

There's a simple set formula for dealing with rust. Add to that a little bit of maintenance, and our troubles are over



## WHAT YOU MUST KNOW

Rust is nature's way of recycling our Land Rovers, but it makes no allowance for the fact that we're still using them. Luckily, Ed Evans has an effective strategy to defeat the elements

**R**usting is an electrolytic process in which the iron within the steel reacts with the oxygen in the natural moisture around it. What happens is that particles (ions) detach themselves from the iron in the steel and link up with the oxygen – thus reducing the thickness of the steel and forming a mass of iron oxides.

The rust starts as a thin, powdery coating. As this thickens it tends to protect the surface beneath but, as the rust layer is porous, moisture gets through to the surface and produces another rust layer. The new layer pushes the first layer up, and the process continues until there's a thick sandwich of rust layers over the surface.

Because rust occupies far more volume than the original steel, we often find the chassis is still reasonably solid after removing a thick piece of scale. It's this extra volume of the rust that causes screw threads to seize: the expanding rust becomes so tightly packed between the threads that it physically jams the nut and bolt together.



## STOPPING THE RUST

It's almost impossible to stop this natural process. But we can slow it almost to a halt with careful treatment and ongoing maintenance. The key is eliminating the moisture; and that's done by sealing the surface of the steel using a variety of treatments and paints.

But this treatment won't reach the surface if there's already a layer of rust over it, so the bulk of the rust has to be shifted first. In the case of light surface rust, simply brushing off or rubbing with emery cloth will do the trick. Heavily encrusted rust will need to be chipped off, often in large flakes. Either way, the exposed surface will still be rusted to some degree, but this isn't a problem.

## CONVERTING RESIDUAL RUST

This remaining rust can be neutralised by applying a rust converter. There are plenty on the market, all doing similar jobs, though I've found Neutra Rust 661 to work every time. This is practical because it can be used even on damp metal. It actually uses the moisture in converting the rusted surface into a black, corrosion-resistant layer with a vinyl coating that's claimed to be impervious to further ingress of moisture and oxygen.

When dried, rust converters can be painted over using primers, top coats, underseals and waxes. Neutra Rust will work

without a top coat, but it's sensible to add more protection for aesthetics and for increased durability.

## EXTRA PROTECTION

For appearance, a good primer and top coat will be fine over a good rust converter. But, underneath, this won't necessarily resist stone spray from the tyres, grounding out and debris flicked up when off-road.

So, on top of the paint, it's worth applying a liquid wax such as Waxoyl or Dinitrol. These products remain relatively fluid so, if the painted surface is scratched down to bare metal, the wax will creep and flow into the groove or nick to seal the exposed steel.

Waxes also contain rust inhibitors so should fettle any fresh rusting. Rust will start almost immediately a surface is exposed to air.

Wherever these treatments are used, it's important that the coatings have flexibility because all body panels and chassis sections undergo some flex and twist during normal use. This, plus vibration, will eventually crack, ripple or lift a basic hard paint. Rust converters and specialised chassis and underbody paints are designed to deal with this – but ordinary paints won't.

So a thorough, flexible treatment will protect well, but keep the layers to the minimum necessary. Piling extra paint layers on to a chassis doesn't help because each can lift slightly; and when that happens

each layer forms a moisture trap with the next. Aim for minimum layers, but with maximum adhesion between them.

## INTERNAL CAVITIES

Internal chassis and body sections are difficult to treat effectively. Standard practice is to inject liquid wax to cover the internal surfaces. But, here, let's go for a belt and braces job.

If the treatment lands on internal scale it'll have no effect right where it's most needed. My method is to first spray inside the chassis or box section with rust converter. Being thin, this will flow into tight crevices and, to some extent, behind the adhering rust scale. When that's dry, tap the steel with a hammer and poke inside through manufactured and drilled holes to loosen the rust scale.

