

LONDON TRANSPORT ROUTEMASTER BUS

RM 857



Pack 02

BUILD INSTRUCTIONS

STAGE 11: FITTING THE STEERING MECHANISM

STAGE 12: LEFT REAR SUSPENSION ARM AND
BRAKE MECHANISM

STAGE 13: RIGHT REAR SUSPENSION ARM AND
BRAKE MECHANISM

STAGE 14: FITTING THE REAR AXLE

STAGE 15: ASSEMBLING THE SUSPENSION ARMS BAR

STAGE 16: FITTING THE REAR CHASSIS FRAME

STAGE 17: CONNECTING THE CHASSIS FRAMES

STAGE 18: THE FIRST OF THE REAR WHEELS

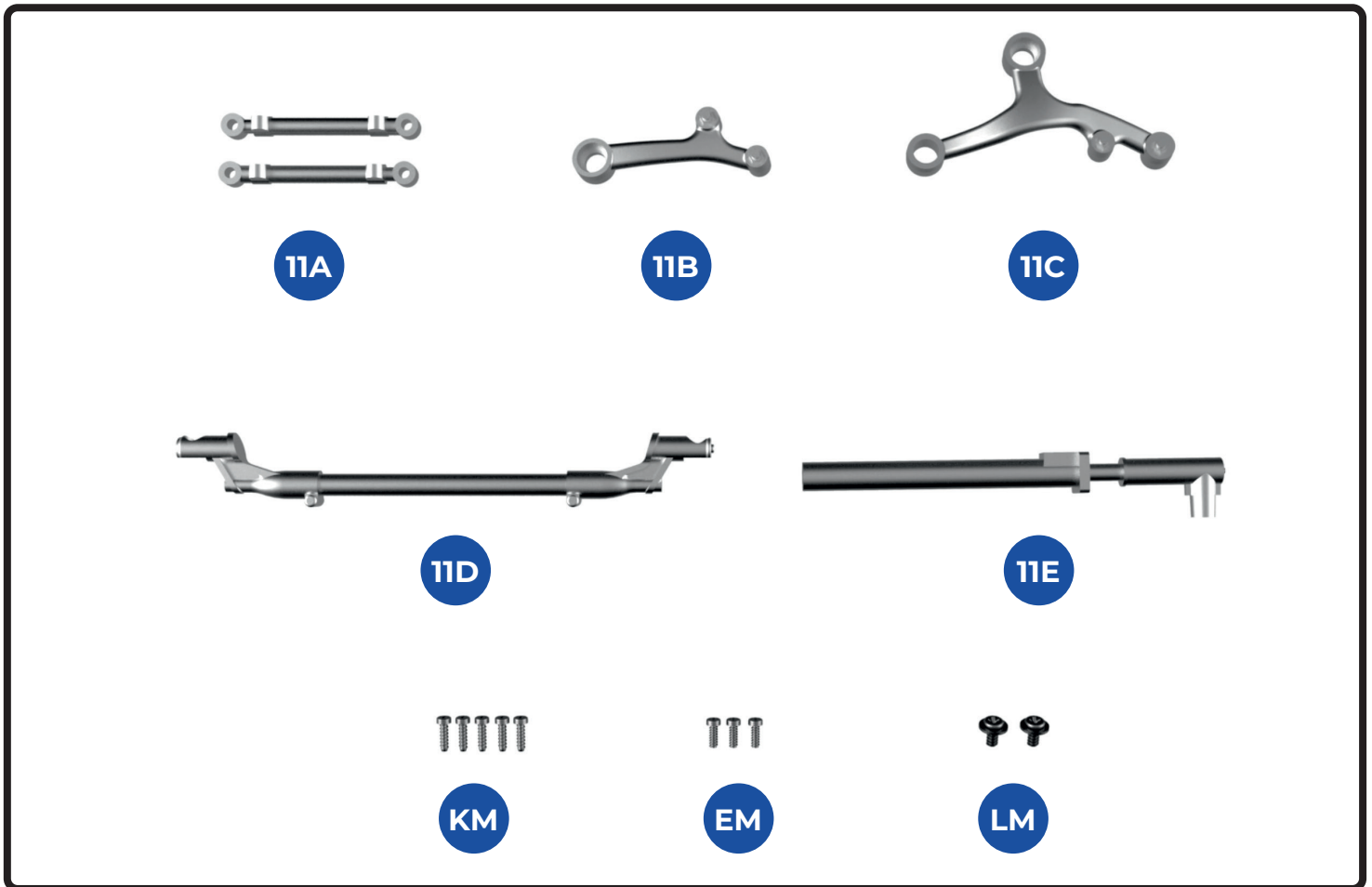
STAGE 19: FITTING THE FIRST PAIR OF REAR
WHEELS

STAGE 20: OFFSIDE REAR OUTER WHEEL

STAGE 11

FITTING THE STEERING MECHANISM

The steering rods and links are fitted to the front axle and suspensions system that was assembled in previous stages.

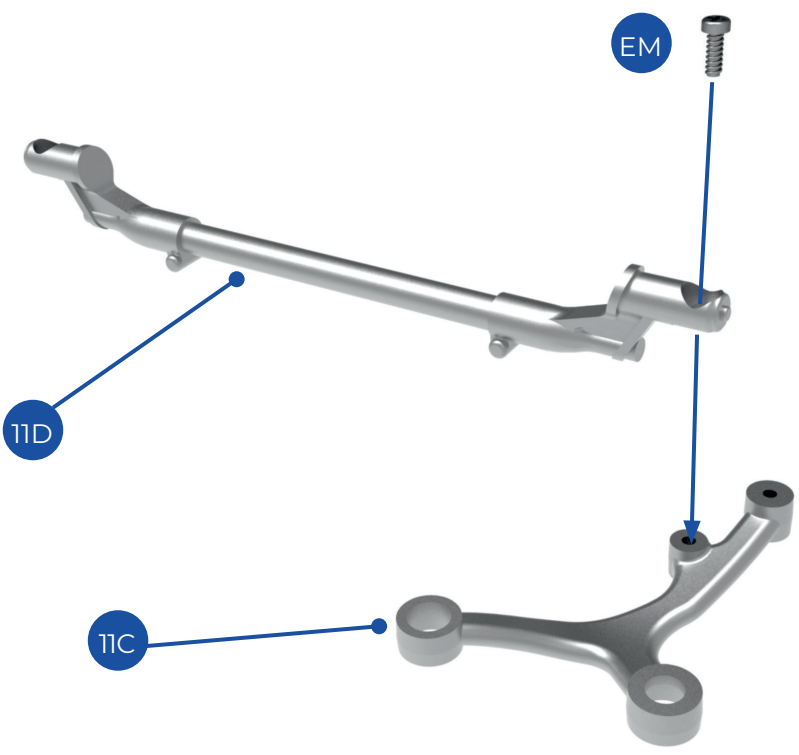


KEY TO PARTS SUPPLIED


11A	Steering tie rod (x2)	KM	1.5 x 5mm (x5)
11B	Push rod link	EM	1.5 x 4mm (x3)
11C	Command arm	LM	2.0 x 4x5mm (x2)
11D	Push rod		
11E	Steering bar		

The KM and EM screws are very similar. The EM screws are just 1mm shorter than the KM screws, so be sure to use the correct size.

1

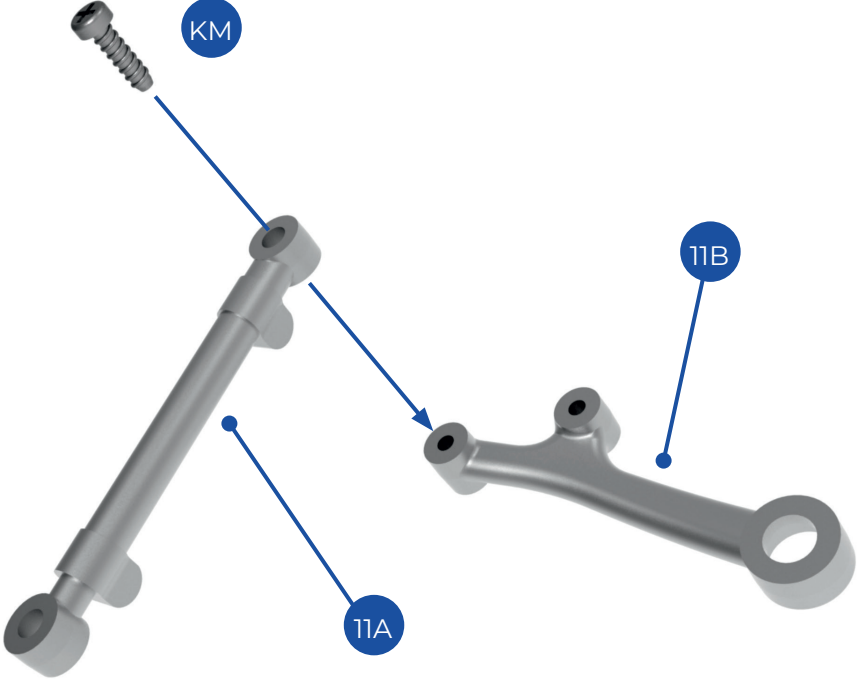


1 Take the push rod (11D) and the command arm (11C). Check that the orientation of the parts matches the diagram (left). Pass an EM screw, through the hole at one end of the push rod and into the socket on the command arm. Fix in place, but do not overtighten the screw as the parts will need to move as the steering turns.




The inset above shows the first two pieces (11D and 11C) fixed together. The inset below shows the parts 11A and 11B fitted together. ✓

2

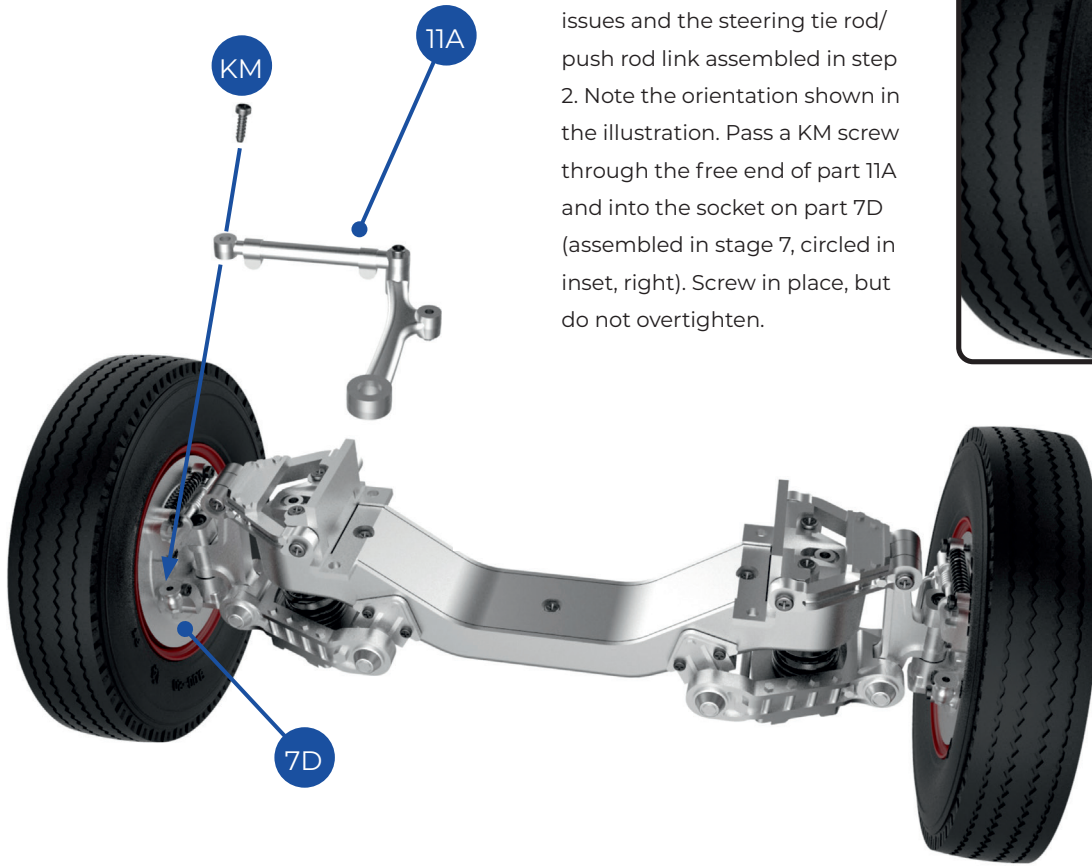


2 Take one of the steering tie rods (11A) and the push rod link (11B). Pass a KM screw through part 11A and into the small socket at the end of part 11B. Screw the two pieces together but do not overtighten as the parts will need to move as the steering turns.



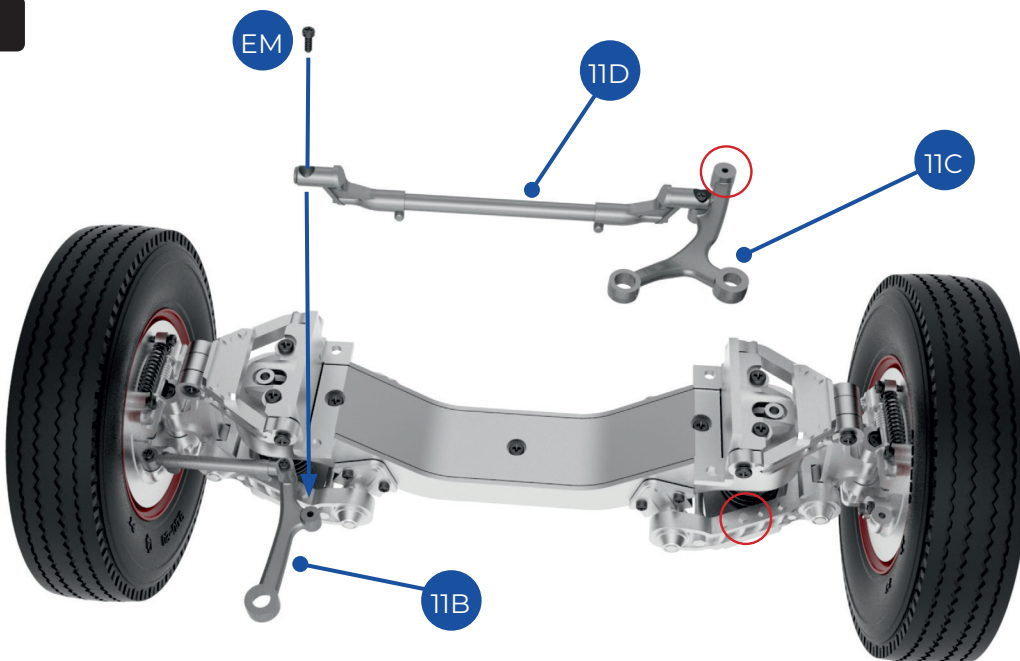
3

3 Take the front axle assembled in previous issues and the steering tie rod/push rod link assembled in step 2. Note the orientation shown in the illustration. Pass a KM screw through the free end of part 11A and into the socket on part 7D (assembled in stage 7, circled in inset, right). Screw in place, but do not overtighten.



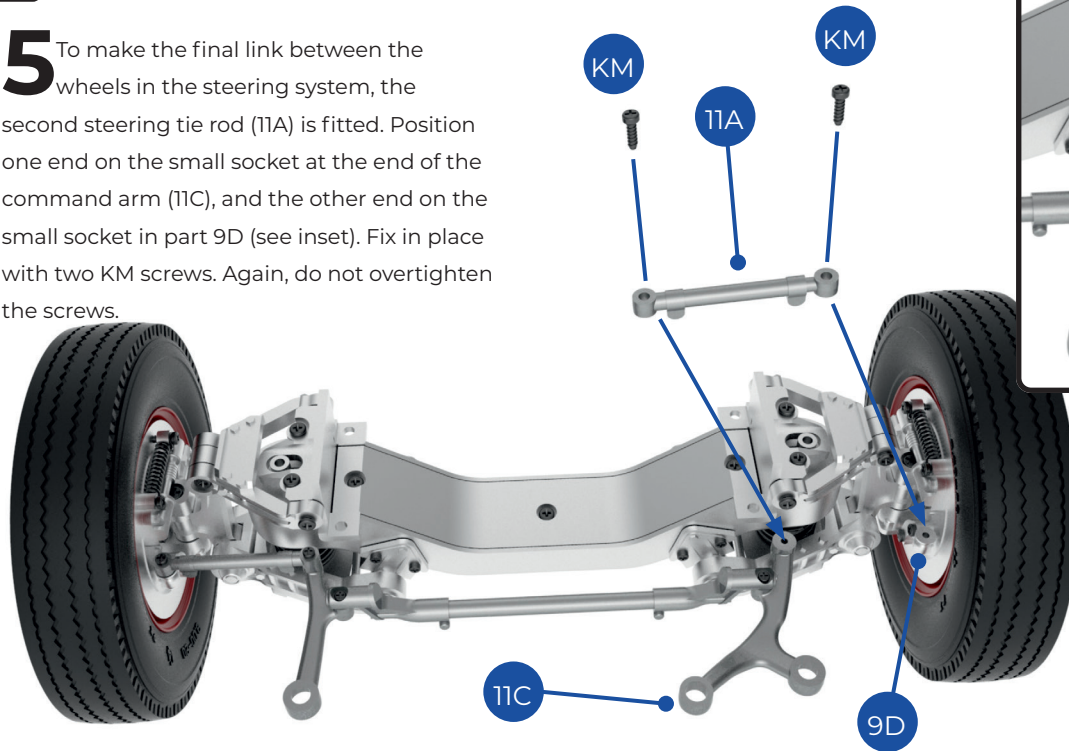
4

4 Take the push rod assembly from step 1 and study the diagram carefully to see how it attaches to the push rod link (11B). One end of part 11C should be positioned above the front axle assembly (circled in red). Pass an EM screw through the hole in the free end of part 11D and into the socket on the side of part 11B. Tighten the screw but take care not to overtighten, to allow some movement.



5

5 To make the final link between the wheels in the steering system, the second steering tie rod (11A) is fitted. Position one end on the small socket at the end of the command arm (11C), and the other end on the small socket in part 9D (see inset). Fix in place with two KM screws. Again, do not overtighten the screws.



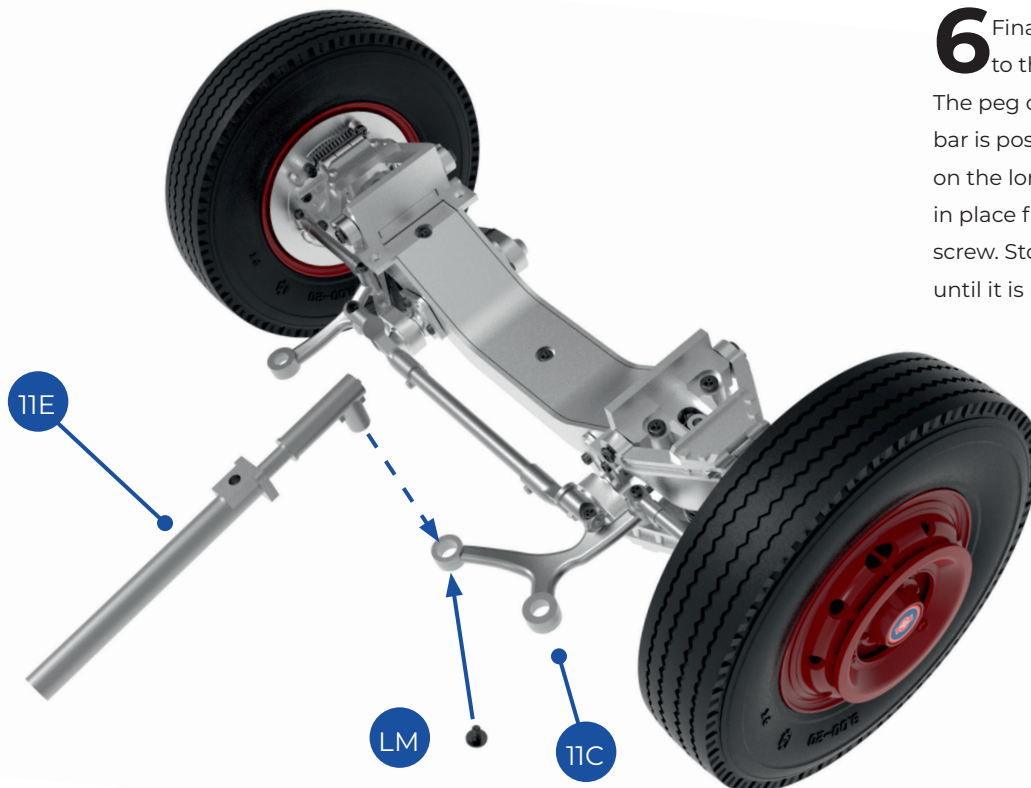
Be sure to identify the two sockets for fixing socket part 11A, circled in red, above.



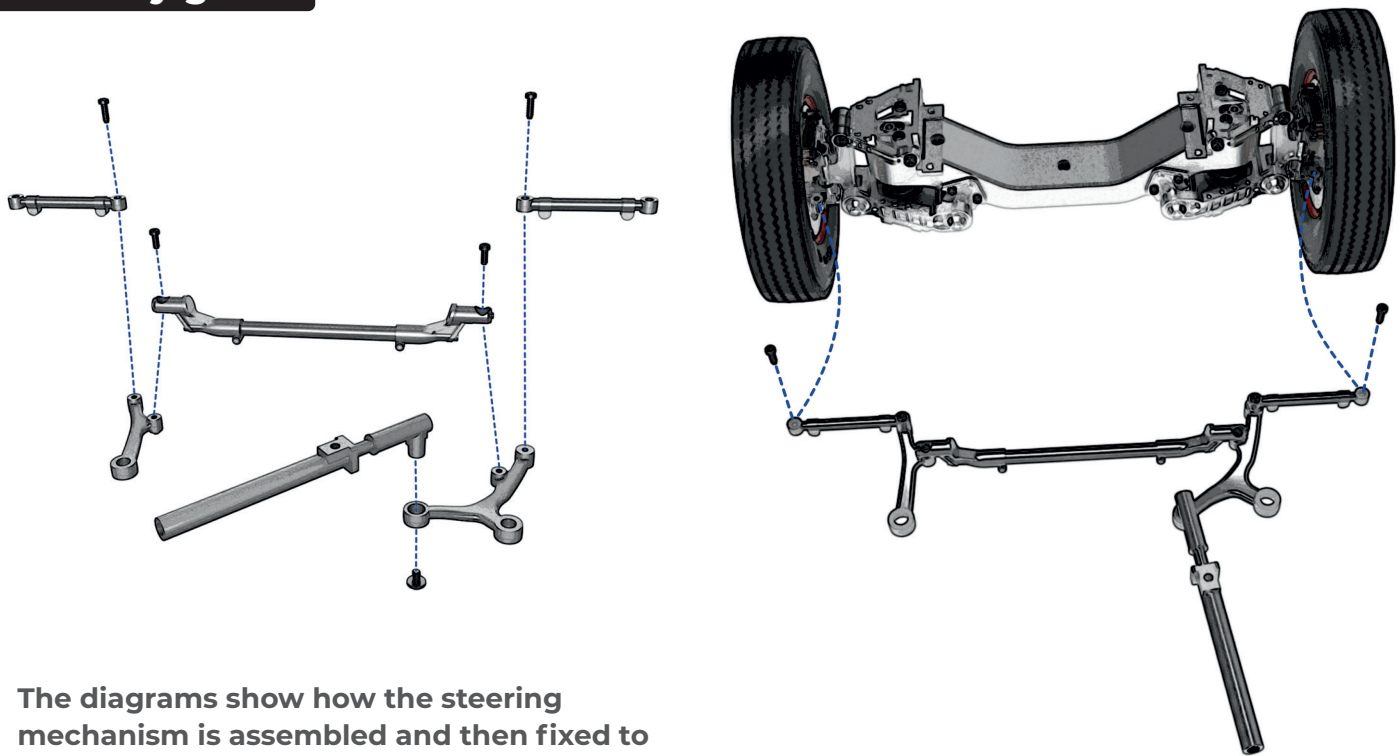
6

6 Finally, fit the steering bar (11E) to the command arm (11C).

The peg on the end of the steering bar is positioned in the large socket on the longer arm of part 11C. Fix in place from below, using an LM screw. Store the assembly carefully until it is next needed.



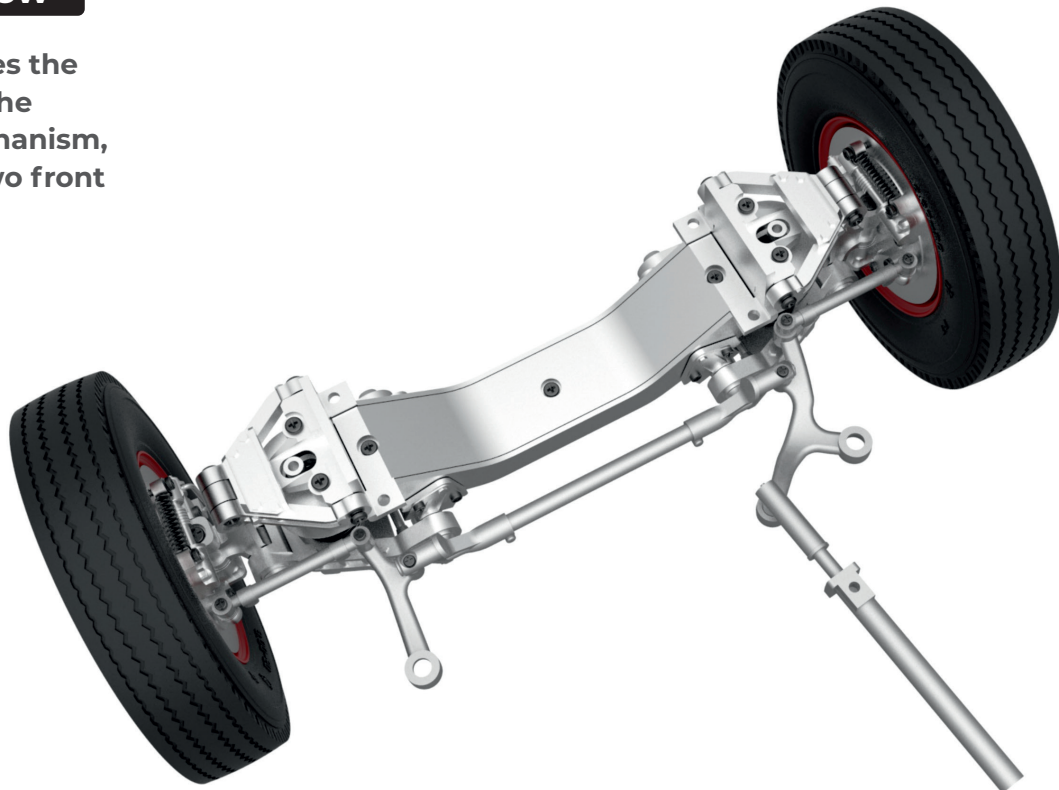
Assembly guide



The diagrams show how the steering mechanism is assembled and then fixed to the front axle with just two screws.

