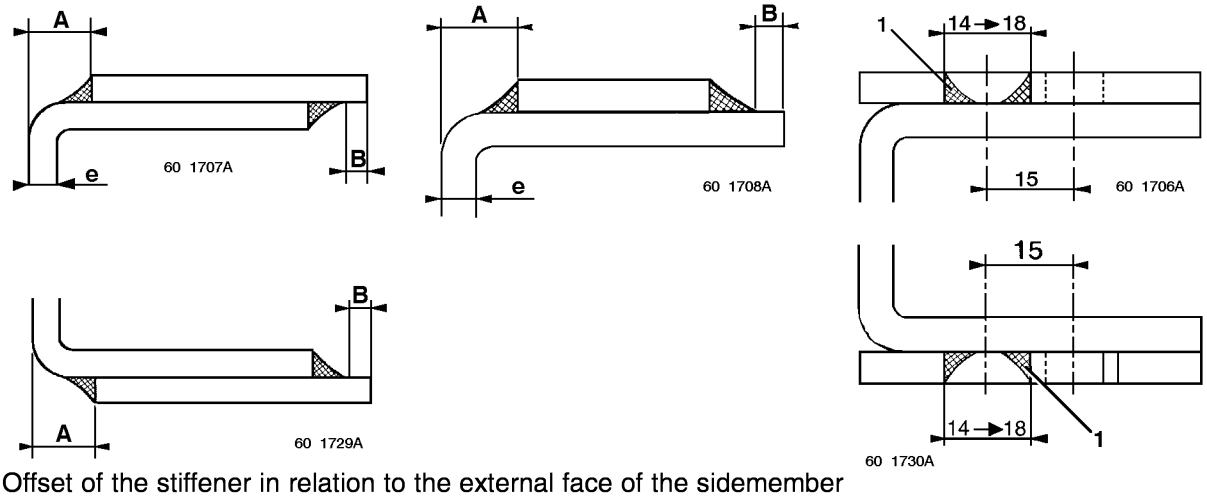
Only conversions (extensions or reductions) rendering the modified vehicle completely in conformity with a **type approved chassis** are permitted without additional testing, with certification from the vehicle manufacturer.

2.2.2 Reinforcement of sidemembers

- For inner reinforcements and chassis flange stiffeners, the thickness should be the same as the thickness of the sidemember.

NOTE
The steel grade must be identical to that used for the sidemember.

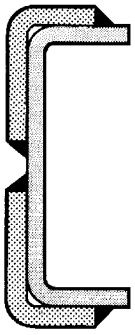
Examples of stiffeners
Sidemember upper and lower stiffeners



A: Offset of the stiffener in relation to the external face of the sidemember
B: Offset of the stiffener in relation to the edge of the sidemember
e: Thickness of the sidemember
1: Welds through round or slotted holes, staggered

Thickness of the sidemember	A	B
e < 6 mm	10 mm	15 mm
e ≥ 6 mm	15 mm	15 mm

Upper and lower stiffeners using angle-irons



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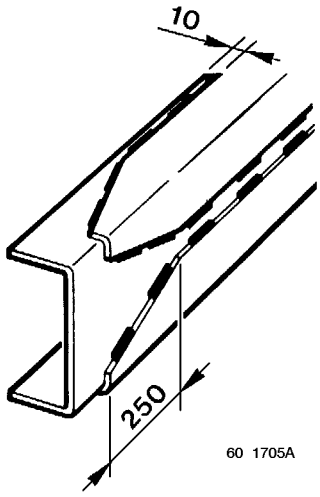
Method of joining

In the case of stiffeners made from flats (on the upper flange or under the lower flange of sidemembers), we recommend attachment by:

INTERMITTENT BEADS by electric welding: as guidance, 80 mm beads spaced 120 mm apart and staggered.



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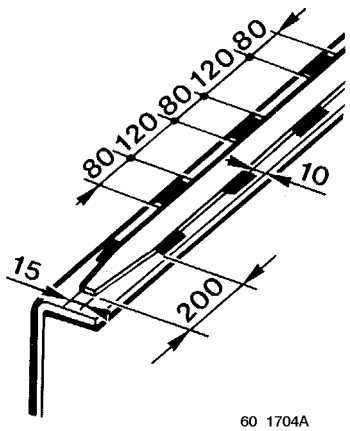

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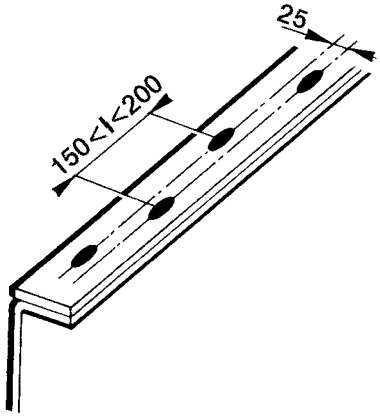

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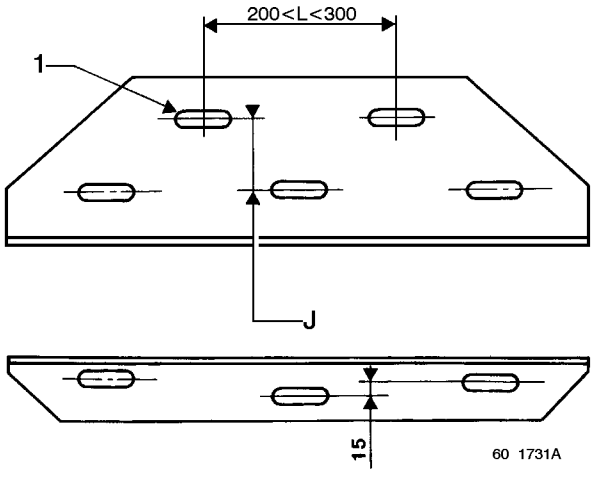
"PLUG" welds: as guidance, round holes diameter 14 to 18 mm or slotted (1) holes diameter 14 x 50 mm to 18 x 50 mm at a "pitch" of 200 mm min. to 300 mm. max., staggered, with good quality weld.

WARNING

No vertical welds on sidemember webs. No transversal welds on sidemember flanges.



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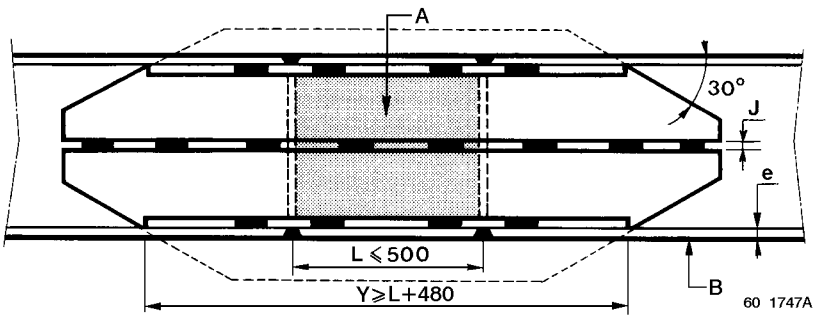
Extension, reduction of sidemembers in the wheelbase

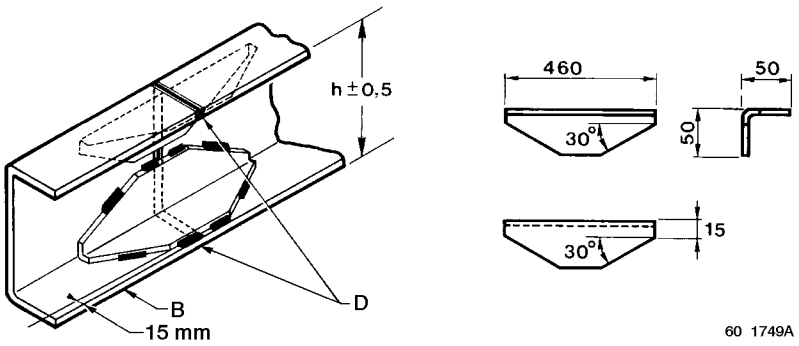
Extension of the sidemembers in the wheelbase

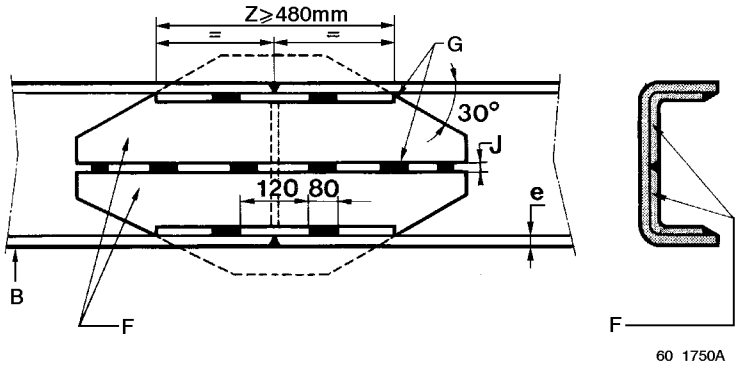
Key

A - piece of sidemember added,
B - sidemember,
C - reconstituted stiffener,
D - welds projecting beyond flanged edge with butt-ends then longitudinal grinding (elimination of sharp edges),
e - thickness of the sidemember,
F - angle-iron of thickness (E) max.: E ≤ (e - 1 mm),
h - height of the sidemember,
J - weld penetration clearance (about 2 mm),
L - max. length of extension,
X - max. length of projection of the stiffener measured on the edge of the flange (extension),
Y - min. length of support of the stiffener measured on the edge of the flange of the sidemember (extension).
Z - min. length of support of the stiffener measured on the edge of the flange (stiffener without extension).

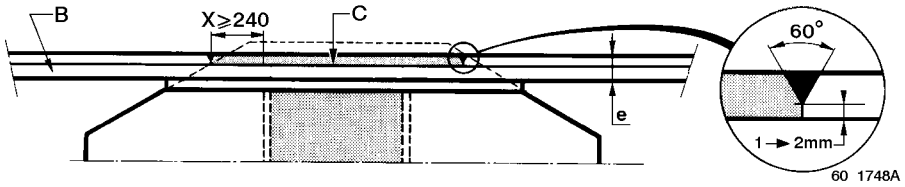
Sidemember without stiffener flat on the flange







Sidemember with stiffener flat on the flange



2.2.3 Modification of the rear overhang

If the bodywork or the equipment fitted do not alter the weight and dimensional characteristics of the chassis entered on the description sheet, the vehicle can be submitted to the Type Approval Department without any action being necessary on the part of RENAULT V.I. (within the permitted limits in force).

- Welding stiffeners are required for drawbar rigids or if the extension is longer than 400 mm for a solo vehicle.

  Examples: Drawbar rigid; tail lift; crane at the rear of the chassis; tipper; etc.
- Extension of the rear overhang will also be required when the rear extremities of the bodywork project beyond the maximum authorised value which is indicated on the bodybuilder's drawing and calculation sheets relating to the vehicle.

Cross-members

Cross-members should be attached with nut and bolt hardware of the 10.9 SSS protected class as per standard 01714002 and distributed by RENAULT V.I.

Drawbar cross-members

Please refer to the chapter on "Drawbar cross-members" in the section entitled "SPECIFIC FEATURES OF THE MASCOTT VEHICLE".

Intermediate cross-members

In the case of extension of the wheelbase or the rear overhang, it is essential to add cross-members, so as not to weaken the rigidity of the frame.

Observe the following instructions:

- Between two cross-members, the spacing must be no greater than the original spacing.
- If the extension to the overhang is longer than 500 mm, the rear cross-member must be moved and an intermediate cross-member fitted which is identical to the others.

2.3 Attachment of bodywork

The bodywork must be correctly attached so that both the static and dynamic stresses are freely transmitted without causing excessive local strain, which could prejudice the reliability of the chassis frame or affect the road behaviour of the vehicle.

The following rules apply to the fastening of various standard bodies fitted to our chassis cabs, such as platforms, vans, tippers, and tankers. For special cases, contact the Product Applications Department.

For body design (i.e. length, load distribution, location of accessories on sidemembers, etc.) refer to the CD-ROM “Information for Bodybuilders” or the 1:20 scale bodywork drawing which we supply upon simple request.

Fastenings should always be tightened progressively and alternately.

The shape of sub-frames or underbodies should always be tapered towards the front (i.e. at the back of the cab), so as to avoid sudden variations in inertia (refer to chapter entitled “Finishing of sub-frame behind the cab”.

2.3.1. The following is forbidden

- The use, drilling or welding of spring hangers.
- Any modification of: the chassis, the driveline, or the suspension.
- Fastening of sub-frames to our sidemembers by welding.
- The drilling of stiffener gussets.
- The notching of sidemembers, gussets or cross-members.
- With the exception of special cases described in this document, the use or modification of our nut and bolt hardware and our riveting for the attachment of a body or sub-frame.
- The attachment of sub-frames by hooks (use U-bolts).

All bodies attached by clamps and brackets must mandatorily have 1 inertia stop to the aft of each sidemember to stop the body from moving in the event of fierce braking, as well as 4 body guides (2 at the front, 2 at the rear).

For bolted fastenings, comply with the following instructions:

- By preference use brackets attached to the chassis.
- Use the fixing bolt holes 11, 13 or 15 mm diameter depending on the particular vehicle, spread out along the length of the sidemembers of the chassis frame.
- Take good note of the attachment principles, set out in the chapter on the “Attachment of sub-frames”.

2.3.2 Protection against exhaust heat radiation

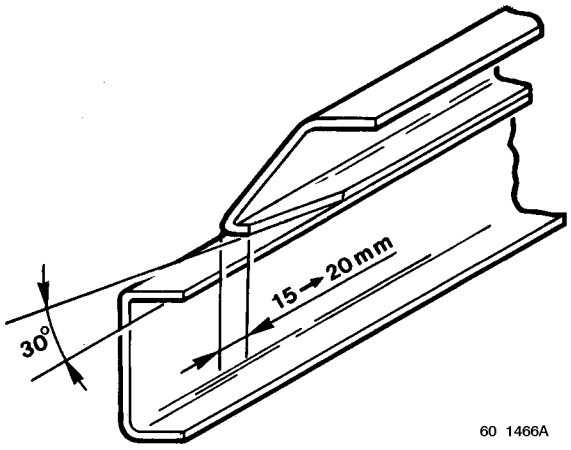
Depending on the features of your bodywork or equipment, the fitting of a heat shield on the original protection is recommended.

2.4 Sub-frame

In order to attach bodywork to the frame of the chassis, you should allow for the fitting of a sub-frame whose module of inertia (I/V) is determined in accordance with the range of vehicle in question (refer to the section entitled “SPECIFIC FEATURES OF THE MASCOTT VEHICLE”.

In order to ensure better distribution of the stresses along the sidemembers, you must allow for a cut-out as far forward as possible under the cab.

2.4.1 Finishing of sub-frames behind the cab



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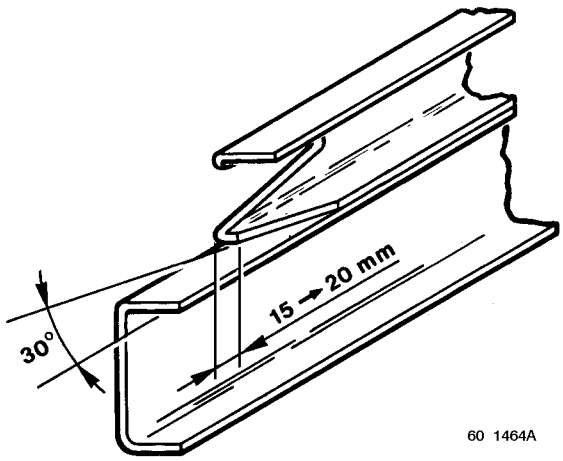

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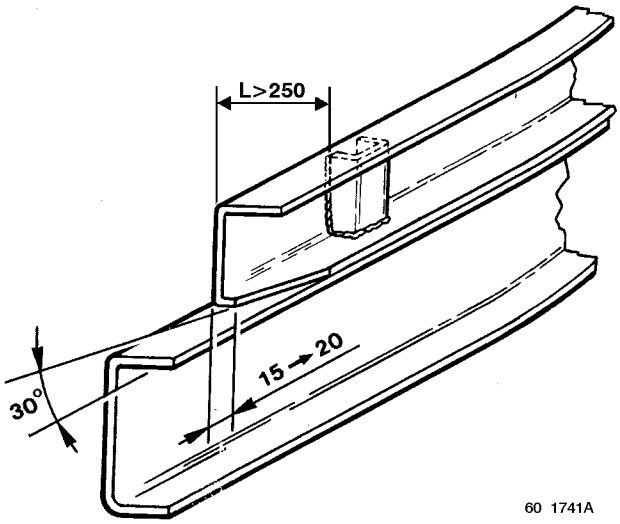

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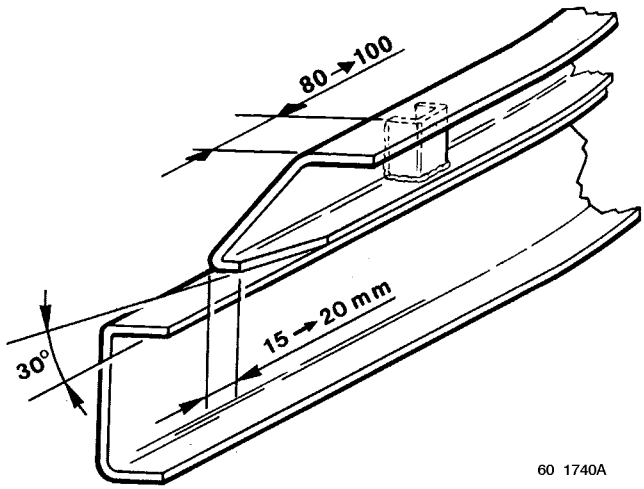

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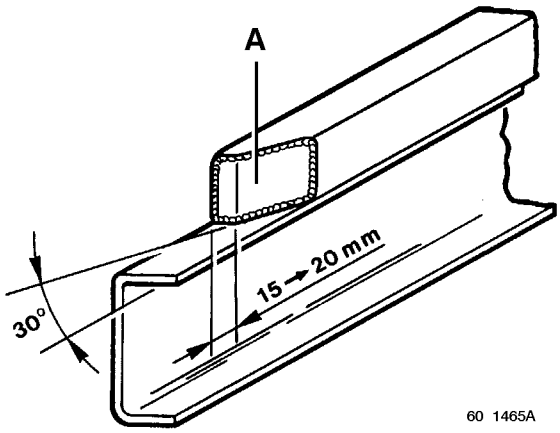
When the sub-frame is constructed of square or rectangular tube section, we also suggest the cut-out shown below.

A: Blank off with 1.5 mm thick sheet metal



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2.5 NUTS AND BOLTS, TIGHTENING TORQUES FOR PARTS IN STEEL AND CAST IRON

The torques indicated in the table are the nominal torques (i.e. average value calculated on the basis of the minimum and maximum torque).

Class III is the class covering precision tightening (± 20 % of nominal torque) in accordance with Standard 01504002 (coefficient of friction 0.15 ± 003).

The tightening torques are given for nut and bolt hardware that is dry and coated with dacromet.

Description	Characteristics	Class of Steel	Part Nos.	Tightening torque*
Screw	H 10 x 125 L 30	10.9	50 03 101 460	60 N.m
	H 10 x 125 L 50	10.9	50 03 101 148	60 N.m
	H 12 x 125 L 40	10.9	50 03 101 151	110 N.m
	H 12 x 125 L 45	10.9	50 03 101 749	110 N.m
	H 12 x 125 L 50	10.9	77 03 101 679	110 N.m
	H 12 x 125 L 60	10.9	50 03 101 153	110 N.m
	H 14 x 150 x 40	10.9	50 03 101 161	170 N.m
	H 14 x 150 x 50	10.9	50 03 101 162	170 N.m
	H 14 x 150 x 60	10.9	50 03 101 163	170 N.m
	H 14 x 150 x 90	10.9	50 03 101 169	170 N.m
	H 14 x 150 x 100	10.9	50 03 101 660	170 N.m
	H 14 x 150 x 110	10.9	50 03 101 171	170 N.m
	H 16 x 150 x 50	10.9	50 03 101 103	220 N.m
Collar screw	H 10 x 125 L 30	10.9	50 03 002 048	60 N.m
	H 12 x 125 L 40	10.9	50 03 002 049	110 N.m

Description	Characteristics	Part Nos.
Cone shaped washer	10 x 20 x 2.2	50 03 058 081
	10 x 24 x 2.8	50 03 058 071
	10 x 27 x 2.8	50 03 058 076
	12 x 30 x 3.2	50 03 058 075
	14 x 28 x 3	50 03 058 069
	16 x 32 x 3.4	50 03 058 034
	16 x 39 x 3.6	50 03 058 070
Flat washer	10 x 22 x 3	50 03 053 453
	10 x 27 x 3	50 03 053 455
	10 x 24 x 2.5	50 03 053 026
	12 x 28 x 5	50 10 054 526
	12 x 32 x 2.5	50 03 053 441
	14 x 30 x 5	50 03 053 014
Cone shaped washer BELLEVILLE	14.5 x 35 x 1.8	00 21 721 040

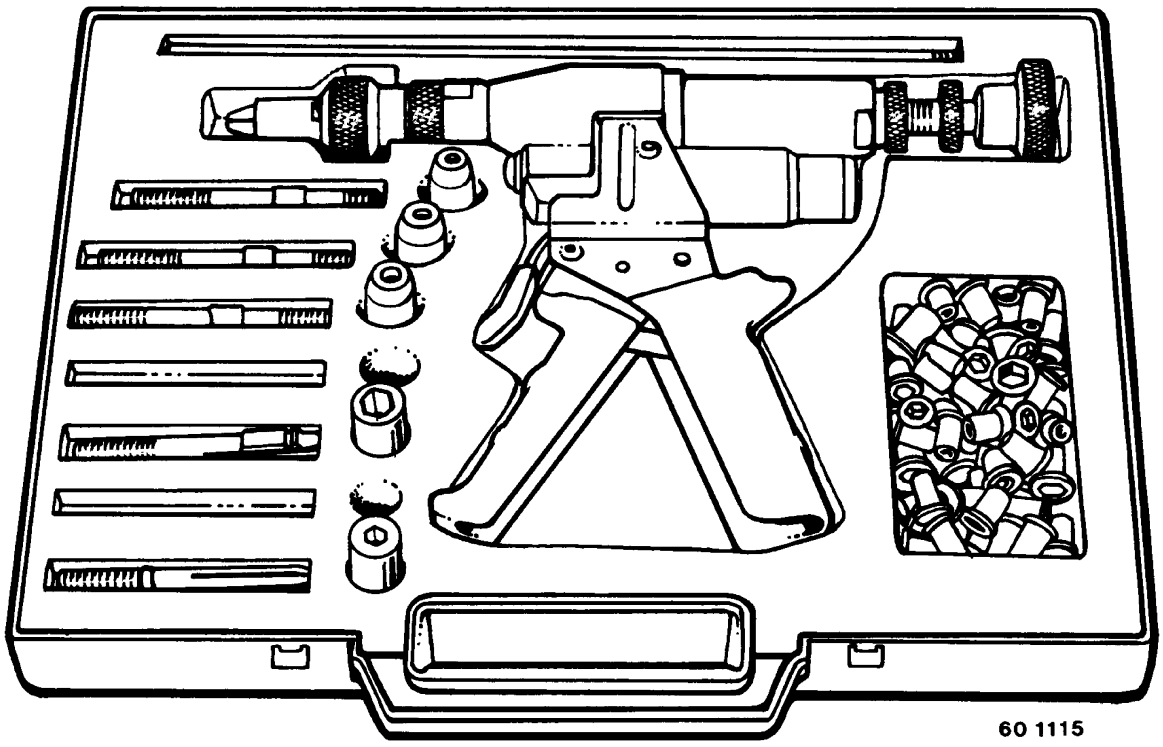
Description	Characteristics	Class of Steel	Part Nos.	Tightening torque*
Nut	10 x 125	10	50 03 032 156	60 N.m
	12 x 125	10	50 03 032 157	110 N.m
	14 x 150	10	50 03 032 159	170 N.m
	16 x 150	10	50 03 032 236	220 N.m
Locknut DRH	10 x 125	10	50 03 034 246	60 N.m
	12 x 125	10	50 03 034 248	110 N.m
	14 x 150	10	50 03 034 250	170 N.m

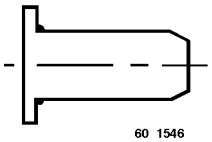
** To be used for tightening a screw in the thread of a mechanical part. In the case of tightening for a screw fitted with a nut, tighten to the torque recommended for the nut.*

2.6 Addition of equipment to the bodywork

The attachment of equipment to the bodywork must be done with fluidtight crimping nuts.

Tooling and crimping nuts





Crimping nut M6 with hexagonal barrel

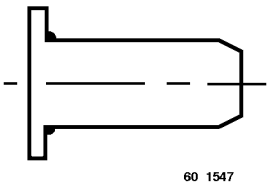
Part N° : 50 03 043 050

Method:

- Drill a 9.2 mm diameter hole (refer to chapter entitled “Drilling of bodywork members for the fitting of accessories”).
- Use the OPEX tooling from OTALU SA.
- Punch out the hexagonal.
- Insert the nut for crimping.

Information:

- Tightening torque max. 10 Nm.
- Length of barrel projecting under bracket after crimping: 17 mm.



Crimping nut M8 with hexagonal barrel

Part N° : 50 03 043 052

Method:

- Drill a 11.2 mm diameter hole (refer to chapter entitled “Drilling of bodywork members for the fitting of accessories”).
- Use the OPEX tooling from OTALU SA.
- Punch out the hexagonal.
- Insert the nut for crimping.

Information:

- Tightening torque max. 24 Nm.
- Length of barrel projecting under bracket after crimping: 21 mm.