It'll fall off and cover the bottom surface, but at least that's already been covered in rust converter (which is why it's applied before dislodging the scale). Now apply more converter to cover the newly exposed surface where scale has fallen off.

If the chassis or body section is being repaired and a section is cut out, that's the time and place to remove as much internal scale as possible while there's a big hole. Don't apply treatment to the repair area until the welding is completed.

Having converted the rust, apply a wax treatment inside that will seep into seams and crevices and will continue working with the natural flexing of the box sections.

Applicators are available for wax products that can be fed into closed sections through drilled holes, though there are usually manufactured holes that allow good internal access. Holes in the line of wheel spray or rainwater need to be plugged and sealed, otherwise underside holes are best left open for drainage and ventilation. Afterwards, check chassis drain holes frequently and poke them clear.

To ensure that you get the correct amount of internal coverage, practice by spraying with the wax applicator nozzle along an external surface until you're familiar with the speed of moving the nozzle along for the desired coverage.



Scrape away loose rust and paint, then use a wire brush. Manufactured holes in the chassis will be handy for injecting wax



Now apply rust converter. Neutra Rust converts surface into corrosion-resistant barrier and dries to a dark colour



After rust converter, a coat of rust-resisting primer provides a base for a final layer of your preferred top coat



My choice is stone chip paint: it's tough, flexible, looks neat and is easily touched up during the annual paint check



Waxoyl and Dinitrol add more external protection. It's also ideal inside chassis, bulkhead, and these Disco sills





# LRO Workshop How to defeat rust



1

After welding on, this Lightweight's brand-new rear crossmember is given an additional coat of zinc primer paint, prior to stone chip paint. That should keep it looking like new



2

Cold galvanising can be achieved on new parts using a zinc aerosol such as Zinga, which is available through [frost.co.uk](http://frost.co.uk)

## PROTECTING NEW PARTS

Fitting new parts gives an ideal opportunity to slap on some protection before rusting can start. Body panels and chassis repair sections are supplied with a basic paint protection that won't survive for long, so these benefit from a good protection system immediately after welding them in place.

Check the adherence of the original paint on new parts and rub down any loose or flaking sections. Remove any surface rust using emery cloth or steel wool.

## MECHANICAL PARTS

This applies to everything other than the body and chassis. Protect critical brake and fuel pipe unions by wire-brushing them clean, then treat with easing fluid. Then, when they're dried, coat them with grease. Prevent brake pipes rusting through by removing surface rust with emery cloth and smearing the pipes with grease.

Surface rust will cause no harm to an exhaust manifold but, if it's to be blinged up with a coat of exhaust paint, apply a good rust converter first. Otherwise, new surface rust will lift the paint off.

The lower parts of the exhaust system rust from the inside and there's nothing to prevent this. But try to keep bolted flanges and pipe clips free of serious rust by occasional wire-brushing and a spray of zinc cold galvanising.

The steel fuel tanks on early Land Rovers can rust along the seams and eventually leak. Degrease the area and treat with rust converter and top coats. You should avoid using metal scrapers and wire brushes due to the risk of sparks.

If underslung LPG tanks are fitted, rust-treat their securing straps and check their condition regularly.

Individual parts can be de-rusted cleanly by using a product called Restore Rust Remover from [frost.co.uk](http://frost.co.uk). Mix a solution with water and suspend the parts in it; the solution can be re-used.



