

CTM ENGINEERING TR2-6 CHASSIS WORK

If you have a TR2, TR3 or 3A, TR4 or 4A, TR5, TR250 or TR6 with a suspect chassis, don't despair for CTM Engineering Ltd of Curbridge in Hampshire can repair yours or supply a new, high quality replacement. Kim Henson finds out what they can do to help...



The backbone of all TRs produced until 1976 is the separate steel chassis on which the body is mounted. But with even the youngest original chassis now at least 35 years old, the effects of corrosion, accident damage and poor repairs will have taken their toll.

It is not always fully appreciated just how vital the condition of the chassis is to the looks and – especially – the dynamic performance of a TR. Even if the metal is sound, the rear end of the chassis frame tends to drop in time, especially if it is rusty. A give-away on TR4A, TR5, TR250 and TR6 versions is the profile of the gap between the trailing edge of each door and the rear bodywork against which it closes; the gap on each side of the car should be reasonably small and uniform. If it is wider at the top, this indicates that the rear section of the chassis has dropped. While installing more packing between the rear of the chassis and the

body will result in a very temporary improvement, the chassis will continue to drop. And besides, a rust-weakened chassis will make the vehicle feel less than positive when it is being driven, with soggy handling and excessive rattles caused by unwanted twisting of the chassis and the bodywork.

Of course, accident damage (commonly encountered on all sports cars it seems, and some of it having taken place years ago) can distort the chassis components and this can also seriously compromise the way in which the car drives. Poorly executed repairs and incorrect tracking may also play their part in making a TR awful to drive. Essentially, if the chassis is duff, the rest of the car cannot be enjoyed to its full potential.

To find out more about the potential problems and remedies, I was invited to visit the long-established firm of CTM Engineering Ltd in Hampshire, famous for their work on TR chassis.

CTM ENGINEERING LTD

These potential problems were appreciated by Colin Matthews after he purchased his first TR6 in 1980 (a car which he still owns, incidentally). After running the Triumph for about three years, Colin took the vehicle to pieces and repaired the chassis himself. At that time (when the model had only been out of production for a few years), he had found that in terms of chassis renovation/replacement, there was very little commercially available to help owners like him.

So he decided there was a market for repairing and renewing TR chassis frames. He started CTM Engineering in 1985, initially restoring existing chassis to a high standard, but later moving into the remanufacture of complete assemblies. This was in response to an increasing need for full replacement chassis, as the accumulated problems of time, rust and accident damage demanded ever more extensive repairs to be made on original chassis

frame assemblies.

Colin carried out extensive research, including studying Triumph drawings and putting together his own data based on working with original chassis in good condition. As a result, during the late 1980s he was able to develop and fabricate his own purpose-made jig, on which the complete chassis structure can be mounted to ensure dimensional accuracy and a perfect bodywork fit – every time. Cleverly, the jig is built to accommodate all the variations from TR2 to TR6 as, through the years, the original chassis was developed and altered by Triumph.

He made and sold his firm's first full chassis (for a TR6) in 1992, and in the two decades since then has helped hundreds of enthusiasts. Originally the Triumph factory-built chassis were made in two halves and welded together, but Colin has streamlined the production

process and adopts a different method of construction, using a number of sub-assemblies flush-welded to each other. In each case the strength, durability, dimensional accuracy and finished appearance of the chassis are of paramount importance.

DIFFERENCES?

The main platform of each chassis is very similar between each early TR variant (TR2, TR3, TR3A and TR4), but a number of different additional sub-assemblies are required in order to cater for the whole range of models. Primarily these relate to different mounting points for the varying suspension set-ups, brakes and other running gear parts.

For these early models CTM can supply a completely new chassis, incorporating localised additional reinforcements (compared with the original design) to improve strength

in known problem areas. For the TR4A, TR5, TR250 and TR6, CTM make all components for the firm's replacement new chassis assemblies, apart from the suspension turrets and steering rack mounting plates and, on the TR4A, the rear hump section in front of the differential; these parts from the original chassis are re-used, having been repaired as required. Colin says that the cost of remanufacturing the original factory pressings for these would be prohibitive. So while complete new chassis assemblies are available from CTM, those three parts (turrets, steering rack mounting plates and TR4A hump section) from customers' original chassis are required to build into future new chassis.