2.7 Rear Underrun guard at the rear

RENAULT V.I. obtains approval for its equipment to cover the requirements of its range. Their attachment being by means of bolts, this allows them to be moved down along the sidemembers to suit such modifications that the chassis may undergo. This must be observed, along with the maintenance of the attachment method detailed on the 1:20 scale bodywork drawing and compliance with the dimensional requirements under the regulations.

A vehicle which is not equipped at the time of delivery can be fitted afterwards, following a conversion making the fitting compulsory, using items which can be supplied from the Parts Stores of our dealers.

Moving of items of equipment

Modifications of a RENAULT V.I. vehicle for the fitting of bodywork and equipment requires technical approval to be obtained from the Product Applications Department of RENAULT V.I.

3. SPECIFIC EQUIPMENT FEATURES

3.1 Running the engine when stationary

Under the conditions of running an engine for a long period under load, it is vital to fit an additional cooler unit in order to keep the temperature of the engine at a normal level (water temperature approx. 80° C).

The prolonged use of the engine under these conditions can cause malfunctions which could adversely affect the life of the engine.

3.2 Mounting of power take-offs and flanged pumps

RENAULT V.I. power take-offs (PTOs) and their adapter kits should be ordered from the RENAULT V.I. Spare Parts Department. In order to carry out the fitting, refer to the specific information circulars that are available from the Product Applications Department.

Bearing in mind the weight and the large overhang required for certain PTOs having flanged pumps, the rear of these units should be supported by a suitable bracket attached to the rear of the gearbox.

COMPLY WITH THE STANDARD NF ISO 7653

IMPORTANT

It is compulsory at the time of fitting a power take-off to ensure that there is a certain amount of play in the setting adjustment, so as to allow an ideal clearance for the teeth of 0.15 to 0.25 mm then to fit a gasket or apply paste in order to achieve a good seal and also to top-up the oil level. (Refer to the vehicle Maintenance Manual).

Refer to our Product Information Sheet and 1:20 scale bodywork drawing on “power take-offs”, which can be requested from our Product Applications Department.

3.3 Front power take-offs (crankshaft nose)

RENAULT V.I. pre-arranged assembly

For belt drive units, pulleys with extra grooves fitted to the engine may be available.
Consult the Product Applications Department to obtain the relevant information and technical approval for the assembly.

3.4 Front and rear power take-offs

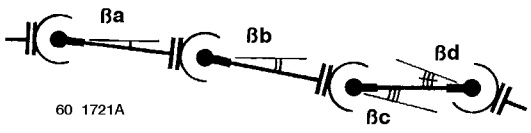
3.4.1 Propeller shaft alignment

In order to achieve satisfactory propeller shaft alignment, several minimum basic **criteria** have to be observed.

Angularity criteria (or: equivalent angle of inclination β_E permissible for all articulations).
This angle β_E must comply with the following condition:

$$\beta_E = \sqrt{|\beta_a^2 \pm \beta_b^2 \pm \beta_c^2 \pm ...|}$$

$$\beta_E \leq 3°$$

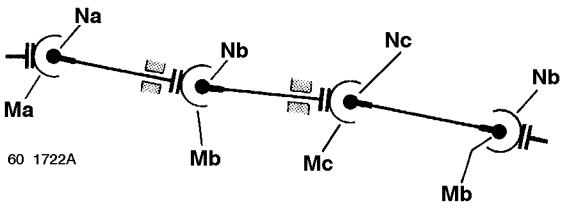


Rule for sign β:
Yoke N° 1 is to be considered as the reference yoke.

β **> 0** when the leading yokes are parallel to the leading yoke (Ma).

Example 1:

$$\beta_E = \sqrt{|\beta_a^2 + \beta_b^2 + \beta_c^2 - \beta_d^2|}$$

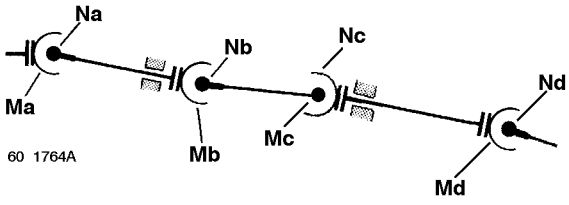


M - Leading yokes
N - Trailing yokes

β **< 0** when the leading yokes are perpendicular to the to leading yoke (Ma).

Example 2:

$$\beta_E = \sqrt{|\beta_a^2 + \beta_b^2 - \beta_c^2 + \beta_d^2|}$$



Angular acceleration criteria θ_1

Calculated criterion for a theoretical maximum speed of rotation (N).

$$\theta_1 = \left(\beta_E \times \frac{\pi}{180}\right)^2 \times \left(\frac{\pi \times N}{30}\right)^2$$

$$\theta_1 \leq 270$$

θ_1 : criterion of acceleration in rd/s²
N : max. speed of rotation in R.P.M.

NOTE
This value is calculated without dynamic amplification of the prop shaft tubes and bearings.

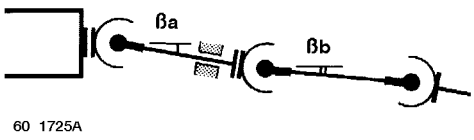
Measured criteria θ_2:
The angular acceleration or torsional vibrations criteria value θ_2 must not exceed 1500 rd/s² at the PTO output or at any point whatsoever of the driveline for a downstream inertia of I such that I ≤ 0.2 kg/m².

$$\theta_2 \leq 1500 \frac{rd}{s^2}$$

NOTE
This limit value θ_2 takes into account possible dynamic amplification of the driveline.

Transversal stress criteria for prop shaft tubes and bearings.

Example β1 and β2 maximum not to be exceeded.
- β_a **< 2°** for a prop shaft with bearing.
- β_b **< 7°** for a prop shaft with sliding yoke.



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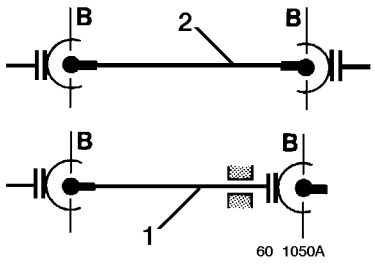
NOTE
If this 7° value has to be exceeded for space or clearance reasons, the vehicle manufacturer must be consulted.

3.4.2 Propeller shaft balancing

Permissible unbalance value (B):

$$B \leq 3 \frac{g \times cm}{kg} \text{ per balancing plane}$$

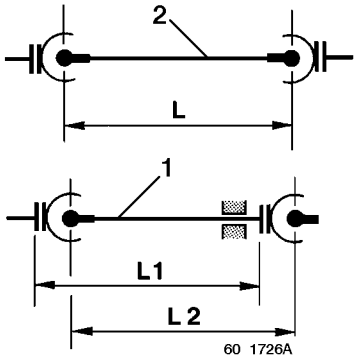


1 - 1/2 prop shaft
2 - prop shaft

NOTA
$g = 10 m/s^2$

3.4.3 Maximum permissible length of a prop shaft as a function of the rotating speed (L, L1 or L2)

L : Distance between centres of articulation of a prop shaft.
L2 : Distance between centres of transmission welds of a half prop shaft.
L1 : Distance between centres of transmission of a half prop shaft.
L1 = L2



$$L = \sqrt{\frac{K}{Nt \times 1.2}} \quad \text{where} \quad K = 0,75 \times 1.22 \times 10^5 \times \sqrt{D^2 + d^2}$$

Nt = prop shaft maximum operating speed
1.2 = safety coefficient
D = prop shaft large diameter
d = prop shaft small diameter

3.5 Vehicle driveline (powertrain)

Any modification to the driveline is forbidden. For special cases, agreement must be obtained from the RENAULT V.I. Product Applications Department.

Any propeller shaft modifications must only be carried out in conformity with the requirements of paragraphs 3.4.2 and 3.4.3

3.6 Mounting of handling cranes

The installer of the crane is responsible with regard to compliance with the regulations, and also for the stability of the vehicle. The recommendations of RENAULT V.I. are only concerned with the attachment of the equipment.

3.6.1 Mounting on the sub-frame

The mounting of a crane on the chassis behind the cab or in the rear overhang requires **the fitting of a specific sub-frame**.

The sub-frame module is defined in the graph of inertia in accordance with the lifting torque only for a crane mounted behind the cab and on rigid or drawbar rigid vehicles (refer to the next page).

For all mountings of cranes in the rear overhang, off-limits and on tractors, consult the RENAULT V.I. Product Applications Department.

The sub-frame must be in **one single piece**, starting from the back of the cab, and extending as far back as the rear tip of the overhang. The front end must be finished in a single or double bevel (refer to the chapter 2.4.1 entitled “Finishing of the sub-frame behind the cab”).

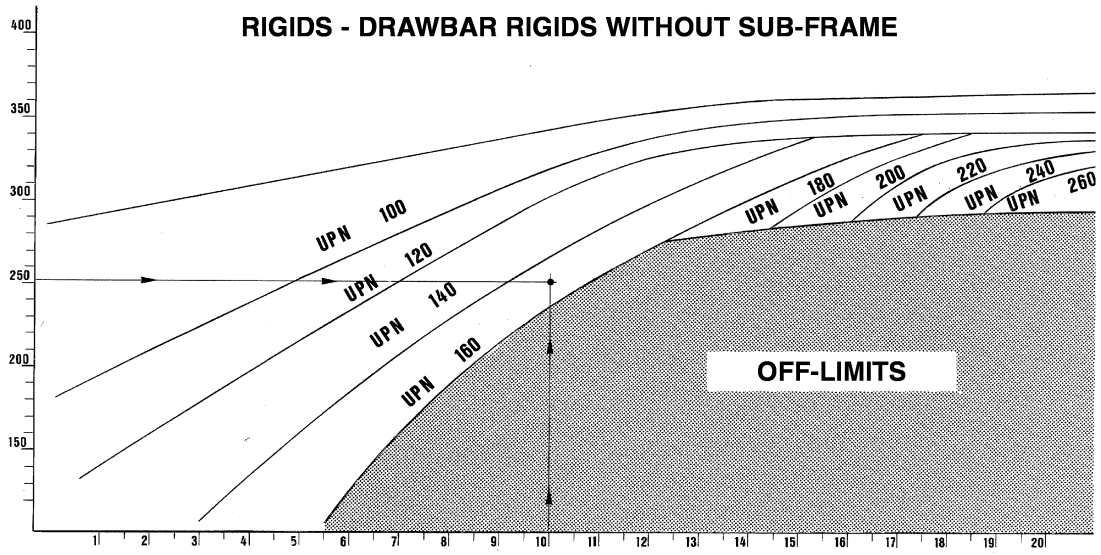
Should the crane be mounted in conjunction with another item of mobile equipment, one **single sub-frame** shall be designed in accordance with that item of equipment **which places the most strain on the sidemembers.**

3.6.2 Graph of the moment of inertia of the sub-frame as a function of the lifting torque

Example:
A chassis with sidemembers 252 mm long, fitted with a crane having a lifting capacity of 10 tonnes per metre. The chassis requires a sub-frame built of size 160 U-section beams (—- direction of reading).

NOTE
The U-section can be replaced by any other steel section offering equivalent total inertia.

Height of sidemember



Crane LIFTING TORQUE in tonnes/metre

NOTE
The U-section beams (UPN) can be replaced by any other steel section offering **equivalent total inertia** (I/V).

UPN 100 : I/V = 41200 mm^3	UPN 160 : I/V = 116000 mm^3	UPN 220 : I/V = 245000 mm^3
UPN 120 : I/V = 60700 mm^3	UPN 180 : I/V = 150000 mm^3	UPN 240 : I/V = 300000 mm^3
UPN 140 : I/V = 86400 mm^3	UPN 200 : I/V = 191000 mm^3	UPN 260 : I/V = 371000 mm^3

WARNING

Before undertaking the mounting of a crane on a vehicle, it is essential to make calculations to check the load distribution, and to determine the new maximum body length of the vehicle, whilst complying with:

- The gross vehicle weight permitted (GVW).
- The maximum permitted axle loads.
- The maximum rear overhang indicated in the Type Approval Department's descriptive sheet and the body-work diagram.

Sould such limits be exceeded and in all cases where the work does not comply with the type approval departments descriptive sheet, special authorisation must be requested from the RENAULT V.I. product applications department.

In addition to this, the bodybuilder will be responsible for commissioning the equipment.

3.6.3 Crane in the rear overhang

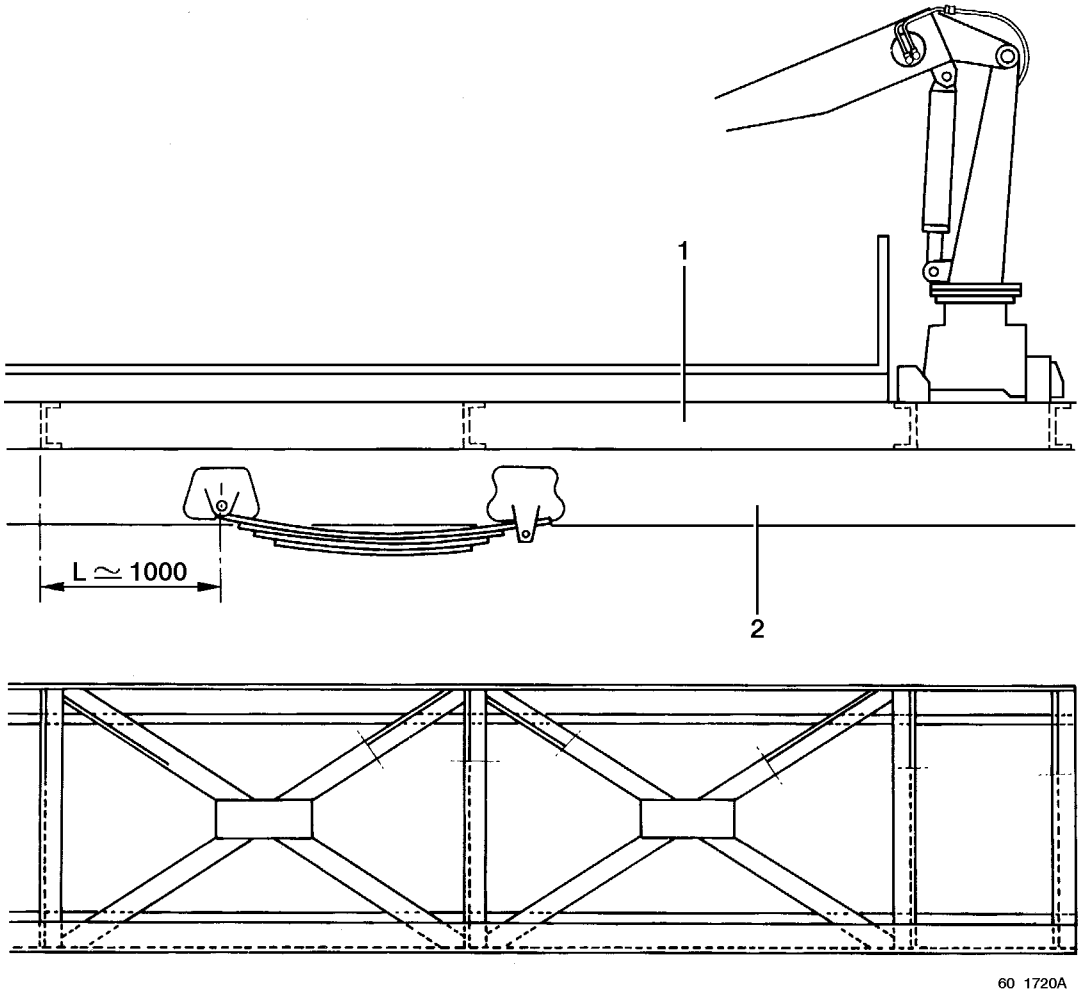
The installer of the crane is responsible with regard to compliance with the regulations, and also for the stability of the vehicle. The recommendations of RENAULT V.I. are only concerned with the attachment of the equipment.

The sub-frame required for such assemblies must be diagonally braced in accordance with the diagram below, using **U-section beams with a module that is immediately lower** than that recommended for the sub-frames.

Example: A sub-frame made of size 140 U-section beams shall be diagonally braced with size 120 U-section beams.

For a crane mounted in the rear overhang, in addition to the recommendations contained in the "WARNING" paragraph above, the following must also be observed:

- The minimum front axle load, for a vehicle fitted with a body and equipped with crane.
- The maximum authorised front axle load shedding: 5% of the value of the weight of the chassis cab on the front axle.



1 - Sub-frame
2 - Vehicle chassis

3.7 Tail lifts

3.7.1 Sub-frames

In the majority of cases, the mounting of a tail lift involves the fitting of a sub-frame to the vehicle. Such a sub-frame must reinforce the entire length of the chassis, with the bevelled front end being located as far forward as possible under the cab.

The module to be used for the sub-frame must be determined for tail lifts:

- without landing legs, for a capacity of 400 to 2,000 kg
- with landing legs, for a capacity of 1,000 to 2,000 kg
- by referring to the graph of inertia of the sub-frame depending on the load to be lifted, plus the information contained in the paragraph entitled “Special Recommendations”, which also deals with tail lifts with a capacity of 1,500 kg without landing legs and tail lifts with a capacity of 2,000 kg with or without landing legs.

3.7.2 Attachment

The tail lift is to be fastened in position with bolted plates. In all cases, the design of the attachment should involve that of the body sub-frame as well. Nut and bolt hardware is to be of class 10.9 fine pitch with a diameter of 12 mm. The plates are to be fastened in position with at least 6 nuts and bolts on each side of the chassis and by 3 bolts and nuts or only by welding to the sub-frame.

If necessary, it may be necessary to wedge the tail lift beam or plate on the lower flange chassis sidemember, so as to avoid flexing of the sidemember.

NOTE
Do not weld the bolted plate to the chassis.

WARNING
In all cases of conversions for tail lifts, it is absolutely essential to calculate the new length of body, to ensure compliance with:

- The maximum gross vehicle weight permitted (GVW).
- The maximum load on the front axle, with the vehicle fitted with its body and equipped with tail lift.
- The maximum loads permitted on the front and rear axles.
- The maximum rear overhang indicated in the Type Approval Department’s descriptive sheet and the bodywork diagram.

If any loads are exceeded, you should consult the Product Applications Department.

3.7.3 Electrical connections for a tail lift

Electrical connections should comply with the recommendations set out in the chapters entitled “Fitting of specific equipment” and “Electrical equipment”.

3.7.4 Special recommendations for tail lifts from 1500 to 2000 kg without landing legs

1,500 kg tail lift

- This is only possible using our chassis with a GVW equal to or greater than 16 tonnes.

2,000 kg tail lift

- This is only possible using our chassis with a GVW equal to or greater than 19 tonnes.
- For off-limits and for vehicles with a lower capability, consult the Product Applications Department.
- **Should the underrun guard have to be modified, care should be taken to ensure compliance with regulations in force.**

3.7.5 Graph of the moment of inertia of the sub-frame as a function of the lifting torque

- Draw a straight line joining the type of tail lift in question (lower part of the graph) to the mark corresponding with the height of the sidemember in mm.
- Draw a straight line from the value of the sidemember height.
- Read the value for the sub-frame at the intersection of these two lines.

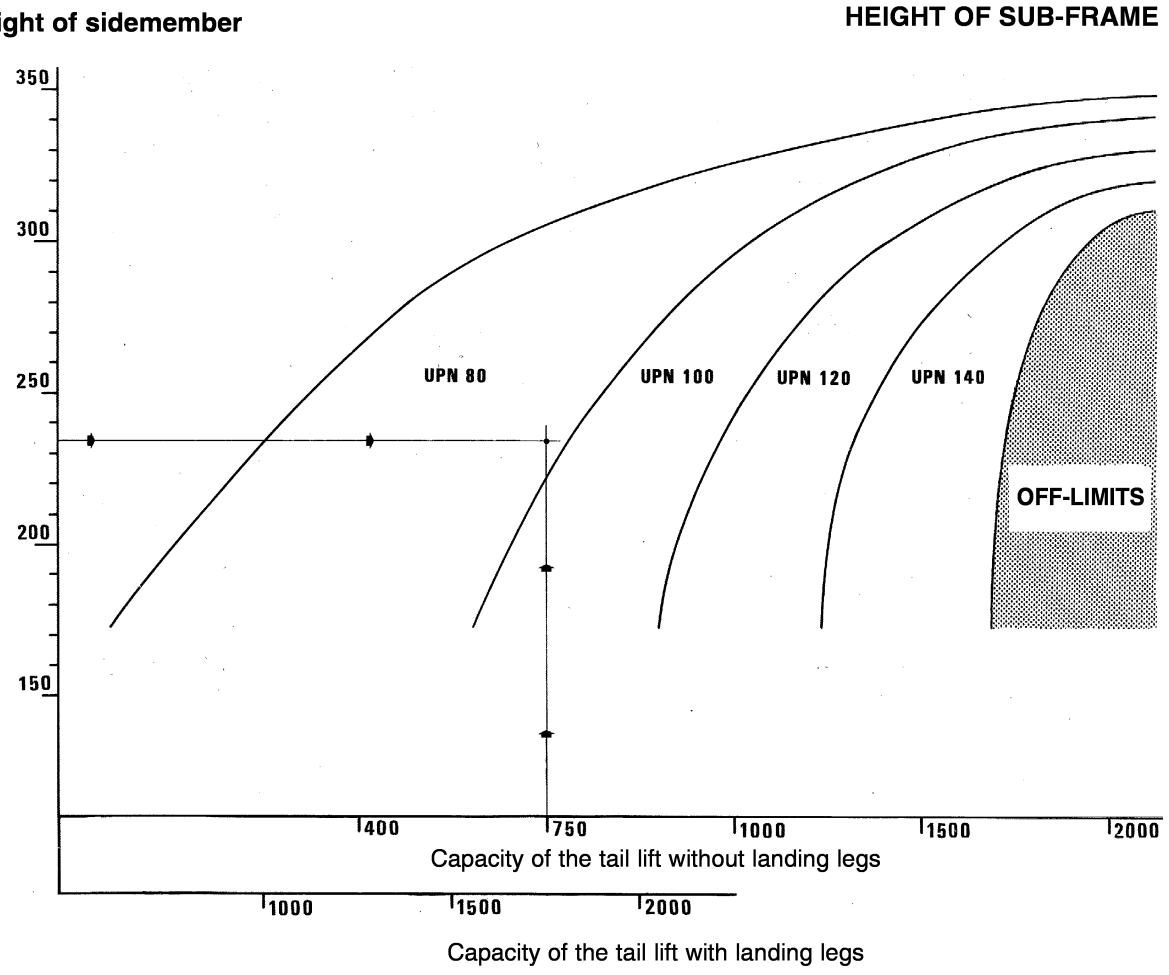
NOTE

For the mounting of tail lifts on 6 x 2 vehicles, it is essential to consult the RENAULT V.I. Product Applications Department.

Example:

Take a chassis with 234 mm high sidemembers, equipped with a 750 kg tail lift.

It requires a sub-frame made of size 80 U-section beams.



NOTE

The size 80 U-section beams can be replaced by any other section which gives an equivalent inertia (I/V).

UPN 80 : I/V = 26500 mm^3

UPN 100 : I/V = 41200 mm^3

UPN 120 : I/V = 60700 mm^3

UPN 140 : I/V = 86400 mm^3

3.8 Sub-frame box section

The recommended box sections should:

- be constructed in sheet metal which is as **thick or thicker** than that used for the sub-frame.
- stretch **over the entire rear** of the sub-frame, starting gradually at least **one metre in front of the foremost spring hanger** of the rear spring.

WARNING

If the sub-frame is to be constructed in a material other than commercially available U-section beams, we approve all other sections on condition that the modulus of inertia of the "truck sidemember + sub-frame" section, measured at the centre-line of the rear axle, be at least equal to the modulus which we recommend (refer to the previous page).

It is forbidden to make any butt welds on the sub-frame in the area defined **as follows:**

- from the centre-line of the rear axle up to 500 mm to the aft of the rearmost spring hanger of the rear spring, in the case of 4 x 2 and 4 x 4 vehicles.
- from the centre-line of the middle axle up to 500 mm to the aft of the centre-line of the rear axle, in the case of all other vehicles.

3.9 Fitting of specific equipment (for example : fridge, tail lift)

3.9.1 Electrical connections

Refer to the recommendations for use (chapter on "Electrical equipment" in the General Section).

The power supply cable should be in one single piece, with a cross-section calculated for a max. rating of 5 Amps per mm^2. The power supply must be protected by a fuse and controlled by a specific master switch during fitting. It is compulsory for the cables to be connected to the battery terminals. The fuse and the master switch must be located as close to the battery connection as possible (in order to keep to a minimum the length of unprotected line).

The electric power and auxiliary wiring must compulsorily be independent from that of the vehicle network.

For this, you should contact the Product Applications Department in order to obtain its permission.

In the case of conversion of an independent self-contained unit on the front end of the body, an access ladder and platform for maintenance purposes should be provided.

3.9.2 Installation of PTO's or generators with a voltage of more than 24 V

Comply with the standards in force and with the safety regulations covering installations and safety of the person (decree dated 14/11/1988). The protective earth is to be made on the equipment, and never on the vehicle structure.

3.10 Tapping on diesel fuel tank

It is forbidden to drill the tank for the installation of a tapping point.

3.11 Hitch coupling for rigid drawbar trailers

3.11.1 Fitting of an additional cross-member

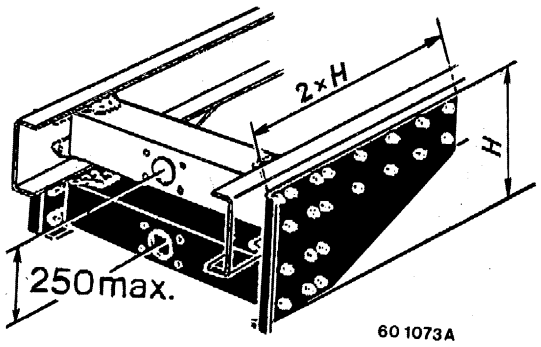
If the rear cross-member fitted is too high, there is the possibility of fitting a second cross-member underneath the other.