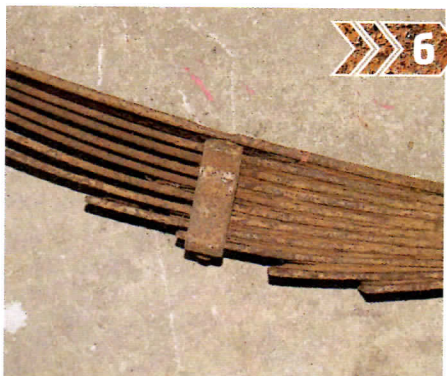
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Protect brake pipes from rust by smearing on some grease. Don't paint them because they won't be properly accessible for MoT



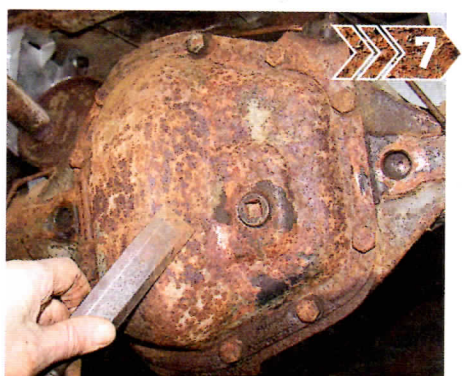
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An occasional application of Rust Buster keeps underside nut, bolt and brake fittings threads from rusting tight



6

Rust occupies more space than the original metal - so rusty leaf springs can become jammed solid. Protect them by oiling



7

Even diff casings can rust through. Improve axle life and appearance by applying the same treatment as for the chassis

**BRITPART**

The quality parts for Land Rovers

Britpart, The Grove, Craven Arms,  
Shropshire SY7 8DA, England.





**No matter how well prepared and painted, a new chassis section will need an annual check and touch-up to keep it rust-free**

One of the best protectors is hot galvanising, but that needs the component to be cleaned down to bare metal and there's also a risk of heat distortion. It's neither practical nor healthy to attempt to weld galvanised material.

Alternatively, cold zinc galvanising is a convenient DIY option using an aerosol product such as Zinga (frost.co.uk), which accepts modern primers and top coats. Again, more protection is advised – good primers and top coats for body panels, and flexible paints and waxes for the underside and those out-of-sight parts.

## RUST MAINTENANCE

None of the treatments is guaranteed, so all parts – new and original – need to be checked at least annually, and ideally just before winter road salt appears. Repair any paint damage and replenish any wax that has been removed by spray, debris, or by wind at high speed.



**CONTACTS** ● neutrarustuk.com ● frost.co.uk

## SAFETY

Apply surface treatments only in a well-ventilated area. Preferably do the work outside, or ensure doors and windows are open and that there's a good airflow. Check the product manufacturers' safety details before use: they'll be on the can.

When removing rust, wear eye protection and wear a particle filter mask to avoid inhaling the dust. Use eye and skin protection as recommended when applying treatments.

## Quick tips

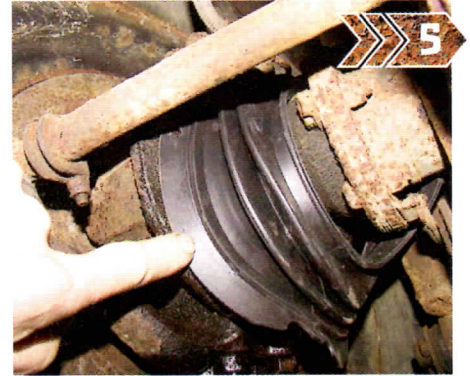
- Attaching an aluminium or zinc sacrificial anode works well on submerged or buried steel that's surrounded by moisture, but is less effective on vehicles.
- Reduce humidity by keeping your garage dry and not putting the vehicle in while it's still wet.
- Frequently wash pockets of mud and dirt from corners of the chassis and underbody – otherwise, they retain moisture, which corrodes the steelwork.
- Ensure water leaks into steel-floored Land Rovers are quickly fixed and the floor area dried and aired.
- Salt from road and sea spray accelerates rusting. During winter, and if you live or travel near the coast, frequently scoosh the underside with the jetwash lance – though not so fiercely as to remove any wax protection you've applied.