Finished view

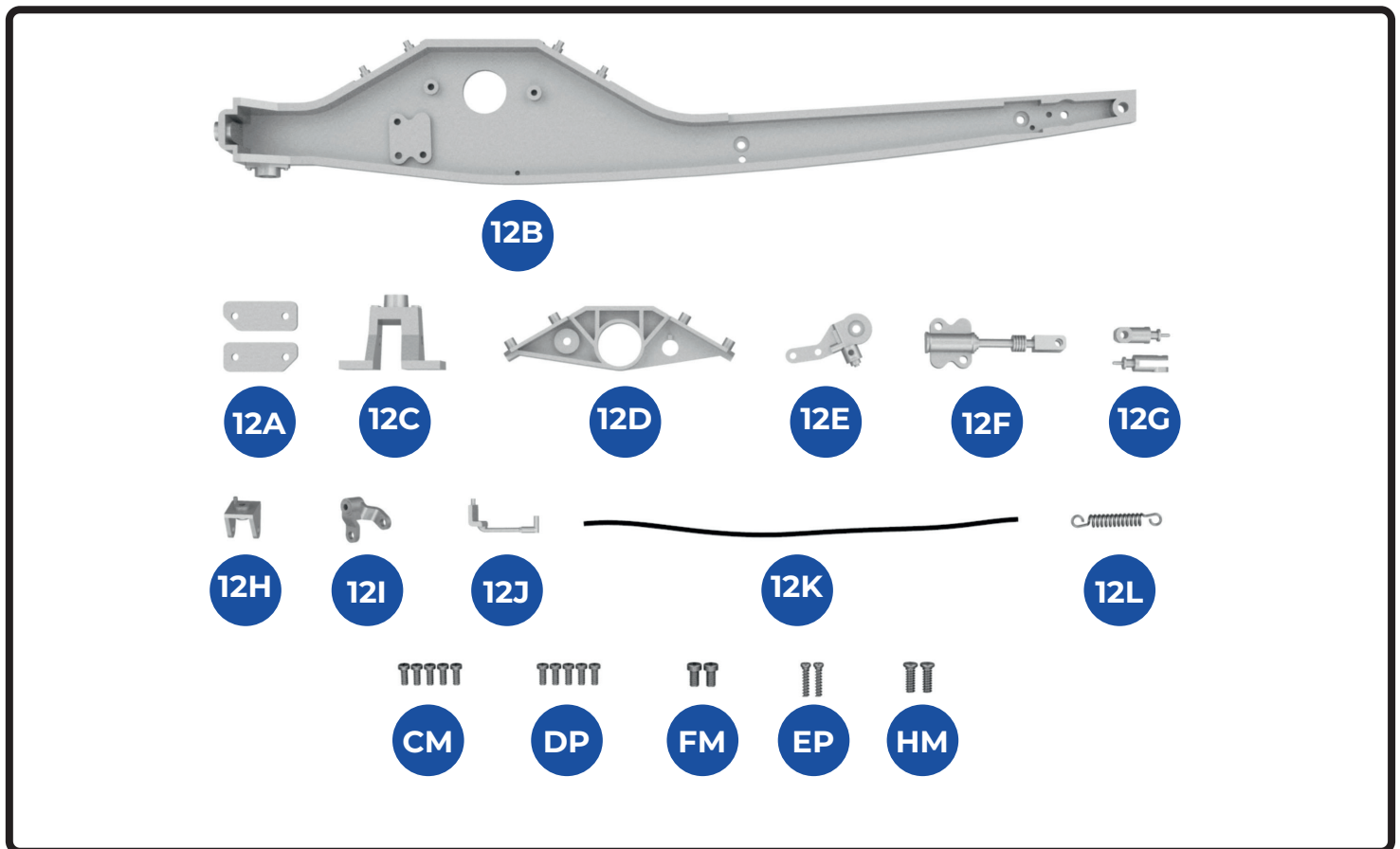
This completes the assembly of the steering mechanism, linking the two front wheels.



STAGE 12

LEFT REAR SUSPENSION ARM AND BRAKE MECHANISM

There is a brake mechanism attached to each of the rear suspension arms. In this stage, the parts for the left-hand side are supplied.

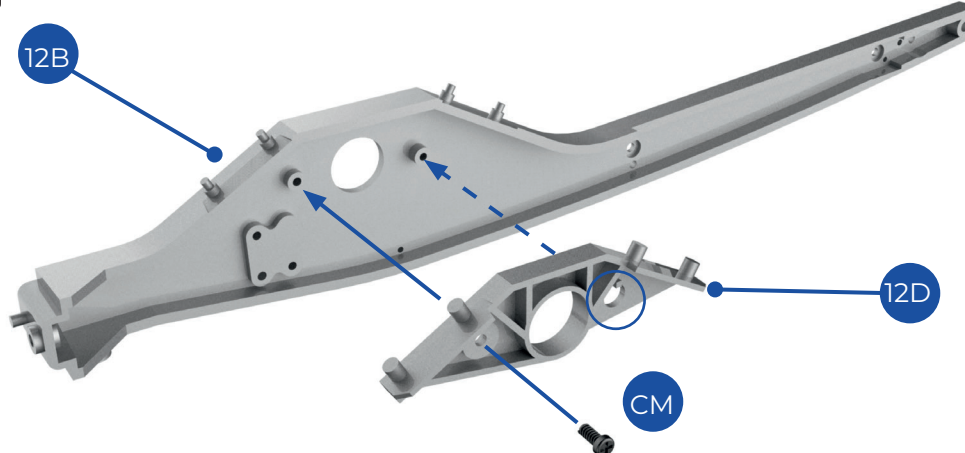


KEY TO PARTS SUPPLIED

12A	Shock damper (x2)	12J	Stiffener
12B	Left rear suspension arm	12K	Brake line
12C	Suspension hinge	12L	Return spring
12D	Left brake mount		
12E	Brake lever	CM	1.7 x 4mm (x5)
12F	Brake cylinder	DP	1.7 x 4mm (x5)
12G	Brake line connector (x2)	FM	2.3 x 4mm (x2)
12H	Bracket	EP	1.7 x 7mm (x2)
12I	Control lever	HM	2.3 x 6mm (x2)

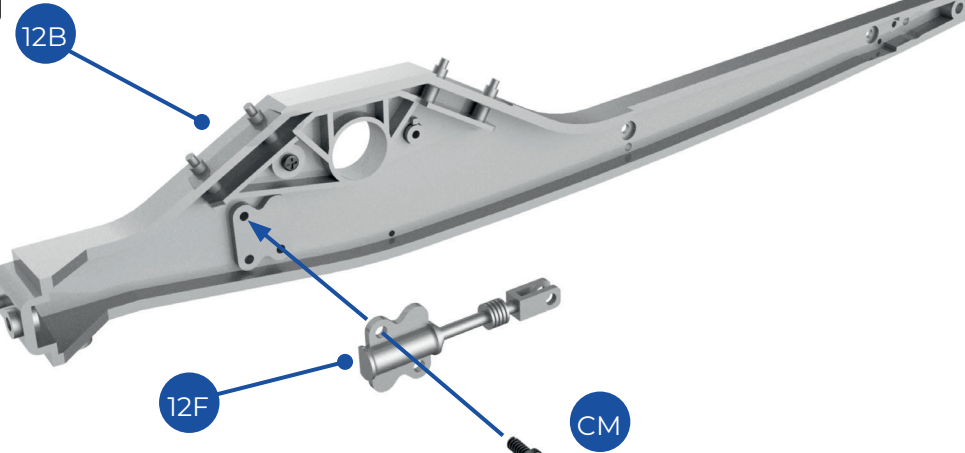
 The CM and DP screws are the same length and diameter. However, the CM screws have a fine machine thread to go into metal, while the DP screws are self-tapping screws for plastic. Store them separately.

1



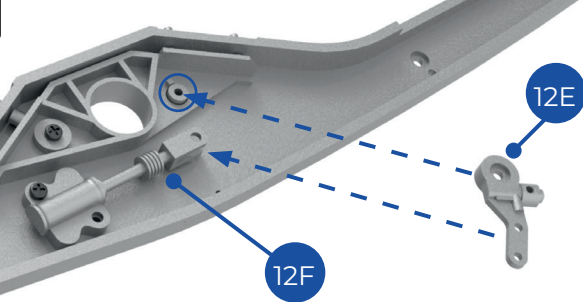
1 Take the left rear suspension arm (12B) and the left brake mount (12D). Position part 12D on part 12B so that the raised screw sockets on 12B fit through the holes in part 12D. Fix in place, using a single CM screw through the left-hand fixing point, as indicated. Do not fix the right-hand side (circled) at this stage.

2



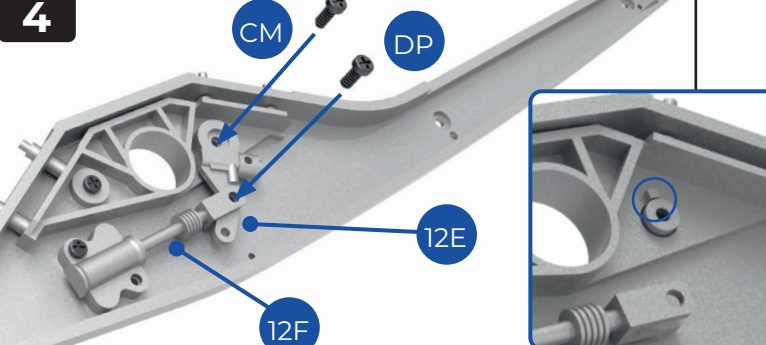
2 Take the brake cylinder (12F) and position it on the raised part of the left rear suspension arm (12B). Fix in place with a single CM screw through the top left-hand hole of part 12F.

3



3 Take the brake lever (12E) and check that the orientation matches the illustration. Position the circular socket of part 12E over the screw socket that protrudes through the hole in part 12D (circled). Swing the lower part of 12E so that it slides between the arms of part 12F, and the middle screw hole on part 12E is aligned with the holes in part 12F.

4



4 Fit the top of part 12E so that the raised notch (circled in inset) on part 12B is located in the recess in part 12E. When part 12E is in the correct position, fix it in place, using a CM screw at the top and a DP screw through the arms of part 12F.

5

5 Take one brake line connector (12G) and position it so that the flange on part 12E fits between the arms of part 12G (where the screw sockets are).

NOTE: The raised screw socket on part 12G should be uppermost (inset, top). Take the return spring (12L) and check that you have it the right way round, as shown in the inset (right). Position it so that one end is aligned with the free hole in the brake cylinder (12F) and the other end is aligned with the screw hole in part 12G. Fix in place with a CM screw on the left and a DP screw on the right.

6

6 Take the stiffener (12J) and position the pegs at each end so that the shorter end fits into the hole in the cylindrical peg on part 12E. The longer end should fit comfortably into the hole in part 12B (circled).

NOTE: These are push-fit fixings.

7

7 Take the hollow brake line (12K). It will run along the length of the suspension arm (12B). Fit one end of part 12K over the pin at the end of the brake line connector (12G).

8

8 Fit the bracket (12H) to the suspension arm (12B) so that the locating pin goes into the hole in the suspension arm (circled). Secure in place from the other side of part 12B using a DP screw.

9

9 Position the control lever (12I) between the flanges on the bracket (12H), checking that you have it in the correct orientation, as shown. Fix in place from below using an EP screw.

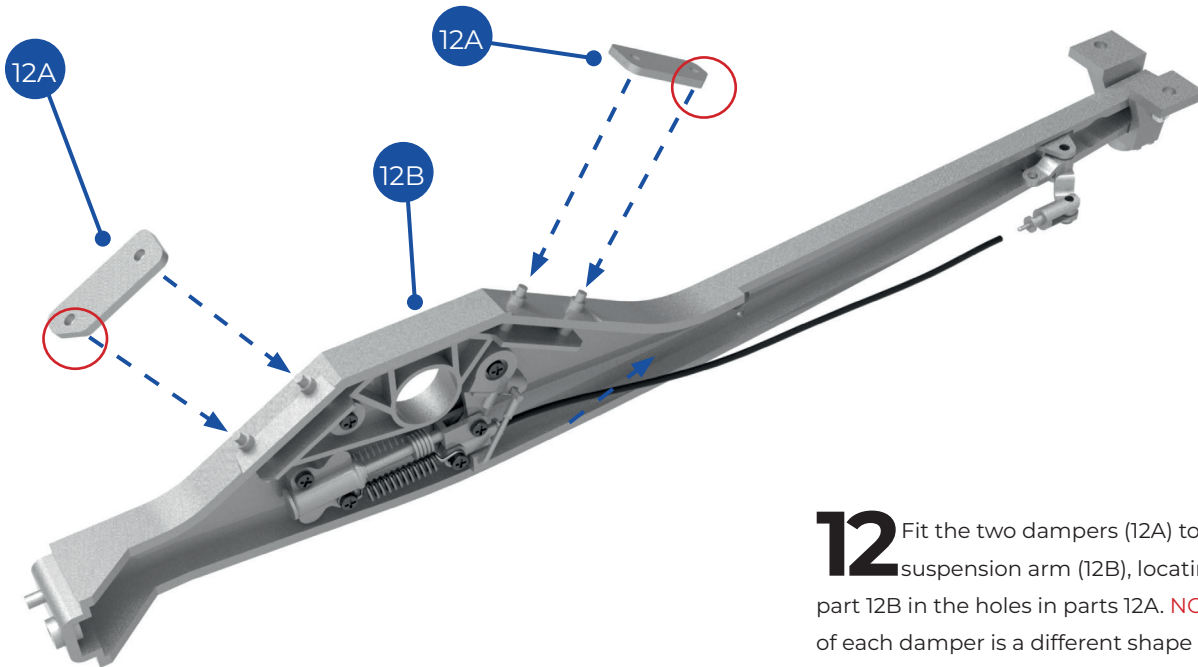
10

10 Slip the two arms of the second brake line connector (12G) over the lower arm of the control lever (12I) so that the holes are aligned. Fix in place from below using a DP screw. **NOTE:** Check that you have the second brake line connector the right way up – the raised socket should face downwards (inset).

11

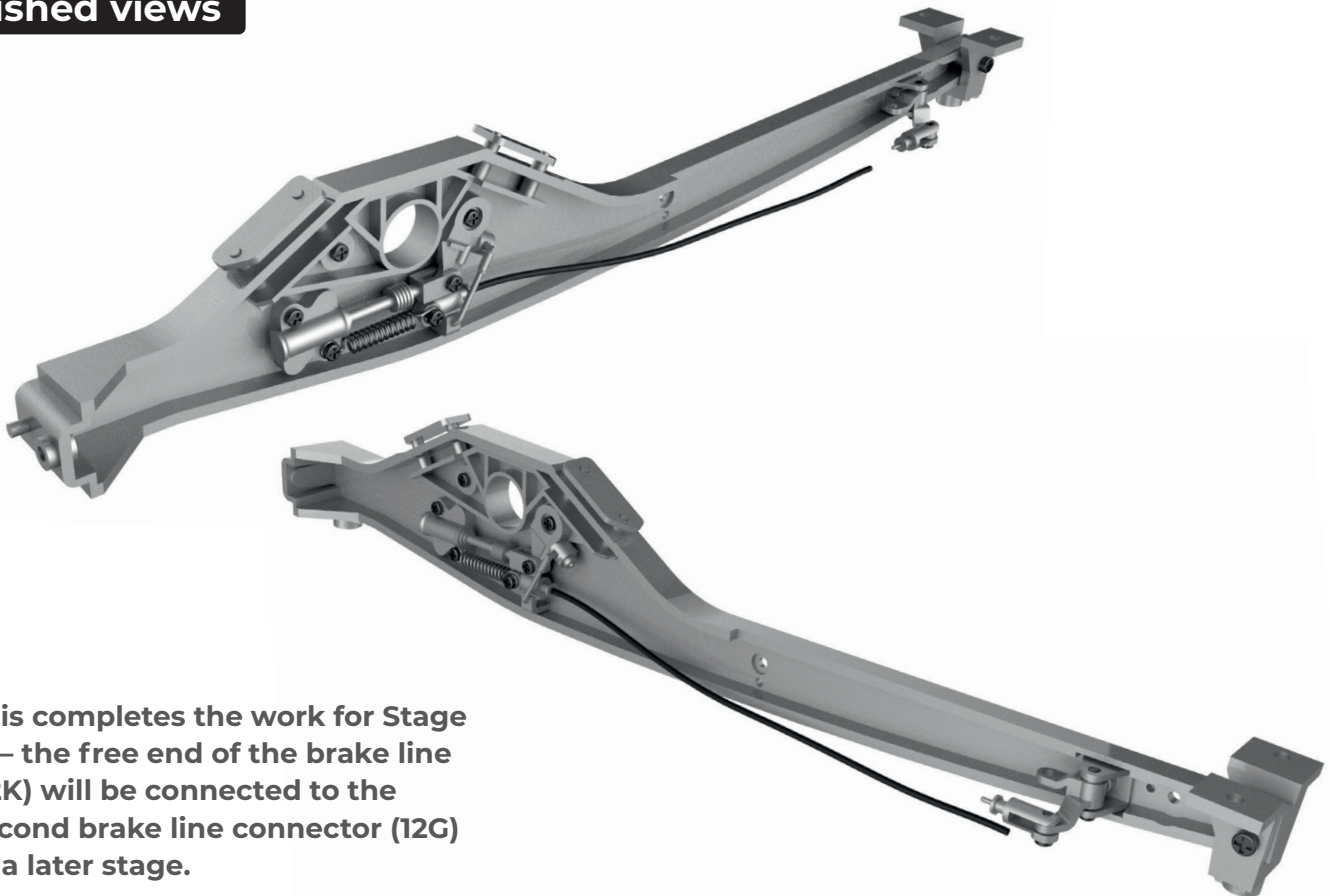
11 Position the suspension hinge (12C) over the end of the suspension arm (12B) as shown. Check that the holes on either side of part 12C align with the holes in part 12B. Fix in place from the inner side with an FM screw and from the outer side with an HM screw. **NOTE:** Make sure you position the bracket the right way round. When fitted, the sides of the bracket should be flush with the end of the arm. The sloped side of the bracket (circled, inset) is away from the end of the arm.

12



12 Fit the two dampers (12A) to the top of the suspension arm (12B), locating the pegs in part 12B in the holes in parts 12A. **NOTE:** One corner of each damper is a different shape (circled in red). These are push-fit connections.

Finished views

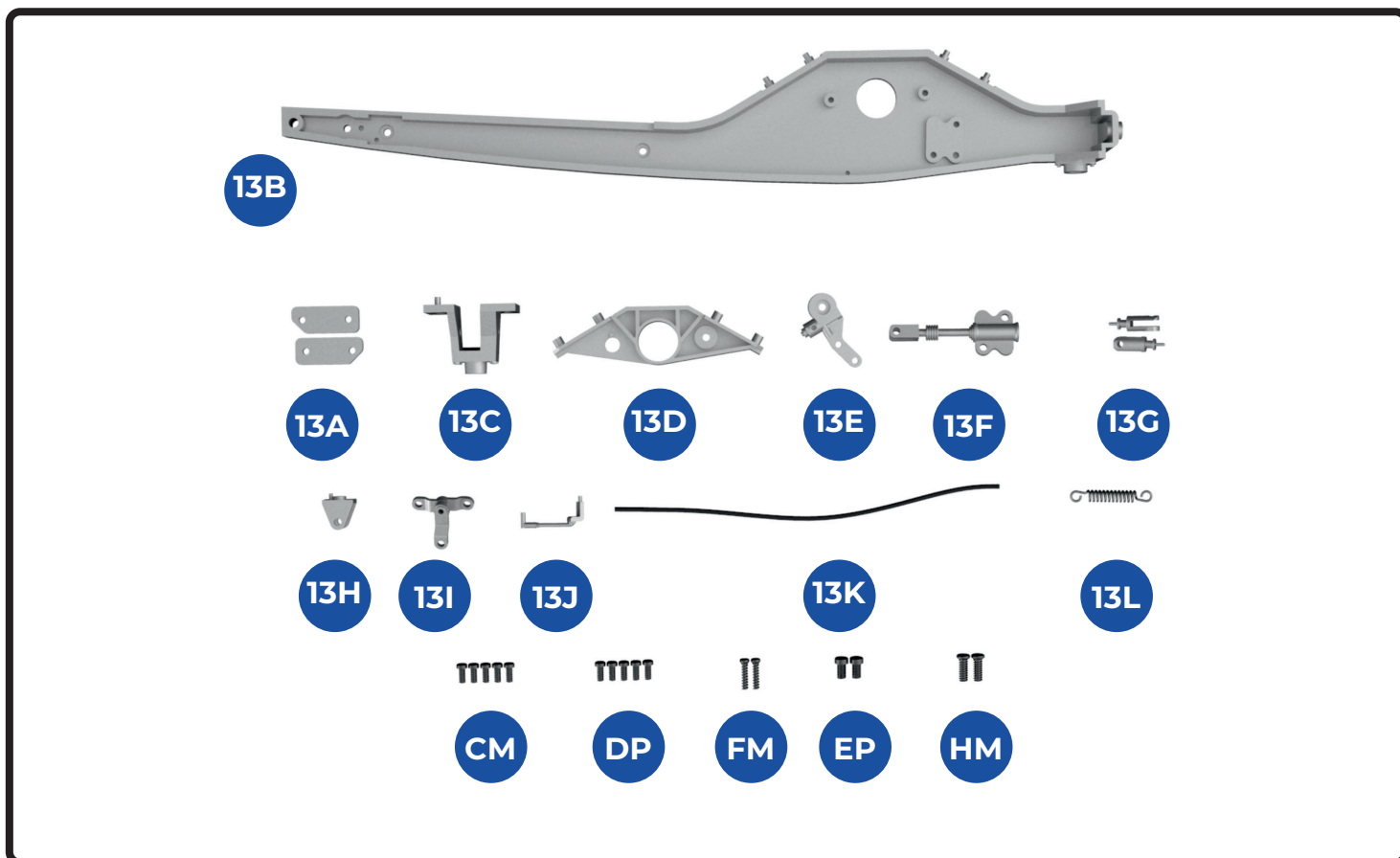


This completes the work for Stage 12 – the free end of the brake line (12K) will be connected to the second brake line connector (12G) at a later stage.

STAGE 13

RIGHT REAR SUSPENSION ARM AND BRAKE MECHANISM

With this stage, we supply the right-hand brake mechanism, which is attached to the right rear suspension arm in a similar way to the brake mechanism on the left-hand side.

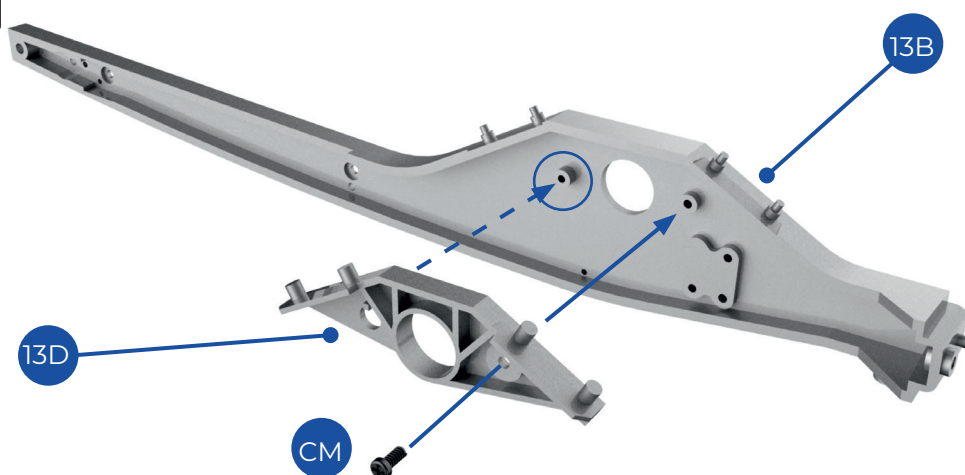


KEY TO PARTS SUPPLIED

13A Shock damper (x2)	13J Stiffener
13B Right rear suspension arm	13K Brake line
13C Suspension hinge	13L Return spring
13D Right brake mount	CM 1.7 x 4mm (x5)
13E Brake lever	DP 1.7 x 4mm (x5)
13F Brake cylinder	FM 2.3 x 4mm (x2)
13G Brake line connector (x2)	EP 1.7 x 7mm (x2)
13H Bracket	HM 2.3 x 6mm (x2)
13I Control lever	

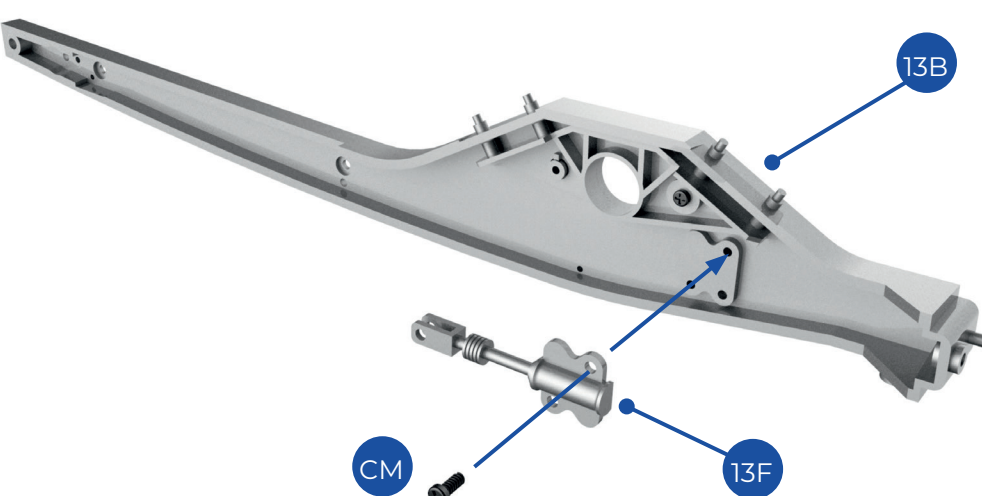
✓ Although these instructions are very similar to Stage 12, there are some subtle differences. Most of the pieces are mirror images of those supplied with Stage 12. Keep the parts for each stage separate and carefully labelled until you assemble them.

1



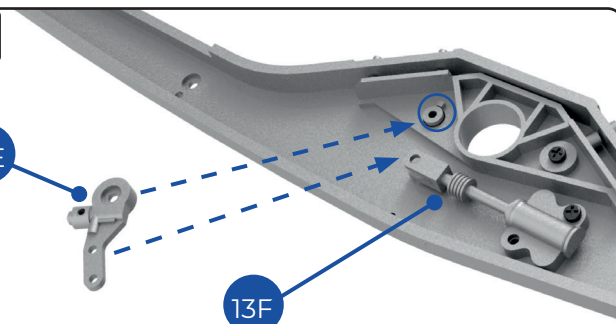
1 Take the right rear suspension arm (13B) and the right brake mount (13D). Position part 13D on part 13B so that the raised screw sockets on 13B fit through the holes in part 13D. Fix in place, using a single CM screw through the right-hand fixing point, as indicated. Do not fix the left-hand side (circled) at this stage.

2



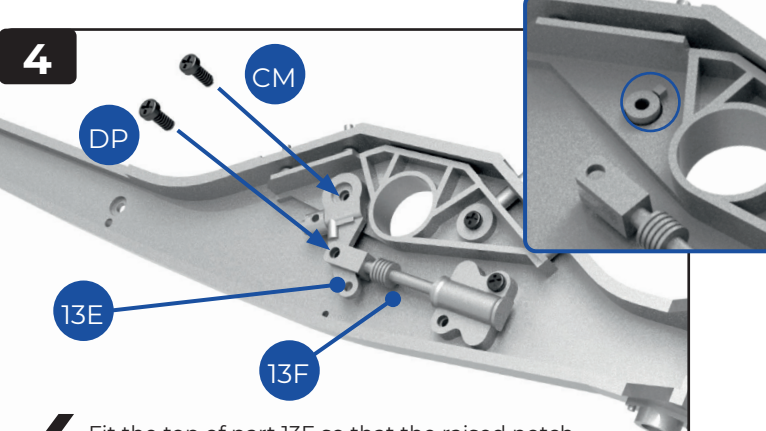
2 Take the brake cylinder (13F) and position it on the raised part of the right rear suspension arm (13B). Fix in place with a single CM screw through the top right-hand hole of part 13F.