The fitting of this must be carried-out using reinforcement plates on the side raves of the sidemembers of the chassis. The attachment bolts of the upper cross-member are used for location of the reinforcing plates. In addition, two rows of eight bolts are to be fitted to each side which are attached to the sidemembers.

The cross-member is mounted on the reinforcement plates and has the same alignment as the cross-member used on the standard vehicle. Use all the holes in the cross-member for the attachment of this. Put in a spacer on each side to take up the space between the new cross-member and the reinforcement plate.

3.11.2 Minimum thickness of reinforcing plates

Thickness = 1.2 x thickness of the sidemember.



3.12 Fifth wheels (baseplates and couplings)

Tractor chassis are normally supplied as original equipment with **bolted angle irons.** In this case they allow for the longitudinal positioning of the baseplate for the fifth wheel on the chassis, in order to ensure **good load distribution** on the tractor axles.

The fifth wheel is located on these channels by the use of a cross-member and/or a baseplate (in certain cases the baseplate is sufficient).

The fitting of the fifth wheel must allow for the manoeuvring of a swan-necked semitrailer in accordance with the ISO Standard in force.

The bedplate and the baseplate must be independently mounted, with a **minimum strength equal to that of the attachment for the fifth wheel.**

Baseplates for each type of vehicle are available in several heights from the Spare Parts Department.

Refer to the Product Applications Department.

3.12.1 Mounting standards

Comply with the standard in force.

Kingpin 50 mm (2") dia.

The attachment of the fifth wheel to the chassis must be done using 12 bolts size **M 16**, quality class 10.9.

Kingpin 90 mm (3.5") dia.

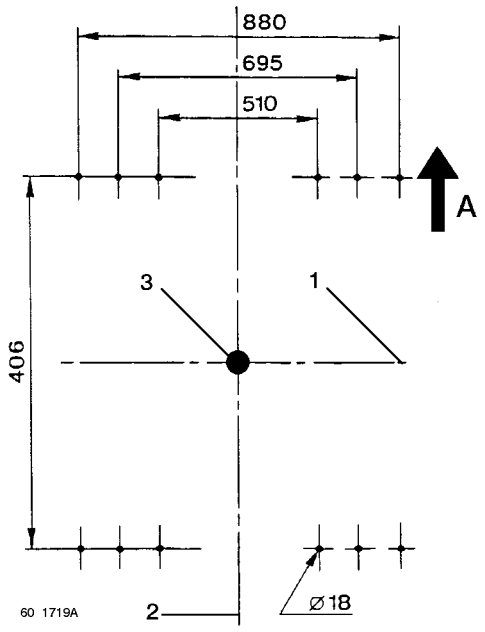
For details of the attachment of the fifth wheel, refer to the Product Applications Department or comply with the recommendations of the supplier.

These values apply equally for the attachment of the baseplate.

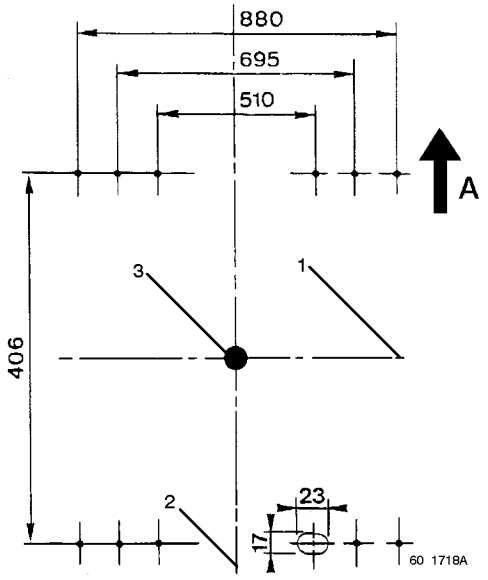
As far as swan-necked semitrailers are concerned, which are not constructed in accordance with the ISO Standard in force, the attachment of the fifth wheel must take into account the instructions given above, whilst **conforming with the capability of the tractor to manoeuvre**, i.e. it must not come into contact with parts of the chassis, such as mudguards, rear lights, registration plates, the back end of the chassis, the tyres, etc.

If the movement of the fifth wheel towards the front causes any interference of the mounts of the baseplate with those of a cross-member, you are obliged to refer to the Product Applications Department.

Drawing for drilling the baseplate for the attachment of the fifth wheel using 12 bolts Ø 16 mm (DIN Standard 74081)



Drawing for drilling the baseplate for the attachment of the fifth wheel by 12 bolts Ø 16 mm with slotted holes (Standard NF R 41-171 dated October 1986)



A - Direction of movement of vehicle
1 - Lateral axis
2 - Longitudinal axis of the tractor engine
3 - Kingpin axis

SPECIFIC FEATURES OF THE MASCOTT VEHICLE

4. PRESENTATION OF THE MASCOTT RANGE

This new range is a continuation of the MESSENGER Range with an improved level of comfort and it offers a level of facilities normally only available in a car.

It preserves the ease for fitting bodies which characterised the range it replaces.

The ease of mounting bodywork has been improved due to a chassis frame construction with straight side-members like a ladder (in HLE steel) with smooth full length flanges and the positioning of brackets is spread out along the entire length of the sidemembers.

The range offers a large choice of configurations, to meet the widest variety of requirements. The main variants are the following (depending on the equipment fitted):

Three engines:
- 2,800 cm^3 atmospherically aspirated 90 bhp,
- 2,800 cm^3 turbocharged 110 bhp,
- 2,800 cm^3 turbocharged diesel with “Common Rail” electronic injection 130 bhp.

Chassis cab
- short cab with 3 seats,
- crew cab with up to 7 seats,
- four wheelbases: 3130, 3630, 4130 and 4630 mm,
- four tonnages available: 3500, 5000, 6000 and 6500 kg GVW

Van
- two wheelbases; 3630 mm (12 m^3) and 4130 mm (14 m^3),
- available at 5500 kg GVW,
- sliding door on right and/or left hand side,
- partition behind the driver’s seat, with the body panelled or fitted with windows.

The other plus points are:

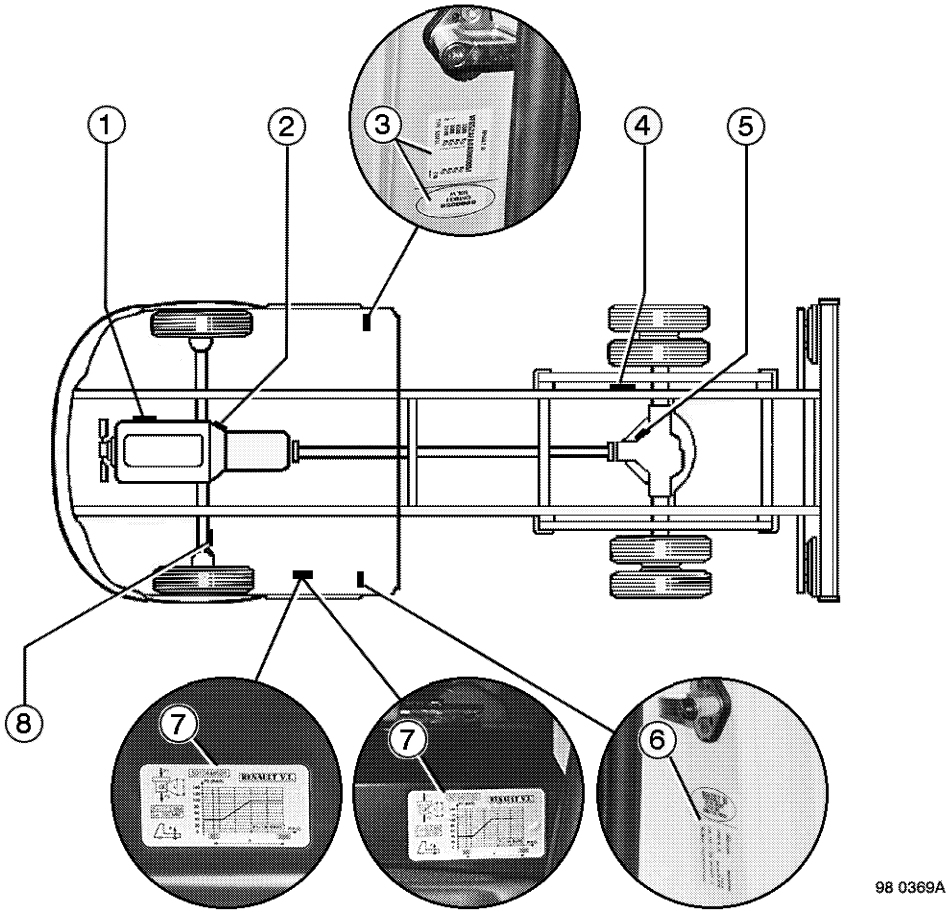
Performance
- Fitted with all round disc brakes,
- 6 speed gearbox as standard on the 130 bhp version and available as option on the 110 bhp version.

Safety and security
- Anti-theft steering lock,
- “ABS” wheel anti-lock brake system,
- Parabolic leaf springs on the front and rear suspension,
- Reinforced spring dampers,
- “Buzzer” warning signal, indicating reverse,
- Cab courtesy light.

Comfort in the cab
- air-conditioning,
- heat-insulated windscreen,
- electrically operated windows and central door locking.

Modular construction
- power supply provided for the bodybuilder,
- provision for power take-off on the gearbox and fast idle,
- provision for power take-off, pulley driven from the engine,
- predrilled sections for the reduction of the overhang,
- reduced height suspension,
- two max. overall widths available,
- high power electrical circuit with alternator and battery.

5. LAYOUT OF THE VEHICLE

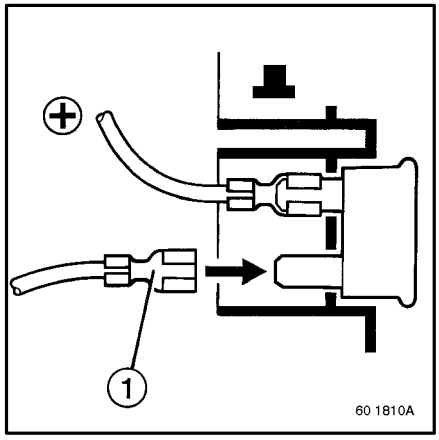


1 - engine
2 - gearbox
3 - maker's nameplate,
VIN plate,
paint reference,
4 - chassis
5 rear axle,
6 - tachograph plate (depending on the equipment),
7 - load sensing valve data plate,
8 - front axle.

Important
The identification marks must be kept visible and accessible without having to take off any part of the body-work.

6 ELECTRICS

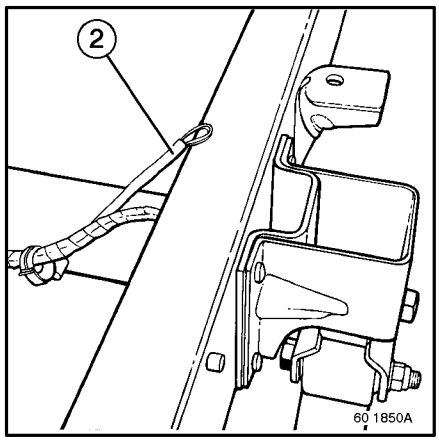
6.1 POWER SUPPLY AVAILABLE



Three options are provided for the connection of receivers to the available power supply.
- the power supply in the cab,
- the power supply in the chassis (6 way black connector).
- the power supply at the rear of the chassis for connection to position lights on bodywork.

It is also possible to run additional signalling units by connecting-up to a frailer connection plug socket on the chassis harness, provided the electrical load capacity is not exceeded

For additional information relating to the electrical wiring diagrams, refer to the Repair Manual MR 70 091, available from the RENAULT V.I. Spare Parts Department.



6.1.1 Power supplies available in the cab

The allocations for the supply available in the cab are located in the fuse compartment:
- F1: “+” battery,
- F3: “+” key-switched contact.

Total maximum rating; 10 Amps per line.

The slots for the fuses carry a current input. In order to tap into the available power, you have to:

- clip in a wire equipped with a terminal connector part N° 77 03 497 183 at the back of the fuse-relay box on the fuse output F1 or F3.
- insert into its slot a flat 10 Amp fuse part N° 77 01 997 053.

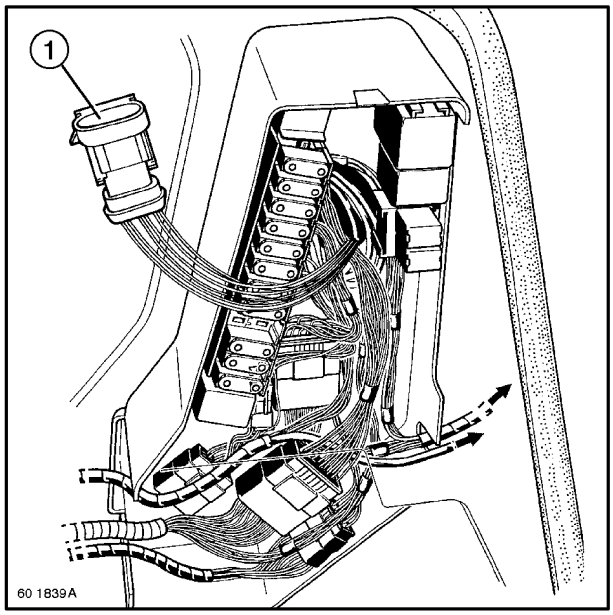
6.1.2 Power supplies available on chassis

1 - Power supply available for connecting the position lamps on the bodywork.

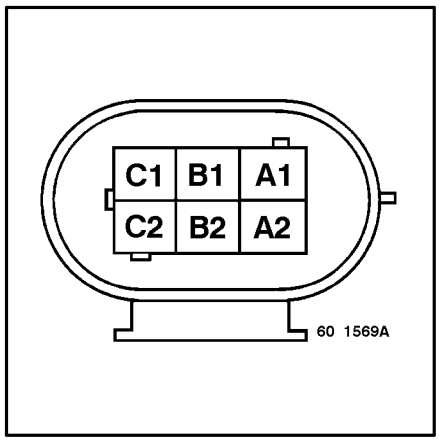
Two wires (2) have been made available in the chassis harness, to connect the position lamps on the bodywork.

Wires affected:
- blue wire: power for lamps.
- black wire: earth.

These wires are 1mm² section. They accept a maximum current of lamps. Use the sealed connectors and adaptors to make the connections.



2 - Power supply available in the engine compartment



Allocation of the terminals of the bodywork 6 way black connector in the engine terminal box:
- terminal A1: “+” battery supply available for the chassis,
- terminal A2: “+” key-switched contact for the supply available on the chassis.
- terminal C1: earth,
- terminal A2: wire N° 17, not allocated, running across the front end,
- terminal B2: wire N° 18, not allocated, running across the front end,
- terminal C2: wire N° 19, not allocated, running across the front end.

Wires 17, 18 and 19 are to be used either for:
- the installation of “an adapter kit for electrical connection on the chassis” (refer to the next pages)
- or installations (i.e. for control, information, etc.) which need a wire to be run across the front end.

In the cab, the wires N° 17, 18 and 19, having a length of about 20 cm, are contained in the wire strands of the harness, next to the seal between the harness and the front end.

In order to connect-up to the 6 way connector in the engine compartment, you should use:
- a 6 way female connector - part N° 77 03 197 259,
- terminal connectors - part N° 50 00 812 492.

Ensure the fluidtight sealing of the harness by using a heat-shrinkable sheath sleeve. Heat the sheath with hot air from a blowtorch so as to make it shrink. The use of a tool with a flame is forbidden.

Safety protection for the power supplies available

Fuse F3: “+” key-switched contact for power supply available in the cab
Fuse F1: “+” battery power supply available in the cab
Fuse F25: “+” key-switched contact for power supply available on the chassis
Fuse F21: “+” battery power supply available on the chassis.

Max. permitted rating: 10 Amps per line.

Connection of signal light units at the rear to the chassis harness

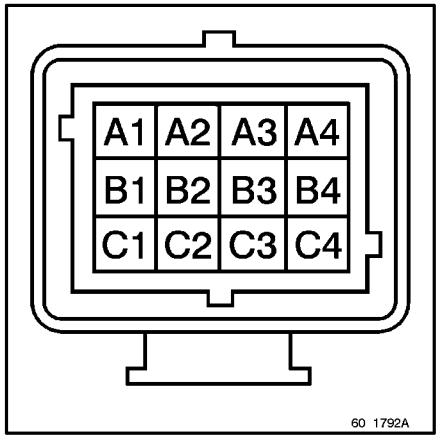
For the connection of signal light units at the back of the chassis, the installer can make an electrical tapping on the chassis harness. This tapping can be made either by:
- connecting up to the connector for the trailer harness in the absence of a trailer unit,
- making branch circuits off the chassis harness or on the trailer plug socket harness.

Important
Connect up to the “trailer harness” connector of the chassis harness a connector fitted with its own harness. Use wire with a 2 mm^2 cross-section.

Ensure that the harness is fluidtight by using a heat-shrinkable sheath sleeve. Heat the sheath with hot air from a hot air heat gun so as to make it shrink. The use of a flame is forbidden.

Supplies can be obtained from the Spare Parts Department, RENAULT V.I.
- Connector part N° 77 03 197 816
- Terminal connectors part N° 50 00 812 493.

Allocation of the connector terminals on the chassis harness and the fuse rating for each line.
- terminal A1: LH trailer side marker lamp (F27 - 7.5 Amps)
- terminal A2: RH trailer side marker lamp (F24 - 7.5 Amps)
- terminal A3: earth
- terminal B1: LH trailer direction indicator lamp (F42 - 15 Amps)
- terminal B2: RH trailer direction indicator lamp (F42 - 15 Amps)
- terminal B3:
- terminal C1: trailer stop lamp (F13 - 10 Amps)
- terminal C2: trailer fog light (F11 - 7.5 Amps)



Branch circuits on the chassis harness or the trailer plug socket harness

If the vehicle is equipped with a tow bar with signal lighting equipment, branch circuits can be taken off these lines to supply the additional lighting units by putting in a junction box on the chassis harness, in which the branch circuits can be made up.

This box must be fluidtight and firmly attached to the chassis.

Important

Before connecting up additional signal lighting, check that the fitting will not cause an overcurrent (check the fuse rating for each line). **It is strictly forbidden to change the rating of the fuses.**

6.1.3 Adapter kit for chassis electrical connection

The MASCOTT vehicle is designed in advance to accept a bodybuilder's adapter kit part N° 50 01 850 529, as supplied by the RENAULT V.I. Spare Parts Department.

Use of this kit allows the quick and simple fitting of an electrical installation, controlled by switches located in their original housings on the vehicle instrument panel.

The use of this kit has the advantage of making use of the vehicles original harness for the wire run across the front of the cab, improving the ease and quality of the fitting by the elimination of problems of routing and sealing between the chassis and the cab.

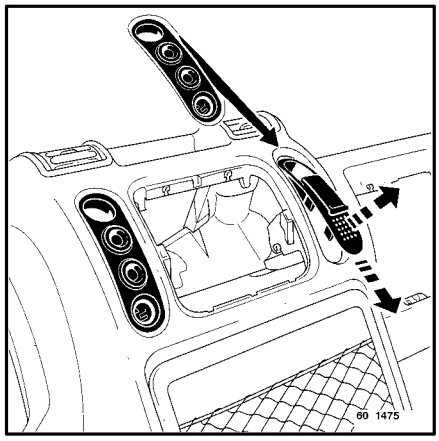
This installation is designed to accept a maximum current rating of 10 Amps. For a higher current level, on the chassis side wire up an electrical installation with a relay whose power circuit must be linked up to the battery terminals and protected by a fuse.

Important

The power supply for the kit is made safe by power supply fuses which are available in the cab (F1 and F3). The maximum authorised rating for these fuses is 10 Amps. In the case of connection of receivers in the cab and of the kit in parallel, you must calculate the level of total current passing through these fuses and check that it is less than 10 Amps. If the total current is greater, you must put in an electrical installation on the chassis side with relays, whose power circuit must be connected up to the battery terminals and protected by a fuse. Changing the rating of fuses is not allowed.

Contents of the kit

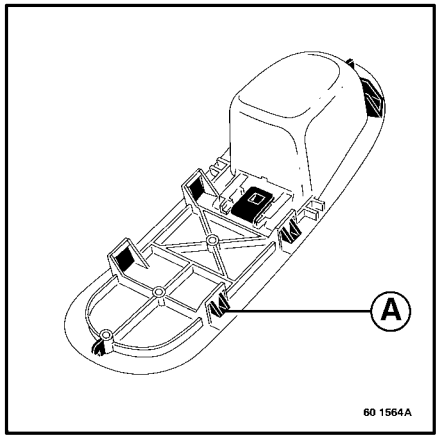
- 2 electric switches with built-in pilot lights
- 1 switch bracket
- 1 electrical harness
- 1 off 6 way male connector and
- 2 off 6 way female connectors
- terminal connectors for 2 mm^2 cross-section wire
- 1 heat-shrinkable sheath sleeve
- 5 glued sleeves
- 2 off 10 Amp fuses.



Installation of adapter kit for chassis electrical connection

Warning

Before any work is carried out on the electrical circuit, disconnect the battery starting with the earth terminal.
The bodybuilder's adapter kit must not be modified in any way.
The maximum current accepted by the kit is 10 Amps.



Inside the cab

Switch bracket

Take out the ash tray and the heater control panel.

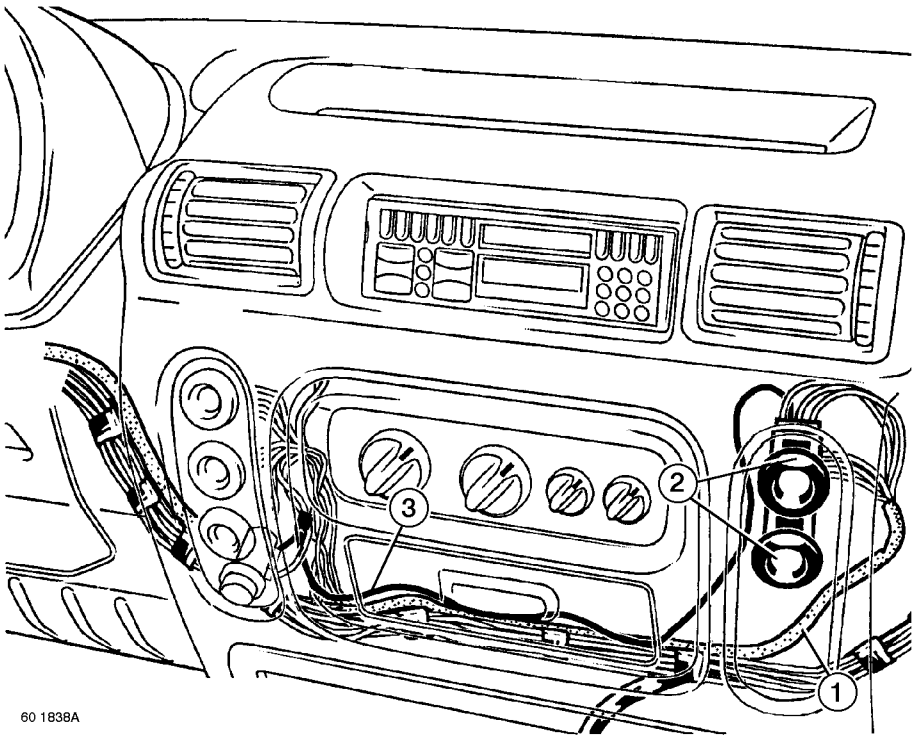
Take out the blanking plates fitted in the slots provided for the switches. If no slot is available, replace the notepad bracket with the bracket for the switches.

Take off the notepad bracket. Push in the lugs (A) and free the bottom part of the bracket. Pull the bracket downward to extract it.

Connect up the kit harness to the two switches. Route the harness on round until it reaches the fuse-relay box. Fix the harness in position using the nylon collars on the fixed units.

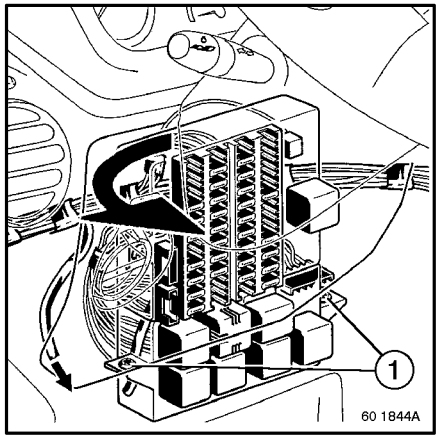
Take off the switch bracket holding the cigar lighter. Disconnect the lamp wire for the cigar lighter (blue wire).

Connect the blue wire in the kit to the lamp wire and the cigar lighter.



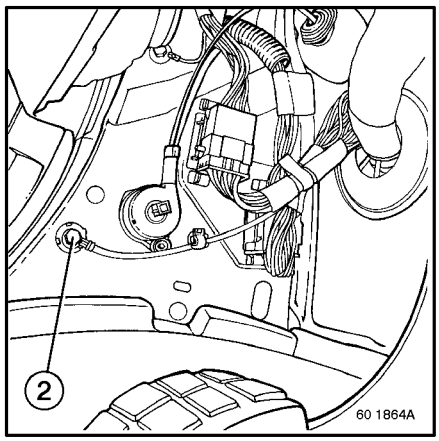
Take out the location screw of the fuse-relay box by turning it. Clip the red wire into the slot provided for housing the fuse F1.

Clip the yellow wire into the slot provided for housing fuse F3



NOTE
The fuses F1 and F3 do not carry power on all vehicles (check the voltage at the terminals for the fuses F1 and F3).
In order to lay on power to fuses F1 and F3, refer to the method described in the paragraphs entitled “Power supplies available in the cab”.

Connect the black wires of the harness to the earth for the cab ( ).