**Series III short-wheelbase fuel tanks corrode along this seam and also at the attachment points of their mounting brackets**



**Rusting can lead to failure of the outer axle shaft splines. Keep them lightly greased if you're frequently driving through water**



**Early steering swivel chrome spheres will pit with rust, which then damages the seal. Rubber gaiters help keep the water off**



**Brake drums can rust heavily but rarely become weakened. For looks, apply rust converter and a heatproof top coat**



**Underbody rust protection on later Land Rovers is excellent. But oil Freelander 1 prop bearing bolts to prevent them from rusting in**



**Apply anti-seize grease to bolt threads. It avoids needing a 2ft pipe to release a rusted bolt, as on this new-ish Range Rover Sport**



## RUST FINDER GUIDE

These are the main rust areas on each model. This isn't a definitive list: individual vehicles will have their own worst areas, so it's necessary to check everywhere. Freelander 1 and 2, Discovery 3 and 4, P38 and current-shape Range Rover and Sport are not listed (except for 'Mechanical Parts') because none has a significant chassis or body rust problem – yet.

RUST FINDER GUIDE	SERIES	DEFENDER NINETY ONE TEN	DISCO1	DISCO2	RANGE ROVER CLASSIC	LATER MODELS
<b>BODY</b>						
steel headlamp bowls	X					
front panel behind grille	X					
door tops	X					
door internal frames	X	X				
mudshields under front wings	X					
bulkhead tops around vents	X	X				
bulkhead footwell toe boards	X	X			X	
bulkhead sides	X	X	X		X	
bulkhead A-posts (behind wing)	X	X				
bulkhead-to-chassis mounting	X					
body mounting brackets			X		X	
rear structural crossmember			X		X	
side structural sills			X		X	
sides of passenger floor			X		X	
upper and lower tailgates					X	
A-post lower section (below screen pillars)					X	
B-post lower section (behind front doors)			X		X	
quarterlights (two-door)					X	
doors on hinge face					X	
inner front wing/engine valance			X		X	
wheelarches			X		X	
rear seatbelt mounting area			X		X	
cross struts under rear load floor	X	X				
rear floor panel			X			
waist capping (Series if galvanising depleted)	X	X				
bulkhead panel below brake master cylinder	X					
<b>CHASSIS</b>						
upper crossmember ahead of rear axle (110)		X				
main front outriggers	X	X				
around radius arm brackets		X	X		X	
rear crossmember	X	X				
rear coil spring seats		X			X	
front coil spring seats			X		X	
main sections along top centre weld		X		X		
main sections dog-leg forward of rear axle	X	X				
main sections underside mid-length		X				
main sections at rear anti-roll bar brackets		X				
between chassis and suspension bump stops	X		X	X	X	
front dumb irons	X					
rear axle strap brackets	X					
<b>MECHANICAL PARTS</b>						
brake discs		X	X	X	X	X
brake pipes and unions	X	X	X	X	X	X
fuel tank	X					
sunroof frame			X	X		X
suspension nuts and bolts	X	X	X	X	X	X
engine hose clips	X	X	X		X	
track rod/drag link threads for TRE joints	X					
underslung lpg tanks and support straps	X	X	X	X	X	X
fuel tank pipe under rear floor			X		X	
leaf springs	X					
damper tubes	X	X	X	X	X	X
exhaust flanges	X	X	X	X	X	X
stub axle splines after immersion		X				
steering swivel balls	X	X				

### SERIES MODELS



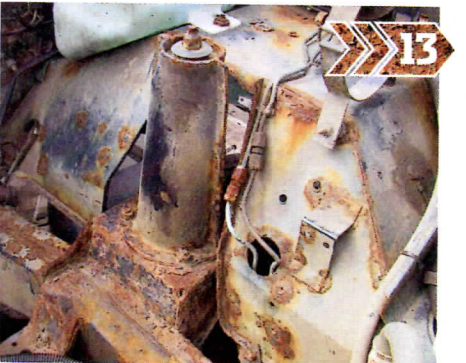
This abrupt angle of chassis ahead of the rear axle can rust badly at the lower part on Series 109 and early One Ten models