Incidentally, when asked why stainless steel chassis are not produced by CTM, Colin advises that the cost would be prohibitive, in addition to which undesirable cracks in



This is a TR3A chassis from Spain, in need of repair due to accident damage but essentially solid, with thick, sound steel evident. In many cases rust will be more of an issue; close inspection after grit-blasting is always required.



This has engine mounting/fulcrum pin damage, rotating the suspension turret and lifting the chassis at the front. The turrets and brackets require removal and repair or renewal, the side rails must be trued up and a rail corner fitted.



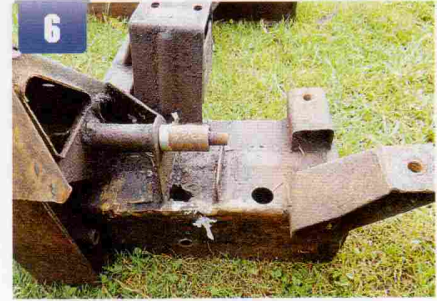
Corrosion within the rear cross-tubes of early type chassis can be a problem. CTM fit inserts within the tubes to strengthen this area of the structure. Gearbox mountings can split too; CTM welds gussets in place for a strong repair.



This TR3A chassis is pictured on its side, highlighting the damage typical of that inflicted by careless use of a trolley jack. Folding of the metal in a concertina-type manner can also occur due to accident damage (compression).



Impact damage and corrosion can result in separation of two layers of steel, as in this case, adjacent to the front suspension mounting area on a TR3A chassis. CTM can usually repair damage of this nature, depending on its extent.



To cater for TR4 models, the front rails of TR2/TR3/3A chassis were widened by approximately two inches on each side with the addition of a box section. (Note that at the rear the chassis are similar, but the TR4 axle is wider).



CTM can supply new steering rack mounts; for all but the earliest cars they often re-use the original factory-pressed mounts (those in this shot are the later TR4 variety). If you own an early TR4, CTM can supply the later mounts.



You can upgrade from the vertical, early type rack mountings to the far stronger later type, which are more suitable for radial tyres, wide wheels and more positive steering, or the early mounts can be strengthened by CTM.



Rust can take its toll in the front turrets, around the upper mountings for the shock absorbers; in some cases the turret tops can be holed and considerably weakened. This is a TR4 chassis, in a bad way in this respect.

stainless steel are not unknown. He adds that fully box-sectioned chassis assemblies have been produced by other firms, but says excessive weight can be a problem with these.

REPAIR OR RENEW?

When a customer visits CTM, an initial assessment is carried out of the true state of their car's chassis. The estimated time and costs involved in repairing the existing chassis are weighed against the price of a complete new assembly. The experience of Colin and his team enables a fairly accurate prognosis to be delivered at this point. However, in reality the full state of a chassis can only be assessed if it is laid bare. This involves removal of the body from the chassis, then steam-cleaning and shot-blasting the chassis. This process reveals everything about the chassis, including rust, kinks, splits and previous repairs.

With the chassis mounted in CTM's jig, localised damage can be cut away and new sections flush-welded in position, with hidden internal reinforcements incorporated in all joints. In some cases complex rebuilding can be carried out – for example if the existing centre section of an early type original chassis is sound but the side rails are in need of replacement, new rails can be welded to the original centre assembly. In each case, whether the existing chassis is repaired or a new one is built, shot-blasting is carried out following welding. This ensures that all rust is banished, and also helps to relieve the metal of stress imparted by the welding process.

For CTM chassis assemblies, zinc-coated

16 gauge steel is employed for corrosion protection. In addition, the metal is etch-primed and a powder-coating is applied. A wax/oil-based protective coating is used too, including around all seams and within the enclosed sections. All threads are cleaned on completion of all other operations.