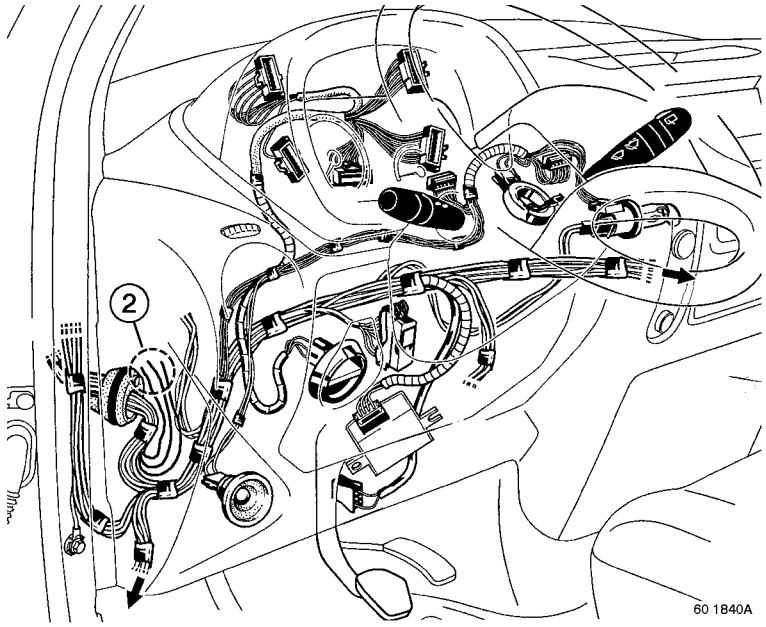


Fit the terminal connectors onto the three wires running across the front plane and clip them into the male 6 way connector
- wire N° 17 into socket A1,
- wire N° 18 into socket B1.

Wire N° 19 can be connected to the 6 way connector, in the case that an additional electrical line is needed.

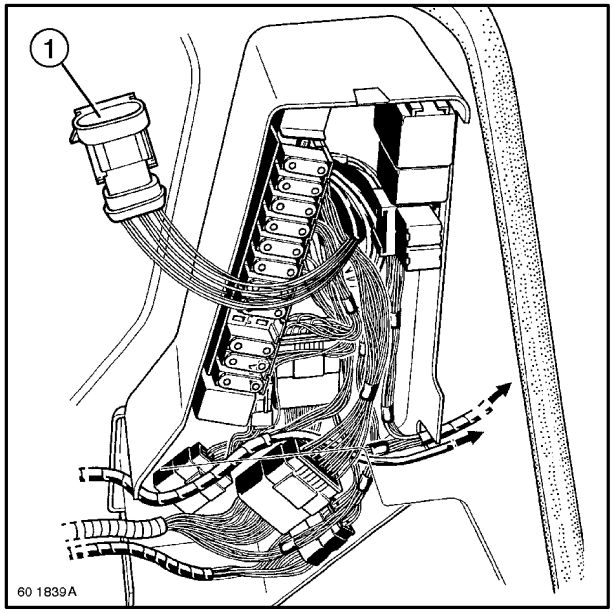
Connect the wires of the kit harness to the female 6 way connector:
- green wire to terminal A1,
- maroon wire to terminal B1.

Connect together the two 6 way connectors and attach them to the vehicle harness.



On the chassis

Make up the harness for fitting to the 6 way connector (1) inside the engine junction box.

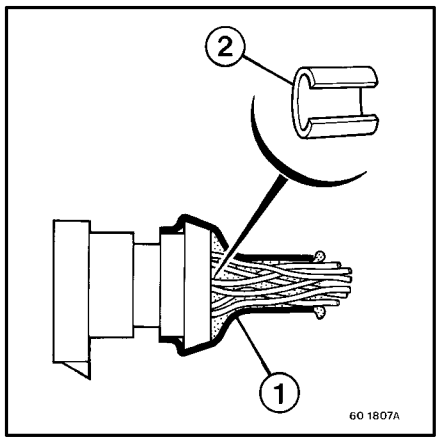


Use the 6 way connector, the terminal connectors, the heat-shrinkable sheath sleeve and the glued sleeves supplied in the kit.

Connect the equipment up to the relevant wires.

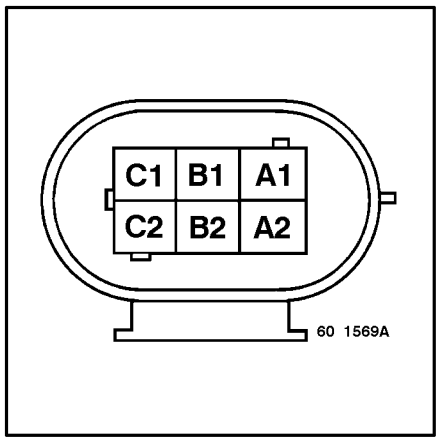
These wires must have a cross-section of 2 mm^2, and be protected by a fluidtight sheath for their entire length.

Use electric wire and sheaths which can withstand a temperature of 120° C.



The allocation of the terminals of the 6 way connector in the engine junction box are:

A1 - Power supply "+" battery
B1 - Power supply "+" key-switched contact
C1 - Earth
A2 - Switch output "+" battery (wire N° 17).
B2 - Switch output "+" key-switched contact (wire N° 18)
C2 - Unused wire crossing the front plane (wire N° 19)



In the case of receivers consuming a power rating greater than 10 Amps, relays should be fitted protected by fuses.

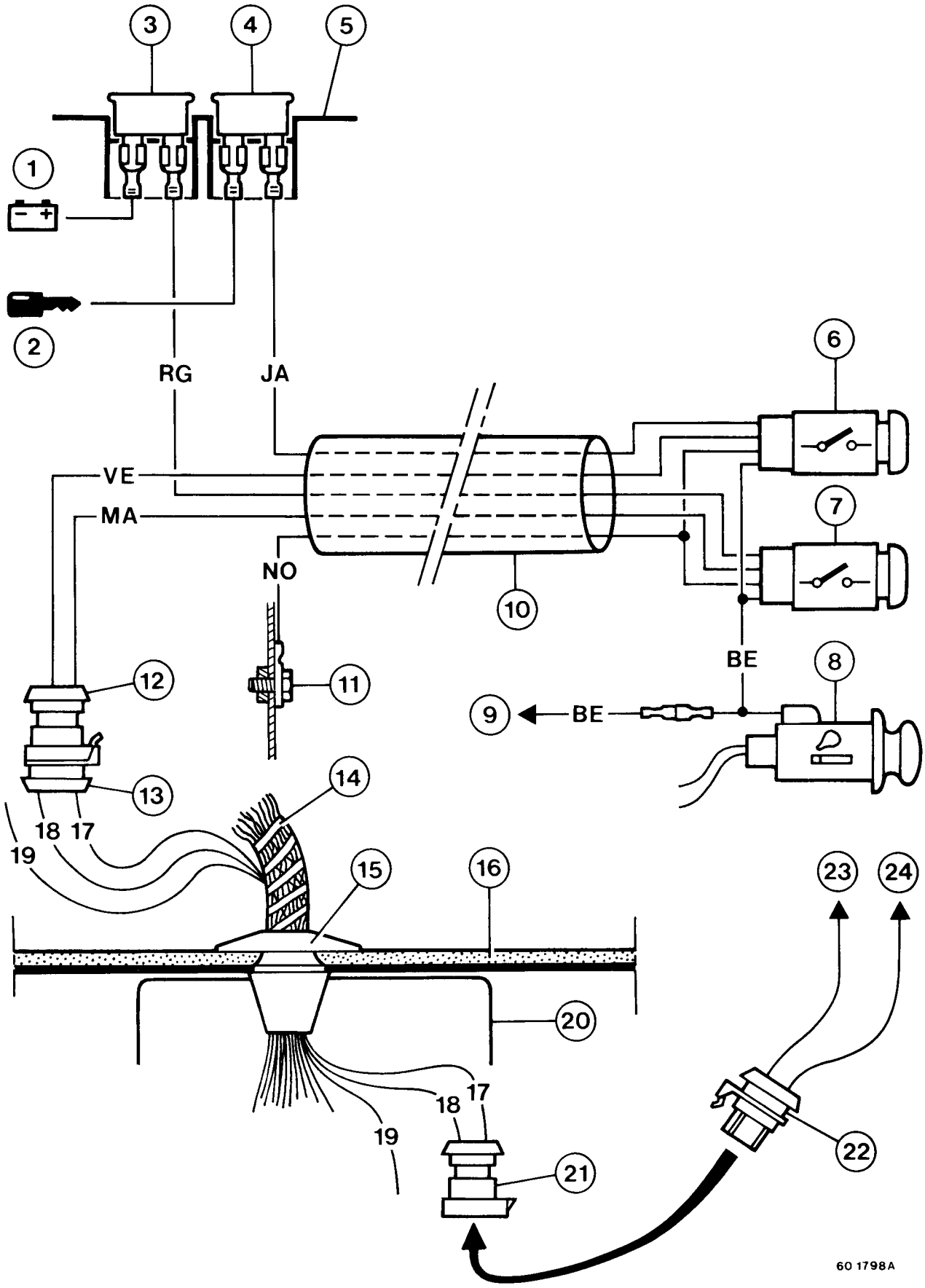
The additional harness on the body must follow the routing for the chassis harness of the vehicle. Secure the harness using a nylon collar.

Make certain that the harness is not subject to any stress.
If necessary, drill holes in lower members to ensure water drainage from the harness.

The kit will allow other electrical fittings than those described above (i.e. a control circuit by closure of the earths, for example).

These types of mounting are authorised so long as they comply with the recommendations for fitting, the connecting up of the maximum power rating given above and if they are carried out in accordance with the state of the art.

Block diagram



Key to the block diagram

1 - Battery feed
2 - Switched feed
3 - Fuse F1
4 - Fuse F3
5 - Fuse relay box
6 - Switch N°1
7 - Switch N°2
8 - Cigar lighter
9 - Cigar lighter illumination feed
10 - Harness protector
11 - Cab earth
12 - 6 way male connector
13 - 6 way female connector
14 - Cab harness
15 - Watertight grommet
16 - Cab surface
17 - Wire N°17
18 - Wire N°18
19 - Wire N°19
20 - Motor Connection Box
21 - 6 way connector female on vehicle harness
22 - 6 way connector male on equipment harness
23 - Towards equipment N°1
23 - Towards equipment N°2

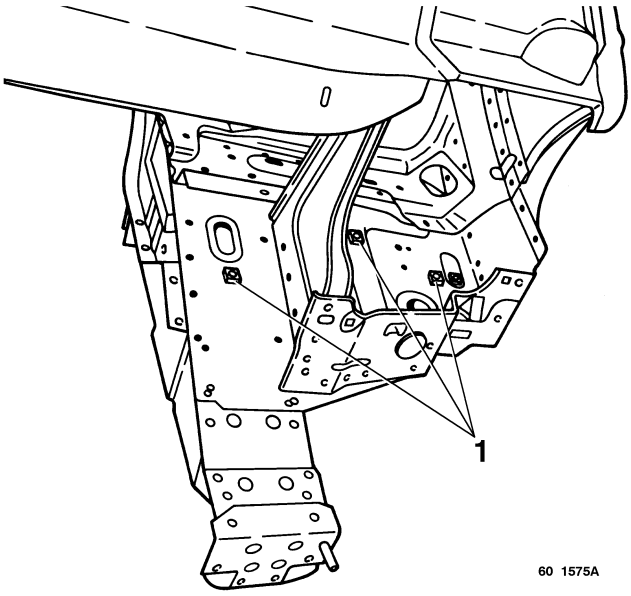
Harness kit wire colors

BE - blue
JA - yellow
MA - maroon
NO - black
RG - red
VE - green

6.2 Earths

6.2.1 Earths in the cab

Earths provided in the cab: welded nut (1) to be tapped into the sidemember and on the wheel arch in the engine compartment.



Attachment of terminal connector or earth braid

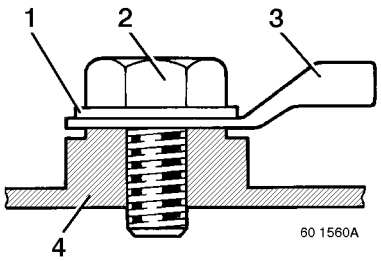
The earth terminal connector can be connected:
- to the main earth for the cab (RH wheel arch in the engine compartment),
- to the point provided (wheel arch in the engine compartment).

Attachment of terminal connector or earth braid at prearranged points

- Tap the bore with a diameter of 8 x 1.25 mm.
- Scratch away the paintwork on the bearing surface.
- Ensure that protection against corrosion is provided by using a zinc based aerosol spray.

1.- Flat stainless steel washer Ø8.
2 - M8 stainless steel screw.
3 - Flat terminal connector or earth braid.
4 - Provided in advance (welded nut) on the vehicle.

Tightening torque of the screw (2): 9 ± 1 Nm.

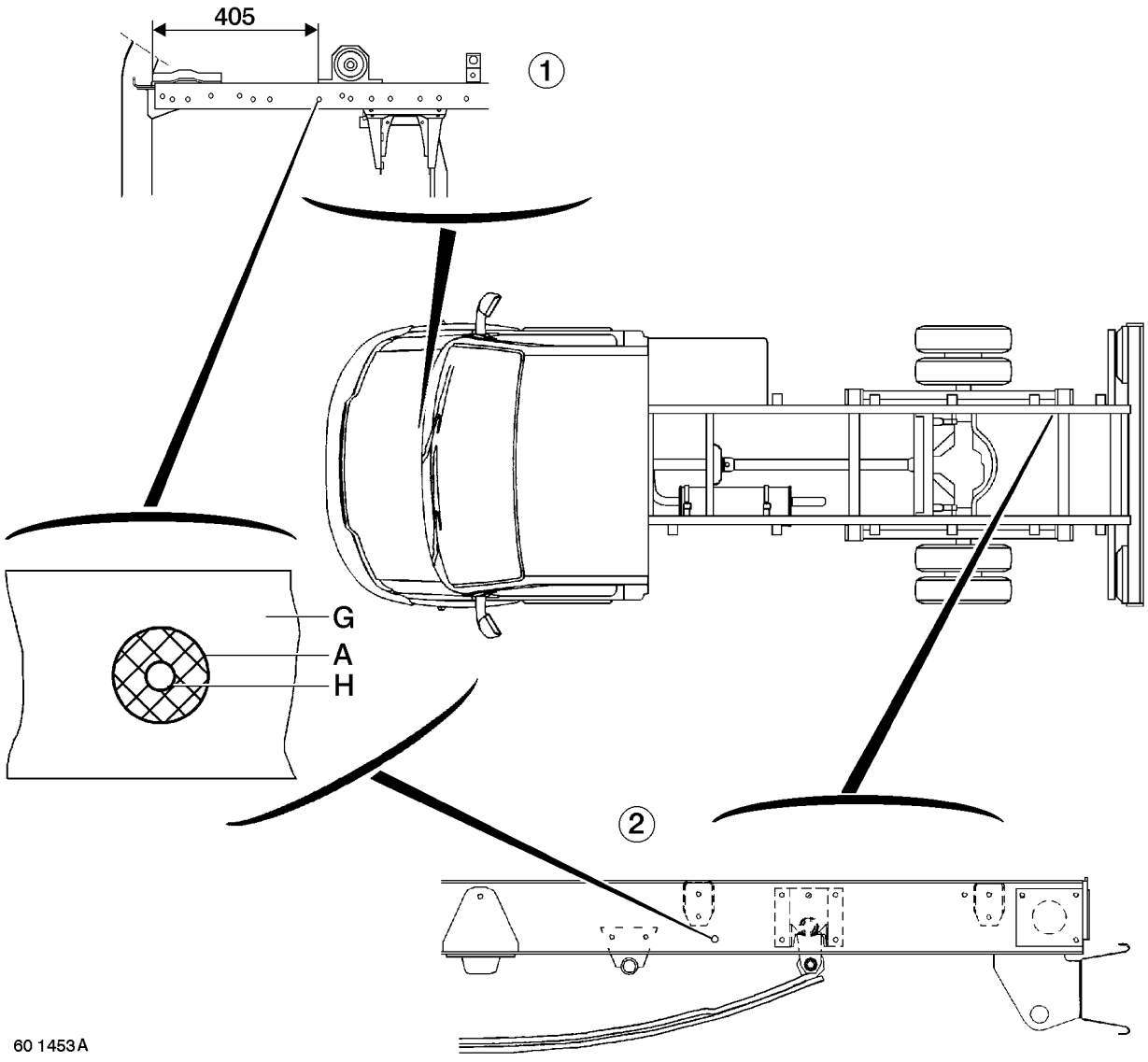


Zinc based aerosol spray (available from the Spare Parts Department part N° 77 01 406 425)

6.2.2 Earths on the chassis

Location of the earth points

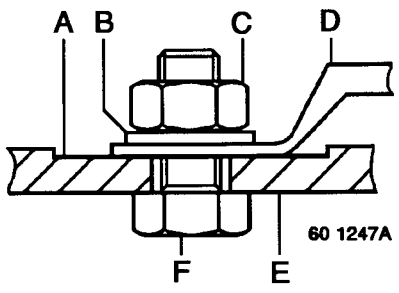
1 - Battery earth on the sidemember (on the opposite side to the steering).
2 - Earth at the back on the web of the LH sidemember (distance in relation to the spring hanger).



Attachment to the earth points

A - Surface area filed bright Ø45 mm, cleaned up and covered with protective zinc coating.
B - Flat stainless steel washer Ø10.
C - Stainless steel nut H 10 x 150.
D - Terminal connector or wire braid.
E - Sidemember.
F - Stainless steel screw H 10 x 150
G - Painted sidemember
H - Anchorage hole Ø11 mm for electric earths.

Tightening torque: 45 Nm ± 20%



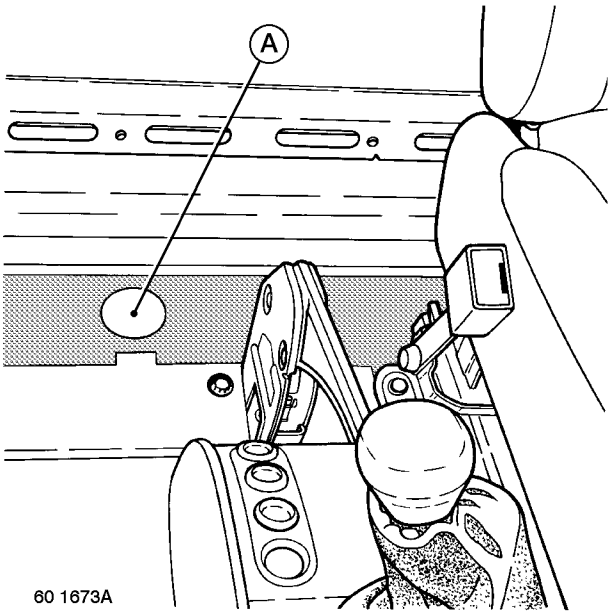
6.3 Routing of the electrical harness into the cab

In order to make the connection between the inside and the outside of the cab, there are two possible routes which can be used. Any routing other than those described in this document are forbidden.

6.3.1 Routing to the rear of the cab (short cab only)

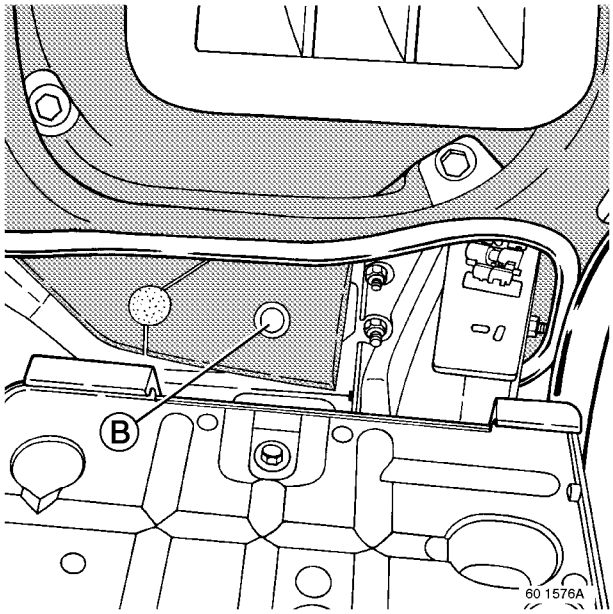
In a circular cut-out in the soundproofing screen on the floor, a laterally centred mark indicates the point to drill, which is 80 mm from the rear end.

At point (A), drill a hole with a maximum diameter of 50 mm for the routing of the harness.
Debur the hole after drilling and ensure that it is protected against corrosion by using a zinc based aerosol spray.
Make certain it is fluidtight by use of a grommet and a fluidtight seal.



6.3.2 Routing to the front of the cab (all vehicles)

Where the steering column passes through the bulkhead on the opposite side to that of the steering:
Take off the battery, if necessary, and take out the floor carpet from the cab.
In the engine compartment, drill a hole in the centre of the orifice marked (B) in the soundproofing screen.
Deburr the hole after drilling and ensure that it is protected against corrosion by using a zinc based aerosol spray.
Pass the harness through the front end and the soundproofing screen.
Make certain it is fluidtight by use of a grommet and a fluidtight seal.

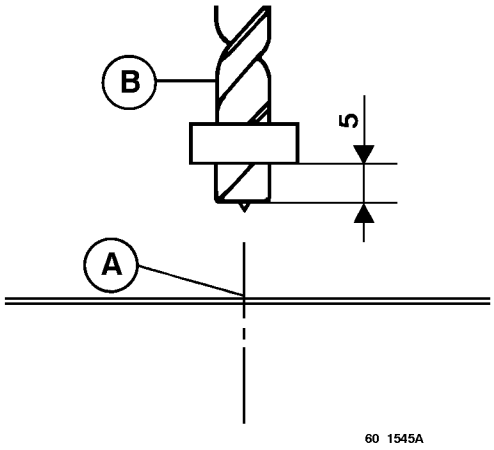


7 GENERAL RULES TO BE OBSERVED WHEN FITTING BODYWORK

7.1 General principles of drilling

7.1.1 Drilling of bodywork members for the fitting of accessories

This makes possible the use of crimping nuts for fitting accessories.
The recommendations set out below ensure the avoidance of any damage to the internal fitments during drilling.



A - Roof
B - Flat ground drill fitted with stop: Ø 9.2 for a crimping nut Ø 6 mm
Ø 11.2 for a crimping nut Ø 8 mm

For details on the tooling and the crimping nuts, refer to chapter entitled “Addition of equipment to the bodywork”

Method

Use a drill with a stop fitted onto it to drill the roof:
Depth to be drilled: 5 mm maximum for the attachment of a crimping nut.

Protection against corrosion
Deburr the holes after drilling.
Ensure that it is protected against corrosion by using a zinc based aerosol spray (available from the Spare Parts Department part N° 77 01 406 425)

7.1.2 Drilling of the sidemembers

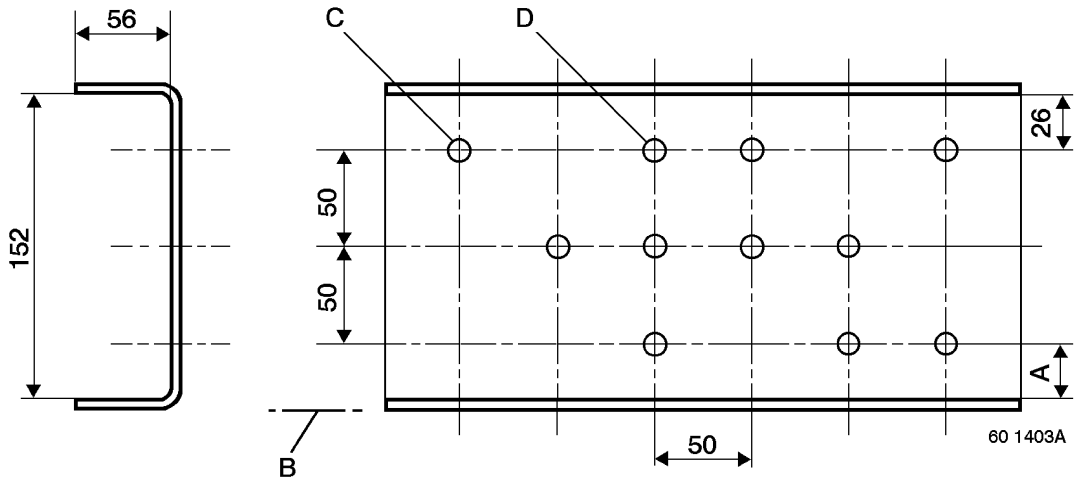
IMPORTANT
The **drilling** the flanges of our side members is **completely forbidden**. It is **compulsory for all drilling to be carried out only in the web of the sidemembers,** complying with the positions allowed which are indicated below.

The **maximum diameter of drilling is 11 mm** for the whole range of MASCOTT chassis.

Positions for drilling

It is forbidden to drill more than three holes on the same vertical axis.

Drilling of the web on the sidemembers



A - Basic dimension (A = 26 mm),
B - Zero line on the chassis,
C - Diameter for drilling, 11 mm recommended,
D - Alignment of max. 3 holes on the same vertical axis.

Protection against corrosion
Deburr the holes after drilling.
Ensure that it is protected against corrosion by using a zinc based aerosol spray (available from the Spare Parts Department part N° 77 01 406 425)

7.2 STEEL GRADES FOR SIDEMEMBERS

Table of classes of steel

MASCOTT Range of Vehicles EXTRA (W = wheelbase)	Section side-members	Class of Steel			
		C	D	E	F
Van = 5.5 tonnes GVW	152x56x5	X			
Chassis cab ≤ 5 tonnes GVW (W < 4630)	152x56x4	X			
Chassis cab (W = 4630)	152x56x5	X			
Chassis cab > 5 tonnes GVW	152x56x5	X			

GVW = Gross Vehicle Weight

7.3 Reinforcement, extension, reduction of sidemembers

7.3.1 Modification of the length of the chassis electrical harness

You are recommended not to modify the harnesses of the vehicle. The harnesses are equipped with coils which allow for an increase in length of about 20 cm. However, if for a vital reason the length of the harness has to be increased, make up an electrical extension equipped with sealed connectors at each end.
The modified harnesses must be correctly attached and follow the original routing for the vehicle.
Welding on the harness is not permitted.
The extended harnesses and their connectors must be perfectly fluidtight. Ensure that there are droops on the harness, if necessary, to drain off the water.