When rustproofing the chassis, remove the suspension bumps stops to treat the hidden steelwork behind them



The Defender's main chassis rails often corrode through around the rear-anti-roll bar-to-chassis mounting brackets



The inner wing can be treated in the engine bay. More crucial is the chassis suspension mounting and suspension turret base





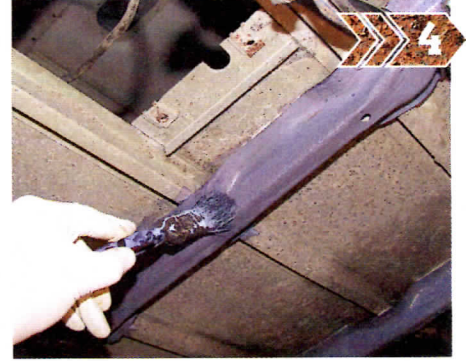
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Chassis front outriggers need protection from wheel spray, as does the bulkhead bracket here that's bolted through



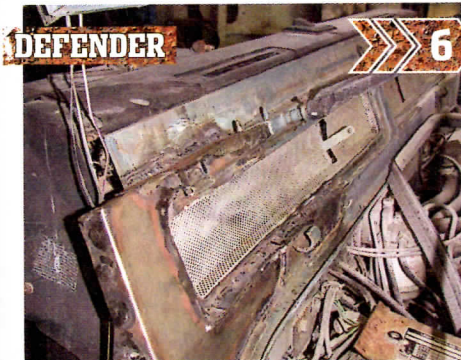
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Rusty mudshields inside front wings can be removed to treat. If they're ignored, water rusts through to rot the bulkhead



4

The underside of the rear loadspace floor won't rust, but these steel stiffeners will. Wax applicator can be fed inside them



DEFENDER

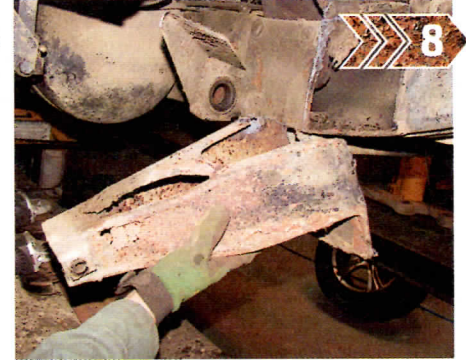
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Bulkhead upper repair panels are expensive to have fitted - therefore best to avoid by drilling and injecting converter and wax



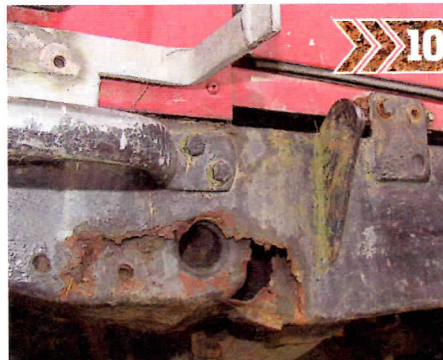
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Battery box is ripe for rust. Keep the battery on a rubber mat and then keep the battery and compartment dry. Maintain paintwork



8

Water enters top of front outriggers, corroding side, bottom and even the main chassis, as seen where cut away



10

It's not only the centre of the rear crossmember that fails - someone's had a surprise when using this jacking point



DISCOVERY 1 & RR CLASSIC

11

Discovery front panel behind the grille receives all the road spray blast. Scrape it clean and apply robust protection



12

Control this typical front inner wing corrosion by spraying rust converter up inside the wing, followed by wax protection



14

Structural sills are both expensive and complex to repair. Corrosion first appears along the bottom face, front to rear...



15

...by which time the corrosion hidden behind the plastic sill trims will be in a shockingly advanced state, as on this rear door sill



16

Rust stains around a Range Rover or Discovery rear seatbelt mount on the wheelarch signals urgent attention