3



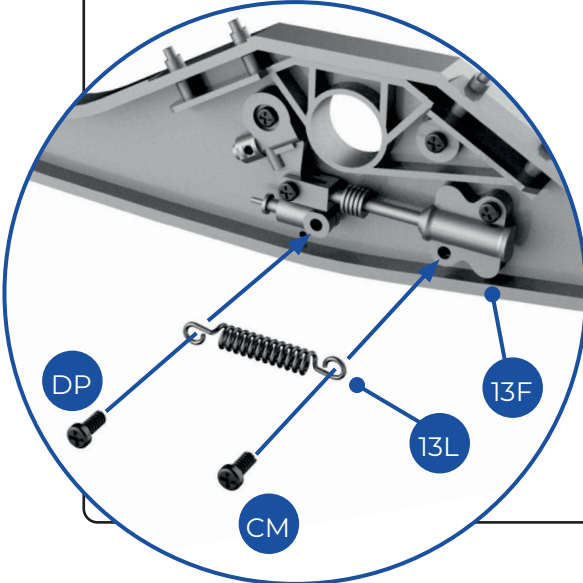
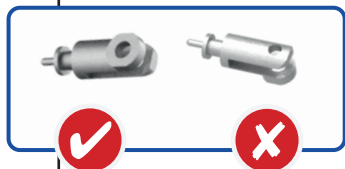
3 Take the brake lever (13E) and check that the orientation matches the illustration. Position the circular socket of part 13E over the screw socket that protrudes through the hole in part 13D (circled). Swing the lower part of 13E so that it slides between the arms of part 13F, and the middle screw hole on part 13E is aligned with the holes in part 13F.

4



4 Fit the top of part 13E so that the raised notch (circled in inset) on part 13B is located in the recess in part 13E. When part 13E is in the correct position, fix it in place, using a CM screw at the top and a DP screw through the arms of part 13F.

5



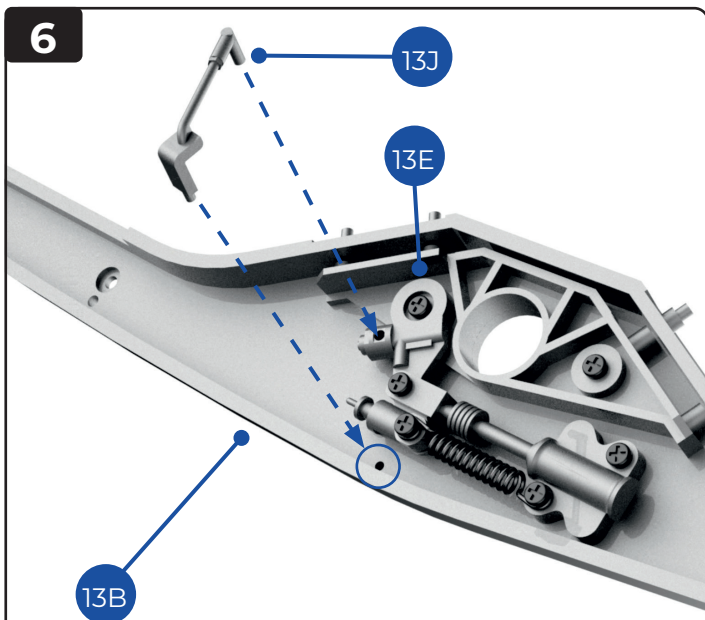
5 Take one brake line connector (13G) and position it so that the flange on part 13E fits between the arms of part 13G (where the screw sockets are).

NOTE: The raised screw socket on part 13G should be uppermost (inset, top). Take the return spring (13L) and check

that you have it the right way round, as shown in the inset (left). Position it so that one end is aligned with the free hole in the brake cylinder (13F) and the other end is aligned with the screw hole in part 13G. Fix in place with a CM screw on the right and a DP screw on the left.

Test fit a DP screw through the screw holes in part 13G to ensure that it will screw in easily when you secure the spring (13L)

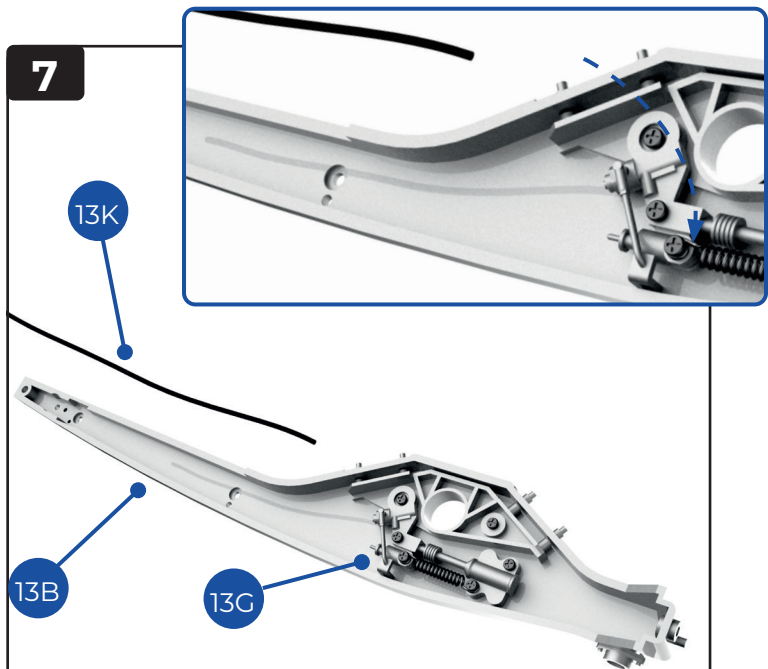
6



6 Take the stiffener (13J) and position the pegs at each end so that the shorter end fits into the hole in the cylindrical peg on part 13E. The longer end should fit comfortably into the hole in part 13B (circled).

NOTE: These are push-fit fixings.

7



7 Take the hollow brake line (13K). It will run along the length of the suspension arm (13B). Fit one end of part 13K over the pin at the end of the brake line connector (13G).

8

8 Fit the bracket (13H) to the suspension arm (13B) so that the locating pin goes into the hole in the suspension arm (circled). Secure in place from the other side of part 13B using a DP screw.

9

9 Position the control lever (13I) between the flanges on the bracket (13H), checking that you have it in the correct orientation, as shown. Fix in place from above using an EP screw.

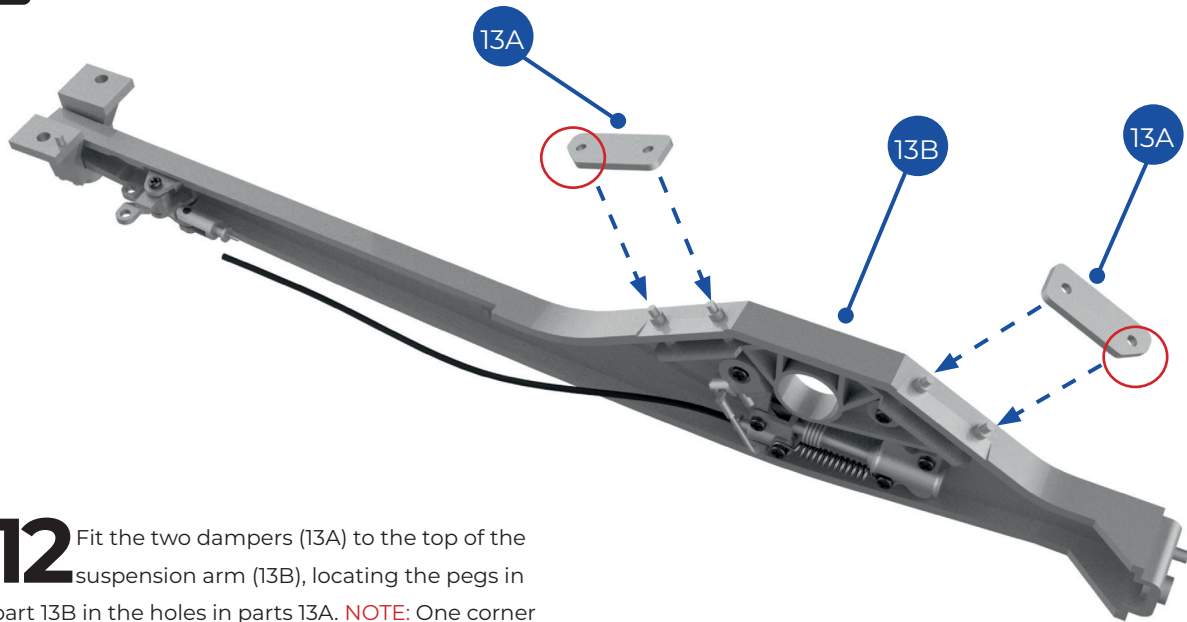
10

10 Slip the two arms of the second brake line connector (13G) over the lower arm of the control lever (13I) so that the holes are aligned. Fix in place from below using a DP screw. **NOTE:** Check that you have the second brake line connector the right way up – the raised socket should face downwards (inset).

11

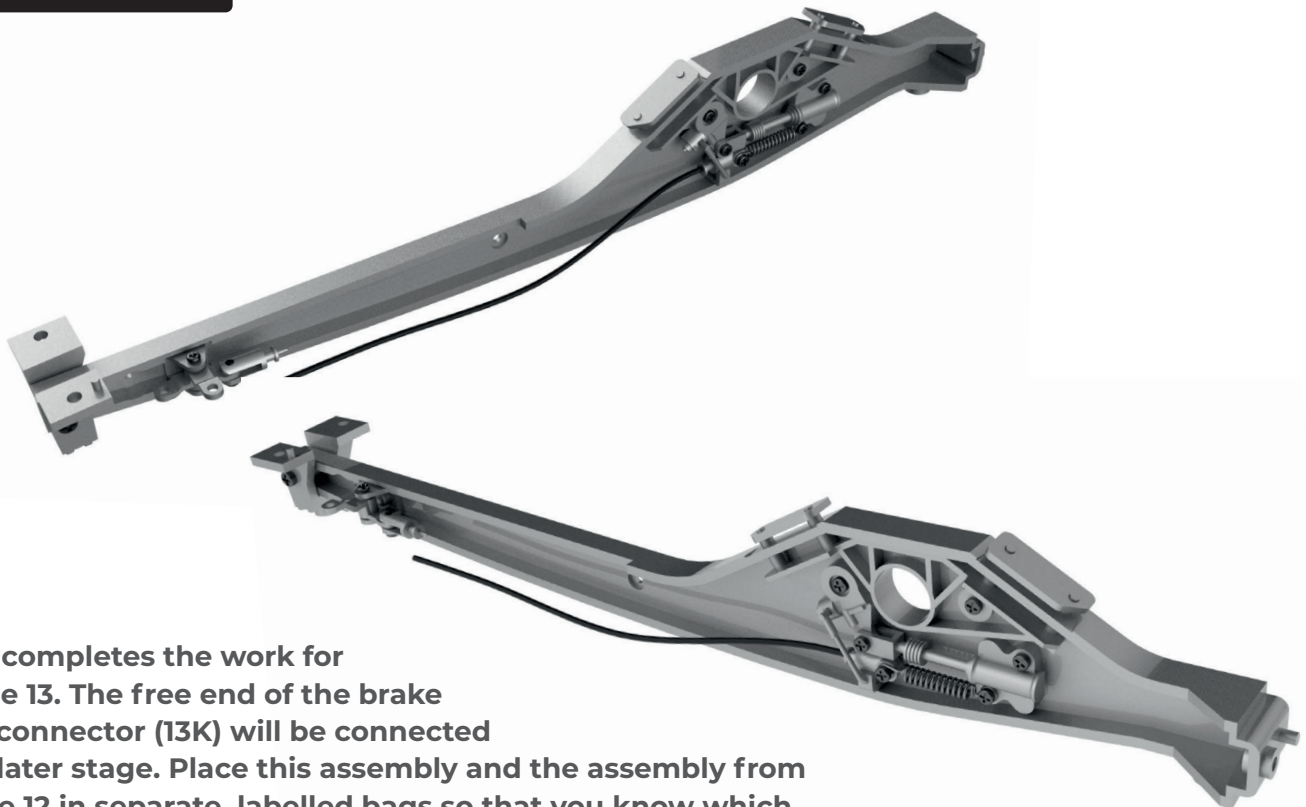
11 Position the suspension hinge (13C) over the end of the suspension arm (13B) as shown. Check that the holes on either side of part 13C align with the holes in part 13B. Fix in place from the inner side with an FM screw and from the outer side with an HM screw. **NOTE:** Make sure you position the bracket the right way round. When fitted, the sides of the bracket should be flush with the end of the arm. The sloped side of the bracket (circled, inset) is away from the end of the arm.

12



12 Fit the two dampers (13A) to the top of the suspension arm (13B), locating the pegs in part 13B in the holes in parts 13A. **NOTE:** One corner of each damper is a different shape (circled in red). These are push-fit connections.

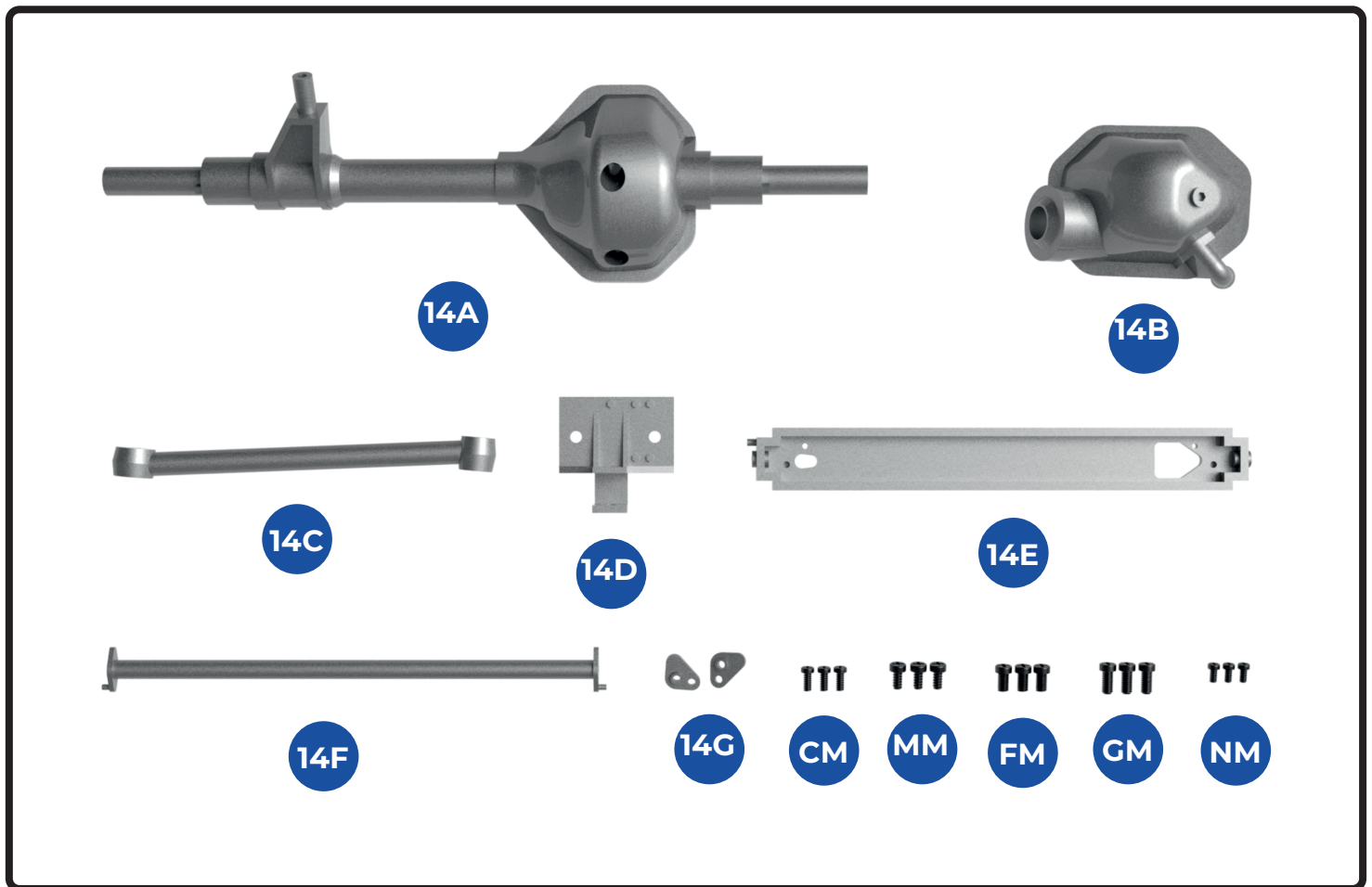
Finished views



This completes the work for Stage 13. The free end of the brake line connector (13K) will be connected at a later stage. Place this assembly and the assembly from stage 12 in separate, labelled bags so that you know which is the right and which is the left suspension arm.

STAGE 14 FITTING THE REAR AXLE

The rear axle creates the first link between the two suspension arms assembled in previous issues. The arms are also connected by two cross pieces.

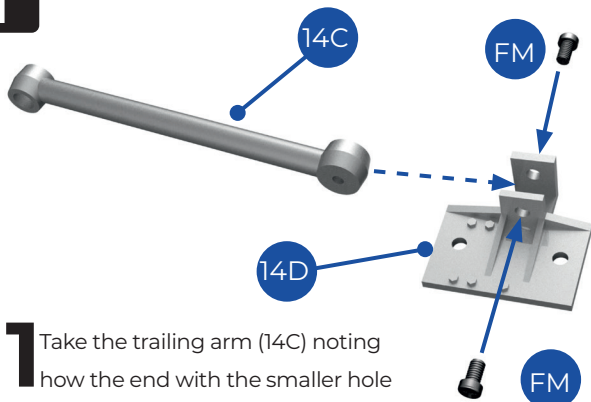


KEY TO PARTS SUPPLIED

14A	Rear axle	CM	1.7 x 4mm (x3)
14B	Differential cover	MM	2.0 x 4mm (x3)
14C	Trailing arm	FM	2.3 x 4mm (x3)
14D	Trailing arm base	GM	2.3 x 5mm (x3)
14E	Cross bar	NM	1.5 x 3mm (x3)
14F	Cross rod		
14G	Adaptor		

To make the instructions clearer, we use dotted lines in the diagrams to indicate that a piece is being positioned, but not fixed. Solid lines indicate that screws are being used to fix pieces in place.

1

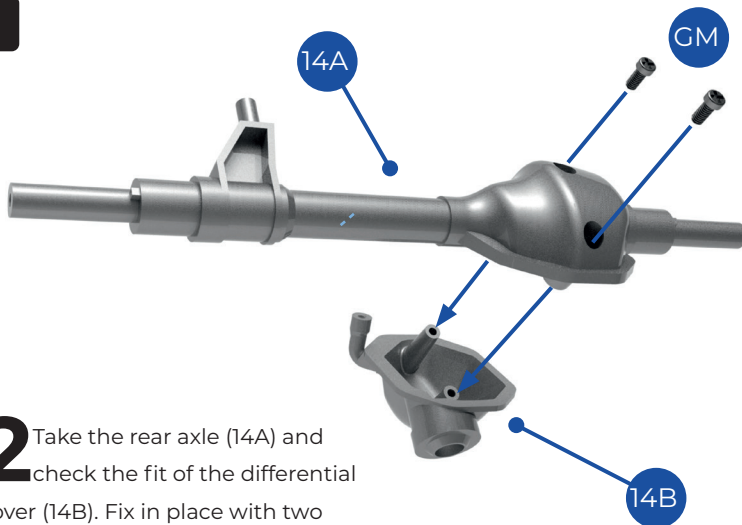


1 Take the trailing arm (14C) noting how the end with the smaller hole fits between the arms of the trailing arm base (14D) so that the arm is angled away from the base. After checking the orientation, fix in place with two FM screws.



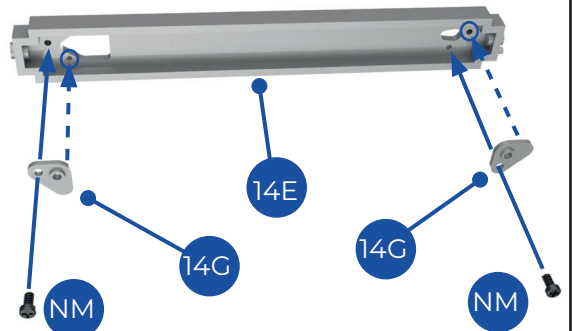
A view of the finished trailing arm, attached to its base. This will be fitted to the main structure later.

2



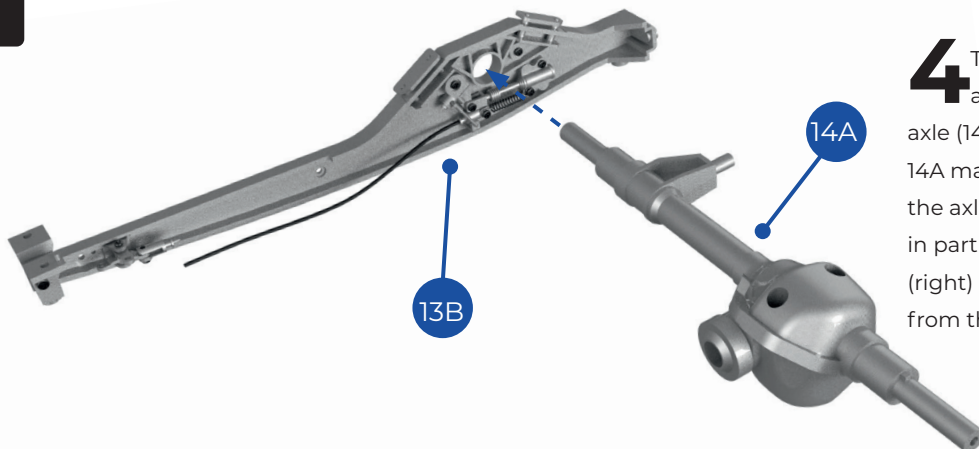
2 Take the rear axle (14A) and check the fit of the differential cover (14B). Fix in place with two GM screws.

3

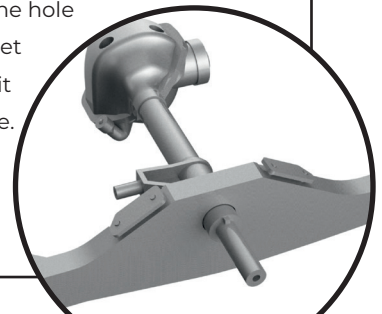


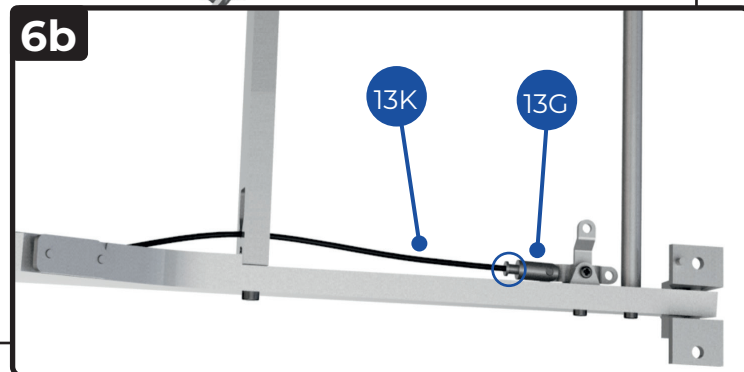
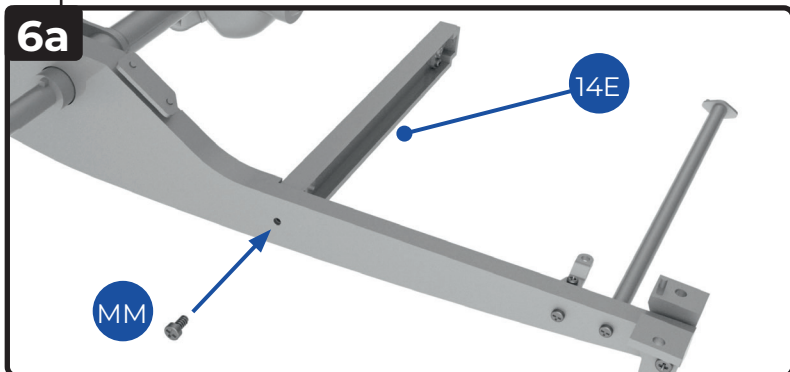
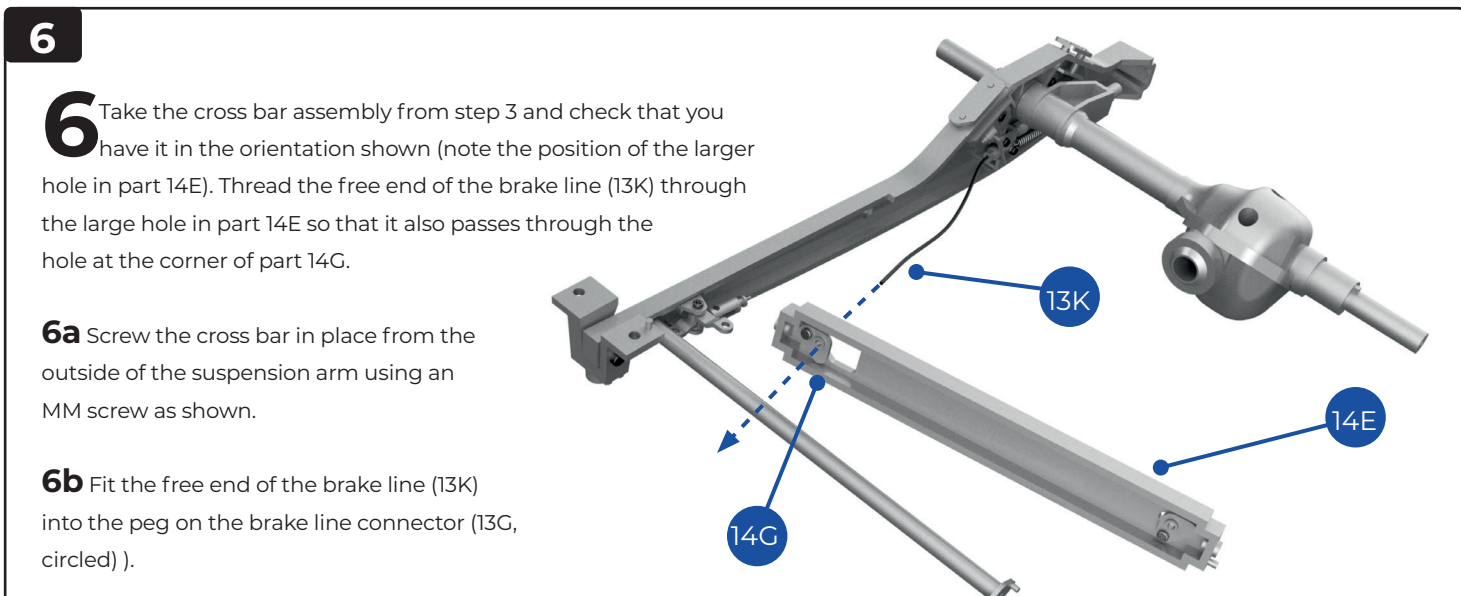
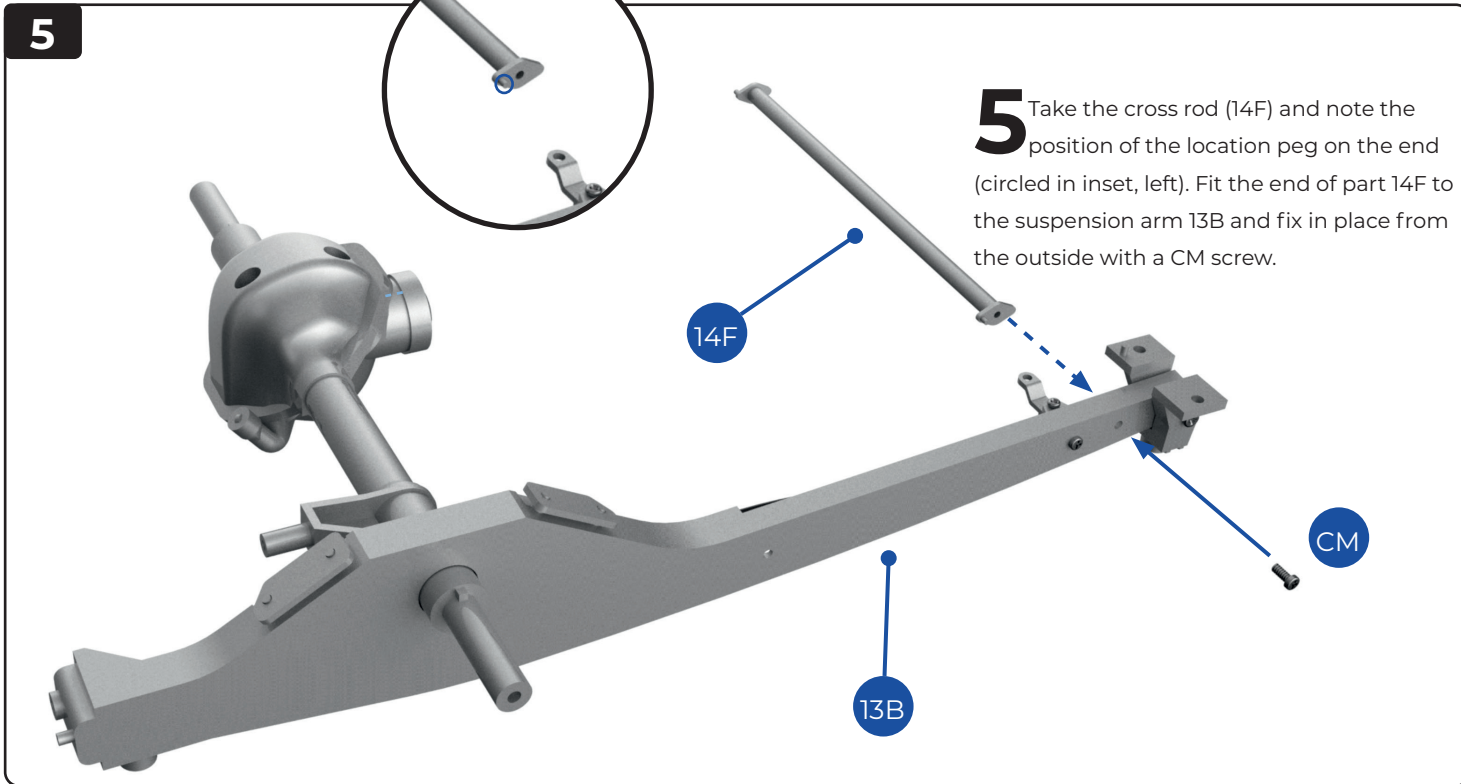
3 Take the cross bar (14E) and check the orientation matches the diagram. At each end, fit an adaptor (14G) with the locating pegs in the sockets (circled). Fix in place with two NM screws.