Supplies
- connector part N° 77 03 197 407,
- snap-on terminal connectors part N° 50 00 812 492,
- 1 connector part N° 77 03 197 816,
- snap-on terminal connectors part N° 50 00 812 493,
- heat-shrinkable sheath sleeve part N° 77 03 397 007,
- glued sleeves part N° 77 03 397 036.

7.3.2 Modification of the brake lines

Welding or extension connections to the brake lines are forbidden. In the case of modification of a brake line, replace the original pipe run with a one-piece pipe that has the same specifications (i.e. inside diameter, quality of steel, type of connection, point of attachment, etc.). The carrying-out of this conversion is the sole responsibility of the bodybuilder.

7.3.3 Modification of the rear overhang

If the bodywork or the equipment mounted does not alter the weight specification and the dimensions of the chassis, recorded in the description sheet, the vehicle can be presented to the Type Approval Department without any action needing to be taken by RENAULT V.I. (within the permitted limits in force).

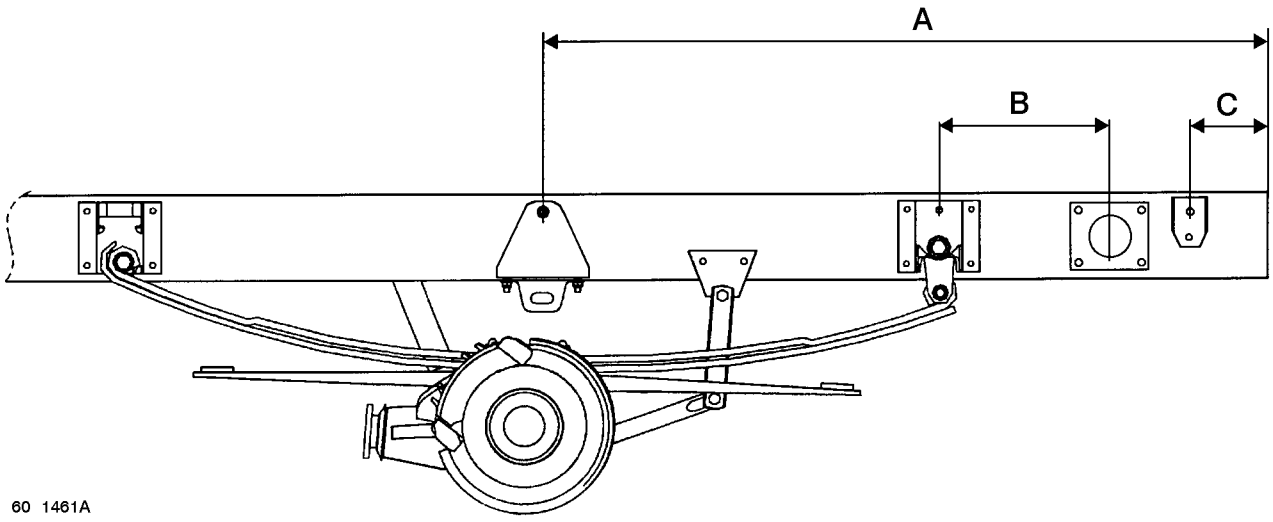
- Welding reinforcements are required for drawbar rigids or if the extension is longer than 400 mm for the solo rigid, examples: drawbar rigids, tail lifts, handling cranes at the back of the chassis, tippers, etc.
- An extension of the rear overhang will also be required when the back of the bodywork extends more than 286 mm from the rear of the run-under bar.
- Limiting values for the rear overhang:
  Minimum: 830 mm
  Maximum; refer to the 1/20 scale bodywork drawing and determine by calculation the maximum overhang, depending on the maximum bodywork dimension that can be fitted and the position of the run-under bar.

As far as the welding is concerned, comply with the recommendations described in the chapter entitled “Extension, reduction of side members in the wheelbase”.

Intermediate cross-members

If, after an extension:

2050 < A < 2550 mm:
The chassis has to be equipped with a cross-member behind the rear spring hanger cross-member.
Distance (B) may not exceed 980 mm.



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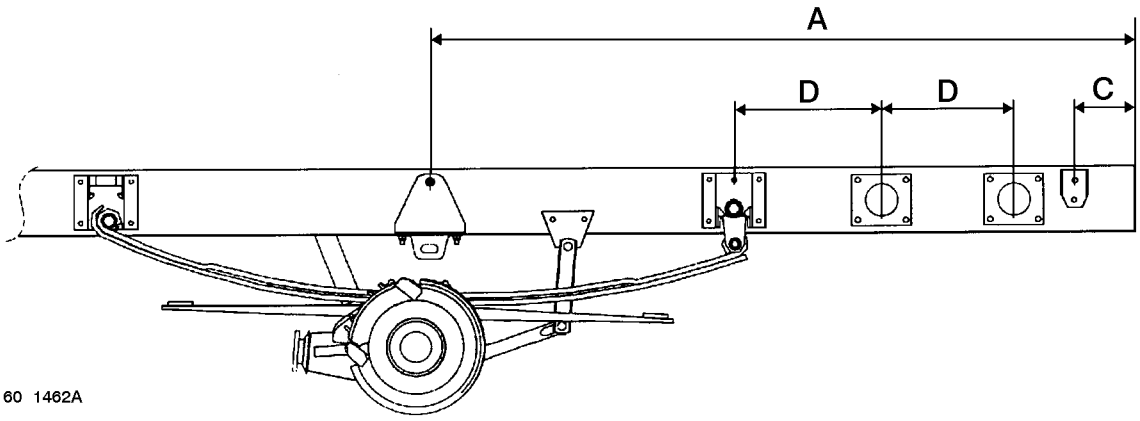
A > 2550 mm:
The chassis must be equipped with two cross-members at a pitch (D) at a maximum of 740 mm from the rear spring hanger cross-member.



NOTE:
Chassis:
- having a wheelbase of 4130 mm and rear overhang of 1780 mm,
- having a wheelbase of 3630 mm, and a rear overhang of 1200 and 1380,
have been supplied with a provision for a reduction of the rear overhang to 830 mm.
The sidemembers have holes punched in them for the repositioning of chassis items without needing any conversion (i.e. light brackets, run-under bar protection, brackets, etc.).

The distance (C) between the last bracket and the back end of the sidemember must be less than 225 mm. If necessary, a towing cross-member must be installed in addition to intermediate cross-members (refer to the chapter entitled “Rear cross-member and drawbar cross-member”.

Supplies:
- 1 or 2 cross-members part N° 50 10 382 622,
- 8 collar screws HM 10 x 125 x 30 - Class 10.9 per cross-member,
- 8 nuts DRH M 10 x 125 - Class 10 per cross-member,
- 8 flat washers 10 x 22 x 3 for use with the nuts.

As far as the nut and bolt hardware is concerned, refer to the chapter entitled “Nuts and bolts, tightening torque for parts in steel and cast iron”.
The use of locknuts with a nylon ring (for example - Nyloc® Nylstop) is forbidden.

7.4 Rear crossmember and drawbar crossmember

7.4.1 Stiffening of the chassis

In the case that the vehicle is not supplied with drawbar equipment, it is vital to fit a rear cross-member when the rear of the sidemembers is subjected to heavy stresses.

Examples: Tail lifts, tipper chassis, breakdown vehicles, etc.

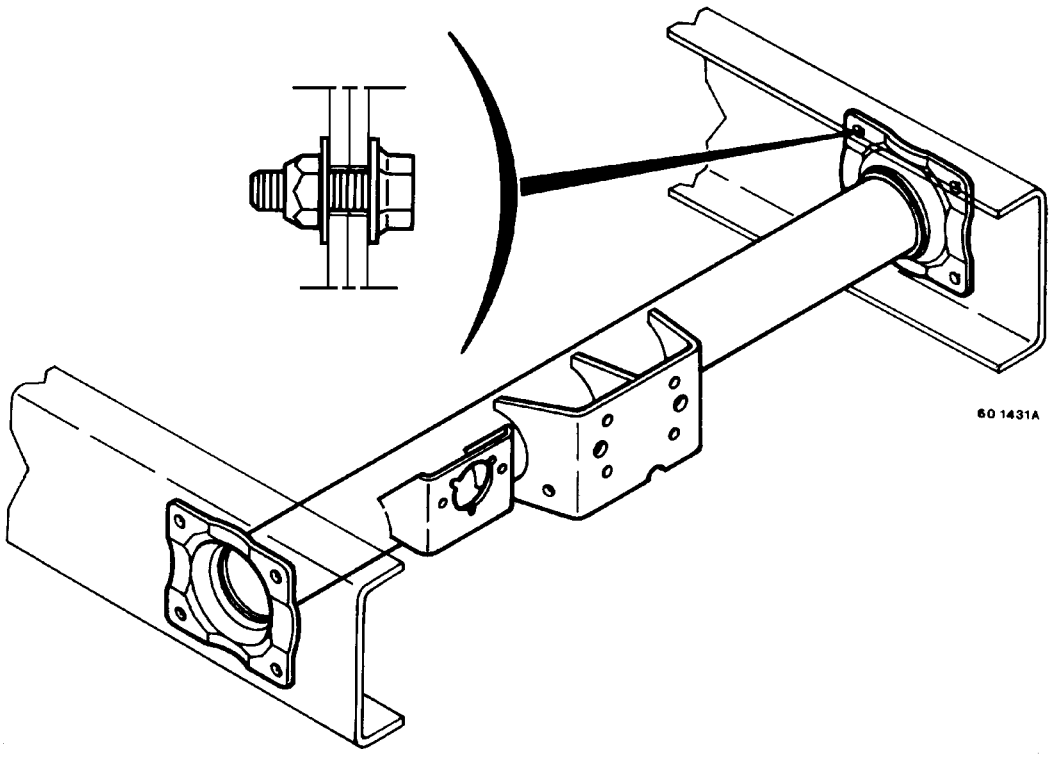
The rear crossmember can either be a drawbar crossmember, or an intermediate crossmember. It should be positioned as close to the area of application of the stress.

7.4.2 Drawbar cross-member

Optional for vehicles delivered without a drawbar hook.

Maximum frailer weight to be pulled: 3,000 kg.

A drawbar crossmember (attachment by 12 bolts instead of 8) is specified for vehicles having a GVW of at least 5.5 tonnes, a wheelbase of 3630 mm, and a rear overhang of 830 mm.



7.4.3 Supplies required

A - For all vehicles except those mentioned under (B) below:
- 1 drawbar crossmember part N° 50 10 382 626 or intermediate crossmember part N° 50 10 382 622,
- 8 collar screws HM 10 x 125 x 30 - Class 10.9,
- 8 nuts DRH M 10 x 125 - Class 10,
- 8 flat washers 10 x 22 x 3 for use with the nuts.

B - For vehicles with a wheelbase of 3630 mm, and rear overhang of 830 mm and a GVW greater than 5.5 tonnes:
- 1 drawbar crossmember part N° 50 10 382 627 or intermediate crossmember part N° 50 10 382 623,
- 12 collar screws HM 10 x 125 x 40 - Class 10.9,
- 12 nuts DRH M 10 x 125 - Class 10,
- 12 flat washers 10 x 22 x 3 for use with the nuts.
- Tow hook and ball part N° 50 10 236 734.

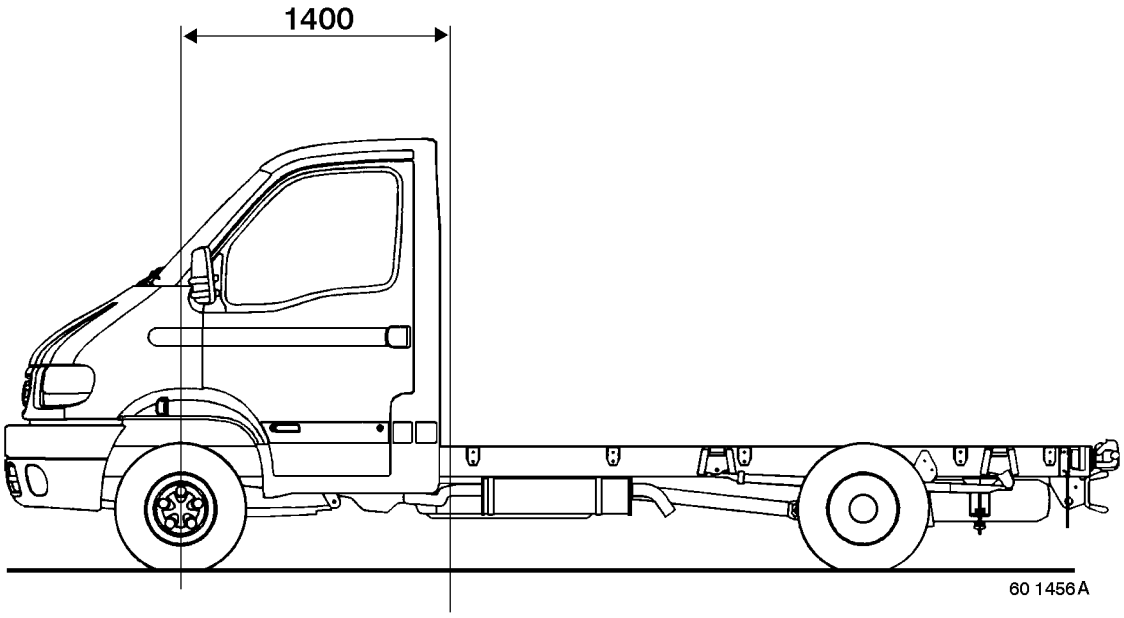
As far as the nut and bolt hardware is concerned, refer to the chapter entitled “Nuts and bolts, tightening torque for parts in steel and cast iron”.

The use of locknuts with a nylon ring (for example - Nyloc® Nylstop) is forbidden.

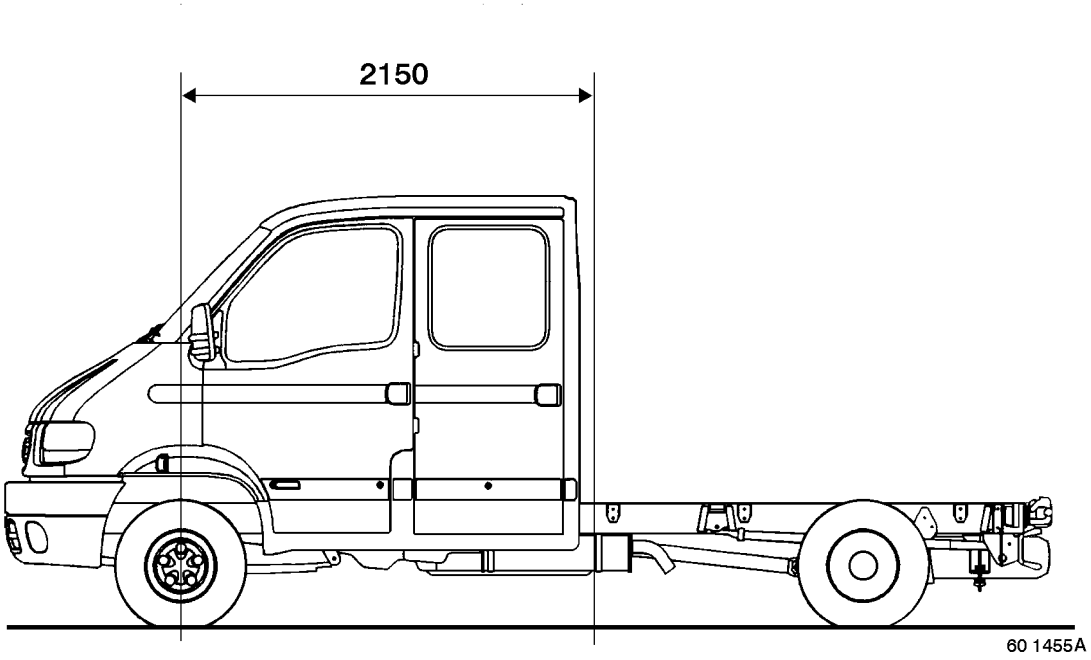
7.5 Sub-frame

7.5.1 Dimensions to front of bodywork

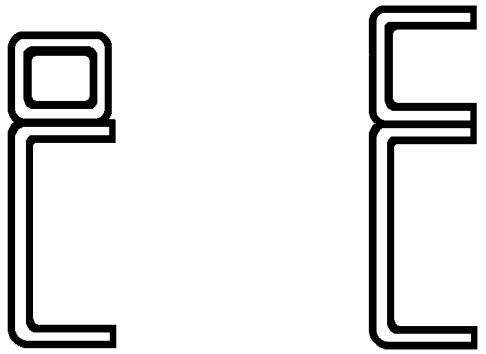
Short cab



Crew cab



7.5.2 Sections used for the sub-frame



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GVW	SECTION	SUB-FRAME MIN. in mm	INERTIA (I) MIN. in mm^4
Up to 5 tonnes	"U"	80 x 40 x 3	430 000
Over 5 tonnes		100 x 50 x 4	1 100 000

The sub-frame can be made of different steel sections, provided that its inertia remains the same for that of the sub-frame which is the minimum recommended.

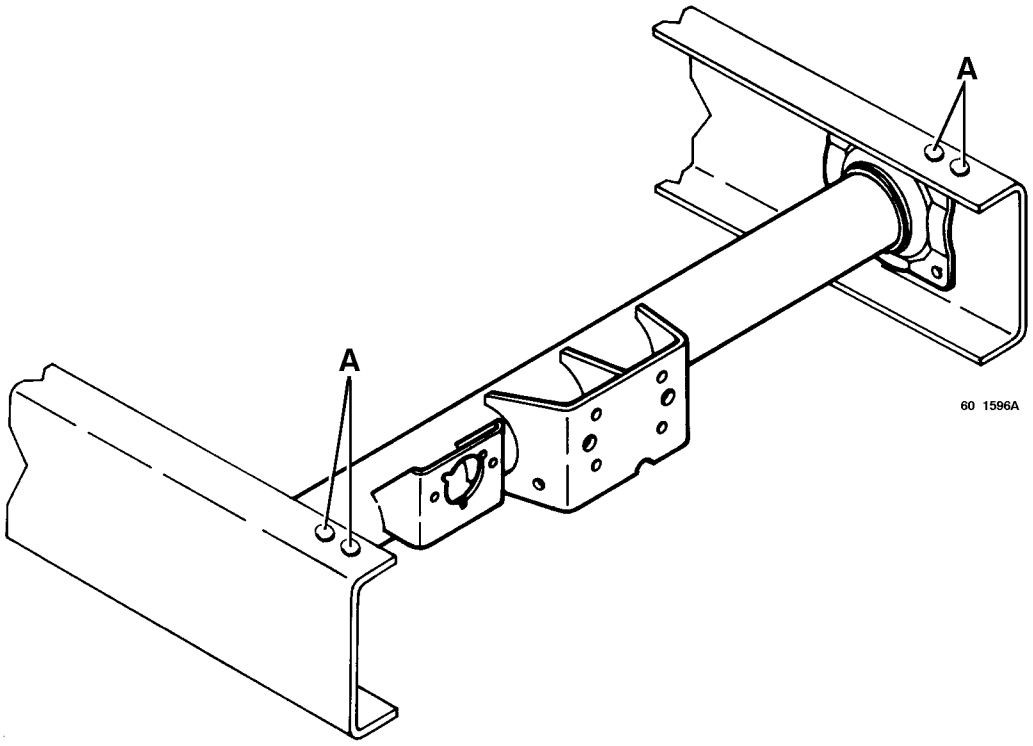
7.6 Attachment of bodywork

The specifications below are to be complied with in full for the attachment of bodywork or equipment on our vehicles:
(For special cases, you should contact our Product Applications Department).

7.6.1 Inertia stop

All bodywork or equipment must be fitted with an inertia stop at the back of each sidemember, in order to secure the bodywork.
It can be done by:

- Attachment to the sub-frame to the chassis by Ø10 mm bolts through the drilled holes provided (A) which are located on the upper flanges at the rear tip of the sidemembers.
- Attachment with screws of side mounted guide plates by means of Ø10 mm bolts (refer to the chapter entitled “Side guides” below). Comply with the recommendations described in the chapter entitled “Drilling of the sidemembers).

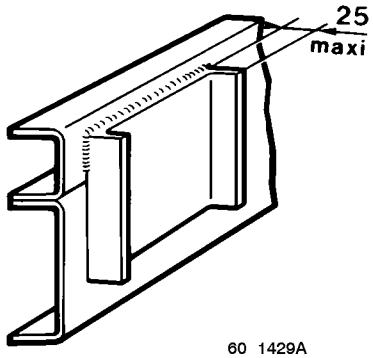


Attachment of the sub-frame at A:
4 screws type HM 10 x 125 Class 10.9,
4 nuts type DRH M 10 x 125 Class 10,
8 washers 10 x 22 x 3.
The use of locknuts with a nylon ring (for example - Nyloc® Nylstop) is forbidden.

7.6.2 Side guides

Lateral guidance must be provided:

- **at the front:** by two guides (guidance per plate).



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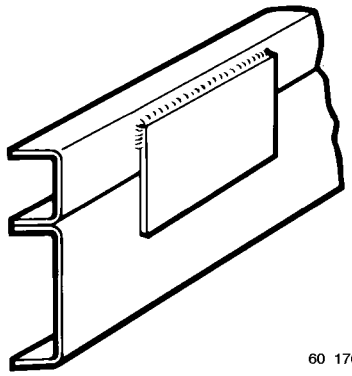
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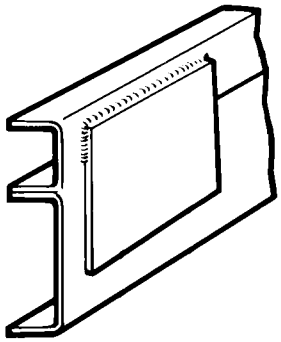
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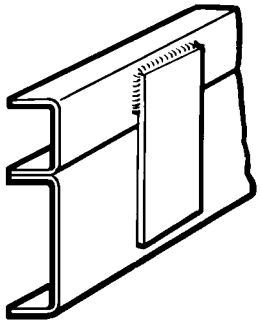
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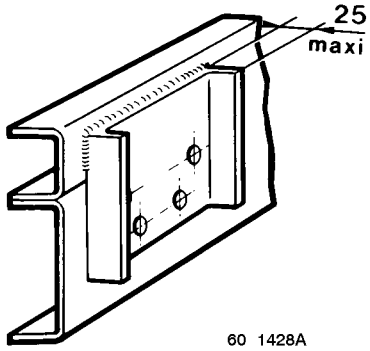
- **at the rear:** by means of two guides. They are to be drilled and held by screws onto the sidemembers, if they also fulfil the function of being an inertia stop.

For the positioning of the drillings on the guides, comply with the recommendations for drilling the sidemembers described in the chapter entitled “Drilling of the sidemembers”.

X (mm)	Y (mm)	Z (mm)
30	50	45

A: Height of the stiffener plate, min. 3/4 of the height (h) of the sidemember.
B: Height of the stiffener plate, min. 1/4 of the height (h) of the sidemember.