Each individual refurbished or new chassis bears the CTM stamp, plus a unique serial number; the company keeps records of all the chassis it has repaired and made over the years. Colin emphasises that his firm always aims for the highest possible quality in repair operations and new chassis, as he is aware that its long-term reputation depends on this. He also points out that ideally it is always best to sort the chassis first and foremost as the basis for any full restoration of a TR. If you start with a sound, rigid chassis, the new/restored running gear components will complement it in terms of dynamic performance, and the body tub and its panels will also fit and stay put in the correct relative positions.

While most of the company's work is on road-going TRs, it has been involved with motorsport, at one time campaigning its own highly modified TR6, and is currently helping a full race TR6 which takes part in events around the country. Modifications to camber, castor and toe-in angles can be made according to individual requirements. Colin advises that relatively mild angles are usually needed for road cars, with more aggressive settings being reserved for examples driven in motorsport.

However, in all cases, after a new chassis has been fitted or extensive repairs have been

carried out on the original unit, he stresses that for the car to drive with desirable neutral characteristics, it is essential for four wheel tracking checks/adjustments to be carried out. CTM can undertake this work, as can most tyre fitting firms.

ALL ASPECTS

Although CTM Engineering is known mainly for its work with TR chassis, the firm can also undertake all other aspects of TR maintenance, repairs and renovation, from mechanical work to body and interior restoration. In addition, the modification of cylinder heads to enable full-time running on unleaded petrol can be carried out, as well as performance enhancements (from mild to wild), as required by the customer.

HOW MUCH?

A new CTM chassis assembly will currently cost approximately £2500 plus (for UK customers) VAT at 20%. For specific costs of other components and reinforcement kits, or for details and prices of all the other services, please contact CTM.

THANKS

For enthusiastic help with this feature, grateful thanks to Colin Matthews, Tony Cooper and Andy Ridge at CTM Engineering Ltd, of Unit 3A, Bury Farm, Botley Road, Curbridge, Nr. Botley, Hampshire, SO30 2HB. Tel. 01489 782054.

Website: www.ctmengineering.co.uk



As already noted, the front of a TR4 chassis is widened by the addition of box sections. If the steel is thin, the front of the chassis has to come apart for renewal of this complete assembly as the inner box sections are not easily repaired.



The rear of the chassis tends to drop in time, and on rusty cars the problem can be very bad. On TR4As, TR5s, TR250s and TR6s, a sign of major corrosion damage is a door-to-rear bodywork gap wider at the top than the bottom.



These components are made by CTM for TR2, 3, 3A and 4 models, to address problems often found at the front of well-used original chassis. Shown here are the turret assembly, fulcrum pin unit, turret support bar and bump stop mount.



The top of each front coil spring mounting turret is a favourite place for rust to accumulate. CTM manufactures new assemblies; these are complex structures, as can be seen when looking into this TR2/3/3A/4 unit from below.



New outriggers and their mounting saddles are also made by CTM, and securing nuts are welded to the undersides of the saddles, as shown here. Note that the outrigger tubes on the TR4 are longer than those of earlier cars.



For TR2, TR3, TR3A and TR4 chassis, new mountings to accommodate lever arm type shock absorbers look like this; the mountings are similar for all chassis. An uprated version is available to suit larger lever arm units.



16 Gearbox/overdrive mounts are produced for inclusion in the chassis (in this shot the new mounts are shown directly above the positions in which they would be fitted to the chassis). Please also see photos/captions 25 and 26.



17 On the left is a new chassis bracket, designed to link the rear end of the chassis to the body and over-rider. On the right is a newly-made mounting assembly for a rear leaf spring. (For TR2-4 models, all new parts are used).



18 If the steering box and idler mounting assemblies are sound, CTM prefers to re-use them as they are original pressings, but if they are ailing, reproduction items are available. A new cross-tube and body mounts are fitted.