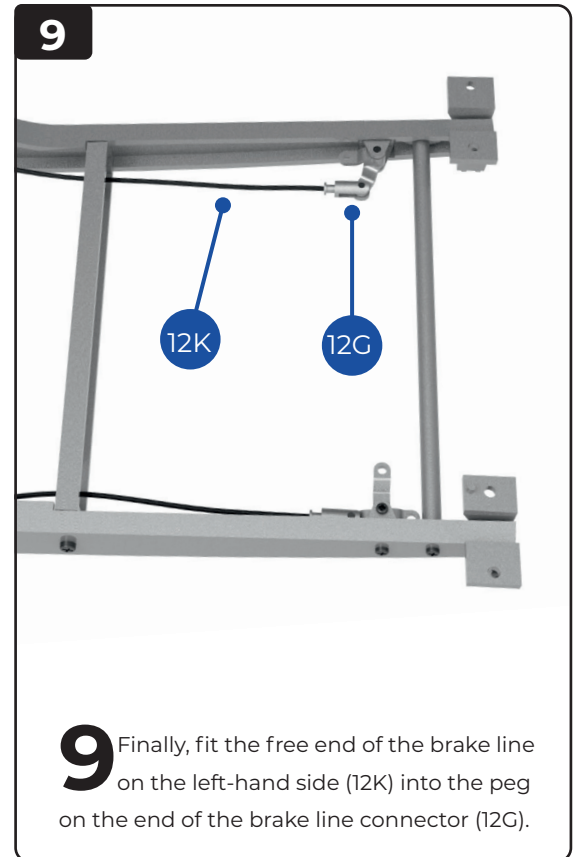
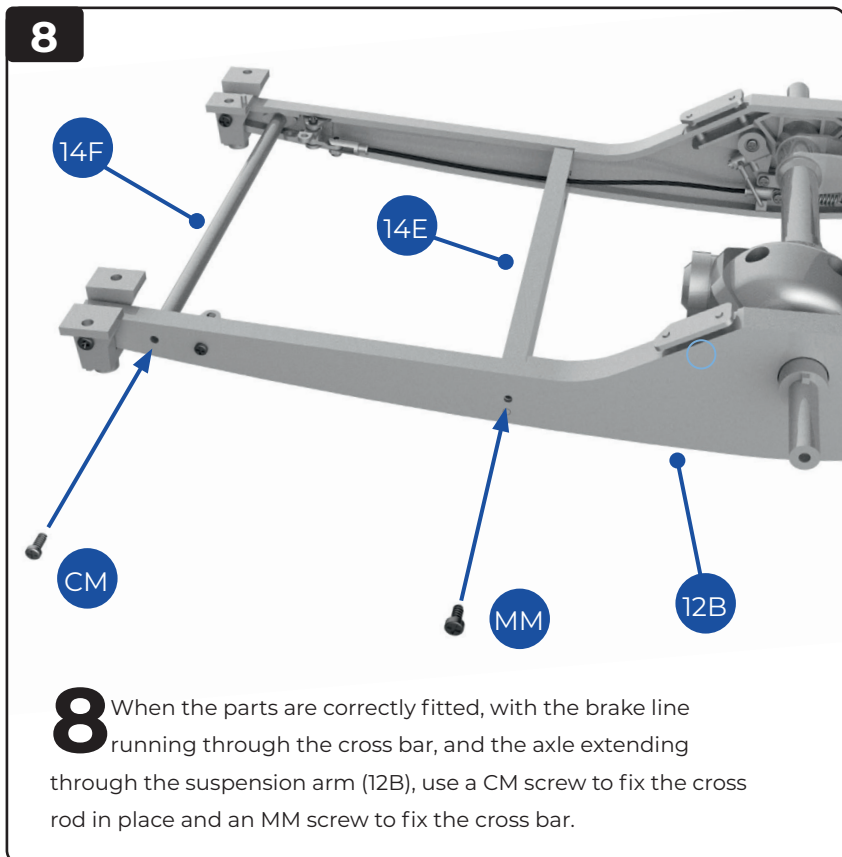
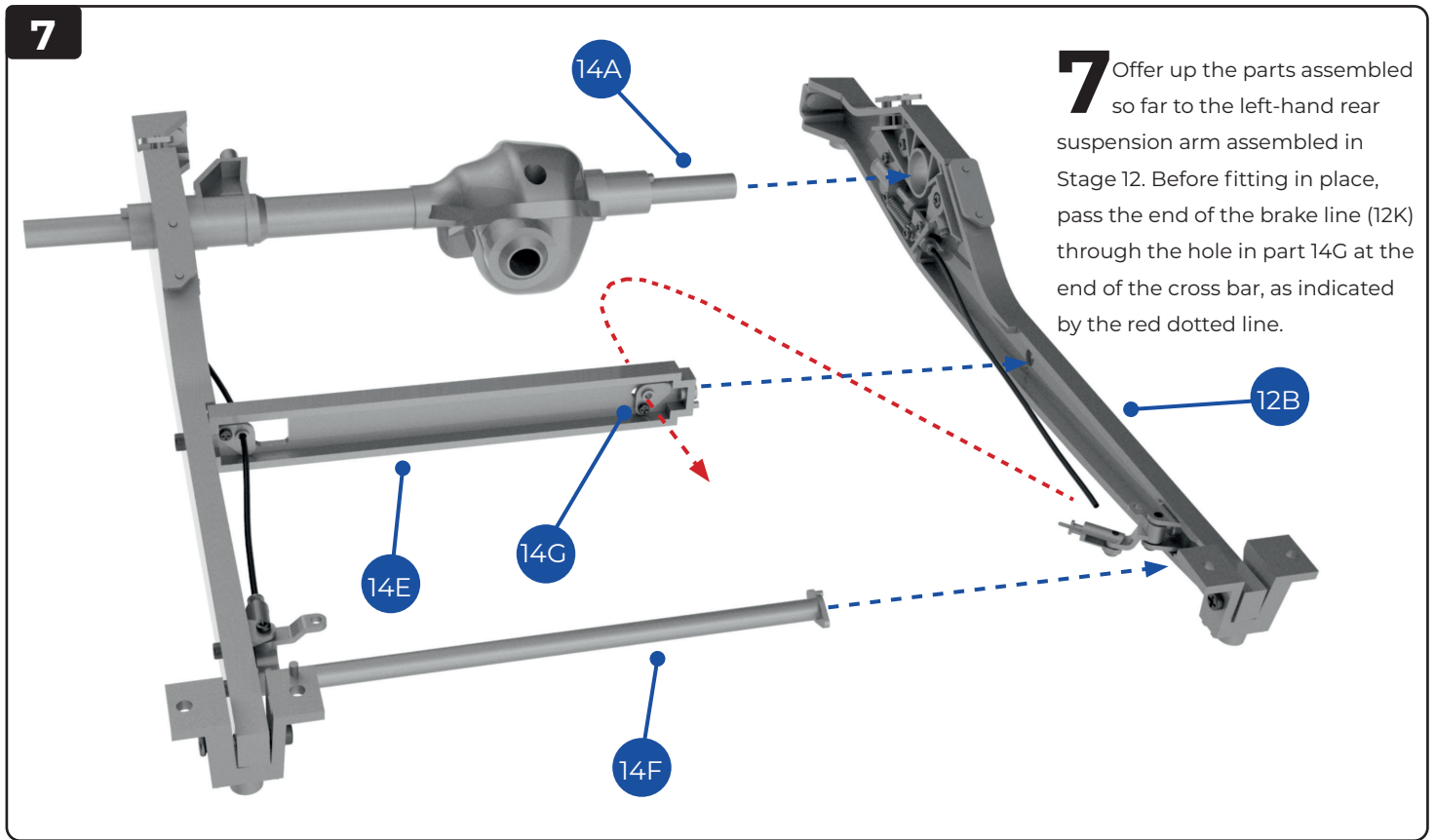
4



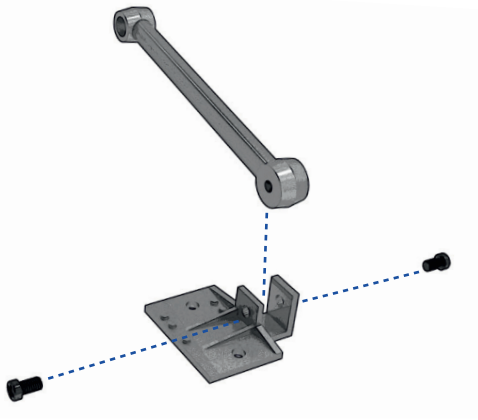
4 Take the right rear suspension arm, assembled in Stage 13 and the rear axle (14A). Check that the orientation of part 14A matches the diagram. Slip the end of the axle through the hole in part 13B. The inset (right) shows the fit from the other side.



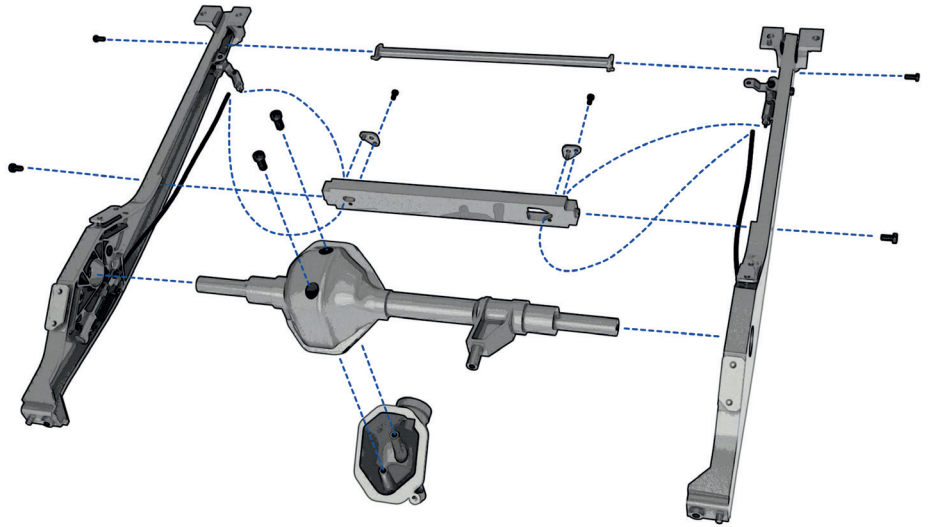




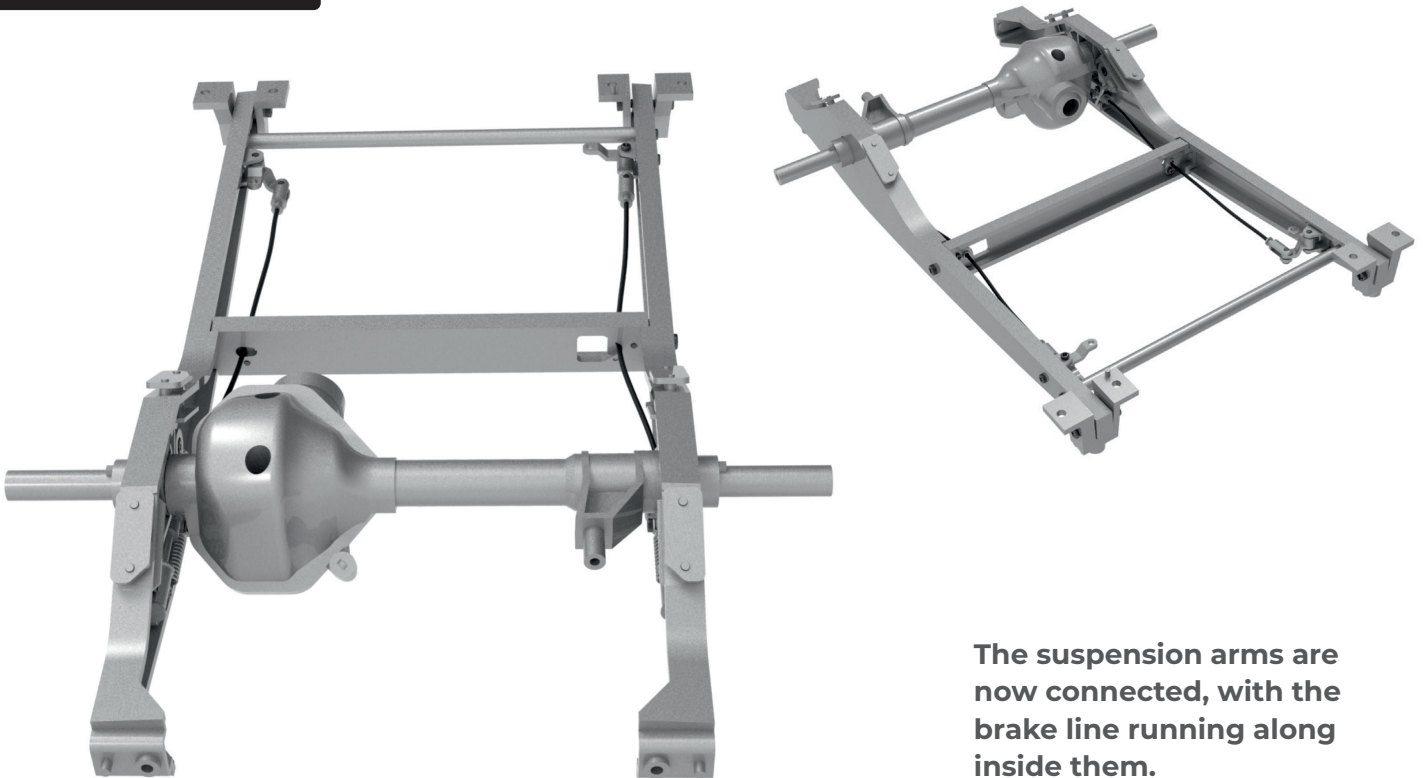
Assembly guide



These diagrams indicate the fixings that have been made, following the instructions in this stage.



Finished views

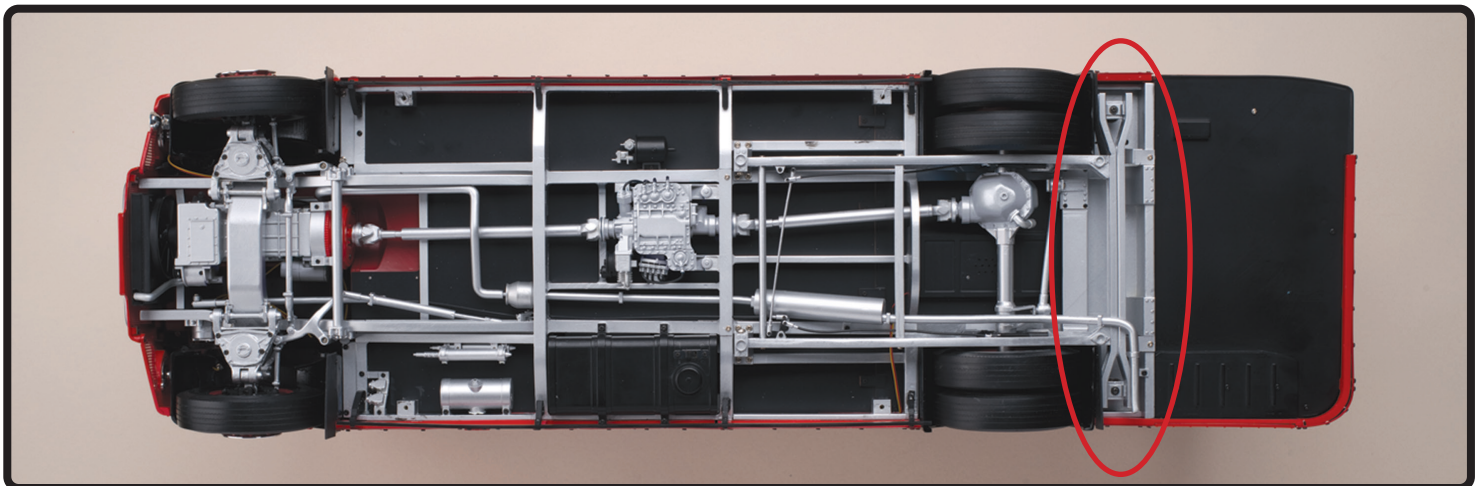
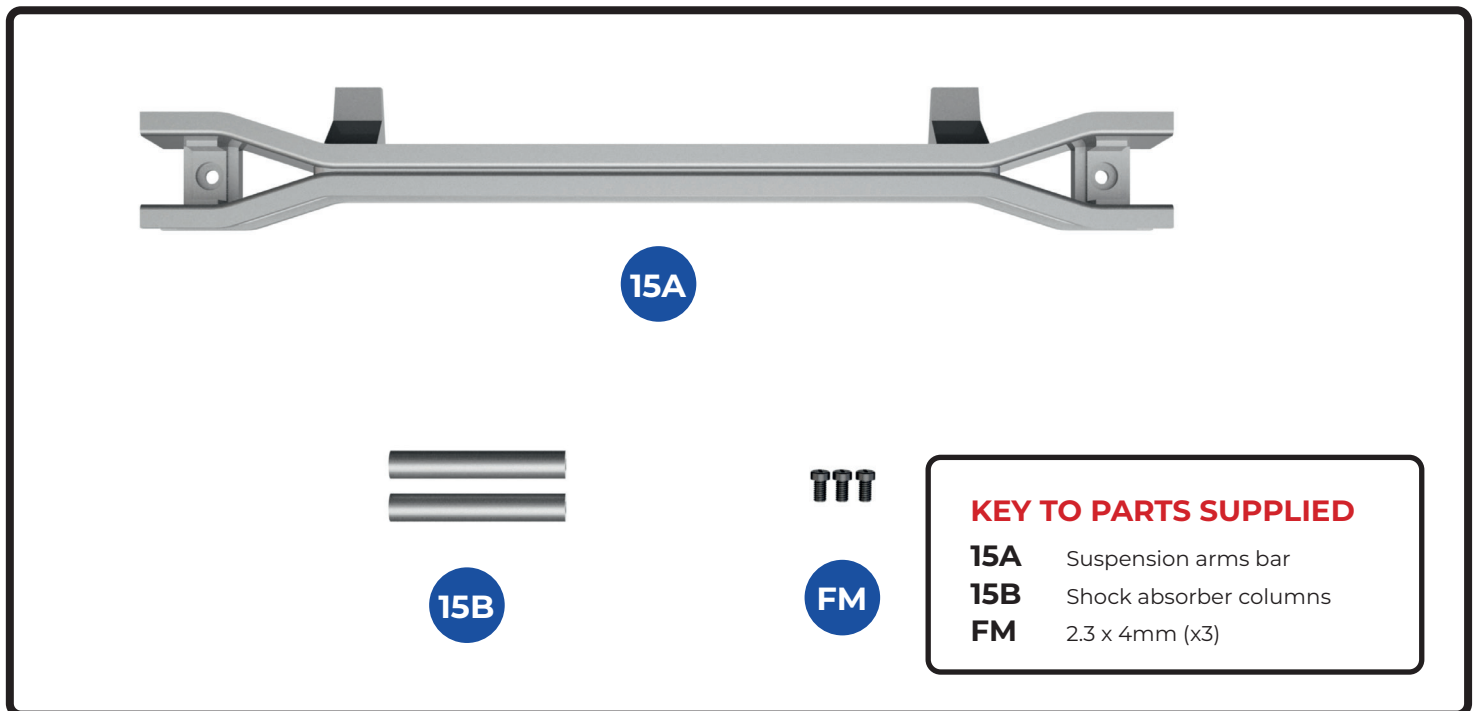


The suspension arms are now connected, with the brake line running along inside them.

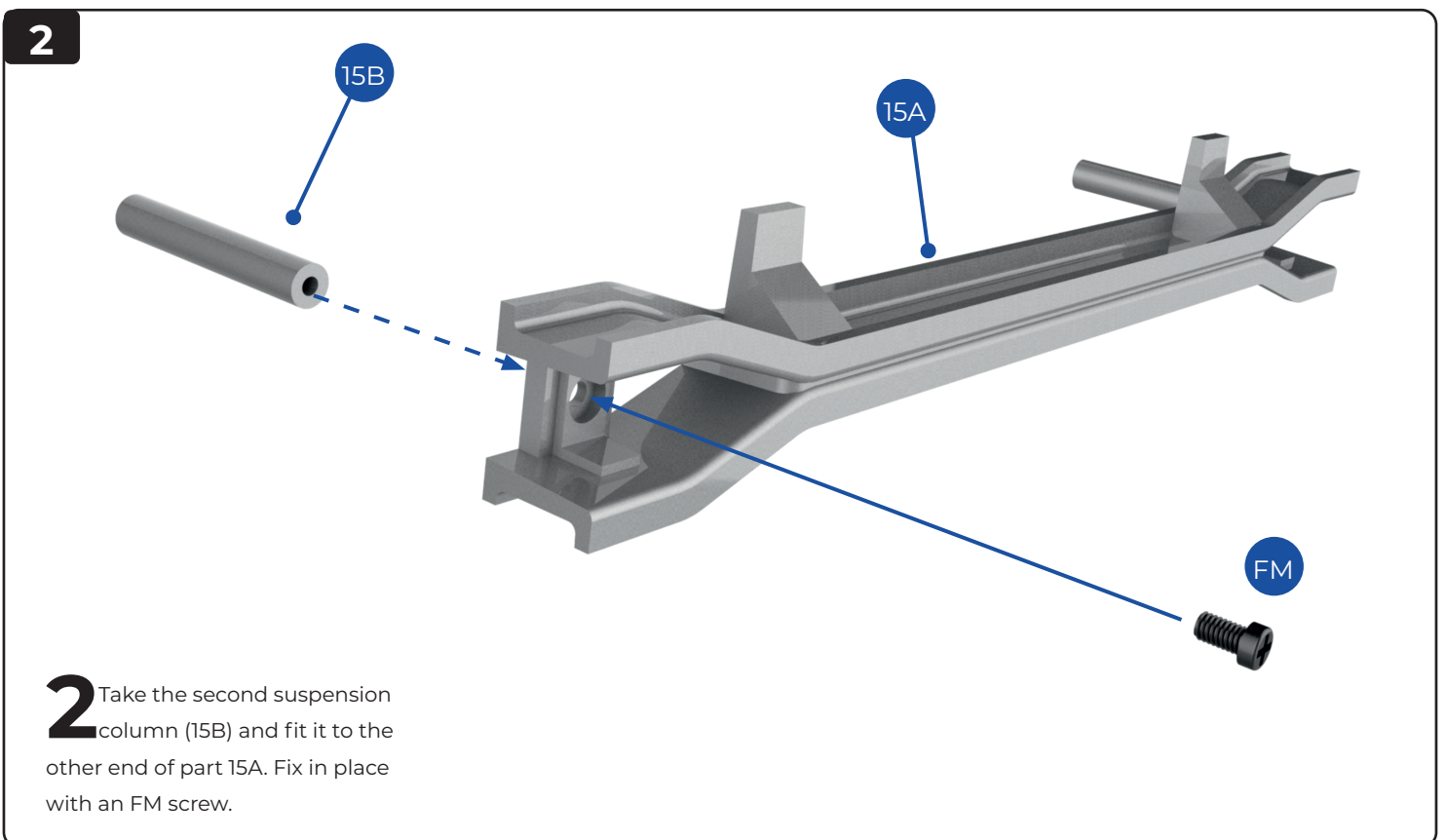
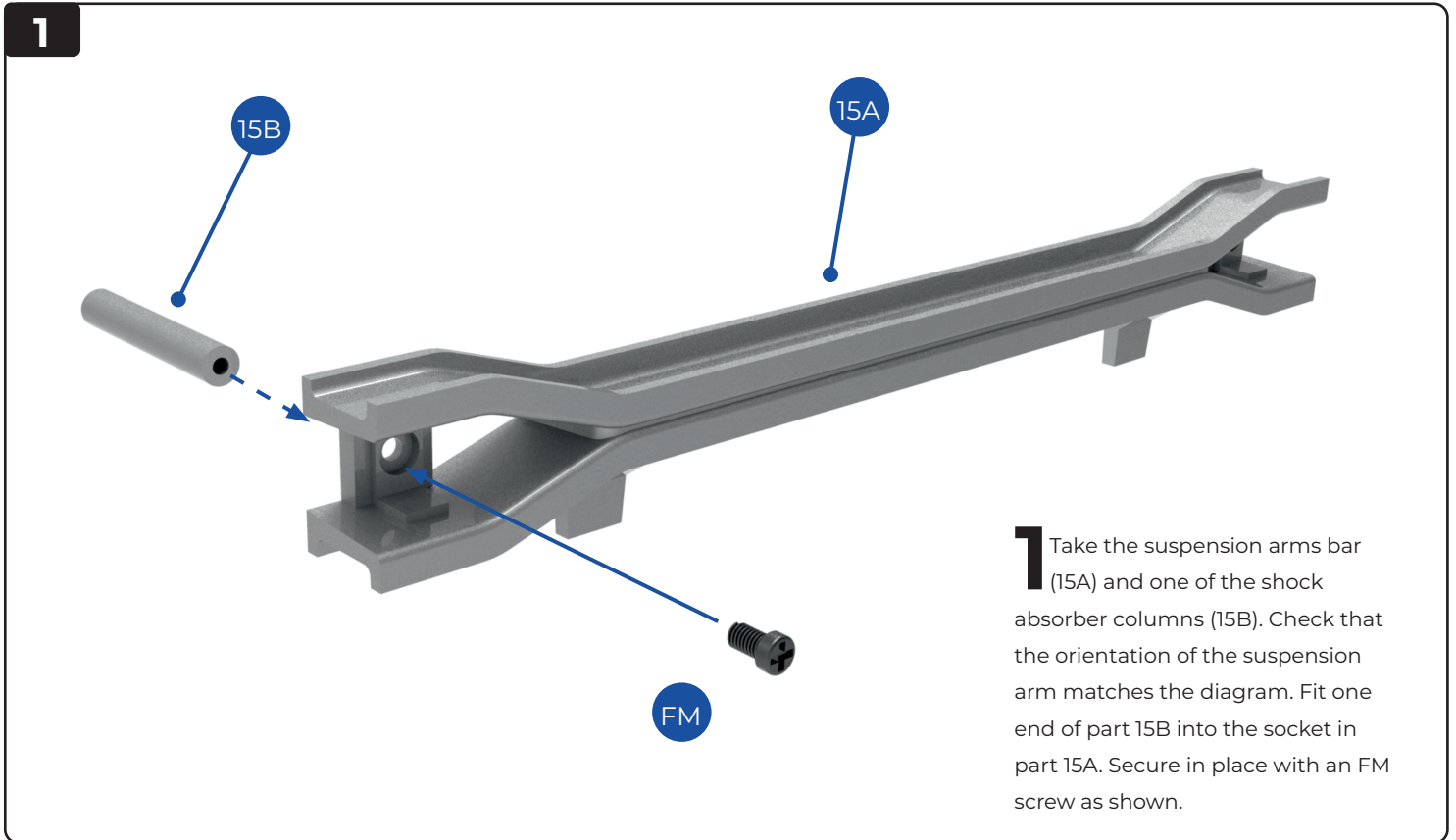
STAGE 15