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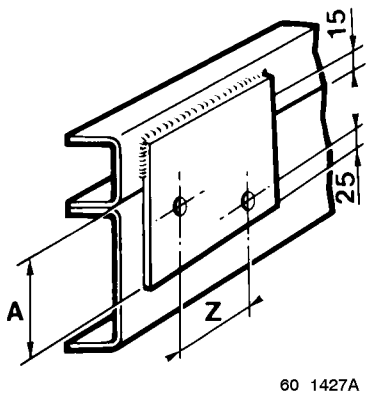

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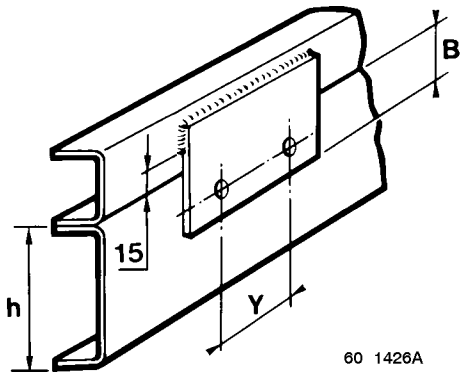

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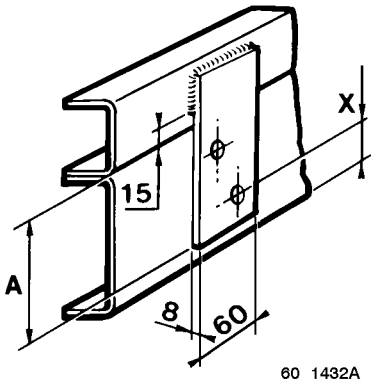

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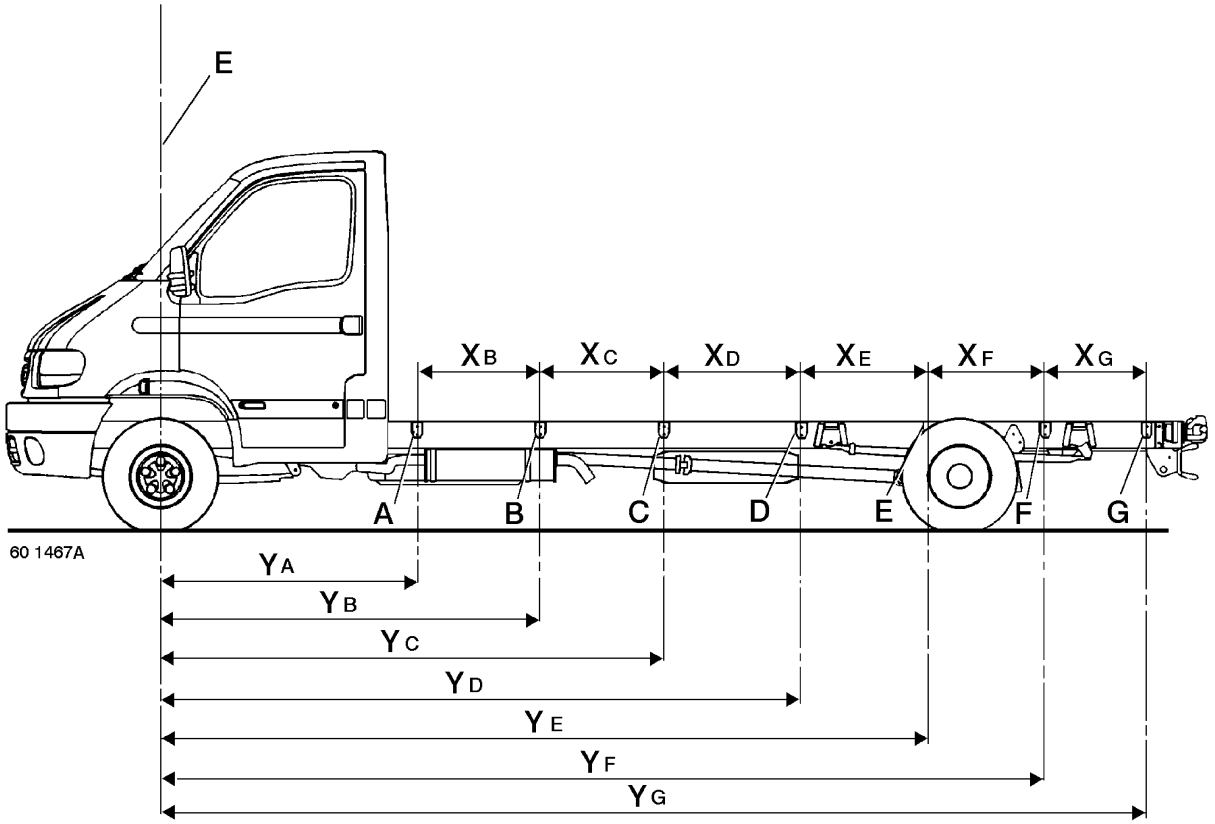
7.6.3 Positioning of brackets



NOTE
The bracket (A) is the first bracket behind the cab. Brackets located under the cab are not taken into account (i.e. the case with crew cabs).

Table indicating the positioning of brackets:
- The distance (Xn) between the bracket (n) and the front axle.
- The distance between centres (Yn) of the bracket (n) and the preceding bracket (the (Yn) values are given in brackets))

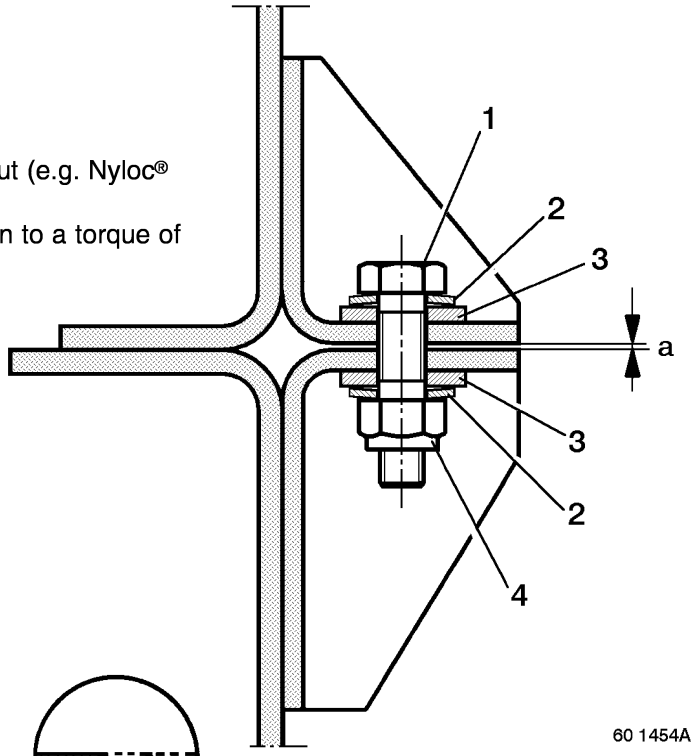
Positions of the brackets								
Type of cab	Wheelbase	Brackets						
		A	B	C	D	E	F	G
Short cab	3130	1550	2500 (950)	3250 (750)	4000 (750)	–	–	–
	3630	1550	2300 (750)	3000 (700)	3550 (550)	4145 (595)	4800 (655)	–
	4130	1550	2300 (750)	2880 (580)	3500 (620)	4250 (750)	5000 (750)	5700 (700)
	4630	1550	2300 (750)	3060 (760)	3710 (650)	4460 (750)	5110 (650)	5760 (650)
Deep cab	3630	2300	3000 (700)	3550 (550)	4145 (595)	–	–	–
	4130	2300	2880 (580)	3500 (620)	4250 (750)	5000 (750)	5700 (700)	–
	4630	2300	3060 (760)	3710 (650)	4460 (750)	5110 (650)	5760 (650)	–

7.6.4 Attachment of the bodywork with brackets

- **It is compulsory to use standard brackets on the chassis.**
- Attachments to the sub-frame or underbody of the bodywork must be secured by rigid mountings.

Rigid mounting

1 - Screws type HM 12 x 125 x 50, class 10.9
2 - 2 cone washers 12 x 30 x 3.2
3 - 2 flat washers 12 x 32 x 2.5
4 - Nuts type DRH M 12, Class 10,
or other locknut, with the exception of nylon locknut (e.g. Nyloc® Nylstop),
a - 1 to 2 mm before tightening and then finally tighten to a torque of 100 Nm.



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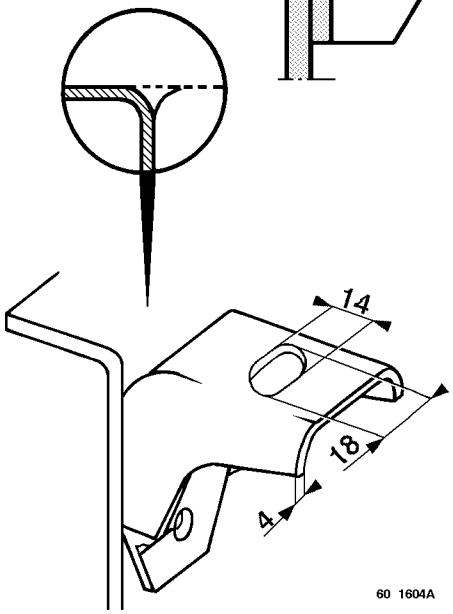
The brackets are aligned flush with the sidemembers



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Supplies required:

Use the kit named “Nut and bolt fitment hardware for a sub-frame mounted on brackets”, part N° 50 01 849 606 (available from the Spare Parts Department, RENAULT V.I.)

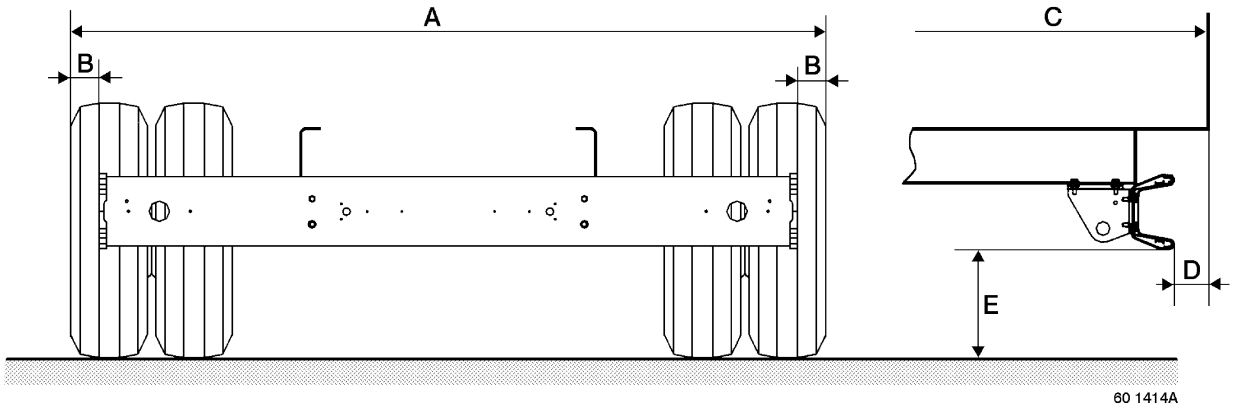
8 SPECIFIC EQUIPMENT FEATURES

8.1 Moving of items of equipment

8.1.1 Rear underrun guard

Dimensions B, D and E must be complied with.

A - Overall width of axle,
B - Projection of the tyre in relation to the rear underrun guard,
C - Overall projecting tip at the back of the vehicle,
D - Projection of the bodywork in relation to the rear underrun guard,
E - Max. unladen height of the rear underrun guard.



8.1.2 Side guards

The bodybuilder must, if necessary, equip the vehicle with side guards to comply with the standards of the regulations in force.

8.1.3 Side mounted rear-view mirrors

Two types of rear-view mirrors are available, which make available two overall body widths (2200 mm or 2300 mm). They are interchangeable. Depending upon the vehicles, they can be heated and the adjustment remotely controlled.

8.2 FITTING AND PROTECTION OF THE EXHAUST SYSTEM

There are three types of fitting available:
- an atmospherically aspirated engine with catalytic converter,
- a turbocharged engine with catalytic converter,
- a turbocharged engine without catalytic converter.

8.2.1 Description of fitting

Exhaust system at the exit from the engine

A: Connection of the exhaust system to the engine
Kit for fitting available from the Spare Parts Department, part N° 50 01 849 388.
Contents:
- 2 screws (1),
- 2 collar rings (2),
- 1 exhaust system ball joint (3),
- 2 insulation washers (4),
- 2 cup washers (5),
- 2 dished thrust collars (6),
- 2 copper nuts (7).

In the atmospherically aspirated version, the exhaust system contains the catalytic converter.

B: Connection of the exhaust system to the catalytic converter or the connecting tube and attachment to the gearbox cross-member.
- 70 mm stirrup clamp (8) part N° 00 00 681 810,
- mounting plate assembly part N° 50 10 435 405,
- elastic anti-vibration mount (10) part N° 50 00 750 531,
- mounting plate (11) part N° 50 10 435 145,
- tightening torque: 9 Nm.

C: Flexible pipe
- J: offset of shear maximum (J < 3 mm),
- α : the maximum angle of flexion (α < 3 degrees).

Catalytic converter (depending upon the equipment):
The catalytic converter must be mounted vertically (tolerance ± 10 degrees).

D: Connection with the connecting tube
- clamp plate (12) part N° 50 10 435 025,
- stirrup clamp (13) part N° 00 00 681 810,
- tightening torque: 9 Nm.

Connecting tube
E: Connection with the exhaust silencer
- band clamp (14) 62 mm diameter part N° 50 10 317 401
- tightening torque: 9 Nm

Exhaust silencer
F: Mounting on the chassis:
- 2 brackets (15) part N° 50 10 435 106,
- 2 mounting plates (16) part N° 50 10 435 250,
- 2 elastic anti-vibration mounts (17) part N° 50 00 750 497,
- band clamp 67 mm (18) part N° 50 10 317 402.

8.2.2 Recommendations for fitting:

Should the other fitting method (A) be used, replace it by using kit part N° 50 01 849 388.

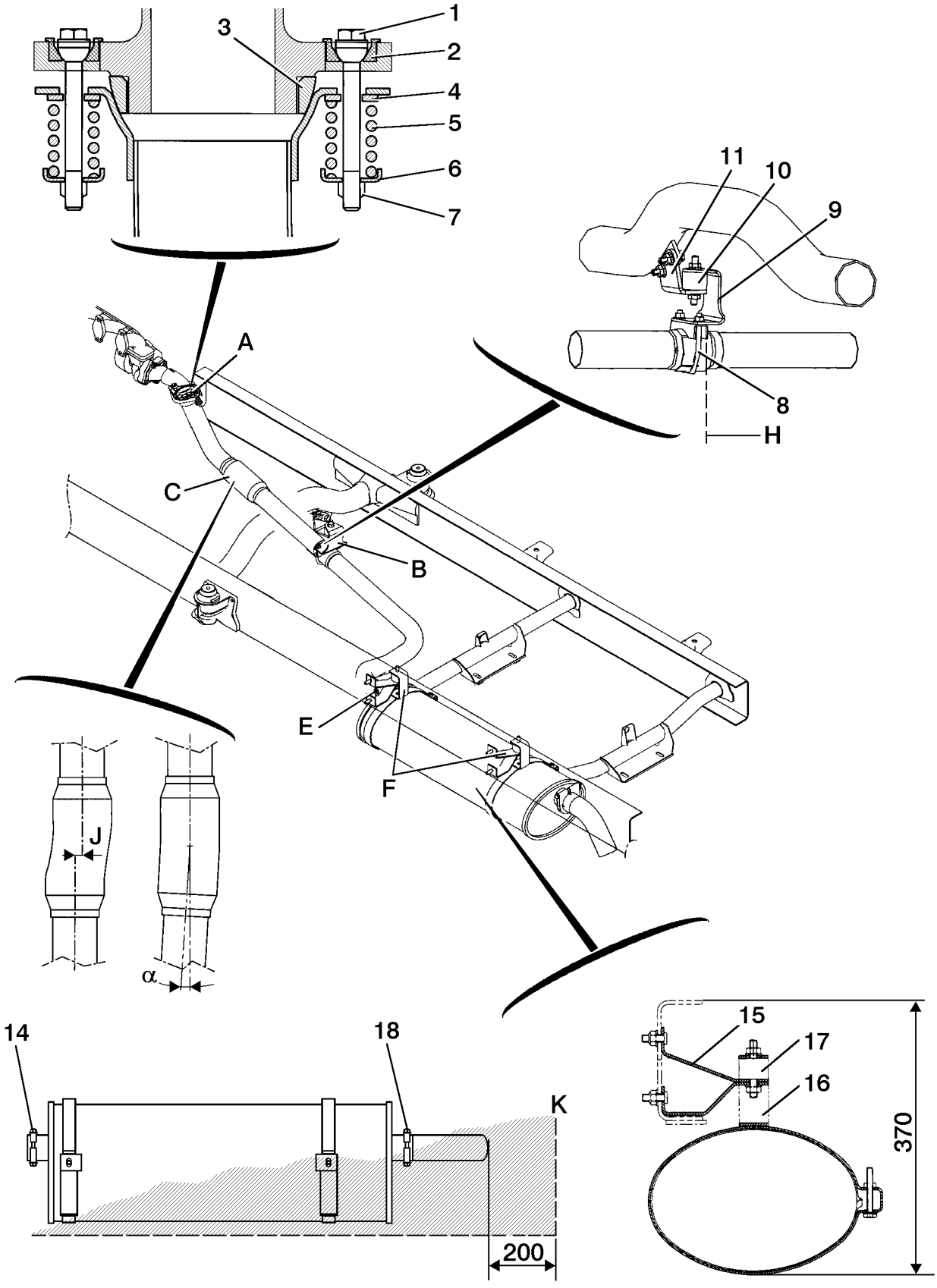
- It is forbidden to modify the position and method of mounting (B).
- Do not stress the flexible pipe during fitting or maintenance. Mounting of the flexible pipe using prestressing (i.e. twisting, pulling or shearing) leads to premature wear and reduction in service life of the exhaust system.
- Tighten the collar(s) (13 - 14) only after having finally located in final position the complete system (stirrup clamp (8) is pretightened).
- The harnesses, tubes, piping, and cables located less than 200 mm from the exhaust system must be protected against any degradation or risk of fire linked with the release of heat.
- Fix the exhausts silencer rigidly in position. The original mounting is strongly recommended.

- **For a vehicle equipped with a catalytic converter**
  It is forbidden to modify the exhaust system as far as the rear tip (G) of the catalytic converter.
- **For a vehicle not equipped with a catalytic converter**
  It is forbidden to modify the exhaust system as far as the rear tip (H) of the exhaust system from the exit from the engine.

8.2.3 Protection against heat radiation

Area to be protected against leaks and discharges of the product being transported (K):

- Width: at least equal to that of the width of the chassis.
- Length: from the rear support brackets of the cab right up to the line (K).



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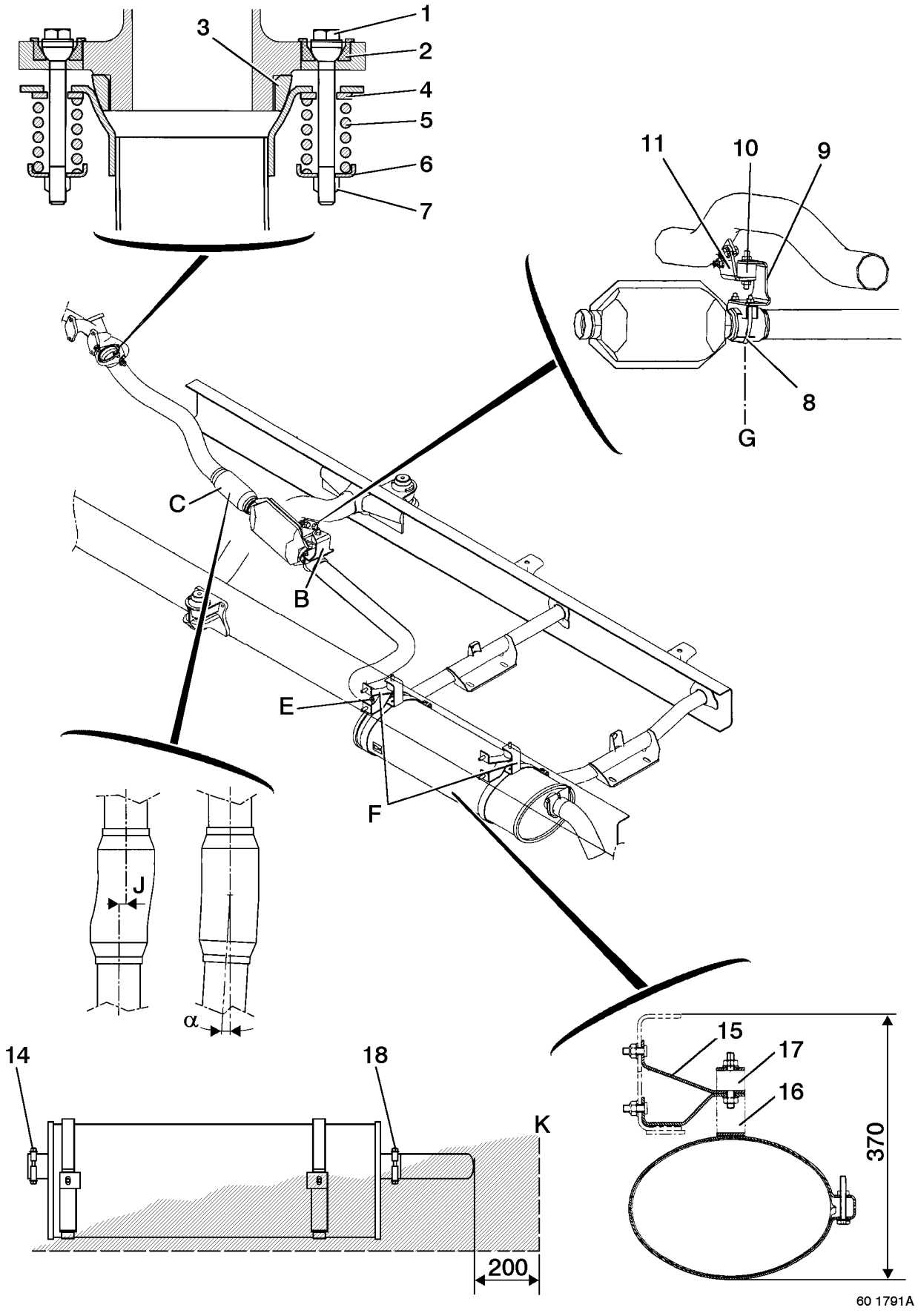
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2
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G
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C
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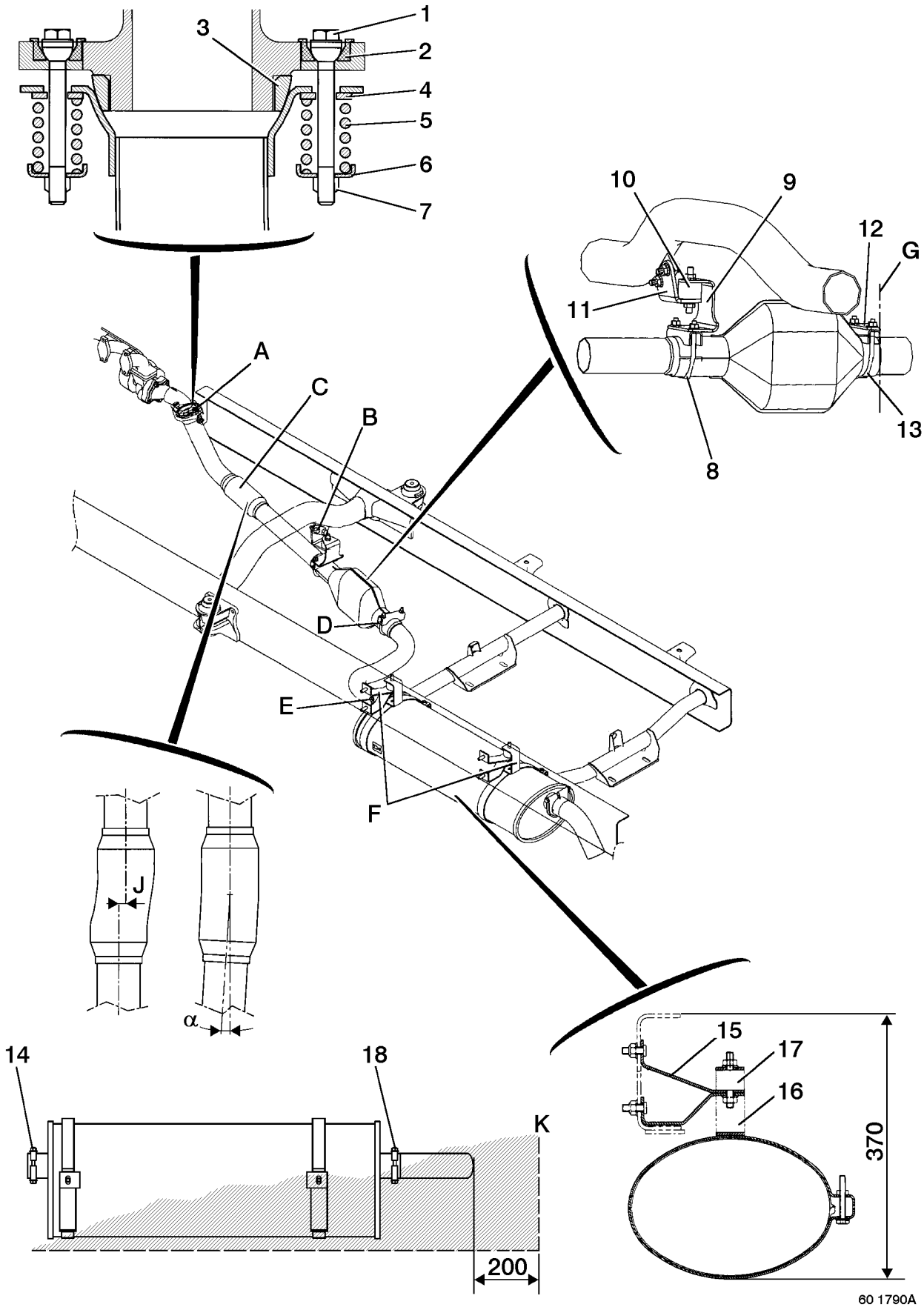
J
α
14
18
K
200
15
16
17
370
60 1791A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α
14
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16
17
18
K
200
370
60 1790A

8.3 Roof cut-outs

8.3.1 Method

Take out the ceiling light.

Take off the interior lining for the roof.

Take out the ceiling light unit bracket.

Insulate the connectors of the ceiling light harness and attach them to the roof cross-member.