19 CTM manufactures new cross-tube braces to bolt between the suspension turrets and tie together the front of the chassis (preventing random changes of camber). A TR3 chassis is shown here, but this also applies to the TR4.



20 On arrival at CTM/removal from the vehicle, each chassis frame assembly is cleaned, then shot-blasted to reveal all blemishes, corrosion, previous repairs and so on. This is a TR3 chassis after shot-blasting...



21 ...and this is the damaged front end of one of the side rails. Further problems (highlighted by shot-blasting) on the same chassis included a cracked fulcrum pin and leaf spring mounting, as well as several dented areas.



22 This is another example of a TR3 chassis, in this case one that has already been through the CTM repair process. Serious accident damage required the grafting on of new front rail assemblies, which were welded in place flush.



23 The chassis of a TR3 differs from that of a TR4, particularly because the front rails are wider. On the right of this shot is the new additional outer box section to provide the additional extra width required (one is needed each side).



24 The later TR4A, TR250, TR5 and TR6 chassis are all virtually the same and differ from those of earlier models, although many of the techniques to repair them are similar. This TR6 chassis has been badly damaged in an accident to the front.



25 This late TR6 chassis (1973-76) has mounting points for a Laycock J-Type overdrive. Where fitted with overdrive, older cars (TR4A/TR5/TR250 and early 'CP' TR6 to 1972) had A-Type units, which are now more difficult to source.



26 CTM sells a modified bracket to accommodate a J-Type gearbox/overdrive (readily available from Triumph saloons). The firm also makes this conversion mounting to fit a later J-Type gearbox/overdrive into a TR2/TR3/TR4 chassis.



27 This TR4A chassis (cleaned, but yet to be blasted) has the same side rail construction as the TR5, TR250 and TR6 models, but the front suspension turrets and the hump at the rear differentiate the assembly from that of later cars.



This fatigued rear bridge assembly is on a TR4A chassis, and shows typical damage sustained after years of service. The holes in the bridge tend to elongate in time, and the mounting pins can break away (one has gone from this unit).



This is a new set of side rails for a TR4A-TR6, with the metal already CNC punched and folded. These typical sub-components are ready for installation in CTM's jig to be clamped and welded together into a full chassis frame set.



When all chassis components are laid in the jig in their correct relative positions, they are spot-welded together using welds at very close intervals (c800 welds per chassis!). The original beams were pressed, but these are fabricated.



All suspension brackets/mounts are reinforced; compared with the original TR4A-TR6 chassis, CTM adds extra metal to all potentially weak areas. All new and repaired chassis are stamped with their name and bear a unique serial number.



This is a superior triangulated bracket/mounting set-up to enable telescopic shock absorbers to be used at the rear. The main bolt-in bracket has been modified/lowered so that wider than standard wheels and tyres can be fitted.



Reinforcements are welded into the underside of the bridge assemblies (for the rear of the chassis), significantly improving their strength and rigidity. This is a new bridge (this channel is open on an original factory Triumph chassis).



A kit of reinforcement plates is available from CTM to upgrade a standard chassis' bridges. The additional steel sections include strengthener plates designed to be welded in position in the vicinity of the differential mountings.



CTM build into their chassis additional reinforcement plates to strengthen the mounting points for the lower suspension arms. This considerably enhances the structural integrity of these areas on the TR4A-TR6.



Strengthener plates are also made and welded into place on the bridge at the rear of the chassis. Larger plates are fitted to original chassis, to help spread the loadings over as wide an area as possible.



The key to a perfectly set-up TR chassis – this is the all-important jig, developed and built by CTM to ensure dimensional accuracy and a perfect fit for all the various chassis components, which are clamped and then welded in position.



The small, close-knit team... from left to right, they are Andy Ridge, Colin Matthews and Tony Cooper. The three work together to produce high quality chassis to help keep TR sports cars on the road for years into the future.



In addition to its chassis repairing/manufacturing operations, CTM Engineering Ltd. carries out all types of work on TRs, from maintenance to full restoration. This beautifully-finished TR4 has just come to the end of a full restoration.