ASSEMBLING THE SUSPENSION ARMS BAR

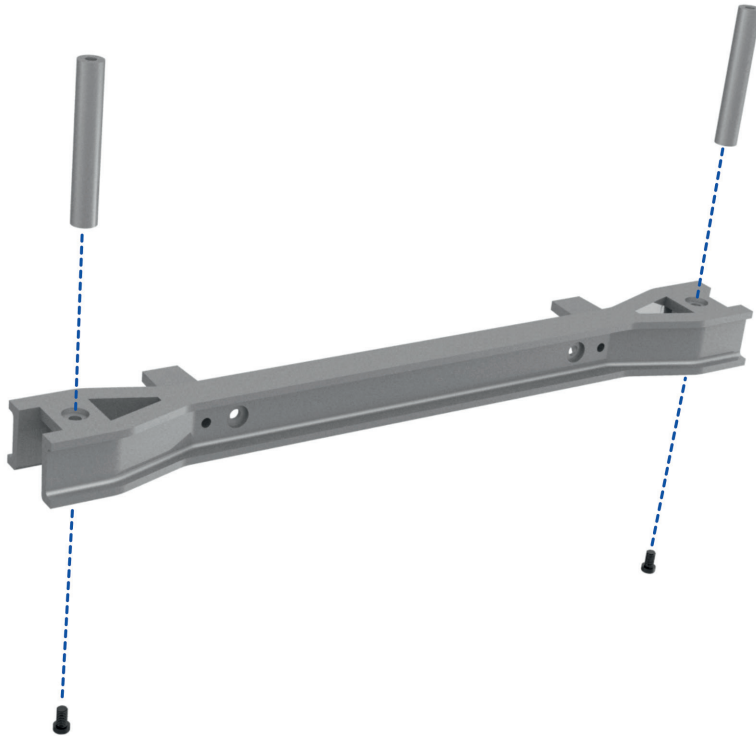
The suspension arms bar runs across the underside of the bus, towards the rear. We also give you a visual guide to the parts assembled so far.



The suspension arms bar (circled in red) will be fitted across the rear of the bus, behind the rear axle, in a later stage.



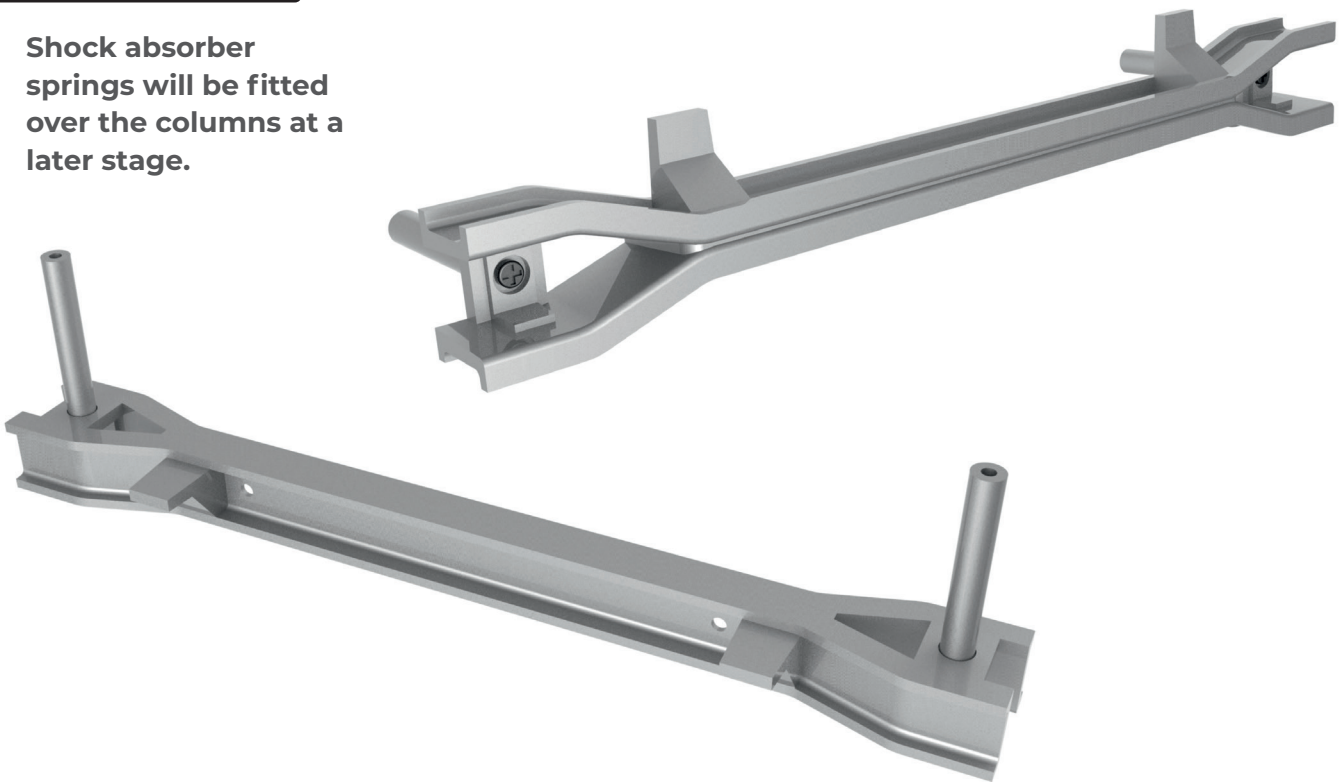
Assembly guide



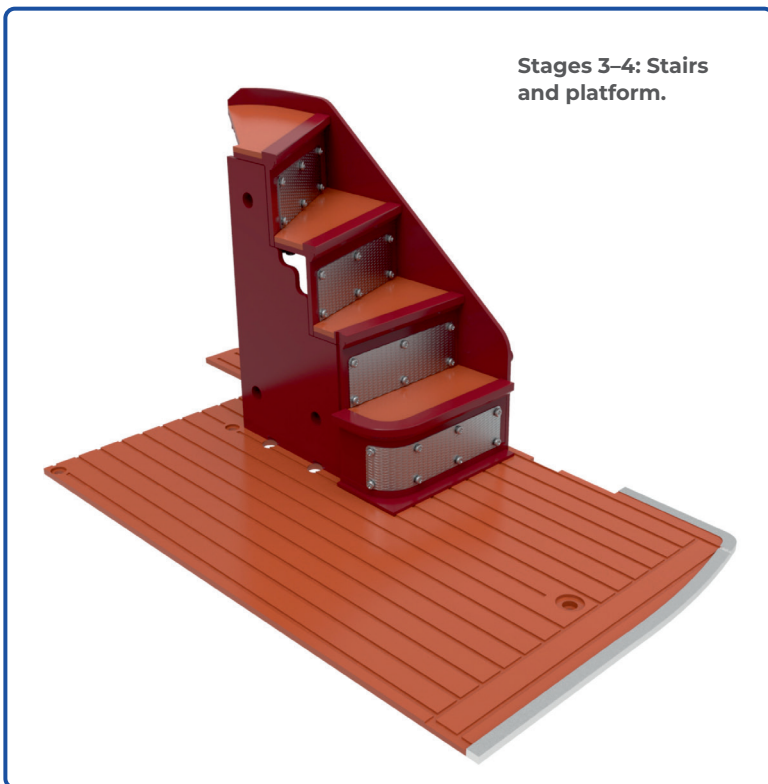
The assembly in this stage is straight forward, but it is important to have the suspension arm bar the right way round.

Finished views

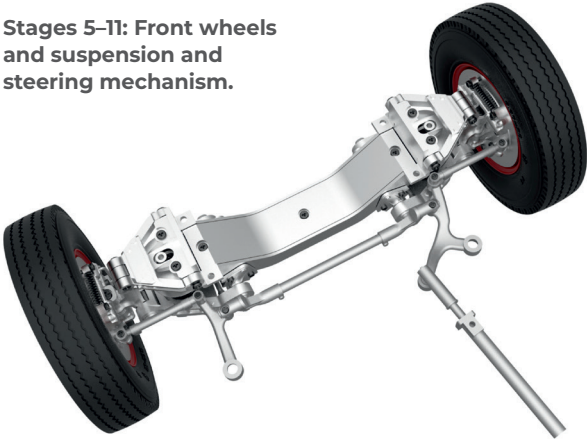
Shock absorber springs will be fitted over the columns at a later stage.



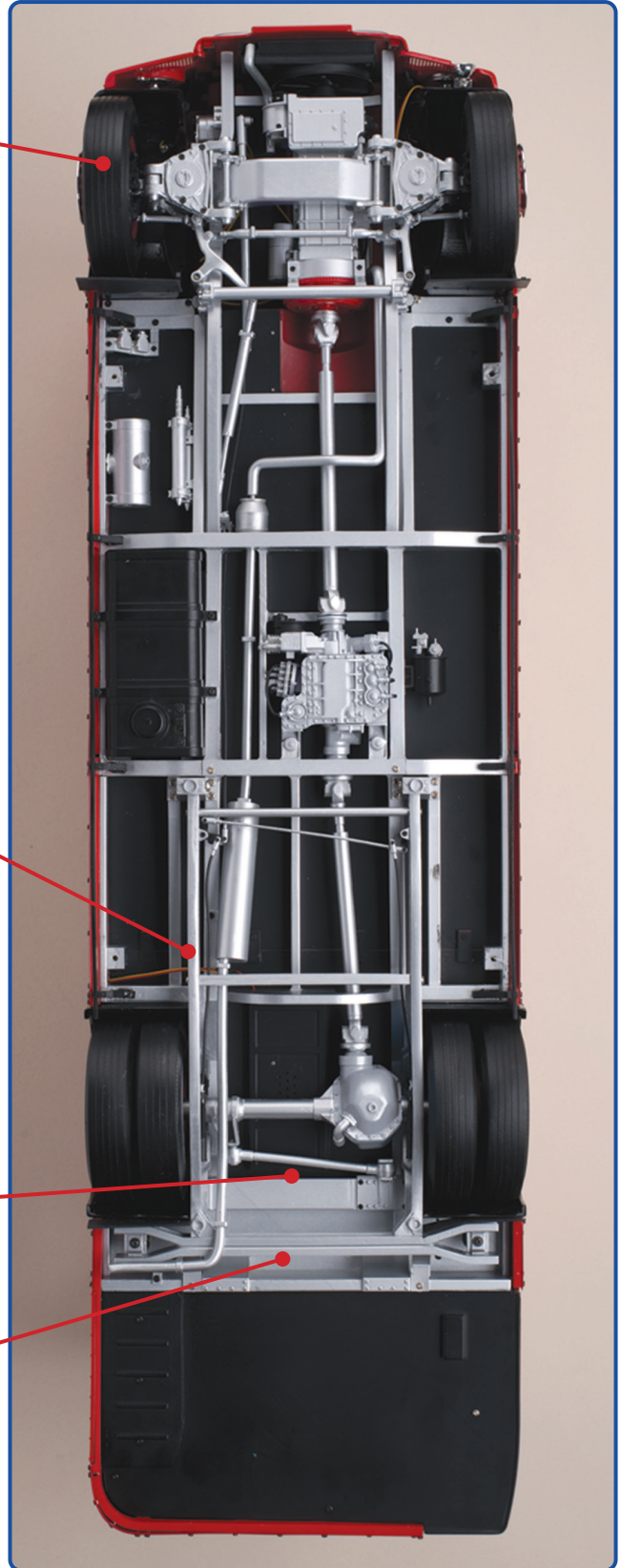
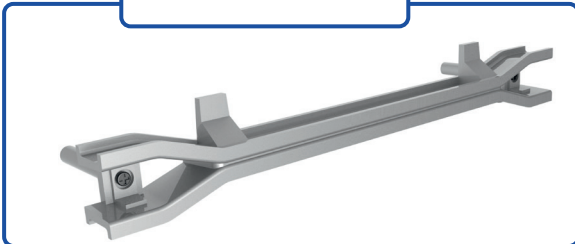
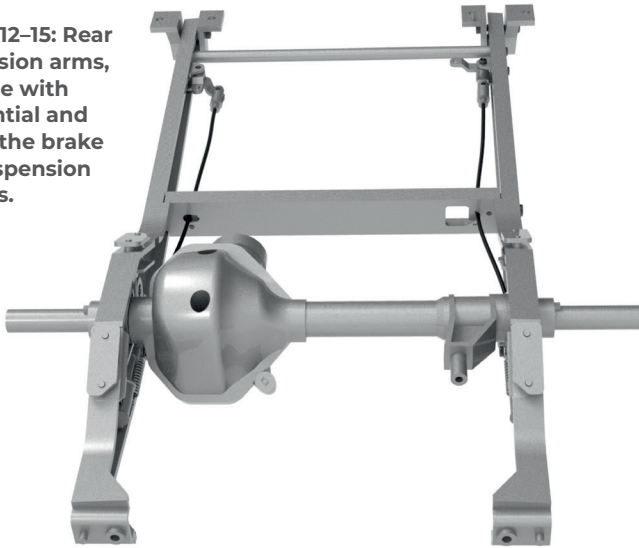
Check your progress



Stages 5-11: Front wheels and suspension and steering mechanism.



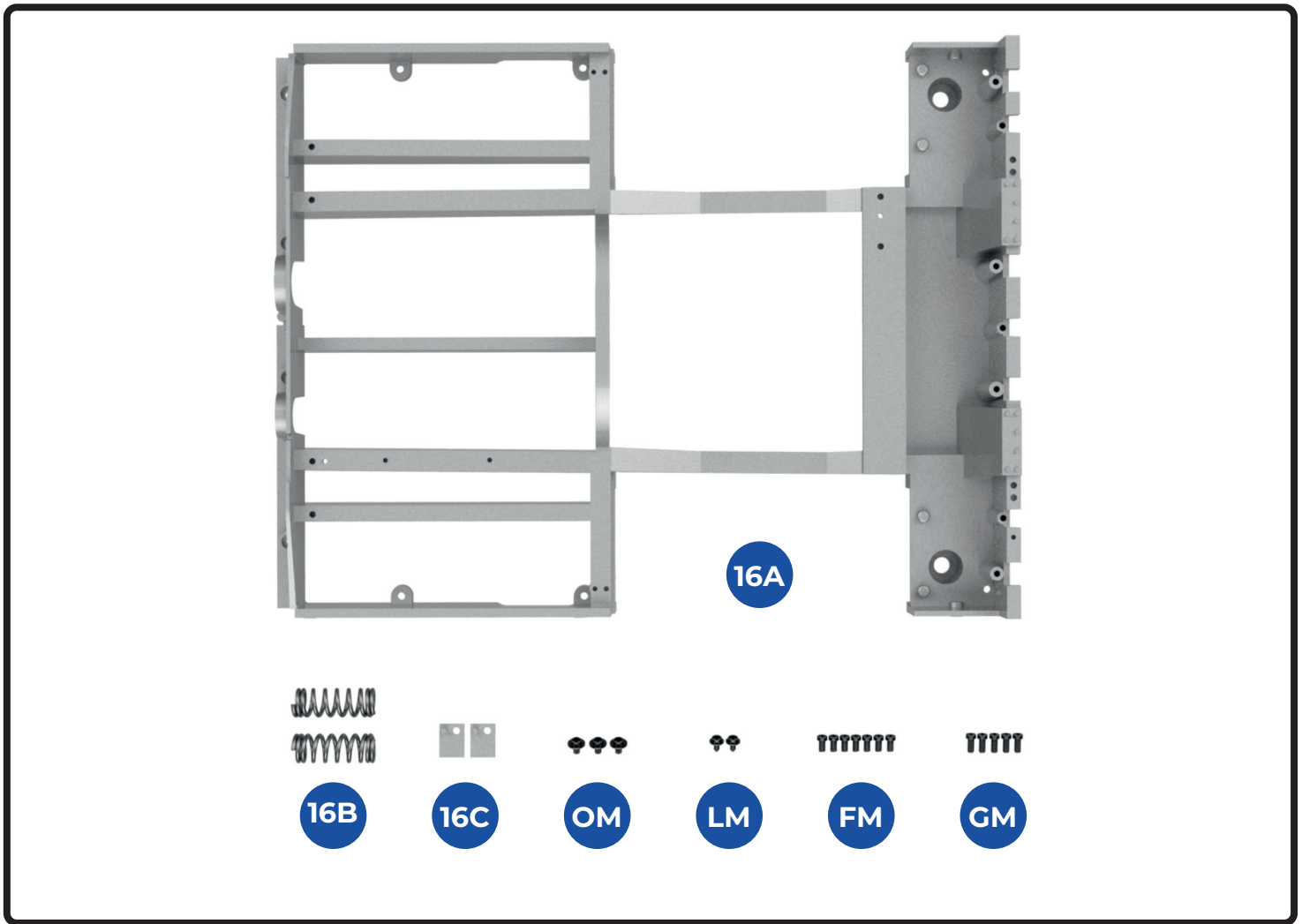
Stages 12-15: Rear suspension arms, rear axle with differential and part of the brake and suspension systems.



STAGE 16

FITTING THE REAR CHASSIS FRAME

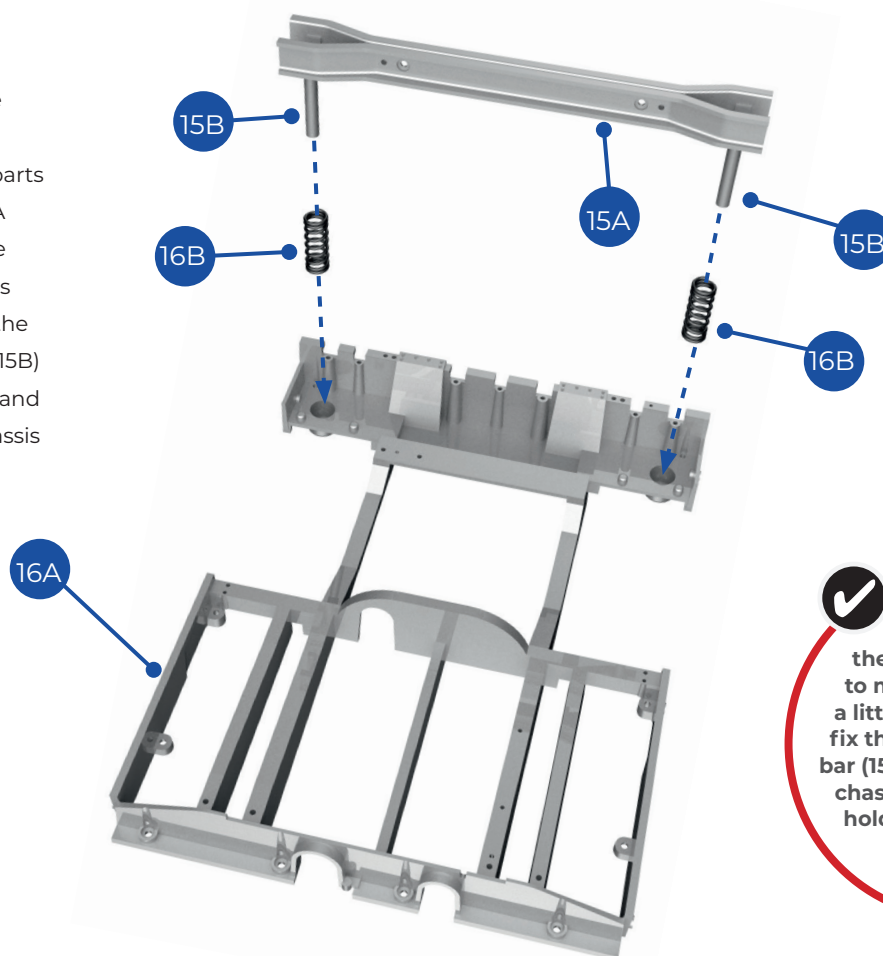
The rear chassis fits between the rear wheels, providing a framework to support the rear axle and rear suspension arms that have already been assembled.



KEY TO PARTS SUPPLIED	
16A	Rear chassis frame
16B	Suspension spring (x2)
16C	Limiting pads (x2)
OM	2.3 x 4mm (x3)
LM	2.0 x 4mm (x2)
FM	2.3 x 4mm (x7)
GM	2.3 x 5mm (x5)

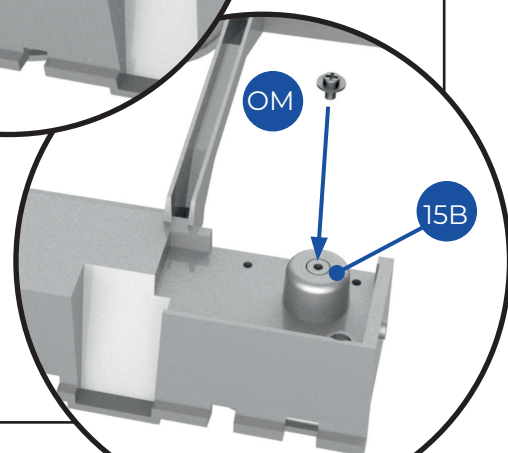
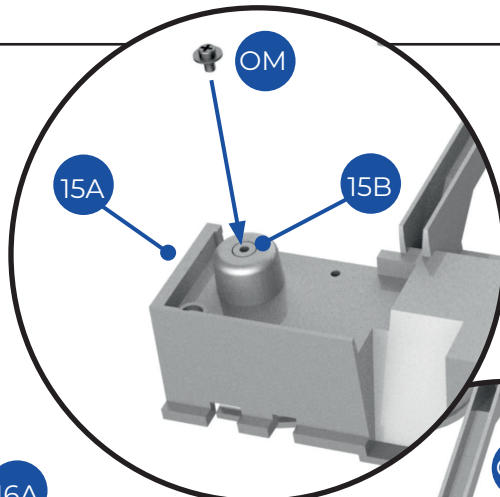
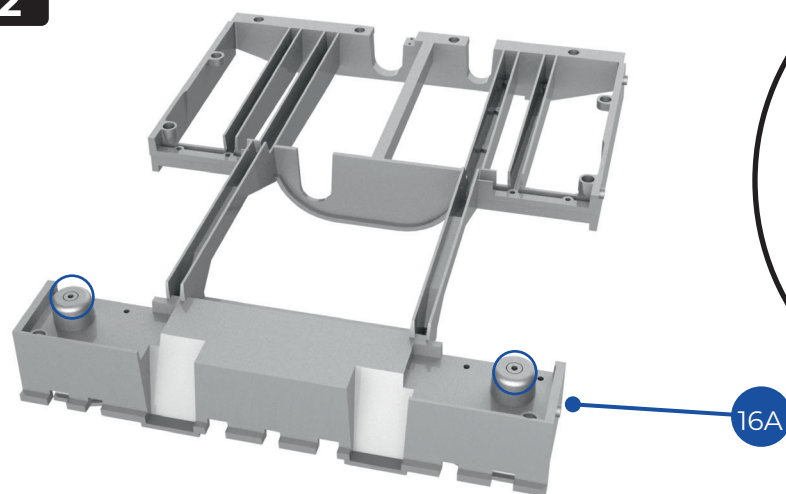
1

Take the chassis frame (16A) and suspension springs (16B x2), plus the parts assembled in Stage 15 (15A and 15B). Place each of the springs (16B) in the sockets in the frame (16A). Lower the shock absorber columns (15B) through the springs (16B) and into the sockets in the chassis frame (16A).



You may find the assembly easier to manage if you use a little masking tape to fix the suspension arms bar (15A) to the end of the chassis frame. This will hold part 15A in place until it is fixed in Step 2.