After having done the cut-out, debur and protect it against corrosion, by using a zinc based aerosol spray (available from the Spare Parts Department part N° 77 01 406 425)

8.3.2 Maximum area of roof cut-out

The maximum area for making a cut-out (D) in the roof of the cab (1) is limited by:

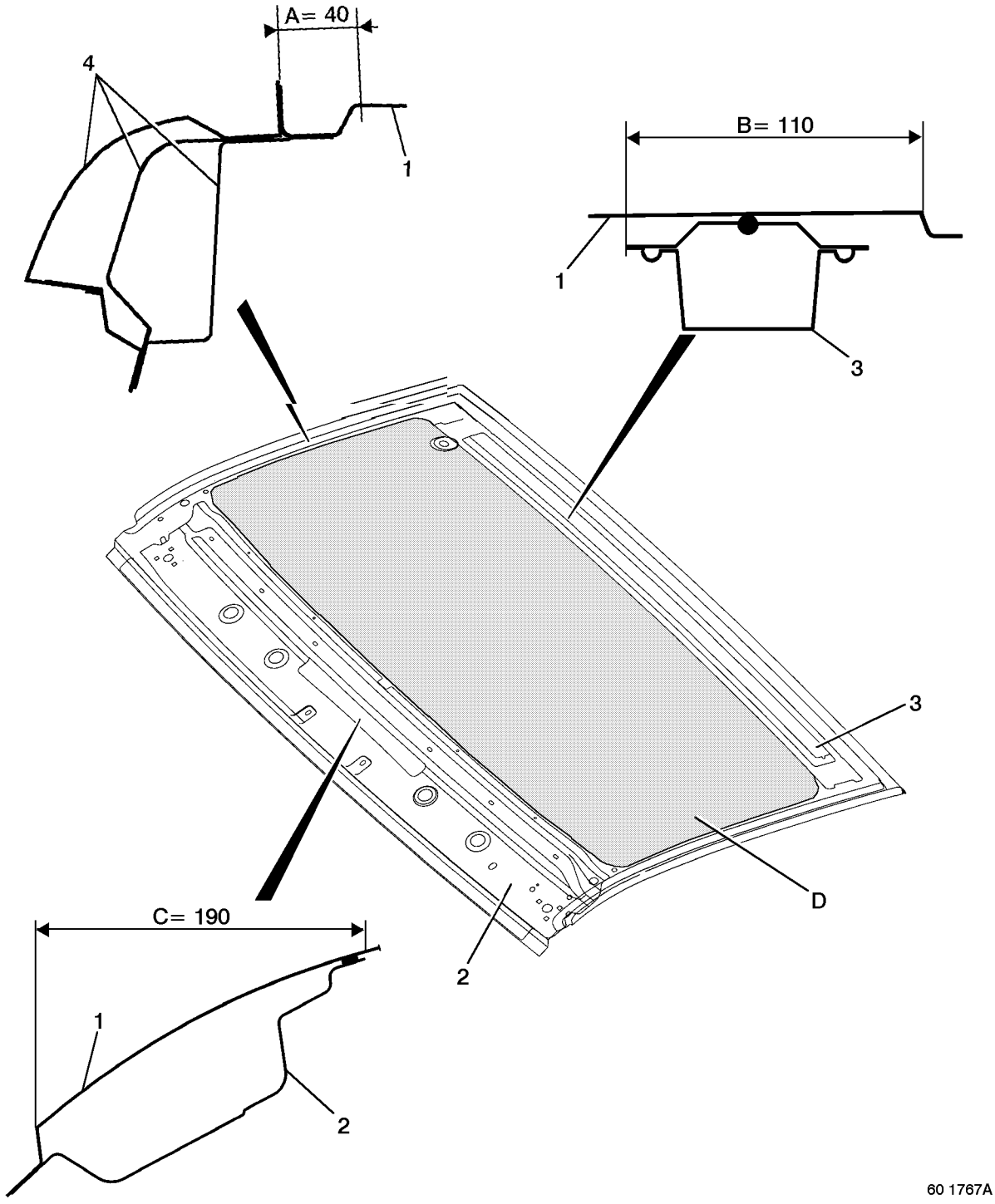
- at the front, the front cross-member of the roof (2),
- at the rear, the rear cross-member of the roof (3),
- at the side, the sides of the cab assembly (4).

Under no circumstances should the crossmembers and the reinforcements at the base of the cab be modified.

A - distance between the maximum cut-out area and the side edge of the cab,

B - distance between the maximum cut-out area and the back rib of the cab,

C - distance between the maximum cut-out area and the windscreen frame ribbing for the cab windscreen.


A= 40
4
1
B= 110
1
3
3
D
2
C= 190
1
2
60 1767A

8.4 Drive for power take off's

The MASCOTT vehicle provides two options for driving power take off's:
- By pulley from the crankshaft,
- By means of a power take-off (PTO), mounted on the gearbox.

NOTE
Fast idle is controlled by means of:
- a cable on a vehicle equipped with a mechanical injection pump,
- an electric switch on a vehicle equipped with the "COMMON RAIL" System of electronic injection.

Important
It is categorically forbidden even to try to interfere with the "Common Rail" System of Injection when the engine is in operation.

For more information on the "Common Rail" System refer to the Repair Manual "MR 20 081", as well as the vehicle driving and maintenance handbook.

8.4.1 Pulley drive from the crankshaft

If the vehicle is not equipped with an air-conditioning system, it is possible to fit a drive for equipment by the use of a pulley from the crankshaft (i.e. for a refrigerator compressor, pump, an additional alternator, etc.).

The maximum drive torque for the equipment is: 90 Nm (fast-acting torque).
Continuous drive operation is also available.

The crankshaft pulley for driving a receiver is clearly specified for this application. It is available from the Spare Parts Department of RENAULT V.I. It consists of:
- a six groove pulley for the drive of engine equipment (i.e. alternators, water pump, etc.).
- a five groove pulley for the drive of ancillary equipment.

In order to replace the pulley on the crankshaft, consult the Engine Repair Manual "MR 20 651".

The equipment must be housed in the location provided for the air-conditioning compressor.

The equipment must not cause any mechanical or thermal damage to the items around it (i.e. engine, soundproofing screens, alternator, harnesses, pipework, etc.)

Manufacture of a bracket for a power take off must be paid for by the bodybuilder.

Attachment of the bracket for the equipment (refer to the next page):

- Direct mounting on the engine block by means of the three tappings provided.
- Mounting on an alternator and air-conditioning bracket. This solution has advantages for the installation of the tensioning pulley as well as 4 points of attachment for the bracket for the unit.

Supplies required:

- 1 pulley damper for the power take-off version mounted on the engine: part N°: 50 10 284 987.
- 1 pulley belt type POLY-V 5K, for which the length will have to be determined depending on the diameter of the pulley fitted on the equipment.

Only for fitting on the alternator/air-conditioning bracket:
- 1 bracket for the alternator and compressor for air-conditioning part N°: 50 10 284 905,
- 1 pulley belt tensionner part N° 50 10 284 918,
- 1 collar screw part N° 50 03 002 026,
- 1 collar screw part N° 50 03 002 021,
- 1 screw part N° 50 03 101 714,
- 1 nut part N° 50 03 032 251,
- 1 collar screw 10 x 125 x 65 part N° 50 03 002 221,
- 2 collar screws 10 x 125 x 55 part N° 77 03 002 290.

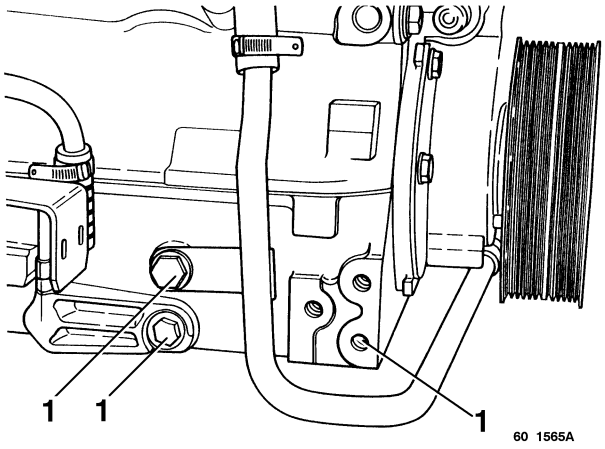
You are not permitted to modify:

- the pipework and its attachments for the cooling and lubrication systems,
- the electrical harnesses and their attachments,
- the soundproofing screens,
- the alternator bracket,
- the tappings and machining of the engine block.

WARNING
Any fitting of a power take-off on a crankshaft pulley requires the compulsory obtaining of technical approval from the Product Applications Department of RENAULT V.I.

Attachment of a bracket for mounting the equipment on the engine block
Fit the bracket for the equipment in position on the engine, using the three threaded tappings (1) which have been provided on the engine block.

Thread: M 10 x 125

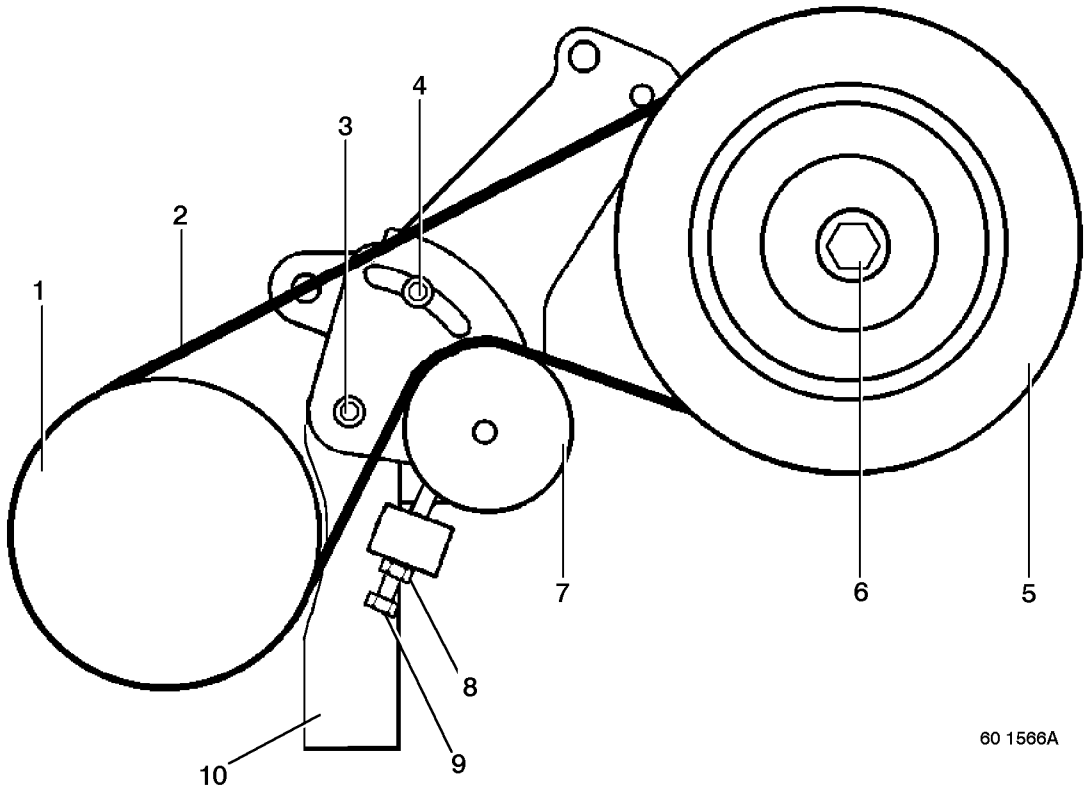


Fitting of a bracket for mounting the equipment on the alternator and air-conditioning compressor bracket

Recommendations for mounting
Disconnect the battery.
Take out the soundproofing screens,
Remove the alternator from its bracket.
Save the tensioning pulley of the alternator belt and its fittings for later re-use.
Install the tensioning pulley of the alternator and its fittings on the bracket for the alternator/air-conditioning compressor, the tensioning pulley (7) and its fittings (3, 4, 8, and 9). Fit the bracket/alternator assembly in position on the engine. Fit in position the equipment bracket on the alternator/compressor bracket. Install the equipment on its bracket.

Key

1 - Power take-off pulley,
2 - POLY-V 5K drive belt,
3 - Collar screw type HM 8 x 125 x 16 (part N° 50 03 002 026),
4 - Collar screw type HM 8 x 125 x 30 (part N° 50 03 002 021),
5 - Engine pulley (part N° 50 10 284 987),
6 - Crankshaft pulley screw (tightening torque: 200 Nm),
7 - Tensioning pulley (part N° 50 10 284 918),
8 - M8 nut (part N° 50 03 032 251),
9 - Screw type HM 8 x 125 x 55 (part N° 50 03 101 714),
10 - Alternator and compressor bracket (part N° 50 10 284 903).



8.4.2 Gearbox mounted power take-off

The power take-off (PTO), gearbox mounted, (an optional extra on a new vehicle) is an item of equipment which can be retrofitted. The control of operation of the PTO is done electrically; it is operated by means of a PTO safety control box which receives inputs of information from:
- control switches in the cab,
- a sensor of position of the clutch pedal,
- contacts showing the position of the PTO.

For recommendations for the use and maintenance of the PTO: refer to the vehicle driving and maintenance handbook.

Maximum resisting torque:
- PTO type 20Z1 (ZF gearbox part N° ZF 5 S 200): 120 Nm
- PTO type 20Z2 (ZF gearbox part N° ZF 6 S 300): 180 Nm

Drive ratio in relation to the speed of engine rotation: approx. 1 to 1.

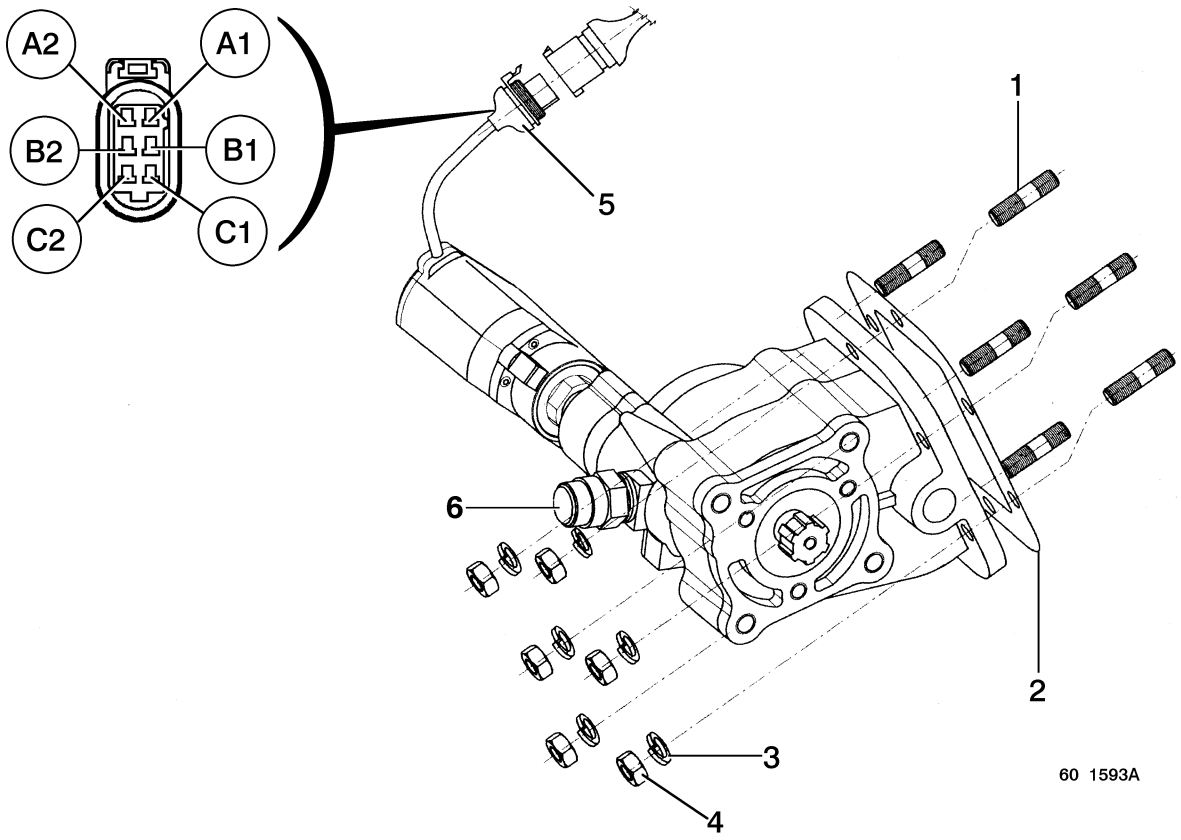
The receiver is mounted on the PTO by means of 4 screws.

Output shaft: faceplate drilled with 4 holes DIN 00.
For the fitting of other output shafts, refer to the PTO manufacturer.

Important
The PTO can only operate if it is controlled by the safety control box for the PTO, and if this is connected up in accordance with the mounting details contained in this document.
As a consequence, it is forbidden to make an electrical connection other than that recommended in the present document.
The clutch pedal position sensor is an item of OEM equipment only fitted to a vehicle equipped with “COMMON RAIL” electronic injection. This should only be fitted to a vehicle equipped with a mechanical fuel injection pump.

Supplies required (all parts available from the Parts Department, RENAULT V.I.):
- PTO type 20Z1 (ZF gearbox part N° ZF 5 S 200): part N° 50 10 245 747
- PTO type 20Z2 (ZF gearbox part N° ZF 6 S 300): part N° 50 10 245 988
- PTO safety control box: part N° 77 00 377 201
- control switches, part N° 77 00 377 205
- clutch pedal position sensor, part N° 77 00 414 988
- PTO harness on the gearbox, part N° 77 00 377 221
- 10 Amp flat fuse, part N° 77 01 998 053.

Installation of the PTO on the gearbox
Drain down the gearbox.
Take off the gearbox cover plate.
Carefully clean the mating surfaces.
Screw the studs (1) into the gearbox housing and tighten them to 15 Nm.
Fit the gasket in position (2), the PTO itself, the washers (3) and the nuts (4).
Tighten the nuts (4) to 37 Nm.
Refilling of the gearbox: refer to the vehicle driving and maintenance handbook.



Allocation of the connector terminals (5), looked at from in front:

A1 - Power supply for electrical actuator motor,
B1 - Limit of travel contact in the “run” position,
C1 - Limit of travel contact in the “stop” position,
A2 - Actuator motor earth,
B2 - Limit of travel contact in the “run” position,
C2 - Limit of travel contact in the “stop” position.

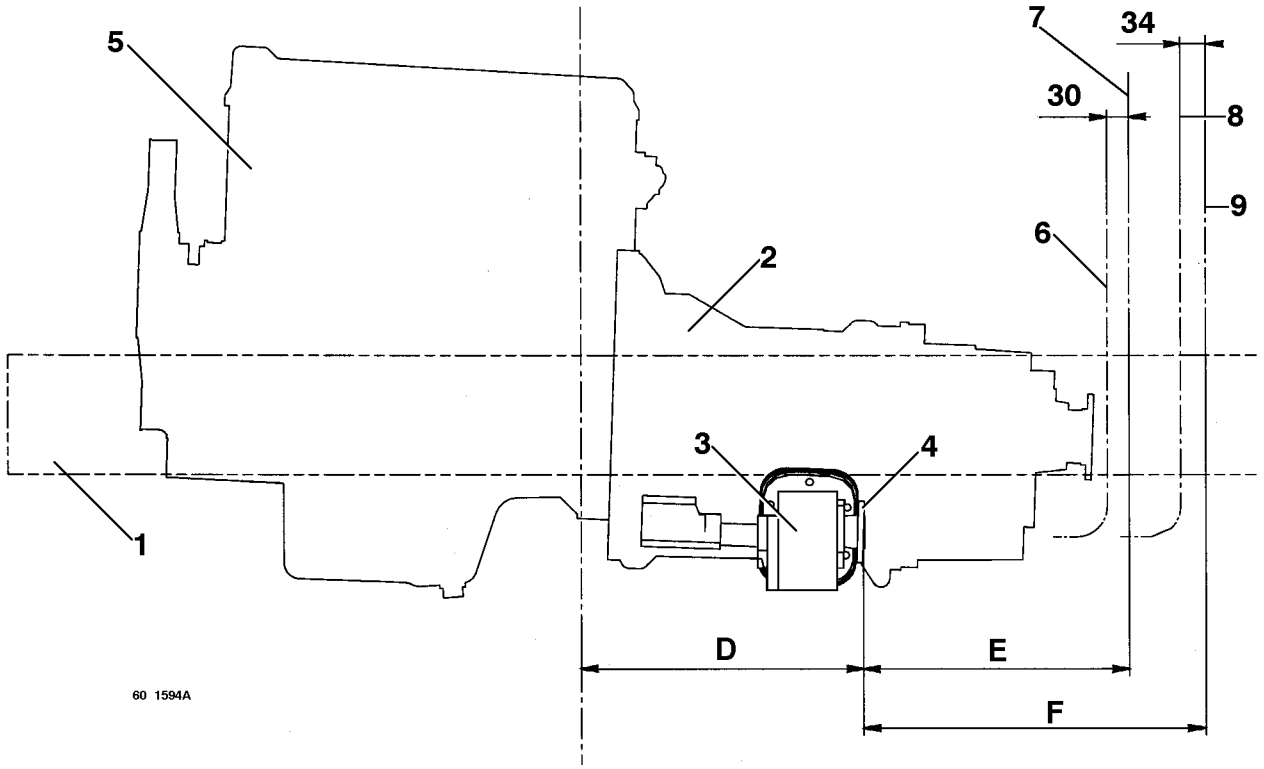
Connector (6): contact on the PTO.

Fitting to the vehicle (tolerance: ± 2 mm)

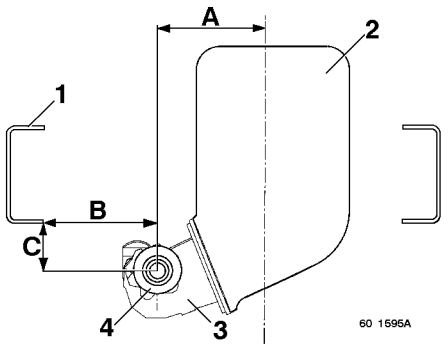
A - Horizontal distance between centres - output faceplate - longitudinal axis of the vehicle
B - Horizontal distance between centres - output faceplate - edge of the sidemember flange
C - Vertical distance between centres - output faceplate - edge of the sidemember flange
D - Distance between centres - output faceplate - centreline of front axle
E - Distance between centres - output faceplate - rear tip of the short cab
F - Distance between centres - output faceplate - rear tip of long cab.

Type of gearbox	A	B	C	D	E	F
S5 – 200	166	203	61	377	1023	1773
S6 – 300	186	183	80	386	1014	1764

All dimensions in mm.

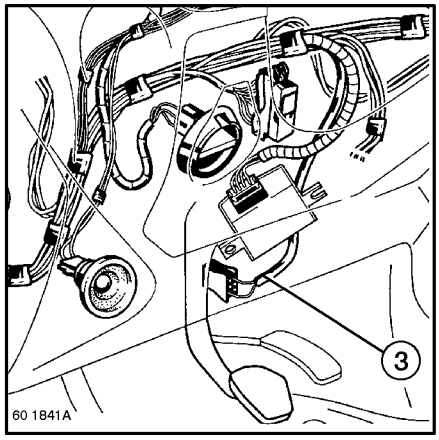


1 - LH sidemember,
2 - gearbox,
3 - PTO,
4 - PTO output faceplate
5 - engine,
6 back of short cab,
7 entrance of frame, short cab,
8 - back of long cab,
9 - entrance of frame, long cab.

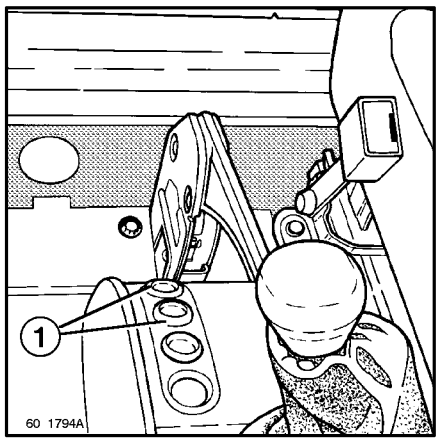


Installation of items in the cab

Fit the clutch pedal position sensor (3) (fitting 1/4 of a turn) and connect it up to the corresponding connector on the cab wiring harness.

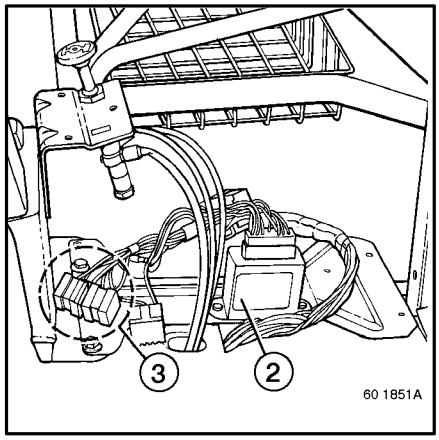


Take out the central console.
Install the two switches (1) in their housing on the console.



Secure the safety control box (2) to the floor, using two screws.
Connect the switches and the safety control box to the connector of the cab harness provided.
Refit the console

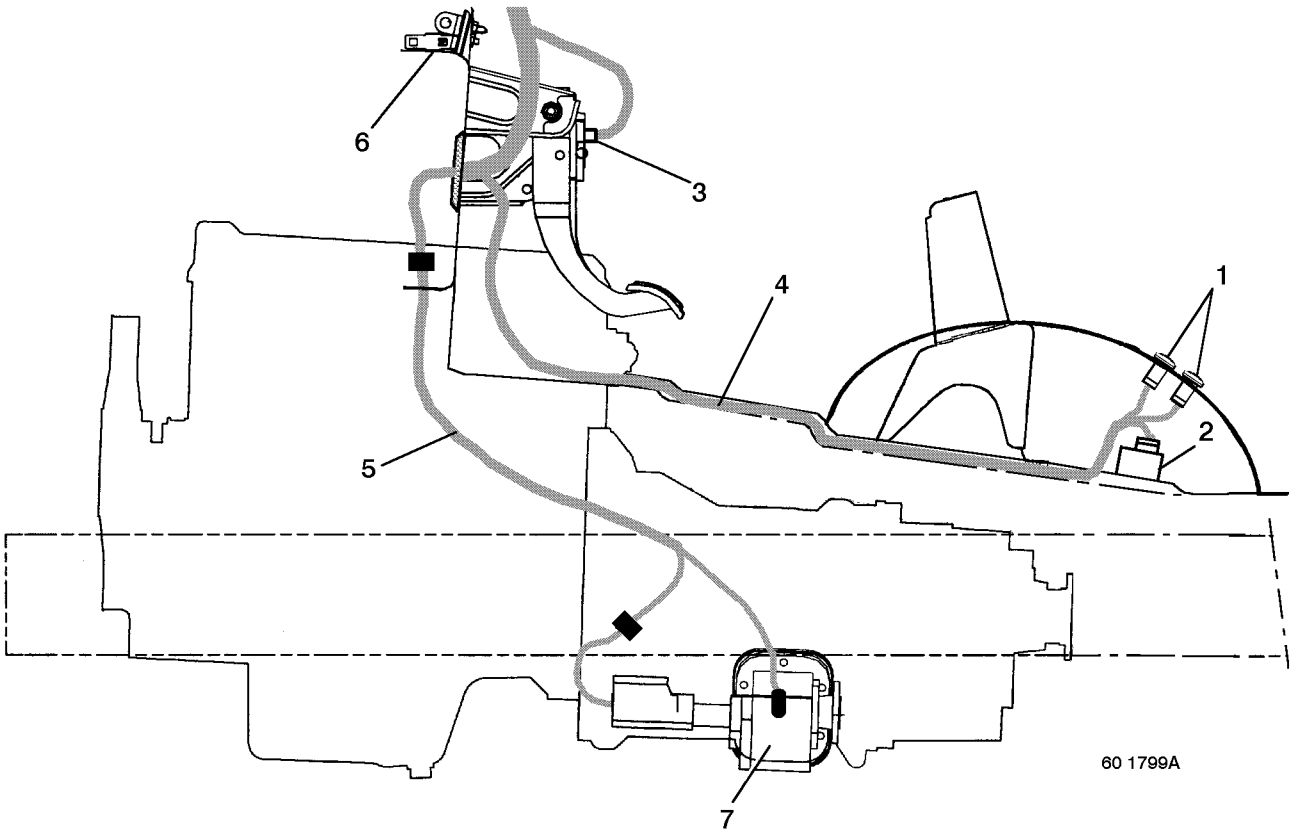
Insert a 10 Amp flat fuse in the fuse slot F2 in the fuse-relay box.



Mounting harness on chassis

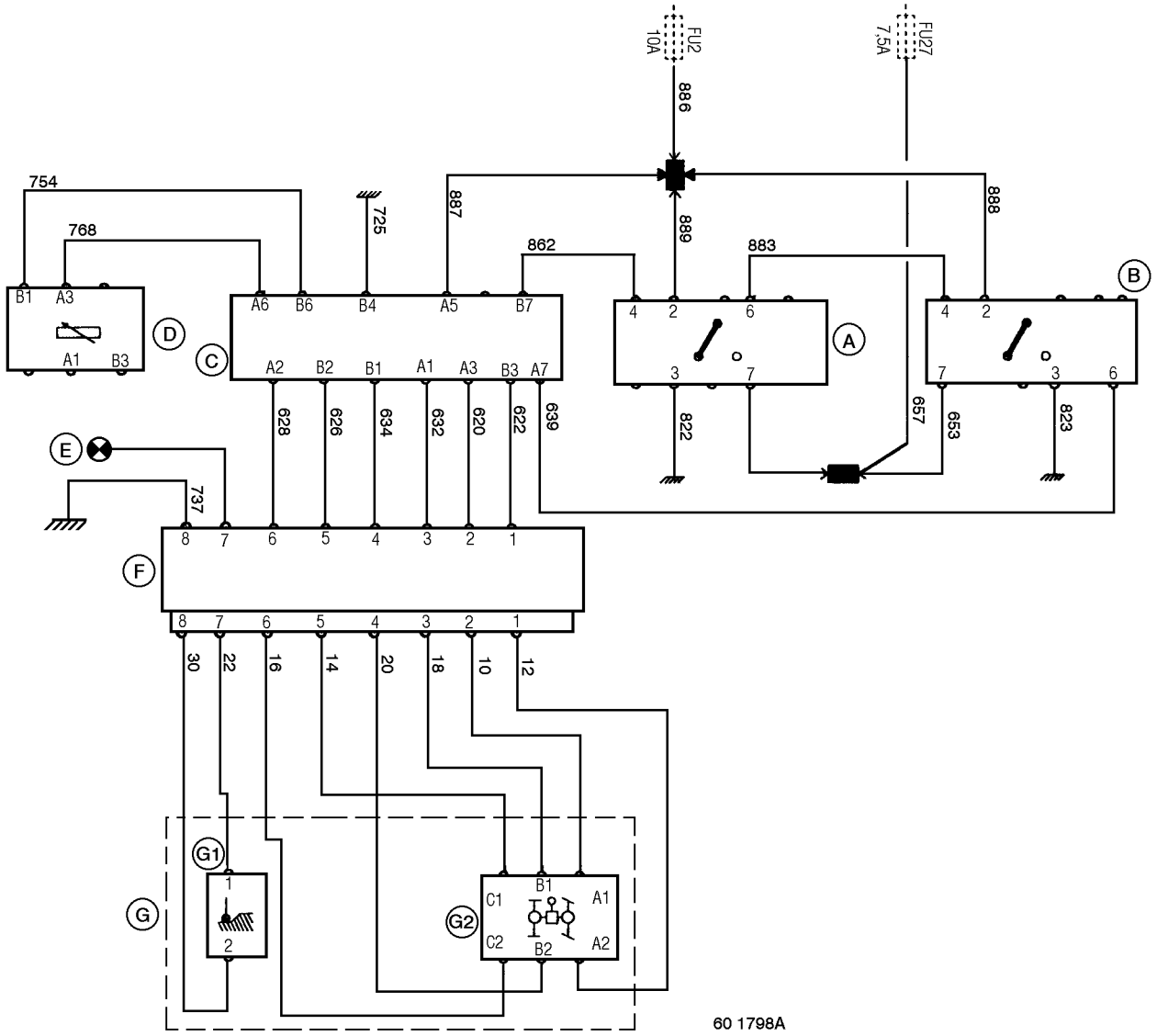
Fit in position the PTO wiring harness on the gearbox and connect it up to:
- the connector of the cab wiring harness in the engine junction box,
- the two connectors on the PTO.

Electrical installation



1 - Power take off control switches.
2 - Control box
3 - Clutch pedal sensor
4 - Cab harness
5 - Power take off harness
6 - Motor junction box
7 - Power take off

Electrical connections



Key to the diagram

A - PTO control switch,
B - PTO control switch,
C - safety control box for the PTO,
E - PTO warning light,
F - connector for connecting-up cab wiring harness to PTO wiring harness,
G - PTO
- G1 - contact on the PTO,
- G2 - 6 way connector for the PTO.

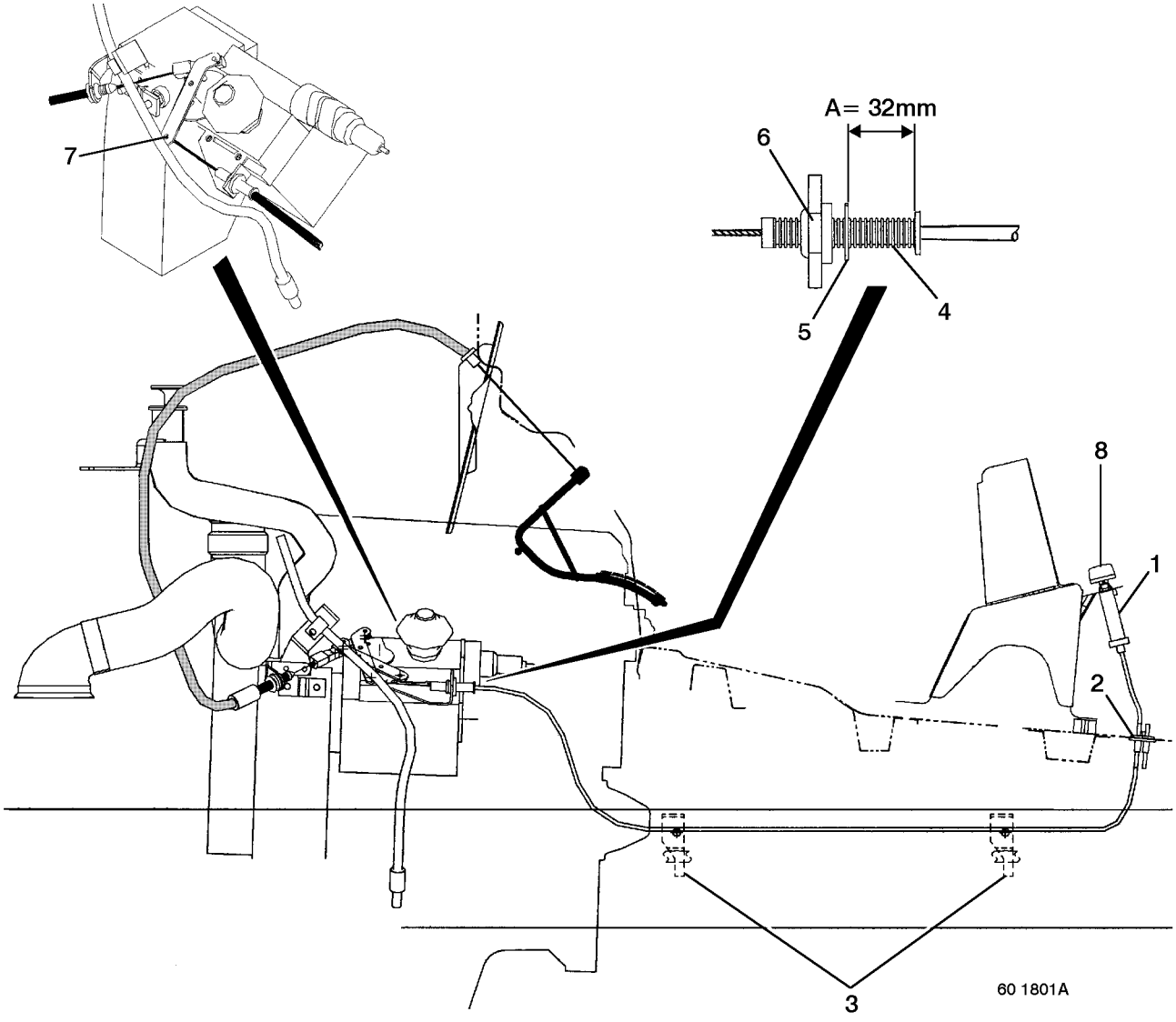
8.4.3 Fast idle control

The fast idle is controlled by:
- a cable on a vehicle with a mechanical injection fuel pump,
- an electrical switch on a vehicle equipped with “COMMON RAIL” electronic fuel injection.

For use: refer to the vehicle driving and maintenance handbook.

Vehicle which is equipped with a mechanical fuel injection pump

Installation of the control cable for fast idle:
Manual cable with knob control (1) clipped in place on the gear lever bracket (LH orifice).
The sheath grommet (2) must be inserted in the hole drilled in the cab floor.
The sheath is held in position by two clamps (3) for the attachment of pipework to the sidemember.
Knob (4) to be fitted in position (dimension A) relating to the pin (5) in the rubber bush (6).
Cable end (7) to be fitted to the control lever of the fuel injection pump.
Control knob (8) to be clipped onto the hand-operated pull.



Supplies required:
- control pull button (8), part N°; 50 00 449 765
- control cable assembly: Left hand drive, part N°: 50 10 382 719,
  Right hand drive, part N°: 50 10 382 720

Vehicle equipped with “COMMON RAIL” fuel injection

Fit a switch (1) in the central console and connect it up to the green connector provided on the chassis wiring harness.

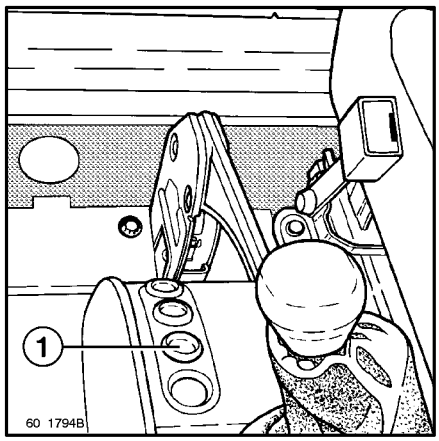
Fit a fast idle micro-relay onto the connector provided on the chassis wiring harness.

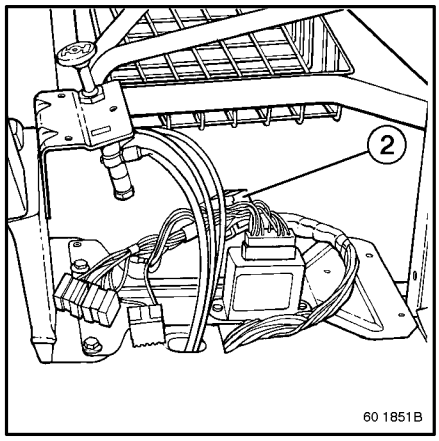
Supplies required:

- fast idle control switch, part N° 77 00 377 205
- fast idle micro-relay, part N° 77 00 414 484

The engine fast idle is programmable, using the diagnostic tool “DIAGNOSTICA”;

For this particular operation, refer to the RENAULT V.I. Dealer Network.





Installing the last idle control switch to the chassis

The information sent from the fast idle control switch to the injection ECU is via an electrical impulse through the switch. This switch being a unique spécification, makes it compulsory to fit an identical switch when adding an additional chassis mounted control switch. The connections for both switches must be the same. The switch must be protected in a sealed box, from bad weather and humidity.

If a cab switch does not exist: make an additional harness to connect directly into the vehicle harness. Connect the fast idle micro relay into the connector (2) available in the chassis harness.

If a cab switch does exist: make an additional harness connected in parallel with the cab switch.

8.5 Heat protection and soundproofing screens

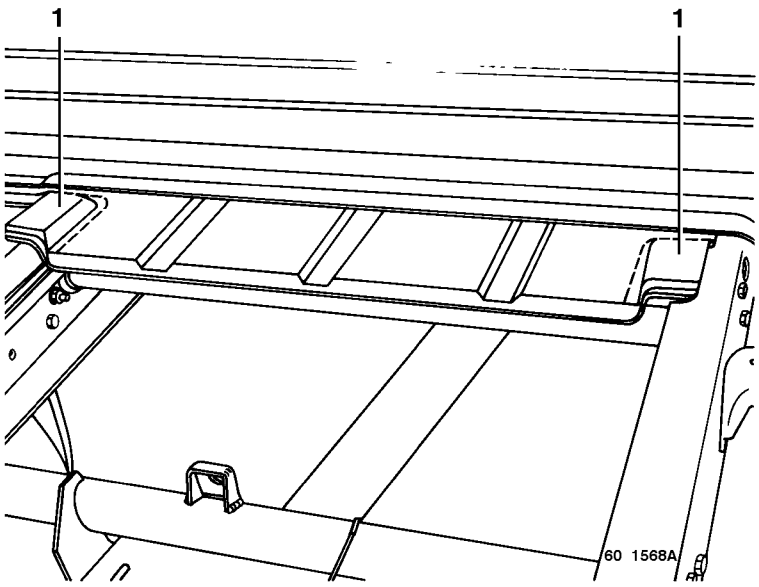
8.5.1 Instructions for soundproofing screens

The soundproofing screens must neither be taken out, nor modified nor moved anywhere else, so as not to cause problems with the sound level of the vehicle which has been the subject of an official approval.
They must be put back in place after any work which requires them to be taken out.
Any damage to the interior protective film of the screen means that it has to be changed.
After having been taken out, only those screens which are perfectly clean should be refitted.
In particular, you should ensure that there is no flammable product on the protective film of the screens.
They should be cleaned with a soft cloth, and if necessary use clean, soapy water (any other product is forbidden).

Important:
Should any welding be done on the vehicle or a grinder used, ensure effective protection is provided or that the soundproofing screens are taken out.

8.5.2 Soundproofing screen at rear of cab

This screen has been pre-cut to allow for the fitting of a sub-frame.
Should it prove to be necessary, take out the 2 detachable parts (1).
No other modification is allowed on the screen.



8.5.3 Instructions for heat protection screens

It is forbidden to take out or modify these screens. They make a major contribution to your safety.

8.6 Handling cranes mounted behind the cab

8.6.1 Maximum lifting capacity

Vehicle GVW (kg)	Lifting torque (tonnes/metre)
3 500	3
5 000 / 6000	4,5
6 500	5

8.6.2 Specific sub-frame for cranes

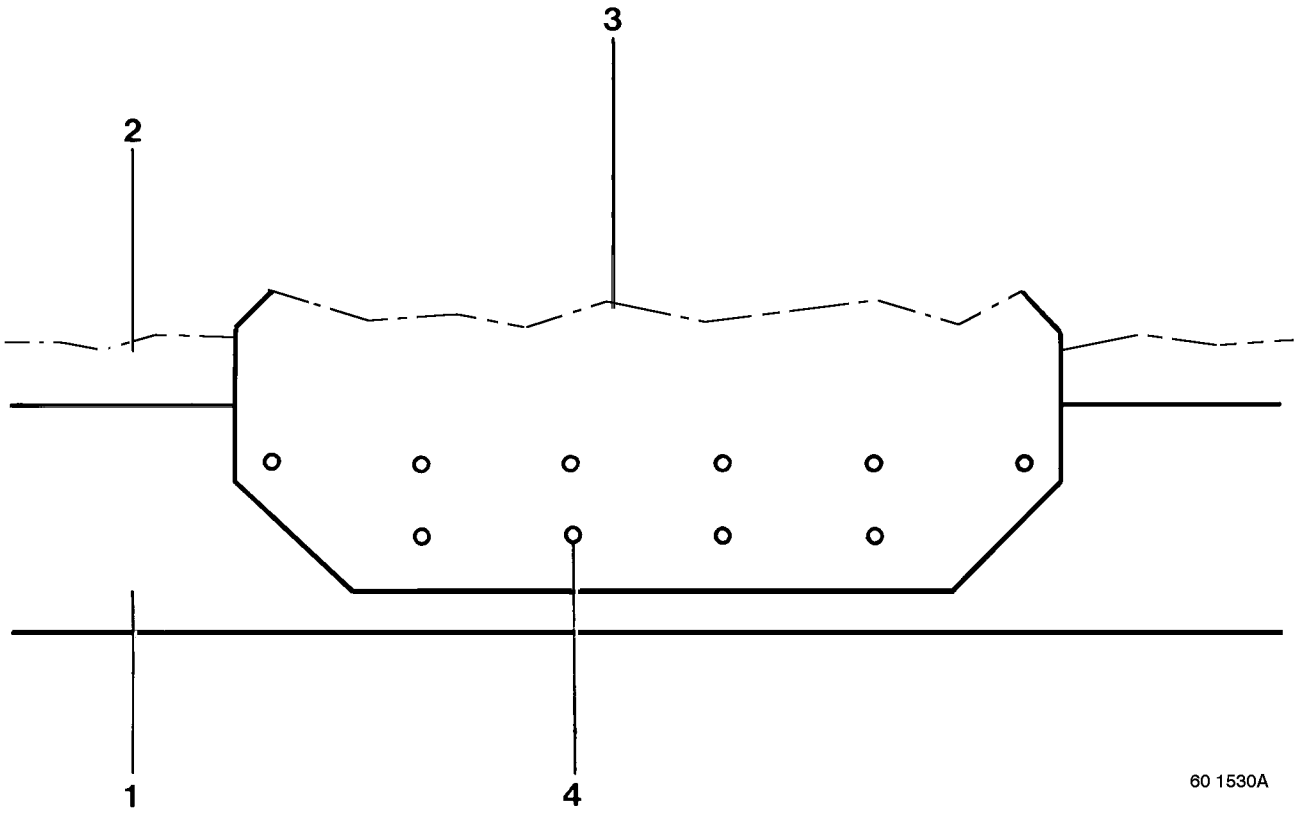
The mounting of a crane on the chassis behind the cab requires the mounting of a specific sub-frame.
The sub-frame must be in one single piece, which begins at the back of the cab and continues right to the tip of the rear overhang. Its shape should be tapered towards the front end (refer to chapter entitled “Finishing-off of the sub-frame behind the cab”).
The sub-frame must be made of steel section with a minimum inertia of **1,100,000 mm^4** (refer to chapter entitled “SUB-FRAME”).

When the crane is fitted together with another item of mobile equipment, they must be mounted on one single sub-frame whose modulus of inertia shall be calculated in line with the equipment causing the most stress to the sidemembers. If necessary, a stiffener should be welded in the crane load bearing area.

8.6.3 Attachment of sub-frame by bolted plates

It is recommended, as far as possible, that you should opt for attachment by the use of a bolted plate rather than mounting by clamps in the area where the crane is seated.

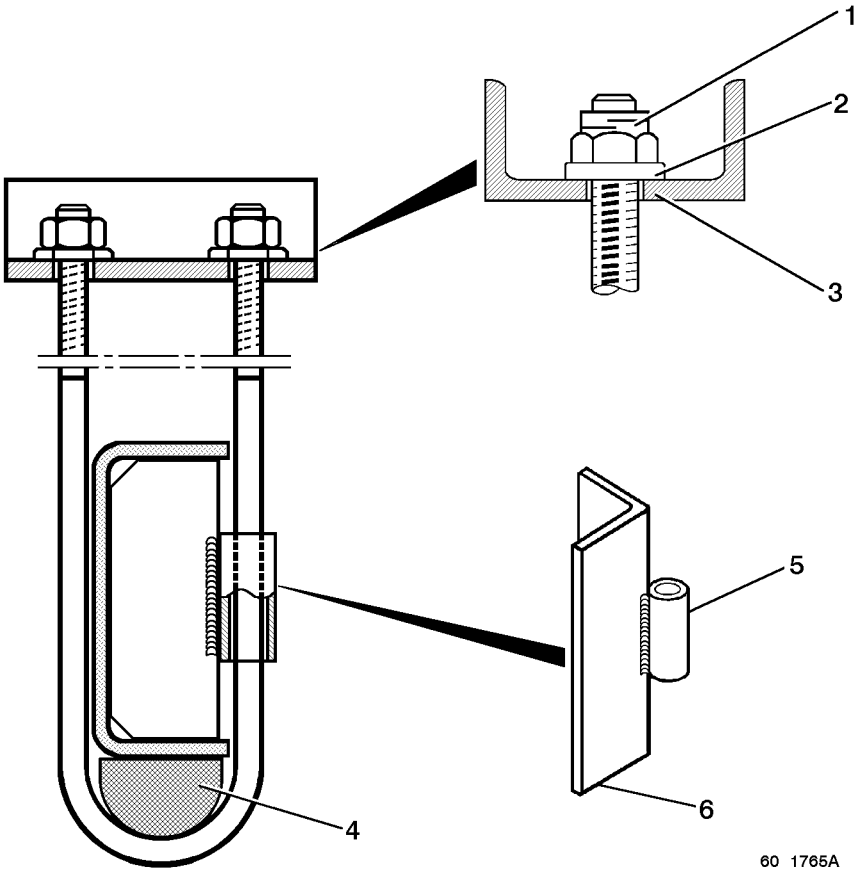
1 - Chassis,
2 - Specific sub-frame fitted,
3 - Mounting plate with the same thickness as the sidemember,
4 - Mounting carried out with 9 bolts minimum.



Nut and bolt hardware required:
- screws type HM 10 x 125 - Class 10.9,
- nuts DRH M 10 x 125 - Class 10

The use of nylon locknuts (e.g. Nyloc® Nylstop) is forbidden.
Welding of the mounting plate onto the chassis of the vehicle is forbidden.

Mounting by the use of clamps (example of fitting)
1 - nuts type DRH M 10 x 125 - Class 10,
2 - flat washer 10 x 27 x 3,
3- U section steel channel,
4 - rounded shim,
5 - tubular section locking piece, welded onto the spacer,
6 - spacer.



Precautions to be taken during fitting:
So as to avoid distortion of the sidemember flanges, tightening must be alternate and progressive.
The attachment of a sub-frame using clamps requires the fitting of a spacer (5 and 6) on the right hand side of each clamp. These tie rod spacers must be clamped together using the tubular section locking piece in order to avoid any relative movement between the two parts.
Assembly with round steel U-bolts clamps requires the use of shims (4), consisting of a wedge piece of round section which mates with the curve of the U-bolt.
The maximum clearance between the spacers (5 and 6) and the inner faces of the side member must not be greater than 1 mm.

The use of nylon locknuts (e.g. Nyloc® Nylstop) is forbidden.

8.7 Tail lifts

Maximum lifting capacity of the tail lift is 500 kg.

8.7.1 Sub-frame

The mounting of a tail lift requires the fitting of a sub-frame in sectional steel having a minimum inertia 1,100,000 mm^4 and complying with the recommendations described in the chapter entitled “Sub-frame”.

8.7.2 Attachment

The tail lift shall be fitted in position using bolted plates. In all cases this has an effect on the design of the sub-frame of the bodywork. The attachment of the plates must be carried-out by means of 6 bolts on the chassis on each side and by 3 bolts or by welding on the sub-frame.

Position of the bolts:

- This must comply with the recommendations for drilling of the sidemembers (refer to chapter entitled “Drilling of the sidemembers”).
- The spacing between the bolts must be sufficiently large to avoid any sliding of the plate in relation to the sidemembers.

If necessary, it would be sensible to wedge the beam or the tail lift plate onto the lower flange of the sidemember to prevent the flexing of the sidemembers.

NOTE

Do not weld the bolted plate onto the chassis.

Nut and bolt hardware required:

- screws type DRH M 10 x 125, Class 10.9,
- nuts type DRH M 10 x 125, Class 10,

The use of nylon locknuts (e.g. Nyloc® Nylstop) is forbidden.

WARNING

In all cases of conversion for a tail lift, it is vital to calculate the new length which is capable of being fitted with bodywork whilst complying with:

- The max. GVW (Gross Vehicle Weight) for the vehicle,
- The min. weight on the front axle, with the vehicle fitted with bodywork and tail lift,
- The maximum loads authorised on the front and rear axles,
- The maximum rear overhang indicated on the description sheet of the Type Approval Department and the bodywork drawing.

Should any of these values be exceeded, consult the Product Applications Department of RENAULT V.I.

Should there be a modification made to the underrun guard, ensure that it complies with the regulations in force.

The installation of a tail lift makes it obligatory to fit a rear crossmember (refer to the chapter entitled “Rear crossmember and drawbar crossmember”).

8.8 Parts kits

The following kits are available from the Spare Parts Department.

8.8.1 Nuts and bolts hardware for attachment of the sub-frame to brackets

Part N° 50 01 849 606

8.8.2 Adapter kit for chassis electrical connections

Part N° 50 01 850 529

Imprimé en France