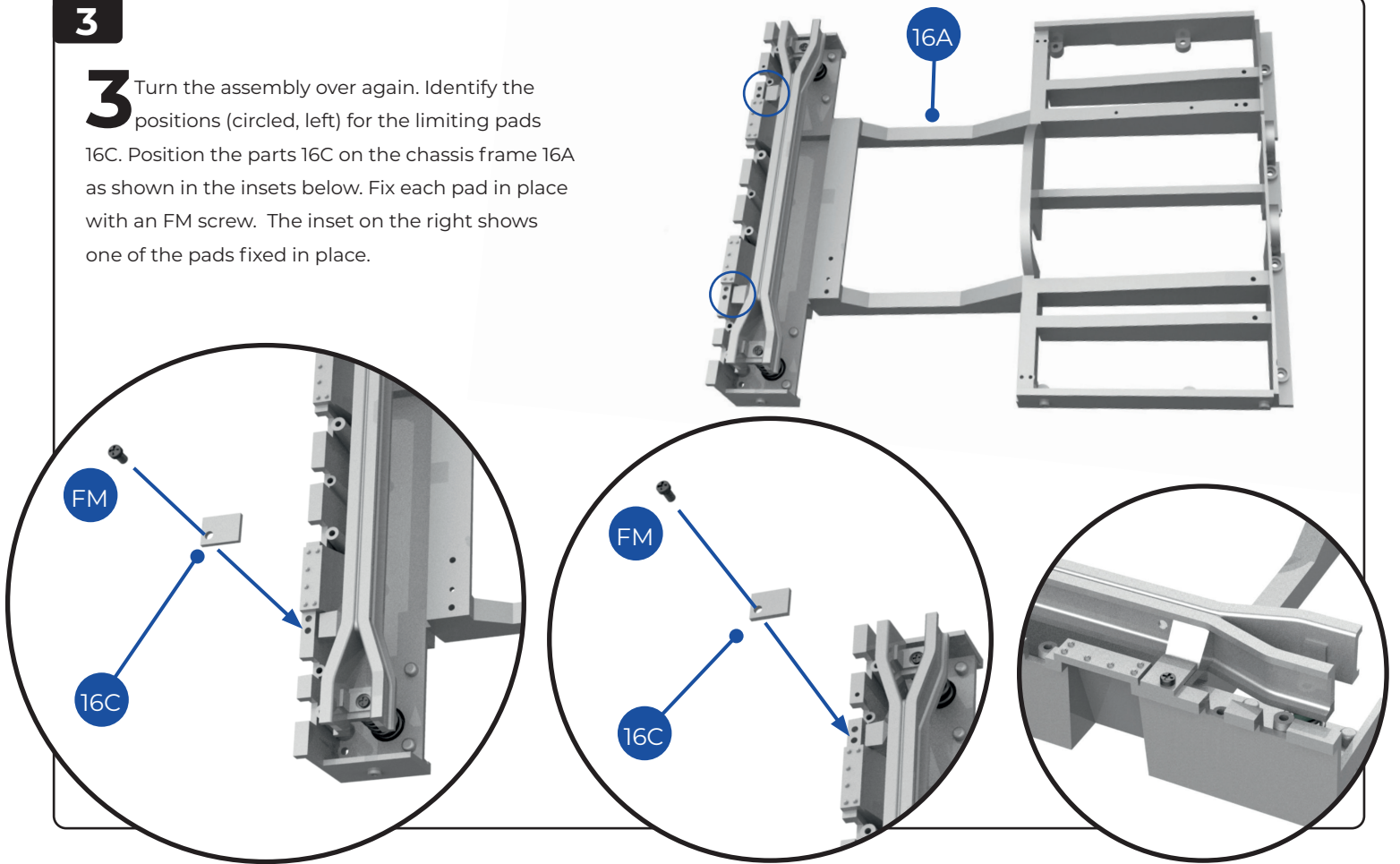
2



Turn the assembly over and check that the ends of the shock absorber columns (15B) are correctly located so they pass through the ends of the raised sockets on the chassis frame (circled). Fix the parts 15B in place with an OM screw in each (see insets).

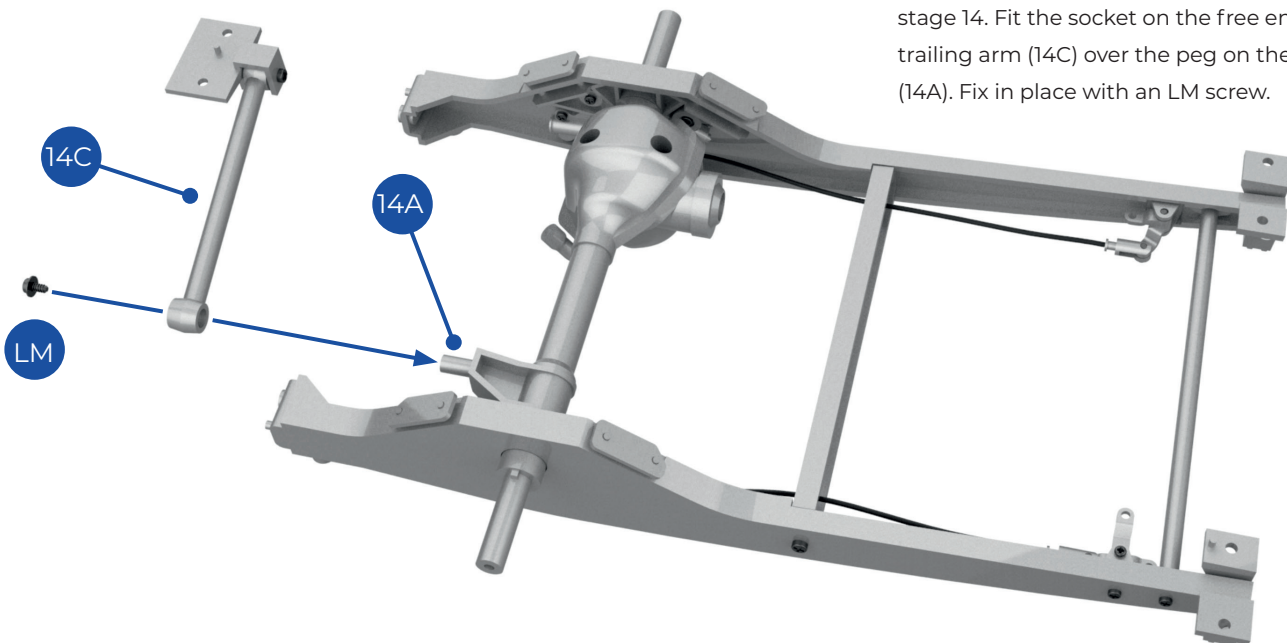
3

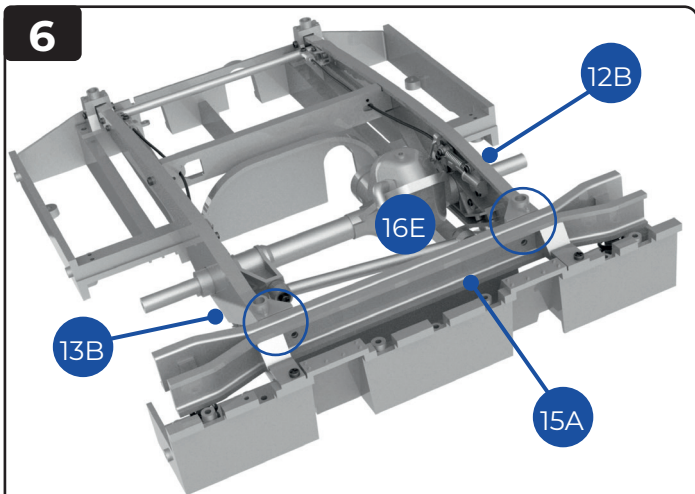
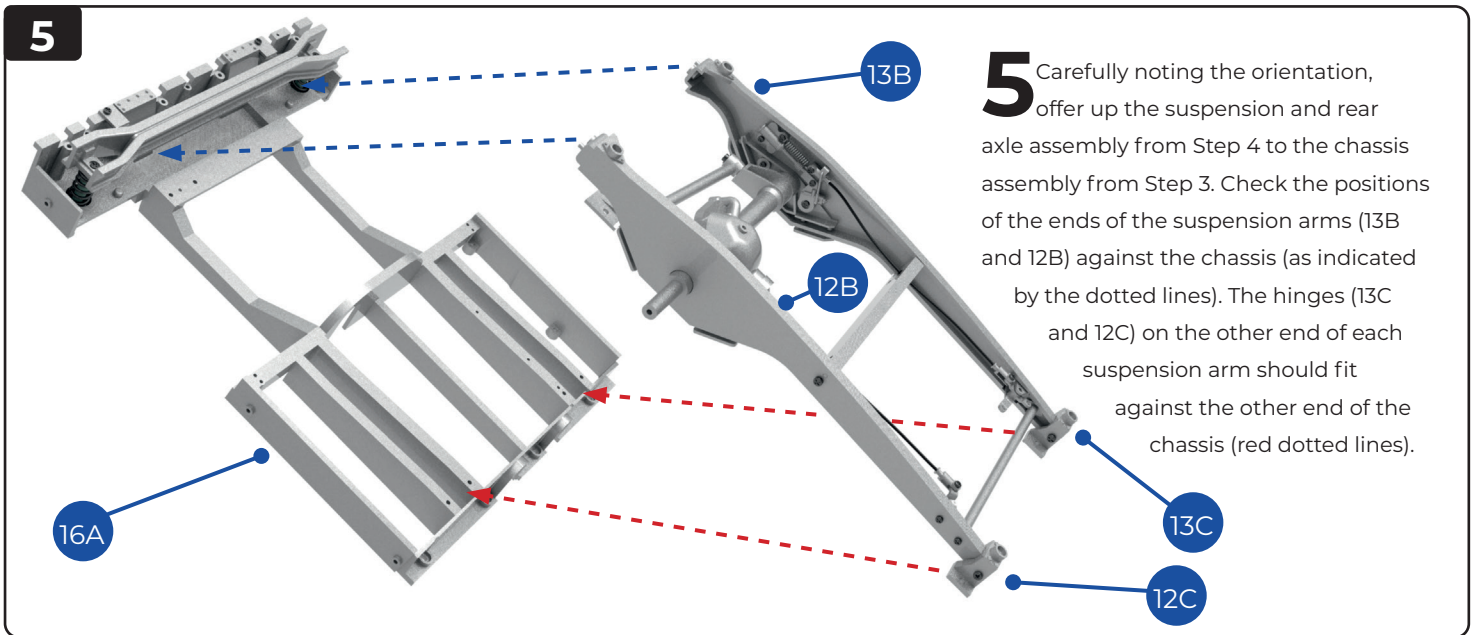
3 Turn the assembly over again. Identify the positions (circled, left) for the limiting pads 16C. Position the parts 16C on the chassis frame 16A as shown in the insets below. Fix each pad in place with an FM screw. The inset on the right shows one of the pads fixed in place.



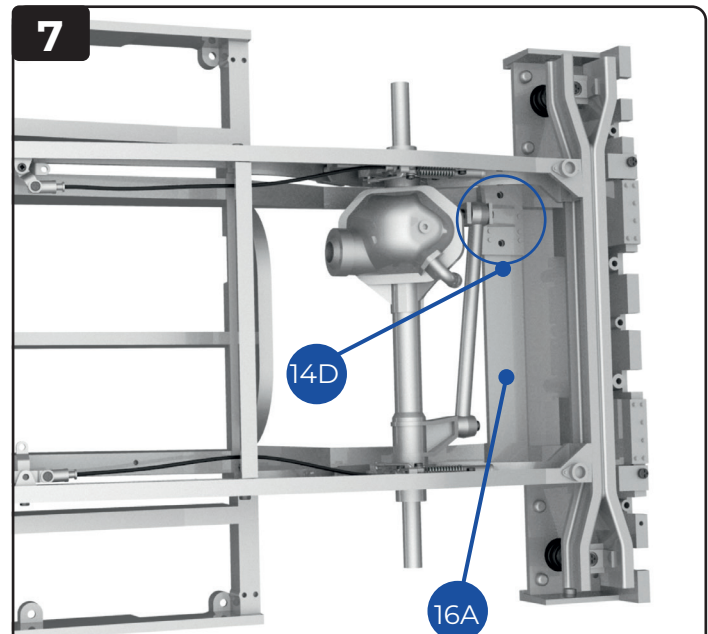
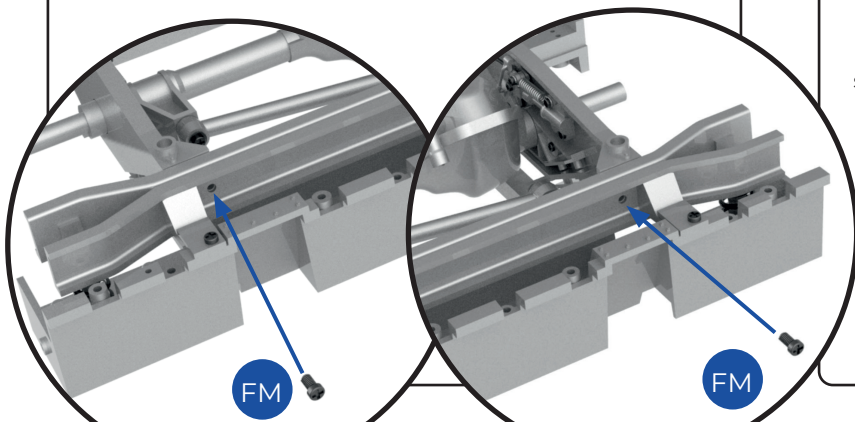
4

4 Take the suspension assembly and the trailing arm and base assembly from stage 14. Fit the socket on the free end of the trailing arm (14C) over the peg on the rear axle (14A). Fix in place with an LM screw.

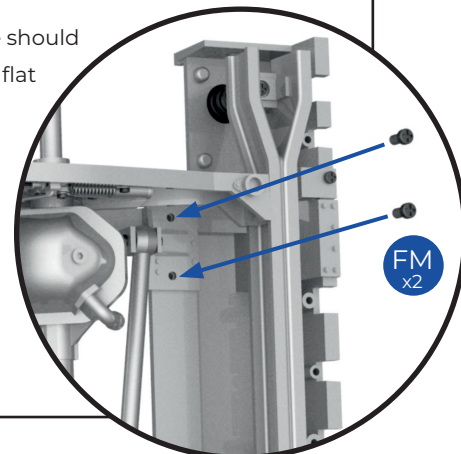




6 The ends of the suspension arms (13B and 12B, circled, above) fit against the suspension arms bar (15A). When the ends are correctly located, fix each in place with an FM screw through the sockets in part 15A (see insets, below).



7 The trailing arm base should be positioned on the flat section at the back of the rear chassis frame (16A), circled above. Screw part 14D in place with two FM screws (right).



8

8 The suspension hinges (12C and 13C) are fitted to the front end of the rear chassis frame (16A). Note that part 13C has a locating peg (inset top right), but 12C does not (inset below right). Screw the parts in place using two GM screws for each of the hinges.

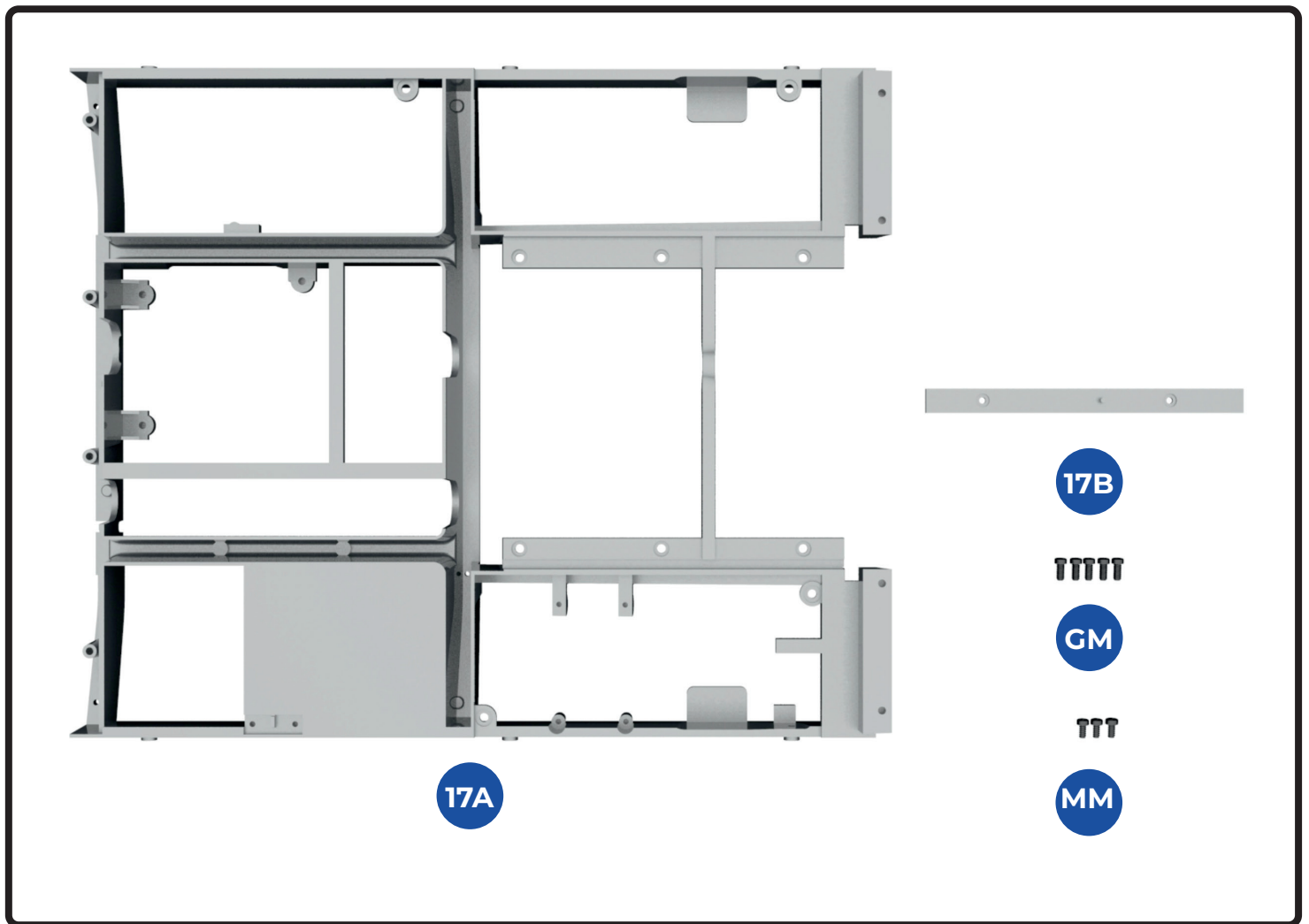
Finished views

The rear chassis frame is now attached to the rear axle and suspension arms. The suspension arms bar and trailing arm are also in place. The image on the left shows the view from below. The image below shows the view from above, with the suspension arms beneath the rear chassis frame.

STAGE 17

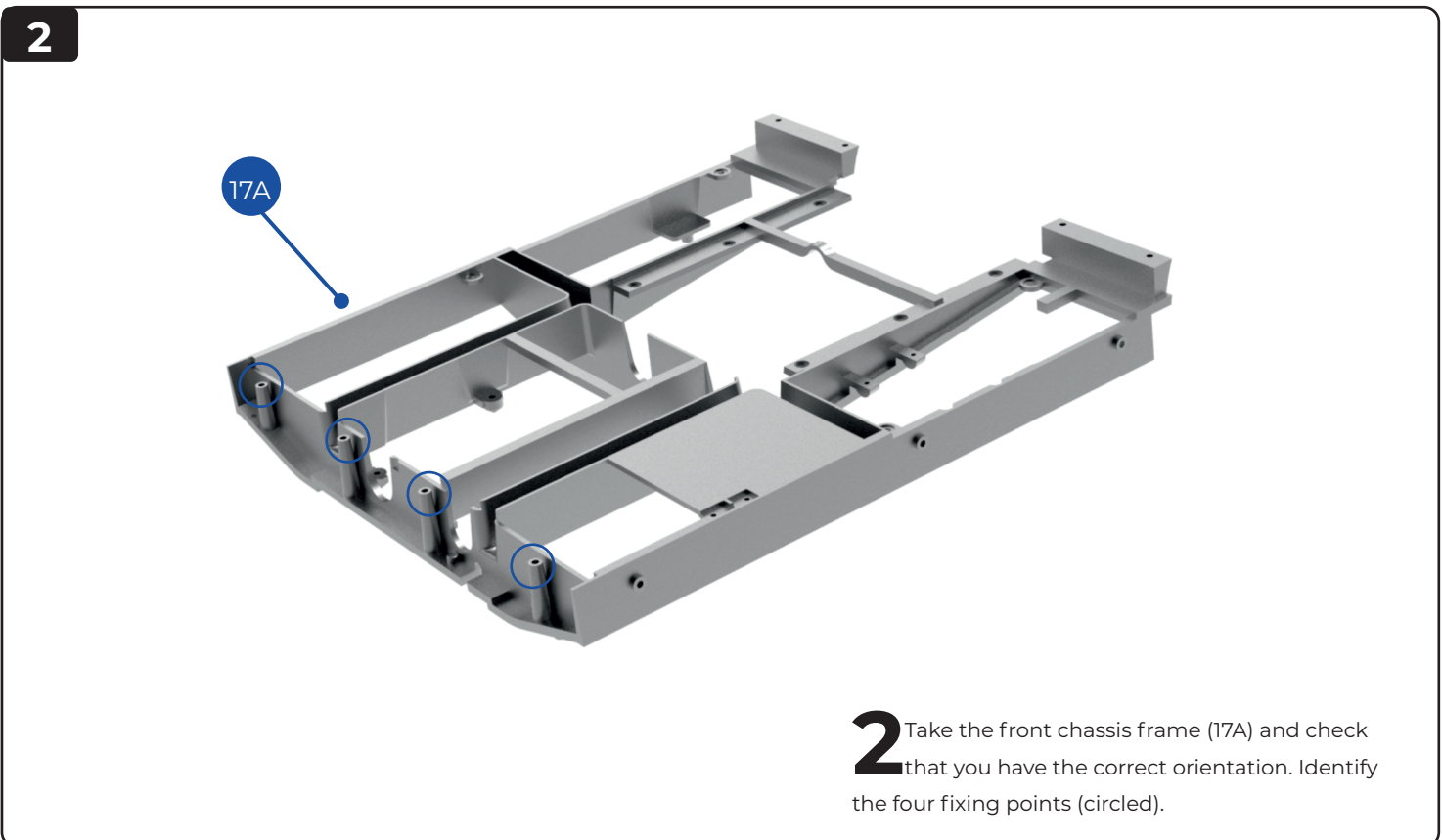
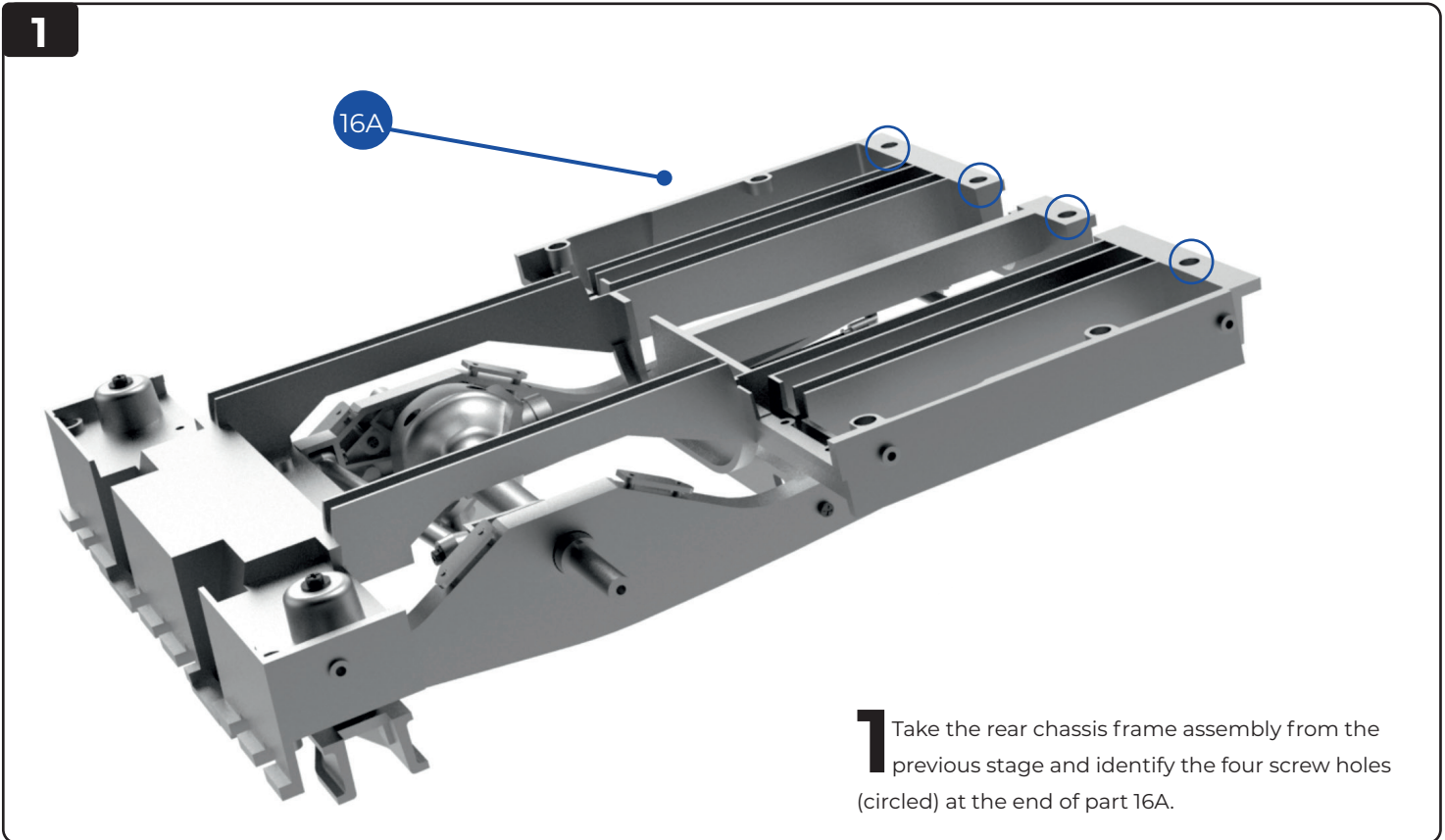
CONNECTING THE CHASSIS FRAMES

In this stage, you receive the front section of the chassis frame. This is connected to the chassis assembly from previous stages.

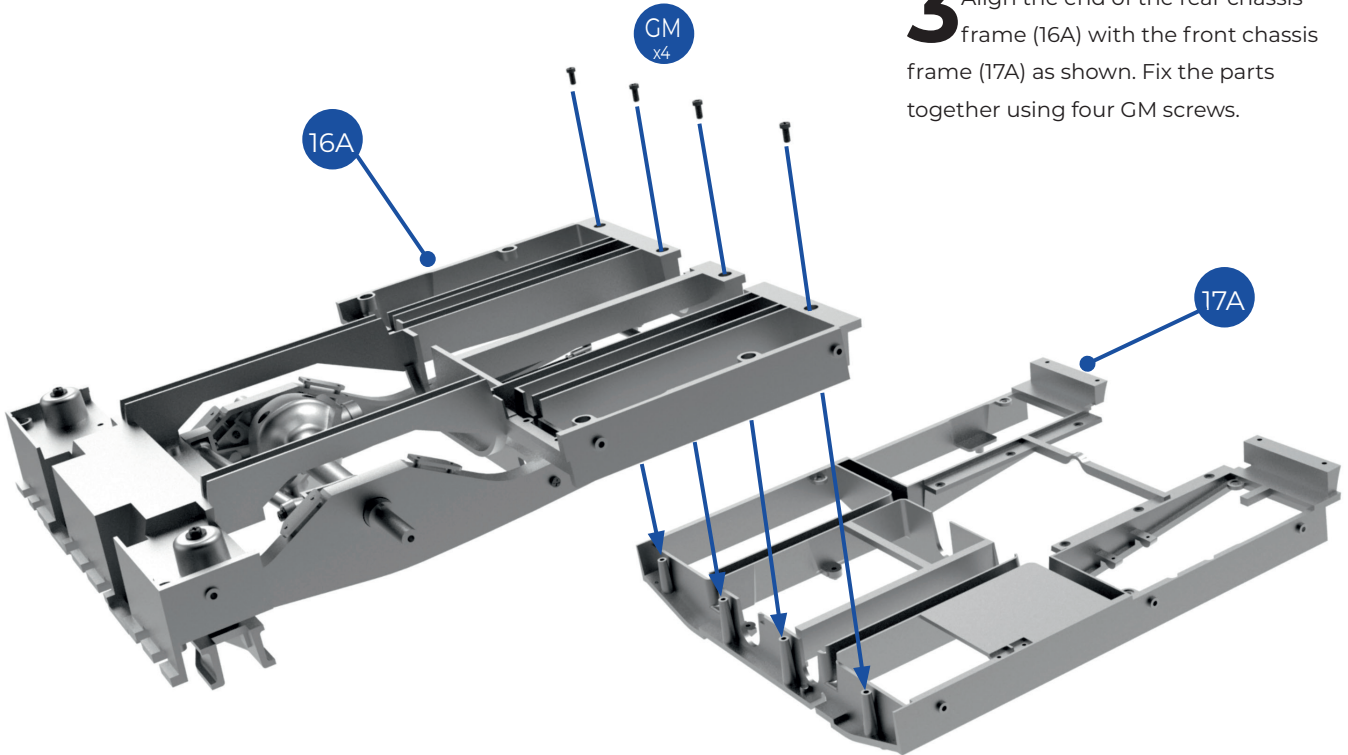


KEY TO PARTS SUPPLIED

- 17A** Front chassis frame
- 17B** Chassis frame link
- GM** 2.3 x 5mm (x5)
- MM** 2.0 x 4mm (x3)



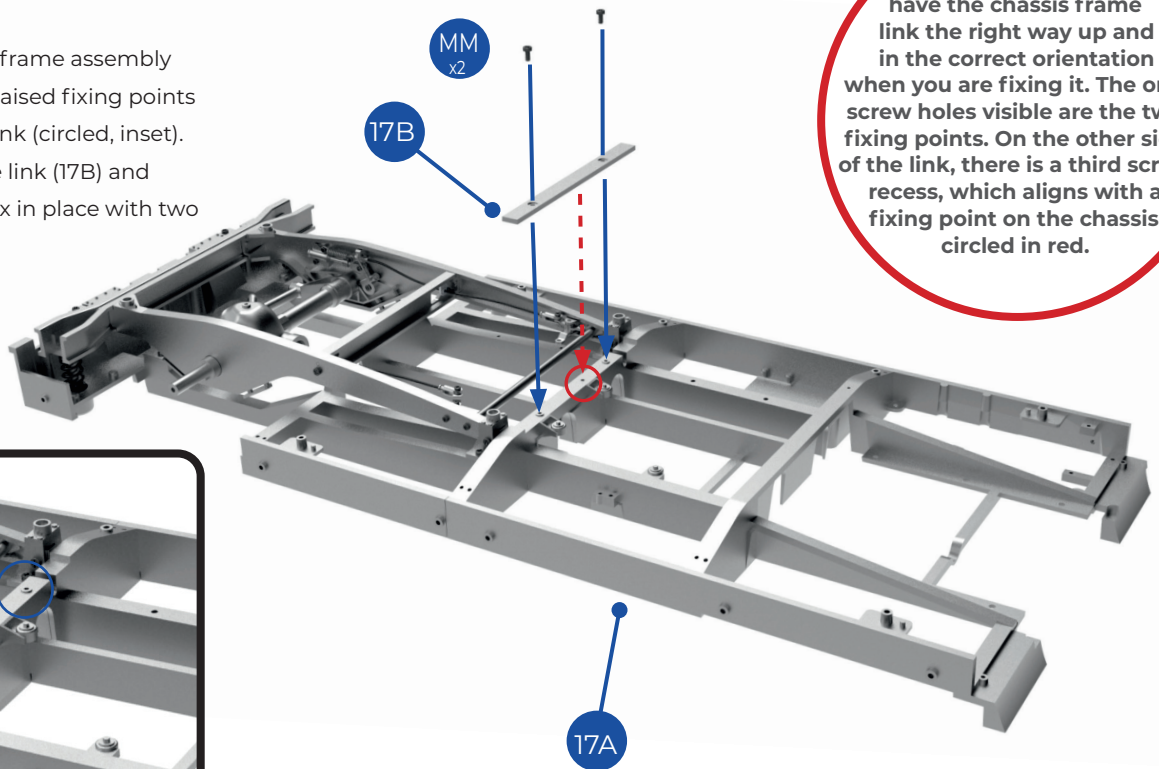
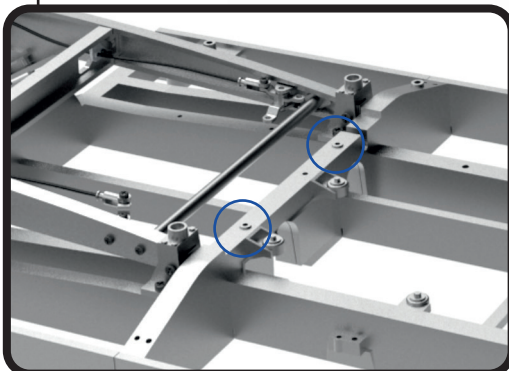
3



3 Align the end of the rear chassis frame (16A) with the front chassis frame (17A) as shown. Fix the parts together using four GM screws.

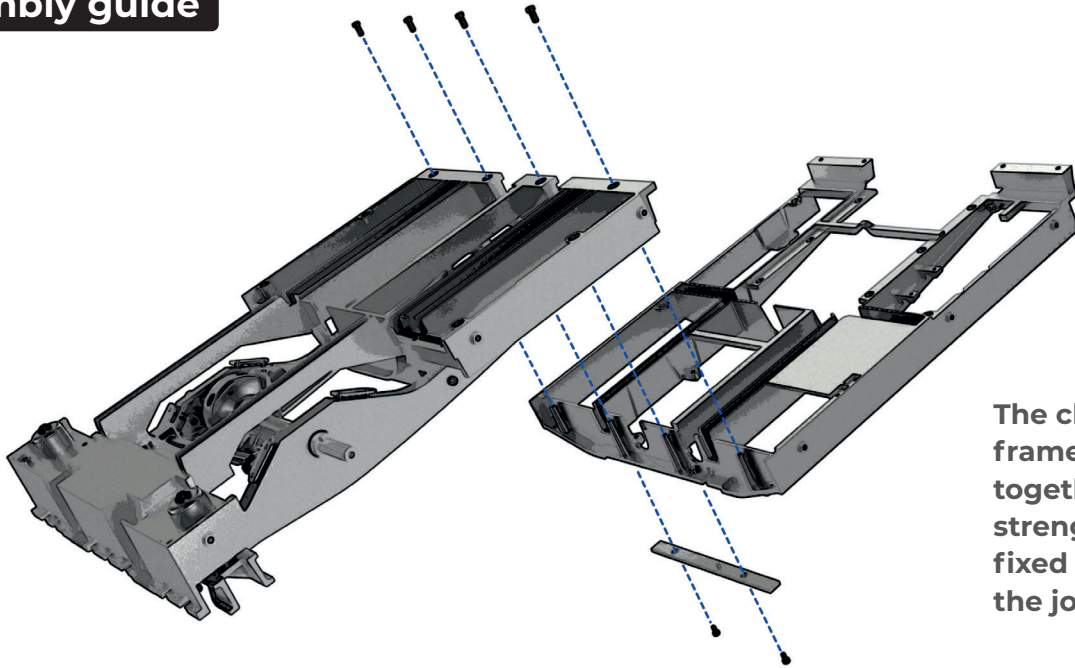
4

4 Turn the chassis frame assembly over. Check the raised fixing points for the chassis frame link (circled, inset). Take the chassis frame link (17B) and position it as shown. Fix in place with two MM screws.



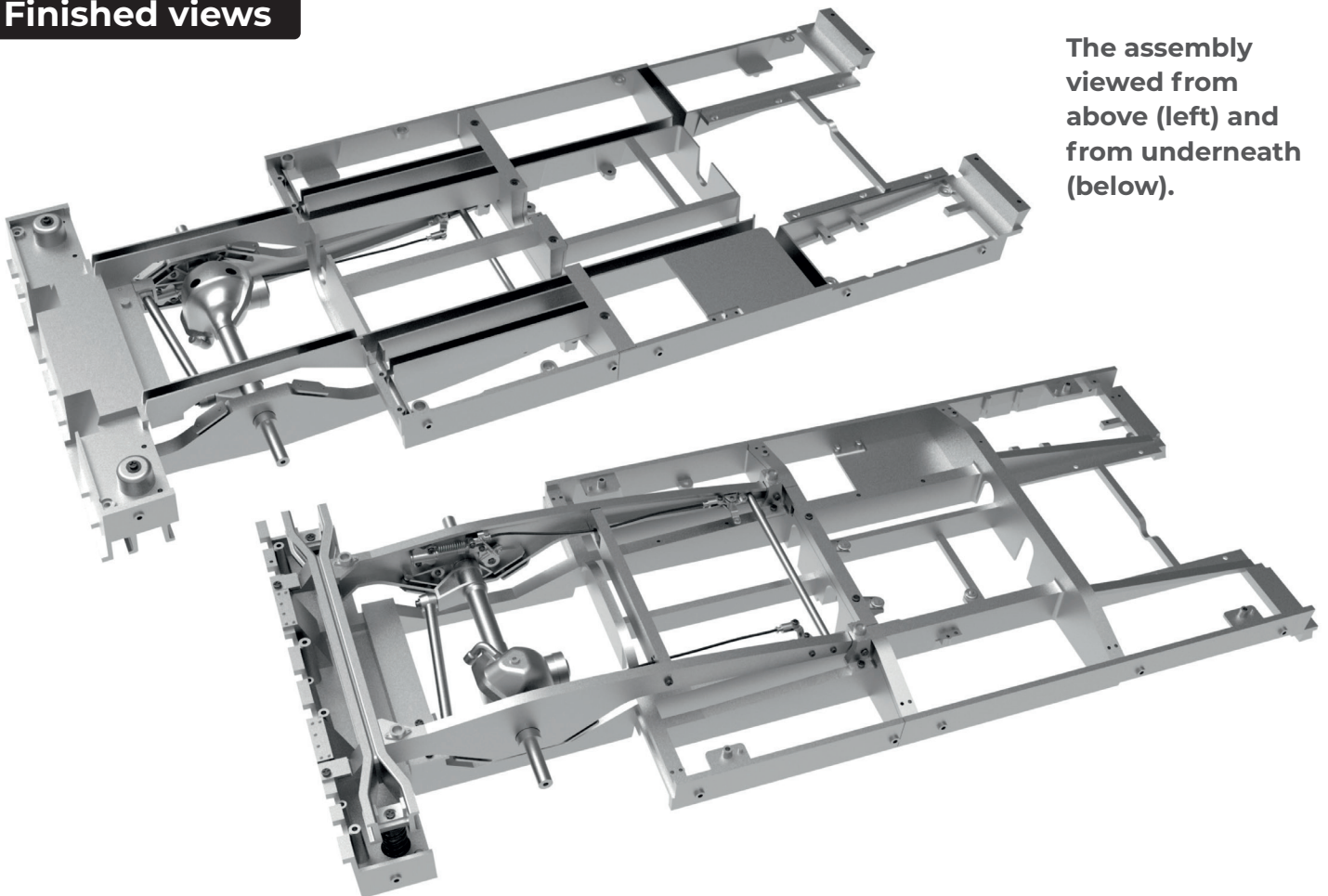
✓ Check that you have the chassis frame link the right way up and in the correct orientation when you are fixing it. The only screw holes visible are the two fixing points. On the other side of the link, there is a third screw recess, which aligns with a fixing point on the chassis, circled in red.

Assembly guide



The chassis frames are fixed together, with a strengthening link fixed in place along the join.

Finished views

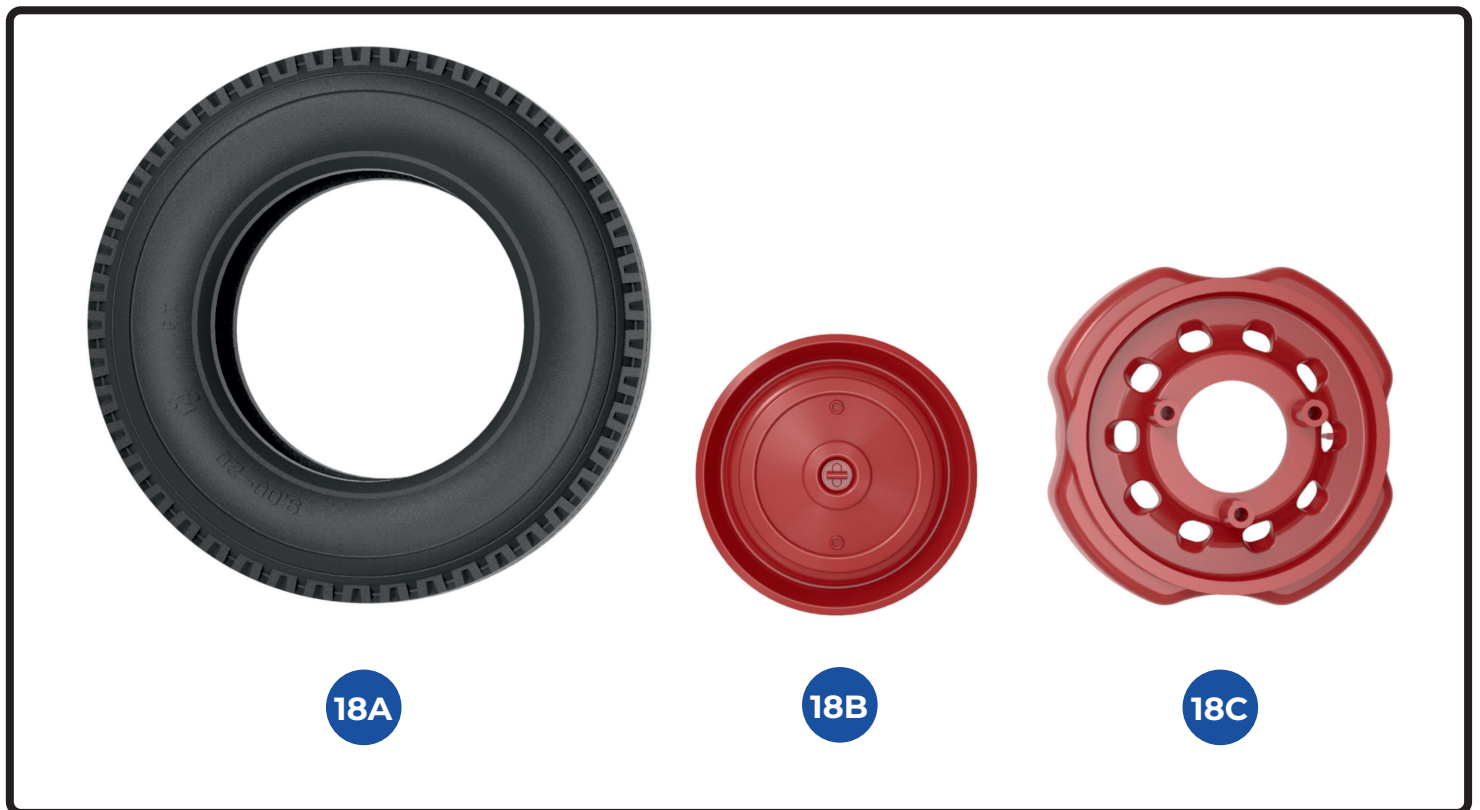


The assembly viewed from above (left) and from underneath (below).

STAGE 18

THE FIRST OF THE REAR WHEELS

The first of the pair of rear nearside wheels is assembled by fitting the tyre over the wheel rim. Keep the wheel rim cover for the next stage in the assembly.



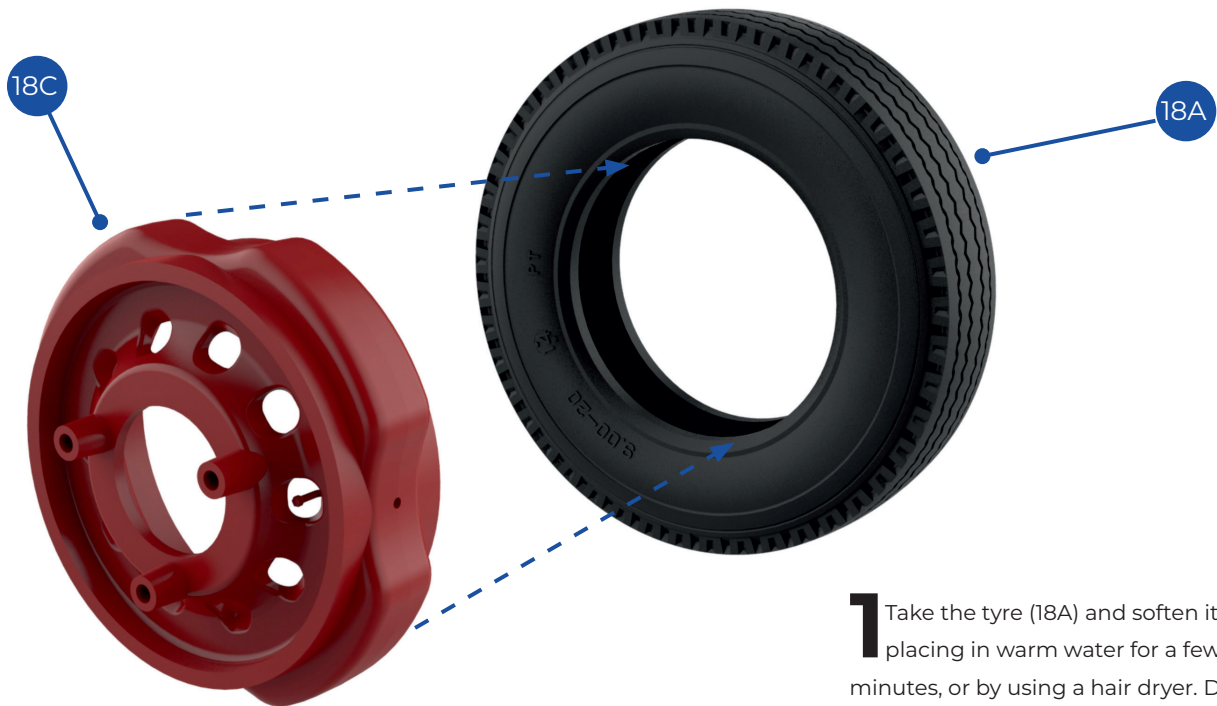
KEY TO PARTS SUPPLIED

- 18A** Tyre
- 18B** Rear wheel rim cover
- 18C** Rear outer wheel rim

Routemasters have a single wheel on each side at the front, but double wheels on each side at the back. The finish of the nut guard and hub has varied over the years.

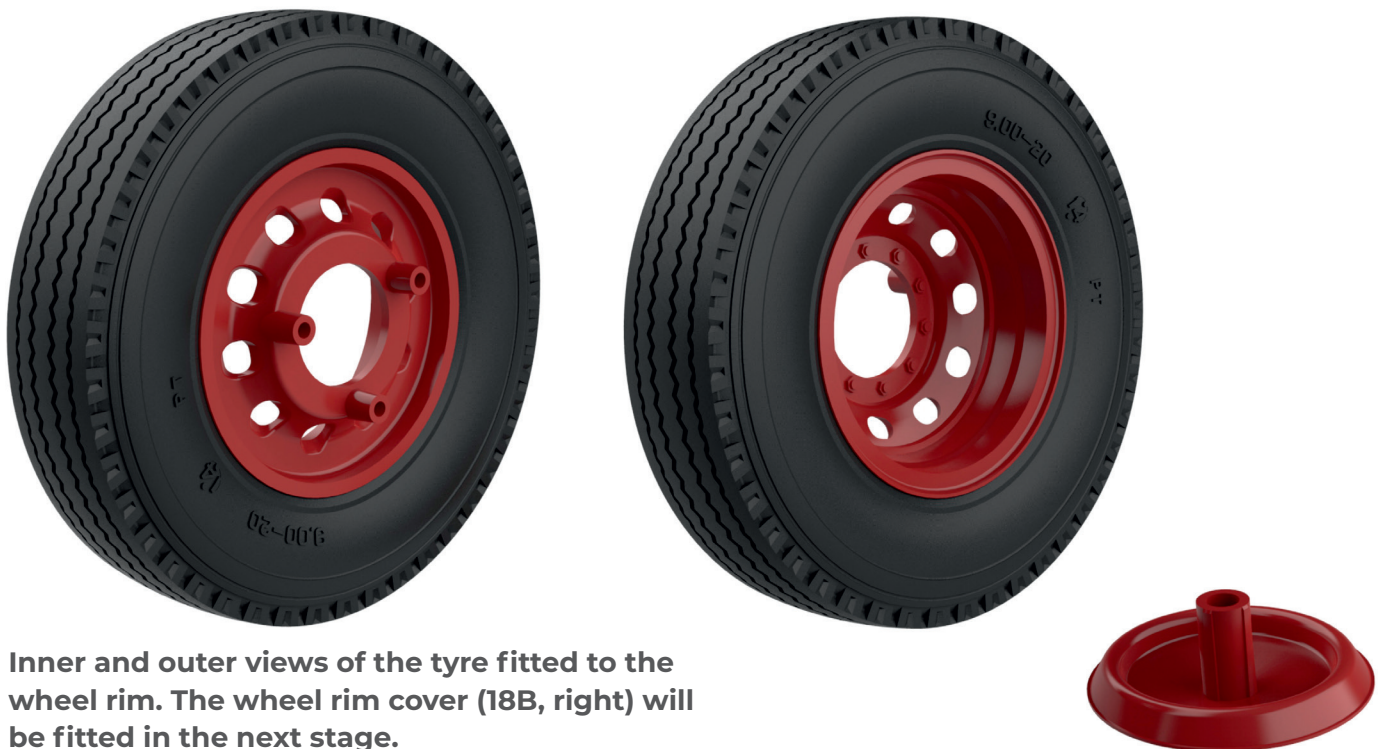


1



1 Take the tyre (18A) and soften it by placing in warm water for a few minutes, or by using a hair dryer. Dry the tyre (if you have used warm water) and fit it over the outer wheel rim (18C).

Finished views

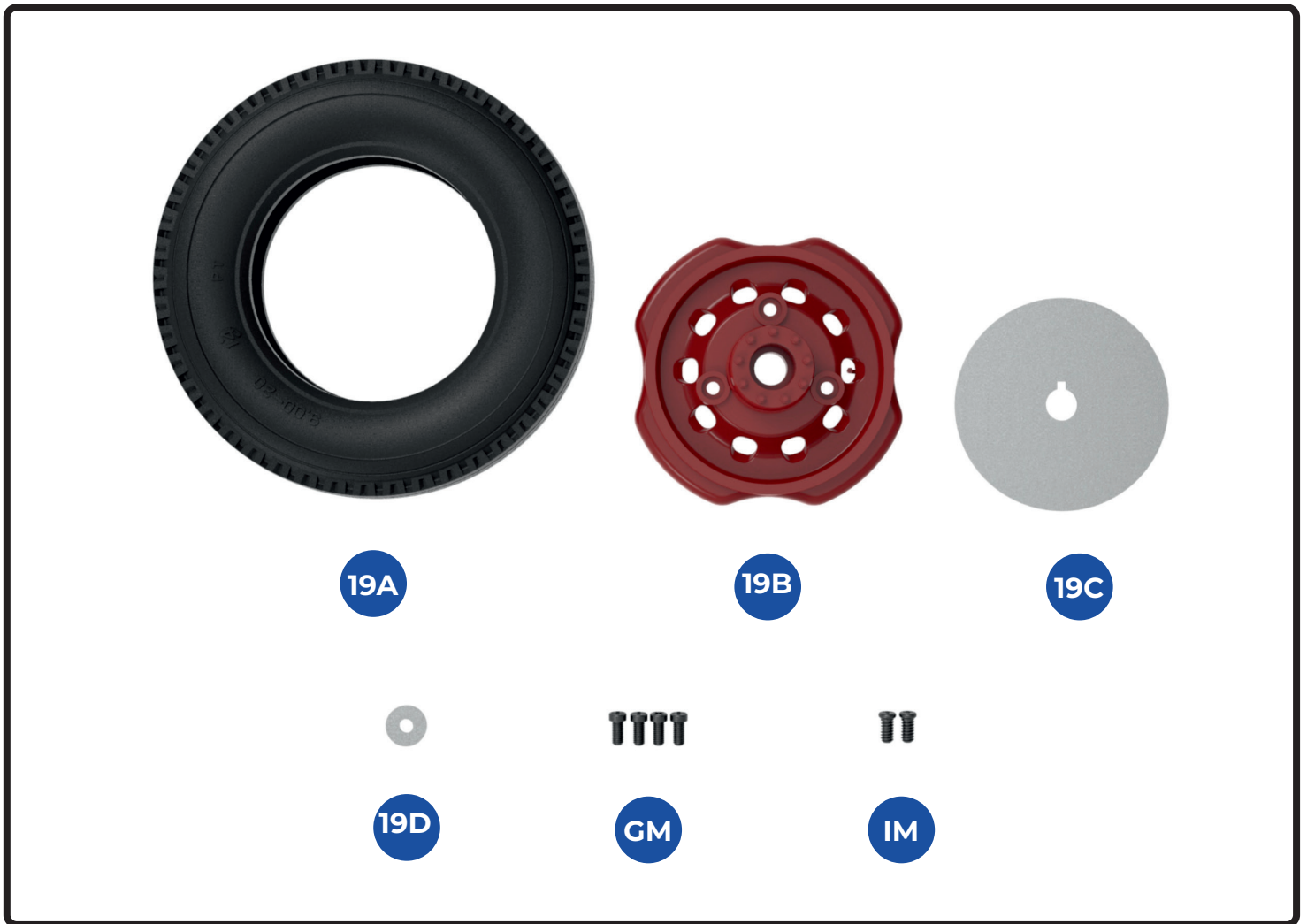


Inner and outer views of the tyre fitted to the wheel rim. The wheel rim cover (18B, right) will be fitted in the next stage.

STAGE 19


FITTING THE FIRST PAIR OF REAR WHEELS

With this stage you receive the second rear tyre and wheel rim.
After assembling the wheel, it is connected to the first rear wheel
and fitted to the rear axle.



KEY TO PARTS SUPPLIED	
19A	Tyre
19B	Rear inner wheel rim
19C	Brake disc
19D	Washer
GM	2.3 x 5mm (x4)
IM	2.6 x 5mm (x2)

1

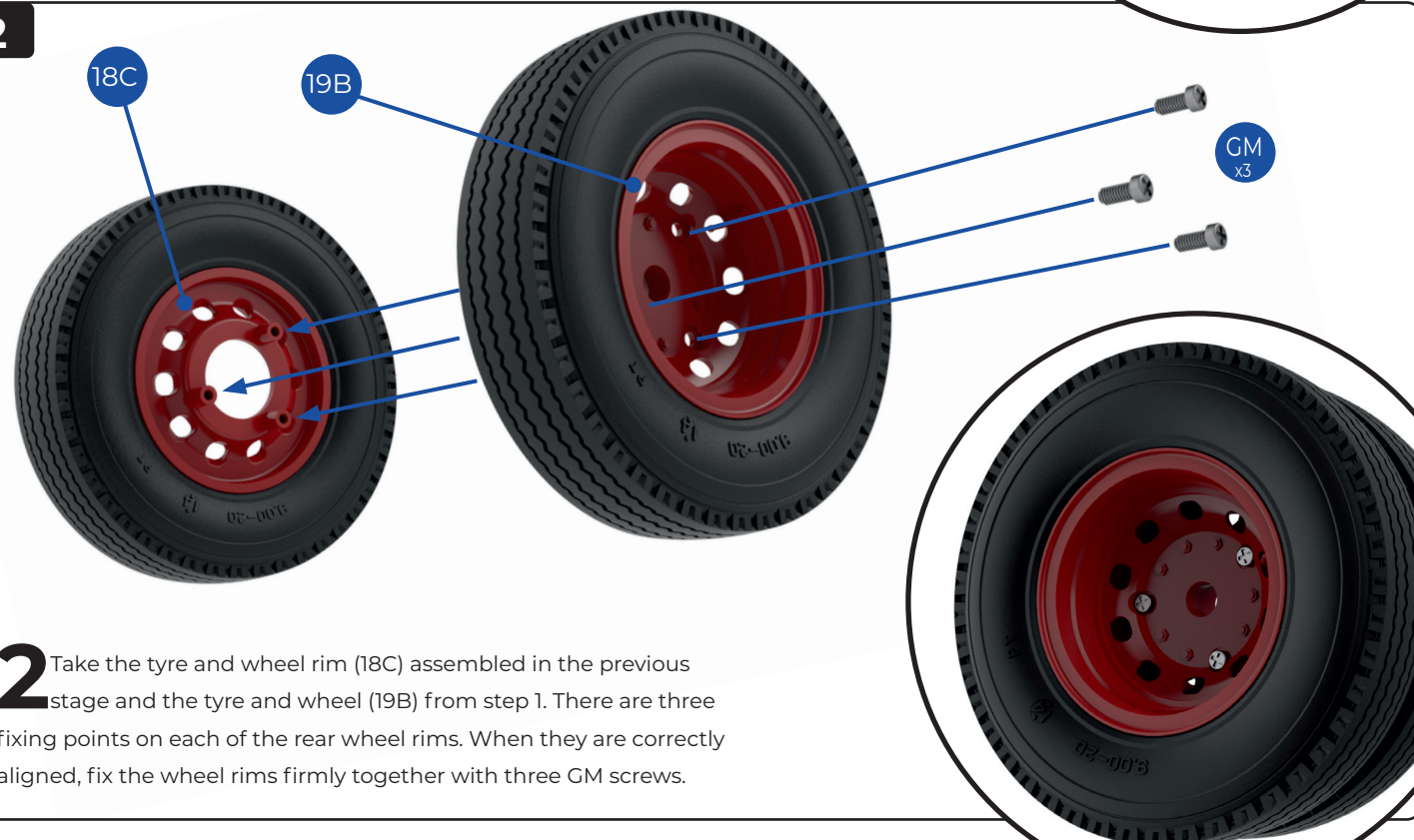


19A

19B

1 Soften the tyre (19A) for a couple of minutes in warm water and dry it. Alternatively, you can heat it with a hair dryer. Fit the tyre over the rear inner wheel rim (19B). Ensure that it is properly fitted over the wheel rim on both sides (inset).

2



18C

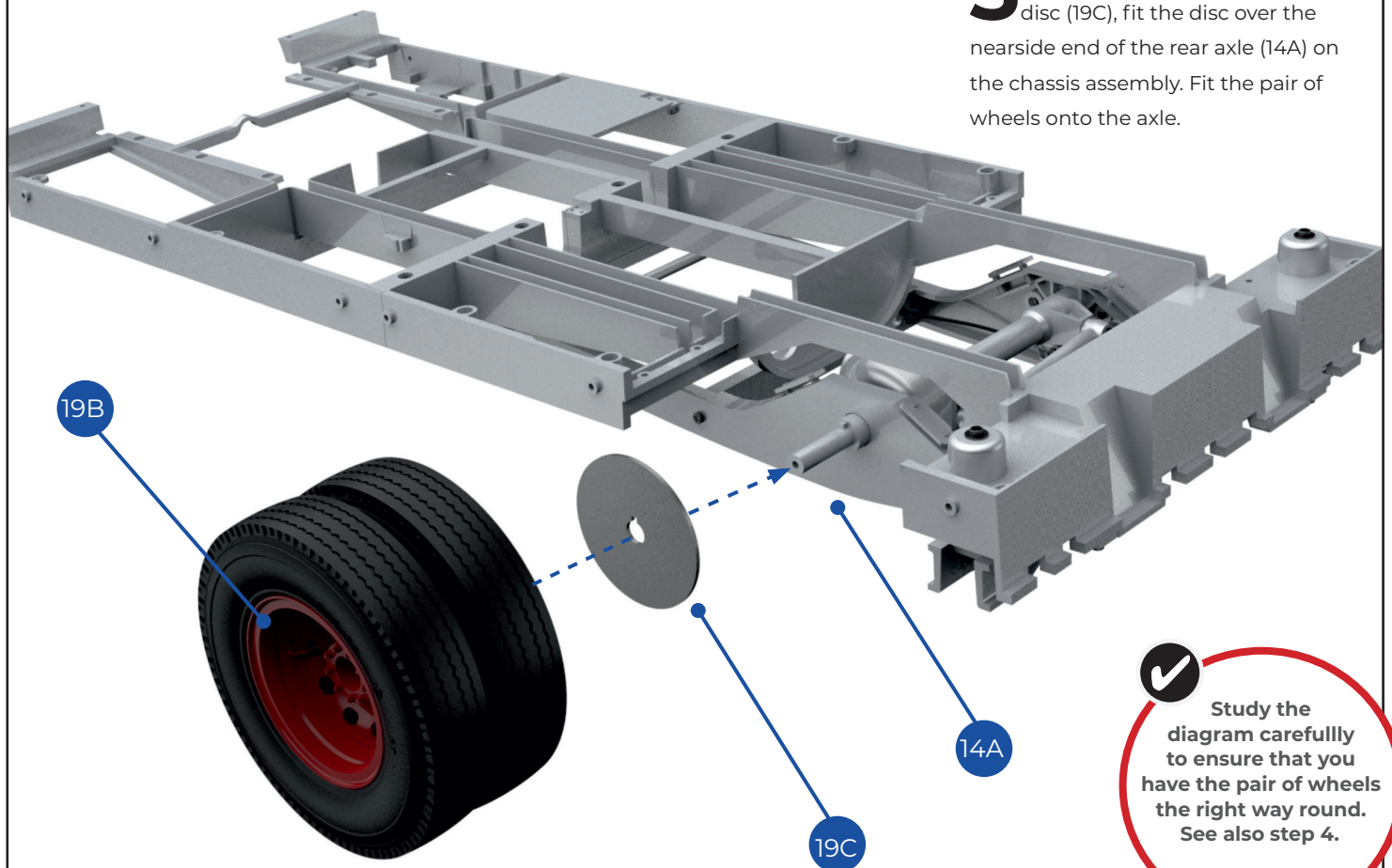
19B

GM x3

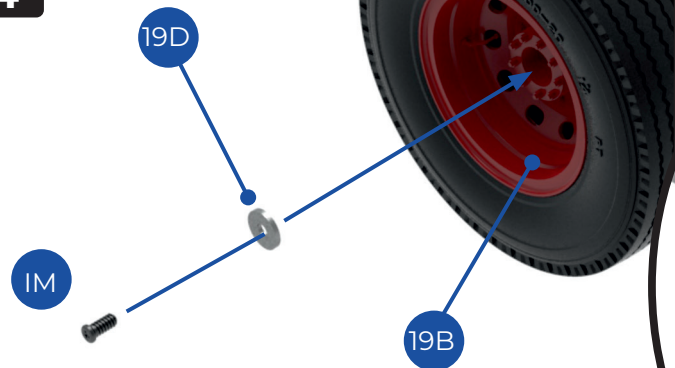
2 Take the tyre and wheel rim (18C) assembled in the previous stage and the tyre and wheel (19B) from step 1. There are three fixing points on each of the rear wheel rims. When they are correctly aligned, fix the wheel rims firmly together with three GM screws.

3

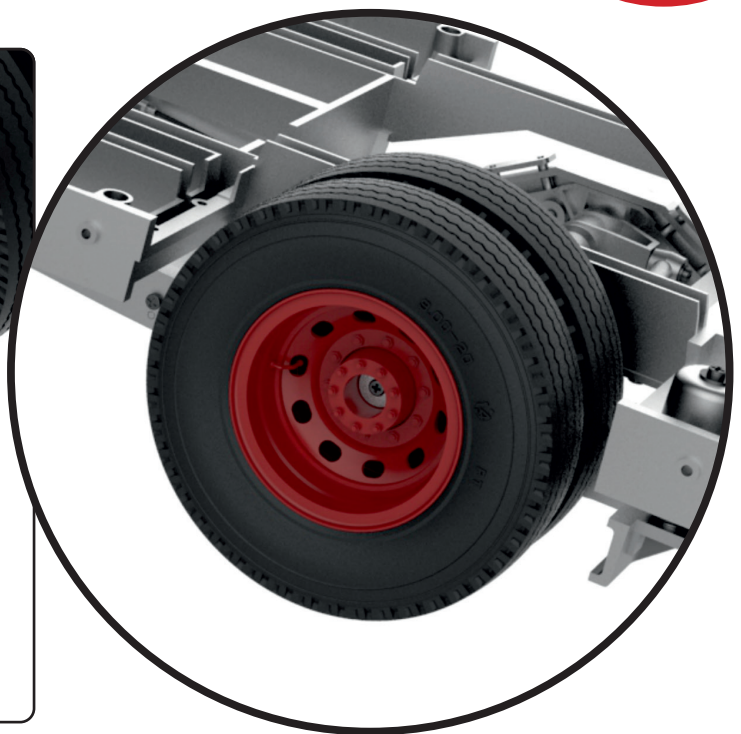
3 Noting the notch in the brake disc (19C), fit the disc over the nearside end of the rear axle (14A) on the chassis assembly. Fit the pair of wheels onto the axle.



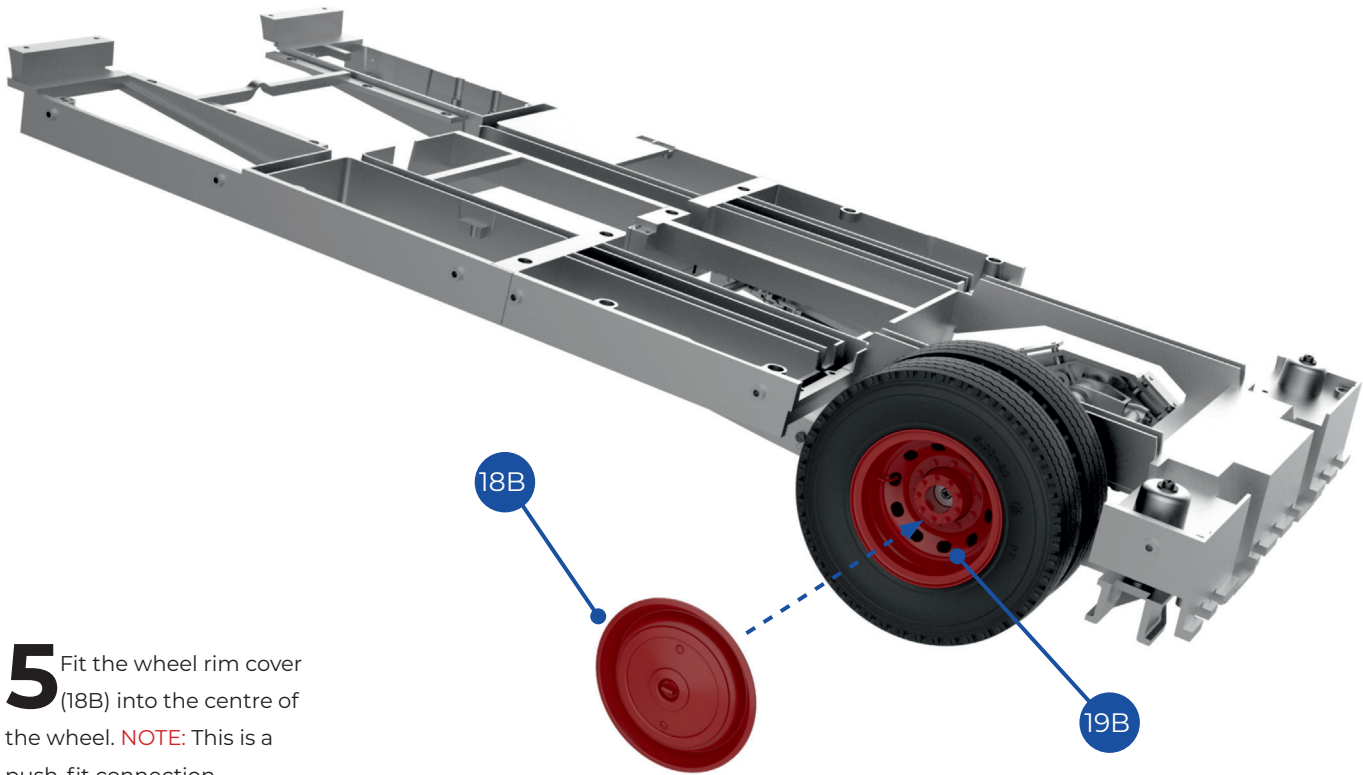
4



4 Take the washer (19D). Pass an IM screw through the washer and into the end of the axle that is visible at the centre of the wheel rim (19B). Tighten the screw to hold the wheel in place (inset, right). Do not overtighten.

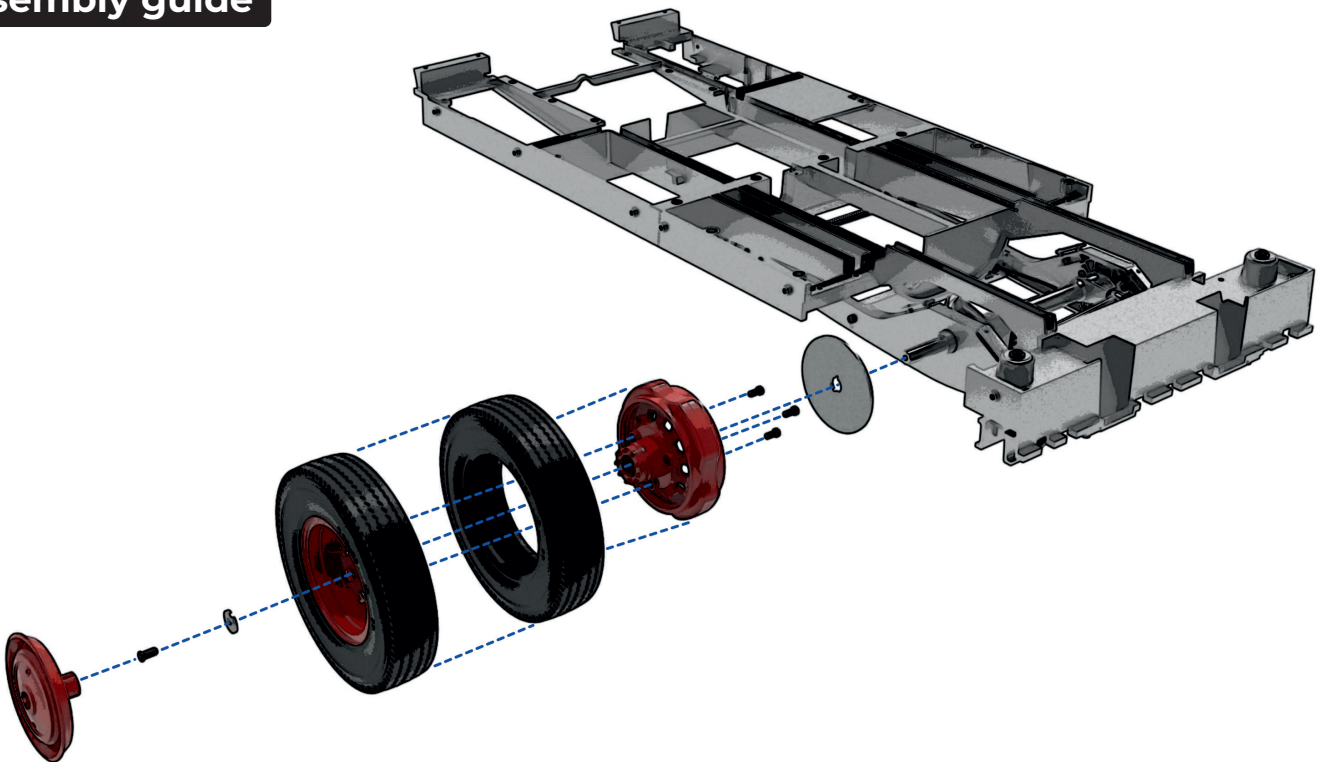


5

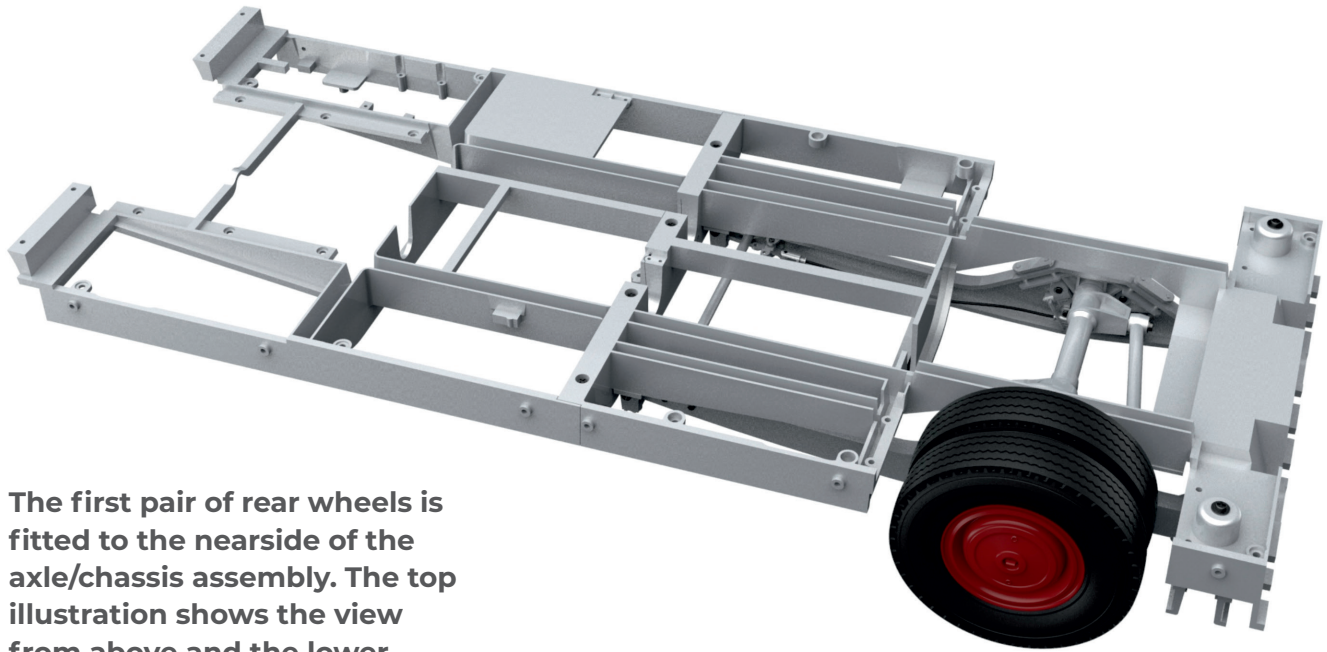


5 Fit the wheel rim cover (18B) into the centre of the wheel. **NOTE:** This is a push-fit connection.

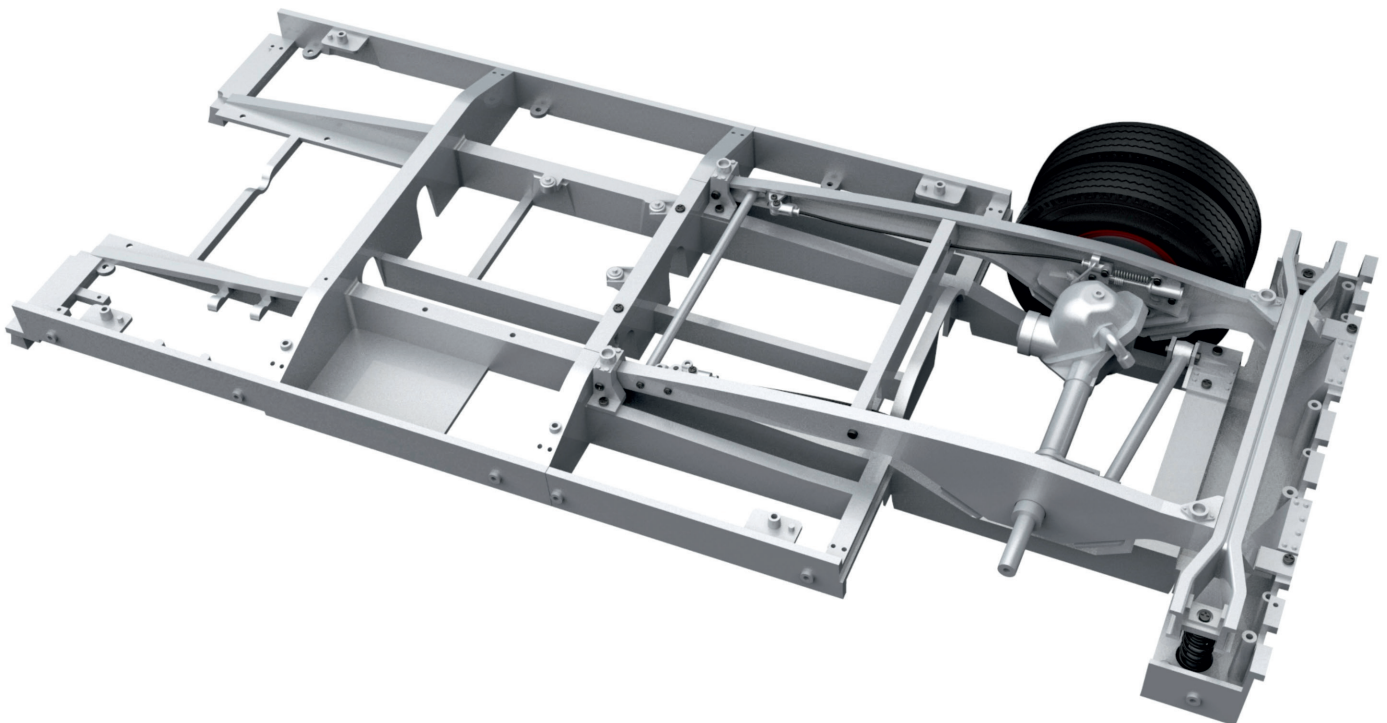
Assembly guide



Finished views



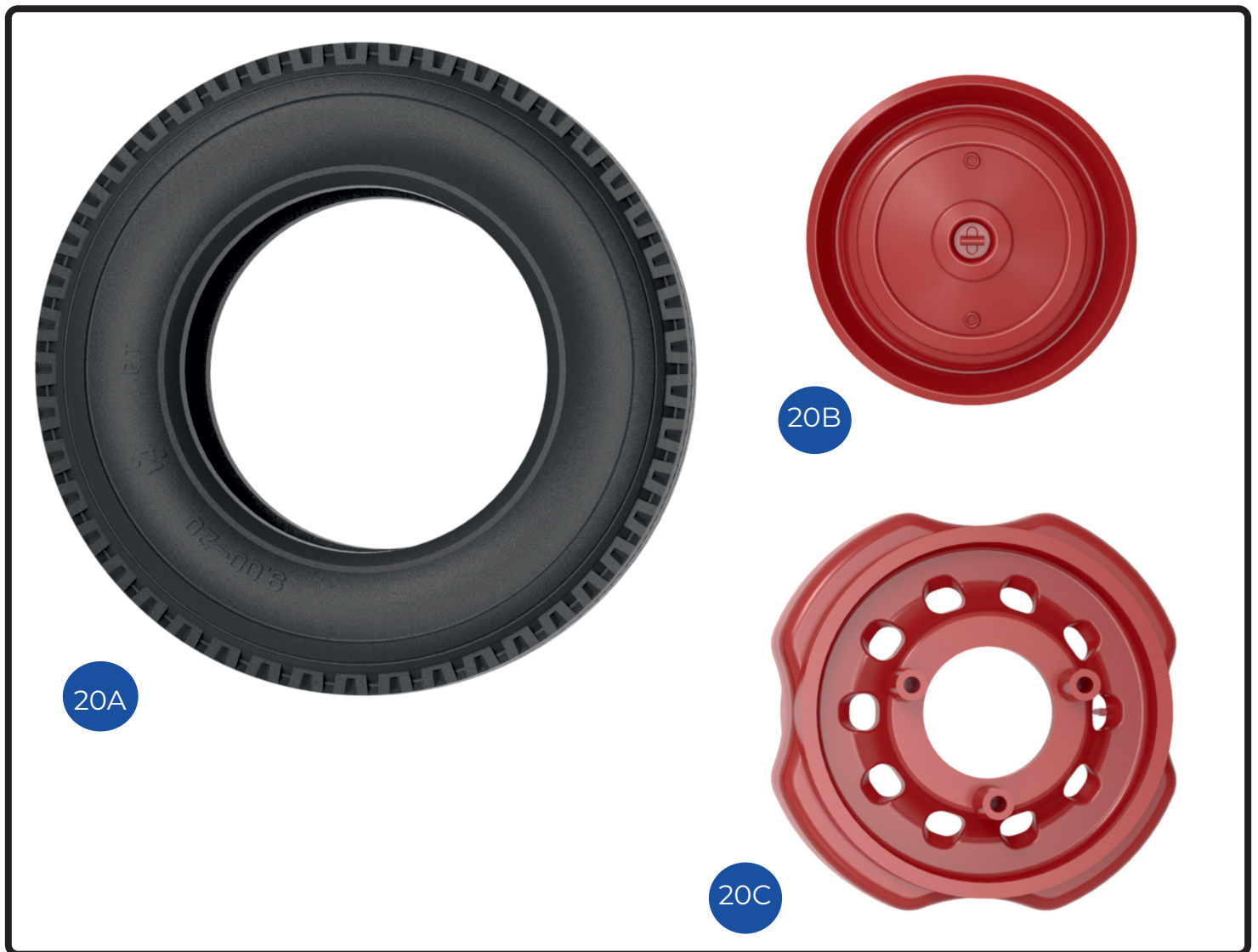
The first pair of rear wheels is fitted to the nearside of the axle/chassis assembly. The top illustration shows the view from above and the lower illustration is the view from below.



STAGE 20

OFFSIDE REAR OUTER WHEEL

Start the assembly of the offside (right) pair of rear wheels by fitting the tyre to the wheel rim supplied with this stage.



KEY TO PARTS SUPPLIED

- 20A** Tyre
- 20B** Rear wheel rim cover
- 20C** Rear outer wheel rim

✓ The parts supplied in this stage are the same as those in stage 18, for the outer right rear wheel.

1



20C



20A

1 Take the tyre (20A) and soften it by placing in warm water for a few minutes, or by using a hair dryer. Dry the tyre (if you have used warm water) and fit it over the outer wheel rim (20C).

Finished views







Inner and outer views of the tyre fitted to the wheel rim. The wheel rim cover (20B, right) will be fitted in the next stage.